

# Ongoing Development in a Proximity-Focusing RICH Detector for ePIC at the Electron-Ion Collider (EIC)

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## Abstract

The Electron-Ion Collider (EIC) will enable precision studies of the strong interaction in nucleons and nuclei. Its primary general-purpose detector, ePIC, is designed to support a broad physics program, which relies on robust particle identification capabilities. In the electron-going endcap, a proximity-focusing Ring Imaging Cherenkov detector (pFRICH) provides charged-particle identification, enabling pion-kaon separation up to momenta of 7 GeV/c.

The pFRICH features a cylindrical vessel with aerogel tiles mounted on the face nearest the interaction point as the Cherenkov radiator. Conical mirrors along the vessel walls focus Cherenkov photons onto the photosensor plane on the opposite face, maximizing photon collection. The baseline photosensors are High-Rate Picosecond Photon Detectors (HRPPDs) developed by Incom, which offer large-area coverage with fine pixelation, high quantum efficiency, low dark count rates, and excellent spatial and timing resolution. At Brookhaven National Laboratory (BNL), mirror test stands are used to measure reflectivity and uniformity, with feedback to achieve high reflectivity ( $\geq 90\%$ ) across 300–600 nm to preserve photon yield. Additionally, HRPPDs have been evaluated in a pFRICH-like configuration under magnetic fields at BNL to verify their performance in ePIC.

This talk will present the pFRICH detector design, ongoing mirror evaluation studies, and preliminary results from HRPPD magnetic-field performance tests at BNL.