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Barrel Imaging Calorimeter at EIC

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The Electron-Ion Collider (EIC) is envisioned as an experimental facility to investigate gluons in nucleons and nuclei, offering insights into their structure and interactions. The Electron-Proton/Ion Collider Experiment (ePIC) Collaboration was formed to design, build, and operate the EIC project detector, which will be the first experiment at the collider. The unique physics goals at the EIC necessitate specific design considerations for the electromagnetic calorimeter in the barrel region of ePIC. Precise measurements of electron energy and shower profiles are crucial for effectively distinguishing electrons from background pions in Deep Inelastic Scattering processes at high Q^2 within the barrel region. Furthermore, the calorimeter must accurately gauge the energy and coordinates of photons from processes such as Deeply Virtual Compton Scattering, while identifying photon pairs from π^0 decays.

In this presentation, I will discuss the design of the Barrel Imaging Calorimeter of ePIC. Our hybrid approach combines scintillating fibers embedded in lead with imaging calorimetry based on AstroPix sensors, a low-power monolithic active pixel sensor. Through comprehensive simulations, we have tested the calorimeter design against the key requirements outlined in the EIC Yellow Report. I will focus on the anticipated performance of the calorimeter, detailing progress in design and prototyping. Additionally, I will provide insights into the development timeline and collaborative efforts involved in this endeavor.

Keyword-1

Electron-Ion Collider

Keyword-2

Calorimetry

Keyword-3

Instrumentation

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