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On the Cosmological Origin of Astroparticles: New Concepts, Phenomena and Processes in galactic SMBH

Ara K. Avetissian

Viktor Ambartsumian Observatory,
Yerevan State University, Armenia

The previous theoretical studies concerning the Russian programs OLIMPIA and “Synthesis of heavy elements” are developing based on original cosmological phenomenon of “gravitons’ entanglement”, revealed in scope of Non-Inflationary Cosmology theory.

(see: Avetissian A. K., *Entangled gravitons? Prospective original scenarios in cosmology*, Gravitation &Cosmology, **26** (1), 22, 2020)

The broad review of this theoretical concept together with prediction of “initial cosmic quasiparticles” – mixture of correlated carriers of the fundamental physical fields in their vacuum states – were able to initiate the new phenomenon -

large-scale entanglement of the prototypes of astroparticles.

These phenomena could generate within earliest Universe
and be continued even during the formation of galaxies,
when the trapped inside the SMBH initial Bose-condensate
could become a large-scale coherent state through the

induced gravitational collapse,

turning further into an effective model of a

galactic source of high energies.

Such a model is able to verify the

theoretical mechanism of the galactic jet

(See: Avetissian A. K., "*Footprints of Non-Inflationary Cosmology in Programs OLIMPIA and Synthesis of Heavy Elements*". *J. Phys. Conf. Ser.* **1390,** 2019)

The next area of possible implementations of these concepts may be

the essence of gravitational attraction inside SMBH,

specifically the characteristic futures of

quantum gravity.

If these a'priori concepts will supported by the registration of

high-frequency gravitational radiation from galactic core,

SMBHs will become objects of identifier of quantum gravity.

Such a possibility might be realized within the set of endless-periodic 3D potential wells, guaranteeing by the regular spatial distribution of

Higgs bosons in the state of Bose-condensate.

(see: Avetissian A. K., "*Cosmological Bang within Matter Era. Is the Generation of Galactic-Scale Mass Possible?*". arXiv: 0711.2969, 2007. Avetissian A. K., "*Cosmological bang as a consequence of a sudden change in the quantum statistics*". Astrophysics, **51** (1) 2008, 130)

The Universe as a translational-invariant limitless spatial crystall

The most transparent estimations in favor of space-period of so called

Cosmic Quantum Lattice

may be presented based on the

new fundamental cosmological scales,

revealed by the theory of Non Inflationary Cosmology in Matter Era and

essentially differ from the Planck scales

(see: Avetissian A. K., *"The Cosmological New Scales as a Cornerstone for the Evolutionary Processes, Energetic Resources and Activity Phenomena of the Non-Stable Universe".* Astronomical Society of the Pacific Conference Series, USA, San Francisco. **511**, 236, 2017.

Avetissian A. K., *"On the Fundamental Cosmological Scales in Matter Era".* Gravitation and Cosmology, **24**(4), 375, 2018.)

Taking into account the fact that the de-Broglie wavelength

of created baryons and moreover leptons were incomparably large compared to the de-Broglie wavelength of Higgs boson,

it becomes clear that within the problem of

Cosmic Quantum Lattice

one will adopt the **“model of weak coupling”,**

using the most natural approximation as necessary approach, first of all

Kronig-Penney model with appropriate replacements

of parameters of usual crystals.

Universe as a translational invariant time-crystal

Within the framework of NIC developed not only hypothesis of space-Cosmic Quantum Lattice and time-Cosmic Quantum Lattice

Due to Higgs bosons' close adhesion to each other within the

Bose-condensate inside SMBHs, the physical situation of CQL is completely different from the physical state inside the LHC.

Own confidence on the persuasion about

"zone-structure of CQL" is able to explain

the astrophysical mechanism of

production and stabilization of leptons together with baryons.

The “squeezing” of Bose-condensate within the galactic SMBH

The major outcomes of theory NIC – the galactic explosure (CSB) and super-strong shock waves (SSW) phenomena –

have initiated original mechanism of so called

induced gravitational collapsing.

Such a scenario might guarantee the next step of evolution – the

squeezing of Bose-condensate as CQL within SMBH

The assumption about cosmic web of “entangled gravitons” and

all kind “collective excitations” might initiate original phenomenon of

“global causality principle of Universe”.

The phenomenon of “squeezing of Bose-condensate” in SMBH

can be tested via characteristics gravitational radiation,

which differs from the observed models of

gravitational radiation of merging cosmic double-objects, likely by the parameters of

frequency and intensity.

These expectations must be punctually investigated, in particular on the basis of the following problems:

Task 1. Generalize the analogues of Kumakhov's effect in usual latticels, specifying the unique lattice CQL as a possible source of high energetic particles beam within jets, using the phenomena of classical banching and quantum modulation, revealed for neutron stars. (A. K. Avetissian, Interaction of charged particles with the field of a rotating magnetic dipole in the presence of electromagnetic radiation. *Astrophysics*, 16,170, 1980).

Task 2. Using the phenomena of entanglements in various aspects, and galactic CSB and SSW phenomena, create a possible theoretical model for the "Fermi Bubbles" around active galactic nuclei, describing the characteristic emision starting from the microwaves till the gamma-rays.

Task 3. Study the role of SMBH's outer surface in generation of high energetic jet by the means of generalized phenomena of classical bunching and quantum modulation.

Task 4. Research the foundations of the gravitational radiation of hypothetical CQL – the coherent system inside an SMBH, testing the main characteristics of such radiation by its frequency and intensity, illustrating the major differences from the observed models of gravitational radiation of merging cosmic double-objects.

Thank you for attention