Contribution ID: **770** Type: **Oral**

Calibration systems of the NICA-MPD electromagnetic calorimeter modules

Tuesday, 10 November 2020 15:15 (15 minutes)

The multipurpose detector (MPD) has been designed at the JINR to study the properties of hot nuclear matter at the NICA collider. The electromagnetic calorimeter (ECal) is one of the subsystems responsible for the identification of γ-quanta and electron-positron pairs. In addition, it is responsible for their separation from hadrons (for example, π0-mesons) as well as for measuring their energy. The process of developing, tuning and validation of several monitoring systems for calibrating ECal modules is the focus of this paper.
One of these systems involves the use of highly efficient large-area scintillator detectors. The detectors have a fiber-optic light extraction that ensures the high uniformity of the output signals. The fibers are read out by silicon photomultipliers (SiPM). The calibration is carried out to the response of each cell of the calorimeter to the minimum ionizing particle that passes through it. Cosmic rays are used as the source of these particles.
Another method to calibrate ECal modules is the side-glow optical fiber (SOF-2) system. SOF-2 fiber emits light transversely along its entire length by means of special laser notches, and can be used to calibrate photosensors of the ECal modules. It is important that the fiber emits light isotropically along its entire length at a constant amplitude. The results of studying the properties of side-glow fibers on a specially developed test bench are presented in this research.

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Session Classification: High energy physics

Track Classification: HEP II - detectors/electronics