IV international conference on particle physics and astrophysics

Report of Contributions

Contribution ID : **256** Type : **Plenary/section talk**

Supergravity with broken Lorentz invariance: theory and phenomenological consequences

Thursday, 25 October 2018 16:30 (20)

Theories with broken Lorentz invariance have attracted much attention recently. For example, a promising approach to quantization of gravity based on abandoning Lorentz invariance has been proposed by Horava. At low energies Horava gravity reduces to a special case of the so-called Einstein-aether theory - a widely studied phenomenological model, where Lorentz violation is described by a time-like vector field with unit norm (”aether”) that minimally couples to gravity. However a phenomenologically acceptable theory where Lorentz invariance is not fundamental, the latter should appear at low energies as an emergent symmetry. A possible mechanism ensuring such emergence is provided by supersymmetry. We consider supersymmetric extension of the Einstein-aether theory. This cannot be realized within the minimal N=1 supergravity which does not allow to define a chiral aether vector superfield. This problem is resolved in the non-minimal formulation of the N=1 supergravity. We use the latter formulation to construct a superfield Lagrangian for the aether field coupled to linearized supergravity. We show that the constructed Lagrangian for this model is unique and obtain its bosonic part expanding in the Grassman coordinates. The model is considered also at the component level. We study supercurrent supermultiplet in the theory as an alternative way to prove its uniqueness and to construct fermionic interaction in the model. The phenomenological consequences of the model are discussed. Extension to the full non-linear Einstein-aether supergravity is also briefly outlined.

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Presenter(s) : Mr. MARAKULIN, Arthur (INR RAS)

Session Classification : Gravitation and Cosmology

Track Classification : Gravitation and cosmology

Contribution ID : **261** Type : **Plenary/section talk**

Time of arrival analysis of constant count rate measurements data

Tuesday, 23 October 2018 09:00 (15)

Some experiments in high energy physics require precision measurement of some process count rate.In those cases one usually just divides the number of events over measurement time. Time information for the events is seldom not used. In this report we discuss few techniques to use time of event arrival to search for anomalies in events and significantly reduce some systematic errors.All techniques are illustrated by real-life application in Troitsk nu-mass ant Tristan in Troitsk experiments.

Primary author(s) : NOZIK, Alexander (INR RAS)

Presenter(s) : NOZIK, Alexander (INR RAS)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **262** Type : **Plenary/section talk**

Study of tau neutrino production in proton nuclear interaction

Tuesday, 23 October 2018 18:30 (15)

Tau neutrino properties are not so well known in comparison to those of muon or electron neutrinos. The tau neutrino interaction cross-section was only measured by the DONUT experiment in 2008 with a large systematical error of 50% due to a poor knowledge of the tau neutrino flux in this beam dump experiment. However, the better measurement of this cross section is needed for the planned future neutrino experiments. It would also allow testing the Lepton Universality (LU) of Standard Model in neutrino interactions. Recently several results for B-meson decays (LHCb, Babar) demonstrated hints of possible LU violation. The tau neutrinos are produced in the Ds meson decays to tau, Ds -> tau + nu_tau, and the cascade decay of the tau, tau-> x + nu_tau. DsTau experiment has been proposed to study the tau neutrino production at CERN SPS. It will measure the Ds production differential cross-section in proton and tungsten interactions. This will allow reducing of the uncertainty due to the tau neutrino flux in the DONUT result from 50% to 10% . The peculiar Ds cascade decay topology (”double kink”) in a few mm range will be detected by nuclear emulsion tracker thanks to its excellent spatial resolution (˜50nm). In 2016 and 2017, we made test beam exposures of nuclear emulsion modules at CERN SPS 400GeV/c proton beam. A pilot run in August 2018 and physics run in 2021 are scheduled. In this talk, the status and prospects of the DsTau project as well as a review of the modern nuclear emulsion technique and the methods of its data analysis will be presented.

Primary author(s) : Dr. GORNUSHKIN, Yury (JINR)

Presenter(s) : Dr. GORNUSHKIN, Yury (JINR)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **263** Type : **Plenary/section talk**

Earth thermal flux in the light of geoneutrinos

Tuesday, 23 October 2018 10:45 (15)

The Earth thermal flux value lays in wide region from 50 up to 250 TW according to number of estimations. Upper limit could be achieved only if potassium abundance in the Earth exceeds 2%. In Borexino data the valley between beryllium neutrinos and 11C spectrum is filled with betas from 210Bi. But it also contains CNO neutrinos. CNO cycle in the Sun could be depressed according to last researches. This means that part of CNO spectrum could be from terrestrial 40K antineutrinos because their spectra are very similar.

Primary author(s) : Dr. SINEV, Valery (INR RAS)

Presenter(s) : Dr. SINEV, Valery (INR RAS)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **264** Type : **Plenary/section talk**

Topological pseudo-defects of a supersymmetric SO(10) model and cosmology

Thursday, 25 October 2018 16:50 (20)

Obtaining realistic supersymmetry preserving vacua in the minimal renormalizable supersymmetric $Spin(10)$ GUT model introduces considerations of the non-trivial topology of the vacuum manifold. The D-parity of low energy unification schemes gets lifted to a one-parameter subgroup $U(1)_D$ of $Spin(10)$. Yet, the choice of the fields signaling spontaneous symmetry breaking leads to disconnected subsets in the vacuum manifold related by the D-parity. The resulting domain walls, existing due to topological reasons but not stable, are identified as topological pseudo-defects. We obtain a class of one-parameter paths connecting D-parity flipped vacua and compute the energy barrier height along the same. We consider the various patterns of symmetry breaking which can result in either intermediate scale gauge groups or a supersymmetric extension of the Standard Model. If the onset of inflation is subsequent to GUT breaking, as could happen also if inflation is naturally explained by the same GUT, the existence of such pseudo-defects can leave signatures in the CMB.

Primary author(s) : GARG, Ila; Prof. YAJNIK, Urjit

Presenter(s) : GARG, Ila

Session Classification : Gravitation and Cosmology

Track Classification : Gravitation and cosmology

Contribution ID : **265** Type : **Plenary/section talk**

Resummed non-global logs in QCD observables from the BMS equation

Non-global logs are very common in observables that are used in precision measurements at particle collider experiments. Perturbative convergence is spoled by the presence of these calculations necessitating a difficult all-orders resummation. The integro-differential Banfi-Marchesini-Smye equation, valid in the Large-Nc aproximation and usually solved numerically, provides us with means to account for these logs to all orders at leading-log accuracy. In this talk I present an analytic solution of the BMS equation as a perturbative series in the exponent. This allows us to perform an accurate partial resummation of the large non-global logs in several QCD observables in e+e- annihilation processes as well as hadronic collisions. I also discuss the possible extension of this work to the solution of the Weigert equation which includes finite-Nc corrections and gives more accurate description of the non-global logarithms.

Primary author(s) : Prof. DELENDA, Yazid (University of Batna 1)

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Presenter(s) : Prof. DELENDA, Yazid (University of Batna 1)

Session Classification : Particle Physics: HEP theory

Track Classification : Particle physics: hep theory

Contribution ID : **266** Type : **Plenary/section talk**

A study of $d^*(2380)$ resonance

Friday, 26 October 2018 17:00 (15)

The newly observed $d^*(2380)$ resonance ($I(J^P) = 0(3^+)$) is studied based on a chiral constituent quark model. Its overall properties, including the mass, the partial decay widths in various decay modes, and the total width, are well reproduced in our calculation and with a compact scenario. Our results show that a compact hexaquark dominated structure might be a reasonable interpretation for this resonance. In addition, its charge distribution is also discussed.

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Presenter(s) : Prof. DONG, Yubing (Institute of High Energy Physics, The Chinese Academy of Sciences)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **267** Type : **Plenary/section talk**

GEM detectors for the Upgrade of the CMS Muon Forward system

Thursday, 25 October 2018 17:20 (15)

CMS experiment is one of the two general purpose experiments at the LHC pp collider. For LHC Phase-2, the instantaneous luminosity delivered to the experiment will reach 5×10^{34} $cm^{-2}s^{-1}$, resulting in high particle fluxes that requires the detectors to be upgraded. The forward regions, corresponding to the endcaps of the detectors, are the most affected parts. In the CMS experiment, to cope with the higher event rates and larger radiation doses, triple-layer Gas Electron Multipliers (GEM) will be installed in the muon endcaps. Triple-GEM chambers will complement the existing Cathode Strip Chambers, leading to a better identification of the muon tracks and a reduction of the trigger rate due to the suppression of fake candidates. In addition, the forward coverage will be further extended. For the first disk of the muon endcaps, 144 GEM chambers are being built in production sites spread in 7 different countries around the world. For the first time, such detectors will have large sizes of the order of 1-2 m^2, thus high requirements on the uniformity across the detector are needed. Before the final installation in the CMS detector, to test their integrity, quality and performance, the GEM chambers undergo multiple quality control tests. This talk gives an introduction to GEM detectors and presents results of the performance tests.

Primary author(s) : MOCELLIN, Giovanni

Presenter(s) : MOCELLIN, Giovanni

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **268** Type : **Plenary/section talk**

“Clusterization in heavy cold nuclei”

Friday, 26 October 2018 14:35 (30)

A cluster is broadly understood to be an object which keeps its identity in a larger scale system. Manifestations of clustering can be revealed in very different size systems from exotic nuclei to galaxies. In our work we are searching for cluster effects in low energy fission of heavy nuclei. In the series of experiments carried out with the spectrometers based both on the gas filled (FOBOS spectrometer and its modifications) and mosaics of solid-state detectors (setups at the beams of alpha-particles and deuterons, COMETA spectrometer) in the frame of the “missing mass” approach and with the direct detection of three decay partners we discovered new type of the ternary decay of heavy nuclei called by us “collinear cluster tri-partition (CCT)”. The most interesting aspects of both the original methodic used and physics of the effect observed are discussed in the presented report.

Primary author(s) : PYATKOV, Yuri (MEPhI)

Presenter(s) : PYATKOV, Yuri (MEPhI)

Session Classification : Plenary

Contribution ID : **269** Type : **Poster**

THE FOUR-DIMENSIONAL SELF-CONSISTENT MODEL OF THE BUNCH OF CHARGED PARTICLES

Monday, 22 October 2018 15:40 (150)

strong text The four-dimensional non-stationary model of a bunch of the particles interacting with own field is studied. For the description of behavior of a bunch the “Meshchersky's integral” allowing to give completely self-consistent kinetic description in 8-dimensional phase space is used. In the considered task the self-coordinated potential determines interaction forces in 3-dimensional space.

Primary author(s) : Prof. CHIKHACHEV, Alexander (Federal State Unitary Enterprise VNIITF im. akad. E. I. Zababakhina VEI-branch)

Presenter(s) : Prof. CHIKHACHEV, Alexander (Federal State Unitary Enterprise VNIITF im. akad. E. I. Zababakhina VEI-branch)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: hep theory

Contribution ID : **270** Type : **Plenary/section talk**

Sub-fs electrons bunches diagnostics trough coherent optical transition radiation

Tuesday, 23 October 2018 09:15 (15)

The report deals with measurements of electron bunch length using coherent backward transition radiation generated by a bunch in a gold target. Such bunches are used in novel compact laser- based acceleration. The aim is to compare efficiently non-polarized and polarized photons backward transition radiation for use in measurement of longitudinal size electron bunch. By calculation, it was shown that radiation with perpendicular polarization more effective than non-polarized radiation for sub-fs longitudinal size measuring. Calculation referred to in the report can be used for bunch diagnostics at SINBAD facility (DESY, Germany).

Primary author(s) : Mr. POTYLITSYN , Alexander; ALEKSEEV, Boris

Presenter(s) : ALEKSEEV, Boris

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **271** Type : **Poster**

Towards a New Model of the Universe

Monday, 22 October 2018 15:40 (150)

We present the astonishing astrophysical and cosmological consequences of the following hypotheses:

1. The Standard Model matter (i.e. matter made from quarks and leptons interacting through the exchange of gauge bosons) is the only content of the Universe.
2. Quantum vacuum fluctuations are virtual gravitational dipoles (i.e. systems composed from one positive and one negative gravitational charge)

The first hypothesis excludes dark matter and dark energy from astrophysics and cosmology, while the second hypothesis postulates quantum vacuum as a cosmological fluid free of the cosmological constant problem.

The phenomena usually attributed to hypothetical dark matter, may be considered as a consequence of the local gravitational polarization of the quantum vacuum by the immersed Standard Model matter; i.e. the galactic halo of dark matter can be replaced by the halo of the polarized quantum vacuum. Globally "quantum vacuum" may be viewed as a cosmological fluid, which during expansion of the Universe converts from a fluid with negative pressure - allowing an accelerated expansion of the Universe - to a fluid with zero pressure, which physically means the end of the accelerated expansion. This, for the first time, suggests that quantum vacuum may explain both phenomena; phenomena for which we have invoked dark matter and phenomena for which we have invoked dark energy.

Furthermore, as a consequence of the hypothesis of virtual gravitational dipoles, together with the gravitational version of the Schwinger mechanism, the possibility exists that we live in a cyclic universe with cycles alternatively dominated by matter and antimatter. Consequently, at least mathematically, there is no initial singularity, there is no need for cosmic inflation and there is an elegant explanation of the matter-antimatter asymmetry in the universe: our universe is dominated by matter because the previous cycle was dominated by antimatter (and the next cycle would be dominated by antimatter again).

The eventual evidence of gravitational effects from the quantum vacuum "enriched" with virtual gravitational dipoles can be revealed, among other ways, through the gravitational experiments with antihydrogen at CERN and by the study of orbits of tiny satellites in trans-Neptunian binaries, for instance UX 25.

Primary author(s) : HAJDUKOVIC, Dragan

Presenter(s) : HAJDUKOVIC, Dragan

Session Classification : Poster session and coffee-buffet

Contribution ID : **272** Type : **Plenary/section talk**

Relativistic three-nucleon nuclei in the Bethe-Salpeter-Faddeev approach

Friday, 26 October 2018 16:05 (15)

Three nucleon system(triton) was considered. Relativistic properties of this system were investigated. For this relativistic generalization of Faddeev approach was used. As two particle T-matrix which contained in relativistic Faddeev equation we used solution of Bethe-Salpeter equation. So eventually we had Bethe-Salpeter-Faddeev(BSF) equation for describe three nucleon system. As potential of nucleon-nucleon(NN) interaction we used saparabel potential. Form factors of this potential taken in Yamaguchi-type function. Using of separable potential in particular allow to reduce integration on two variables into integration on one variable in BSF equation. Six states 1S0,3S1,3D1,3P0,3P1 and 1P1 with different angular momenta were considered. For this we made particle wave decomposition of BSF equation. System of 12 integral equations(for real and imaginary parts of amplitudes of 1S0,3S1,3D1,3P0,3P1 and 1P1 states) was solved with used iteration method. Bound state energy of triton and amplitudes of S,P and D states was found. Amplitudes used for calculation electric and magnetic form factors of triton.

Primary author(s) : YUREV, Sergey (JOINT INSTITUTE FOR NUCLEAR RESEARCH)

Presenter(s) : YUREV, Sergey (JOINT INSTITUTE FOR NUCLEAR RESEARCH)

Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **274** Type : **Plenary/section talk**

Recent results of ultrahigh-energy cosmic rays observed with the Telescope Array Experiment

Friday, 26 October 2018 09:50 (20)

The origin and acceleration mechanism of ultrahigh-energy cosmic rays (UHECRs) are of the upmost importance in particle astrophysics and astronomy. The Telescope Array Experiment (TA) is the largest cosmic ray detector in the Norther hemisphere, located near the town of Delta in central Utah, USA. TA consists of a surface detector array overlooked by fluorescence detectors and covers a ground area of 700 km^2. We will review a detection techniques and observational instruments, and present latest results focusing on three important measurements; energy spectrum, mass composition and arrival direction. Finally, we will highlight our ongoing upgrade and future perspectives.

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Presenter(s) : FUJII, Toshihiro (Institute for Cosmic Ray Research, University of Tokyo)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **275** Type : **Plenary/section talk**

Selection of parameters of the input window of a gas-filled separator operating at an increased intensity of a heavy ion beam

Friday, 26 October 2018 16:20 (15)

The detailed study of properties of superheavy nuclei (SHN) in the experiments with the complete fusion reactions induced by the 48Ca projectile on actinide target nuclei, which lead to 112≤Z≤118 nuclei, implies the use of heavy ion (HI) beams with the intensity significantly higher than the one used earlier in the discovery experiments with the 48Ca beam [1]. Synthesis of SHN with Z>118 implies the use of the heavier than 48Ca beam particles (50Ti, 54Cr etc.). In this lecture, the durability of the entrance window working at high the intensity of heavy ion beams is considered. The durability of the entrance window is estimated as the result of the action of an intense heavy ion beam, such as sputtering, radiation damage and temperature [2]. The assessments of these actions that determine the durability of the entrance window are discussed. The temperaturstrong texte of the entrance window is calculated as a function of time in the conditions of its pulsed heating by means of a heavy ion beam, followed by radiative cooling with radiation emitted from its surface. The entrance window temperatures are calculated for heavy ion beams, such as 48Ca, 50Ti, 54Cr and 58Fe, with their intensities expected for the DC-280 accelerator. With these calculations of the temperature dependences against the time of the beam action the optimal parameters of the entrance window operation is chosen. Literature. 1. Yu.Ts. Oganessian, V.K. Utyonkov, et. al. "Superheavy nuclei from 48Ca-induced reactions" //Nucl. Phys. A, 2015, vol. 944, pp. 62–98. 2. J. Yntema and F. Nickel, "Targets for heavy ion beams," in Experimental Methods in Heavy Ion Physics, Lecture Notes in Physics, 1978, vol. 83, pp. 206-235.*

Primary author(s) : Mr. IBADULLAEV, Dastan

Co-author(s) : Mr. SAGAIDAK, Roman (Nikolaevich)

Presenter(s) : Mr. IBADULLAEV, Dastan

Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **276** Type : **Plenary/section talk**

Double beta decay experiments: present and future

Wednesday, 24 October 2018 09:00 (15)

A.S. Barabash NRC "Kurchatov Institute", Institute of Theoretical and Experimental Physics, B. Cheremushkinskaya 25, 117218 Moscow, Russia

This report reviews of modern double beta decay experiments. Results of the most sensitive current

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Presenter(s) : Dr. BARABASH, Alexander (ITEP)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **277** Type : **Plenary/section talk**

Overview of the Compressed Baryonic Matter experiment at FAIR

Thursday, 25 October 2018 17:25 (20)

In this talk an overview of the heavy-ion program and the status of the Compressed Baryonic Matter (CBM) experiment at the future Facility for Antiproton and Ion Research (FAIR), which is being under construction in Germany, will be given.

Primary author(s) : KLOCHKOV, Viktor (GSI Helmholtzzentrum für Schwerionenforschung)

Presenter(s) : KLOCHKOV, Viktor (GSI Helmholtzzentrum für Schwerionenforschung)

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **278** Type : **Plenary/section talk**

Baryon charge transfer in proton reactions: baryon asymmetry at LHC, String Junction trajectory intercept and SJ torus as DM candidate.

Wednesday, 24 October 2018 10:30 (15)

The asymmetry of baryon/antibaryon production has been measured in many proton-proton, pion-proton and electron-proton experiments. In the framework of Quark-Gluon String Model the energy dependence of asymmetry tells us about the value of \alpha_{SJ}(0), the intercept of String Junction Regge trajectory. This object (SJ) transfers the baryon charge from proton projectile into the central rapidity region at high energy proton interactions, while the diquarks used to bring this access of positive baryons to Y=0 point in the reactions of intermediate energies. In previous MQGS description of dozen experimental results the value of intercept has been estimated as 0.5 < \alpha_{SJ} < 0.9. Now String Junction behaviors are accumulated in toy symmetrical model in order to build an object with zero baryon charge. The important effect was discovered that baryon junctions are easily combinable with antibaryon ones only on torus surface due to three gluon connections. The object has discrete number of baryon/antibaryon junctions. This single parameter reveals the mass or energy of the object. It looks like DM particle, is not it? How often appears this "compactificated" pomeron string in multiparticle production at LHC energy? As it has been calculated in recent paper, it goes approximately in 1.2 % of inelastic events. More, the torus configuration of QCD matter, which has been found by Chandra experiment right on the event horizon of supermassive Black Holes, must be so dense "donuts" that roentgen radiation from BH is screened on 40%. By the way, we know that QCD matter falling under BH horizon should be symmetric, or in other words, has no charge information. This toy model seems very realistic and can help us to deal with an "arm-wrestling" of QCD and gravitation singularity at extremely high masses.

Primary author(s) : Dr. PISKOUNOVA, Olga (Lebedev Physics Institute)

Presenter(s) : Dr. PISKOUNOVA, Olga (Lebedev Physics Institute)

Session Classification : Particle Physics

Track Classification : Particle physics: hep theory

Contribution ID : **279** Type : **Poster**

cosmic rays in the Earth's atmosphere

Monday, 22 October 2018 15:40 (150)

Primary particles of cosmic rays originate in outer space and when they reach the Earth, they cause a series of nuclear reactions with the molecules and particles presented in the Earth's atmosphere and therefore, lead to the creation of many secondary particles in the form of extensive air showers. By the increase in altitude, the layer of the protective atmosphere being thinner and therefore, exposure to cosmic radiation becomes more important. Thus, calculation of the flux of the cosmic rays in the atmosphere is very important for the evaluation of the received dose. The purpose of this work is to discuss the impact of cosmic rays in the Earth's atmosphere using the latest experimental data and the most recent version of the EXPACS code.

Primary author(s) : SEDRATI, rafik (faculty of science and technology,university of soukahras,algeria)

Presenter(s) : SEDRATI, rafik (faculty of science and technology,university of soukahras,algeria)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **280** Type : **Poster**

Gravitational Hertz experiment in dielectrics, excited by intense laser pulses.

Monday, 22 October 2018 15:40 (150)

The possibility of generating and detecting high-frequency gravitational waves based on parametric optical processes in dielectric media at their excitation by intense laser radiation of visible or ultraviolet ranges is analyzed. The theory predicts the feasibility of the Hertz gravitational laboratory experiment in which the parametric conversion of intense laser pulses with frequency ω0 to a gravitational wave with frequency ωg=2ω0 and the reverse process of gravitational radiation reconversion to optical radiation. Experiments have been fulfilled for observation of multifrequency Stimulated Raman Scattering and photon-biphoton conversion in dielectrics

Primary author(s) : GORELIK, Vladimir (P.N. Lebedev Physical Institute of the Russian Academy of Sciences)

Presenter(s) : GORELIK, Vladimir (P.N. Lebedev Physical Institute of the Russian Academy of Sciences)

Session Classification : Poster session and coffee-buffet

Contribution ID : **281** Type : **Plenary/section talk**

Ultra-high energy cosmic rays from supermassive black holes: contribution to particle flux on the Earth and extragalactic diffuse emission.

Friday, 26 October 2018 10:10 (15)

We discuss ultra-high energy cosmic rays from supermassive black holes and their contribution to the particle flux on the Earth along with diffuse gamma-ray emission and cosmogenic neutrino flux. Several processes of particle acceleration in supermassive black holes are suggested in literature, based on which various particle injection spectra are considered in this paper. Cosmic ray spectra on the Earth and the intensity of quanta and neutrinos produced by particles in extragalactic space are obtained. The computational results are compared with the data by Pierre Auger Observatory and Telescope Array, with extragalactic diffuse gamma-ray emission measured by Fermi LAT, and neutrino flux obtained by IceCube. We conclude that supermassive black holes are possibly cosmic ray sources which make a negligible contribution to the particle flux at the Earth but contribute noticeably to extragalactic diffuse gamma-ray emission. We also conclude that data on diffuse gamma-ray emission can be applied to study processes in supermassive black holes. Model flux of cosmogenic neutrino is several orders lower than IceCube flux.

Primary author(s) : Dr. URYSON, Anna (Lebedev Physical Institute of RAS)

Presenter(s) : Dr. URYSON, Anna (Lebedev Physical Institute of RAS)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **282** Type : **Poster**

Wormholes with quardratic equation of state

Monday, 22 October 2018 15:40 (150)

In last few years, several cosmologists have been used different equation of states (EOS) (namely, Phantom energy, generalized Chaplygin gas, Vander Walls quintessence EOS etc) to explain the present accelerated expansion of the Universe. By using the same EOS, some theoretical physicists have been trying to construct traversable wormholes. Recently, Ananda and Bruni [Phys.Rev.D74:023523,2006] have proposed quardratic EOS to describe homogeneous and inhomogeneous cosmological models. In this, article we explore the possibility that the wormholes be supported by quardratic EOS. We have found a series solution of Einstein equations describing wormhole for a matter source that is characterized by quardratic EOS.

Primary author(s) : Dr. RAHAMAN, Farook (Jadavpur University); Dr. ISLAM, Safiqul (Harish-Chandra Research Institute); Ms. BANERJEE, Sumita (Jadavpur University, Kolkata)

Presenter(s) : Dr. ISLAM, Safiqul (Harish-Chandra Research Institute)

Session Classification : Poster session and coffee-buffet

Contribution ID : **284** Type : **Poster**

THE ADAPTIVE-MODULAR TECHNIQUE FOR PRE-PROJECT SIMULATION THE TRANSPORTATION CHANNELS OF THE RELATIVISTIC CHARGED-PARTICLE BEAMS

Monday, 22 October 2018 15:40 (150)

Considered the numerical simulation technique which providing optimum beam parameters at the transport channel output of electron accelerator. The KATRAN channels design environment used for this purpose has a modular structure includes the basic beam focusing blocks. This allows enabling create and configure the optical system of the accelerator fast and efficiently if a given topology of the transport channel.

Primary author(s) : AVERYANOV, German (National Research Nuclear University (MEPhI)); DMITRIEVA, Valentina (National Research Nuclear University (MEPhI)); BUDKIN, Valery (National Research Nuclear University (MEPhI))

Presenter(s) : AVERYANOV, German (National Research Nuclear University (MEPhI))

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **286** Type : **Plenary/section talk**

Measurement of the energy spectra and of the angular distribution of the Transition Radiation with a silicon strip detector

Thursday, 25 October 2018 16:45 (20)

We plan to develop an advanced Transition Radiation Detector (TRD) for hadron identification in the TeV momentum range, based on the simultaneous measurement of the energies and of the emission angles of the Transition Radiation (TR) X-rays with respect to the radiating particles. To study the feasibility of this project, we have carried out a beam test campaign at the CERN SPS facility with 20 GeV/c electrons and muons up to 300 GeV/c. To detect the TR X-rays and the radiating particles, we used a 300 µm thick double-sided silicon strip detector, with a strip pitch of 50 µm. A 2 m long helium pipe was placed between the radiators and the detector, in order to ensure adequate separation between the TR X-rays and the radiating particle on the detector plane and to limit the X-ray absorption before the detector. We measured the double-differential (in energy and angle) spectra of the TR emitted by several radiators. The results are in good agreement with the predictions obtained from the TR theory.

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Presenter(s) : Dr. LOPARCO, Francesco (Bari University and INFN)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **288** Type : **Poster**

Radiative transitions of electrons between Landau levels in a moderately strong magnetic field

Monday, 22 October 2018 15:40 (150)

We investigate the processes of radiative transitions of electrons between the Landau levels, $e_{(\ell)} \to e_{(n)} + \gamma$, in a moderately strong magnetic field. Under such conditions, it is necessary to take into account transitions in which both the initial and final electrons can be in states corresponding to arbitrary Landau levels. The results obtained can be used in calculating the efficiency of the electron-positron plasma generation under the conditions of the Kerr black hole accretion disk.

Primary author(s) : Ms. ZABRODINA, Olga (Yaroslavl State University); Prof. KUZNETSOV, Alexander (Yaroslavl State University)

Presenter(s) : Ms. ZABRODINA, Olga (Yaroslavl State University)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **289** Type : **Plenary/section talk**

VIRTUAL MECHANISMS OF THE NUCLEAR DECAYS AND REACTIONS

Friday, 26 October 2018 09:45 (15)

The one-step decay ($A \longrightarrow a_1 + A_1$) of the ground state of the resting parent nucleus A with the formation of real states of nucleus A_1 and particle a_1 is impossible, if the heat Q_1 of this decay, defined as $Q_1 = E_A - E_{A_1} - E_{a_1}$, where E_A, E_{A_1} and E_{a_1} are the internal energies of nuclei A, A_1 and particle a_1 , and connected at the implementation of the energy conservation law with the kinetic energies T_{A_1} and T_{a_1} of nucleus A_1 and particle a_1 as $Q_1 = T_{A_1} + T_{a_1}$ has a negative value. At the same time, the two-step decay of the same nucleus ($A \longrightarrow a_1 + A_1 \longrightarrow a_1 + a_2 + A_2$) described by the Feynman diagram, including at the first step the flight of the real particle A_1 from the nucleus A with the formation of the virtual state of the intermediate nucleus A_1, described by the Green function G_{A_1} of this nucleus whose pole lies in the region of negative values of the kinetic energy T_{A_1} of the nucleus A_1, and at the second step the decay of the nucleus A_1 with the formation of the real particle a_2 and the real daughter nucleus A_2, is possible if the heat Q_2 of the decay of the nucleus A_1 satisfies the condition $Q_2 >$⊠Q_1⊠, when the total heat Q of the analyzed decay, defined as $Q = Q_1 + Q_2$, is positive. For the first time, the named above virtual mechanism of the two-step decay was successfully used [1] to describe the true double β-decay of an even-even parent nucleus (A, Z) with the formation of a daughter nucleus (A, $Z\pm2$) and flight of two electrons and two electron antineutrinos or of two positrons and two electron neutrinos, when one-step β-decay of nucleus (A, Z) with the formation of an intermediate nucleus (A, $Z\pm1$) is forbidden. This situation was realized because of the influence of Cooper pairing of two protons and two neutrons in the parent nucleus (A, Z), when the heats Q_1 and Q_2 of the single β-decays of the nucleus (A, Z) and the virtual state of the intermediate nucleus-isobar (A, $Z\pm1$) satisfy the conditions $Q_1 < 0$, $Q_2 >$⊠Q_1⊠and $Q = Q_1 + Q_2 > 0$. In [2], the phenomenon of two-proton radioactivity also caused by the proton pairing effects was predicted for series of neutron-deficient nuclei (A, Z) even in Z. In [3], the presentation about virtual two-step mechanism for the two-proton decay of nuclei was first used unlike to the earlier proposed concept [4] of two-proton decay of the nucleus (A, Z) with the simultaneous flight of the daughter nucleus ($A-2$, $Z-2$) and two protons. This allowed to describe the two-proton widths and the energy and angular distributions of two emitted protons in the superfluid model of atomic nucleus in a consistent manner. Finally, it can be shown that the appearance of long-range -particles emitted as third (fourth) particles in the true ternary (quaternary) fission of compound nuclei (A , Z) produced in nuclear reactions with slow neutrons can be described successively with usage the stationary mechanism of named above reactions associated with the appearance of virtual states of intermediate nuclei formed in the two-step (three-step) nuclear decay of compound nuclei (A , Z) in contrast to the nonstationary nonadiabatic mechanism of [5].

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Primary author(s) : Prof. KADMENSKY, Stanislav (Voronezh State University)

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Presenter(s) : Prof. KADMENSKY, Stanislav (Voronezh State University)

Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **290** Type : **Plenary/section talk**

SMASH model and atmospheric neutrino mass splitting

Wednesday, 24 October 2018 17:30 (15)

Five fundamental problems - neutrino oscillations, baryogenesis, dark matter, inflation, strong CP problem - are solved at one stroke in a model, dubbed as "SM-A-S-H" (Standard Model-Axion-Seesaw-Higgs portal inflation) by Andreas Ringwald et. al. The Standard Model (SM) particle content is extended by three right-handed SM-singlet neutrinos N_i, a vector-like color triplet quark Q, a complex SM-singlet scalar field σ that stabilises the Higgs potential, all of them being charged under a global lepton number (hyper-charge) and Peccei-Quinn (PQ) $U(1)$ symmetry, the vacuum expectation value $v_\sigma \sim 10^{11}$ GeV breaks the lepton number and the Peccei-Quinn symmetry simultaneously. We found that numerically SMASH model not only solves five fundamental problems but also the sixth problem "Vacuum Metastability" through the extended scalar sector and can predict approximately correct atmospheric neutrino mass splitting around 0.05 eV.

Primary author(s) : Dr. DAS, Chitta Ranjan (Bogoliubov Laboratory of Theoretical Physics)

Co-author(s) : Prof. HUITU, Katri (Helsinki Institute of Physics); Dr. KÄRKKÄINEN, Timo (Department of Physics)

Presenter(s) : Dr. DAS, Chitta Ranjan (Bogoliubov Laboratory of Theoretical Physics)

Session Classification : Particle Physics: HEP theory

Track Classification : Particle physics: hep theory

Contribution ID : **291** Type : **Plenary/section talk**

Magnetic field contribution to black-hole-hedgehog's solution in GraviWeak unification

Wednesday, 24 October 2018 09:30 (20)

In the framework of Multiple Point Principle (MPP), where the existence of the two degenerate vacua of the Universe: the first, ElectroWeak vacuum with ≈ 246 GeV ("true vacuum"), and the second at Planck scale $\sim 10^{18}$ GeV ("false vacuum"); we investigated the gravitational black-hole-hedgehog's solution with magnetic field contribution in the GraviWeak unification model described by $f(R)$ gravity. We have considered the phase transition from the "false vacuum" to the "true vacuum" and confirmed the stability of the ElectroWeak vacuum. The "false vacuum" defect configurations for the black-hole-hedgehog have given a global monopole and this monopole has been "swallowed" by the black-hole with core mass $M_{BH} \approx 3.65 \times 10^{18}$ GeV and radius $\delta \approx 6 \times 10^{-21}$ GeV^{-1}. The horizon radius of the black-hole-hedgehog is around $r_h \approx 1.14\delta$.

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Presenter(s) : Dr. DAS, Chitta Ranjan (Bogoliubov Laboratory of Theoretical Physics)

Session Classification : Gravitation and Cosmology

Contribution ID : **292** Type : **Plenary/section talk**

Double beta decay experiments: status and prospects

Tuesday, 23 October 2018 15:40 (35)

Neutrinos are the only fundamental fermions without electric charge. Consequently, they might be identical to their own anti-particles (Majorana type). In this case neutrinoless double beta decay should exist where a nucleus (A,Z) decays to (A,Z+2)+2e-, i.e., Lepton number is not conserved. There are a variety of experiments searching for this decay using very different experimental concepts and isotopes. The talk reviews the motivation and the status of the ongoing and planned experiments.

Primary author(s) : Mr. SCHWINGENHEUER, Bernhard (MPI Kernphysik)

Presenter(s) : Mr. SCHWINGENHEUER, Bernhard (MPI Kernphysik)

Session Classification : Plenary

Track Classification : Particle physics: neutrino physics

Contribution ID : **293** Type : **Plenary/section talk**

Searching for neutrinoless double beta decay with Ge76

Friday, 26 October 2018 09:30 (15)

Neutinoless double beta decay is a lepton number violating decay which should be observable for some isotopes like Ge76 if neutrinos are Majorana particles. One historically important and still leading technology is using germanium detectors made from material with enriched Ge76 fraction. The talk discusses the recent results from GERDA and the preparations for the future LEGEND experiment.

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Presenter(s) : SCHWINGENHEUER, Bernhard (MPI Kernphysik)

Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **294** Type : **Plenary/section talk**

Prospect for top quark FCNC searches at the FCC-hh

Tuesday, 23 October 2018 09:55 (15)

FCC-hh is a proposed future energy-frontier hadron collider, which goal is to provide high luminosity proton-proton collisions at a centre-of-mass energy of 100 TeV. The FCC-hh has an extremely rich physics program ranging from standard model (SM) measurements to direct searches for physics beyond the standard model (BSM). Among processes sensitive to new physics are Flavour-Changing Neutral Currents (FCNC) which extremely rare within the SM but have enhanced behaviour in several BSM scenarios. In this report we present the results of projections of FCNC searches in top quark interactions to the FCC-hh conditions based on Monte-Carlo simulation of FCC-hh detector.

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Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **295** Type : **Plenary/section talk**

The Dibaryon resonance d*(2380) and other higher isospin states

Friday, 26 October 2018 17:30 (15)

The Dibarion resonance d*(2380) was measured in the two pion production reactons $pN->d\pi\pi$ and by use of a polarized deuteron beam in the quasifree scattering mode on hydrogen target. Total and differential cross sections have been measured for the various isotopic final states. Covered energy region includes the regions of* $N(1440)$ and $\Delta(1230)\Delta(1230)$ resonance excitations. Calculations using t-channel meson exchange differ from the experimental data. An isotensor ΔN Dibarion I(J^P)=2(1^+) state is able to compensate observed difference.

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Presenter(s) : Dr. DOROSHKEVICH, Eugene (Institute for Nuclear Research)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **296** Type : **Plenary/section talk**

New results from the OPERA experiment in the CNGS neutrino beam

Tuesday, 23 October 2018 18:10 (15)

A new data analysis was performed, based on looser selection criteria and multivariate approach. Oscillation parameters and tau neutrino cross-section have been determined with a reduced statistical uncertainty, and the discovery of tau neutrino appearance is confirmed with an improved significance level. Moreover, the search for electron neutrino events has been extended to the full dataset, exploiting an improved method for the electron neutrino energy estimation. New limits have been set in the 3+1 neutrino model.

Primary author(s) : VASINA, Svetlana (JINR)

Presenter(s) : VASINA, Svetlana (JINR)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **297** Type : **Plenary/section talk**

Reconnection of magnetic field in neutron stars driven by electron mass term in triangle anomaly

Wednesday, 24 October 2018 16:30 (15)

We analyze the role of the surface terms in the conservation law for the sum of the magnetic helicity density and the chiral imbalance of the charged particle densities. These terms are neglected in the chiral magnetohydrodynamics (MHD), where infinite volume is considered typically. We discuss a finite volume system, such as a magnetized neutron star (NS), and study the contribution of the surface terms to the evolution of the magnetic helicity. Accounting for the fast washing out of the chiral imbalance in a nascent NS, we demonstrate that the surface terms contribution can potentially lead to the reconnection of magnetic field lines and subsequent gamma or X-ray bursts observed from magnetars. We derive the additional surface terms originated by the mean spin flux through a volume boundary arising due to macroscopic spin effects in electron-positron plasma. Then, comparing this quantum surface term with the classical one known in standard MHD, we find that the new quantum contribution prevails over classical term for the rigid NS rotation only.
Reference: M. Dvornikov and V. B. Semikoz, JCAP 08 (2018) 021; arXiv:1805.04910.

Primary author(s) : Dr. DVORNIKOV, Maxim

Presenter(s) : Dr. DVORNIKOV, Maxim

Session Classification : Particle Physics: HEP theory

Track Classification : Particle physics: hep theory

Contribution ID : **298** Type : **Poster**

(2+1) dimensional cosmological models in f(R, T) gravity with Λ(R, T)

Monday, 22 October 2018 15:40 (150)

We intend to study a new class of cosmological models in f(R, T) modified theories of gravity, hence define the cosmological constant Λ as a function of the trace of the stress energy-momentum-tensor T and the Ricci scalar R, and name such a model Λ(R, T) gravity where we have specified a certain form of Λ(R, T). Λ(R, T) is also defined in the perfect fluid and dust case. Some physical and geometric properties of the model are also discussed. We study the behavior of some cosmological quantities such as Hubble and deceleration parameters and also the redshift function. The model is innovative in the sense that it has been described in terms of both R and T and display a better understanding of the cosmological observations.

Primary author(s) : Mr. KUMAR, Praveen (Department of Mathematics, R.T.M.Nagpur University Nagpur)

Presenter(s) : Mr. KUMAR, Praveen (Department of Mathematics, R.T.M.Nagpur University Nagpur)

Session Classification : Poster session and coffee-buffet

Contribution ID : **299** Type : **Plenary/section talk**

NA61/SHINE experiment at CERN SPS: Recent results, current status and perspectives

Thursday, 25 October 2018 15:30 (30)

NA61/SHINE is a fixed-target experiment at the CERN Super-Proton-Synchrotron (SPS) measuring the hadron production in hadron-nucleus and nucleus-nucleus collisions with a large acceptance detector system. The measurements performed for a wide range of reactions provide valuable data for studying properties of hadronic matter under extreme conditions. They also provide precise results on hadron production for determining the neutrino flux in long-baseline neutrino experiments and for more reliable simulations of cosmic-ray showers.

The primary aim of the experiment is the investigation of the transition from hadron gas to quark-gluon plasma and the search for associated critical point. A broad region of the phase diagram is probed by varying energy and size of the collision system (from p+p to Pb+Pb at beam momenta 13A – 150 /158A GeV/c). Various observables, e.g. quantities measuring event-to-event fluctuations of the particle multiplicity, which are expected to reveal the occurrence of phase transition or critical behavior are examined. The observed non-monotonic pattern in the excitation function of the K+/π+ ratio in NA49 Pb+Pb reactions has been interpreted as the onset of deconfinement. This ratio is currently studied in p+p, Be+Be and Ar+Sc collisions by NA61/SHINE.

Analysis of the system-size dependence of hadron production properties has shown a distinct qualitative change in passing from p+p and Be+Be to Ar+Sc system, which indicates a threshold for formation of large clusters of strongly interacting matter - the onset of fireball.

Recently, the experimental program was extended by measurements of production properties of open charm mesons that are expected to provide a better insight into the phase transition behavior of hadronic matter. For this purpose, the NA61/SHINE spectrometer was supplemented with a Vertex Detector, which allowed identification of D^0 mesons in the first test measurements performed for Pb+Pb collisions at 150A GeV/c.

This talk will present the recent experimental results and the physics program for future measurements beyond 2020, after the Long Shutdown 2 of the CERN accelerators, as well as the planned upgrade of the NA61/SHINE facility.

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Presenter(s) : Prof. BRZYCHCZYK, Janusz (Jagiellonian University)

Session Classification : Plenary

Contribution ID : **300** Type : **Plenary/section talk**

Search for periodical variations of Fe-55 isotop weak decay parameters

Friday, 26 October 2018 10:00 (15)

Possible temporal variations of nucleus decay parameters studied extensively in the last years, their observation can be the signal of unknown physical effects. Earlier, several experiments reported the annual and daily decay rate oscillations in alpha and beta-decays of some nuclides of the order .05 % [1,2]. BGU - PhIAN experiment studies the decay rate variations in inverse beta-decay (e-capture) of Fe-55 isotope. In this process K-shell electron absorbed by nuclei and electron neutrino emitted; it accompanied by X-ray with energy 5,9 or 6,4 KeV which in our set-up detected by cooled Si-Pin detectors. Measurements of decay rate performed in 2016 -2018 , demonstrate that together with observed Fe-55 decay exponent with life-time 1004 days, annual oscillation component value is present at the level (.21 +/- .04)%. Another period 29.5 +/- 1.5 days corresponding to moon month is found with amplitude (.32 +/- .4)% . Simultaneous Fe-55 decay measurements by Si-Pin detectors in orbital flight conditions and in Earth conditions are planned at International Space Station as part of DODO project.

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2. E. Alekseev et al. , Phys. Part. Nucl. (2018) to be published; ArXiv:1505.01752

Primary author(s) : Prof. MAYBUROV, Sergey (Lebedev Institute of Physica)

Presenter(s) : Prof. MAYBUROV, Sergey (Lebedev Institute of Physica)

Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **301** Type : **Plenary/section talk**

Search for contact interactions in inclusive ep scattering at HERA

Wednesday, 24 October 2018 10:45 (15)

The high-precision HERA data are used to search for Beyond the Standard Model contributions to electron-quark scattering in the framework of eeqq contact interactions (CI). Combined measurements of the inclusive deep inelastic cross sections in neutral and charged current ep scattering are considered, corresponding to a luminosity of around 1 fb^{-1}. The analysis of the inclusive ep data is based on the simultaneous fits of parton distribution functions together with contributions of CI couplings to ep scattering. Results are presented for different CI scenarios and the resulting 95% CL limits on the CI mass scales extend up to the 10 TeV scale.

Primary author(s) : WING, Matthew (UCL); LEVCHENKO, Boris

Presenter(s) : LEVCHENKO, Boris

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **302** Type : **Plenary/section talk**

Hyperons at BM@N experiment: first results

Friday, 26 October 2018 15:35 (15)

BM@N (Baryonic Matter at Nuclotron) is the first experiment to be realized at the accelerator complex of NICA-Nuclotron at JINR (Dubna). The aim of the experiment is to study interactions of relativistic heavy ion beams with a kinetic energy from 1 to 4.5 AGeV with fixed targets. Some results of the analysis of minimum bias experimental data on interactions of the deuteron and carbon beams at 4 AGeV with different targets collected during technical rubs are presented. Preliminary results on the data processing from the first physical run with argon beam are also shown and discussed.

Primary author(s) : Dr. KAPISHIN, Mikhail; Dr. ZINCHENKO, Alexandre; RUFANOV , Igor; Mr. POKATASHKIN, Gleb; Ms. VASENDINA, Veronika; Ms. GORNAYA, Yulia

Presenter(s) : Ms. GORNAYA, Yulia

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **303** Type : **Plenary/section talk**

Investigating the properties of the QGP and searching for its smallest scale

The primary goal of the ultra-relativistic heavy-ion collision program at the Large Hadron Collider (LHC) is to study the properties of the Quark-Gluon Plasma (QGP), a novel state of strongly interacting matter which exists in the early universe. Anisotropic flow, which quantifies the anisotropy of the momentum distribution of final state particles, is sensitive to the fluctuating initial conditions and the transport properties of the created QGPs. The successful description of the measured anisotropic flow coefficients by hydrodynamic calculations suggests that the created medium behaves as a nearly perfect fluid.

In this talk, I will show the latest flow measurements in Xenon–Xenon collisions at $\sqrt{s_{\rm NN}} = 5.44$ TeV, Lead–Lead collisions at $\sqrt{s_{\rm NN}} = 2.76$ and 5.02 TeV at the LHC. The standard anisotropic flow, as well as the newly developed flow observables, will be discussed. In addition, I will show the new results of anisotropic flow in proton–lead at $\sqrt{s_{\rm NN}} = 5.02$ TeV and proton–proton collisions at $\sqrt{s} = 13$ TeV, to search for a smallest drop of QGP created at the LHC. Possible explanations on the origins of the observed collectivity will be discussed.

Primary author(s) : ZHOU, You (Niels Bohr Institute)

Presenter(s) : ZHOU, You (Niels Bohr Institute)

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **304** Type : **Poster**

Strong indications of true quaternary fission of 252Cf(sf)

Monday, 22 October 2018 15:40 (150)

Strong indications of true quaternary fission of 252Cf(sf)

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Abstract In our previous publications [1, 2] we discussed possible physical scenario standing behind rectangular–like structures in the fission fragments mass-correlation distributions from 252Cf(sf) and 235U(nth, f). The rectangle is bounded by the known magic nuclei such as 68Ni, 84Se and others. The fission events aggregated in the rectangle show extremely low total kinetic energies. Previously only decay mode with two Ni clusters in the exit channel was discussed. A more complete analysis are presented which gives additional arguments in favor of true quaternary fission of 252Cf (sf).

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2. Yu. V. Pyatkov et al., Journal of Physics: Conference Series, V. 863 (2017) 012046.

Primary author(s) : Prof. PYATKOV, Yuri; Prof. KAMANIN, Dmitri; Ms. TOMAS, Angelina; Mrs. GORYAINOVA, Zoya; STREKALOVSKY, Alexander

Presenter(s) : Ms. TOMAS, Angelina

Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics

Contribution ID : **305** Type : **Plenary/section talk**

Long-lived particle searches by ATLAS and CMS

Monday, 22 October 2018 15:05 (35)

Several models beyond the Standard Model predict the production of long-lived particles (LLP). For instance R-parity violating supersymmetry or hidden valley models allow such production of LLP, defining a lot of different and non-conventional experimental signatures. We present the different strategies and recent results to look for these new LLP, using 13 TeV data recorded by both ATLAS and CMS collaborations.

Primary author(s) : TEYSSIER, Daniel (RWTH Aachen University)

Presenter(s) : TEYSSIER, Daniel (RWTH Aachen University)

Session Classification : Plenary

Track Classification : Particle physics

Contribution ID : **306** Type : **Plenary/section talk**

Search for Hidden-Photon Dark Matter by Means of a Multi-Cathode Counter.

Thursday, 25 October 2018 16:45 (15)

The results of the search of hidden-photon dark matter by means of a multi-cathode counter are presented. The technique is based on counting of single electrons emitted from outer cathode as a result of the conversion of hidden-photons. The apparatus and the calibration of the counter by ultraviolet lamp are described and the data processing is outlined in details. It is shown that this technique attains a maximum sensitivity in the energy range of Vacuum Ultraviolet. The results obtained from measurements during 78 days by counter with an aluminum outer cathode are presented. The next steps to lower the limits obtained by this technique are discussed.

Primary author(s) : Dr. KOPYLOV, Anatoly (INR RAS); Dr. OREKHOV , Igor (INR RAS); Dr. PETUKHOV, Valery (INR RAS)

Presenter(s) : Dr. KOPYLOV, Anatoly (INR RAS)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **307** Type : **Poster**

A new ring scintillation detector wihout blind areas for neuton diffraction

Monday, 22 October 2018 15:40 (150)

We developed a new ring neutron detectors based on ZnS/LiF scintillators and solid-state photomultipliers (SiPM) for powder neutron difractometers. This detector can capture full Sherrer's ring and therefore can provide the most effective regustration of scaterred by sample neutrons. The design of the detector allows completely avoiding blind areas. The developed detectors consisst from linear scintillation counters developed and fabricted in INR RAS [1]. This counters use for light readout a lightguide with diffuse reflection. The light readout by this method is more effective than the wavelenght shifting fibers - up to 80 photoelectrons [2-3]. These ring detectors are successfully tested on time-of-flight diffractometers at spallation source RADEX of INR RAS [3]. The efficiency of thermal neutrons registration can reach 70%. It is also possible to create multi-layer detectors to increase efficiency. We also developed counters with trapezoidal lightguide for assembling of the ring detector. This method allows us to achieve 0 % of blind areas. This method has patented [4]. Proposed schemes will make it possible to create highly efficient, compact and lightweight detectors that do not require high voltage (because used solid-state photomultipliers). Due to the miniaturized sizes of photodetectors, these detectors have proved to be an effective and inexpensive alternative to 3He-filled detectors.

[1] Marin V.N., Sadykov R.A., Trunov D.N. et al. Tech. Phys. Lett. (2015) 41: 912.

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[3] Marin V.N., Sadykov R.A., Trunov D.N. et al. Instrum Exp Tech (2018) 61: 1.

[4] Patent RU 177857, 17.12.2017.

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Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **308** Type : **Poster**

THE POSSIBLE EXPERIMENT FOR SEARCH OF STERILE NEUTRINOS ON THE BASE OF INTENSIVE ANTINEUTRINO SOURCE WITH REGULATED HARD SPECTRUM

Monday, 22 October 2018 15:40 (150)

The work devoted to development of the novel type of antineutrino source and propose of the oscillation experiment to ensure: a) hard and well defined antineutrino flux that larger compare to reactor flux; b) drop of neutrino flux errors in several times at energy > 3 MeV; c) high rate of antineutrino events in the detector (about - ˜ 1E+3 per day); d) possibility to diminish significantly the dimensions of the detector; e) search of electron antineutrino disappearance (short base line experiment).

The most intensive artificial neutrino sources are the nuclear reactors. But antineutrino reactor spectra (formed by main fuel isotopes) are characterized by large uncertainties in the total -spectrum that lead to very serious problem in understanding of neutrino oscillation results. The reactor spectrum is known with ˜ (4-5)% -precision and this errors dramatically rise up to tens persents at more higher energies. [1-4].

The proposed scheme is based on activation of 7Li in the reactor neutron flux and transport of the fast beta-decaying 8Li isotope toward a remote neutrino detector and back in the closed loop to the reactor for the next activation in the continuous cycle. Well investigated neutrino spectrum of 8Li is hard: with maximal energy up to 13 MeV. For increasing of a hard lithium antineutrinos part in the total spectrum we propose to construct a being pumped reservoir near the neutrino detector. This novel type of the source will ensure not only harder neutrino spectrum in the detector volume but also an opportunity to register neutrino interaction at different summary spectrum hardness varying smoothly (without stop of the experiment) a rate of 8Li (or it's chemical compound) pumping in the closed loop [5, 6].

The strong advantage is that lithium component of the spectrum is well known and this fact allows to decrease significantly the count errors [7, 8]. The rate of neutrino detector counts in such hard flux will rise strongly compare to rate from reactor component. One more advantage is to use compact detector (with volume about ˜ cubic meter) that is exclusively important for realization of the experiment.

The simulation of the possible experiment for search of sterile neutrinos (the reaction of inverse beta decay) with Δm2 ˜1 eV2 reveals the promise to detect reliable the disappearance of electron antineutrinos. The detailed results for (3+1) and (3+2)-model are presented and discussed. It is proposed the variant of short base line oscillation experiment basing on the considered antineutrino source.

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Primary author(s) : LYASHUK, Vladimir

Presenter(s) : LYASHUK, Vladimir

Session Classification : Poster session and coffee-buffet

Contribution ID : **309** Type : **Poster**

THE PRINCIPLES OF NEUTRINO SOURCE CREATION ON THE BASE OF LITHIUM. THE VARIANTS OF REALIZATIONS (REVIEW)

Monday, 22 October 2018 15:40 (150)

The 8Li is neutron rich short living isotope (T1/2 = 0.84 s) with hard antineutrino spectrum (Emax= 13 MeV and averaged - 6.5 MeV). Powerful 8Li-antineutrino source can be realized on the base of (n,gamma)-activation of 7Li isotope and subsequent beta-decay. The source is a prime perspective owing to the hard antineutrino spectrum as cross section of neutrino depends at the considered energy proportional to squared energy and rate of the neutrino interactions will increase strongly.

Different neutron sources can be utilized for lithium activation [1-3]. It can be the high-flux nuclear reactors (in a stationary mode) enclosed by lithium blanket-converter (i.e., the neutrino factory in a static regime of operation). The advantages of 8Li antineutrino spectrum will be more fully utilized in the scheme with pulse reactors, when antineutrino flux from beta-decay of fission isotopes will be separated in time from neutrino of 8Li decay. Another perspective regime is dynamical one, when an activated 7Li is pumped in the close cycle through the active zone of the reactor and further is delivered close to the neutrino detector. Today significant activity directed to creation of the neutrino factory based on the tandem of lithium blanket plus an accelerator and neutron generating target [4-5].

It was calculated the efficiency (number of 8Li isotopes per neutron of the neutron source) of such an installations. It was considered the geometries of lithium blankets. Different types of blanket matter were considered: the pure lithium in the metallic state and lithium chemical compounds. The most preferable is the D2O-solution of LiOD, which allows to decrease the requirements in mass of high purified 7Li isotope from tens to about three hundreds times [5-7]. It was considered the neutron yield from targets (W, Pb) of the neutrino factory in the “tandem” scheme of proton accelerator (with energy of several hundreds MeV’s) and the expected efficiency of the lithium blanket were obtained. The conception of the proposed lithium source in the “tandem” scheme [8] is included today to the project of the powerful source and proposed for neutrino investigations [4]. It was considered the advantages ensured by 8Li source for neutrino experiments.

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Presenter(s) : LYASHUK, Vladimir

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **311** Type : **Poster**

Project on searching for neutron-antineutron oscillation at the WWR-M reactor

Monday, 22 October 2018 15:40 (150)

Supersource of ultracold neutrons on the basis of superfluid helium is under construction in PNPI NRC KI. It must provide UCN density 2-3 orders of magnitude higher than existing sources. For the new source we propose an experiment on search for neutron–antineutron oscillations based on the storage of ultracold neutrons in a material trap. The sensitivity of the experiment mostly depends on the trap size and the amount of UCN in it. The results of simulations of the designed experimental scheme show that the sensitivity can be increased by ~ 10–40 times compared to sensitivity of previous experiment depending on the model of neutron reflection from walls.

Primary author(s) : FOMIN, Alexey (PNPI NRC KI); Mr. SEREBROV, Anatolii (NRC "Kurchatov Institute" - PNPI); CHAIKOVSKII, Mikhail (PNPI)

Presenter(s) : CHAIKOVSKII, Mikhail (PNPI)

Session Classification : Poster session and coffee-buffet

Contribution ID : **312** Type : **Poster**

OBSERVATION OF CLUSTER STRUCTURE OF FISSION FRAGMENTS

Monday, 22 October 2018 15:40 (150)

In our previous publications [1–3] we have discussed new original effect appeared at crossing of the metal foils by fission fragments (FFs). We have observed significant mass deficit in the total mass Ms of the FFs detected in coincidence with ions knocked out from the foil. In series of the recent more detailed experiments we have compared event by event the mass of the FF before (Mtt) and after (Mte) it passes the foil. In the light of the results obtained a FF from conventional binary fission is supposed to be born in the shape isomer state which looks like di-nuclear system consisting of the magic core and lighter cluster. Comparison of the correlation mass distributions Mtt-Mte for different metal foils is presented aimed at testing possible models of the effect.

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Presenter(s) : Mr. STREKALOVSKY, Alexandr (Joint Institute for Nuclear Research)

Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics

Contribution ID : **313** Type : **Poster**

Correlations between multiplicities and transverse momenta in nucleus-nucleus collisions from model with cluster of fused color strings.

Monday, 22 October 2018 15:40 (150)

The long-range rapidity correlations between the multiplicities (n-n) and the transverse momentum and the multiplicity (p_T-n) of charge particles are analyzed in the framework of the simple string inspired model with two types of sources. The sources of the first type correspond to the initial strings formed in a hadronic collision. The sources of the second type imitate the appearance of the emitters of a new kind resulting from interaction (fusion) of the initial strings. The model enabled to describe effectively the influence of the string fusion effects on the strength both the n-n and the p_T-n correlations. Modification of the model to the analogue of the "core-corona" mechanism allows to take into account event selection criteria based on centrality and perform a comparison with existing experimental data on correlation measurements in nucleus-nucleus collisions at LHC energies. It is shown that string fusion effects leads to change of a sign of the p_T-n correlation coefficient with decrease of a centrality interval width.

The research was supported by the grant of the Russian Foundation for Basic Research (project 18-32-01055_mol_a).

Primary author(s) : ANDRONOV, Evgeny

Presenter(s) : ANDRONOV, Evgeny

Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics

Contribution ID : **314** Type : **Plenary/section talk**

Coherent J/ψ photo-production in ultra-peripheral Pb-Pb collisions with ALICE at the LHC

Friday, 26 October 2018 10:20 (15)

There are several different predictions for the behaviour of the gluon distribution in nuclei at small Bjorken x and experimental data are needed to choose among them. This is achieved by measuring the cross section of processes specially sensitive to this parton distribution.

The high flux of photons from lead ions at the LHC allows us to study photon-induced reactions in ultra-peripheral collisions (UPC) of Pb-Pb nuclei, in particular of those producing a J/ψ meson exclusively. The study of these collisions, where projectiles do not overlap, provides information about the initial state of nuclei.

The newest ALICE results on vector meson photoproduction are presented. The increased statistics and higher collision energy of $\sqrt{s}$=5.02 TeV of Run 2 allow us to put new constraints on available models.

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Presenter(s) : Mr. LAVICKA, Roman (FNSPE CTU in PRAGUE)

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **315** Type : **Plenary/section talk**

4π semiconductor beta-spectrometer for measurement of ^{144}Ce-^{144}Pr spectra

Thursday, 25 October 2018 18:20 (15)

Precision measurements of beta-spectra have always been and are still playing an important role in several fundamental physical problems, predominantly in neutrino physics. Magnetic and electrostatic spectrometers possess the superior energy resolution, but at the same time such devices appear to be very complex and large-scale setups. Since the electron free path at 3˜MeV (which is, basically, the maximum beta-transition energy for long-living isotopes) does not exceed 2˜g/cm^3, solid state scintillation and ionization detectors were effectively employed for detection of electron. In case of semiconductor detectors there is a significant probability of back-scattering from the detector surface that depends on the detector material. This issue could be overcome by constructing a beta-spectrometer with 4π geometry, fully covering the source and capable of detecting backscattered electrons. Here we present a technology allowing production of a beta-spectrometer based on silicon detectors and having 4π geometry. The spectrometer developed had been fitted with a ^{144}Ce-^{144}Pr radioactive source and has demonstrated capability of performing precision beta-spectrometry for this nuclides.

Primary author(s) : Mr. DRACHNEV, Ilia; Prof. DERBIN, Alexander; Mr. UNZHAKOV, Evgeniy; Mr. SEMENOV, Dmitriy; Mrs. PILIPENKO, Nelly (PNPI NRC KI); Mrs. LOMSKAIA, Irina (PNPI NRC KI); Dr. KOTINA, Irina (PNPI NRC KI); Mrs. MURATOVA, Valentina

Presenter(s) : Mr. DRACHNEV, Ilia

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **316** Type : **Plenary/section talk**

ONE-LOOP AMPLITUDES OF CHARGED FERMIONS IN CONSTANT HOMOGENEOUS ELECTROMAGNETIC FIELDS

Wednesday, 24 October 2018 16:45 (15)

Two-point one-loop amplitudes induced by charged fermions and modified by a constant homogeneous electromagnetic fields are presented. For the background field, two configurations – pure magnetic field and crossed electromagnetic fields – are considered. The set of two-point amplitudes of scalar, pseudoscalar, vector and axial-vector fermionic currents, already known in literature, is completed by ones which contain the tensor current. Such a tensor current is a fermionic part of the Pauli Lagrangian relevant for the electromagnetic interaction of fermions through the anomalous magnetic moment. Its contribution to the photon polarization operator is discussed.

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Presenter(s) : Mr. ILYA, Karabanov (P.G. Demidov Yaroslavl State University)

Session Classification : Particle Physics: HEP theory

Track Classification : Particle physics: hep theory

Contribution ID : **318** Type : **Plenary/section talk**

Measurement of variations in the flux of atmospheric muons using underground LVD detector

Tuesday, 23 October 2018 09:30 (15)

Data on the measurement of the flux of atmospheric muons by a scintillation detector LVD at 3300 m w.e. depth with an average energy of 280 GeV are presented. The results of measuring the seasonal variation of the muon flux over 25 years of observations are discussed.

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Presenter(s) : AGAFONOVA, Natalia (INR RAS)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **319** Type : **Poster**

Поиск событий в детекторе LVD коррелирующих с гравитационным коллапсом тесных двойных систем

Monday, 22 October 2018 15:40 (150)

Приводятся результаты поиска событий, регистрируемых детектором LVD, совпадающих с гравитационными сигналами от источников GW150914, GW151226, GW170104, GW170608, GW170814 и GW170817.

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Presenter(s) : ASHIKHMIN, Vsevolod (INR RAS)

Session Classification : Poster session and coffee-buffet

Contribution ID : **320** Type : **Plenary/section talk**

Overview of ALICE results on light flavor hadron production

Friday, 26 October 2018 10:00 (20)

Light flavor hadrons are copiously produced in hadronic and heavy-ion interactions and bring a wealth of information about properties of the produced medium and reaction dynamics. In this talk, we review the most recent ALICE results on the production of different light-flavor hadrons, including transverse momentum spectra, yields, nuclear modification factors and particle ratios in pp, p-Pb, Xe-Xe and Pb-Pb collisions at LHC energies. Having different masses, quark content and lifetimes, light flavour hadrons do not only serve as general observables in the soft sector, but also play an important role as high transverse momentum probes and signatures of the onset of collectivity in high-multiplicity collisions of small systems. Production of light flavour hadrons containing strange quarks is enhanced from pp to p-Pb and Xe-Xe/Pb-Pb collisions. The strength of such an enhancement depends on the particle strangeness content, but it is also present for phi(1020) mesons with hidden strangeness. The production of short-lived resonances with lifetimes comparable to that of the fireball is suppressed in central heavy-ion collisions, which can be attributed to rescattering of daughter particles in the dense hadronic medium. Transverse momentum spectra for light hadrons become harder at higher multiplicities in all collision systems, which is likely the result of radial flow. The baryon-to-meson ratios evolve with event multiplicity and demonstrate qualitatively similar behavior in pp, p-Pb and Xe-Xe/Pb-Pb collisions at high multiplicities. Production of light hadrons is similarly suppressed at high transverse momenta in central Pb-Pb collisions, while no significant modification is found in p-Pb collisions. The obtained results are compared to lower energy experiments and theoretical model predictions where available.

Primary author(s) : Dr. RIABOV, Victor

Presenter(s) : Dr. RIABOV, Victor

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **322** Type : **Plenary/section talk**

Prospects for a study of strangeness and hypenuclei production at NICA/MPD

Friday, 26 October 2018 16:05 (15)

Relativistic heavy-ion collisions provide a unique opportunity to study nuclear matter under extreme density and temperature. NICA (Nuclotron-based Ion Collider fAcility) is a new flagship project aimed at the construction at JINR (Dubna) a modern machine providing beams of heavy ions with the highest intensity ever achieved in the energy range from 4 to 11 GeV per nucleon. The main scientific goal of the NICA project is the experimental exploration of a yet poorly known region of the QCD phase diagram of the highest net-baryon density with an emphasis on the nature of deconfinement phase transition, study of hadron properties in dense baryonic matter, and search for the critical end point (CEP).

The study of strangeness production is of particular interest. Since strange hadrons are initially not present but created during the heavy-ion collisions, the strangeness is one among the most sensitive probes for the deconfinement phase transition as well as for the in-medium effects in dense nuclear matter.

The prospects for a study of strangeness and hypenuclei production with the MultiPurpose Detector (MPD) at NICA will be presented and the detector performance for such physics analyses, evaluated from the Monte Carlo simulation, demonstrated.

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Presenter(s) : Dr. ZINCHENKO, Alexander (JINR)

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **323** Type : **Plenary/section talk**

Hadronic production of radial and orbital excitations of doubly heavy baryon Ξ_{cc}

Friday, 26 October 2018 17:15 (15)

In view of the recent discovery of Ξ_{cc} by the LHCb collaboration the study of doubly heavy baryons is becoming relevant. In this work we discuss the prospects of the observation of such states with excited cc-diquark (S and P excitations) by the LHCb experiment. P-wave excitations of a diquark in Ξ_{cc} are expected to be quite narrow since their decay into the ground state is suppressed as Λ^2_{QCD}/m_c^2. The relative yield of S-wave and P-wave excitations for the LHCb kinematics has been estimated as 50% and 5% respectively.

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Presenter(s) : Mr. BELOV, Ilia (Moscow State University)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **324** Type : **Plenary/section talk**

Neutrino astrophysics with Borexino: comprehensive study of proton-proton chain solar neutrinos

Tuesday, 23 October 2018 09:00 (15)

For thousands years of human evolution we were curious about what the Sun is? Answers began to come during recent 50 years, thanks to development of astrophysics and helioseismology, particle and neutrino physics. The latter research field allows studying the Sun's deep interior and achieved enormous progress during last ten years. This period of Sun's studies is marked by the operation of the currently most sensitive solar neutrino detector Borexino, which takes data in Gran Sasso national laboratories in Italy. Thanks to extreme radiopurity achieved in Borexino, this is for the first time that a single detector is able to separately measure neutrinos produced in various nuclear reactions of the solar proton-proton fusion chain. Borexino results indicate the preference of high over low metallicity solar models - the step forward of extreme importance for solar physics. Neutrino physics gains as well: for the first time Borexino examines the MSW-LMA neutrino oscillation paradigm both in the vacuum and the matter dominated regimes. In this talk I overview the wide set of Borexino accomplishments done in the fields of solar and neutrino physics.

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Presenter(s) : Dr. LITVINOVICH, Evgeny (NRC Kurchatov Institute)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **325** Type : **Plenary/section talk**

Exotic hadrons in the decays of vector bottomonia

Friday, 26 October 2018 10:50 (15)

Line shapes of the Zb(10610) and Zb(10650) bottomonium-like exotic states produced in the decays of vector bottomonium Upsilon(10860) are analysed. A combined analysis of the existing experimental data in the elastic and inelastic decay channels of Upsilon(10860) is performed within a nonperturbative coupled-channel approach which complies with the requirements of unitarity and analyticity of the multichannel amplitude. The nature of the Zb states is revealed and the parameters of the interaction are extracted from the fit for the data. The heavy quark spin symmetry is employed then to predict the poles position and the line shapes of the spin partners of the Zb states which are expected to be produced in radiative decays of the vector bottomonia Upsilon(10860) and Upsilon(11020).

Primary author(s) : Dr. NEFEDIEV, Alexey (MEPhI)

Presenter(s) : Dr. NEFEDIEV, Alexey (MEPhI)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **326** Type : **Plenary/section talk**

Search for K+ ->pi+nunu at NA62

Tuesday, 23 October 2018 18:15 (15)

The decay K+→π+νν, with a very precisely predicted branching ratio of less than 10-10, is one of the best candidates to reveal indirect effects of new physics at the highest mass scales. The NA62 experiment at CERN SPS is designed to measure the branching ratio of the K+→π+νν with a decay-in-flight technique, novel for this channel. NA62 took data in 2016, 2017 and another year run is scheduled in 2018. Statistics collected in 2016 allows NA62 to reach the Standard Model sensitivity for K+→π+νν, entering the domain of 10-10 single event sensitivity and showing the proof of principle of the experiment. The analysis data is reviewed and the preliminary result from the 2016 data set presented.

Primary author(s) : KURSHETSOV, Victor (IHEP, Protvino)

Presenter(s) : KURSHETSOV, Victor (IHEP, Protvino)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **327** Type : **Plenary/section talk**

Neutron lifetime: experimental problem or anomaly?

Friday, 26 October 2018 10:15 (15)

The review of experimental measurements of neutron lifetime is presented. Latest measurements with gravitational trap (PNPI NRC KI) and magnetic trap (LANL, USA) confirmed the result obtained by PNPI group in 2005. The results of measurements performed using UCN storing method are in good agreement; however there is a significant discrepancy at 3.5σ (1% of decay probability) level with beam method experiment. That discrepancy is mentioned in scientific literature as "neutron anomaly". The possible sources of the discrepancy are discussed.

Primary author(s) : Prof. SEREBROV, Anatolii

Presenter(s) : Prof. SEREBROV, Anatolii

Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **328** Type : **Plenary/section talk**

The first observation of effect of oscillation in Neutrino-4 experiment on search for sterile neutrino

Tuesday, 23 October 2018 16:45 (25)

We report Neutrino-4 experiment results of measurements of reactor antineutrinos flux and spectrum dependence on the distance in range 6-12 meters from the center of the reactor core. The fit of experimental dependence with the law $1/L^2$, where L is the distance from the reactor center, gave satisfactory result with goodness of fit 81%. However, we discovered that the experimental neutrino spectrum is different from the calculated one. Using experimental spectrum we performed the model independent analysis of restrictions on oscillation parameters Δm^2_{14} and $sin^2 2\Theta_{14}$. The results of this analysis exclude area of reactor and gallium anomaly at C.L more than 99.7% ($> 3\sigma$) for values $\Delta m^2_{14} \leq 4\ eV^2$ and $sin^2 2\Theta_{14} > 0.1$. However, we observed an oscillation effect at C.L. 99.7% (3σ) in vicinity of $\Delta m^2_{14} \approx 7\ eV^2$ and $sin^2 2\Theta_{14} \approx 0.35$. The method of coherent addition of results of measurements, which allows us to directly observe the effect of oscillations, is proposed. The analysis of that effect is presented. In general, it seems that the effect predicted in gallium and reactor experiments is confirmed but at sufficiently large value of Δm^2_{14}. Future prospects of the experiment are discussed.

Primary author(s) : Prof. SEREBROV, Anatolii

Presenter(s) : Prof. SEREBROV, Anatolii

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **329** Type : **Plenary/section talk**

Experiment BEST-2 with a source of 65Zn on gallium target for the search of neutrino oscillations on a short baseline

Tuesday, 23 October 2018 18:25 (15)

A proposal for an experiment on a 2-zone gallium target of a solar Gallium-germanium neutrino telescope in the Baksan neutrino Observatory of the INR RAS with a source of 65Zn for short baseline neutrino oscillations search is considered. The possibilities of determining the parameters of oscillations, the necessary characteristics of the neutrino source, the possibility of its production and use are described. The expected results are compared with the BEST experiment with the 51Cr source.

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Presenter(s) : Dr. GORBACHEV, Valery (BNO, INR RAS)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **330** Type : **Plenary/section talk**

GEM / CSC tracking system of the BM@N experiment at the Nuclotron

Thursday, 25 October 2018 17:35 (15)

BM@N (Baryonic Matter at the Nuclotron) is the fixed target experiment aimed to study nuclear matter in the relativistic heavy ion collisions at the Nuclotron accelerator in JINR. Detectors based on Gas Electron multipliers (GEM) have been identified as appropriate for the BM@N central tracking system, which is located inside the BM@N analyzing magnet. Cathode Strip Chamber (CSC) is installed outside the magnet to improve momentum resolution of the experimental setup. The structure of the GEM and CSC detectors and the results of study of their characteristics are presented.Both GEM and CSC detectors are integrated into the BM@N experimental setup and data acquisition system. Their performance at the last Nuclotron run is shortly reviewed.

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Presenter(s) : MAKSYMCHUK, Anna

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **331** Type : **Plenary/section talk**

New constraints on magnetic moments of solar neutrinos in Borexino

Tuesday, 23 October 2018 09:15 (15)

Effective magnetic moment of solar neutrinos is constrained using a 1291.5 days dataset of Borexino Phase-II. The sought-for effect from electromagnetic neutrino interaction is the contribution to the low-energy part of the $\nu - e$ scattering cross section affecting the shapes of the electron recoil spectra. Spectral fit of the solar neutrino data leads to the limit of $\mu_\nu^{eff} < 2.8 \cdot 10^{-11} \mu_B$ (90% C. L.). Finally, this result has been used to constrain the elements of the magnetic moments matrix in the mass and flavor bases.

Primary author(s) : VISHNEVA, Alina (DLNP JINR)

Presenter(s) : VISHNEVA, Alina (DLNP JINR)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **332** Type : **Poster**

Forbush Decrease Mechanism in a Magnetic Cloud

Monday, 22 October 2018 15:40 (150)

Using back tracing we research galactic cosmic ray propagation in a moving magnetic cloud having the shape of magnetic loop. It is obtained that the inductive electric field of an extended magnetic cloud decreases particle energy. Both energy losses and long particle trapping by a magnetic loop produce Forbush decrease. The calculation results of particle density and the components of uni- and bidirectional anisotropies are shown. The calculation results generally agree with measurements.

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Presenter(s) : PETUKHOVA, Anastasia (Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy of SB RAS)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **333** Type : **Poster**

Practical realization of the Force-free Magnetic Field models

Monday, 22 October 2018 15:40 (150)

To apply force-free magnetic field models we present and discuss properties and feathers of the following models: Miller and Turner solution, modified Miller and Turner solution, Romashets and Vandas solution, Integral model, Krittinatham and Ruffolo model. These models can be used to interpret in-situ observations of the magnetic flux rope, study Forbush decrease in magnetic clouds or investigate transport effects of solar energetic particles injected inside a coronal mass ejection.

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Presenter(s) : PETUKHOVA, Anastasia (Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy of SB RAS)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **334** Type : **Plenary/section talk**

Vacuum polarization of a quantized scalar field in the thermal state in a long throat

Wednesday, 24 October 2018 16:55 (20)

The study of vacuum polarization effects in strong gravitational fields is a pertinent issue since such effects may play a role in the cosmological scenario and the construction of a self-consistent model of black hole evaporation. These effects can be taken into account by solving the semiclassical backreaction equations

$G^\mu_\nu = 8\pi\langle T^\mu_\nu\rangle,$ (1)

where $\langle T^\mu_\nu\rangle$ is the expectation value of the stress-energy tensor operator for the quantized fields.

The main difficulty in the theory of semiclassical gravity is that the vacuum polarization effects are determined by the topological and geometrical properties of spacetime as a whole or by the choice of quantum state in which the expectation values are taken. It means that calculation of the functional dependence of $\langle T^\mu_\nu\rangle_{ren}$ on the metric tensor in an arbitrary spacetime presents formidable difficulty. Only in some spacetimes with high degrees of symmetry for the conformally invariant fields $\langle T_{\mu\nu}\rangle_{ren}$ can be computed and equations of the theory of semiclassical gravity can be solved exactly. Let us stress that the single parameter of length dimensionality in problem (1) is the Planck length l_{PL}. This implies that the characteristic scale l of the spacetime curvature (which corresponds to the solution of equations (1) can differ from l_{PL} only if there is a large dimensionless parameter. As an example of such a parameter one can consider a number of fields the polarization of which is a source of spacetime curvature (*it is assumed, of course, that the characteristic scale of change of the background gravitational field is sufficiently greater than l_{PL} so that the very notion of a classical spacetime still has some meaning*). In the case of massive field, the existence of an additional parameter $1/m$ does not increase the characteristic scale of the spacetime curvature l which is described by the solution of equations (1) (*the characteristic scale of the components G^μ_ν on the left-hand side of equations (1) is $1/l^2$, on the right-hand side - ${l_{PL}}^2/(m^2l^6)$*). For the massless quantized fields such a parameter can be the coupling constants of field to the curvature of spacetime [1]. Another possibility of introducing an additional parameter in the problem (1) is to consider the non-zero temperature of quantum state for the quantized field. It is known (see, e.g., [2]) that in the high-temperature limit (when $T \gg 1/l, T$ being a temperature of thermal state) $\langle T^\mu_\nu\rangle$ for such a thermal state is proportional to the fourth power of the temperature T.

In this work an analytical approximation of $\langle\varphi^2\rangle$ for a quantized scalar field in a thermal state at arbitrary temperature is considered. The scalar field is assumed to be both massive and massless, with an arbitrary coupling ξ to the scalar curvature, and in a thermal state at an arbitrary temperature T. The gravitational background is assumed to be static spherically symmetric and slowly varying. We have shown that in such spacetime the effect of vacuum polarization of a quantized scalar field in the thermal state does not depend on temperature and conditions at infinity. This implies that in considered situation $\langle\varphi^2\rangle$ is a local quantity for any finite mass m of the quantized field, including $m = 0$.

References

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[2] N. Nakazawa and T. Fukuyama, *Nucl. Phys. B* **252**, 621 (1985).

[3] A.A. Popov, *Phys. Rev D.* **94**, 124033 (2016).

Primary author(s) : Dr. POPOV, Arkadiy

Presenter(s) : Dr. POPOV, Arkadiy

Session Classification : Gravitation and Cosmology

Contribution ID : **335** Type : **Poster**

Reissner-Nordstr\"om solution in tetrad representation as model for classical electron

Monday, 22 October 2018 15:40 (150)

The exact Reissner-Nordstr\"om solution of the Maxwell and Einstein equations corresponding the electromagnetic field configuration localized in the region with the range of about 10^{-34} cm is considered as a model for the classical electron. It is shown that in the tetrad representation, in spite of singularities of the electromagnetic and gravitational fields, there are solutions with the finite total Lagrangian and total electron mass. It is argued that the gravitational force can play a crucial role in the structure of elementary particles.

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Presenter(s) : Dr. MANAENKOV, Serguei (NRC "Kurchatov Institute")

Session Classification : Poster session and coffee-buffet

Track Classification : Gravitation and cosmology

Contribution ID : **336** Type : **Plenary/section talk**

Measurement of electroweak boson production in pp, p+Pb and Pb+Pb collisions with the ATLAS detector

Thursday, 25 October 2018 16:50 (20)

Measurement of electroweak boson production in different collision systems are of great interest to understanding the partonic structure of heavy nuclei, and serve as a constraint on the initial state in larger collision systems. Their production yields in Pb+Pb with respect to pp collisions provide direct tests of both binary collision scaling and possible modification of parton distribution functions (nPDF) due to nuclear effects. Further, the p+Pb collisions provide a relatively clean environment to study nPDFs in detail. The ATLAS detector has a broad acceptance with excellent performance even in the high occupancy environment of central heavy-ion collisions. In this talk the latest ATLAS results on W and Z boson production at the center-of-mass energy of 5.02 TeV are presented, including updated precise result production in pp collisions. Also photon yields are reported in 8.16 TeV p+Pb collision data, and the production rates are compared to an extrapolated pp reference based on existing 8 TeV collision data.

Primary author(s) : Mr. JANUS, Piotr

Presenter(s) : Mr. JANUS, Piotr

Session Classification : Heavy Ion Physics

Contribution ID : **337** Type : **Plenary/section talk**

Measurements of quarkonia and open charm production in heavy-ion collisions with the ATLAS detector

Thursday, 25 October 2018 16:30 (20)

Measurements of quarkonia produced in ultrarelativistic Pb+Pb collisions provide a means to probe the properties and evolution of the hot and dense medium created in those collisions. Promptly produced quarkonia are directly affected by the interaction with the hot nuclear matter, while non-prompt production allows for the study of b-quark energy loss. The studies of quarkonia production are complemented by measurements of the azimuthal modulation of J/ψ production. Studies of quarkonia and open charm production in p+Pb collisions provide an additional insight, as they directly probe cold nuclear matter effects. This talk will report on the most recent ATLAS measurements of charmonia production and flow in Pb+Pb collisions, as well as charmonia and bottomonia production in p+Pb collisions. In addition, results on D meson production and flow will be presented.

Primary author(s) : KREMER, Jakub (AGH University of Science and Technology)

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Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **338** Type : **Plenary/section talk**

Measurements of secondary origin nuclei and isotopes in cosmic rays with AMS02

Friday, 26 October 2018 10:25 (20)

Nuclei and isotopes of secondary origin are important tools to understand and model the propagation of cosmic rays (CR) through the Galaxy. We report on the observation of new properties of secondary cosmic rays Li, Be, and B measured in the rigidity (momentum per unit charge) range 1.9 GV to 3.3 TV with a total of 5.4 million nuclei collected by AMS during the first five years of operation aboard the International Space Station. All the three fluxes have an identical rigidity dependence above 30 GV and deviate from a single power law above 200 GV in an identical way. This behavior of secondary cosmic rays has also been observed in the AMS measurement of primary cosmic rays He, C, and O but the rigidity dependences of primary cosmic rays and of secondary cosmic rays are distinctly different. We also present the status of Z<=2 isotope measurements, also of secondary origin, able to further constrain CR propagation models. Such measurements are presented in dependence of kin. En/n and cover a still substantially uncharted energy range.

Primary author(s) : Dr. DIMICCOLI, Francesco (UNITN - Università degli studi di Trento)

Presenter(s) : Dr. DIMICCOLI, Francesco (UNITN - Università degli studi di Trento)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **339** Type : **Plenary/section talk**

UCN supersource at WWR-M reactor development

Wednesday, 24 October 2018 10:40 (15)

The WWR-M reactor at NRC «Kurchatov Institute» - PNPI is going to be equipped with an high-density ultracold neutron source. Method of UCN production is based on their accumulation in the superfluid helium at 1.2K temperature. Thus, the source will provide the UCN density at EDM spectrometer equals to ρ= 1.3E4 n/cm3 which is 2 order magnitude greater than the output density of existing UCN source in the world. An extensive program of fundamental researches such as measuring of neutron lifetime and searching of neutron-antineutron oscillation is planned. In addition, CN and VCN beams are going to be equipped with condensed matter physics experimental setups. The design of the UCN source has been completed, complex tests at full-scale model showed that is possible to maintain superfluid helium under reactor heat load; calculations of an UCN source passive shielding, which ensures source safe operation, is completed. At the moment the process of UCN source manufacturing is taking place.

Primary author(s) : Prof. SEREBROV, Anatolii (NRC "Kurchatov Institute" - PNPI); Mr. LIAMKIN, Vitalii (NRC "Kurchatov Institute" - PNPI); Dr. FOMIN, Alexey (NRC "Kurchatov Institute" - PNPI); Mr. KOPTYUKHOV, Artem (NRC "Kurchatov Institute" - PNPI); Mr. PRUDNIKOV, Dmitriy (NRC "Kurchatov Institute" - PNPI); Mr. SAMODUROV, Oleg (NRC "Kurchatov Institute" - PNPI); Mr. ILATOVSKIY, Vladimir (NRC "Kurchatov Institute" - PNPI); Prof. KESHISHEV, Konstantin (P.L. Kapitza IPP of RAS); Dr. BOLDAREV, Sergey (P.L. Kapitza IPP of RAS)

Presenter(s) : Mr. LIAMKIN, Vitalii (NRC "Kurchatov Institute" - PNPI)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **340** Type : **Plenary/section talk**

Measurements of the Higgs boson by ATLAS and CMS

Friday, 26 October 2018 12:00 (35)

Recent results on Higgs boson production and decays in the ATLAS and CMS experiments at the LHC are reviewed. They are mostly based on the analyses of 13 TeV LHC proton-proton collision data accumulated during 2015–2016 or 2015–2017 year exposures. Production cross sections in five main decay channels are measured. These channels are combined to extract the Higgs boson signal strength, mass and couplings. All experimental results are found to be compatible with the Standard Model predictions. Upper limits on non-standard Higgs boson production in different decay modes are also put.

Primary author(s) : TSUKERMAN, Ilya (Ilia)

Presenter(s) : TSUKERMAN, Ilya (Ilia)

Session Classification : Plenary

Contribution ID : **341** Type : **Poster**

Complex method of preparing working medium for two-phase xenon emission detector

Monday, 22 October 2018 15:40 (150)

The attachment of electrons to electronegative impurities in condensed phases is the most important process limiting performance of two-phase emission detectors. These impurities are also responsible for some other processes that degrade the efficiency of the detector, such as reducing energy of electrons during drift and absorbing UV radiation. We present a complex method for preparing working medium for the next generation of two-phase emission detectors planned for use in the largest international nuclear physics experiments. The method is based on multi-stage technology for xenon purification from electronegative impurities. In the first stage, liquid xenon is irradiated by the hard ultraviolet radiation generated by an electric high-voltage discharge in a liquid, for the purpose of decomposition of complex high-molecular impurities due to photolysis. At the second stage, a massive sample of liquid xenon is purified with nanodispersed titanium generated in the liquid by a high-voltage electric discharge between the titanium electrodes. In the third stage, which can run parallel to the first and second stages in time, the internal surfaces of the detector and gas lines are cleaned by repeatedly circulating the gaseous xenon through a hot metal getter in a closed loop. At the fourth stage, already during the operation of the detector, the liquid xenon is withdrawed from the filled detector, evaporated in a special heat exchanger, goes through the hot metal getter, and condensates into the detector by means of a heat exchanger. This stage is carried out simultaneously with a physical experiment and assumes a continuous measurement of the lifetime of electrons before capture by electronegative impurities to correct the experimental data obtained.

Primary author(s) : Mr. SHAKIROV, Aleksey (MEPhI); Dr. AKIMOV, Dmitry; Mr. BELOV, Vladimir; Prof. BOLOZDYNYA, Alexander; KHROMOV, Alexander; KONOVALOV, Alexey; Mr. KOVALENKO, Aleksey (NRNU MEPhI); KOZLOVA, Ekaterina (NRNU MEPhI); Mr. KUMPAN, Alexander; Mr. LUKYASHIN, Anton; MELIKYAN, Yury (NRNU MEPhI); NEPOCHATAYA, Olga; Mr. RUDIK, Dmitry; Mr. SOSNOVTSEV, Valery (NRNU MEPhI)

Presenter(s) : Mr. SHAKIROV, Aleksey (MEPhI)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **342** Type : **Plenary/section talk**

The Dark Matter search at KamLAND

Wednesday, 24 October 2018 09:00 (20)

Nature of the Dark Matter is one of the most fundamental physics problems. While practically all currently running Dark Matter experiments yield no positive result the DAMA/LIBRA collaboration continues to claim observation of the Dark Matter signal in the NaI(Tl) detector located deep underground. The new data released from the DAMA/LIBRA phase-2 experiment favors presence of a modulated signal from the Dark Matter with proper features at 11.9 sigma C.L. However, due to importance of the problem this observation requires verification by other groups of independent researchers.

This talk describes development of the ultra-low background NaI(Tl) detector modules by the KamLAND collaboration. It covers several subjects: the research infrastructure we built at the Kamioka mine (including supplementary neutron and radon detectors), a new laboratory for growth of ultra-low background crystals, selection of ultra-low background detector components, and experimental data taken with new NaI(Tl) ultra-low background test modules. Also it explains advantages of using a central ultra-low background region of the KamLAND liquid scintillator neutrino detector as a location for a large Dark Matter detector made of isolated NaI(Tl) modules.

Primary author(s) : KOZLOV, Alexandre

Presenter(s) : KOZLOV, Alexandre

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **343** Type : **Plenary/section talk**

Cosmological Mission of Higgs Boson and Evolution of Universe

Monday, 22 October 2018 15:40 (150)

The original ideas of new theory – "Non-Inflationary Cosmology" (NIC) – and its consequences are manifested: 1. Global hierarchy of Bose-Einstein statistics' (BES) at earliest Universe guarantees the formation of Bose-Einstein condensate in Matter Era (ME). 2. New phenomenon – Cosmological Small-Bang – has been disclosed as a consequence of further phase-transition process from BES to FDS in ME. 3. Time-evolution of Planck constant may be an alternative mechanism for the explanation of cosmological redshift. 4. Higgs boson's cosmological mission with this hypothesis disclose fundamental new cosmic scales for ME, which already is perceives by modern physics. A broad scenario is revealing to unify into general model the mechanisms of generation of galaxies and their components (black holes, massive stars and supernovas). An original road map for theoretical investigations and astrophysical observations is suggested, aiming at explanation of morphological varieties of galaxies and their rotation's profiles. The space-time-energy new fundamental measures in ME describe the evolution of Universe in ME, especially the hierarchic structure of galaxies' groups and clusters, even illustrate the possible essence of giant voids. In suspense of "storage of frozen micro-pieces of BEC" within the galactic cosmic rays and relativistic jets, the experimental advantage of Higgs bosons assure a far-reaching program for the possible comparison of NIC results with experimental data of two major Russian projects: "OLIMPIA" and "Synthesis of Super Heavy Elements".

Primary author(s) : Prof. AVETISSIAN, Ara (Yerevan state university, Observatory)

Presenter(s) : Prof. AVETISSIAN, Ara (Yerevan state university, Observatory)

Session Classification : Poster session and coffee-buffet

Contribution ID : **344** Type : **Poster**

Additional sources of antineitrinos in experiments on nuclear reactors

Monday, 22 October 2018 15:40 (150)

The flux and spectrum of reactor antineitrinos depend not only on the current reactor state, which is specified by the power level and the nuclear fuel used, but also on the amount of spent fuel (SF) in the pool where spent fuel placed after refueling. The antineutrino spectrum from SF pool observed in 30 cubic meters detector at a distance 400 m is presented in the work.

Primary author(s) : LARIN, Dmitry

Co-author(s) : SINEV, Valery (Institute for Nuclear Research RAS)

Presenter(s) : LARIN, Dmitry

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: neutrino physics

Contribution ID : **345** Type : **Plenary/section talk**

Overview of the Compact Linear Collider (CLIC) project

Wednesday, 24 October 2018 09:20 (20)

Abstract: The Compact Linear Collider (CLIC) is a proposed high-luminosity linear electron-positron collider at the energy frontier, designed to be built near CERN, Geneva. To maximize the physics potential of CLIC a staged approach is adopted with three distinct energy stages currently assumed to be 380 GeV, 1.5 TeV and 3 TeV. The initial energy stage is optimized for the precise measurement of Higgs boson properties, as well as precision top quark physics. With precisions beyond the HL-LHC reach, this programme further provides very competitive constraints on models describing physics beyond the Standard Model. The higher energy stages of CLIC will focus on measurements of rare Higgs-boson processes, as well as direct and indirect searches for new physics, and precision measurements of possible new particles. This talk will present the current status of the project, including detector R&D activities, and present full simulation results of the foreseen physics programme.

Primary author(s) : PANDUROVIC, Mila (Vinca Insitute of Nuclear Sciences); ON BEHALF OF CLICDP COLLABORATION

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Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **346** Type : **Poster**

Recovery Time Measurements of the Hamamatsu Linear Assembly SiPM

Monday, 22 October 2018 15:40 (150)

Abstract. The pixel recovery time of the Hamamatsu SiPM linear assembly was measured. The assembly contains eight SiPMs of 2.8 mm active area diameter; pixel size is 15 x 15 mkm2. The assembly is used in calorimeters of the CMS experiment. The measurements were made for two groups of pixels: 49 and 17 pixels. Recovering time was found as 7 ns and 6 ns respectively. The amplifier of 40 db and digital oscilloscope TDS3052 Tektronix were used when measurements.

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Presenter(s) : Mr. KAYUMOV, Fred (LPI, MEPhI)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **347** Type : **Plenary/section talk**

Creation of the ”Carpet-3” multipurpose shower array for search of diffuse gamma radiation whith energy E>100 TeV

Tuesday, 23 October 2018 16:45 (15)

An experiment for measuring the flux of cosmic gamma rays with energy above 100TeV is currently being prepared at the Baksan Neutrino Observatory of the Institute for Nuclear Research, Russian Academy of Sciences. At present the plastic scintillation counters with a total continuous area of 410mˆ2 are installed in the muon detector (MD) underground tunnels, and they are totally equipped with electronics. Six modules of shower detectors(out of twenty planned to be installed) have been already placed on the surface of the MD absorber. In each of them are placed on 9 standard plastic scintillation counters with an area of 1mˆ2 each. These modules are by part ground of "Carpet-3" shower array. It is also placing and arrange of recording apparatus for this array. The calculations are showed that the "Carpet-3" shower array will have the best sensitivity to the flux of primary gamma rays with energy TeV and will be quite competitive in gamma ray astronomy in such energies.

Primary author(s) : Dr. KUDZHAEV, Aleksandr (Baksan Neutrino Observatory, INR of RAS)

Presenter(s) : Dr. KUDZHAEV, Aleksandr (Baksan Neutrino Observatory, INR of RAS)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **348** Type : **Plenary/section talk**

Cosmic ray electrons and positrons over decade with the PAMELA experiment

Friday, 26 October 2018 11:00 (15)

The PAMELA experiment has measured the electron and positron fluxes at Earth orbit from June 2006 till January 2016. The spectra have been evaluated in wide energy range from several tens MeVs till several TeVs. Measurements were carried out during the A<0 solar minimum of solar cycle 23 till the beginning of A>0 epoch. These measurements provide important information to study cosmic ray sources and propogation in Galaxy and heliosphere

Primary author(s) : MIKHAILOV, Vladimir (NRNU MEPHI); KLEYMENOVA, Svetlana (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute))

Presenter(s) : MIKHAILOV, Vladimir (NRNU MEPHI)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **349** Type : **Poster**

Digitised response of the highly granular ILD hadron calorimeter to single hadrons

Monday, 22 October 2018 15:40 (150)

Highly granular calorimeters are proposed for the calorimeter systems of multi-purpose detectors at future lepton colliders. In particular, the ILD hadron calorimeter will be assembled from scintillator tiles read out directly by silicon photomultipliers. We have measured a response of the tile-SiPM system to minimum ionising particles emulated by electrons from radioactive source. The contribution of different effects, such as light collection efficiency and electronic noise, to the response width was estimated from these experimental data. The estimated contribution is implemented in the digitisation of simulated signals from single hadrons in the cells of the ILD hadron calorimeter. We show here the impact of the experimentally measured detector effects on the simulated ILD hadron calorimeter resolution for single hadrons in the energy range from 5 to 50 GeV.

Primary author(s) : Mr. KORPACHEV, Sergey; CHADEEVA, Marina (P.N. Lebedev Physical Institute of RAS (LPI))

Presenter(s) : Mr. KORPACHEV, Sergey

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **350** Type : **Plenary/section talk**

The contribution of the sigma-meson to the Lamb shift of muonic hydrogen

Wednesday, 24 October 2018 09:30 (15)

Among the various electromagnetic interactions, the processes of two-photon meson production take a special place. First, they have been studied experimentally for quite a long time, for which a rich material has been accumulated. Secondly, with the development of the quark model and non-perturbative methods of quantum chromodynamics, such reactions, as well as the reverse decay processes of mesons into two photons, were constantly in the field of intensive theoretical studies. A new round of interest in such processes is connected with their possible role as a new source of interactions between leptons and nucleons. Since in atomic physics there are precise experiments to measure the fine and hyperfine structure of the spectrum, any new contributions to the particle interaction operator are important and can be studied experimentally. The first estimate of the contribution of effective meson exchanges in muonic hydrogen, which have already appeared, show that this contribution can be significant. In this study we extend our analysis to the case of scalar mesons. There are several scalar mesons with the mass near 1 GeV, which can contribute to the effective muon-proton interaction: f0(550) (or sigma), f0(980), a0(980), f0(1370). On the basis of quasipotential method in quantum electrodynamics we construct the muon-proton interaction amplitudes due to scalar meson exchange. Analytical expressions for corresponding energy shifts in the case of 2S- and 2P-states are obtained. Using quark model we calculate parameters of two-photon - scalar meson transition form factor and obtain numerical estimate of the contribution to the Lamb shift (2P-2S) in muonic hydrogen.

Primary author(s) : Dr. DOROKHOV, Alexandr; Dr. MARTYNENKO, Alexey; MARTYNENKO, Fedor; Mr. RADZHABOV, Andrei

Presenter(s) : MARTYNENKO, Fedor

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **351** Type : **Plenary/section talk**

EXO-200 results

Wednesday, 24 October 2018 09:15 (15)

EXO-200 is dedicated for study of the double beta decay of ^{136}Xe using 200kg of enriched xenon. This large and homogeneous TPC filled with liquid xenon have proven to be excellent tool in the search for neutrinoless double beta decay with ultra-low background and state of the art sensitivity. The experiment made the first observation of the $2\beta2\nu$ decay in ^{136}Xe and the most precise measurement of half-life among any double beta decay isotopes to date. I will report on current status and the latest results obtained.

Primary author(s) : Mr. BELOV, Vladimir

Presenter(s) : Mr. BELOV, Vladimir

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **352** Type : **Poster**

Development of Transition Radiation Detectors for hadron identification at TeV energy scale.

Monday, 22 October 2018 15:40 (150)

Possible study of hadron production at small angles with respect to beam at the Large Hadron Collider (LHC) is being actively discussed now. Apart from a better understanding of the fundamental QCD processes, the study of high energy particle production in the forward direction is an extremely important topic for cosmic ray physics. Such measurements could remove uncertainties in physics models explaining particle production with energies up to 10^17 eV in the Universe. The energy range of the particles explored in the proposed Small-Angle-Spectrometer (SAS) experiments at the LHC extends from ~1 TeV to ~6 TeV that corresponds for protons, kaons and pions to Lorentz gamma-factor value from ~10^3 to ~4*10^4. The only particle identification technique able to effectively separate hadrons with these gamma-factors is based on the properties of the X-ray transition radiation (TR) production. In order to study this possibility, a dedicated set-ups based on straw proportional tube arrays were built and tested at the CERN SPS accelerator. Dedicated Monte Carlo (MC) simulations were also performed and compared with the experimental data. Then this proved MC was used for simulation of possible construction of full-scale Transition Radiation Detectors (TRD) for SAS experiments at the LHC. Some test beam results, comparison with MC simulations and abilities of proposed full-scale TRD are presented.

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Presenter(s) : Dr. TIKHOMIROV, Vladimir (P.N.Lebedev Physical Institute RAS)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **353** Type : **Plenary/section talk**

New Results from Multi-quark Exotic States Searches at D0 Experiment

Friday, 26 October 2018 10:35 (15)

Recent results from a search for multi-quark exotic states at DZero experiment (FNAL, USA) are presented in this talk. This includes the new data for possible tetraquark state X(5568) in the channels with semileptonic decays of B_s mesons. Also, result of the J/\psi \pi system analysis and evidence for exotic charged charmonium-like state Z_c(3900) in semi-inclusive weak decays of b-flavored hadrons are presented as well.

Primary author(s) : Dr. POPOV, Aleksei

Presenter(s) : Dr. POPOV, Aleksei

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **354** Type : **Plenary/section talk**

Description of processes passing at finite space-time intervals in the framework of quantum field theory

Wednesday, 24 October 2018 18:00 (15)

We consider a novel quantum field-theoretical approach to the description of processes passing at finite space-time intervals based on the Feynman diagram technique in the coordinate representation. The most know processes of this type are neutrino and neutral kaon oscillations, which are described nowadays only in an eclectic quantum-mechanical approach. The experimental setting of these processes requires one to adjust the rules of passing to the momentum representation in the Feynman diagram technique in accordance with it, which leads to a modification of the Feynman propagator in the momentum representation. The approach does not make use of wave packets, both initial and final particle states are described by plane waves, which simplifies the calculations considerably. The description is very similar to the usual one performed in the framework of the Feynman diagram technique in the momentum representation, where the standard propagators are replaced by their modified versions. We demonstrate the validity of the formalism by applying it to three processes: neutrino oscillations, unstable particle decay and neutral kaon oscillations. It is shown that the considered approach correctly reproduces the known results.

Primary author(s) : EGOROV, Vadim (M.V.Lomonosov Moscow State University, Skobeltsyn Institute of Nuclear Physics (SINP MSU)); Prof. VOLOBUEV, Igor (Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University)

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Session Classification : Particle Physics: HEP theory

Track Classification : Particle physics: hep theory

Contribution ID : **355** Type : **Plenary/section talk**

Spectroscopy of 7He in reactions of stopped pion absorption by nuclei 12,14C

Friday, 26 October 2018 11:00 (15)

The structure of the levels of the heavy helium isotope 7He have been studied in reactions of stopped pion absorption: 12C(pi−, p4He)X, 12C(pi−, d3He)X и 14C(pi−, t4He)X. Experiment was performed at low energy pion channel of the LANL using two-arm semiconductor spectrometer. Search for nuclear states was correlative measurements of missing mass spectra up to excitation energy of ˜ 30 MeV.

Primary author(s) : Dr. CHERNYSHEV, Boris (NRNU MEPhI); Dr. GUROV, Yuriy (NRNU MEPhI); Dr. LAPUSHKIN, Sergey (NRNU MEPhI); Dr. KARPUKHIN, Vasiliy (NRNU MEPhI); Dr. SANDUKOVSKY, Vyacheslav (NRNU MEPhI)

Presenter(s) : Dr. CHERNYSHEV, Boris (NRNU MEPhI)

Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **356** Type : **Plenary/section talk**

Calibration of the photon spectrometer PHOS of the ALICE experiment

Wednesday, 24 October 2018 17:00 (15)

The procedure of the energy calibration of the highly granulated electromagnetic calorimeter PHOS of the ALICE experiment is presented. PHOS consists of 12544 PbWO4 crystals with Avalanche PhotoDiodes (APD) as photodetectors. It is accompanied by an LED monitoring system and cooling plant which maintains a stable temperature of the crystals at -25° C.

After this latest and new calibration procedure was applied to the pp-collision data at $\sqrt{s}$ = 13 TeV, we obtained π^0 and η peak positions close to their PDG mass values over a wide p_T ranges with widths $\sigma_m^{\pi^0}$ = 4.40 $\pm$ 0.03 MeV/c^2 and σ_m^{η} = 15.3 $\pm$ 1.0 MeV/c^2, respectively.

These methods which were used to perform relative gain calibration, to estimate geometrical alignment and corresponding correction of the absolute energy scale, to calculate the time-dependent corrections and to evaluate the non-linearity corrections, will be discussed and illustrated by the PHOS performance in proton-proton collisions at $\sqrt{s}$ = 13 TeV.

Primary author(s) : Dr. BLAU , Dmitry (NRC "Kurchatov Institute")

Presenter(s) : Dr. BLAU , Dmitry (NRC "Kurchatov Institute")

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **357** Type : **Plenary/section talk**

Study of the charmed mesons pairs production in the electron-positron annihilation with initial state radiation at the energies near the open charm threshold

Friday, 26 October 2018 10:20 (15)

Until recently, parameters of vector charmoinia lying above the open-charm threshold were determined from the inclusive cross section of the electron-positron annihilation to hadronic final state. However, the parameters of the resonances obtained this way are model-dependent and they suffer from large uncertainties. On the other hand, measurements of exclusive cross sections of the e+e- annihilation to charm hadrons should provide important missing information about strong interaction in this region so that the results of such measurements are of large intrest both developments of experimental methods, and theory. In particular, the aforementioned measurements should shed light on the nature on the charminia states with quantum numbers 1−, which are not fully understood yet. Determination of the masses and widths of these resonances in a model-independent way and extraction of their coupling constant to elastic open-charm channels will allow to obtain information on the wave functions of the vector charmonia and to verify the phenomenological models for heavy hadrons.

Primary author(s) : ZHUKOVA, Valentina (LPI OF RAS)

Presenter(s) : PAKHLOVA, Galina (NEPHI, LPI RAS); ZHUKOVA, Valentina (LPI OF RAS)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **358** Type : **Plenary/section talk**

Measurement of K+->$\mu^+\nu_\mu\gamma$ decay form factors in OKA experiment

Tuesday, 23 October 2018 18:00 (15)

A precise measurement of the vector and axial-vector form factors difference $F_V - F_A$ in the decay $K^+ \to ^+$ is presented. About 100K events of $K^+ \to ^+$ have been selected in OKA experiment. The result is $F_V - F_A = 0.13 \pm 0.02(stat.) \pm 0.02(syst.)$. Both errors are two times lower of the first measurement of $F_V - F_A$ in ISTRA experiment. The presented result is considered as preliminary.

Primary author(s) : KRAVTSOV, Vladimir

Presenter(s) : KRAVTSOV, Vladimir

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **359** Type : **Plenary/section talk**

Studies of Short Range Correlations in inverse kinematics at BM@N at the NICA facility

Friday, 26 October 2018 15:50 (15)

NICA-Nuclotron (Nuclotron-based Ion Collider fAcility) is a new accelerator complex designed at the Joint Institute for Nuclear Research (Dubna, Russia) to study properties of dense baryonic matter. NICA will provide variety of beam species ranged from protons and polarized deuterons to very massive gold ions. BM@N (Baryonic Matter at Nuclotron) is the first fixed target experiment at the NICA-Nuclotron. The aim of the experiment is to study collisions of relativistic ion beams of the kinetic energy from 1 to 4.5 AGeV with fixed targets. BM@N energies are perfectly suitable for strange hypernuclei investigation. The last data taking period started a new physics program of SRC (Short Range Correlations) studies at BM@N. The BM@N setup allows detecting of the nucleus after interaction for the first time. BM@N tracking detectors contribute to the identification of the nucleus after hard scattering in inverse kinematics. We will discuss the SRC at BM@N project and present the first results of the BM@N tracking detectors using the data collected in spring 2018.

Primary author(s) : Ms. LENIVENKO, Vasilisa

Presenter(s) : Ms. LENIVENKO, Vasilisa

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **360** Type : **Plenary/section talk**

Charmonium results at Belle

Friday, 26 October 2018 10:05 (15)

A review of recent charmonium experimental results at Belle is presented, including observation of an alternative $\chi_{c0}(2P)$ candidate in $e^+e^- \to J/\psi D\bar{D}$, measurements of the absolute branching fractions of $B^+ \to X_{c\bar{c}}K^+$, measurement of $\eta_c(1S)$ and $\eta_c(2S)$ two-photon production, search for $\Upsilon(1S,2S) \to Z_c^+\bar{Z}_c^-$.

Primary author(s) : CHILIKIN, Kirill (LPI RAS)

Presenter(s) : CHILIKIN, Kirill (LPI RAS)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **361** Type : **Plenary/section talk**

Characterization of a scintillator tile equipped with SiPMs for future cosmic-ray space experiments

Tuesday, 23 October 2018 17:00 (15)

Current gamma-ray and cosmic-ray satellite experiments employ plastic scintillators to discriminate charged and neutral particles and to identify nuclei . Scintillators are commonly read out using the classical photomultiplier tubes (PMTs). Recent measurements and R&D projects are demonstrating that Silicon Photomultipliers (SiPMs) are suitable for the detection of fast light signals with resolution up to the single photoelectron, with a lower power consumption. For these reasons, next generation missions are planning to replace PMTs with SiPMs. We tested a prototype plastic scintillator tile, equipped with a set of SiPMs and studied its response to a beam of electrons and pions at CERN. We used Near Ultraviolet (NUV) SiPMs of 1x1 mm^2 and 4x4 mm^2 area, placed along the edges of the tile. The tile was irradiated in different positions in order to study the dependence of the collected light on the impact point of the beam particles. We also varied the energy of the beam in order to study how this parameter affects the amount of collected light.

Primary author(s) : DI VENERE, Leonardo (INFN Bari)

Co-author(s) : DE LA TORRE LUQUE , Pedro (Università and INFN Bari); Dr. GARGANO, Fabio; Prof. GIORDANO, Francesco (Università and INFN Bari); Dr. FUSCO, Piergiorgio (Bari University and INFN); Dr. LOPARCO, Francesco; LOPORCHIO, Serena (Università and INFN Bari); Dr. MAZZIOTTA, Mario Nicola; SERINI, Davide (Università and INFN Bari)

Presenter(s) : Dr. LOPARCO, Francesco

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **362** Type : **Plenary/section talk**

Some manifestations of two-component Dark Matter structure in vectorlike hypercolor model

Wednesday, 24 October 2018 17:45 (15)

A minimal vectorlike extension of the Standard Model (SM) having two types of stable neutral particles is considered. In this scenario hyper-quark sector is added to the SM and new fermion fields can be rewritten so that to enforce their vectorial interaction with the SM particles. As a consequence of the SU(4) symmetry breaking, in the model it occurs a set of pseudo-Nambu-Goldstone states containing a stable neutral hyper-pion and one more (di-hyper-quark) state, B0, which is also stable. Both of these states can be interpreted as the Dark Matter (DM) carriers.We analyze the mass splitting between these particles, formation of the DM relic abundance and consider possible regions of allowed values of the scenario parameters. As one of applications of the model, we study some annihilation channels for these DM particles which can be a significant source of gamma emission and also electron-positron pairs and neutrino.

Primary author(s) : BEZUGLOV, Maxim (MIPT); Dr. BEYLIN, Vitaly (Research Institute of Physics, Southern Federal University, Russia); Dr. KUKSA , Vladimir (Research Institute of Physics, Southern Federal University, Russia)

Presenter(s) : BEZUGLOV, Maxim (MIPT)

Session Classification : Particle Physics: HEP theory

Track Classification : Particle physics: hep theory

Contribution ID : **363** Type : **Plenary/section talk**

Detecting neutrinos from the next galactic supernova in the NOvA detectors

Tuesday, 23 October 2018 10:30 (15)

Core-collapse supernovae emit about 99% of their gravitational energy in a burst of neutrinos. This signal carries precious information about the processes inside the collapsing core as well as neutrino properties. The large liquid scintillator detectors used by the NOvA experiment provide a possibility to detect such a signal. A dedicated trigger system was developed to perform a search for inverse beta decay neutrino interaction candidates in real time and detect potential supernova bursts, saving the data from the detector for further offline analysis. This system has been running in stable mode since November 2017. Recent improvements in the detection algorithms allowed to extend the sensitivity range for the 9.6 $M_{\odot}$ star collapse up to 7 kiloparsec.

Primary author(s) : SHESHUKOV, Andrey (Joint Institute for Nuclear Research, JINR)

Presenter(s) : SHESHUKOV, Andrey (Joint Institute for Nuclear Research, JINR)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **364** Type : **Plenary/section talk**

Comparisom of the Measured Invarinat Cross Sections with Model Predictions for Production at Zero Angle of Secondary Light nuclei in CC-collisions at Beam Energy 20.5 GeV/n on the Accelerator U-70 IHEP

Wednesday, 24 October 2018 10:00 (15)

Abstract. M.Yu. Bogolyubsky, A.A. Volkov, D.K. Elumakhov, A.A. Ivanilov, A.Yu. Kalinin, A.N. Krinitsyn, V.I. Kryshkin, N.V. Kulagin, D.I. Patalakha, K.A. Romanishin, V.V. Skvortsov, V.V. Talov, L.K. Turchanovich "Comparisom of the Measured Invarinat Cross Sections with Model Predictions for Production at Zero Angle of Secondary Light nuclei in CC-collisions at Beam Energy 20.5 GeV/n on the Accelerator U-70 IHEP". The measurements of the invarinat cross sections for particles and nuclear fragments produced forward at zero angle in CC-collisions at beam energy 20.5 GeV/n have been performed on the accelerator U-70 (National Research Center «Kurchatov Institute » Institute for High Energy Physics, Protvino, Russia). For particle detection we use the combine spectromer built from the beamline no. 22 and detectors of the modified setup FODS. Beam line rigidity was veried from 7 to 70 GeV/c. In the experiment the secondary light nuclei with momenta above kinematic limit of NN-interactions have been detected. The transfering from observed yields of patticles to the invariant cross section made on the base of detailed simulation for propagation of particles and nuclei through the beam line and the FODS detectors in the framework of Geant4. By this we define both the angular aperture of the combine spectrometer and the loss of particles and nuclear fragments due to decays and interactions in the material of the setup. Modern version of Gent4 includes a number of theoretical models that allows simple comparison of experimental data and predictions following from theory to select the preferable model with refinement and adjustment of its parameters. For detailed analysis we chose from Geant4 models QGSP-FTFP-BERT-EMV, outside of this package model UrQMD and also nuclear scaling hypothesis supported with Stavinskij formula in terms of Smin variable.

Primary author(s) : Dr. BOGOLYUBSKY, Mikhail (National Research Center «Kurchatov Institute » Institute for High Energy Physics, Protvino, Russia)

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Session Classification : Particle Physics

Track Classification : Nuclear physics

Contribution ID : **365** Type : **Poster**

Monte-Carlo study of long-range correlations of average transverse momentum and multiplicity for strange particles in pp-collisions at the LHC energies.

Monday, 22 October 2018 15:40 (150)

One of the main directions of modern high-energy physics research is the study of quark-gluon plasma (QGP) – a super-hot and super-dense state of strongly interacting matter that could be formed in the collisions of relativistic heavy nuclei. Recently some signals of the QGP formation were obtained in high-energy pp-collisions at the Large Hadron Collider (LHC) [1], so the interest in the processes occurring in these collisions has increased.

One of the new instruments to study the high-energy particle collisions at the LHC was proposed in [2] to measure the long-range correlations (LRC) between quantities observed in different (pseudo)rapidity intervals – so-called "forward" and "backward" windows, separated by some gap. The appearance of non-negligible values of LRC coefficients might bring important information on the role of the initial stages of hadron-hadron collisions preceding the formation of the QGP. We present in this report the MC-based study of long-range correlations between average transverse momentum $\langle p_T \rangle$ and multiplicity n for particles containing strange quarks. The analysis of LRC in production of K-mesons and Lambda-hyperons in pp-collisions at $\sqrt{s} = 7$ TeV is done in the framework of PYTHIA 8 event generator [3]. The collectivity effects in pp-collisions are taken into account in these MC studies by formation of a so-called "flavour rope", which is hadronized with a larger, effective string tension [4, 5], providing the increase of strangeness yield.

The dependencies of correlation coefficients b_{n-n}, b_{p_T-n} and $b_{p_T-p_T}$ on the gap between forward and backward pseudorapidity windows and on the width of the forward pseudorapidity window are studied. The behavior of correlation coefficients for strange particles is compared with the behavior of correlation coefficients for charged particles. It is demonstrated that for all studied types of particles positive n-n, p_T-n and p_T-p_T correlations are observed. The correlation coefficients of strange particles in each of the considered cases are noticeably less than for charged particles. The difference of the behavior of the correlation coefficients of charged particles and strange particles is discussed. The obtained results do not contradict the model of color string formation and fusion that might occur at the initial stage of pp-collision.

1. ALICE Collaboration. Enhanced production of multi-strange hadrons in high-multiplicity proton–proton collisions // Nature Physics 13, 535–539. 2017.
2. ALICE Collaboration, B. Alessandro et al. ALICE: Physics performance report, volume II // J.Phys. G 32, 1295-2040. 2006.
3. T. Sjostrand, S. Mrenna, P. Skands. An Introduction to PYTHIA 8.2 // Comput. Phys. Commun. 178, 852-867. 2008.
4. C. Bierlich. Rope Hadronization and Strange Particle Production // EPJ Web of Conferences 171, 14003. 2018.
5. C. Bierlich, G. Gustafson, L. Lönnblad. Effects of overlapping strings in pp collisions // J. High Energ. Phys. 2015: 148. 2015.

Primary author(s) : SANDUL, Vladislav; Dr. FEOFILOV, Grigory

Presenter(s) : SANDUL, Vladislav

Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics: heavy ion

Contribution ID : **366** Type : **Plenary/section talk**

Search for neutrinoless double beta decay with the KamLAND-Zen experiment

Wednesday, 24 October 2018 09:30 (15)

Neutrinoless double beta decay is a hypothetical nuclear transition which if observed will allow to establish Majorana nature of neutrino, determine the absolute neutrino mass and the neutrino-mass hierarchy, to verify the lepton number violation and possible contribution of right-handed admixture to weak interaction, help to test leptogenesis, existence of Nambu-Goldstone bosons (majorons) and other effects beyond the Standard Model.

The KamLAND-Zen experiment is searching for neutrinoless double beta decay of Xe-136 by using xenon-loaded liquid scintillator inside the KamLAND detector. The experiment is located in the Kamioka underground laboratory (Hida, Japan) at the depth of approximately 1000 m.

The previous phase of the experiment called KamLAND-Zen 400 used 13 tons of Xe-loaded liquid scintillator contained in a 3.08-m-diameter spherical inner balloon placed at the center of the KamLAND detector. The amount of the enriched xenon gas was almost 400 kg. The KamLAND-Zen 400 experiment was finished at the end of 2015 with the upper limits on the effective Majorana neutrino mass are in the range of 61−165 meV.

Status of the current phase of the experiment called KamLAND-Zen 800 will be reported. The amount of enriched Xe during this phase will be increased up to ˜750 kg. The production and installation of a new 3.84-m-diameter mini-balloon will be shown. The expected sensitivity on the effective Majorana neutrino mass will be discussed.

Progress on R&D for the next phase of the experiment − KamLAND2-Zen − will be also presented.

Primary author(s) : Dr. CHERNYAK, Dmitry (Kavli Institute for the Physics and Mathematics of the Universe, The University of Tokyo)

Presenter(s) : Dr. CHERNYAK, Dmitry (Kavli Institute for the Physics and Mathematics of the Universe, The University of Tokyo)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **367** Type : **Poster**

Complex for spectrometry of hard X-ray and gamma radiation of the Sun and study of polarization of solar flares for the perspective space project SOLARIS.

Monday, 22 October 2018 15:40 (150)

The perspective space project SOLARIS involves research on board a spacecraft launched at Lagrange L1 point, which should provide long-term continuous complex observations of the Sun in various ranges of the electromagnetic spectrum. The complex of scientific devices developed by NRNU MEPhI is designed to study active nonstationary processes on the Sun in a wide range of X-ray and gamma radiation (1 keV to 10 MeV), physical mechanisms of acceleration and transport of electrons, protons and nuclei at various phases of solar flare development, plasma in the region of the flare by the methods of spectral-temporal and polarimetric measurements (in the range 30-150 keV) of radiation fluxes. In this paper, the scientific tasks, operating principles and basic characteristics of NRNU MEPhI devices for the SOLARIS space project are described.

Primary author(s) : Dr. GLYANENKO, Alexander (NRNU MEPhI); Dr. YUROV, Vitali (NRNU MEPhI); Mr. LUPAR, Evgenij (NRNU MEPHI); Mr. TROFIMOV , Yurij (NRNU MEPhI)

Presenter(s) : Dr. GLYANENKO, Alexander (NRNU MEPhI)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **368** Type : **Poster**

Compact neutron generators for the calibration of low background experiments

Monday, 22 October 2018 15:40 (150)

In the coming years, the compact monoenergetic neutron generators producing up to 10^3 n/s may become an alternative to the standard neutron sources based on radioactive isotopes for the calibrations of neutrino and dark matter detectors. Such neutron generators have a typical size of about several centimetres, they may be manufactured using low-background materials and require only low voltage power supply like a standard CR2032 battery for operation. We discuss the advantages and disadvantages of two types of the compact neutron generators, namely a pyroelectric neutron source and a source based on the carbon nanotubes. Also the results of the technical analysis of the possibilities to apply such sources for the calibration of low-background experiments are given, the variants of the internal device design are shown and the data of the primary tests of a full-size compact neutron generator prototype are presented.

The research was supported by the grant from the Russian Science Foundation (project №16-19-10535).

Primary author(s) : CHEPURNOV, Alexander (BNRU, SINP MSU); GROMOV, Maxim (SINP MSU); IONIDI, Vasily (SINP MSU); KAPLII, Anna (BNRU); KIRSANOV, Mikhail (NRNU MEPhI); Mr. KLENIN, Artemiy (BNRU); KOLESNIKOV, Dmitry (BNRU, KIPT); Dr. KUBANKIN, Alexander (BNRU); MASLENKINA, Anastasia (NRNU MEPhI); Mr. OLEINIK, Andrey (BNRU, JAI); SELIVANOVA, Daria (NRNU MEPhI); SHCHAGIN, Alexander (BNRU, KIPT)

Presenter(s) : GROMOV, Maxim (SINP MSU)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **369** Type : **Plenary/section talk**

Investigation of local deformations of muon flux angular distribution during CME with GSE-mapping technique

Wednesday, 24 October 2018 17:15 (15)

Coronal mass ejections (CME) have an impact on the flux of cosmic rays that penetrate the disturbed areas in the heliosphere and the near-terrestrial space. Unlike most ground-based cosmic ray detectors, the URAGAN muon hodoscope (MEPhI) allows to investigate both the integrated counting rate of registered particles and the spatial and angular characteristics of the muon flux at the ground level. To select the local areas with statistically significant intensity changes, the angular distributions for the last hour and preceding it 24 hours corrected for the barometric effect are used. Angular distributions are smoothed, and the matrix relative changes of the angular distribution in units of statistical errors is formed. Using the asymptotic directions calculated in advance, the angular cells of the matrix are mapped from the local coordinate system to the GSE coordinate system. The results of the study of GSE-mapping of local deformations of the angular distribution for different types of CMEs are discussed.

Primary author(s) : ASTAPOV, Ivan (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); BARBASHINA, Natalia (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); DMITRIEVA, Anna (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); Mrs. MELNIKOVA, Irina (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); OSETROVA, Natalia (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); SHUTENKO, Victor (National Research Nuclear University (MEPhI)); YASHIN, Igor (National Research Nuclear University MEPHI)

Presenter(s) : ASTAPOV, Ivan (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute))

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **370** Type : **Plenary/section talk**

Thunderstorm investigations based on the data obtained by the URAGAN muon hodoscope and Doppler weather radar DMRL-C

Wednesday, 24 October 2018 16:45 (15)

Comparison of data obtained by means of two facilities during thunderstorm periods of spring and summer of 2018 has been performed. Muon snapshots (muonographs) and meteorological maps obtained every ten minutes are compared with each other. Distributions of basic parameters describing variations of the muon flux during and before thunderstorms are obtained. Fourier and wavelet analyses of obtained data are performed. Search of possible predictors of thunderstorm is conducted. Results are illustrated by thunderstorm event occurred in Moscow on August 30, 2018.

Primary author(s) : KACHUR, Alexandra (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); PAVLYUKOV, Yuri (Central Aerological Observatory); PETRUKHIN, Anatoly (National Research Nuclear University MEPhI); SEREBRYANNIK, Natalia (Central Aerological Observatory); SHUTENKO, Victor (National Research Nuclear University (MEPhI))

Presenter(s) : KACHUR, Alexandra (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute))

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **371** Type : **Poster**

TOTAL REACTION CROSS SECTIONS OF NEUTRON-RICH LIGHT NUCLEI MEASURED BY THE COMBAS FRAGMENT-SEPARATOR

Monday, 22 October 2018 15:40 (150)

Preliminary results of measurements of the total reaction cross sections σR for weakly bound 4He, 6He, 8He, 7Li, 8Li, 9Li, 11Li, 7Be, 9Be, 10Be, 11Be, 12Be, 8B, 10B, 11B and 12B nuclei at energy range (10-45) A MeV with 28Si and 181Ta target are presented. The secondary beams of light nuclei were produced by bombardment of the 15N (50 A MeV) primary beam on Be target and separated by COMBAS fragment-separator. In dispersive focal plane a horizontal slit defined the momentum acceptance as 1% and a wedge degrader of 600 µm Al was installed. The Bρ of the second section of the fragment-separator was adjusted for measurements in energy range (10-45) A MeV. The strong absorption model reproduces the A-dependence of σR, but not the detailed structure. We are comparing our experimental data with Glauber multiple scattering theory and preliminary results are obtained.

Primary author(s) : BATCHULUUN, Erdemchimeg (JINR); Dr. ARTUKH, Anatoly; Prof. SUREN, Davaa; ISATAEV, Talgat; Ms. HUE , Bui; Mr. KLYGIN, Sergey; Dr. KONONENKO, Gennady; Prof. GONCHIGDORJ, Khuukhenkhuu; Dr. LUKYANOV, Sergey; Dr. MIKHAILOVA, Tatyana; Prof. PENIONZHKEVICH, Yuri; Mr. SEREDA, Yuri; Mr. VORONTSOV, Andrey; Dr. MASLOV , Vladimir; Mr. MENDIBAEV, Kairat

Presenter(s) : BATCHULUUN, Erdemchimeg (JINR)

Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics

Contribution ID : **372** Type : **Poster**

Comparing EAS registered with at PRISMA-32 array and CWC NEVOD

Monday, 22 October 2018 15:40 (150)

The paper presents the data on comparing events recorded with two detectors of the Experimental complex NEVOD: PRISMA-32 array and Cherenkov water calorimeter (CWC) NEVOD. PRISMA-32 is an array for simultaneous registration of the electron-photon and neutron components of the EAS and consists of 32 en-detectors deployed over the area of ˜ 500 m2, along the perimeter of the CWC NEVOD. CWC NEVOD is a detector of a calorimetric type with a volume of 2000 cubic meters, in which the registration system of 91 quasispherical modules (546 FEU-200 photomultipliers) is placed. CWC provides measurement of the intensity of Cerenkov radiation from any direction with practically the same efficiency. The results of comparison of jointly registered events with different selection criteria are presented.

Primary author(s) : GROMUSHKIN, Dmitry (MEPhI)

Co-author(s) : BOGDANOV, Fedor; Mr. BULAN, Alexander (MEPhI)

Presenter(s) : GROMUSHKIN, Dmitry (MEPhI)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **373** Type : **Poster**

The response of the PRISMA-32 and NEVOD setups to the passage of the EAS

Monday, 22 October 2018 15:40 (150)

The PRISMA-32 setup consists of two independently operating clusters which include sixteen scintillation-type en-detectors based on inorganic scintillator ZnSAg + LiF. Detectors of the setup are located on the fourth floor of the Experimental complex NEVOD building on the territory of the MEPhI. PRISMA-32 is deployed above the Cherenkov water calorimeter (CWC); the distance between the detectors is 2.5 m and 5 m, the total area of the setup is ˜ 500 m2. The PRISMA-32 registers two main EAS components - electron-photon and neutrons - throughout the setup area. The CWC is a water tank with a volume of 2000 cubic meters in which the registration system of 91 quasispherical modules with six FEU-200 photomultipliers looking in different directions is deployed. The responses of the two presented detectors to the passage of the EAS are analyzed.

Primary author(s) : BOGDANOV, Fedor

Co-author(s) : GROMUSHKIN, Dmitry (MEPhI); Mr. BULAN, Alexander

Presenter(s) : BOGDANOV, Fedor

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **374** Type : **Poster**

The possibility of sterile neutrino search with ^{144}Ce - ^{144}Pr source and liquid scintillation detectors

Monday, 22 October 2018 15:40 (150)

Expected energy spectra calculations for large volume liquid scintillation detectors to inverse β-decay for anti-neutrinos produced by ^{144}Ce - ^{144}Pr artificial source have been performed. The calculations were carried out through Monte-Carlo method within GEANT4.10 framework and were purposed to search for neutrino oscillation to sterile eigenstate. The analysis of relative sensitivity to oscillation parameters for different detector shapes has been performed.

Primary author(s) : Prof. DERBIN, Alexander; Mr. DRACHNEV, Ilia; LOMSKAIA, Irina (PNPI NRC KI); Mrs. MURATOVA, Valentina; Mrs. PILIPENKO, Nelly (PNPI NRC KI); Mr. SEMENOV, Dmitriy; Mr. UNZHAKOV, Evgeniy

Presenter(s) : LOMSKAIA, Irina (PNPI NRC KI)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: neutrino physics

Contribution ID : **375** Type : **Plenary/section talk**

On stable exponential cosmological solutions with two factor spaces in the Einstein-Gauss-Bonnet model with a Λ-term

Thursday, 25 October 2018 17:50 (20)

We study D-dimensional Einstein-Gauss-Bonnet gravitational model including the Gauss-Bonnet term and the cosmological term Λ. We find a class of solutions with exponential time dependence of two scale factors, governed by two Hubble-like parameters $H > 0$ and h, corresponding to factor spaces of dimensions $m > 2$ and $l > 2$, respectively. These solutions contain a fine-tuned $\Lambda = \Lambda(x, m, l, \alpha)$, which depends upon the ratio $h/H = x$, dimensions of factor spaces m and l, and the ratio $\alpha = \alpha_2/\alpha_1$ of two constants (α_2 and α_1) of the model. The master equation $\Lambda(x, m, l, \alpha) = \Lambda$ is equivalent to a polynomial equation of either fourth or third order and may be solved in radicals. The explicit solution for $m = l$ is presented in Appendix. Imposing certain restrictions on x, we prove the stability of the solutions in a class of cosmological solutions with diagonal metrics. We also consider a subclass of solutions with small enough variation of the effective gravitational constant G and show the stability of all solutions from this subclass.

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Session Classification : Gravitation and Cosmology

Contribution ID : **376** Type : **Plenary/section talk**

Search for lepton flavor violating decay of muon in MEG experiment

Wednesday, 24 October 2018 09:15 (15)

Charged lepton flavor violation (CLFV) is prohibited in SM. On the other hand, detectable branching ratio is predicted in many BSM models, and experimental searches have been performed to find a clue for BSM. MEG experiment has searched for one of the major CLFV process, $\mu \to e\gamma$, by utilizing innovative detector and world most intense DC muon beam at Paul Scherrer Institut. Full data set of MEG has been analyzed, and it set the upper limit of 4.2×10^{-13} to the branching ratio of $\mu \to e\gamma$, which is 30 times better than the previous result given by MEGA experiment.

To further improve the sensitivity by one order of magnitude, upgraded experiment, called MEG II, is in preparation. All the detectors have been upgraded to achieve twice better detector resolutions, and detector commissioning is ongoing. Engineering of MEG II is planned in 2019, followed by the a few years of physics data taking.

In this talk, result of MEG and recent status of MEG II will be reported.

Primary author(s) : OGAWA, Shinji

Presenter(s) : OGAWA, Shinji

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **377** Type : **Poster**

Examples of stable exponential cosmological solutions with three factor spaces in EGB model with a Λ-term

Monday, 22 October 2018 15:40 (150)

We consider a D-dimensional gravitational model with a Gauss-Bonnet term and the cosmological term Λ. We restrict the metrics to diagonal cosmological ones and find for certain Λ a certain examples of solutions with exponential time dependence of three scale factors, governed by three non-coinciding Hubble-like parameters. We prove the stability of these solutions in a class of cosmological solutions with diagonal metrics. A solution describing an exponential expansion of $3d$ subspace with Hubble parameter H and small enough variation of the effective gravitational constant G is singled out.

Primary author(s) : Dr. IVASHCHUK, Vladimir; Mr. ERNAZAROV, Kubantai

Presenter(s) : Mr. ERNAZAROV, Kubantai

Session Classification : Poster session and coffee-buffet

Contribution ID : **378** Type : **Plenary/section talk**

On generalized Melvin solutions for Lie algebras of rank 3

Thursday, 25 October 2018 17:10 (20)

Generalized Melvin solutions for rank-3 Lie algebras A_3, B_3 and C_3 are considered. Any solution contains metric, three Abelian 2-forms and three scalar fields. It is governed by three moduli functions $H_1(z), H_2(z), H_3(z)$ ($z = \rho^2$ and ρ is a radial variable), obeying three differential equations with certain boundary conditions imposed. These functions are polynomials with powers $(n_1, n_2, n_3) = (3, 4, 3), (6, 10, 6), (5, 8, 9)$ for Lie algebras A_3, B_3, C_3, respectively. The solutions depend upon integration constants $q_1, q_2, q_3 \neq 0$. The power-law asymptotic relations for polynomials at large z are governed by integer-valued 3×3 matrix ν, which coincides with twice the inverse Cartan matrix $2A^{-1}$ for Lie algebras B_3 and C_3, while in the A_3 case $\nu = A^{-1}(I + P)$, where I is the identity matrix and P is a permutation matrix, corresponding to a generator of the $\mathbb{Z}_2$-group of symmetry of the Dynkin diagram. The duality identities for polynomials and asymptotic relations for solutions at large distances are obtained. 2-form flux integrals over a 2-dimensional disc of radius R and corresponding Wilson loop factors over a circle of radius R are presented.

Primary author(s) : Dr. BOLOKHOV, Sergei; Dr. IVASHCHUK, Vladimir

Presenter(s) : Dr. IVASHCHUK, Vladimir

Session Classification : Gravitation and Cosmology

Contribution ID : **379** Type : **Plenary/section talk**

Track Based Alignment Procedures of the CBM Silicon Tracking Detector

Thursday, 25 October 2018 18:35 (20)

for the CBM Collaboration — Physikalisches Institut, Eberhard Karls Universität Tübingen The CBM experiment at FAIR is being designed for the study of the QCD phase diagram in the region of the high baryon chemical potential at relatively moderate temperatures. The Silicon Tracking System (STS) is the central detector for momentum reconstruction of the produced charged particles in the CBM experiment. It consists of 8 layers of altogether ~900 double sided silicon micro strip sensors. Limited mechanical precision(>100µm) during the mounting, temperature differences result in misalignment to the detector component positions. Therefore, the intrinsic spatial resolution(~20µm) of the detector components has to be recovered by a track based alignment method. In this contribution, we will present the current status of implementation of the alignment algorithm. For this work, We will employ GBL(General broken line)track refit model to create the necessary input data structure to provide to the standalone PEDE part of the $\chi 2$ minimization based MILLEPEDE alignment algorithm.

• This work was supported by grant BMBF-05P16VTFC1

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Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **380** Type : **Plenary/section talk**

The AEgIS experiment: towards antimatter gravity measurements

Wednesday, 24 October 2018 09:40 (20)

The AE$\bar{g}$IS (Antimatter Experiment: Gravity, Interferometry, Spectroscopy) is a CERN based experiment aiming to probe the Weak Equivalence Principle of General Relativity with antimatter by studying free fall of antihydrogen in the Earth's gravitational field. A pulsed cold beam of antihydrogen produced by charge exchange between Rydberg positronium and cold antiprotons will be horizontally accelerated by an electric field gradient and whose free fall will then be measured by a classical moiré. deflectometer. An overview of the experimental setup, the present status of the experiment along with current achievements and results will be presented.

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Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **381** Type : **Plenary/section talk**

On fluctuations of the charge particles multiplicities in the electromagnetic showers.

Wednesday, 24 October 2018 17:15 (20)

Abstract.

Different types of gamma and electron detectors based on registration of the electromagnetic (EM) cascades are widely used in the modern HEP experiments. Thus the properties of EM showers are of particular interest. In this report the new results on the fluctuations of charge particles fluxes in the EM cascades initiated by 10 to 1000 GeV electrons in lead are presented. GEANT4 was used to calculate showers development in these studies. It is shown for the first time that asymmetric distributions of charge particle multiplicities are well described by the inverse sum of two exponents with 3 free parameters in a wide range of the Pb thickness where the average particle flux »1. Two of these parameters define the steepness of the distribution slopes and the third one is close to the most probable value. The dependence of the distribution shapes on the shower depth is discussed in details. Presented data allow one to calculate the multiplicity distribution for any Pb depth and shower energy within the studied intervals.

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Presenter(s) : Prof. DENISOV, Sergey (IHEP)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **382** Type : **Plenary/section talk**

Investigation of the interaction of ion beams and X-ray quanta with deuterated crystal structures at the HELIS facility.

Friday, 26 October 2018 15:50 (15)

The results of studies of the interaction of ion beams and X-ray quanta with deuterated crystal structures at the HELIS facility (LPI) are presented. Results on research of DD-reactions in deuterated crystal structures at deuteron energies 10-25 keV are shown significant enhancement effect. It is shown that the effect of the beams of ions Ne+ and H+ at energies in the range of 10 - 25 keV and a beam of X-radiation of 20-30 keV for deuterated target leads to stimulation of DD-reaction. For the target of CVD-diamond showed that the orientation of the sample with respect to the deuteron beam affects the neutron yield. Targets (deuterated CVD diamond, palladium, zirconium and titanium) were irradiated with both ion beams and X-ray quanta using an X-ray tube with an energy of up to 30 keV. Analysis of X-ray fluorescence spectra from deuterated targets of CVD diamond and palladium revealed "additional" peaks that are not identified by any of the characteristic radiation lines. Their appearance can not be connected with any known element, as well as with diffraction processes.

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Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **383** Type : **Poster**

Space and energy distributions of the charged particles at the maximum of electromagnetic showers initiated by 5-1000 GeV electrons in Fe, W and Pb

Monday, 22 October 2018 15:40 (150)

Detectors consisting of a high Z converter and a hodoscope type particle detector behind it are often used in HEP experiments for e,γ/hadron and γ/π0 separations and for e,γ coordinate and energy measurements. The most popular converter materials are Pb and W, while Fe or Cu are used less frequently. The converter thickness is often close to tmax that corresponds to the maximum flux of charge particles (mainly electrons and positrons) in the EM shower. Thus the characteristics of EM showers at tmax are of particular interest. In our article/1/ fluctuations of charge particles flux at tmax were considered. In this report the results of calculations of the charged particles space and energy distributions at tmax for the Fe, W and Pb converters irradiated by 5 to 1000 GeV electrons are discussed in details. The calculations are based on GEANT4. In particular it is shown that a converter of tmax placed in a high energy electron beam can be used as a source of the intense bunches of ultarelativistic positrons and electrons with subpicosecond time spread and of ˜2 mm in diameter. Obtained results are compared with experimental data.

1.S.P.Denisov, V.N.Goryachev. Preprint IHEP 2018-10, Protvino, 2018.

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Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **384** Type : **Plenary/section talk**

Beyond Standard Model searches by ATLAS and CMS

Monday, 22 October 2018 14:30 (35)

An overview of recent searches for BSM physics with the ATLAS and CMS experiments is given. A focus is placed on searches with top quarks, in particular searches for top-quark partners. The presented searches use data taken in 13 TeV proton-proton collisions at the LHC with an integrated luminosity of up to 80 fb^{-1}.

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Presenter(s) : ERDMANN, Johannes (Technische Universität Dortmund)

Session Classification : Plenary

Contribution ID : **385** Type : **Poster**

New Tm-containing bolometer for resonat absorption of solar axions.

Monday, 22 October 2018 15:40 (150)

A search for resonant absorption of the solar axion by ^{169}Tm nuclei will be performed using the Tm-containing bolometers installed inside the low-background setup at the underground laboratory. The thulium crystal $Tm_3Al_5O_{12}$ have been grown and tested for the first time as a bolometric detector. The expected sensitivity of 1 kg Tm-bolometer to axion-photon g_A and axion-electron g_{Ae} coupling constants for axions with mass in the range (10 eV - 8 keV) is stronger than the present astrophysical limits.

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Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **386** Type : **Poster**

Event identification with machine learning in DarkSide-50 experiment

Monday, 22 October 2018 15:40 (150)

A study of electron recoil and nuclear recoil identification in liquid argon is presented. In the DarkSide-50 experiment identification based on f90 criterion and selection cuts. We propose a new approach with use of machine learning techniques. The idea is to implement pulse shape discrimination through multi layer perceptron (MLP). We use calibration data to train the classifier and then test it on data collected during dark matter search runs with underground argon (UAr).

Primary author(s) : GROBOV, Alexey

Presenter(s) : GROBOV, Alexey

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **388** Type : **Poster**

Modernization of the pulse shape discrimination method for neutron and gamma quanta in scintillation detector

Monday, 22 October 2018 15:40 (150)

Detectors based on organic scintillators are widely used in the tasks when fast neutrons in the presence of gamma radiation are necessary to detect. Such tasks are control of spent nuclear fuel, measurement of the yield of fast neutrons from neutron generators, monitoring of neutron and gamma background in underground low-background experiments (neutrino and dark matter detectors), and environmental monitoring. There are fast, slow components of scintillator de-excitation in such detectors and an intensity of slow component depends on the type of the detected particle. In this paper, we investigated the efficiency of several known and two new methods of digital pulse shape discrimination for neutrons and gamma quanta. Experimental data were obtained on a setup consists of a Pu-Be neutron source, organic monocrystalline p-terphenyl scintillation detector and 14 bits, 500 MHz sampling rate flash-ADC with capability to store and upload to the host computer long waveforms for further analysis. A comparison is made in between the results of using traditional and new methods for calculating the signal separation efficiency of Figure of Merit (FOM). The best known from the literature value of the efficiency of neutron and gamma quanta discrimination for the Pu-Be source is FOM = 1.5. We obtained the separation efficiency FOM = 1.77 in the scintillation detector with the p-terphenyl crystal, by a new method. Note also that for the known liquid scintillator BC-501A FOM≈1. A new method of scintillation detector pulse shape discrimination from neutrons and gamma quanta is used to detect the neutron yield from compact neutron generator that is created on the basis of carbon nanotubes.

The work was supported by a program of the ministry of education and science of the Russian Federation for higher education establishments, project №14.578.21.0192 (RFMEFI57816X0192).

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Session Classification : Poster session and coffee-buffet

Contribution ID : **389** Type : **Plenary/section talk**

Characterisation of the first prototype of large Micromegas chamber "LM2 Module-0" for the upgrade of the ATLAS Muon System

Thursday, 25 October 2018 16:30 (15)

Overview of the construction and characterisation of the first prototype of large Micromegas chamber "LM2 Module-0" for the upgrade of the ATLAS Muon System is presented. Performance studies of the detectors with cosmic rays and X-ray source are shown and discussed. Preliminary results of operating the detector under high rate irradiation at the CERN GIF++ irradiation facility and the future plans are also presented in the report.

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Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **390** Type : **Poster**

A cluster approach to the analysis of experimental data of the NEVOD-EAS shower array

Monday, 22 October 2018 15:40 (150)

The NEVOD-EAS array for the detection of extensive air showers in the energy range 10ˆ15–10ˆ17 eV is being created in MEPhI on the basis of the Experimental complex NEVOD. It is aimed at independent estimations of the size, axis position and arrival direction of EAS registered with other detectors of the complex. Since the NEVOD-EAS is being created at a densely built territory and detecting elements cannot be deployed in the same plane like in usual air shower arrays, its registering system is organized in a cluster principle, and data analysis is performed using a newly developed cluster approach. The NEVOD-EAS cluster is an independent system including 16 counters of EAS electron-photon component and registering electronics. The cluster electronics digitizes signals, selects and time-stamps local events and transfers information to the central DAQ post. Events from different clusters are then combined according to their timestamps. The features of the developed cluster approach to the analysis of the NEVOD-EAS shower array experimental data are described.

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Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **391** Type : **Plenary/section talk**

The results of the first experimental series carried out at the NEVOD-EAS shower array

Wednesday, 24 October 2018 17:00 (15)

For studying muon bundles arriving at various zenith angles, the method of the local muon density spectra (LMDS) is used at the experimental complex NEVOD-DECOR (MEPhI, Moscow). Estimation of the primary particle energy by means of this method has a rather low accuracy – σ(lgE0) ˜ 0.4 – due to contribution of extensive air showers (EAS) registered at different distances from the axis to the events with a fixed local muon density. To reduce the primary energy estimation uncertainties, the NEVOD-EAS air shower array is being created. The array will ensure independent estimation, by means of a traditional technique, of the size, arrival direction and axis position of the showers registered by with other installations and detectors of the Experimental complex NEVOD in the energy range of 10ˆ15 – 10ˆ17 eV. The first part of the NEVOD-EAS shower array including 7 independent clusters of scintillation detector stations is now launched into operation. The results of EAS detection carried out at the NEVOD-EAS during the experimental series from January to July 2018, as well as results of the analysis of joint events in the shower array and NEVOD-DECOR experimental complex will be presented.

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Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **392** Type : **Poster**

Large-acceptance scintillator ring of the Fast Interaction Trigger for the ALICE Experiment.

Monday, 22 October 2018 15:40 (150)

During the upcoming Long Shutdown 2 the accelerator complex at CERN will implement significant improvements to the performance of the collider including the increase of the luminosity such that it is expected a sustain interaction rates up to 1MHz for p-p collisions and 50 kHz for Pb-Pb collisions. In order to remain operational during the Run 3 and Run 4 ALICE has to upgrade many of its subsystems or replace these with new detector solutions [1] including the new Fast Interaction Trigger (FIT) [2,3]. The main online functionalities of FIT will be luminosity monitoring with a direct link to the LHC and generation of a fast trigger signal for ALICE subsystems. This trigger must be generated with the latency of less than 425 ns, of which 222 ns is the delay along the connecting cables. The trigger generated by FIT will allow for online vertex determination, minimum bias and centrality-based event selection, suppression of beam-gas events, and for a veto of ultra-peripheral collisions. FIT is a hybrid detector composed of two Cherenkov detector arrays (T0+) and a large, sectored scintillator ring (V0+). Due to the limited space, unlike with the T0+ arrays, the V0+ scintillator disk can be located only on one side of the interaction point.

The V0+ is a 148 cm diameter plastic scintillator disc divided into 40 optically-separated modules, forming eight 45 degrees wedges subdivided into 5 radial segments. The size of the radial segments was chosen to cover equal pseudo-rapidity chunks. The scintillator will be viewed by clear optical fibers coupled perpendicularly to its surface. At the other end the fibers will be gathered into bundles and read out by fine-mesh PMT sensors. V0+ will be characterized by high efficiency, single Minimum Ionizing Particle (MIP) time resolution of around 250 ps, and the ability to cope with a high dynamic range (1-600 MIP). The presentation will focus on the design of the V0+ and the test results obtained with the latest prototype representing a 45 degrees section of the actual detector. These test measurements were carried out using beams from the CERN-PS accelerator.

We acknowledge the support from DGAPA-UNAM PAPIIT IN111117.

[1] Upgrade of the ALICE Experiment: Letter of Intent, J.Phys. G41 (2014), 087001

[2] W.H. Trzaska, New Fast Interaction Trigger for ALICE, Nucl. Instrum. Meth. A 845 (2017) 463

[3] M. Slupecki, ALICE forward rapidity upgrades, PoS (EPS-HEP2017) 519

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Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **394** Type : **Poster**

Observable relics of the simple harmonic universe

Monday, 22 October 2018 15:40 (150)

We analyze observational signatures that may arise from a cosmological epoch corresponding to the simple harmonic universe, which consists of positive curvature, a negative cosmological constant, and one or more matter sources with an intermediate equation of state, which then tunnels and/or evolves into inflation and radiation-dominated eras. We find that the effects on the cosmic microwave background and matter power spectrum from additional matter sources are subdominant to the effects arising due to curvature alone. Moreover, even if the curvature is too small to detect at late times, it can modify the primordial power spectrum, and may help explain the observed suppression of the CMB TT quadrupole in the Planck satellite data

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Presenter(s) : Prof. HORN, Bart (Manhattan.College)

Session Classification : Poster session and coffee-buffet

Contribution ID : **395** Type : **Plenary/section talk**

Cosmic muons measurements in DANSS experiment

Wednesday, 24 October 2018 18:00 (15)

DANSS is a highly segmented detector, which contains 2500 one meter long plastic scintillator strips. The DANSS detector is placed under industrial reactor of the Kalinin Nuclear Power Plant. The distance to the core is varied on-line from 10.7~m to 12.7~m, and the primal task of experiment is a search for short-distance neutrino oscillations. This work contains results of the cosmic muons research based on the data received from DANSS. In order to achieve these results, the specific algorithm with 97 % efficiency of the muon events selection and track reconstruction was developed. We also present the preliminary results on the annual variability in the flux of cosmic muons and an evaluation of the Ethrcosθ parameter.

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Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **396** Type : **Plenary/section talk**

Calibration and performance of the ATLAS Tile Calorimeter

Wednesday, 24 October 2018 16:45 (15)

The Tile Calorimeter (TileCal) of the ATLAS experiment at the LHC is the central hadronic calorimeter designed for the reconstruction of hadrons, jets, tau-particles and missing transverse energy. This sampling calorimeter uses steel plates as absorber and scintillating tiles as active medium. The light produced by the passage of charged particles is transmitted by wavelength shifting fibres to photomultiplier tubes (PMTs). The readout is segmented into about 5000 cells, each of them being read out by two PMTs in parallel.

The TileCal calibration system comprises Cesium radioactive sources, laser, charge injection elements, and an integrator based readout system. Combined information from all systems allows to monitor and to equalize the calorimeter response at each stage of the signal evolution, from scintillation light to digitization.

The performance of the calorimeter has been established with cosmic ray muons and the large sample of the proton-proton collisions. The response of high momentum isolated muons is used to study the energy response at the electromagnetic scale, isolated hadrons are used as a probe of the hadronic response. The calorimeter time resolution is studied with multijet events. A description of the different TileCal calibration systems and the results on the calorimeter performance during the LHC Run 2 will be presented.

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Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **397** Type : **Plenary/section talk**

Exploring hot QCD matter via direct photons at ALICE

Friday, 26 October 2018 10:35 (20)

Measurements of direct photon production in heavy-ion collisions provide a unique tool to test proton structure and properties of the hot QCD medium. Unlike hadrons, direct photons are produced in all stages of a nucleus-nucleus collision and escape freely from the hot zone. Prompt direct photons can be emitted in pp, p-Pb and Pb-Pb collisions and provide means to test the initial stage of AA collision. The spectrum and collective flow of thermal direct photons carry information about the temperature and space-time evolution of the emitting medium.

The ALICE experiment at LHC reconstructs photons via complementary methods, using the ALICE electromagnetic calorimeters and the central tracking system identifying photons converted to e+e- pairs in the material of the inner barrel detectors. Applying different techniques, one can measure photons in a wide range of transverse momenta. In addition, since calorimetric and tracking approaches have practically independent systematic uncertainties, their comparison provides a reliable cross-check. In this talk we review recent ALICE results on direct photon production in pp, pA and AA collisions and compare to available data at SPS and RHIC energies.

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Presenter(s) : Dr. PERESUNKO, Dmitri (Kurchatov Institute)

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **399** Type : **Plenary/section talk**

Quantum-induced trans-Planckian energy near horizon

Thursday, 25 October 2018 17:30 (20)

We study the loop effects on the geometry and boundary conditions of time-dependent black hole spacetimes and analyze the energy measured by an infalling observer near their horizons. As a result of our studies (A.J. Nurmagambetov & I.Y. Park JHEP05(2018)167) we obtain a trans- Planckian energy in the time-dependent case, the importance of which for the black hole (in)formation is discussed.

Primary author(s) : NURMAGAMBETOV, Alexei

Presenter(s) : NURMAGAMBETOV, Alexei

Session Classification : Gravitation and Cosmology

Contribution ID : **400** Type : **Plenary/section talk**

Photo-sensors and Front-end Electronics for the Fast Interaction Trigger detector of the ALICE experiment at CERN

Tuesday, 23 October 2018 09:30 (15)

The new Fast Interaction Trigger (FIT) [1] was developed for the upgrade of the ALICE detector [2] at CERN LHC. FIT will consist of two arrays of Cherenkov radiators (T0+) and a large segmented scintillator ring (V0+). FIT will serve as the main luminometer, as well as the detector which will determine collision time, multiplicity, centrality, and reaction plane in ALICE during Runs 3 and 4. Among the many challenges of this project are: a high dynamic range (0.4 to 250 MIP (minimum interaction particle) amplitude for T0+, 0.5 to 600 MIP amplitude for V0+), operation with the sustained bunch crossing of 25 ns, time resolution below 50 ps, signal processing and trigger generation within 205 ns. Light generated in the scintillators of the V0 will be detected by 48 Hamamatsu fine mesh 2" PMTs. The Cherenkov radiators will be coupled to 52 modified Planacon light sensors. The photocathode size of XP85012/FIT-Q is 53x53 mm2. The 64 anodes at the base of a chevron-shaped assembly of MCP plates are divided into 4 equal sectors matching the radiator quadrants. To reach the required lifetime and dynamic range, Planacons will operate at the output amplitude of 10 mV/MIP (charge 0.63 pC/MIP) requiring special cabling and low-noise fast electronics. The time information will be extracted from a CFD and digitized with the accuracy of better than 50 ps over the entire dynamic range. The input charge will be integrated and measured by an ADC. The first prototype of a Cherenkov module and the full chain of front-end electronics were installed inside of the ALICE magnet and are part of the Run 2 data collection since 2016. This work was supported by INR RAS and NRNU MEPhI within the Russian activities in the ALICE upgrade and by the Ministry of Education and Science of Russian Federation, contract No14.610.21.0003.

[1] W.H. Trzaska et al, New Fast Interaction Trigger for ALICE, Nucl. Instrum. Meth. A 845 (2017) 463. [2] Upgrade of the ALICE Experiment: Letter Of Intent, J.Phys. G41 (2014), 087001

Primary author(s) : SEREBRYAKOV, Dmitry (INR RAS); KARAVICHEVA, Tatiana (Institute for nuclear research of RAS ,Leading research scientist); MELIKYAN, Yury (NRNU MEPhI); Mr. FINOGEEV, Dmitry; Dr. TRZASKA, Wladislaw; GRABSKI, Varlen (IF-UNAM); Dr. KAPLIN, Vladimir (National Research Nuclear University MEPh); Mr. MOROZOV, Igor (INR RAS); Mr. TIKHONOV, Anatoly (INR RAS); Dr. BEARDEN, Ian (Niels Bohr Institute, University of Copenhagen); Dr. GARCIA-SOLIS, Edmundo (Chicago State University); Dr. HARTON, Austin (Chicago State University); Dr. KLAY, Jennifer (California Polytechnic State Univ.); Mr. SLUPECKI, Maciej (University of Jyväskylä)

Presenter(s) : SEREBRYAKOV, Dmitry (INR RAS)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **401** Type : **Plenary/section talk**

Proposal of the complete experiment for elastic pp and p(bar)p scattering at SPASCHARM program at U70 accelerator.

Wednesday, 24 October 2018 10:15 (15)

A.A. Bogdanov1, V.A.Chetvertkova4, V.P. Ladygin3, V.V.Mochalov1,2, M.B. Nurusheva1, V.A. Okorokov1, P.A.Semenov,1,2, A.N.Vasiliev1,2, L.S.Zherebtsova1,2

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Newly developing SPASCHARM (SPin Asymmetry in CHARMonia) experiment at U70 accelerator will give the unique possibility to measure spin effects with the use of polarized proton and antiproton beams and polarized target. We suggest to carry out the measurements of the pp and p(bar)p elastic scattering spin observables at 16 GeV/c (direct reconstruction of elastic pp and p(bar)p elastic scattering amplitudes at SPASCHARM experiment). To date the direct reconstruction of amplitudes for pp elastic scattering has performed up to 6 GeV/c only, while there is no available data for p(bar)p elastics scattering. New measurements at SPASCHARM will significantly extend the energy range of the spin studies and will give unique possibility to compare elastic pp and p(bar)p scattering .

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Presenter(s) : Mrs. M.B. NURUSHEVA (National Research Nuclear University (Moscow Engineering Physics Institute), Moscow, 115409, Russia)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **403** Type : **Poster**

Self-organization of nonlocal energy fluxes instead of Newton's reductionism

Monday, 22 October 2018 15:40 (150)

The inside energy content of the extended particle obeys Umov's estimate of 1873 mcˆ2/γ ≈ mcˆ2 (1-0.5βˆ2) ≤ mcˆ2 under low velocities despite γmcˆ2 ≈ mcˆ2 (1+0.5βˆ2) ≥ mcˆ2 for the total kinetic energy. Geodesic auto-accelerations in mechanics / gravitation of nonlocal energy fluxes drive the probe body toward equipartition of kinetic energies of inside chaos, mcˆ2/γ, and its ordered translation,mcˆ2[γ-γˆ(-1)]. Adaptive thermo-mechanics of delocalized elementary energies due to competing degrees of freedom for inside chaos and translational order should replace Newton's reductionism of point mass without inside energy variables.

Based on "Gravitational attraction until relativistic equipartition of internal and translational kinetic energies", Astrophys. Space Sci. 363:39 (2018).

Primary author(s) : Dr. BULYZHENKOV, Igor (lebedev Physics Institutes RAS)

Presenter(s) : Dr. BULYZHENKOV, Igor (lebedev Physics Institutes RAS)

Session Classification : Poster session and coffee-buffet

Contribution ID : **404** Type : **Poster**

Compact x-ray spectrometer based on thermoluminescent detectors

Monday, 22 October 2018 15:40 (150)

Single-channel compact noise-proof spectrometer (Ø 5x10 mm) is based on the absorption filter method. Spectrometer is an assembly of thermoluminescent detectors made of lithium fluoride LiF, that are placed one after another, which are also used as filters for X-ray spectrum selection. Spectrometer has been developed for measuring X-ray spectra of micropinch-discharge plasma in the energy range of 1–25 keV. The thermoluminescent LiF detectors are most attractive for use in plasma diagnostics. The thermoluminescent LiF detectors are immune to electromagnetic interference, practically insensitive to ultraviolet radiation, and do not have a dead surface layer; at the same time, their response is linear in a wide dynamic range of the absorbed radiation dose (from 20 mSv to 10 Sv). The calibration measurements and test tests demonstrated the good operability and reliability of the compact spectrometer based on the array of thermoluminescent LiF detectors. The basic experimental results obtained in the investigation of the X-ray spectra of plasma objects are presented.

Primary author(s) : Prof. SALAKHUTDINOV, Gayar; Mrs. GRIGORYEVA, Irina; Mr. KHIL'KO, Maksim

Presenter(s) : Prof. SALAKHUTDINOV, Gayar

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **408** Type : **Plenary/section talk**

The latest results from the Daya Bay

Tuesday, 23 October 2018 17:40 (15)

Daya Bay was the first experiment to unambiguously measure a non-zero value of the θ_{13} mixing angle and the first reactor experiment to measure the Δm^2_{32} mass splitting. The experiment includes eight identically designed detectors and six nuclear reactors at baselines ranging from 0.5 km to 1.6 km. A data set of nearly 4 million events has been collected over 1958 days of data taking, providing the most precise measurement of θ_{13} and a measurement of Δm^2_{32} with a precision rivaling that from accelerator experiments. These measurements will be covered in this talk alongside with other significant results such as high-statistics measurement of the absolute reactor antineutrino flux and spectrum, as well as a search for light sterile neutrino mixing.

Primary author(s) : Mr. TRESKOV, Konstantin (Joint Institute for Nuclear Research)

Presenter(s) : Mr. TRESKOV, Konstantin (Joint Institute for Nuclear Research)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **409** Type : **Plenary/section talk**

Doubly heavy baryons at LHC

Friday, 26 October 2018 16:40 (20)

The last year was marked by the first observation of doubly heavy baryon Ξ_{cc}^{++} in the decay mode $\Lambda_c^+ K^- \pi^+ \pi^+$, which was confirmed by the observation of decay $\Xi_{cc}^{++} \to \Xi_c^+ \pi^+$ this year. This circumstance greatly revived the research activities in this direction. In the study we discuss from the theoretical point of view the perspectives of further research of doubly heavy baryon states in the LHC experiments: their decays, production and possibility of observation.

Primary author(s) : Prof. LIKHODED, Anatolii (IHEP NRC «Kurchatov Institute»); Dr. BEREZHNOI, Aleksandr (SINP MSU); Dr. LUCHINSKY, Alexey (IHEP NRC «Kurchatov Institute»)

Presenter(s) : Dr. BEREZHNOI, Aleksandr (SINP MSU)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **410** Type : **Plenary/section talk**

The use of CVD diamond in gas detectors of charged particles for experiments in high-energy physics.

Thursday, 25 October 2018 18:05 (15)

Brief overview on microstructure gaseous detectors (MSGD) used in high-energy physics and description of technological steps for producing gas electron multiplier (GEM) made of polycrystalline CVD diamond are presented. GEM is widely used in modern gas detectors of ionizing radiation in experiments on high-energy physics at accelerators and in other fields of science. The test results of the gas electron multiplier m ade of radiation-hard material such as CVD diamond are described.

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Presenter(s) : Mrs. DRIBAS, Irina (Lebedev Physical Institute of RAS)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **411** Type : **Plenary/section talk**

Anisotropic flow measured in Pb-Pb collisions with the NA49 experiment at the CERN SPS

Thursday, 25 October 2018 17:45 (15)

Anisotropic flow at SPS energies was measured by the NA49 Collaboration more than 10 years ago. Recently new data for Pb-Pb collisions were collected by the NA61/SHINE experiment during the Pb-ion beam energy scan program at the SPS. This motivated a new analysis of the available NA49 data, based on modern flow measurement techniques that will also utilize the spectator fragments for reaction plane determination. The new results on directed and elliptic flow in Pb-Pb collisions at beam energy of 40 A GeV recorded with the fixed target experiment NA49 at CERN SPS are presented. Event classification is based on the multiplicity of produced particles as well as on the energy of the projectile spectators using the procedure implemented within the Centrality Framework developed for the future CBM experiment at FAIR. To account for the azimuthal asymmetry of the fixed target setup of the NA49 experiment, a three-subevent technique is used for the determination of the reaction plane resolution. The reaction plane is estimated both from the azimuthal asymmetry of the produced particles measured with the NA49 TPCs as well as by using the transverse granularity of the NA49 forward VETO calorimeter. Corrections for the detector acceptance anisotropy in the transverse plane are applied using an extension of the Qn-Corrections Framework developed originally for the ALICE experiment at the LHC. The results are compared with those previously obtained by the experiments STAR at RHIC and NA49 at the SPS. The new study is complementary to the ongoing analysis of the recently collected Pb-Pb data of the NA61/SHINE experiment at the CERN SPS and provide an important reference for the performance investigations for the future CBM experiment at FAIR.

Primary author(s) : Mr. GOLOSOV, Oleg; Mr. KLOCHKOV, Viktor; Dr. SELYUZHENKOV, Ilya; KASHIRIN, Evgeny (National Research Nuclear University MEPhI)

Presenter(s) : Mr. GOLOSOV, Oleg

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **412** Type : **Plenary/section talk**

Searching for new light charged particles in photoproduction

Tuesday, 23 October 2018 17:45 (15)

Motivated by recent V.A. Nikitin's reports on observation of 9-MeV/c^2 charged particles with a 2 meter JINR propane bubble chamber we perform an experiment at the LPI electron synchrotron "Pakhra" with the aim to detect such particles in the Bethe–Heitler process. Theoretical limits for masses of new light charged particles of spin 0, 1/2 and 1 arising from precise data on the muon anomalous magnetic moment are recalculated and updated. A geometry of the photoproduction experiment is proposed that optimizes sigma-to-noise ratio. Preliminary results of the experiment are exposed.

Primary author(s) : L'VOV, Anatoly (P.N. Lebedev Physical Institute)

Presenter(s) : L'VOV, Anatoly (P.N. Lebedev Physical Institute)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **413** Type : **Plenary/section talk**

Anisotropic flow measurement from NA61/SHINE experiment at CERN SPS

Friday, 26 October 2018 11:10 (15)

The NA61/SHINE experiment at the CERN SPS recently extended its program for the energy scan with Pb ions in the energy range of 13-150A GeV/c. In the year 2016 a sample of Pb-Pb collisions at 13 and 30A GeV/c was collected by the NA61/SHINE experiment. The NA61/SHINE measurements with Pb ions and the experimental techniques using spectators at the lowest energy available at the SPS are also relevant for the preparation of the Compressed Baryonic Matter (CBM) heavy-ion experiment at the future FAIR facility in Darmstadt.

We present results on direct and elliptic flow measurement in Pb-Pb collisions at 30A GeV/c relative to the spectator plane determined with the Projectile Spectator Detector. Flow coefficients are reported as a function of rapidity and transverse momentum in different classes of collision centrality. The new results are compared with existing results from previous NA49 analysis and the STAR data at RHIC.

Primary author(s) : KASHIRIN, Evgeny (National Research Nuclear University MEPhI); Mr. GOLOSOV, Oleg; Mr. KLOCHKOV, Viktor; Dr. SELYUZHENKOV, Ilya

Presenter(s) : KASHIRIN, Evgeny (National Research Nuclear University MEPhI)

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **414** Type : **Plenary/section talk**

New results of the Clusters and Hypernuclei formation study within PHQMD Model

Friday, 26 October 2018 16:35 (15)

We present a new results on the dynamical modeling of cluster formation with the new combined PHQMD+FRIGA model at Nuclotron and NICA energies. The FRIGA clusterisation algorithm, which can be applied to the n-body transport approaches, is based on the simulated annealing technique to obtain the most bound configuration of fragments and nucleons. The PHQMD+FRIGA model is able to predict isotope yields as well as hyper-nucleus production. Based on present predictions of the combined model we study the possibility to detect such clusters and hypernuclei in the BM@N and MPD/NICA detectors.

Primary author(s) : KIREYEU, Viktar (JINR); LE FEVRE, Arnaud (GSI); BRATKOVSKAYA, Elena (GSI); AICHELIN, Joerg (SUBATECH); LEIFELS, Yvonne (GSI)

Presenter(s) : KIREYEU, Viktar (JINR)

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **415** Type : **Plenary/section talk**

Project KATRIN: First results and future plans.

Wednesday, 24 October 2018 10:00 (15)

The KArlsruhe TRItium Neutrino (KATRIN) experiment aims to make a model-independent determination of the active electron antineutrino mass with an upper limit of 0.2 eV/c2 from the analysis of Tritium beta-spectrum shape near the endpoint. Experimental set-up is fully assembled and undergoes multiple tests. Small amount of Tritium molecules were injected at June 2018 and first spectra were measured. Experimental program for the nearest future includes determination of active electron antineutrino mass with an upper limit of 1.0 eV/c2 and preliminary search for sterile neutrinos with several keV mass.

Primary author(s) : Dr. TITOV, Nikita (INR RAS)

Presenter(s) : Dr. TITOV, Nikita (INR RAS)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **416** Type : **Plenary/section talk**

Cosmological attractors and inflationary scenarios with many scalar fields

Tuesday, 23 October 2018 18:30 (20)

The idea of a cosmological attractor is based on the observation that in many models the kinetic term in Jordan frame practically does not affect the slow-roll parameters during inflation. In the case of many scalar fields, the use of this observation gets a possibility to construct a one-field inflationary model that approximates the original multifield model. In the talk, the examples of such multifield models based on sypersymmetric theories of particles will be presented.

Primary author(s) : VERNOV, Sergey (Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University)

Presenter(s) : VERNOV, Sergey (Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University)

Session Classification : Gravitation and Cosmology

Contribution ID : **417** Type : **Plenary/section talk**

De Sitter and Power-law Solutions in Non-local Gauss-Bonnet Gravity

Wednesday, 24 October 2018 09:50 (20)

The cosmological dynamics of a non-locally corrected gravity theory, involving a power of the inverse d'Alembertian, is investigated. Casting the dynamical equations into local form, the fixed points of the models are derived, as well as corresponding de Sitter and power-law solutions. Necessary and sufficient conditions on the model parameters for the existence of de Sitter solutions are obtained. The possible existence of power-law solutions is investigated, and it is proven that models with de Sitter solutions have no power-law solutions. A model is found, which allows to describe the matter-dominated phase of the Universe evolution.

Primary author(s) : POZDEEVA, Ekaterina

Presenter(s) : POZDEEVA, Ekaterina

Session Classification : Gravitation and Cosmology

Contribution ID : **418** Type : **Plenary/section talk**

Weakly bound states of dtμ muonic molecular ion in quantum electrodynamics

Wednesday, 24 October 2018 17:15 (15)

An investigation of the energy spectra of hydrogen muonic molecules is important for muonic catalysis of nuclear fusion reactions. A calculation of fine and hyperfine structure of muonic molecular ions as well as of higher order QED corrections allows us to predict the rates of reactions of their formation and other parameters of the μCF cycle. In this work, the energy spectrum of the excited bound states of muonic molecules $pt\mu$, $pd\mu$, and $dt\mu$ is calculated on the basis of variational method. In our work we use a stochastic variational method for obtaining energies of a three-particle bound system with high accuracy. The trial wave function of the muonic molecule in this approach has the Gaussian form. Such a choice of the basis makes it possible to calculate the matrix elements of the Hamiltonian analytically. The matrix of variational parameters in the framework of stochastic variational method is generated randomly, which prevents convergence of the result to a local minimum and eliminates the possibility of obtaining an incorrect result for the energy. For a direct numerical calculation, a computer code was written in the MATLAB system to solve the many-body problem based on the Schrodinger equation. The program allows not only to find the values of energy for ground and excited state, but also to perform refinement cycles, which improve the accuracy of previously calculated energies. As a result, the numerical energy levels of excited states of the muonic molecules $pt\mu$, $pd\mu$ and $dt\mu$ were obtained. We also take into account important QED corrections connected with the vacuum polarization and relativism.

Primary author(s) : SOROKIN, Viacheslav (Samara University); Dr. KOROBOV, Vladimir (Joint Institute of Nuclear Research, BLTP); Dr. MARTYNENKO, Alexei (Samara National Research University named after S.P. Korolev); Mr. ESKIN, Alexei (Samara National Research University named after S.P. Korolev)

Presenter(s) : SOROKIN, Viacheslav (Samara University)

Session Classification : Particle Physics: HEP theory

Track Classification : Particle physics: hep theory

Contribution ID : **419** Type : **Plenary/section talk**

Hyperfine structure of S-states in muonic ions of lithium, beryllium and boron

Wednesday, 24 October 2018 17:00 (15)

Precision investigation of the hyperfine structure (HFS) of the energy spectrum of light muonic atoms is an important task nowadays. It allows us to check the standard model and obtain more precise values of fundamental physical constants. The relevance of such research is connected with the experiments carried out by CREMA Collaboration. In these experiments Lamb shift of 2S and 2P and HFS for muonic hydrogen and muonic deuterium was obtained by means of laser spectroscopy. To calculate HFS of muonic ions we use quasipotential method in quantum electrodynamics, where the bound state of muon and nucleus can be described by means of Schrodinger equation and the potential is constructed with the use of scattering off-shell amplitude. The main contribution to the interaction operator of two particles is given by the well-known Breit Hamiltonian. In perturbation theory infinite series for the interaction operator of particles includes contributions of different kinds of interactions, primarily electromagnetic. Relativistic corrections of order α^6 and also the contribution of anomalous magnetic moment of muon are known in analytical form. One- and two-loop vacuum polarization effects of order α^5 and α^6 in first and second order perturbation theory were obtained in integral form and evaluated numerically. One of the leading contributions to the HFS is given by the nuclear structure effect. Such effects can be described by means of two-photon exchange amplitudes. To calculate these amplitudes and also to calculate amplitudes of higher order of α the approach of projection operator was used. We also calculate more complicated corrections that involve combined effects of vacuum polarization, relativism and nuclear structure of order α^6. Furthermore the dependance of the calculated contributions on the charge Z of the nucleus was studied and final numerical values of HFS were obtained.

Primary author(s) : Ms. SUKHORUKOVA, Olga; Mr. DOROKHOV, Alexander (Joint Institute of Nuclear Research); Mr. KRUTOV, Andrey (Samara University); Mr. MARTYNENKO, Alexei (Samara University); Mr. MARTYNENKO, Fedor (Samara University)

Presenter(s) : Ms. SUKHORUKOVA, Olga

Session Classification : Particle Physics: HEP theory

Track Classification : Particle physics: hep theory

Contribution ID : **420** Type : **Plenary/section talk**

Status of the Super Charm-Tau project at Novosibirsk

Wednesday, 24 October 2018 10:00 (20)

The Super Charm–Tau factory at the Budker Institute of Nuclear Physics (Novosibirsk, Russia) is an electron-positron collider that will operate in the center-of-mass energy range from 2 to 5 GeV with the peak luminosity of about 10^{35} cm^{-2}s^{-1}. The main goal of experiments is to study processes with c quark or τ leptons in the final state.

We'll discuss the physics case for the Super Charm–Tau factory, the conceptual design of the collider and the detector and the status of the project.

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Presenter(s) : KROKOVNY, Pavel (Budkker INP and Novosibirsk State University)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **421** Type : **Plenary/section talk**

The single mechanism of solar and galactic cosmic rays acceleration arising during the flare process

Friday, 26 October 2018 09:30 (20)

The modern detection of giant flares on the star dwarfs of the class G with the energy significantly exceeding the energy of the solar flares indicates the possibility of proton acceleration beyond the boundary of the solar system to energies significantly greater than the energy of solar cosmic rays. The superflare generation with the energy much larger than energy of big solar flares on a variety of class G stars are reported, some of which are rapidly rotating and some of which are of ordinary solar type [1]. 365 superflares are observed on the stars, including some superflares that are generated on the slowly rotating solar-type stars. About 83,000 stars have been investigated over 120 days using Kepler spacecraft data.

The previously considered significant difference in the energy maximums of galactic and solar cosmic rays did not contribute to the idea of the same cosmic ray acceleration mechanisms on the Sun and on stars. The recent data [2] is showed that the energy of the stellar flare can exceed 10^{36} erg. It is by 3-4 orders greater than the energy of a large solar flare, and, apparently, the energy of the protons accelerated in these stellar flares can significantly exceed the energy of the particles registered from flares on the Sun. Thus, the flare can be a universal astronomical process responsible for proton acceleration on the Sun and on the stars. The flare and dynamics of the pre-flare state of the active region that caused the flare are available for direct investigation only on the Sun. Acceleration of particles of solar cosmic rays occurs during flares by the electric field in a current sheet in the corona above the active region.

1. Lin R.P., Krucker S., Hurford, G.J. et al.: 2003, Astrophys. J. 595, L69.
2. Maehara, H., Shibayama, T., Notsu, S., et al.: 2012, Nature. 485, 478.

Primary author(s) : PODGORNY, Igor (Institute of Astronomy of the Russian Academy of Sciences)

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Presenter(s) : PODGORNY, Alexander (Lebedev Physical Institute RAS)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **422** Type : **Poster**

A four-layer gaseous detector allowing to measure the energy of charged particles

Monday, 22 October 2018 15:40 (150)

A four-layer gaseous detector for electrons and other charged particles is developed. A charged particle passing through a thin window produces ionization in four consecutive gas gaps separated by absorbers. The gas gain about of 10^4 allows one to determine four signal amplitudes under the control of any combination of these signals. Simultaneous measurement of the ionization losses of the particle in the successive layers of the detector makes it possible to determine the energy of the passing particle.

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Presenter(s) : Dr. POTASHEV, Stanislav (Institute for Nuclear Research of the Russian Academy of Sciences)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **423** Type : **Poster**

Invariant Cross-Section of secondary particles in forward direction in 20 A GeV carbon beam interactions with nuclear targets

Monday, 22 October 2018 15:40 (150)

M.Yu. Bogolyubsky, A.Yu. Bordanovky , A.A. Volkov, D.K. Elumahov, V.P. Efremov, A.A. Ivanilov, A.Yu. Kalinin, A.N. Krinitsyn, V.I. Kryshkin, N.V. Kulagin, D.I. Patalakha, K.A. Romanishin, V.V. Skvortsov, V.V. Talov, L.K. Turchanovich

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Invariant Cross-Sections of π^-,k^-, protons and antiprotons were measured in 20.5 A GeV/c carbon beam interactions with carbon and lead targets at the IHEP accelerator U-70. Measurements were made at production angles of secondaries from 0 to 6 milliradians and momentum from 10 to 60 GeV/c in lab. system. Also we present comparison with Monte Carlo simulation provided with URQMD and FTFP generators.

This work was supported by grant № 16-02-0021 from the Russian Foundation for Basic Research.

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Presenter(s) : ELUMAKHOV, Dmitry (IHEP)

Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics

Contribution ID : **424** Type : **Plenary/section talk**

A comparative study of the ”muon excess” in extensive air showers

Wednesday, 24 October 2018 17:45 (15)

The excess of muons in observed extensive air showers with respect to Monte-Carlo simulations shows up itself in the data of various experiments and under different conditions. We present a comparative quantitative analysis of the muon content of showers observed at various energies, zenith angles, core distances etc. by several experiments.

Primary author(s) : KARPIKOV, Ivan (INR RAS); KALMYKOV, Nikolai (SINP MSU); RUBTSOV, Gregory (INR RAS); TROITSKY, Sergei (INR RAS); ZHEZHER, Yana (INR RAS)

Presenter(s) : KARPIKOV, Ivan (INR RAS)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **426** Type : **Plenary/section talk**

Performance of the ALICE charge-particle veto detector in pp collisions at 13 TeV

Thursday, 25 October 2018 17:50 (15)

Performance of the ALICE charge-particle veto detector in pp collisions at 13 TeV

Sergey Evdokimov for the ALICE collaboration

The charged-particle veto (CPV) detector of the ALICE experiment is a multi-wire proportional chamber with pad readout. It is designed to improve photon identification in the photon spectrometer PHOS. One module of the CPV detector was put in operation in LHC Run2 in 2015. In this talk we will discuss the performance of the CPV in pp collisions at $\sqrt{s}$=13 TeV, which was studied using data collected by ALICE in 2016-2017. We will present the estimate of the efficiency of charged-particle track reconstruction in the CPV, optimization of photon identification criteria and the capabilities of the PHOS+CPV. Plans for the CPV upgrade in Run3 will also be presented.

Primary author(s) : Mr. EVDOKIMOV, Sergey (NRC "Kurchatov institute"); ALICE, collaboration

Presenter(s) : Mr. EVDOKIMOV, Sergey (NRC "Kurchatov institute")

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **427** Type : **Plenary/section talk**

Late-time power-law stages of cosmological evolution in teleparallel gravity with nonminimal coupling

Tuesday, 23 October 2018 17:05 (20)

We investigate the Universe evolution at late-time stages in models of teleparallel gravity with power-law nonminimal coupling and a decreasing power-law potential of the scalar field ϕ. New asymptotic solutions are found analytically for these models in vacuum and with a perfect fluid. Applying numerical integration, we show that the cosmological evolution leads to these solutions for some region of the initial conditions, and these asymptotic regimes are stable with respect to homogeneous variations of the initial data. The physical sense of the results is discussed.

Primary author(s) : SKUGOREVA, Maria

Presenter(s) : SKUGOREVA, Maria

Session Classification : Gravitation and Cosmology

Contribution ID : **428** Type : **Plenary/section talk**

Hadronic shower properties in highly granular calorimeters with different absorbers

Wednesday, 24 October 2018 16:15 (15)

The CALICE collaboration develops and tests highly granular calorimeter prototypes for future collider experiments. Scintillator-SiPM-based prototype of the ILD hadron calorimeter was tested with steel and tungsten absorbers using single-particle beams from the CERN SPS. The results of beam tests are presented as well as an application of the software compensation technique for energy reconstruction in the range from 10 to 80 GeV. It was observed from experimental data that the achieved improvement of relative energy resolution is about 20% for the noncompensating calorimeter, while it is less than 5% for the compensating one.

Primary author(s) : CHADEEVA, Marina (P.N. Lebedev Physical Institute of RAS (LPI))

Presenter(s) : CHADEEVA, Marina (P.N. Lebedev Physical Institute of RAS (LPI))

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **429** Type : **Plenary/section talk**

Nonstationary self-gravitating configurations of scalar and electromagnetic fields

Wednesday, 24 October 2018 10:10 (20)

Mathematical modeling of gravitating configurations of physical fields is one of the priority directions of the modern theory of gravity. Most of the exact solutions constructed within the framework of the general relativity are static or stationary configurations. This is due to the objective complexity of solving the Einstein equations under the assumption of nonstationarity. We present an approach to constructing nonstationary configurations of a spherically symmetric nonlinear real scalar field and the electromagnetic field, which are assumed both to be minimally coupled to gravity. It is based on the separation of one invariant equation, written in terms of the characteristic function and scalar field potential. Using the proposed method, an exact nonstationary solution with a nontrivial topology of space-time will be constructed.

Primary author(s) : Dr. TCHEMARINA, Julia (Tver State University); Dr. ALEKSEEVA, Elena (Bauman Moscow State Technical University); Prof. TSIRULEV, Alexander (Tver State University); Mr. NURALIEV, Nurali (Tver State University)

Presenter(s) : Dr. TCHEMARINA, Julia (Tver State University)

Session Classification : Gravitation and Cosmology

Contribution ID : **430** Type : **Plenary/section talk**

Reactor antineutrino measurements with DANSS experiment

Tuesday, 23 October 2018 17:10 (15)

Experiments with reactor antineutrino provide a wide range of physics opportunities. Solid state scintillator detector DANSS is placed just below the core of 3.1 GWatt industrial reactor of Kalinin Nuclear Power Plant. The detector features the world highest counting rate of 5000 neutrino events per day with the cosmic rays induced background as low as 130 events per day. The talk will cover detector performance of a year and a half operation, effects of fuel burning over reactor campaign, results of the search for oscillations into light sterile neutrinos.

Primary author(s) : ALEKSEEV, Igor (ITEP)

Presenter(s) : ALEKSEEV, Igor (ITEP)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **431** Type : **Plenary/section talk**

Latest astrophysical and particle physics results and future prospects from IceCube

Tuesday, 23 October 2018 10:00 (15)

The IceCube neutrino observatory uses a cubic km of deep South Pole ice instrumented with over 5000 optical sensors to detect Cherenkov light produced by astrophysical and atmospheric neutrinos interacting in the ice. The detector probes neutrino energies from GeV to PeV, propagation distances ranging from a few km to astrophysical scales, and collects high statistics neutrino samples due to its extremely large volume.

IceCube has a broad physics reach in both astrophysical and particle physics observations. Astrophysical neutrinos are a crucial component of the nascent field of multimessenger astronomy, allowing observations of distant and extreme astrophysical phenomena. Additionally, neutrinos of both astrophysical and atmospheric origin can be used to test our understanding of fundamental physics, such as neutrino oscillations and interactions with matter, and to probe Beyond Standard Model (BSM) theories.

This talk will present the latest results from the IceCube collaboration and look ahead to future plans for next generation South Pole neutrino detection.

Primary author(s) : STUTTARD, Thomas (Niels Bohr Institute)

Presenter(s) : STUTTARD, Thomas (Niels Bohr Institute)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **432** Type : **Poster**

Environmental decoherence in atmospheric neutrinos with IceCube

Monday, 22 October 2018 15:40 (150)

Dissipative interactions between neutrinos and the environment in which they propagate lead to quantum decoherence. Such an environment is predicted by quantum gravity models featuring a 'foamy' space-time structure. Environmental decoherence degrades the interference between neutrino states that is responsible for neutrino oscillations, resulting in exponential damping of oscillation probability with propagation distance. The IceCube detector at the South Pole measures atmospheric neutrinos that have traversed a range of distances, up to 12,742 km for neutrinos crossing the Earth's diameter, making it sensitive to decoherence effects. In this poster, a phenomenological model of neutrino environmental decoherence and the resulting signal in IceCube is presented, and the measurement sensitivity estimated for a 6 year data sample.

Primary author(s) : STUTTARD, Thomas (Niels Bohr Institute)

Presenter(s) : STUTTARD, Thomas (Niels Bohr Institute)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: neutrino physics

Contribution ID : **433** Type : **Plenary/section talk**

Graviton-to -photon conversion effect in magnetized relativistic plasma

Wednesday, 24 October 2018 09:10 (20)

The graviton-to-photon conversion effect in a magnetized relativistic lepton plasma is considered. This effect can be important for the possible generation of electromagnetic radiation accompanying coalescence of relativistic compact neutron star – black hole binaries. The relativistic electron-positron plasma can be generated near the surface of a rotating magnetized neutron star (a radio pulsar). The formation of a relativistic compact binary containing a pulsar and a black hole is predicted by the evolution of massive binary stars. Prior to the coalescence of such a binary due to gravitational wave (GW) emission, a fraction of the GW power can be converted in the plasma outflow into a low-frequency electromagnetic (EM) waves, which can lead to additional radio power prior to the coalescence. Using the graviton-to-photon conversion mechanism in an external magnetic field, we calculate the fraction of GW power converted into the EM radiation in the relativistic plasma. The result is found to depend on the neutron star spin period P, plasma Lorentz factor γ and the cascade multiplicity λ, but independent of the neutron star magnetic field: $K \simeq 10^{-35}(P/1\mathrm{s})^2(\gamma/10^5)^2(\lambda/10^5)^{-2}$. The possibility of the detection of the non-thermal EM counterparts from neutron star – black hole coalescences in the forthcoming GW observations by aLIGO/Virgo detectors is briefly discussed.

Primary author(s) : SIMKIN, Ivan

Co-author(s) : Prof. POSTNOV, Konstantin (Sternberg Astronomical Institute)

Presenter(s) : SIMKIN, Ivan; Prof. POSTNOV, Konstantin (Sternberg Astronomical Institute)

Session Classification : Gravitation and Cosmology

Contribution ID : **434** Type : **Plenary/section talk**

Calibration and rare physics searches with the SNO+ experiment

Tuesday, 23 October 2018 09:45 (15)

The SNO+ collaboration has upgraded the SNO detector to pursue a wide range of physics goals, which will be achieved in three distinct phases. In the ongoing water phase, a search for invisible nucleon decays with expected lifetime sensitivities as high as $10^{28} - 10^{30}$ years is being conducted. In the upcoming scintillator phase, the increased light yield will lower the energy threshold, allowing studies of solar neutrinos, geoneutrinos, reactor antineutrinos, and supernova neutrinos to begin. Finally, in the double-beta phase, the active volume will be doped with Tellurium, allowing the search for neutrinoless double-beta decay. In order to measure such rare events, both the backgrounds and the detector response must be well understood - precise calibration methods are therefore required. This presentation will give an overview of the calibration methods and discuss the status of the nucleon decay search.

Primary author(s) : NIRKKO, Martti (University of Sussex)

Presenter(s) : NIRKKO, Martti (University of Sussex)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **435** Type : **Plenary/section talk**

Search for parameter modification of neutral light mesons in nuclear matter in Hyperon-M experiment at U-70 accelerator

Wednesday, 24 October 2018 09:45 (15)

Search for parameter modification of neutral light mesons in nuclear matter in Hyperon-M experiment at U-70 accelerator

Sergey Evdokimov et al. (Hyperon-M experiment)

Hyperon-M at U-70 accelerator in Protvino is fixed-target experiment for study of parameter modifications of neutral light mesons produced in meson-nucleus interactions on different nuclear targets. On the base of collected high statistic experimental data on C, Be, Al, Cu, Sn and Pb targets the parametric unfolding method for meson mass and width determination (measurement) is developed to decrease systematic errors related to various apparatus (instrument) effects of the experiment and thus to improve essentially the precision of parameter measurements. It is employed for the analysis of $f_2(1270)$ and $\omega(782)$ mesons. The obtained masses and widths of the mesons are presented in dependence on the target mass A with the aim to search for possible modification of the meson properties in nuclei.

Primary author(s) : Mr. EVDOKIMOV, Sergey (NRC "Kurchatov institute" - IHEP); HYPERON-M, experiment

Presenter(s) : Mr. EVDOKIMOV, Sergey (NRC "Kurchatov institute" - IHEP)

Session Classification : Particle Physics

Track Classification : Nuclear physics

Contribution ID : **436** Type : **Plenary/section talk**

The DArk Matter Particle Explorer and its latest results

Thursday, 25 October 2018 17:00 (15)

The DArk Matter Particle Explorer (DAMPE) is a high-performance space particle detector launched in orbit on 17 December 2015 by a collaboration of Chinese, Italian and Swiss scientific institutions, coordinated by the Chinese Academy of Sciences. It consists of a high-resolution segmented BGO electromagnetic calorimeter with a depth of 31 radiation lengths, a silicon-tungsten tracker-converter that reaches an angular resolution below 0.2°, an anti-coincidence shield and ion detector made of segmented plastic scintillators and a neutron detector made of boron-doped plastic scintillators. An overview of the experiment and a summary of the latest results coming from the observation of cosmic rays up to 100 TeV, of gamma-rays up to 10 TeV and of cosmic electrons up to 5 TeV will be presented.

Primary author(s) : Dr. FUSCO, Piergiorgio (Bari University and INFN)

Presenter(s) : Dr. FUSCO, Piergiorgio (Bari University and INFN)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **437** Type : **Plenary/section talk**

Investigation of muon bundles generated by UHECR by means of the new coordinate-tracking detector

Tuesday, 23 October 2018 17:15 (15)

The new coordinate-tracking detector based on drift chambers (CTUDC) is developed in MEPhI. The detector represents two planes with total area of 30 m2 placed on opposite sides of Cherenkov water detector of 2000 mˆ3 volume. Each plane consists of 8 large multiwire drift chambers (4000x508x112 mmˆ3). The key advantages of these chambers are a large effective area (1.85 mˆ2) and a good coordinate and angular resolution with a small number of measuring channels. From the beginning of 2017, CTUDC operates as a part of the experimental complex NEVOD. The detector is designed for measuring of high density muon bundles (up to 10 particles per mˆ2) at zenith angles in the range from 30° to 90°. The results of the operation of the CTUDC at the last year are given, the first distributions of the events in zenith angle and muon multiplicity obtained from the detector data are discussed.

Primary author(s) : Dr. BORISOV, Anatoly (MEPhI/IHEP); Dr. KOZHIN, Anatoly (MEPhI/IHEP); PETRUKHIN, Anatoly (National Research Nuclear University MEPhI); Dr. ZADEBA, Egor (MEPhI); YASHIN, Igor (National Research Nuclear University MEPHI); Dr. KOMPANIETS, Konstantin (MEPhI); Dr. FAKHRUTDINOV, Rinat (MEPhI); KOKOULIN, Rostislav (National Research Nuclear University MEPhI); Mr. IVANOV, Stanislav (MEPhI); VOROBYEV, Vladislav (MEPhI)

Presenter(s) : Dr. ZADEBA, Egor (MEPhI)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **438** Type : **Plenary/section talk**

ArgonCube: A Modular Approach for Very Large Liquid Argon Time Projection Chambers

Tuesday, 23 October 2018 17:30 (15)

Liquid Argon Time Projection Chambers (LAr TPCs) are ideal detectors for neutrino experiments, providing both particle track imaging and calorimetry in a dense medium. The sensitivity required by future neutrino physics implies unprecedented detector masses, for which traditional LAr TPC designs face challenges e.g. due to the long drift distances of O(10m). In order to efficiently drift ionisation electrons, very High Voltage (HV) and LAr purity are required, which comes along with risks of HV breakdowns with huge power dissipations. To address these issues, the ArgonCube Collaboration developed a novel generation LAr TPC design, segmenting the total detector volume into a number of electrically and optically isolated TPCs sharing a common cryostat. For the charge readout, a pixelated anode plane is employed, providing unambiguous 3D event reconstruction. To minimize inactive and dense material within the TPC a new technology is used for field shaping, replacing the classical field cage by a resistive field-shell. In the case of HV breakdown the continuous resistive shell reduces power dissipation. The scintillation light readout is achieved by large dielectric planes inside the field-shell allowing for an efficient detection of prompt scintillation light and improved particle identification and trigger efficiency. The technology proposed by ArgonCube will be applied to the near detector of the Deep Underground Neutrino Experiment, DUNE, and being proposed also for one of the far detectors.

Primary author(s) : BERNER, Roman (LHEP University of Bern)

Presenter(s) : BERNER, Roman (LHEP University of Bern)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **439** Type : **Plenary/section talk**

Direct dark matter search with the CRESST-III experiment

Thursday, 25 October 2018 17:15 (15)

The CRESST-III (the third stage of the Cryogenic Rare Event Search with Superconducting Thermometers) is a direct dark matter (DM) search experiment, located at the Laboratori Nazionali del Gran Sasso in Italy, where an overburden of 1400m of rock (3800m water equivalent) provides an efficient reduction of the cosmic radiation background. In the first phase of the CRESST-III experiment, scintillating $\mathrm{CaWO_4}$ crystals are used as target material for elastic DM-nucleus scattering and operated as cryogenic detectors at mK temperatures. The simultaneous measurement of the phonon signal from each target crystal and the emitted scintillation light in a separate cryogenic light detector provide event-by-event particle identification for background suppression. In 2018, the first phase of CRESST-III data taking was successfully completed, achieving an unprecedented energy threshold for nuclear recoils, lower than 100eV. The latest results of CRESST-III will be presented accompanied by a brief status update on the ongoing activities.

Primary author(s) : Dr. MOKINA , Valentyna (Institute of High Energy Physics of OEAW)

Presenter(s) : Dr. MOKINA , Valentyna (Institute of High Energy Physics of OEAW)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **440** Type : **Plenary/section talk**

Latest results from T2K

Tuesday, 23 October 2018 17:55 (15)

T2K is a long-baseline neutrino oscillation experiment based in Japan. A muon neutrino (or antineutrino) beam is produced at JPARC and sent 295 km to the Super-Kamiokande detector where neutrino oscillation is studied via muon neutrino disappearance and electron neutrino appearance channels. Such studies have demonstrated muon neutrino to electron neutrino oscillation and provide precision measurements of the muon neutrino and antineutrino disappearance parameters, acting as a probe of unknown physics, including the potential to observe CP violation in neutrino mixing. In this talk, we will present our latest neutrino and antineutrino oscillation results and also present the future prospects of the experiment.

Primary author(s) : CHAPPELL, Andy (University of Warwick)

Presenter(s) : CHAPPELL, Andy (University of Warwick)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **441** Type : **Plenary/section talk**

Discreteness of Dyonic Dilaton Black Holes

Wednesday, 24 October 2018 17:15 (20)

Now, after decades of purely theoretical research, a new era begins in the study of black holes. Thanks to such projects as the Event Horizon Telescope, LIGO and VIRGO, eLISA and others, it will be possible to obtain observational data and to test various theoretical models. Therefore, it is important to close some gaps in the theories of black holes that have not been resolved in due time. One of these not fully investigated questions is the dyon black hole model in the presence of a dilaton field. Black holes with electric and / or magnetic charges are well studied, and solutions for them are represented by RN metric. However, in the presence of the dilaton field, the situation becomes much more complicated. We show that there are two classes of solutions that describe static spherically symmetric dyonic dilaton black holes with two nonsingular horizons. The first class includes only the already known solutions that exist for a few special values of the dilaton coupling constant. Solutions belonging to the second class have essentially different properties. They exist for continuously varying values of the dilaton coupling constant, but arise only for discrete values of the dilaton field at the horizon. For each given value of the dilaton coupling constant, there may exist several such solutions differing by the number of zeros of the shifted dilaton function in the subhorizon region and separating the domains of singular solutions. The obtained result disproves the existing triangular hypothesis that regular dyon-dilaton black holes can exist only for a certain discrete sequence of the dilaton coupling constant. Since the dilaton coupling constant is an external parameter in this model (and can be specified by a more fundamental theory of gravitation), the independence of the discreteness phenomenon from the value of this constant is a rather important result. The universal nature of the discreteness of regular solutions can lead to a number of new phenomena in the dyon-dilaton system of black holes.

Primary author(s) : DAVYDOV, Evgeny (JINR)

Presenter(s) : DAVYDOV, Evgeny (JINR)

Session Classification : Gravitation and Cosmology

Contribution ID : **442** Type : **Plenary/section talk**

Prediction of particle production in pp collisions at MPD/NICA

Friday, 26 October 2018 16:20 (15)

The possibilities of the Multi-Purpose Detector (MPD) to register data from small systems like proton - proton collisions are studied with Monte Carlo simulations of proton - proton inelastic interactions at the energy range of NICA. Particle generators based on different models are compared. The production of protons, pions and kaons from pp collisions is studied through their mean multiplicity, rapidity spectra and particle ratios as function of the collision energy. The production of Lambda hyperons is also estimated through Monte Carlo simulations based on EPOS 1.99 and its reconstruction in TPC and TOF. The comparison with recent data from NA61/SHINE experiment is presented.

Primary author(s) : Dr. SHTEJER, Katherin (JINR)

Presenter(s) : Dr. SHTEJER, Katherin (JINR)

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **443** Type : **Plenary/section talk**

The background simulation of experiment for searching of 2K-capture in ^{124}Xe

Wednesday, 24 October 2018 09:45 (15)

During several years at the Baksan Neutrino Observatory INR RAS is undergoing the experiment for searching of 2K (2ν)-capture in ^{124}Xe. This isotope has several advantages: 1) it has the largest kinetic energy of transition Q – 2.866 MeV, among candidates of nuclei for which predicted the existence of ECEC; 2) since xenon is the noble gas, then it could be easily use as a system isotope-detecting medium in a gas detector. To search for 2K-capture in ^{124}Xe the large volume copper proportional counter (LPC) is used.

In our work, we present the results of the simulation, with the Geant4 package, of LPC background from the decays of ^{238}U and ^{232}Th nuclei in the construction materials of the LPC case, as well as in elements of the low-background shield. The influence of neutrons produced in the rock of the underground laboratory from the decay of ^{238}U and ^{232}Th, where the experimental setup is located, on the production of the ^{125}I isotope in the working gas of the detector, upon capture of thermalized neutrons by the ^{124}Xe isotope is considered. The ^{125}I isotope can have a significant influence on the background of the experiment since the total energy release in its decay belongs to the same energy region as ROI of 2K-capture in ^{124}Xe.

Primary author(s) : KAZALOV, Vladimir (INR RAS); GAVRILYUK, Yu. M. (INR RAS); Dr. GANGAPSHEV, A. M. (INR RAS); Dr. KUZMINOV, V. V. (INR RAS); Dr. PANASENKO, S. I. (V.N.Karazin Kharkiv National University); Dr. RATKEVICH, S. S. (V.N.Karazin Kharkiv National University); TEKUEVA, D. A. (INR RAS); YAKIMENKO, S. P. (INR RAS); PETRENKO, A.D. (V.N.Karazin Kharkiv National University)

Presenter(s) : KAZALOV, Vladimir (INR RAS)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **444** Type : **Plenary/section talk**

Reconstruction techniques in supersymmetry searches in the ATLAS experiment

Tuesday, 23 October 2018 10:30 (20)

Many supersymmetric scenarios feature final states with non-standard final state objects. The production of massive sparticles can lead to the production of boosted top quarks or vector bosons, high-pt b-jets. At the same time, transitions between nearly mass-degenerate sparticles can challenge the standard reconstruction because of the presence of very soft leptons or jets. The talk will review the application of innovative reconstruction techniques to supersymmetry searches in ATLAS.

Primary author(s) : VERMEULEN, Ambrosius (Nikhef Amsterdam); ATLAS COLLABORATION

Presenter(s) : VERMEULEN, Ambrosius (Nikhef Amsterdam)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **446** Type : **Poster**

Поиск тяжелых нейтральных лептонов в эксперименте NA62 (CERN)

Monday, 22 October 2018 15:40 (150)

Обнаруженные осцилляции нейтрино свидетельствуют о том, что Стандартная Модель (СМ) элементарных частиц не является полной. Но пока неизвестны свойства частиц, которые скрываются за этим явлением. В некоторых расширениях СМ естественным образом вводятся тяжелые стерильные нейтрино (нейтральные лептоны). Поиск тяжелых стерильных нейтрино (нейтральных лептонов), N, выполнен в эксперименте NA62 (CERN), основной целью которого является измерение с точностью около 10% вероятности редкого распада K+⟶π+νν. Измерение этого распада, рассчитанного с высокой точностью в СМ, является чувствительным тестом различных расширений СМ. Поиск тяжелых нейтрино в эксперименте NA62 осуществляется при измерении распадов на один заряженный лептон (мюон или электрон). В докладе будет кратко описана установка NA62 и ее параметры. Будут разобраны методы моделирования распадов каонов, и изложены критерии отбора событий K+⟶l+N (l = e+, μ+); рассмотрены методы анализа экспериментальных данных по поиску стерильных нейтрино, проанализированы основные источники фона и приведены их величины. В докладе будут представлены новые результаты: ограничения на уровне 10ˆ(-6)-10ˆ(-7) на параметры смешивания стерильных нейтрино |Ue4|ˆ2 в диапазоне масс 170-450 МэВ и |Uμ4|ˆ2 в диапазоне масс 240-370 МэВ, полученные на основе данных, накопленных в 2015 году. Также будут обсуждаться дальнейшие перспективы по поиску стерильных нейтрино в эксперименте NA62.

Primary author(s) : KUROCHKA, Viktoriia

Presenter(s) : KUROCHKA, Viktoriia

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics

Contribution ID : **447** Type : **Plenary/section talk**

Bound orbits near black holes with scalar hair

Wednesday, 24 October 2018 10:30 (20)

We consider spherically symmetric black holes with minimally coupled scalar fields and concentrate our attention on asymptotically flat self-gravitating configurations having the event horizons located at radii much smaller than 2M. We think of such configurations as rigorous mathematical models of the gravitating objects, surrounded by dark matter, at the centres of normal galaxies. In astronomical observations, a key role in distinguishing between black holes, wormholes, and naked singularities plays measuring parameters of bound quasiperiodic timelike orbits, in particular, the location of the innermost stable circular orbit, specific angular momentum of a test particle on it, the angle of precession of periapsis, and the precession rate.

Primary author(s) : Mr. POTASHOV, Ivan (Tver State University); Dr. TCHEMARINA, Julia (Tver State University); TSIRULEV, Alexander (Tver State University)

Presenter(s) : TSIRULEV, Alexander (Tver State University)

Session Classification : Gravitation and Cosmology

Contribution ID : **448** Type : **Plenary/section talk**

TAU-4 installation intended for long-term monitoring of a half-life value of the 212Po

Friday, 26 October 2018 10:30 (15)

Description of the TAU-4 installation intended for long-term monitoring of the half-life value T1/2 of the 212Po is presented. Natural thorium used as a source of the mother's chain. The methods of measurement and processing of collected data are reported. Short testing measurements were made in the ground building (680 hours) and underground laboratory (564 hours). Averaged value T1/2=294.09±0.07 ns of the 212Po half-life was found for the ground level data set similar one for the underground data set. The solar-daily variations with amplitudes ASo=(11.7±5.2)·10-4 for the ground data and ASo=(7.5±5.3)·10-4 for the underground one were found in a series of τ values.

Primary author(s) : KUZMINOV, Valery (INR RAS)

Presenter(s) : KUZMINOV, Valery (INR RAS)

Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **449** Type : **Poster**

Calculated spectrum of muon-induced cascades at great depths of water or ice

Monday, 22 October 2018 15:40 (150)

Modern existing and being developed Cherenkov water detectors for neutrino astrophysics have a cubic-kilometers volume. These detectors are deployed at great depths of water or ice and, in addition to neutrinos, register atmospheric muons with a high energy threshold (hundreds GeV). The energy spectrum of muons with energies above 100 TeV is extremely poorly studied. Knowing the spectrum will allow testing the models of hadron interaction and to resolve some disputed issues of cosmic ray physics. One of the best ways for investigations of muon spectrum is measuring the spectrum of stochastic energy losses (cascades, originating mainly due to muon bremsstrahlung). The results of calculations of cascade spectrum at a great depths of water or ice are discussed.

Primary author(s) : SOZINOV, Egor; EVDOKIMOV, Dmitriy (MEPhI)

Co-author(s) : KHOKHLOV, Semyon (National Research Nuclear University MEPhI)

Presenter(s) : SOZINOV, Egor; EVDOKIMOV, Dmitriy (MEPhI); KHOKHLOV, Semyon (National Research Nuclear University MEPhI)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **450** Type : **Plenary/section talk**

Compactification scenario in Einstein-Gauss-Bonnet cosmology

Tuesday, 23 October 2018 16:45 (20)

In this talk we address two important issues which could affect reaching the exponential and Kasner asymptotes in Einstein-Gauss-Bonnet cosmologies – spatial curvature and anisotropy in both three- and extra-dimensional subspaces. In the first part we consider cosmological evolution of spaces being the product of two isotropic and spatially curved subspaces. We consider all possible number of spatial dimensions and provide description of the curvature effects in these dimensions. It is demonstrated that the dynamics in $D = 2$ (the number of extra dimensions) and $D \geq 3$ is different. In particular, the regime with the "stabilization" of extra dimensions could be reached only if $D \geq 3$. In the second part we study the influence of initial anisotropy. Our study of reveals that transition from Gauss-Bonnet Kasner regime to anisotropic exponential expansion (with expanding three and contracting extra dimensions) is stable with respect to breaking the symmetry within both three- and extra-dimensional subspaces in any number of extra dimensions. This allows us to construct a scenario where isotropisation of outer and inner subspaces is reached dynamically from rather general anisotropic initial conditions.

Primary author(s) : Dr. TOPORENSKY, Alexey (Sternberg Astronomical Institute)

Presenter(s) : Dr. TOPORENSKY, Alexey (Sternberg Astronomical Institute)

Session Classification : Gravitation and Cosmology

Contribution ID : **451** Type : **Plenary/section talk**

Search for features in the cosmic-ray electron and positron spectrum measured by the Fermi Large Area Telescope

Thursday, 25 October 2018 17:30 (15)

Over its ten years of mission the Large Area Telescope onboard the Fermi Gamma-ray Space Telescope has collected the largest ever sample of high-energy cosmic-ray electron and positron events. Possible features in their energy spectrum could be a signature of the presence of nearby astrophysical sources or of more exotic sources, such as annihilation or decay of dark matter (DM) particles in the Galaxy. We will present the results of the search for possible delta-like line features in the cosmic-ray electron and positron spectrum. We will also present the results of the search for possible features originating from DM particles annihilating into electron-positron pairs. We are able to set constraints on DM masses up to 1.7 TeV/c^2 and exclude the thermal value of the relic annihilation cross section for DM candidates lighter than 150 GeV/c^2.

Primary author(s) : Dr. MAZZIOTTA, Mario Nicola (Istituto Nazionale di Fisica Nucleare, Sezione di Bari)

Presenter(s) : Dr. MAZZIOTTA, Mario Nicola (Istituto Nazionale di Fisica Nucleare, Sezione di Bari)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **452** Type : **Poster**

Performance for anisotropic flow measurements of the future CBM experiment at FAIR

Monday, 22 October 2018 15:40 (150)

The Compressed Baryonic Matter experiment (CBM) at FAIR aims to study the QCD phase diagram at high net baryon densities and moderate temperatures using collisions of heavy ions at center-of-mass energies of a few GeV per nucleon. Anisotropic transverse flow is among the key observables to study the properties of matter created in such collisions.

The CBM performance for anisotropic flow measurements is studied with Monte-Carlo simulations using gold ions at SIS-100 energies with lab momentum of 3.5-12 AGeV/c employing different heavy-ion event generators. Various combinations of CBM detector subsystems are used to investigate the possible systematic biases in flow measurement and to study the effects of detector azimuthal non-uniformity. The resulting performance of CBM for flow measurements is demonstrated for different harmonics of identified charged hadron anisotropic flow as a function of rapidity and transverse momentum in different centrality classes.

The measurement techniques developed for CBM were also validated with the experimental data recently collected by the NA61/SHINE experiment at CERN SPS for Pb-Pb collisions at the beam momenta 13 and 30 AGeV/c (the first energy point is close to the top SIS-100 energy). This is also of importance for CBM performance studies, because both CBM and the NA61/SHINE are fixed target experiments and have a similar Projectile Spectators Detector (PSD) as a part of their setup.

Primary author(s) : SELYUZHENKOV, Ilya (GSI - Helmholtzzentrum fur Schwerionenforschung GmbH (DE)); KLOCHKOV, Viktor (GSI Helmholtzzentrum für Schwerionenforschung / Frankfurt Uni); KASHIRIN, Evgeny (National Research Nuclear University MEPhI); Mr. GOLOSOV, Oleg

Presenter(s) : SELYUZHENKOV, Ilya (GSI - Helmholtzzentrum fur Schwerionenforschung GmbH (DE)); KLOCHKOV, Viktor (GSI Helmholtzzentrum für Schwerionenforschung / Frankfurt Uni); KASHIRIN, Evgeny (National Research Nuclear University MEPhI); Mr. GOLOSOV, Oleg

Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics: heavy ion

Contribution ID : **453** Type : **Poster**

Indirect Dark Matter searches with the HAWC Observatory.

Monday, 22 October 2018 15:40 (150)

The High Altitude Water Cherenkov (HAWC) observatory is a wide-field-of-view (2sr) and high duty cycle (>95%) gamma-ray detector array, which is sensitive to gamma rays from 500 GeV - 100 TeV. HAWC operates at an altitude of 4100 meters in the state of Puebla, Mexico, since HAWC observes 2/3 of the sky 24 hours a day, it is a well-suited instrument to perform indirect dark matter searches by detecting high energy photons resulting from annihilation or decay of dark matter particles. For such searches, we have considered dwarf spheroidal galaxies, the Milky Way halo, and the M31 galaxy. Besides the traditional regions, we have also searched in some other regions as dwarf irregulars galaxies. Since HAWC has not seen statistically significant excess from these sources, we present annihilation and decay limits for dark matter masses above 1 TeV.

Primary author(s) : ALFARO, Ruben (Universidad Nacional Autonoma de Mexico)

Co-author(s) : HERNANDEZ, Sergio (IF-UNAM); SERNA, Jose (IF-UNAM)

Presenter(s) : ALFARO, Ruben (Universidad Nacional Autonoma de Mexico)

Session Classification : Poster session and coffee-buffet

Contribution ID : **454** Type : **Poster**

Influence of atomic effects on antineutrino spectrum of Pr-144

Monday, 22 October 2018 15:40 (150)

^{144}Pr isotope is one of the most favorable antineutrino sources for short-baseline experiments aimed at sterile neutrino search. These experiments require precise theoretical knowledge of the antineutrino spectrum. We calculate antineutrino spectrum of ^{144}Pr taking into account various corrections. Particular attention is given to atomic effects.

Primary author(s) : Mr. TITOV, Oleg; Mrs. LUKYANCHENKO, Liudmila; Prof. SKOROKHVATOV, Mikhail

Presenter(s) : Mr. TITOV, Oleg

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: neutrino physics

Contribution ID : **455** Type : **Plenary/section talk**

Recent results from the Belle experiment.

Friday, 26 October 2018 09:30 (20)

Recent results from the Belle experiment. B.Shwartz for Belle collaboration, Budker Institute of Nuclear Physics and Novosibirsk State University, Novosibirsk, Russia

Experiments at the KEKB e⊠e⊠ energy-asymmetric collider with world highest luminosity, 2.1⊠1034cm-2s-1, continued with the Belle detector from 1999 to 2010. The total integrated luminosity collected in these experiments in the center-of-mass energy range within ⊠-meson family exceeded 1000 fb-1. The main target of the Belle experiment was to discover the CP-violation (CPV) in B meson decays and to measure its parameters. This goal was achieved in 2001 when the time dependent CP asymmetry was observed in the decay B0⊠ J/⊠ K0 decay. However, in addition to the main task, many other important results were obtained, including precise measurement of the CKM matrix unitarity triangle parameters, branching fractions of many B-meson decays, discovery of the new charmonia and bottomonia states including exotic ones. Important results were obtained for two-photon processes as well as for tau-lepton decays. Although the experiment runs were completed seven years ago the analysis of the data sample is still continuing. In this report I am going to review recent results of these analyses concentrating more on the leptonic and semi-leptonic B Decays.

Primary author(s) : SHWARTZ, Boris (Budker Institute of Nuclear Physics)

Presenter(s) : SHWARTZ, Boris (Budker Institute of Nuclear Physics)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **456** Type : **Plenary/section talk**

Bottomonium and bottomonium-like states at the Belle experiment

Friday, 26 October 2018 11:15 (15)

Bottomonia are heavy mesons consisting of b and b-bar quarks, while bottomonium-like states are mesons containing b and b-bar quarks but having properties unexpected for bottomonia. Presumably they have a more complicated structure with excited gluon fields (glueballs) or additional valence light quarks (multiquark states: hadronic molecules or compact tetrquarks). Candidates for such exotic states have been observed a few years ago by the Belle experiment at the KEKB e+e- collider (Japan). We present status and recent results in the field, that include observation of several new hadronic transitions, measurement of the eta_b(1S) mass using radiative transition from Upsilon(2S) and scan of several exclusive cross sections.

Primary author(s) : MIZUK, Roman

Presenter(s) : MIZUK, Roman

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **457** Type : **Poster**

Kinks in the relativistic model with logarithmic nonlinearity

Monday, 22 October 2018 15:40 (150)

We study the properties of a certain class of solutions of a relativistic model with the logarithmic nonlinearity. We show that such a model have two types of solutions: topologically trivial (gaussons) and topologically non-trivial (kinks). For the kink-antikink scattering, we have found a critical value of the initial velocity $v_{\rm cr}$, which separates two different scenarios of scattering. At the initial velocities $v_{\rm in} < v_{\rm cr}$, the kinks form a bound state, which then decays slowly. At $v_{\rm in} > v_{\rm cr}$, the kinks collide, bounce and eventually escape to infinities. During this process, the higher initial velocity is, the greater is the elasticity of the collision. We also study excitation spectrum of the kink solution.

Primary author(s) : Dr. GANI, Vakhid (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), 115409 Moscow, Russia); Dr. ZLOSHCHASTIEV, Konstantin (Institute of Systems Science, Durban University of Technology, P.O. Box 1334, Durban 4000, South Africa)

Presenter(s) : Dr. GANI, Vakhid (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), 115409 Moscow, Russia)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: hep theory

Contribution ID : **458** Type : **Poster**

Application of the multichannel front-end chip for SiPM based gamma detectors

Monday, 22 October 2018 15:40 (150)

Application of the multichannel front-end chip for SiPM based gamma detectors

Chergui A., Popova E.V., Stifutkin A.A. National research Nuclear University MEPHI (Moscow Engineering Physics Institute) Cherguicherif@hotmail.com ,elenap73@mail.ru , stifout@rambler.ru

Abstract: Silicon Photomultiplier (SiPM) is a modern photosensorwhich is widely used in different fields of science and technology. When coupled with a scintillator crystal it can serve as a gamma-detector. However, building of multichannel systems based on very popular scintillators such as NaI(Tl) and CsI(Tl) is difficult due to lack of the multichannel front-end chips designed for use with those "slow" crystals. A prototype of such chip was designed and manufactured in NRNU MEPhI, Department of Microelectronics (N27). The chip is configurable and each channel includes an input linear amplifier, an integrator, slow and fast shapers, a discriminator, a peak-detector and controlling electronics. In addition, a test-board for the chip evaluation was build and special control software was developed. The evaluation board was connected to a detector module which consists from a NaI(Tl) crystal and SiPM matrix and the system energy resolution for a number of gamma-sources was measured.

Primary author(s) : CHERGUI, Ahmed Cherif; STIFUTKIN, Alexey; POPOVA, Elena; BYCHKOVA, Oksana (NRNU MEPhI)

Presenter(s) : CHERGUI, Ahmed Cherif

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **459** Type : **Plenary/section talk**

A U.S.-Based Electron-Ion Collider

Tuesday, 23 October 2018 12:00 (30)

An Electron-Ion Collider (EIC) in USA is currently discussed as a next-generation facility for high-energy nuclear physics. The main goal of the EIC is to study fundamental questions of Quantum Chromodynamics, which include the origin of the nucleon mass and spin and the three-dimensional structure of the nucleon in terms of quarks and gluons, the emergent properties of dense systems of gluons, and influence of nuclear matter on distributions of quarks and gluons and propagation of color charges through it. The EIC machine designs are aimed at achieving variable center of mass energies of 20-100 GeV, upgradable to 150 GeV, high degree of polarization (~70%) of beams of electrons, protons and light nuclei, high collision luminosity of 10^{33-34} cm-2s-1, and ion beams from deuteron to heaviest (Lead) nuclei. The talk will present the current status of the EIC project, its physics program, and proposed designs of EIC realization.

Primary author(s) : GUZEY, Vadim (University of Jyvaskyla, Finland & Petersburg Nuclear Physics Institute, Russia)

Presenter(s) : GUZEY, Vadim (University of Jyvaskyla, Finland & Petersburg Nuclear Physics Institute, Russia)

Session Classification : Plenary

Contribution ID : **460** Type : **Poster**

Fabrication of reactor target from enriched 50Cr for artificial neutrino source

Monday, 22 October 2018 15:40 (150)

In the report the current state of fabrication of the enriched 50Cr target for the artificial 51Cr neutrino source with activity > 3 MCi for the experiment BEST is presented. The processes of obtaining a target in the form of disks with a thickness of 4 mm and a diameter of 84 and 88 mm required to achieve the necessary activity using the reactor SM-3 are considered, including: enrichment of natural chromium in the form of oxyfluoride by gas centrifugation, electrolytic reduction and refining of metallic chromium, as well as the formation of chromium disks by spark plasma sintering.

Primary author(s) : KOZLOVA, Julia (Pavlovna); Mr. VERETENKIN, Evgeny (Institute for Nuclear Research Russian Academy of Sciences); Prof. GAVRIN, Vladimir (Institute for Nuclear Research Russian Academy of Sciences); Mr. DANSHIN, Sergey (Institute for Nuclear Research, Russian Academy of Sciences); Dr. IBRAGIMOVA, Tatiana (Institute for Nuclear Research Russian Academy of Sciences); Mr. KOMAROV, Boris (Institute for Nuclear Research Russian Academy of Sciences)

Presenter(s) : KOZLOVA, Julia (Pavlovna)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **461** Type : **Plenary/section talk**

Neutrino recoil force in electron-capture decay of polarized nuclei: measurement prospects and potential applications

Wednesday, 24 October 2018 10:45 (15)

Due to parity violation in the weak interaction, a sample of radioactive atoms will experience a recoil force from neutrino radiation accompanying electron capture by polarized nuclei. The recoil force resulting from anisotropy of neutrino angular distribution can be measured by modern micromechanical devices. Both angular distribution and recoil force are calculated for the case of allowed nuclear transitions. We consider the most suitable radioactive isotopes for such a measurement. Potential applications are discussed.

Primary author(s) : Mr. TITOV, Oleg; Dr. BARABANOV, Alexey (NRC "Kurchatov Institute")

Presenter(s) : Mr. TITOV, Oleg

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **462** Type : **Plenary/section talk**

Neutron lifetime measurement with the big gravitational trap for ultracold neutrons. Current state and future prospects.

Wednesday, 24 October 2018 18:05 (15)

A new measurement of the neutron lifetime, carried out with the aid of a large gravitational spectrometer made in Petersburg Institute of Nuclear Physics (PNPI) is presented. In our experiment the measurement of neutron lifetime is carried out using the method of storing ultracold neutrons in a material trap with gravity barrier. Further improvement of the obtained result can be achieved at the helium temperatures. A modified installation scheme and the first results of cryogenic tests are discussed.

Primary author(s) : CHECHKIN, Anton

Presenter(s) : CHECHKIN, Anton

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **463** Type : **Plenary/section talk**

The Nuclotron-based Ion Collider Facility (NICA) Project. The Physics Programme for the Multi-Purpose Detector.

Wednesday, 24 October 2018 10:20 (20)

The Nuclotron-based Ion Collider fAcility (NICA) is a new accelerator complex being constructed at the Joint Institute for Nuclear Research (JINR). The general objective of the project is to provide beams for the experimental study of hot and dense strongly interacting QCD matter. The heavy ion programme includes two planned detectors: BM@N (Baryonic Matter at Nuclotron) – a fixed target experiment with extracted Nuclotron beams; and MPD (MultiPurpose Detector) – a collider mode experiment at NICA. The accelerated particles can range from protons and light nuclei to gold ions. Beam energies will span $\sqrt{s} = 12 - 27$ GeV with luminosity $L \geq 1 \times 10^{30}$ cm^{-2}s^{-1} and $\sqrt{s_{NN}} = 4 - 11$ GeV and average luminosity $L = 1 \times 10^{27}$ cm$^{-2}s^{-1}$(for ^{197}Au^{79+}), respectively. A third experiment for spin physics is planned with the SPD (Spin Physics Detector) at the NICA collider in polarized beams mode. A brief overview of the MPD is presented along with several observables in the MPD physics programme.

Primary author(s) : GERAKSIEV, Nikolay

Presenter(s) : GERAKSIEV, Nikolay

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **464** Type : **Plenary/section talk**

A quasi-monochromatic electron beam of ”PAHRA” accelerator for calibration of detectors

Tuesday, 23 October 2018 10:00 (15)

The characteristics of the calibration quasi-monochromatic beam of secondary electrons of the accelerator S-25R “PAHRA” of the P. N. Lebedev Physics Institute of Russian Academy of Sciences based on the magnet SP-57 are presented. The energy resolution of the beam from a copper converter in the thickness range of 0.1 - 5 mm and the interpolar gap of the magnet 6 cm in the energy range of the electron beam E = 98 - 294 MeV amounted to δ = 10 - 4.5 %, respectively.

Primary author(s) : Dr. BASKOV, Vladimir (Lebedev Physical Institute RAS)

Presenter(s) : Dr. BASKOV, Vladimir (Lebedev Physical Institute RAS)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **465** Type : **Plenary/section talk**

Latest results in heavy baryons spectroscopy

Friday, 26 October 2018 09:50 (15)

The talk will cover most recent results and present status of the spectroscopy of excited heavy (charmed and bottom) baryons: their masses, natural widths, decay modes and presumably assigned quantum numbers.

Primary author(s) : SOLOVIEVA, Elena

Presenter(s) : SOLOVIEVA, Elena

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **466** Type : **Poster**

Разработка жидких органических сцинтилляторов на основе ЛАБ для решения фундаментальных и прикладных задач физики нейтрино

Monday, 22 October 2018 15:40 (150)

Жидкие органические сцинтилляторы (ЖОС) в настоящее время являются единственным материалом, позволяющим создавать многотонные сцинтилляционные детекторы оптимальной геометрии для исследований в области физики нейтрино. Широкое распространение в качестве базового растворителя в таких сцинтилляторах в мировой практике получил линейный алкилбензол (ЛАБ). В настоящее время в Лаборатории физики нейтрино НИЦ «Курчатовский институт» создаётся экспериментальный комплекс для производства и исследования ЖОС на основе ЛАБ объёмом в несколько кубометров. Проведённые измерения показывают, что синтезированный нами ЖОС остаётся стабильным в пределах 5% в течение 225 суток наблюдений.

Primary author(s) : LITVINOVICH, Evgeny (NRC Kurchatov Institute); Mr. MURCHENKO, Alexey; Dr. OBINYAKOV, Boris; ORALBAEV, Aldiyar; Dr. SUKHOTIN, Sergey; Mr. KUZNETSOV, Denis

Presenter(s) : Mr. KUZNETSOV, Denis

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **467** Type : **Plenary/section talk**

Study of viscous-convection instabilities of thin laminar accretion flows

Thursday, 25 October 2018 18:10 (20)

Disk accretion is a very common phenomenon in the Universe: planets are born in accretion disks near young stars, bright X-ray outbursts of accretion disks occur in close star binary systems, supermassive black holes accrete matter from the surrounding disks. Observation behavior of accretion disks in different sources are described in the terms of standard accretion disk model (Shakura & Sunyaev 1973). The standard model of disk accretion assumes turbulent viscosity, but the nature of the turbulence is still under discussion. This problem doesn't have general solution for all types of accretion disks because pure hydrodynamical Keplerian flow is stable due classical Rayleigh criterion. The report describes resent results on search of small perturbations in thin laminar Keplerian accretion flows. New type of instabilities – viscous-convective instabilities – was found in laminar accretion flows taking into account the dependence macroscopic coefficients of viscosity and thermal conductivity on the temperature.

Primary author(s) : Dr. MALANCHEV, Konstantin (Sternberg Astronomical Institute MSU); Prof. POSTNOV, Konstantin (Sternberg Astronomical Institute MSU); Prof. SHAKURA, Nikolay (Sternberg Astronomical Institute MSU)

Presenter(s) : Dr. MALANCHEV, Konstantin (Sternberg Astronomical Institute MSU)

Session Classification : Gravitation and Cosmology

Contribution ID : **468** Type : **Plenary/section talk**

Studies of the Electromagnetic Calorimeter with projective geometry for the MPD/NICA

Wednesday, 24 October 2018 17:35 (15)

In the MPDRoot, projective geometry of the Electromagnetic Calorimeter had been developed, also specific classes had been prepared. Using this package, characteristics of the detector had been studied by Monte Carlo methods. We obtained information about energy and spatial resolution as well as registration effectivity for the different clusterisation procedures. In the August few detector modules had been tested using electron beam in DESY - modules developed in China for the central part of the ECal and modules developed in the JINR, located far from the vertex. Energy scan for those modules was carried out to estimate detector linearity. Both results - of the simulations and real data will be presented.

Primary author(s) : DABROWSKA, Boyana; TYAPKIN, Igor

Co-author(s) : Mr. MARTEMIANOV, M; Dr. KULIKOV, V; ZINCHENKO, Alexander (Joint Institute for Nuclear Research (RU))

Presenter(s) : DABROWSKA, Boyana

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **469** Type : **Plenary/section talk**

Cylindrical wormholes without exotic matter in GR

Wednesday, 24 October 2018 16:15 (20)

All known solutions to the Einstein equations describing rotating cylindrical wormholes lack asymptotic flatness and therefore cannot describe wormhole entrances as local objects in our Universe.To overcome this difficulty, wormhole solutions are joined to flat asymptotic regions at some surfaces Σ_- and Σ_+. The whole configuration thus consists of three regions, the internal one containing a throat and two flat external ones, considered in rotating reference frames. Using a special kind of anisotropic fluid respecting the Weak Energy Condition (WEC) as a source of gravity in the internal region, we show that the parameters of this configuration can be chosen in such a way that matter on both junction surfaces Σ_- and Σ_+ also respects the WEC. It seems to be the first example of regular twice asymptotically flat wormholes without exotic matter and without closed timelike curves, obtained in general relativity.

Primary author(s) : Prof. BRONNIKOV, Kirill

Presenter(s) : Prof. BRONNIKOV, Kirill

Session Classification : Gravitation and Cosmology

Contribution ID : **470** Type : **Plenary/section talk**

Experimental study of CEvNS process

Wednesday, 24 October 2018 10:15 (15)

A review of experiments aimed on detection and study of the recently discovered process of coherent elastic neutrino-nucleus scattering (CEvNS) is presented.

Primary author(s) : Dr. AKIMOV, Dmitry

Presenter(s) : Dr. AKIMOV, Dmitry

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **471** Type : **Poster**

Virtual pion beams at the LHC and extraction of pion-proton cross-sections

Monday, 22 October 2018 15:40 (150)

In the light of the latest data by LHCf collaboration of the LHC on leading neutrons spectra it is possible to obtain total pion-proton cross-sections in the TeV energy region. In this work the exact extraction procedure is shown. Final numbers for the pion-proton cross-section are collected at several different values of the colliding energy and compared with some popular theoretical predictions. Errors of results are estimated.

Primary author(s) : Dr. RYUTIN, Roman (NRC "Kurchatov Institute", IHEP, Protvino)

Presenter(s) : Dr. RYUTIN, Roman (NRC "Kurchatov Institute", IHEP, Protvino)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics

Contribution ID : **472** Type : **Plenary/section talk**

On separate chemical freeze-outs of hadrons and light (anti)nuclei in high energy nuclear collisions

Tuesday, 23 October 2018 10:50 (10)

The multiplicities of light (anti)nuclei were measured recently by the ALICE collaboration in Pb+Pb collisions at the center-of-mass collision energy $\sqrt{s} = 2.76$ TeV [1]. Surprisingly, the hadron resonance gas model (HRGM) is able to perfectly describe the their multiplicities [2] under various assumptions. For instance, one can consider the (anti)nuclei with a vanishing hard-core radius (as the point-like particles) or with the hard-core radius of proton, but the fit quality is the same for these assumptions. However, it is clear that the hard-core radius of a nuclei consisting of A baryons or antibaryons must be give by the expression $R(A) = R(1)A^{\frac{1}{3}}$. To implement such a relation into the HRMG we employ the induced surface tension concept [3] and perform a thorough analysis of hadronic and (anti)nuclei multiplicities measured by the ALICE collaboration. The HRGM with the induced surface tension allows us to verify different assumptions on the values of hard-core radii and different scenarios of chemical freeze-out of (anti)nuclei. It is shown that the most successful description of hadrons can be achieved at the chemical freeze-out temperature $T_h = 150$ MeV, while the one for all (anti)nuclei is $T_A = 168$ MeV. Possible explanations of this very high temperature of (anti)nuclei chemical freeze-out are discussed.

1. J. Adam et al. [ALICE Collaboration], Phys. Rev. C 93, no. 2, 024917 (2016).
2. K. A. Bugaev, V. V. Sagun, A. I. Ivanytskyi, I. P. Yakimenko, E. G. Nikonov, A.V. Taranenko and G. M. Zinovjev, Nucl. Phys. A 970, 133 (2018).
3. V. V. Sagun, K. A. Bugaev, A. I. Ivanytskyi, I. P. Yakimenko, E. G. Nikonov, A.V. Taranenko, C. Greiner, D. B. Blaschke and G. M. Zinovjev, Eur. Phys. J. A 54, 100 (2018).

Primary author(s) : Prof. BUGAEV, Kyrill (Bogolyubov Institute for Theoretical Phsycs)

Presenter(s) : Prof. BUGAEV, Kyrill (Bogolyubov Institute for Theoretical Phsycs)

Session Classification : Particle Physics

Track Classification : Nuclear physics

Contribution ID : **473** Type : **Plenary/section talk**

MTCA Systems for Data acquisition

Tuesday, 23 October 2018 10:15 (15)

The application of the platform MICRO TCA standard in physical experiments. Chassis and specialized modules for data acquisition systems. Data storage and transmission systems developed by a Russian company. Construction of distributed systems for data collection and control of physical experiments with the use of Micro-TCA platforms.

Primary author(s) : Mr. CHIRKOV, Kirill (Skiner ltd)

Presenter(s) : Mr. CHIRKOV, Kirill (Skiner ltd)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **474** Type : **Plenary/section talk**

Spherically symmetric double layers and thin shells in Weyl-Einstein gravity. Theory and examples.

Wednesday, 24 October 2018 16:35 (20)

Victor Berezin, Vyacheslav Dokuchaev and Yuri Eroshenko

Institute for Nuclear Research of the Russian Academy of Sciences

Moscow, Russia

The role of the exact solutions in gravitational theories is impossible to overestimate. But the intrinsically nonlinear character of gravitational eauations makes solving them a very difficult and problemticc task. This is why the investigations of the hypersurfaces where the matter energy-momentum tensor undergoes some discontinuities are so important. The physically interesting discontinuities are jumps (they can be viewed as an idealization of the shock waves) and thin shells (i.e., δ-function distributions, describing some idealized matter sources including the potential barriers between two different phases during cosmological phase transitions).

The thin shell formalism in General Relativity was elaborated by W.Israel. But, nowadays, the Einstein's theory is no more the ultimate theory of gravitation. The necessity to include into the gravitational action itegral the terms, quadratic (and higher order) in curvature tensor, was foreseen by A.D.Sakharov 50 years ago (induced gravity), and it was confirmed in the series of works by A.A.Starobinsky and Ya.B.Zel'dovich, L.Parker and S.Fulling, A.A.Grib and V.M.Mostepanenko and many others while considering the quantum processes of particale creation in cosmology. The selfconsistent treatment of the black hole evaporation discovered by S.W.Hawking also requires inclusion of such nonliner terms into the action integral. Surely, the first step is to consider the so called quadratic gravity. In this case the gravitational Lagrangian is the most general quadratic form constructed from the Riemann curvature tensor and its convolutions (the Ricci tensor and the curvature scalar), it includes also the Einstein-Hilbert linear term (the curvature scalar) and the cosmological term. It appeared that the quadratic gravity allows the existence of the hypersurfaces more singular than the thin shells. Namely, the double layers (i.e., δ'-distributions) which are completely forbidden in General Relativity. The general thery of such double layers was elaborated quite recently by J.Senovilla et al.

Here we resrict ourselves to investigation of the so called Weyl-Einstein gravity, the specific case of the generic quadratic gravity, when all the quadratic terms are just consituents of the square of the Weyl tensor. This is done partly because the additional symmetry leads to the less restrictive matching conditions (and, hence, deserves separate consideration), and also of the importance of this very combination for the cosmological particle creation processes. For the sake of simplicity (and the physically transparent interpretation) we constructed the theory of the spherically symmetric double layers and thin shells. The applications are the examples of the thin shells without double layers and double layers without thin shells. Also we showed that the matching conditions forbid the formation of the null double layers in Weyl+Einstein gravity.

Primary author(s) : Prof. BEREZIN, Victor (Institute for Nuclear Research, Russian Academy of Sciences); Prof. DOKUCHAEV, Vyacheslav (Institute for Nuclear Research, Russian Academy of Sciences)

Presenter(s) : Prof. BEREZIN, Victor (Institute for Nuclear Research, Russian Academy of Sciences)

Session Classification : Gravitation and Cosmology

Contribution ID : **475** Type : **Plenary/section talk**

Noble Element Simulation Technique v2.0

Tuesday, 23 October 2018 10:30 (15)

Authors: E.S.Kozlova on behalf the NEST collaboration

The Noble Element Simulation Technique (NEST) is a comprehensive mostly-empirical standalone package for complete and accurate simulation both the scintillation light and ionization yields of noble elements for many particle types (nuclear recoil, electron recoil, Kr83, alphas, etc.). Instead of NEST v.1.0, v.2.0 could fully work both as GEANT4 library and command-line tool. Huge updates to the NEST models, which make the package even more realistic, are presented. Near all available gas, liquid and solid xenon data to date have been taken into consideration in arriving at the current models.

Primary author(s) : Ms. KOZLOVA, Ekaterina (NRNU MEPhI)

Presenter(s) : Ms. KOZLOVA, Ekaterina (NRNU MEPhI)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **476** Type : **Poster**

Arg(NEST) - Argon Noble Element Simulation Technique

Monday, 22 October 2018 15:40 (150)

Authors: E.S.Kozlova on behalf the NEST collaboration

The Noble Element Simulation Technique (NEST) is a comprehensive mostly-empirical standalone package for complete and accurate simulation both the scintillation light and ionization yields of noble elements for many particle types.

Development of argon NEST is discussed; first results of arg(NEST) v2.0 are presented.

Primary author(s) : Ms. KOZLOVA, Ekaterina

Presenter(s) : Ms. KOZLOVA, Ekaterina

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **477** Type : **Poster**

Fast component in the Xe-dopant LAr

Monday, 22 October 2018 15:40 (150)

We proposed the first experimental confirmation of the fast component reemitence in the Xe-doped LAr. The effect is clearly visible at the concentration of more than 100 ppm Xe (mol by mol). Previously observed improvement of PSD ability with the increasing of Xe concentration in LAr by different experimental groups is explained by this effect. Advantages of Xe-dopant as a WLS for LAr-detectors are discussed.

Primary author(s) : Mr. RUDIK, Dmitry

Presenter(s) : Mr. RUDIK, Dmitry

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **478** Type : **Plenary/section talk**

Identity of the supermassive black hole at the Galactic Center

Wednesday, 24 October 2018 14:45 (30)

Review of the recent and future projects for direct observations of the nearest supermassive black hole Sgr A* at the Galactic Center. The primary purpose of these projects is a verification (or falsification) of the General Relativity theory in the strong field limit by means of comprehensive investigations of the shadow and the nearest environment of the event horizon of this black hole.

Primary author(s) : Prof. DOKUCHAEV, Vyacheslav

Presenter(s) : Prof. DOKUCHAEV, Vyacheslav

Session Classification : Plenary

Contribution ID : **479** Type : **Plenary/section talk**

Chiral Cosmological Models and f(R) gravity with higher derivatives

Tuesday, 23 October 2018 17:45 (20)

f(R) gravity with higher derivatives are represented in terms of the chiral cosmological models. Symmetries of a chiral space of obtained models are studied. Examples of exact solutions are found and diccassed.

Primary author(s) : Prof. CHERVON, Sergey (Ulyanovsk State Pedagogical University)

Presenter(s) : Prof. CHERVON, Sergey (Ulyanovsk State Pedagogical University)

Session Classification : Gravitation and Cosmology

Contribution ID : **480** Type : **Plenary/section talk**

ANISOTROPIC FLOW MEASUREMENTS FROM LHC TO SIS

Thursday, 25 October 2018 17:10 (15)

Extensive measurements of azimuthal anisotropy in relativistic A+A collisions, have provided invaluable insights on the expansion dynamics and the transport properties of the strongly interacting matter produced in such collisions. The recent results of flow measurements from the top LHC energy (5.2 TeV) to the top SIS energy (2.4 GeV) will discussed with emphasis on techniques, interpretation, and uncertainties in the measurements. The prospects for future measurements at NICA energies will be presented and discussed.

Primary author(s) : Dr. TARANENKO, Arkadiy (NRNU MEPhI)

Presenter(s) : Dr. TARANENKO, Arkadiy (NRNU MEPhI)

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **481** Type : **Poster**

On Kasner solution in Bianchi I $f(T)$ cosmology

Monday, 22 October 2018 15:40 (150)

Recently cosmological dynamics of anisotropic Universe in $f(T)$ gravity became an area of intense investigations. Some earlier papers devoted to this issue contain contradictory claims about the nature and propertied of vacuum solutions in this theory. The goal of the present paper is to clarify this situation. We compare properties of $f(T)$ and $f(R)$ vacuum solutions and outline differences between them. The Kasner solution appears to be an exact solution for the $T = 0$ branch, and an asymptotic solution for $T \neq 0$ branch. It is shown that Kasner solution is the past attractor if $T < 0$, being past and future attractor for $T > 0$ branch.

Primary author(s) : SKUGOREVA, Maria; TOPORENSKY, Alexey (Sternberg Astronomical Institute, Moscow)

Presenter(s) : SKUGOREVA, Maria

Session Classification : Poster session and coffee-buffet

Contribution ID : **483** Type : **Plenary/section talk**

Reconstruction of particle's energy spectrum in experiment with Unfolding technique

Friday, 26 October 2018 11:15 (15)

In this talk we present an analysis of the Unfold technique for reconstruction of the truth distribution of the measured experimental value. To test we select a particle's rigidity measured by magnetic track system of PAMELA spectrometer, obtained by simulations of the device with Geant4 Monte-Carlo simulation. A modern popular unfolding techniques was analyzed: D'Agostini, SVD and L-curve. It was shown that a correct truth spectrum reconstruction depends on a lot of factors, for example, from splitting into energy bins.

Primary author(s) : DUNAEVA, Olga (Aleksandrovna); MAYOROV, Andrey (National Research Nuclear University MEPhI); BOGOMOLOV, Yuri (Demidov Yaroslavl State University)

Presenter(s) : DUNAEVA, Olga (Aleksandrovna)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **484** Type : **Plenary/section talk**

Study of noise characteristics of irradiated pixel detectors

Tuesday, 23 October 2018 09:45 (15)

The Inner Tracking System (ITS) plays a key role in the precise determination of secondary vertices in high energy hadron collisions in ALICE at the LHC. The beam luminosity of the collider will be increased by more than 10 times after the upgrade planned in 2020. This will provide new possibilities of studies of rare processes in high energy hadron collisions including production of short-lived particles containing heavy-flavour quarks. Monolithic Active Pixel Sensors (MAPS) will be used as a base detector of the new ITS to meet the challenging requirements of charged-particle tracking. As part of this work we will present the main characteristics and noise performance of the irradiated MAPS which were studied at various temperatures using special experimental set-up equipped with a cryogenic module.

Primary author(s) : NESTEROV, Dmitrii (Saint-Petersburg State University)

Co-author(s) : ZHEREBCHEVSKY, Vladimir (Saint-Petersburg State University); Dr. FEOFILOV, Grigory; LAZAREVA, Tatiana (Saint-Petersburg State University); Mr. MALTSEV, Nikolay (Saint-Petersburg State University); Mr. PROKOFIEV, Nikita (Saint-Petersburg State University); Ms. RAKHMATULLINA, Alina (Saint-Petersburg State University)

Presenter(s) : NESTEROV, Dmitrii (Saint-Petersburg State University)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **485** Type : **Plenary/section talk**

Two-phase emission liquid xenon detector RED100 for rare events search at ground level laboratory

Tuesday, 23 October 2018 17:45 (20)

The RED100 is a two-phase emission liquid xenon detector to search for rare events such as coherent elastic neutrino nucleus scattering (CEvNS) and neutrinoless double positron decay ($0\nu2\beta+$). To detect these processes detector was specially built to work at ground level laboratory with intensive muon background.The RED100 experimental setup consists of several systems that provide stable and effective operation. These systems are the detector itself located inside a shielding, cryogenics, purification, electronics and data acquisition. High muon flux leads to PMT ageing and drastically increases single electron noise. Active voltage dividers and electron shutter were specially designed to overcome these issues. The detector principle of operation and design are described in detail. The first experimental run with 200 kg of LXe has been recently completed. The detector worked stable over 2 months. The main experimental results including liquid purity and single electron rate are presented. The projects of experiments to detect CEvNS and $0\nu2\beta+$ decays are presented as well.

Primary author(s) : KHROMOV, Alexander (NRNU)

Presenter(s) : KHROMOV, Alexander (NRNU)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **486** Type : **Plenary/section talk**

Experimental program of the COHERENT collaboration

Wednesday, 24 October 2018 10:30 (15)

The goal of the COHERENT collaboration is to observe coherent elastic neutrino-nucleus scattering (CEvNS) using different target nuclei and detector technologies. The talk focuses on the ongoing experimental effort and plans following the first observation.

Primary author(s) : Mr. KONOVALOV, Alexey (ITEP / MEPhI)

Presenter(s) : Mr. KONOVALOV, Alexey (ITEP / MEPhI)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **487** Type : **Poster**

Energy deposition distribution in GGG crystal spaghetti calorimeter during NICA experiments

Monday, 22 October 2018 15:40 (150)

Using the Monte Carlo method (GEANT4), energy deposit distributions were obtained for incident gamma photons with energy from 256 MeV up to 8192 MeV interacting with the various parts of the spaghetti calorimeter (SPACAL). The SPACAL consists of nine scintillation single crystal gallium-gadolinium garnet (GGG) rods with dimensions $3 \times 3 \times 100$ mm^3 forming a 3×3 array surrounded by tungsten. The distribution of energy deposit on the boundary of the connection and in the crosshairs of cells were also considered. Distributions were obtained for the central crystal, the ring of eight crystals surrounding the central crystal, and over all the crystals.

As a result, the amount of energy that remains in the crystal surrounded by tungsten equal to 34% of the energy released in a pure GGG scintillator when a photons hit the crystal. Released energy in photon tungsten interaction lies in range from 1.65% to 4.5% and depends on incident point position.

The high light yield of GGG crystal 3×3 array detector allows for performing measurements in nuclotron-based ion collider facility (NICA) experiments at the Joint Institute for Nuclear Research (JINR).

Primary author(s) : MOSOLOVA, Ekaterina (Joint Institute for Nuclear Research/Peter the Great St. Petersburg Polytechnic University)

Co-author(s) : Mr. DUNIN, Vladimir; Dr. KOKOULINA, Elena

Presenter(s) : MOSOLOVA, Ekaterina (Joint Institute for Nuclear Research/Peter the Great St. Petersburg Polytechnic University)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **488** Type : **Poster**

On application of wobbler in experiments with cylindrical targets

Monday, 22 October 2018 15:40 (150)

For the experiments with irradiation of cylindrical targets by intense ion beams which are actual in some fundamental and applied researches (laboratory astrophysics, medicine, etc) it is necessary to shape the irradiating beam with hollow geometry. Among the various methods of hollow beam formation the wobbling is of interest. The deflecting plates or RF-cavities with phase shift of electromagnetic fields create the fast beam rotation. In the case of the suitable relation between the velocity of the rotation and the characteristic velocity of the processes inside the target substance arising from the irradiation (for instance, the velocity of the front motion of the shock wave caused by the target implosion) the beam may be considered as hollow one. In this report some problems of the method are discussed, resulting in the asymmetry of the irradiation. The calculation results are presented.

Primary author(s) : Mr. SULEYMENOV, E. (NRNU MEPhI (on leave)); Dr. BARMINOVA, H. (NRNU MEPhI)

Presenter(s) : Dr. BARMINOVA, H. (NRNU MEPhI)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **489** Type : **Plenary/section talk**

SOLAR NEUTRINO CAPTURE CROSS-SECTION FOR Ge-76 NUCLEI

Friday, 26 October 2018 10:45 (15)

The calculations of the capture cross section of solar neutrinos σ (E) by the 76Ge nucleus are presented. The calculations used experimental data on the strength function S (E) obtained in the charge-exchange reaction of 76Ge (3He, t) 76As. The effect of the resonant structure of the strength function S (E) on the calculated cross section σ (E) was investigated. It is shown that only a giant Gamow-Teller resonance contributes about 20%, and an even greater contribution is made by excitations located lower in the continuous part of the spectrum. These contributions should be taken into account in the calculation of background events in experiments on double beta decay of the GERDA type (LEGEND).

Primary author(s) : VYBOROV, Andrei (MIPT); Mr. FAZLIAKHMETOV, Almaz; Mr. KOROTEEV, Grigory (Moscow Institute of Physics and Technology); Mr. INZHECHIK, Lev (Moscow Institute of Physics and Technology); Dr. LUTOSTANKY, Yury (National Research Centre "Kurchatov Institute"); Dr. TIKHONOV, Viktor (National Research Centre "Kurchatov Institute")

Presenter(s) : VYBOROV, Andrei (MIPT)

Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **490** Type : **Plenary/section talk**

Overview of the Tunka-Rex experiment

Wednesday, 24 October 2018 17:30 (15)

Tunka-Rex is a sparse antenna array, detecting radio emission from cosmic-ray air showers. It works in the frequency band of 30 to 80 MHz and consists of 63 station, equipped with SALLA antennas. Tunka-Rex operates jointly with other detectors of the TAIGA (Tunka Advanced Instrument for cosmic ray physics and Gamma Astronomy) facility, the scintillator array Tunka-Grande and the air-Cherenkov array Tunka-133, receiving the trigger from them. The threshold of Tunka-Rex is higher than for Tunka-Rex and Tunka-Grande and is about 100 PeV. By applying new methods of reconstruction, firstly, the shower maximum resolution was improved to 25-35 g/cm^2, secondly, the energy resolution was increased to 10%. In this work, we present an overview of the experiment and discuss the latest results of Tunka-Rex.

Primary author(s) : Ms. MARSHALKINA, Tatiana (MSU, API ISU)

Presenter(s) : Ms. MARSHALKINA, Tatiana (MSU, API ISU)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **491** Type : **Poster**

Operator-based method for finding exact solutions of the propagator equation in the presence of a magnetic field

Monday, 22 October 2018 15:40 (150)

Elementary particle processes in the extreme astrophysical conditions, such as strong magnetic fields, require knowledge of the exact propagators. There are known expressions for the propagators of scalar, Dirac and massive vector fields in the presence of the constant magnetic field both in the coordinate and in the momentum spaces. In general they require either following the tedious Fock-Schwinger procedure or first obtaining the exact solutions of the wave equation of interest followed by summation over the allowed quantum numbers. In this work we present a general method of obtaining the exact analytical solutions of the propagator equation based on the decomposition of the delta function into the sum of the Hamiltonian-like operator eigenfunctions with the subsequent integration of the corresponding operator exponent in the proper time domain. Providing that parts of the operator exponent commute, it becomes possible to decouple them from each other and apply each part separately to the delta function decomposition series. This method not just allows to straightforwardly obtain the expression for the propagator in the momentum space as a sum over the Landau levels, but also helps to gain insights into the propagator's anatomy, revealing the origins of its constituent parts.

Primary author(s) : Mr. IABLOKOV, STANISLAV (P.G. Demidov Yaroslavl State University); KUZNETSOV, Alexander (Yaroslavl State P.G. Demidov University)

Presenter(s) : Mr. IABLOKOV, STANISLAV (P.G. Demidov Yaroslavl State University)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: hep theory

Contribution ID : **492** Type : **Plenary/section talk**

Cosmological perturbations during the kinetic inflationary epoch in the Horndeski theory

Tuesday, 23 October 2018 18:05 (25)

We consider cosmological perturbations in the theory of gravity with nonminimal kinetic coupling. The Lagrangian of the theory contains the term $\zeta G^{ij}\phi_{,i}\phi_{,j}$, and represents the particular example of a general Horndeski Lagrangian, which results in second-order field equations. We derive a complete set of equations for scalar and tensor pertubations. The scalar and tensor modes are analyzed in detail. It is shown that their behavior inside the Hubble horizon differs cardinally from the analogous behavior of scalar and tensor modes in Friedmann cosmology.

Primary author(s) : SUSHKOV, Sergey (Kazan Federal University)

Presenter(s) : SUSHKOV, Sergey (Kazan Federal University)

Session Classification : Gravitation and Cosmology

Contribution ID : **493** Type : **Plenary/section talk**

The Structure of UV Divergences in Maximally Supersymmetric Gauge Theories

Wednesday, 24 October 2018 16:15 (15)

We consider the UV divergences up to sub-sub leading order for the four-point on-shell scattering amplitudes in D=8 supersymmetric Yang-Mills theory in the planar limit. We trace how the leading, subleading, etc divergences appear in all orders of perturbation theory. The structure of these divergences is typical for any local quantum field theory independently on renormalizability. We show how the generalized RG equations allow one to evaluate the leading, subleading, etc. contributions in all orders of PT starting from one-, two-, etc. loop diagrams respectively. We focus then on subtraction scheme dependence of the results and show that in full analogy with renormalizable theories the scheme dependence can be absorbed into the redefinition of the couplings. The only difference is that the role of the couplings play dimensionless combinations like g^2s^2 or g^2t^2, where s and t are the Mandelstam variables.

Primary author(s) : Mr. TOLKACHOU, Denis

Co-author(s) : Mr. KAZAKOV, Dmitry

Presenter(s) : Mr. TOLKACHOU, Denis

Session Classification : Particle Physics: HEP theory

Track Classification : Particle physics: hep theory

Contribution ID : **494** Type : **Plenary/section talk**

On the meaning of the wave function of the Universe

Tuesday, 23 October 2018 17:25 (20)

The meaning of the wave function of the Universe was actively discussed in 1980s. In most works on quantum cosmology it is accepted that the wave function defines the probability amplitude for the Universe to have some space geometry, or to be found in some point of the Wheeler superspace. It seems that the wave function gives maximally objective description compatible with quantum theory. However, the probability distribution does not depend on time and does not take into account the existing of our macroscopic evolving Universe. What we wish to know is how quantum processes in the Early Universe determined the state of the present Universe in which we are able to observe macroscopic consequences of these quantum processes. The picture that can be obtained in the Wheeler – DeWitt quantum geometrodynamics is compared with that that of the extended phase space approach to quantization of gravity. We shall discuss how the wave function can be chosen among all possible solutions of the Wheeler – DeWitt (or Schrödinger) equation, if it does not depend on a reference frame, and what stage of the Universe evolution it describes.

Primary author(s) : Dr. SHESTAKOVA, Tatyana

Presenter(s) : Dr. SHESTAKOVA, Tatyana

Session Classification : Gravitation and Cosmology

Contribution ID : **495** Type : **Plenary/section talk**

Femtoscopic scales of particle-emitting source in small and large systems

Friday, 26 October 2018 17:10 (15)

The femtoscopy technique allows one to measure the spatial and temporal scales of the particle-emitting source produced at high energy collisions. In non-central ultra-relativistic heavy-ion collisions, emitting source may be tilted in the reaction plane. The orientation of freeze-out distributions is interesting because it provides complementary information about quark-gluon matter properties. In the experiment, the tilt can be extracted by measuring femtoscopic radii as a function of the pair angle with respect to the first-order event plane.

In this talk, we will present results of azimuthally sensitive femtoscopic analysis of Au+Au collisions at 200 GeV using UrQMD and vHLLE models. We will also present the transverse momentum and multiplicity dependence of identical pion and kaon femtoscopic radii from d+Au, ^{3}He+Au collisions at 200 GeV obtained from the UrQMD model.

Primary author(s) : SEMENOVA, Varvara

Co-author(s) : KHYZHNIAK, Eugenia; NIGMATKULOV, Grigory

Presenter(s) : SEMENOVA, Varvara

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **496** Type : **Plenary/section talk**

STAR Highlights and Future

Thursday, 25 October 2018 15:00 (30)

Heavy-ion collisions provide opportunity to explore phase structures of strongly interacting hot and dense nuclear matter called Quark-Gluon Plasma (QGP). Quantifying the properties of the QGP is necessary for describing the QCD phase diagram. The Relativistic Heavy Ion Collider (RHIC) makes it possible to map QCD phase diagram by varying the energy of collisions, as well as colliding different nuclei. In this talk, we will present recent results from the STAR experiment at RHIC and discuss future plans.

Primary author(s) : Mr. NIGMATKULOV, Grigory

Presenter(s) : Mr. NIGMATKULOV, Grigory

Session Classification : Plenary

Track Classification : Nuclear physics: heavy ion

Contribution ID : **497** Type : **Plenary/section talk**

On the stability of extra dimensions in nonlinear multidimensional gravity with multiple factor spaces

Wednesday, 24 October 2018 17:35 (20)

We consider a multidimensional Kaluza–-Klein-like model with nonlinear curvature terms and two spherical extra spaces of dimensions m and n. The properties of an effective action for the scale factors of extra dimensions are studied. Dimensional reduction leads to an effective 4D multiscalar-tensor theory. Based on qualitative estimates of the Casimir energy contribution at a physically reasonable length scale, we demonstrate the existence of such sets of the initial parameters of the theory in the case $m = n$ that provide a minimum of the effective potential at this scale which yields a fine-tuned value of the effective 4D cosmological constant. The corresponding size of extra dimensions depends of which conformal frame is interpreted as the observational one: it is about three orders of magnitude larger than the standard Planck length if we adhere to the Einstein frame, but it is n-dependent in the Jordan frame, and its invisibility requirement leads to some restrictions on the total dimension of space-time.

Primary author(s) : Prof. BRONNIKOV, Kirill

Co-author(s) : Dr. BOLOKHOV, Sergei

Presenter(s) : Dr. BOLOKHOV, Sergei

Session Classification : Gravitation and Cosmology

Contribution ID : **498** Type : **Poster**

Two-loop master integral for the correlator of two composite fermion currents

Monday, 22 October 2018 15:40 (150)

We calculate two-loop massless correlator $G(n_1, n_2, n_3, n_4, n_5; x, y; D)$ of two composite vertexes with Bjorken fractions x and y, arbitrary indices n_i, and arbitrary space-time dimension, D. A closed-form expression for this two-loop kite Feynman diagram with composite vertexes is given in terms of a twofold hypergeometric series. In some special cases it reduces to a sum of univariate hypergeometric functions ${}_3F_2$.

Primary author(s) : MIKHAILOV, Sergey (BLTP JINR); VOLCHANSKIY, Nikolay (BLTPh JINR & Southern Federal U.)

Presenter(s) : VOLCHANSKIY, Nikolay (BLTPh JINR & Southern Federal U.)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: hep theory

Contribution ID : **500** Type : **Plenary/section talk**

Searches for electroweak production of higgsino with ATLAS

Tuesday, 23 October 2018 10:10 (20)

Fine-tuning arguments suggest the mass of the supersymmetric partner of the Higgs boson, the higgsino, is not too far from the weak scale. The search for higgsinos represents an experimental challenge due to the near mass-degeneracy resulting in soft decay products, and the low production cross section. This talk presents recent ATLAS results of analyses explicitly targeting the higgsino with a variety of experimental techniques.

Primary author(s) : TODOME, Kazuki

Presenter(s) : TODOME, Kazuki

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **501** Type : **Plenary/section talk**

Reconstruction of the spectrum of cascades generated by VHE muons in IceCube

Tuesday, 23 October 2018 10:15 (15)

One of the best ways for investigations of VHE muons spectrum is measuring the spectrum of stochastic energy losses (cascades). IceCube is the world's unique detector capable of measuring the cascade spectrum in the energy region of tens TeV – one PeV where manifestation of prompt muons is predicted. In events with muon bundles, the longitudinal energy deposit profile reconstructed by means of the maximum likelihood method is analyzed. Cascade energies and positions are estimated in the events in which the highest local energy deposit is much greater than median energy deposit. The technique of cascade spectrum reconstruction has been tested with MC-simulated events. Criteria of events selection, cascade parameters estimation accuracy and efficiency of spectrum reconstruction will be discussed.

Primary author(s) : KHOKHLOV, Semyon (National Research Nuclear University MEPhI)

Presenter(s) : KHOKHLOV, Semyon (National Research Nuclear University MEPhI)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **502** Type : **Plenary/section talk**

Current status of LZ and LUX Dark Matter Experiments

Thursday, 25 October 2018 16:30 (15)

LUX-ZEPLIN (LZ) is a second-generation dark matter experiment to be installed 1480 m underground at the Sanford Underground Research Facility (SURF) in South Dakota, USA. The LZ detector is a dual-phase (liquid/gas) time projection chamber with active volume containing 7 tonnes of highly-purified xenon. The experiment will be looking for evidence of galactic dark matter in the form of Weakly Interacting Massive Particles (WIMPs). Its projected sensitivity for the spin-independent cross section is of 1.6×10-48 cm2 for a 40 GeV/c2 mass WIMP after 1000 live-days exposure of a 5.6-tonne fiducial mass. An overview, the timeline and the current status of the LZ experiment will be presented.

The most recent results from analysing the data from the LUX experiment (LZ predecessor) will be presented as well. This analysis, still very active at the moment, aims for better understanding of the properties of liquid xenon as particle detection medium and also looks for dark matter candidates beyond the standard WIMP paradigm.

Primary author(s) : SOLOVOV, Vladimir (LIP-Coimbra); ON BEHALF OF THE LUX AND LZ COLLABORATIONS

Presenter(s) : SOLOVOV, Vladimir (LIP-Coimbra)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **503** Type : **Poster**

Axionlike particle searches by means of the GAMMA-400 gamma-ray telescope

Monday, 22 October 2018 15:40 (150)

The existence of axionlike particles (ALPs) is predicted by many extensions of the Standard Model. ALPs represent very probable and well motivated candidate for the role of dark matter. ALPs may manifest themselves through interaction with photons – particularly, through photon-ALP conversion in magnetic fields. This hypothetical process is able to solve a big astrophysical problem of an anomalous transparency of the Universe for GeV-TeV photons. Besides that, the potential conversion have been naturally employed for ALP search and constraining their properties. In our work we study the potential of the planned GAMMA-400 telescope to detect the ALP signal or at least constrain further the ALP properties by analyzing the spectra of typical targets. These include gamma-ray pulsars – particularly, PSR J2021+3651, which has tentative ALP signatures in its spectrum; NGC 1275 (central galaxy of the Perseus cluster) and others. We also evaluate the potential of the joint analysis of data from GAMMA-400 and other telescopes – Fermi-LAT, CTA, etc.

Primary author(s) : EGOROV, Andrey (Lebedev Physical Institute of the Russian Academy of Sciences); GAMMA-400 COLLABORATION

Presenter(s) : EGOROV, Andrey (Lebedev Physical Institute of the Russian Academy of Sciences)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **504** Type : **Plenary/section talk**

^{8}He spectroscopy in stopped pion absorption by ^{11}B

Friday, 26 October 2018 11:15 (15)

Level structure of ^{8}He has been studied in the reaction of stopped pion absorption by ^{11}B nuclei ^{11}B(π^{-},pd)X. The experiment was carried out at the LANL with a two-arm semiconductor spectrometer. The missing mass spectrum in the range 0 MeV < MM < 50 MeV has been described by the superposition of phase-space distributions and the six states of ^{8}He. Parameters of these states have been compared with data of other experimental and theoretical works.

Primary author(s) : LEONOVA, Tatiana

Co-author(s) : Dr. CHERNYSHEV, Boris; Dr. GUROV, Yuri; Dr. SANDUKOVSKY, Vyacheslav (NRNU MEPhI); LAPUSHKIN, Sergei

Presenter(s) : LEONOVA, Tatiana

Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **505** Type : **Poster**

Search and study for extensive air shower events in the TUS detector data

Monday, 22 October 2018 15:40 (150)

The TUS experiment is designed to investigate the ultra high energy cosmic ray (UHECR) at energy ˜ 100 EeV from the space orbit by the UV radiation measurement of extensive air showers (EAS). It was launched on board the "Lomonosov" satellite from the Vostochny Cosmodrome on April 28, 2016 for 5 years of data taking. It is the first orbital telescope aimed for such measurements. The main mode of operation has 0.8 us temporal resolution with a 200 us duration of measured waveforms. Spatial resolution in the atmosphere is 5 km with a total field of view of about 80x80 kmˆ2. There are two main parts of the detector: a modular Fresnel mirror and a photo receiver matrix with the corresponding DAQ. The TUS apparatus structure, methods of UHECR on-line selection and a multi-level algorithm for the search of EAS-like events was developed and applied to the TUS data set analysis. A few UHECR EAS candidates were found. The preliminary results of the TUS data analysis, including the PMT relative calibration, search and study of candidates for the UHECR event are presented.

Primary author(s) : LAVROVA, Maria (Joint Institute for Nuclear Research); FOR THE LOMONOSOV-UHECR/TLE COLLABORATION

Presenter(s) : LAVROVA, Maria (Joint Institute for Nuclear Research)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **506** Type : **Poster**

Performance studies for collective flow measurements with CBM at FAIR

Monday, 22 October 2018 15:40 (150)

Measurements of the directed and elliptic flow of strange and multi-strange hadrons are an important part of the physics program of the Compressed Baryonic Matter experiment (CBM) at the future accelerator complex FAIR in Darmstadt, Germany. It was shown recently by studies from the RHIC BES program that $dv_1/dy|y = 0$ and the difference between v_2 of particles and antiparticles in the $\sqrt{s_{NN}}$ region of a few GeV are of great interest for understanding a pattern of the phase transition between quark-gluon and hadronic matter. Precision measurements of these observables in the CBM experiment will be a significant step forward in the exploration of the QCD phase diagram in the region of $\sqrt{s_{NN}} = 2 - 5$ GeV.

We will present recent results from CBM performance studies for measurements of the directed (v_1) and elliptic (v_2) flow of strange hadrons, Λ and K_s^0. Detailed comparison of these coefficients for different collision energies and event generators (UrQMD or DCM-QGSM models) will be presented. For the performance studies we use the CBMROOT environment for Monte-Carlo simulations and event reconstruction. The Kalman Filter Particle Finder (KFParticleFinder) package is used for hyperon reconstruction via their weak decays, and the Projectile Spectator Detector (PSD) for event plane determination. A status of the fast simulator implementation for the PSD calorimeter response, which is required for high statistics simulation, will be also presented.

Primary author(s) : Mr. KLOCHKOV, Viktor; Dr. SELYUZHENKOV, Ilya; KASHIRIN, Evgeny (National Research Nuclear University MEPhI); Dr. BLAU, Dmitry; Mr. GOLOSOV, Oleg

Presenter(s) : KASHIRIN, Evgeny (National Research Nuclear University MEPhI); Dr. BLAU, Dmitry

Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics: heavy ion

Contribution ID : **507** Type : **Poster**

GAMMA-400 gamma-ray telescope construction features

Monday, 22 October 2018 15:40 (150)

Space-based GAMMA-400 gamma-ray telescope will be installed on the Russian space observatory. GAMMA-400 is intended for precision measurements of gamma-radiation in the energy range from 20 MeV to several TeV of discrete sources in the Galactic plane, especially, Galactic Center, etc. measuring of the energy spectra of galactic and extragalactic diffuse gamma-radiation, which may be associated with the annihilation or decay of dark matter particles. Main parameters of the gamma-ray telescope are: angular resolution ˜0.01° at Eγ =100 GeV and energy resolution ˜1% at Eγ =100 GeV, calorimeter thickness 22 r.l., proton rejection 105.

Primary author(s) : Dr. SUCHKOV, S (LPI); GAMMA-400 COLLABORATION

Presenter(s) : Dr. SUCHKOV, S (LPI)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **508** Type : **Poster**

Development of a large liquid Argon detector for study of CEvNS

Monday, 22 October 2018 15:40 (150)

After Coherent elastic neutrino-nucleus scattering (CEvNS) was discovered with CsI detector the main task of the COHERENT Collaboration is the detailed study of this process characteristics using different target nuclei. A prototype liquid Argon detector is working at the SNS now. In this talk development of a large liquid Argon detector will be described. Another important task of a large detector is detection of a charged current neutrino interaction.

Primary author(s) : Mr. KUMPAN, Alexander

Presenter(s) : Mr. KUMPAN, Alexander

Session Classification : Poster session and coffee-buffet

Contribution ID : **509** Type : **Poster**

Modelling of position reconstruction in CENNS1ton

Monday, 22 October 2018 15:40 (150)

Coherent elastic neutrino nucleus scattering (CENNS) is a process predicted in 1974 but observed for the first time only in 2017 by COHERENT collaboration. Now this collaboration continues CENNS research using detectors with different working materials. One of them is CENNS10 - detector with 10kg of liquid argon (LAr) and two phitomultiplier tubes on the top and on the bottom. Using CENNS-10 as an example COHERENT collaboration is preparing the building of CENNS-1ton - detector with mass of working material (LAr) about 1 ton. This poster is about ability of position reconstruction in this detector. Modelling of different photodetectors configuration using ANTS-2 package will be shown. The goal of this work is comparing different configurations from the point of view of position reconstruction ability and accuracy.

Primary author(s) : NEPOCHATAYA, Olga

Presenter(s) : NEPOCHATAYA, Olga

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **510** Type : **Plenary/section talk**

ASIC evolution for particle physics and astrophysics

Tuesday, 23 October 2018 10:45 (15)

Construction of the advanced megascience facilities, basing on advanced particle detector technologies, is closely connected with development of read-out electronics, having as a core element – application specific integrated circuit (ASIC). In order to reach limit specifications of multichannel detector setups a whole set of factors defines ASIC design. Today application specific chips should provide new level of functionality, fitting to a new set of constraints and trade-offs on technical specifications (like an integration scale, power consumption, speed, radiation hardness) as well as economic- and technology-related ones. The talk presents overview of the state of the art and evolution in ASIC design for particle physics and astrophysics.

Primary author(s) : ATKIN, Eduard (NRNU MEPHI)

Presenter(s) : ATKIN, Eduard (NRNU MEPHI)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **511** Type : **Plenary/section talk**

Estimation of the spectrum of atmospheric neutrons at sea level in the energy range 0.05-1 GeV

Friday, 26 October 2018 10:45 (15)

The neutron spectra induced by the flux of primary cosmic radiation, taking into account its absorption in the atmosphere and the generation of neutrons in the energy range 0.05-1 GeV has been estimated. An estimate of the neutron flux with energy above 1 GeV is approximately 0.3 $particle/m^2/s/sr$. An evaluation of the neutron flux has been conducted to realize a ground-based experiment to monitoring the operation of nuclear installations. These calculations will be taken into account to calculate the background events for the ground-based laboratory science run.

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Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **512** Type : **Plenary/section talk**

Halo – like structure of unbound 7He

Friday, 26 October 2018 15:35 (15)

^{7}He, a particle unstable nucleus is lying in the line of neutron – rich Helium isotopes between ^{6}He with a neutron halo and ^{8}He having a neutron skin [1]. Normally it is taken for granted that the notion "halo" could not be applied to unstable nuclei. However, if the time of life T of a particular nucleus is much larger than the characteristic time τ of flight of the escaping neutron, there is no difference between stable and unstable nuclei. As for ^{7}He the ratio T/τ ≈ 7 we looked for data which could provide some information on the halo – like structure of ^{7}He. We applied the Modified diffraction model MDM [2-4] to the charge – exchange reactions ^{6}Li(t,^{3}He)^{6}He [5] and ^{7}Li(t,^{3}He)^{7}He [6]. According to MDM the difference of the RMS of the states under study is determined by the difference of the corresponding diffraction radii taken from the differential cross-sections under study. We found that the radius of ^{7}He is R_{rms} = 2.37±0.38 fm. This value is close to those of ^{6}He and ^{8}He 2.48±0.03 fm and 2.52±0.03 fm [1]. The result supports suggestion that neutrons outside ^{4}He occupy the same orbitals and indicates to smooth transition between halo and skin. The phase distributions of the fragments emitted in the reactions with stopped pions on ^{9}Be and ^{11}B [7, 8] showed that the main ^{7}He decay configurations are $^6He_{gr.st}$ + n and ^{6}He* + n confirming the complicated halo – like of ^{7}He.

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Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **513** Type : **Poster**

Simulation of nonrelativistic jets using a solution of the Grad-Shafranov equation as the initial condition

Monday, 22 October 2018 15:40 (150)

There are several problems in the numerical simulation of jets of young stars: the results of calculations depend very much on the initial conditions, most of which are unknown from observational data. Analytical approaches, based on the solution of the Grad-Shafranov equation, can only provide a stationary one-dimensional picture of what is happening.

The purpose of this work is to combine the above two approaches, using the plasma configuration and its magnetic field, obtained by solving the Grad-Shafranov equation, as the initial conditions for the magnetohydrodynamic modeling of a jet. The dynamics of jet propagation through the surrounding space was investigated, morphology similar to the morphology of the observed jets was obtained. Also the stability of the solution of the Grad-Shafranov equation with finite perturbations was numerically investigated.

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Presenter(s) : Mr. KALASHNIKOV, Ilia (National Research Nuclear University MEPhI)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **514** Type : **Poster**

THE STUDY OF THE 12C STATES FROM THE REACTION 11B(3He,d)12C

Monday, 22 October 2018 15:40 (150)

The experiment was done to study ^{11}B(^{3}He,d)^{12}C reaction with energy E(^{3}He) = 25 MeV.

The aim of the experiment is to determine the properties of ^{12}C states at high excitation energies and in particular to verify which of the conflicting spin-parity assignments of the 13.35 MeV state (2^- or 4^-) is consistent with the data and optical model predictions.

The contradicting reports attribute either 2^- [1-4] or 4^- [5,6] for 13.35 MeV state in ^{12}C. Unambiguous determination of the spin parity of the 13.35 MeV state is necessary to define its possible contribution to the part of the spectrum that we have previously identified as a new level in ^{12}C with excitation energy of 13.75 MeV [7]. Initially, we have estimated this contribution as equal to the measured state 11.83 MeV (J =2^-). This estimation assumed spin parity J =2^- of the 13.35 MeV state. However, from our experiment was settled spin-parity of the 13.35 state is 4^-.

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Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics

Contribution ID : **515** Type : **Poster**

Simulation of Gamma-400 calorimeter physical characteristics with considering of optical processes in scintillation crystal.

Monday, 22 October 2018 15:40 (150)

Simulation of Gamma-400 calorimeter physical characteristics with considering processes of generation, propagation and detection of optical photons in scintillation crystal was performed using Geant4 toolkit with G4OpticalPhoton library, which contains the characteristics of processes with participation of optical photons and its processing procedures. Including of optical processes into simulation of scintillation material allow to investigate the influence of following processes (light yield fluctuations, absorption, reflection and refraction on material borders, light detector characteristics) on the most important detection characteristics of scintillation calorimeter.

Primary author(s) : CHERNYSHEVA, Irina (NRNU MEPhI, LPI RAS)

Co-author(s) : Prof. GALPER, Arkady; LEONOV, Alexey (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); SUCHKOV, Sergey (Lebedev Physical Institute); Dr. TOPCHIEV, Nikolay; Dr. PAPPE, N.Yu. (LPI RAS)

Presenter(s) : CHERNYSHEVA, Irina (NRNU MEPhI, LPI RAS)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **516** Type : **Plenary/section talk**

Status of the Russian-Italian experiment NEVOD-EAS

Wednesday, 24 October 2018 16:15 (30)

The NEVOD-EAS air shower array is being created in MEPhI in frames of the Russian-Italian collaboration NEVOD-DECOR. The installation is aimed at independent estimations of the size, axis position and arrival direction of extensive air showers (EAS) registered with other detectors of the Experimental complex NEVOD. This information will provide calibration of two novel perspective techniques developed in the Experimental Complex NEVOD for studying inclined muon bundles – local muon density spectra – as well as for investigation of EAS hadronic component via thermalized neutrons. In 2017 the central part of the array including 6 independent clusters of scintillation detectors located at the area of about 10ˆ4 mˆ2 was launched into operation. First experimental series has proved the possibility of using the cluster approach to registering system organization and experimental data analysis for the extension of the NEVOD-EAS array with an area of about 10ˆ6 mˆ2.

Primary author(s) : CHIAVASSA, Andrea (Universita agli Studi di Torino); SHULZHENKO, Ivan (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute))

Presenter(s) : CHIAVASSA, Andrea (Universita agli Studi di Torino); SHULZHENKO, Ivan (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute))

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Facilities and advanced detector technologies

Contribution ID : **517** Type : **Plenary/section talk**

Study of P-wave B0s states at the CMS experiment

Friday, 26 October 2018 16:25 (15)

The observation of the B*s2(5840)0 -> B0 K0S decay and the evidence for the Bs1(5830)0 -> B0 K0S decay are presented. The analysis uses the data collected by the CMS experiment at the LHC in proton-proton collisions at sqrt(s) = 8 TeV. In addition, properties of the P-wave B0 s mesons are determined, as well as the mass differences MB0 – MB+ and MB*0 - MB*+, where the latter is measured for the first time.

Primary author(s) : POLIKARPOV, Sergey (NRNU MEPhI, LPI RAS)

Presenter(s) : POLIKARPOV, Sergey (NRNU MEPhI, LPI RAS)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **519** Type : **Plenary/section talk**

Search for a narrow mu+mu- state produced in association with b-quark at s=\sqrt{13} TeV

Tuesday, 23 October 2018 09:40 (15)

The report is dedicated to the results of search for resonances, decaying to $\mu^+\mu^-$ in mass region 12-70 GeV, produced in association with two jets, one of which is b quark jet. The research was done using data collected in CMS experiment in 2016 in pp collisions at $\sqrt{s} = 13$ TeV. Events were divided into two independent categories: first event category contained one b quark jet in central region ($|\eta| < 2.4$) and one forward jet ($|\eta| > 2.4$), while in second event category both jets are central. Comparison with results, obtained with data, collected in pp collisions at $\sqrt{s} = 8$ TeV was done.

Primary author(s) : STEPENNOV, Anton; Dr. GAVRILOV , Vladimir; Dr. KODOLOVA, Olga; Dr. NIKITENKO, Alexandre

Presenter(s) : STEPENNOV, Anton

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **520** Type : **Plenary/section talk**

A Monte Carlo Study of Hypernuclei production at NICA/MPD

Wednesday, 24 October 2018 17:50 (15)

The main goal of the NICA/MPD facility is a study of the properties of hot and dense baryonic matter. One of posible ways is to study of strangeness production in nuclear collisions.The enhance production of strange particles in heavy-ion collision is consider to be signal for quarck-gluon plasma formation.In this talk MPD detector abilities to measure different hypernuclei species in Au+Au collisions at NICA energy region, will be presented.

Primary author(s) : ILIEVA, Mariya (JINR)

Presenter(s) : ILIEVA, Mariya (JINR)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **521** Type : **Plenary/section talk**

Heavy-quark spin-symmetry partners of the bottomonium molecular states at Belle-II

Friday, 26 October 2018 11:05 (10)

Assuming a molecular nature for the $Z_b(10610)$ and $Z_b(10650)$ exotic states, the properties of these states and their pole positions are extracted from the effective-field theory based analysis of the experimental line shapes in the decay channels $\Upsilon(10860) \to \pi\alpha$ (with α being $B\bar{B}^*$, $B^*\bar{B}^*$ and $h_b(mP)\pi$ (m=1,2)). The consequences for the heavy-quark spin-symmetry partners of these states are predicted parameter free.

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Presenter(s) : Dr. BARU, Vadim (HISKP, University of Bonn)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **522** Type : **Poster**

The baryon asymmetry in the framework of the Kaluza-Klein theory

Monday, 22 October 2018 15:40 (150)

The possibility of describing the origin of the baryon asymmetry is discussed within the framework of the Kaluza-Klein approach. The approach allows to obtain a mechanism similar to the Affleck–Dine mechanism from the dynamics of extra-space metric. The baryon number arises as a result of U(1)-symmetrization of extra dimentions at low energies. Baryon asymmetry is generated due to perturbations in the extra-space occurring in the early Universe.

Primary author(s) : NIKULIN, Valeriy

Co-author(s) : Prof. RUBIN, Sergey

Presenter(s) : NIKULIN, Valeriy

Session Classification : Poster session and coffee-buffet

Contribution ID : **523** Type : **Poster**

SEARCH FOR STATES WITH ENHANCED RADII IN TRIPLET 12B-12C-12N

Monday, 22 October 2018 15:40 (150)

Two independent methods: ANC (Asymptotic normalization coefficients) [1,2] and MDM (Modified diffraction model) [3,4] were applied to new and existing experimental data. The purpose of this analysis is search for states with enhanced radii in isobar-analog excited states of triplet A=12: ^{12}B – ^{12}C – ^{12}N.

There is experimental work [1] where halo was observed for 2 states of ^{12}B: 2$^-$, 1.67 MeV and 1$^-$, 2.62 MeV. To check this result new experimental data ^{11}B(d,p)^{12}B was obtained at E_d = 21.5 MeV [5,6]. On base of ANC analysis of this new data [5,6], neutron halo existence was confirmed for the 2$^-$, 1.67 MeV and 1$^-$, 2.62 MeV states in ^{12}B. An unexpected result was obtained for the unbound 3$^-$, 3.39 MeV state, which is 19 keV above the neutron emission threshold. Its halo radius was also found to be increased and equal to ˜ 6.5 fm [5,6]. This result can be considered as an evidence of the halo-like structure in this ^{12}B state.

What can we expect in isobar-analog states in ^{12}C and ^{12}N? Are these states also characterized by enhanced radii? To check this prediction, preliminary analysis of existing ^{12}C(^{3}He,t)^{12}N and ^{12}C(^{3}He,^{3}He')^{12}C experimental data using Modified diffraction model (MDM, [3,4]) was done.

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Presenter(s) : Mr. DANILOV, Andrey

Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics

Contribution ID : **524** Type : **Poster**

Design flow of the electronic units of multichannel detector systems for large physical experiments

Monday, 22 October 2018 15:40 (150)

The conducting of physical experiments at large accelerator facilities, of the FAIR (Germany) type requires the provision of readout and processing of signals from a large number of detectors. To solve these tasks there are used complicated electronic units, which are designed as application specific integrated circuits (ASIC). The design process is subject to hard requirements, bound with reading out a great number of detector signals, high frequency of signal emergence, diversity of data types, necessary for analysing the results of experiment. The report presents the description of a mixed ASIC design flow with account of the requirements of large physical experiments. The given flow permits to reduce design time, to increase reliability and optimise the ASIC architecture. Probation of the flow was executed in the course of designing IC prototypes for the 180 and 65 nm technologies, executing the functions of data processing and readout.

Primary author(s) : NORMANOV, Dmitry (NRNU Mephi); IVANOV, Pavel (NRNU MEPhI)

Presenter(s) : NORMANOV, Dmitry (NRNU Mephi)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **525** Type : **Plenary/section talk**

Why the hydrodynamics is valid at early stage of heavy-ion collisions?

Friday, 26 October 2018 16:50 (20)

We study equilibration of hot and dense nuclear matter produced in relativistic heavy-ion collisions within two microscopic transport models, UrQMD and QGSM. Both models indicate that the state of kinetic, thermal and chemical equilibrium is nearly approached at any collision energy after a certain relaxation period. The hydrodynamic scenario is based on the assumptions of fast equilibration and almost isentropic expansion of the matter. Then, it employs the equation of state (EOS) which links pressure to energy density. Microscopic calculations show that (i) the matter expands with the constant entropy-per-baryon ratio and (ii) with the constant pressure to energy density ratio already at very early times, when the matter is not in local chemical and thermal equilibrium yet. Both findings justify the application of hydrodynamic description to early stages of heavy-ion collisions.

Primary author(s) : Dr. ZABRODIN, Evgeny; Prof. BRAVINA, Larisa (University of Oslo)

Presenter(s) : Dr. ZABRODIN, Evgeny

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **526** Type : **Plenary/section talk**

New method of high-energy gamma ray direction reconstruction in multilayered converters

Tuesday, 23 October 2018 18:05 (15)

A new method of high-energy gamma ray incident direction reconstruction is developed for gamma-ray detectors with multilayered converters. The method uses data from converter and, if available, from position-sensitive calorimeter to reconstruct an electromagnetic cascade axis and to determine the incident direction of a primary gamma. For the first time to find point of intersection of gamma direction line with a convertor plane, the median of energy deposit in sensitive plane of a convertor is used. Applied, for example, to space gamma-telescope "GAMMA-400" this method allowed to achieve the angular resolution ˜ 0.01° at gamma-ray energy of 100 GeV, being much better than accuracy of the past and present space- and ground-based experiments. In the algorithm presented, a trade-off between the angular resolution and the effective area can be found to meet scientific goal of an experiment.

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Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **527** Type : **Poster**

Determination of parameters for the propagation of jets of young stars and a plasma-focus installation.

Monday, 22 October 2018 15:40 (150)

The construction of theoretical models of astrophysical jet observations, in which the process of formation of collimated outcomes and their acceleration takes place. Observation of the same distribution of jets also does not provide detailed information about the physical parameters of both the jets themselves and their environment. Interaction with these possibilities is acquired by attempts to recreate astrophysical conditions by means of laboratory experiments in which scaling plasma parameters close to those observed in young jet stars can be achieved. Numerical modeling makes it possible to verify the theoretical models of these processes, making it possible to identify parameters that are inaccessible to observation.

In this work, a numerical simulation of the propagation of a plasma bunch in the experimental facility PF-3 and in astrophysical jets was carried out to determine the parameters influencing the development of this bunch. The measurement process was started at various initial parameters of the system, after which there was a dependence on these parameters, as a rule, at the initial and final moments of time. An analytical estimate of the collimation angle was also obtained. The results in this paper are necessary to determine the unknown parameters of this system, such as: the density of the bunch and the initial velocity of the bunch.

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Presenter(s) : Mr. SHATALOV, Nazar

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **528** Type : **Poster**

Test beam studies of light yield, time and coordinate resolutions of scintillation detector prototype with SiPM readout for space-based gamma-telescope GAMMA-400

Monday, 22 October 2018 15:40 (150)

Prototype detector based on long BC-408 scintillators with SiPM readout for space-based gamma-telescope GAMMA-400 was tested in 100-300 MeV secondary positron beam of synchrotron C-25P «PAKHRA» of Lebedev Physical Institute. The measurement setup, design concepts for the prototype detector and chosen solutions together with some test results are discussed.

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Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **529** Type : **Poster**

Рассчёт параметров электрических полей в затворе РЭД 100

Одноэлектронный шум в двухфазных эмиссионных жидко-ксеноновых детекторах неотличим от слабоионизирующих событий, в частности, связанных с упругим когерентным рассеянием нейтрино на ядрах, что существенно ограничивает возможность регистрации данного процесса. Одноэлектронный шум связан с накоплением под поверхностью раздела фаз неэмитировавших электронов, возникших в результате регистрации фоновых событий от гамма-квантов и космических мюонов при практически достижимом коэффициенте эмиссии 70-90%. Для подавления данного шума был разработан электронный затвор, идея которого основана на разгрузке поверхности жидкости от подповерхностных электронов путем блокировки дрейфующих к границе раздела фаз ионизационных электронов от фоновых событий. Электронный затвор представляет собой электрод, который находится под поверхностью жидкости и при взаимодействии полезного события обеспечивает свободный дрейф электронов из жидкой фазы в газовую фазу. При взаимодействии фонового события на него подается блокирующий импульс напряжения от внешнего источника, приводящий к возникновению электрического поля перпендикулярного направлению движения электронов ионизации. За счет этого электроны ионизации нейтрализуются на электронном затворе, и таким образом не доходят до поверхности жидкости, что приводит к уменьшению числа накопленных неэмитировавших электронов. Компьютерное моделирование затвора проводится (в программе COMSOL Multyphysics версия 5.2a) для выявления уровня напряжения, при котором электроны будут проходить/задерживаться в нём (затвор открыт/закрыт).

Primary author(s) : VASIN, Anton

Presenter(s) : VASIN, Anton

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **530** Type : **Poster**

Search for the suppression of the photon yield from the decay of dark matter particle

Monday, 22 October 2018 15:40 (150)

In the late 2000s, Pamela experiment discovered an excess of the cosmic positron flux over the expected background at high energies, which was verified by several subsequent experiments (AMS-2, Fermi-LAT). This excess was called the "positron anomaly". There are many attempts to explain it with annihilation or decays of particles of Dark Matter (DM). However, these attempts become practically incompatible with the latest data on the cosmic gamma background, obtained by the Fermi-LAT satellite, because photons unavoidably appear during the decay or annihilation with the formation of positrons. In this paper, we investigate the possibility of suppressing photon radiation in the processes of decay of dark matter particles due to the parameters of the physics of the interaction of Dark Matter, leading to this decay. It was found that the considered variants of the interaction model ((pseudo) scalar and (axially) vector cases) don't allow to obtain such suppression.

Primary author(s) : Mr. KAMALETDINOV, Ayrat; BELOTSKY, Konstantin

Presenter(s) : Mr. KAMALETDINOV, Ayrat

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **531** Type : **Poster**

Energy deposition and anisotropic flow comparative analysis using FHCal in MPD experiment (NICA)

Monday, 22 October 2018 15:40 (150)

Multi-Purpose Detector (MPD) experiment at NICA collider has a potential of discoveries in the area of QCD phase diagram with high net baryon densities and moderate temperatures. Anisotropic transverse flow is one of the key observables to study the properties of matter created in heavy-ion collisions. MPD performance for anisotropic flow measurements is studied with Monte-Carlo simulations of gold ions at NICA energies \sqrt{s_NN}=4-11 GeV using different heavy-ion event generators. Different combinations of the MPD detector subsystems are used to investigate the possible systematic biases in flow measurement and to study effects of detector azimuthal non-uniformity. Resulting performance of the MPD for flow measurements will be demonstrated for directed and elliptic flow of identified charged hadrons as a function of rapidity and transverse momentum in different centrality classes.

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Presenter(s) : Mr. PARFENOV, Peter

Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics: heavy ion

Contribution ID : **532** Type : **Poster**

The measurement of liquid scintillator nonlinear response and intrinsic energy resolution

Monday, 22 October 2018 15:40 (150)

For Jiangmen Underground Neutrino Observatory the requirements < 1 % energy scale uncertainty and 3 % at 1 MeV energy resolution are crucial in order to determine neutrino Mass Hierarchy. Several effects determine the energy scale and response function of the detector. To measure two of them, ionization quenching and intrinsic energy resolution, small-scale laboratory setup was developed.

The setup consisted of a quartz cell, filled with liquid scintillator and coupled with a photomultiplier (PMT), High Purity Germanium detector (HPGe) and monoenergetic gamma source. The response of the liquid scintillator was measured by observation of Compton scattering events in coincidence. There were several problems with application of this technique that were never settled in literature. In the present study some of them were overpassed by means of setup development and Monte Carlo simulation. It was shown that quenching, if it is small enough, could be effectively decoupled from Cherenkov effect. The structure of bidirectional coincidence diagram was explicitly investigated. The systematic effect of multiple Compton events was also estimated. The stability of the system was checked and gain variations were corrected. The technique to estimate non-linearity of PMT was developed.

Several problems, such as a light collection uniformity, are still remaining. Thus, it is too prematurely to guarantee that measured quenching parameter kB represents the non-linearity of liquid scintillator and it is not biased by experimental artifacts. The sensitivity of the setup in term of resolution was found to be not yet sufficient for intrinsic resolution measurement. The strategy for setup improvement was proposed. Further work, especially in direction of Monte Carlo - data comparison, may significantly increase the reliability of the measurement.

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Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **533** Type : **Poster**

The background model estimation for scintillation detectors onboard low altitude and high inclination satellites in the low energy gamma region using the AVS-F apparatus data

Monday, 22 October 2018 15:40 (150)

The gamma-quanta background count rate model in the energy range from 0.1 MeV up to several MeV for high inclination satellites is presented. The AVS-F instrument (Amplitude-Time Spectrometry of the Sun) was installed onboard the specialized automatic station CORONAS-F functioning in time interval since July, 2001 up to December, 2005 on the orbit with initial parameters: altitude ˜500 km, inclination 82.5°. The device was intended for the solar flares hard X-ray and gamma emission characteristic studies. The background count rate time profile of AVS-F instrument analysis allows concluding the possibility of its approximation by 4-5 order polynomials in equatorial regions of the satellite orbit, and 1-3 order polynomials or constant in polar caps. We obtain polynomial's coefficients for equatorial regions similar within errors intervals for the same geomagnetic indexes regions. The example of use of this method for gamma-emission background estimation for RHESSI data corrected to registration efficiency, detectors size and satellite altitude (orbit parameters were: altitude ˜600 km, inclination 38° in the beginning of its operation in January, 2000) is discussed.

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Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **534** Type : **Plenary/section talk**

Simulation of dark photon generation process e-Z -> e-ZA' for NA64 experiment using Geant4

Wednesday, 24 October 2018 09:00 (15)

According to some theoretical models a new dark matter gauge boson A' (dark photon) might exist, possibly coupled with ordinary photon by different(non-gravitational) type of weak interaction. The NA64 experiment at CERN SPS accelerator is aimed at probing an unexplored parameter space of kinetic gamma-A' mixing strength and mass values of A'. Experiment utilizes 100 GeV electron beam and the main process is the generation of A' inside an active target via the reaction: e-Z -> e-ZA' which is possible due to gamma-A' mixing. The existence of A' can be determined by presence of missing energy signature events inside the target and subsequent A' decay signature events inside downstream calorimeters. The NA64's simulation software package provides Monte-Carlo modelling for such processes. This work is aimed at developing a Geant4-like implementation of a new A' particle and processes corresponding to it's production and decay for the NA64's simulation software package. Added modules are based on Bremsstrahlung process implementaion for e- with modified cross section computations. Developed modules can be later included into further versions of Geant4 simulation toolkit

Primary author(s) : ON BEHALF OF NA64 COLLABORATION; SHCHUKIN, Dmitry (Lebedev Physical Institute RAS)

Presenter(s) : SHCHUKIN, Dmitry (Lebedev Physical Institute RAS)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **535** Type : **Poster**

Development of the signal readout and processing ASIC for GEM detectors

Monday, 22 October 2018 15:40 (150)

Design approach and structure of an Application-Specific Integrated Circuit (ASIC) for multichannel Gas Electron Multiplier (GEM) detectors are presented. This ASIC is designed for use in tracking and calorimetric systems of large physical experiments such as CBM (FAIR, Darmstadt) and MPD (NICA, Dubna). The amount of data to be processed by ASIC is related to the channel event rate, ADC resolution, and sampling rate. For the CBM experiment the average event rate is 1 MHz, with 10-bit ADC resolution and 200 ns peaking time. That results in about 100 Mbit/s of generated raw data for each channel. Modern ASICs usually contain at least 32 readout channels, therefore the output data rate for each of them is not less than 3.2 Gbit/s. The ASIC contains a digital data processing block, which particularly calculates a signal peak amplitude, event timestamp and also determines signal shape and pile-ups. The block allows transmitting values of interest only, significantly reducing the output data flow, and using a less complex interface circuit at lower power consumption.

Primary author(s) : NORMANOV, Dmitry (NRNU Mephi); Dr. ATKIN, Eduard (NRNU MEPHI); BULBAKOV, Ivan (NRNU MEPHI); IVANOV, Pavel (NRNU MEPhI); SHUMIKHIN, Vitaly (NRNU MEPhI)

Presenter(s) : BULBAKOV, Ivan (NRNU MEPHI)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **536** Type : **Poster**

Investigation of properties of Galaxies groups # 933, 88, 142, 1046, 1101 from CfA2 redshift survey.

Monday, 22 October 2018 15:40 (150)

Groups and clusters of galaxies are the most massive systems in Metagalaxy and its distinctiveness analysis allows concluding large-scale structure properties. We have analyzed several characteristics of galaxies groups # 933, 88, 142, 1046, 1101 from CfA2 redshift survey. Several peculiarities were separated for group #1101, for example, in the shape of its distribution on angular velocity. Particular qualities investigation of motion of galaxies in groups allows studying properties of such inhomogeneities and understanding of its nature which may be caused by dark matter.

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Presenter(s) : Mr. LU, Nhat Khanh

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics

Contribution ID : **537** Type : **Poster**

The automation of choosing of the optimal kinematic variables for discrimination of the electroweak Zgamma production

Monday, 22 October 2018 15:40 (150)

In this talk the automation of the search for the variable of interest is discussed. Few different automation techiques was probed. The output distributions obtained with these techniques can be used as an discriminants or the part of the discriminants of the rare high energy physics process. An overview of performance and efficiency for each technique is preseted.

Primary author(s) : SOLDATOV, Evgeny; Mr. BELYAEV, Nikita

Presenter(s) : SOLDATOV, Evgeny

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics

Contribution ID : **538** Type : **Plenary/section talk**

Search for the critical behavior at NA61/SHINE

Friday, 26 October 2018 10:55 (15)

NA61/SHINE is a fixed-target experiment at CERN SPS which conducts studies of strongly interacting matter. The search for experimental signatures of the critical point is performed via comprehensive two-dimensional scan of the phase diagram of strongly interacting matter by changing beam momenta (13A – 150A GeV/c) and the colliding system size (p+p, p+Pb, Be+Be, Ar+Sc, Xe+La). Recent NA61/SHINE results on the critical behavior search in terms of two-particle correlations, multiplicity and transverse momentum fluctuations, femtoscopy studies and intermittency analysis will be presented.

Presenter(s) : Ms. PROKHOROVA, Daria

Session Classification : Heavy Ion Physics

Track Classification : Nuclear physics: heavy ion

Contribution ID : **540** Type : **Plenary/section talk**

Development of a novel 3D SuperFGD neutrino detector

Wednesday, 24 October 2018 16:30 (15)

The long baseline neutrino experiments T2K has obtained a first hint on CP violation in neutrino oscillations and excluded CP conservation at the 95% confidence level. To strengthen this result the T2K collaboration is expected to collect the full exposure of 7.8×1021 protons on target, thanks to planned upgrades to the J-PARC and the neutrino beamline. An upgrade of the T2K near detector ND280 has a goal to reduce a systematic uncertainty in the prediction of number of events at the far detector of less than 4%. The project includes the development of a new highly granular fully active scintillator neutrino detector as a neutrino target. This detector will allow us to obtain a much better uniformity of acceptance as a function of polar angle, to reduce the threshold for detection of charged particles, to improve the localization of the neutrino interaction vertex, and to effectively separate electrons from the neutrino interaction and background photons. The baseline concept of a novel highly granular fully active detector with dimensions of ˜200x180x60 cm3 and a total mass of about 2 tons will represent an array of about 2x106 small scintillator cubes each of 1 cm3. Each cube covered by a chemical reflector has three orthogonal cylindrical holes of a 1.5 mm diameter. The signal readout from each cube is provided by inserted in these holes three 1.0 mm Kuraray Y11 multiclad WLS fibers which connected to micro-pixel avalanche photodiodes MPPCs. A prototype of this detector comprised of about 10000 cubes was tested in a beam of charged particles (electrons, muons, pions, protons) at CERN in 2018. Obtained parameters of the prototype: the light yield, cross-talk, and time resolution will be presented. The progress in R&D of this detector, future plans to construct the full scale detectors and results of simulations will be also reported.

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Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **541** Type : **Plenary/section talk**

A perspective of gamma-ray bursts registration due to gamma-telescope GAMMA-400

Tuesday, 23 October 2018 18:20 (15)

Several thousands of gamma-ray bursts were observed by various experiments, but their sources of origin still remain unclear up to now. During several GRBs very high-energy photons were detected both in space and ground-based experiments (up to some tens of GeV and up to some TeV, respectively). The GAMMA-400 project will be the new generation of satellite gamma-observatory. Three apertures provide events registration from both upper and lateral directions: main, additional and lateral ones. Its characteristics are better than existing instruments both satellite and ground: energy resolution (˜2% at Eγ = 102 GeV), detectors dead time is better than 50 mks, data storage quota ˜ 100 GB per day. But fine angular resolution (˜10° at Eγ = 20 MeV, ˜0.1° at Eγ = 10 GeV, ˜0.01° at Eγ = 102 GeV) will be provided only for high energy events registered in the main aperture in the energy band from ˜10 GeV to several TeV. It allows making more effective observations of GRBs (better signal to noise ratio), more detailed study of its high energy afterglow due long term measurements (because of high apogee orbit provides low background variations with time) and detailed analysis of the sources luminosity variability (spectral, angular and temporal).

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Presenter(s) : ARKHANGELSKAJA, Irene (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute))

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **543** Type : **Poster**

The probe of the Matrix Element Method at the NLO level in the Higgs boson studies

Monday, 22 October 2018 15:40 (150)

In this talk the description of possible realisation of NLO Mateix Element Method is presented and probed with the Higgs boson decays. The comparison of LO and NLO approaches is demonstrated and the separation power of each approach is estimated.

Primary author(s) : Mr. BELYAEV, Nikita; Prof. KONOPLICH, Rostislav; Mr. PROKOFIEV, Kirill

Presenter(s) : Mr. BELYAEV, Nikita

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: hep theory

Contribution ID : **544** Type : **Plenary/section talk**

Measurement of the $t\bar{t}H$ production

Tuesday, 23 October 2018 09:00 (20)

The top quark is the heaviest elementary particle in the Standard Model, and has an expected Yukawa coupling of order unity. The value of this coupling is a key ingredient to unravel the nature of the observed Higgs boson. The only known process which has a direct sensitivity to this coupling is the production of a Higgs boson in association with a top quark-pair ($t\bar{t}H$). This talk will present an overview of the $\sqrt{s}$ = 13 TeV $t\bar{t}H$ ATLAS analyses leading to the observation of this process.

Primary author(s) : MELLENTHIN, Johannes (II. Physikalisches Institut, Georg-August-Universität Göttingen)

Presenter(s) : MELLENTHIN, Johannes (II. Physikalisches Institut, Georg-August-Universität Göttingen)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **545** Type : **Plenary/section talk**

Observation of the Higgs decays to beauty quarks

Tuesday, 23 October 2018 09:20 (20)

This presentation shows the observation of the decay of the Higgs bosons to b quark-antiquark pairs by the ATLAS experiment. The analysis presented includes datasets recorded in LHC Run-1 and Run-2. ttH, VBF and VH production modes analyzed to extract the signals are discussed.

Primary author(s) : NOGUCHI, Yohei (Kyoto University)

Presenter(s) : NOGUCHI, Yohei (Kyoto University)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **546** Type : **Plenary/section talk**

Measurements of CPV at LHCb

Tuesday, 23 October 2018 17:25 (20)

Precision measurements of CP violating observables in hadron decays are powerful probes to search for physics effects beyond the Standard Model. The most recent results on CP violation in decays of mesons and baryons obtained by the LHCb Collaboration will be presented, some of which are world-first measurements. In particular results obtained exploiting the data collected during the Run 2 of LHC will be discussed.

Primary author(s) : KLIMASZEWSKI, Konrad (National Centre for Nuclear Research)

Presenter(s) : KLIMASZEWSKI, Konrad (National Centre for Nuclear Research)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **547** Type : **Plenary/section talk**

Cosmological limit on the size of extra dimensions

Wednesday, 24 October 2018 17:55 (20)

There are two main processes during inflation - quick space expansion and grows of the field energy due to fluctuations. In simplest and most widespread realization of the inflationary scenario, only one dimensional parameter plays essential role - the Hubble parameter H. If a compact space is involved into consideration, another dimensional parameter - an extra space size l - appears. There are two opposite cases $l \gg H^{-1}$ and $l \ll H^{-1}$. The second case is not very interesting because the Kaluza-Klein excitations are too massive to be excited during the inflation. Much more promising is the first case which leads to the energy storage "inside"\ the extra space in the form of its fluctuations. It will be shown here that the first case contradicts observations. Therefore he size of extra dimensions should be smaller than 10^{-27} cm.

Primary author(s) : Prof. RUBIN, Sergey

Presenter(s) : Prof. RUBIN, Sergey

Session Classification : Gravitation and Cosmology

Contribution ID : **548** Type : **Poster**

About some opportunities of driving of a particle in a black hole

Monday, 22 October 2018 15:40 (150)

It is supposed that in a black hole unlike the routine world of coordinate and time are constants, and an impulse and energy are variables. In work some possibilities of driving of a particle of matter in these conditions are considered. For their consideration the principle of ab inititio but not traditional minimization of expression of action through a Lagrangian is used. In this work at first possible processes, connected to this driving are constructed and then Planck's quantum is used for drawing up equations of motion. Matter density in a black hole is supposed locally a constant. Radius vector of a particle is necessary to constants as well as its time. Only its impulse and energy change. The picture, opposite to driving of a particle in the routine world turns out. Two conditions of a particle characterized by two pairs of parameters, time and energy (t, E) and also a vector of a position and an impulse (r, p), are considered. If in the routine world at the uniform and rectilinear motion of t and r strive for infinity at constancy of E and p, then in a black hole energy and an impulse do not go beyond its limits. Therefore they or are tied to a point of t, r and alternate the phases, or oscillate concerning it in the presence of the reflecting force, for example, caused by a density gradient in space (E, p). Vectors of r and p rely collinear. Equations of motion are presented in finite differences. Charts of driving at the same time form a closed circuit. Quantization of driving is made on state variables. Thus, it turns out that the routine world and the world of a black hole somewhat dual each other. Issues of streams of energy and an impulse are discussed. Further consideration and quantization of more difficult movements of a particle in a black hole, including rotation or its analog is supposed.

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Presenter(s) : VORONTSOV, Victor (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute))

Session Classification : Poster session and coffee-buffet

Track Classification : Gravitation and cosmology

Contribution ID : **549** Type : **Poster**

Superheavy objects composed of nuclear and dark matter

Monday, 22 October 2018 15:40 (150)

We consider a model of OHe atomic dark matter formed by Coulomb binding of the stable double charged massive O^{--} particles with nuclei of primordial helium. Such dark matter can be captured by ordinary matter forming superheavy nuclei. We discuss O-nuclearites formed by multiple capture of O^{--} particles by heavy nuclei and effect of accumulation of OHe atoms in stellar evolution.

Primary author(s) : Dr. GANI, Vakhid (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), 115409 Moscow, Russia); KHLOPOV, Maxim (MEPHI/APC); Prof. VOSKRESENSKY, Dmitri (NRNU MEPhI & JINR)

Presenter(s) : Dr. GANI, Vakhid (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), 115409 Moscow, Russia)

Session Classification : Poster session and coffee-buffet

Track Classification : Gravitation and cosmology

Contribution ID : **550** Type : **Poster**

Studying effects of microlensing for cluster of primordial black holes

Monday, 22 October 2018 15:40 (150)

Primordial black holes (PBH) attracted particular attention last time. They are possible candidates not only to dark matter, but to supermassive black holes, gravitational waves events from black hole merger and others. However, recently there appeared constraints on PBH abundance from different observations (including those from gravitational microlensing). The present work is devoted to the model of a PBH cluster in which these constraints (part of them) can be avoided. In this work we investigate effect of gravitational microlensing for PBH, strongly constraining single PBH abundance. Analyses of data on respective observation for a cluster can remove not only constraints on them, but it makes possible to test this model distinguishing it from the model of single PBHs.

Primary author(s) : Dr. BELOTSKY, Konstantin; TOSHCHENKO, Konstantin (NRNU MEPhI)

Presenter(s) : TOSHCHENKO, Konstantin (NRNU MEPhI)

Session Classification : Poster session and coffee-buffet

Track Classification : Gravitation and cosmology

Contribution ID : **551** Type : **Poster**

Studying the possibility of FSR suppression in DM decay in dependence of the mass of intermediate particle

Monday, 22 October 2018 15:40 (150)

The main difficulty of description of particle excess in cosmic rays [1] with unstable dark matter is the restriction given by isotropic gamma-ray background (IGRB) [2-4]. The final-state radiation (FSR) from the DM decay or annihilation process makes major contribution to the gamma-ray flux in these models. There are models where decay goes through cascades with some intermediate particles. In this work we study the FSR output from such cascade in dependence of the mass of intermediate particle in the search for its possible suppression.

Primary author(s) : Dr. KIRILLOV, Alexander; Dr. BELOTSKY, Konstantin; Mr. SOLOVIEV, Maxim

Presenter(s) : Mr. SOLOVIEV, Maxim

Session Classification : Poster session and coffee-buffet

Track Classification : Gravitation and cosmology

Contribution ID : **552** Type : **Poster**

Future e+e- colliders and study of color reconnection effects

Monday, 22 October 2018 15:40 (150)

At future e+e- colliders integral luminosity will amount to several ab-1 to provide the needed statistics for precision physics measurements (both SM and BSM). New measurements which will be possible with large statistics and high energies accessible at the future e+e- colliders would allow detailed study of the CR phenomenon, specially in the hadronic WW decays, and would be help for other studies: presents of this effects in $t\bar{t}$ and in Higgs decays.

Primary author(s) : PUKHAEVA, Nelli (JINR)

Presenter(s) : PUKHAEVA, Nelli (JINR)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: hep theory

Contribution ID : **553** Type : **Poster**

Investigations of large scintillation detectors response based on SiPM

Monday, 22 October 2018 15:40 (150)

During the development of large fast scintillation detectors with silicon photomutipliers (SiPM) for the satellite based gamma-ray telescope GAMMA-400, the properties of the SiPM allowed to measure the number of photoelectrons detected. The minimum of photoelectrons detected is calculated for effective particles selection. The functions of the detector response to SiPM with a different number of cells are compared with the use of a photomultiplier. It was found that to increase the efficiency of charged particles detection it is necessary to raise the amount of collected light. The technical possibilities of this enhancement are considered.

Primary author(s) : ARKHANGELSKAJA, Irene (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); ARKHANGELSKIY, Andrey (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); CHASOVIKOV, Evgeniy (National Research Nuclear University "MEPhI" (Moscow Engineering Physics Institute)); Mrs. GRIGORYEVA, Irina; NAUMOV, Pavel (MEPhI); NAUMOV, Peter (NRNU MEPhI); SALAKHUTDINOV, Gayar; SOLODOVNIKOV, Artyom (NRNU MEPhI); RUNZO, Mikhail

Presenter(s) : NAUMOV, Peter (NRNU MEPhI); RUNZO, Mikhail

Session Classification : Poster session and coffee-buffet

Contribution ID : **554** Type : **Plenary/section talk**

Lepton flavour universality tests at LHCb

Tuesday, 23 October 2018 17:05 (20)

In the Standard Model the three charged leptons are identical copies of each other, apart from mass differences, and the electroweak coupling of the gauge bosons to leptons is independent of the lepton flavour. This prediction is called lepton flavour universality (LFU) and is well tested in tree level decays; any violation of LFU would be a clear sign of physics beyond the Standard Model. Experimental tests of LFU in semileptonic decays of b hadrons and in rare b decays are highly sensitive to models of New Physics in which new, heavy particles couple preferentially to the 2nd and 3rd generations of leptons. Such models often also predict charged lepton flavour violation (CLFV). Recent results from LHCb on LFU in semileptonic $b \longrightarrow c l \nu$ transitions and rare b->sll decays are discussed, along with searches for CLFV.

Primary author(s) : KROKOVNY, Pavel (Budkker INP and Novosibirsk State University)

Presenter(s) : KROKOVNY, Pavel (Budkker INP and Novosibirsk State University)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **555** Type : **Plenary/section talk**

Machine learning at LHCb

Tuesday, 23 October 2018 16:45 (20)

Machine learning methods are widely used in the LHCb experiment at every stage of data processing. This talk will cover some of the established applications of machine learning, such as the classification and selection of interesting events in triggering and offline analysis of the data, such as particle identification, unbiased offline characterization of reconstructed events, tracking, and data quality assessment. We will also discuss ongoing and future developments, including challenges of dealing with the luminosity increase and the migration to a pure software trigger, which is planned for LHC Run III, as well as the application of Generative Adversarial Networks to fast detector simulation.

Primary author(s) : KAZEEV, Nikita (Higher School of Economics, Yandex School of Data Analysis)

Presenter(s) : KAZEEV, Nikita (Higher School of Economics, Yandex School of Data Analysis)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **556** Type : **Poster**

Study of CP violation in the process of associated Higgs boson production with a decay into muon pair

Monday, 22 October 2018 15:40 (150)

Associated Higgs boson production in pp collisions can be a powerful tool for searches for CP violation in the Higgs sector. In this study we analyze CP sensitive observables constructed for a four lepton final state. It is shown that azimuthal angle distributions of leptons in this process demonstrate a strong sensitivity to CP violation at the current limits on Higgs boson coupling parameters and can reveal a genuine mechanism of CP violation.

Primary author(s) : Mr. BELYAEV, Nikita; Prof. KONOPLICH, Rostislav; Mr. PROKOFIEV, Kirill; Mr. REESE, Tyler (Manhattan College)

Presenter(s) : Mr. BELYAEV, Nikita; Mr. REESE, Tyler (Manhattan College)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: hep theory

Contribution ID : **557** Type : **Plenary/section talk**

Statistical data analysis in the DANSS experiment

Tuesday, 23 October 2018 17:25 (15)

DANSS is a one cubic meter highly segmented solid scintillator detector. It consists of 2500 scintillator strips, covered with gadolinium loaded reflective coating and read out with SiPMs via wavelength shifting fibers. DANSS is placed under a 3 GW industrial reactor at the Kalinin NPP (Russia) on a movable platform. The distance from the reactor core center is varied from 10.7 m to 12.7 m on-line. The inverse beta decay (IBD) process is used to detect antineutrinos. DANSS detects about 5000 IBD events per day with the background from cosmic muons at the level of few percent. Sterile neutrinos are searched for assuming a 4 neutrino model (3 active and 1 sterile neutrino). The exclusion area in the sterile neutrino parameter plane is obtained using a ratio of positron energy spectra collected at different distances. Therefore results do not depend on the shape and normalization of the reactor νe spectrum, as well as on the detector efficiency. The excluded area covers a wide range of the sterile neutrino parameters up to $sin2\theta^2$ < 0.01 in the most sensitive region. The Reactor Antineutrino Anomaly optimum point is excluded with a confidence level higher than 5σ. The talk will cover the statistical methods used to obtain exclusion areas and the description of new CL_s method which is more conservative then Raster Scan method. CL_s method includes a point from $sin2\theta^2$ Δm^2 plane into exclusion area only if the experiment sensitivity to such point is good.

Primary author(s) : SKROBOVA, Natalia (ITEP, LPI, MIPT)

Presenter(s) : SKROBOVA, Natalia (ITEP, LPI, MIPT)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics

Contribution ID : **558** Type : **Poster**

H -> WW*->lnulnu searches in the ATLAS 13 TeV data

Monday, 22 October 2018 15:40 (150)

Higgs boson production cross-sections via the gluon–gluon fusion and vector-boson fusion modes are measured in the $H \to WW^* \to \nu\mu\nu$ decay channel in the ATLAS experiment at the LHC. The $H \to WW^*$ decay channel has the second largest branching fraction and allows to measure Higgs boson production cross-section with good precision. The analysis is based on the proton–proton collision data produced at the LHC at a centre-of-mass energy of 13 TeV and recorded by the ATLAS detector in 2015 and 2016, corresponding to an integrated luminosity of 36.1 fb^{-1}. The ggF and VBF cross-sections multiplied by the $H \to WW^*$ branching ratio arefound to be in agreement with the Standard Model predictions.

Primary author(s) : RAMAKOTI, Ekaterina (NRNU MEPhI)

Presenter(s) : RAMAKOTI, Ekaterina (NRNU MEPhI)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics

Contribution ID : **559** Type : **Plenary/section talk**

Gravity theory tests with observations of stars near the black hole at the Galactic Center

Wednesday, 24 October 2018 15:15 (30)

Presenter(s) : Prof. ZAKHAROV, Alexander

Session Classification : Plenary

Track Classification : Gravitation and cosmology

Contribution ID : **560** Type : **Plenary/section talk**

Current status of the ReD experiment

Thursday, 25 October 2018 17:45 (15)

The REcoil Directionality project (ReD) aims at investigating a novel observable for directional dark matter detection in next generation liquid argon detectors. A small liquid argon dual-phase TPC of innovative design will be exposed to a neutron beam produced at the Laboratori Nazionali del Sud (LNS, Italy) Tandem accelerator to investigate "columnar recombination" effects.

Primary author(s) : SUVOROV, yury (UCLA)

Presenter(s) : SUVOROV, yury (UCLA)

Session Classification : Particle Physics: Astroparticle physics

Track Classification : Particle physics: astroparticle physics

Contribution ID : **561** Type : **Plenary/section talk**

The Belle II Experiment at SuperKEKB: status and prospects

Friday, 26 October 2018 16:05 (20)

The Belle II detector together with the SuperKEKB e+e− asymmetric collider are the second generation experiment at a B-Factory. The aim is to reach a luminosity of 8 × 1035 $cm^{-2}s^{-1}$, that is a Y(4S) production rate close to 800 Hz, by exploiting the nano beam collision scheme with large Piwinsky angle. A major upgrade of all the components of the former Belle detector had been completed in order to improve its performances and to withstand the severe background conditions foreseen during the running at nominal luminosity. SuperKEKB and an almost complete version of the Belle2 detector started the experimental run in the spring 2018 observing the first collision on April 26 and collecting a sample of almost 0.5 fb^{-1}. The key concepts of the new detectors and a first assay of their performances on real data will presented together with a status report of the machine operations and the prospects for the new experimental run that will start with the complete Belle II detector by spring 2019.

Primary author(s) : PAOLONI, Eugenio (INFN & University Pisa)

Presenter(s) : PAOLONI, Eugenio (INFN & University Pisa)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **562** Type : **Plenary/section talk**

ION PRODUCTION IN THE 12C + 7Be INTERACTIONS AT GeV ENERGIES

Friday, 26 October 2018 16:35 (15)

Differential cross sections of nuclear fragment production at 3.5 degrees for 12C fragmentation at 0.3 – 2.0. GeV/nucleon on a Be target were measured in the FRAGM experiment at the ITEP TWA heavy ion accelerator. The momentum spectra of fragments span the region of the fragmentation peak as well as the cumulative region. The differential cross sections cover up to five orders of magnitude. The fragment momentum distributions in laboratory frame as well as the kinetic energy spectra in the rest frame of the fragmenting nucleus are used to test the predictions of four ion-ion interaction models: INCL++, LAQGSM03.03, QMD and BC. Here we focus on our results obtained at 0.95 and 2.0 GeV/c.

Primary author(s) : KRUTENKOVA, Anna (ITEP)

Presenter(s) : KRUTENKOVA, Anna (ITEP)

Session Classification : Nuclear physics

Track Classification : Nuclear physics

Contribution ID : **563** Type : **Plenary/section talk**

Scientific activities at IHEP CAS. Status of JUNO

Presenter(s) : Prof. WANG, Yifang (Institute of High Energy Physics of Chinese Academy of Sciences)

Session Classification : Plenary

Contribution ID : **564** Type : **Plenary/section talk**

Theoretical overview for high energy physics

Monday, 22 October 2018 13:45 (45)

Presenter(s) : Prof. ANTONIADIS, Ignatios (LPTHE Paris and AEC Bern)

Session Classification : Plenary

Contribution ID : **565** Type : **Plenary/section talk**

XFEL Scientific program

Tuesday, 23 October 2018 11:30 (30)

Presenter(s) : Dr. MOLODTSOV, Serguei (European XFEL)

Session Classification : Plenary

Contribution ID : **566** Type : **Plenary/section talk**

ATLAS detector upgrade

Tuesday, 23 October 2018 12:30 (30)

Presenter(s) : Dr. STANECKA, Ewa (Institute of Nuclear Physics PAN)

Session Classification : Plenary

Contribution ID : **567** Type : **Plenary/section talk**

Review on the neutrino oscillations experimental results

Presenter(s) : Dr. WASCKO, Morgan (Imperial College London)

Session Classification : Plenary

Contribution ID : **568** Type : **Plenary/section talk**

Rare Decay Search with Scintillating Monocrystals Operating at mK temperature

Tuesday, 23 October 2018 15:05 (35)

I will briefly review the double beta decay experiments using scintillating mono crystals at low temperature, such as CUPID and AMoRE experiments. The status of AMoRE experiment for Mo-100 double beta decays will be described in detail.

Presenter(s) : KIM, Yeongduk

Session Classification : Plenary

Contribution ID : **569** Type : **Plenary/section talk**

Searches for sterile neutrinos at reactors

Tuesday, 23 October 2018 14:30 (35)

Presenter(s) : Prof. DANILOV, Mikhail (LPI and MEPhI)

Session Classification : Plenary

Contribution ID : **570** Type : **Plenary/section talk**

Physics at LHCb

Wednesday, 24 October 2018 12:30 (35)

Presenter(s) : KROKOVNY, Pavel (Budkker INP and Novosibirsk State University)

Session Classification : Plenary

Contribution ID : **571** Type : **Plenary/section talk**

Gravitational waves

Wednesday, 24 October 2018 14:15 (30)

Presenter(s) : Prof. CARDOSO, Vitor (Instituto Superior Técnico)

Session Classification : Plenary

Contribution ID : **572** Type : **Plenary/section talk**

FAIR Scientific Program

Thursday, 25 October 2018 14:00 (30)

Presenter(s) : Prof. GIUBELLINO, Paolo (GSI/FAIR)

Session Classification : Plenary

Contribution ID : **573** Type : **Plenary/section talk**

Heavy-ion Physics at LHC

Thursday, 25 October 2018 14:30 (30)

Presenter(s) : Dr. ARSENE, Ionut Cristian (University of Oslo)

Session Classification : Plenary

Contribution ID : **574** Type : **Plenary/section talk**

AMS status and physics results

Wednesday, 24 October 2018 11:30 (60)

Presenter(s) : Prof. TING, Samuel C.C. (CERN)

Session Classification : Plenary

Contribution ID : **575** Type : **Plenary/section talk**

Boiling QCD in supernova explosions and binary mergers

Friday, 26 October 2018 14:00 (35)

Presenter(s) : Prof. BLASCHKE, David (University of Wroclaw)

Session Classification : Plenary

Contribution ID : **576** Type : **Plenary/section talk**

The Silicon Tracking System of the CBM Experiment at FAIR

Thursday, 25 October 2018 17:05 (15)

The Compressed Baryonic Matter (CBM) experiment at the future Facility for Antiproton and Ion Research (FAIR) aims to study the properties of nuclear matter at high net-baryon densities and moderate temperatures. The Silicon Tracking System (STS) is the key detector to reconstruct with a high efficiency up to 1000 charged particle trajectories created in heavy-ion collisions at interaction rates of up to 10 MHz. It will determine the momentum of the particles with a momentum resolution $\Delta p/p \approx$ 1-2% which requires ultralow detector material budget of 0.3-1% X0 per layer. The detector comprise eight layers of double-sided silicon microstrip sensors and will be placed inside the 1 Tm superconducting magnet which limits the space available, which in turn requires advanced cooling approaches and mechanical design with precise tracking layers alignment. The microstrip sensors have to be radiation hard and checked for their quality optically and electrically before the assembly. This presentation summarizes the status of developments for the CBM STS as well as for the detector demonstrator in a framework of mCBM campaign at SIS18@GSI.

Primary author(s) : Dr. LAVRIK, Evgeny (Universität Tübingen)

Presenter(s) : Dr. LAVRIK, Evgeny (Universität Tübingen)

Session Classification : Facilities and Advanced Detector Technologies

Track Classification : Facilities and advanced detector technologies

Contribution ID : **577** Type : **Poster**

Performance simulations of the Silicon Tracking System of the CBM Experiment at FAIR

Monday, 22 October 2018 15:40 (150)

The Compressed Baryonic Matter (CBM) experiment at the future Facility for Antiproton and Ion Research (FAIR) aims to study the properties of nuclear matter at high net-baryon densities and moderate temperatures. The Silicon Tracking System (STS) is the key detector to reconstruct with a high efficiency up to 1000 charged particle trajectories created in heavy-ion collisions at interaction rates of up to 10 MHz. It will determine the momentum of the particles with a momentum resolution $\Delta p/p \approx$ 1-2% which requires ultralow detector material budget of 0.3-1% X0 per layer. The detector comprise eight layers of double-sided silicon microstrip sensors and will be placed inside the 1 Tm superconducting magnet. This poster contribution describes the simulated analog and digital response of the STS and its performance with regard to different geometries, sensor layouts and varied sensor thicknesses. Key metrics such as track and primary vertex reconstruction efficiencies, momentum resolution will be presented. In addition the effect of delta-electrons originating from beam-target interactions on the detector performance and read-out data rates will be shown.

Primary author(s) : LAVRIK, Evgeny (Universität Tübingen)

Presenter(s) : LAVRIK, Evgeny (Universität Tübingen)

Session Classification : Poster session and coffee-buffet

Track Classification : Facilities and advanced detector technologies

Contribution ID : **578** Type : **Poster**

The results and prospects of the Baikal Gigaton Volume Detector

Monday, 22 October 2018 15:40 (150)

We present the current status and plans of the Baikal-Gigaton Volume Detector (Baikal-GVD) experiment. Baikal-GVD is the project of a cubic-kilometer scale high-energy neutrino observatory. For the time being GVD consists of three clusters of optical modules, the first of which was deployed in 2015. At the moment detector reconstructs both muon tracks and showers produced by high-energy neutrino. We present the preliminary analysis of data acquired coincidentally with IceCube "blazar" IC170922A and LIGO neutron stars merger GW170817 events, and give the upper limits for neutrino fluxes for these event obtained at GVD. Finally, we discuss the development of Baikal-GVD alert system for multimessenger studies.

Primary author(s) : DIK, Viktoriya (JINR)

Presenter(s) : DIK, Viktoriya (JINR)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: neutrino physics

Contribution ID : **579** Type : **Plenary/section talk**

Heavy flavor physics at ATLAS and CMS

Friday, 26 October 2018 15:35 (30)

In this talk we review recent results on heavy flavor physics at ATLAS and CMS. It includes results from a study of production and properties of b-hadrons with open or hidden beauty as well as rare decays of B-mesons in which the phenomena of New Physics were searched for. The discussed results are based on the statistics obtained during Run I (8 TeV) and Run II (13 TeV).

Primary author(s) : CHISTOV, Ruslan (ITEP, MEPhI)

Presenter(s) : CHISTOV, Ruslan (ITEP, MEPhI)

Session Classification : Particle Physics

Track Classification : Particle physics

Contribution ID : **580** Type : **Poster**

Study of 4 charged pion production at VEPP 2000 collider with CMD-3 detector

Monday, 22 October 2018 15:40 (150)

A cross section of the process e+ e− ⟶ π + π − π + π − has been measured using an integrated luminosity of 17 pbˆ{-1} collected with the CMD-3 detector in the center-of-mass energy range 650-1000 MeV. The main goal of this analysis is precise measurement of the cross section. High-precision measurements of various hadronic cross sections are of great interest in connection with the problem of the muon anomalous magnetic moment g-2. The e+ e− ⟶ π + π − π + π − can be used to test the conservation of vector current (CVC) hypothesis, which predicts a relation between the e+ e− ⟶ π + π

Primary author(s) : KOROBOV, Alexandr (BINP)

Presenter(s) : KOROBOV, Alexandr (BINP)

Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics

Contribution ID : **581** Type : **Poster**

Phase diagram and dualities of dense baryonic matter with chiral imbalance

Monday, 22 October 2018 15:40 (150)

In this talk the phase structure of the dense baryonic/quark matter has been investigated in the presence of baryon, isospin, chiral and chiral isospin chemical potentials in the framework of Nambu–Jona-Lasinio model. It has been shown that in the large-Nc limit there exist several dualities of the phase portrait. One of the key conclusions of our studies is the fact that chiral imbalance generates charged pion condensation in dense baryonic/quark matter even in the case of charge neutral matter, which is interesting in the context of the astrophysics of neutron stars. It was also shown that our results in particular cases are consistent with the simulation of lattice QCD. Our studies show that different types of chiral imbalances can occur in the cores of neutron stars or in heavy ion collision experiments where large baryon densities can be reached, due to the so-called chiral separation and chiral vortical effects.

Primary author(s) : Dr. ZHOKHOV, Roman (IHEP NRC KI, IZMIRAN)

Presenter(s) : Dr. ZHOKHOV, Roman (IHEP NRC KI, IZMIRAN)

Session Classification : Poster session and coffee-buffet

Track Classification : Nuclear physics: heavy ion

Contribution ID : **582** Type : **Plenary/section talk**

The CUORE Experiment : Neutrinoless Double Beta Decay Results

Tuesday, 23 October 2018 18:40 (15)

The Cryogenic Underground Observatory for Rare Events (CUORE) is the first bolometric experiment searching for neutrinoless double beta decay (0νββ) that has been able to reach the one-ton scale. The detector consists of an array of 988 TeO_2 crystals arranged in a compact cylindrical structure of 19 towers. The construction of the experiment was completed in August 2016 with the installation of all towers in the cryostat. Following a cooldown, diagnostic, and optimization campaign, routine data-taking began in spring 2017. In this talk, we present the 0νββ results of CUORE from examining a total TeO_2 exposure of 86.3 kg·yr, characterized by an average energy resolution of 7.7 keV FWHM and a background in the region of interest of 0.014 counts/(keV·kg·yr). In this physics run, CUORE placed a lower limit on the 130Te 0νββ half-life of > 1.3 × 10^25 yr (90% C.L.). We then discuss the additional improvements in the detector performance achieved in 2018 and the latest update on the study of other rare processes in Tellurium and the evaluation of the background budget.

Primary author(s) : ALDUINO, Cristopher (University of South Carolina)

Presenter(s) : ALDUINO, Cristopher (University of South Carolina)

Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics