Contribution ID : **188** Type : **Oral talk**

Analysis of energy deposit of EAS cores in the Cherenkov water calorimeter NEVOD

Friday, 30 October 2026 18:30 (15)

A basis of the Experimental Complex NEVOD (MEPhI, Moscow) is the Cherenkov water calorimeter (CWC) with a volume of 2000 m3. The quasi-spherical modules (QSMs) consisting of 6 orthogonally oriented photomultiplier tubes (PMTs) are used to detect Cherenkov radiation. The CWC NEVOD includes 91 QSMs (546 PMTs in total) which form a spatial grid in the water volume with 25 vertically arranged strings, 3 – 4 QSMs in each. Such arrangement of photomultiplier tubes and their wide dynamic range from 1 to 105 photoelectrons, achieved by a two-dynode signal readout, allows CWC NEVOD to operate in the calorimeter mode.

The NEVOD-EAS array is a part of the Experimental Complex NEVOD. It consists of 36 scintillation detector stations (DS), combined into 9 clusters, which are placed over an area of about 104 m2 on the roofs of laboratory buildings and on the ground surface. The array is designed to measure the electron-photon component of extensive air showers (EAS) within an energy range from 1015 to 1017 eV. Using its data various EAS parameters are reconstructed: the air-shower core position, size and arrival direction.

The central part of an extensive air shower near its axis is called the EAS core, where hadrons being generated. In their decays, the hadrons form electron-photon and muon components of the EAS. Fluctuations in the recorded shower characteristics, containing information on primary nuclear interaction acts, are minimal in the cores of extensive air showers. But at the same time, most of the conducted studies are focused on the EAS electron-photon component, which is the easiest one to detect.

The combination of the EC NEVOD facilities provides an opportunity to select and reconstruct extensive air showers by the electron-photon component with NEVOD-EAS array and to study the energy deposit of EAS cores in the Cherenkov water calorimeter.

In this work, the study of joint events of the CWC NEVOD and the NEVOD-EAS array was carried out based on the experimental data recorded in 2018 - 2023. For such events, the selection conditions and characteristics are presented, the features of the reconstructed EAS size spectrum, as well as the spectra of energy deposit from all events and events with cores passing through the CWC are discussed.

Primary author(s) : LISITSYN, Mikhail (PhD student); KHOKHLOV, Semyon (National Research Nuclear University MEPhI)

Co-author(s) : BOGDANOV, Aleksei (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); GROMUSHKIN, Dmitry (MEPhI); KARETNIKOVA, Tatyana (National Research Nuclear University MEPhI, Russia, Moscow); KINDIN, Victor (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); KONOVALOVA, Alena (National Research Nuclear University MEPhI); KHOMCHUK , Evgeny; SHULZHENKO, Ivan (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); YUZHAKOVA, Elena (MEPhI)

Presenter(s) : LISITSYN, Mikhail (PhD student)

Session Classification : Astroparticle physics

Track Classification : Astroparticle physics