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Reconstruction of photons and neutral mesons in heavy-ion collisions with MPD at NICA

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The Multi-Purpose Detector (MPD) serves as the main experiment of the NICA complex under construction at JINR. With heavy-ion collisions in the energy range $\sqrt{s_{NN}} = 4 - 11$ GeV, the MPD will scan the baryon-reach region of the QCD phase diagram to look for the first order phase transition and critical end-point. The measurement of direct photon and neutral meson production plays an important role in the physics program of the MPD experiment.

We report results of physics feasibility studies for photon and neutral meson (π^0 and η) reconstruction with the MPD detector in Bi+Bi collisions at $\sqrt{s_{NN}} = 9.2$ GeV simulated using realistic event generators. The photon measurements rely on different methods such as identification of photon clusters in the electromagnetic calorimeter (ECAL) and reconstruction of photons in the tracking system as dielectron pairs produced in conversion on detector materials (PCM). Neutral meson signals are studied using the invariant mass method by combining ECAL-ECAL, PCM-PCM and ECAL-PCM photon pairs, the uncorrelated combinatorial background is estimated using event-mixing technique. The developed signal reconstruction techniques are compared and tested versus truly generated signals. Complications for the reconstruction of direct photon signals are discussed.

Category

Experiment

Collaboration

MPD Collaboration

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