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Production of Vessel and Mirrors for the pfRICH Detector at the EIC

Thursday 9 October 2025 15:00 (20 minutes)

We will present an overview of the proximity-focusing Ring Imaging Cherenkov (pfRICH) detector developed for the ePIC experiment at the Electron-Ion Collider (EIC) at Brookhaven National Laboratory (BNL). Serving as a key particle identification (PID) subsystem in the backward pseudorapidity region -3.5
$lesssim\eta$
$lesssim -1.5$, the pfRICH provides at least 3σ PID separation for pions, kaons, and protons up to 7 GeV/c —capabilities crucial for Semi-Inclusive Deep Inelastic Scattering (SIDIS) measurements.
In this presentation, we will focus on two critical components: the vessel and the mirrors. The vessel, constructed from a robust carbon fiber composite plastic (CFRP) with an aramid honeycomb core, supports all detector components, ensures gas and light containment, and minimizes the material budget by employing construction techniques adapted from the sPHENIX TPC field cages. The mirrors, fabricated using evaporative coating methods, achieve high reflectivity (up to 90 \%) and precisely redirect a fraction of the Cherenkov photons produced in the aerogel radiator toward the photon sensors, enhancing ring imaging performance.

We will discuss the design, fabrication, and assembly of these components at Stony Brook University, in collaboration with Purdue University and BNL, highlighting their essential roles in the overall performance of the pfRICH detector for the upcoming EIC.

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