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Development and Simulation of Backward Hadronic calorimeter for the ePIC detector at EIC

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The Electron-Ion Collider (EIC) is a future particle accelerator at Brookhaven National Laboratory. It will provide physicists with high luminosity and highly polarized beams with a wide range of nuclei species at different energies, covering an extensive kinematic range, which will provide unprecedented access to the spatial and spin structure of proton, neutron, and light ions. The EIC physics goals include measuring the Generalized Parton Distribution, performing precision 3D imaging of the nuclei structure, and studying color confinement and hadronization mechanisms.
The backward hadronic calorimeter (backward HCal) for the Electron-Proton/Ion Collider experiment(ePIC) is a tail-catcher type calorimeter under development, which is to be located in the electron-going direction. In order to meet the physics goals of the EIC, a high position resolution backward hadronic calorimeter is needed to measure and distinguish charged and neutral hadronic showers coming from jets originating from fragmentation of small-x partons. The planned design type is a sandwich calorimeter with alternating layers of non-magnetic steel and plastic scintillator with wavelength-shifting fibers(Fe/SciFi). The light readout will be provided by Silicon Photomultipliers. It will cover the pseudorapidity range $-3.5 < \eta < -1.2$. We will present a comprehensive overview with study on position resolution, clustering optimization, low energy neutron detection and separation.

Category

Experiment

Collaboration

EPIC

Author: PROZOROV, Alexandr

Presenter: PROZOROV, Alexandr

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