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The study of characteristics and calibration of the electromagnetic calorimeter for the NICA/MPD detector

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The electromagnetic calorimeter is the important part of the NICA / MPD detector in terms of solving fundamental problems in studying of the nuclear matter properties. The high-granularity electromagnetic calorimeter (ECal) of the Multi-Purpose Detector (MPD) at heavy-ion NICA collider is optimized to measure the spatial coordinates and energy of photons and electrons. The production of the calorimeter modules was started this year. This report presents the methods and results of testing and calibration of the ECal modules. A technique for measuring assemblies of calorimeter modules on cosmic muons was developed, which allows calibrating a large number of modules in a wide dynamic range during limited time. For the simultaneous calibration of 12 modules for each of 8 types of modules a special stand was designed and manufactured. The periodic measurement to selective quality control and determination of the main physical parameters of modules was proposed to carry out on an electron beam at various energies. For this purposes, an electron beam of S-25P synchrotron of the Lebedev Physics Institute has been approved. A secondary electron channels was commissioned on the bremsstrahlung photon beam and transported to the calibration area. The calibration measurements were started at the beginning of 2020 with electron beam using an assembly of calorimeter modules at energies from 30 to 300 MeV. A higher electron beam energies are under tests. The simulation programs for beam and cosmic tests were developed. The experimental results in comparison with simulated data are presented and discussed. This work was supported by RFBR grants No. 18-02-40079.

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