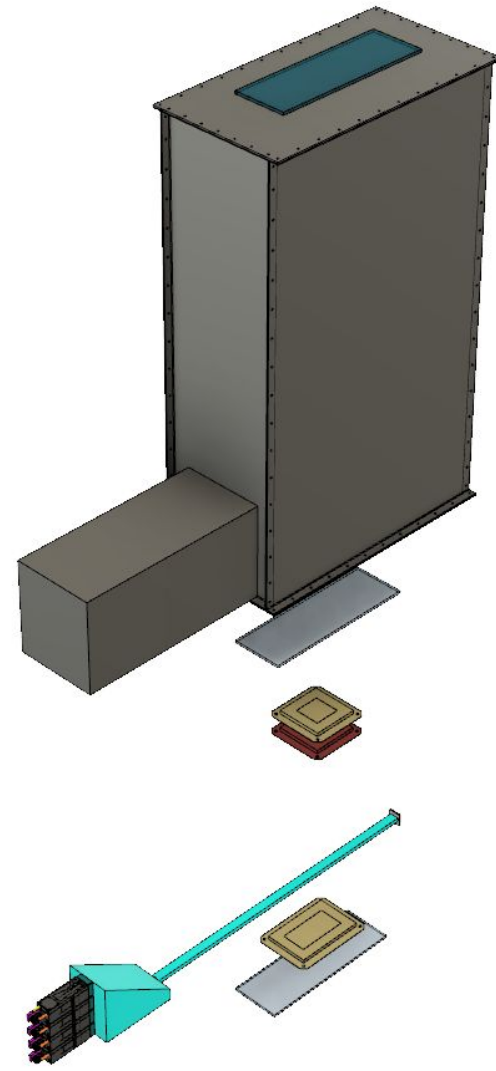


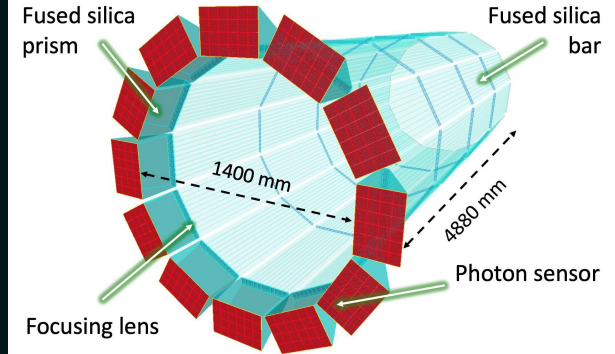
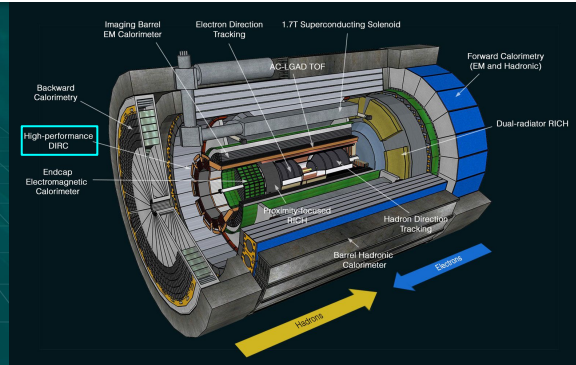
Construction of a Cosmic Ray Telescope for the hpDIRC of the Electron-Ion Collider

Nathan Shankman
Stony Brook University, CFNS



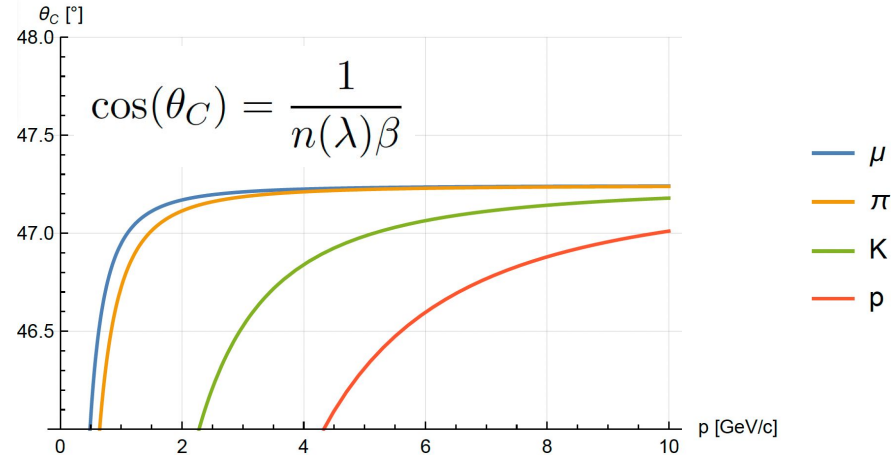
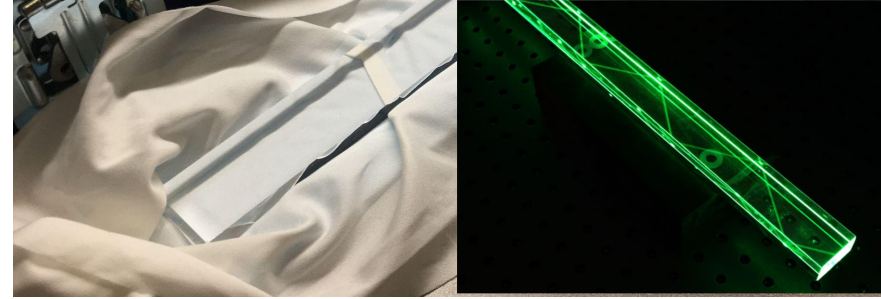
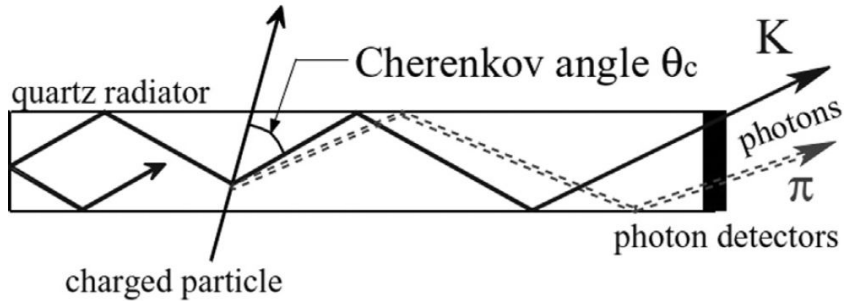
hpDIRC

- “High Performance” DIRC detector for PID of charged hadrons in the barrel region ($-1.5 < \eta < 1.5$) of the ePIC detector (Detector I)
- 3σ π/K separation (6 GeV/c)
- New 3-layer focusing lens, small pixel sensors, high-speed readout electronics



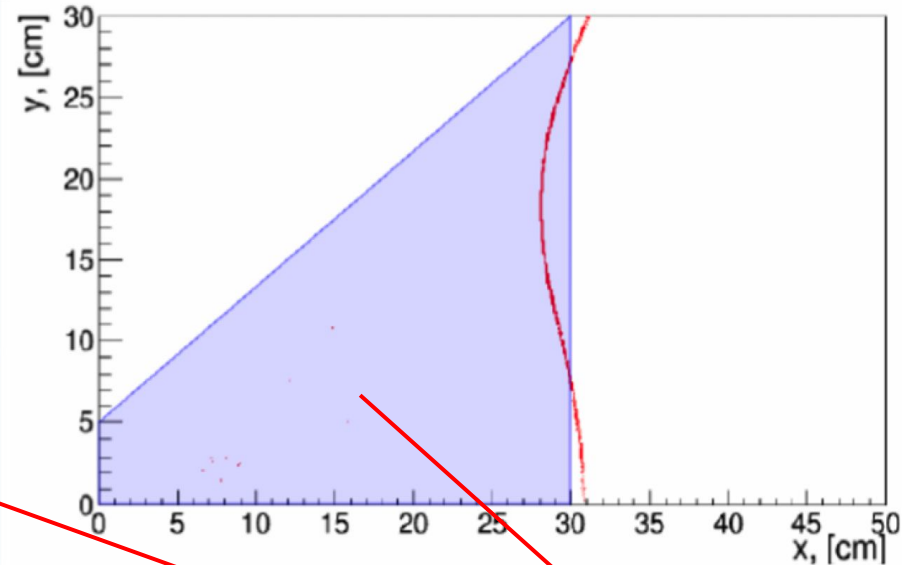
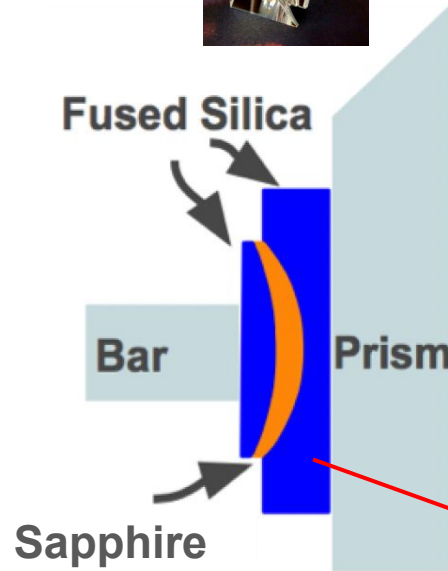
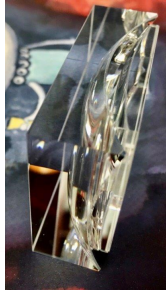
DIRC Radiators

- Detection of **I**nternally **R**elected **C**herenkov radiation
- Synthetic Fused Silica (SiO_2)
- $n = 1.473$
- Internal reflection coefficient: 0.9997



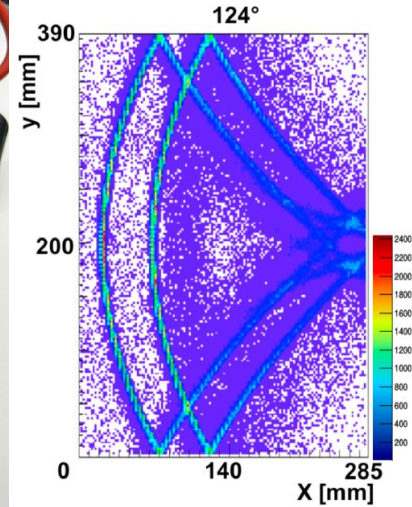
Lens and Prism

- Focus and defocus photons onto a flat readout plane
- 3-layer-lens
- Synthetic fused silica / Synthetic sapphire



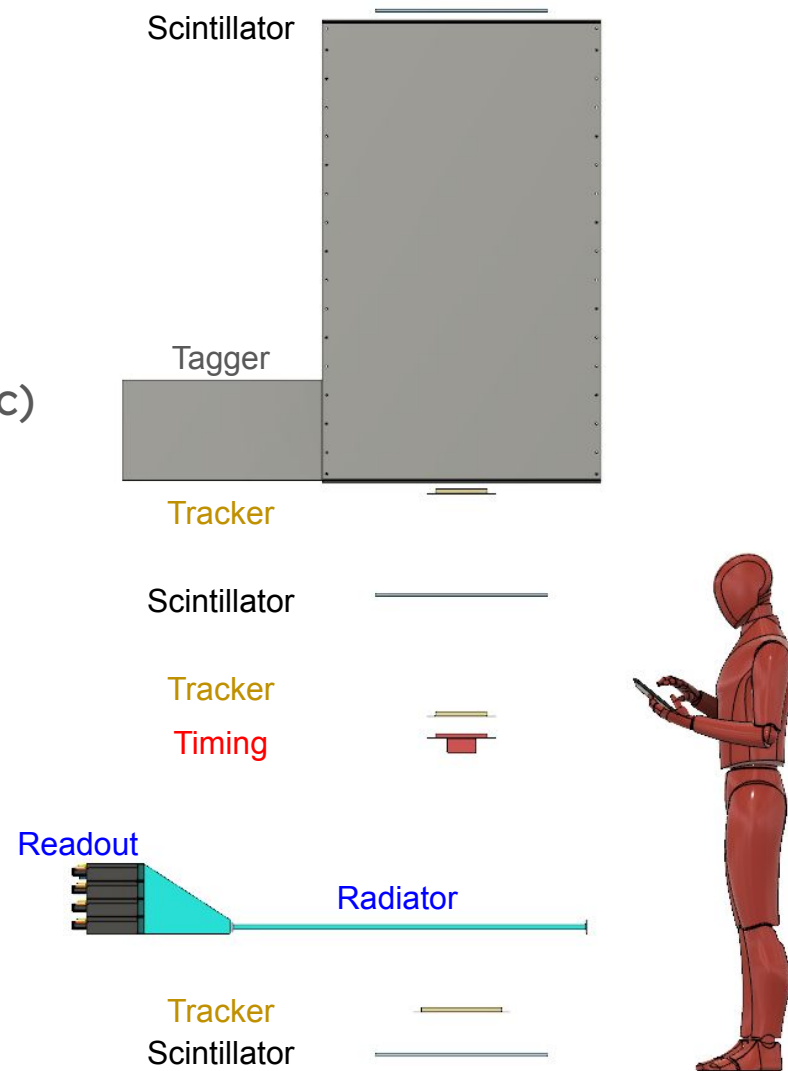
Electronic Readout

- PLANACON XP85012 MCP-PMTs
- 8 x 8 pixel array
- 6.5 mm x 6.5 mm pixels
- $\sigma_{\text{t}} < 100$ ps
- Padiwa pre-amplifiers
- Trigger and Readout Board (TRB) from HADES



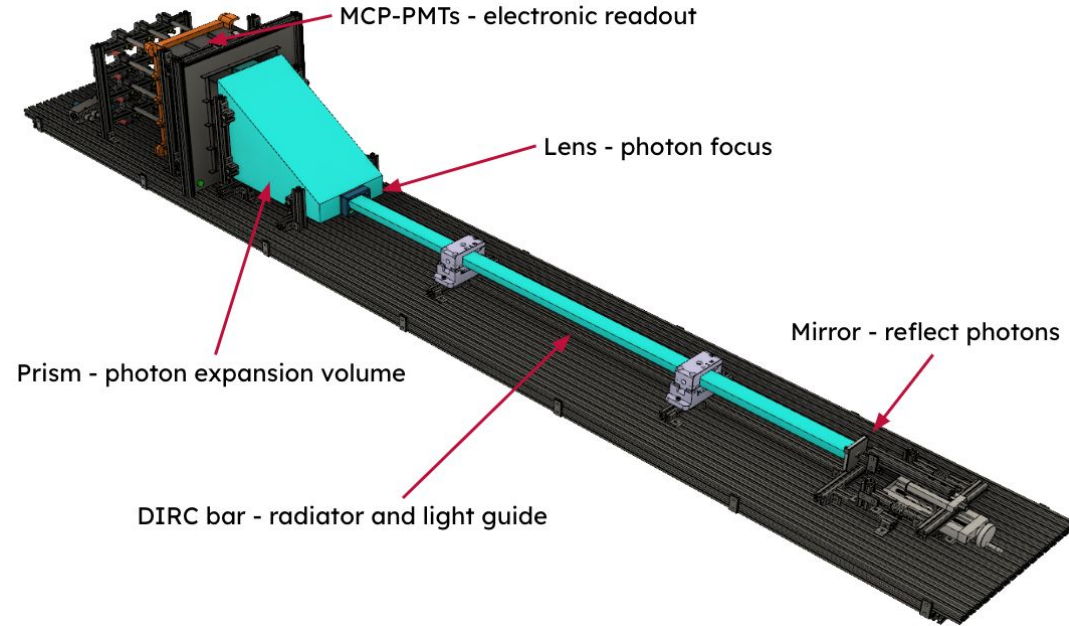
Cosmic Ray Telescope

- Characterization of DIRC radiators and optics
- Cherenkov Momentum Tagger ($p > 3.5 \text{ GeV}/c$)
- μ -RWELLS (trackers)
- PICOSEC (timing)
- DIRC Radiator/lens/expansion volume
- MCP-PMTs (readout)
- Motion Platform
- DAQ
 - HADES
 - Trigger Readout Board (TRB)
- “Slice” of the hpDIRC detector

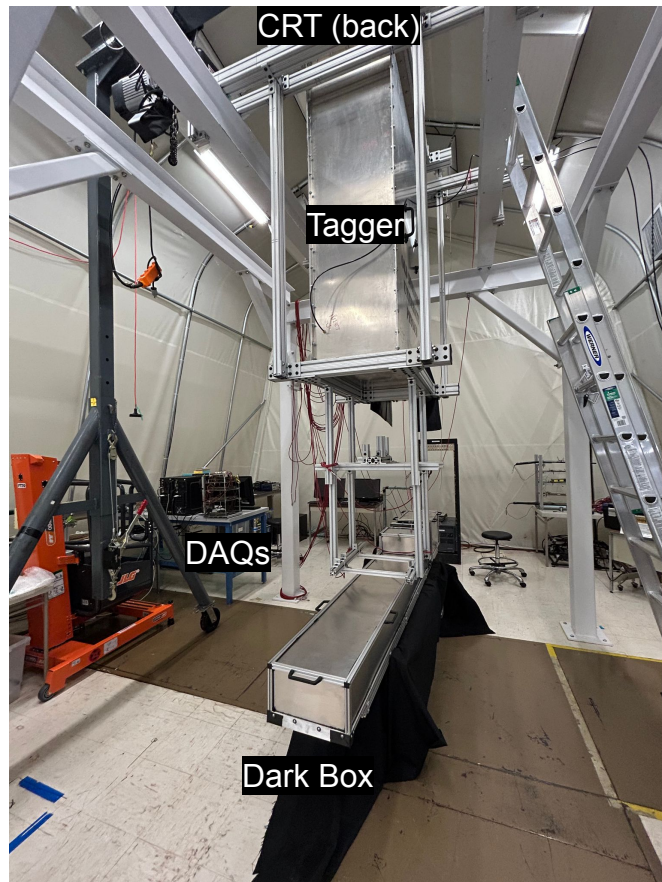
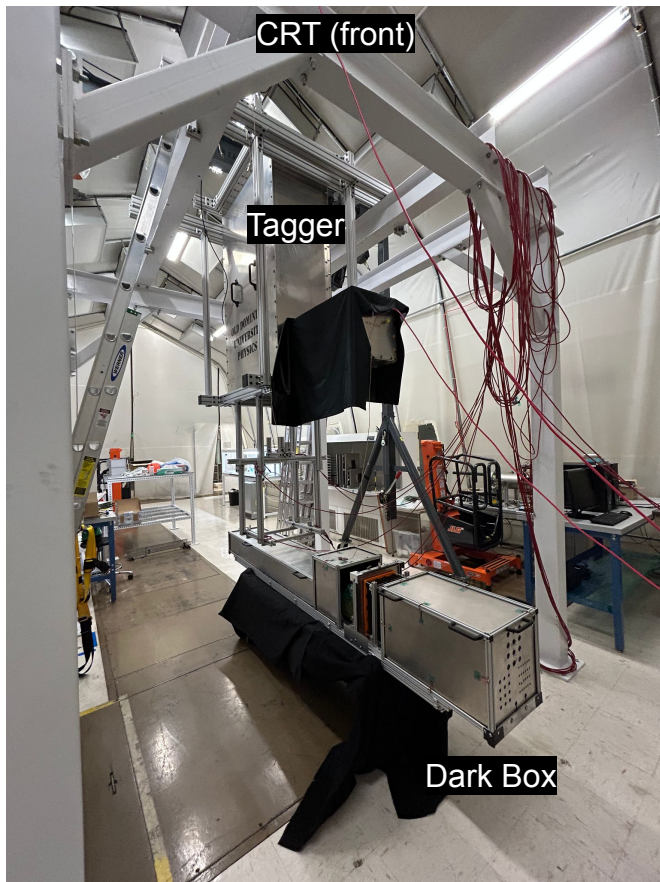
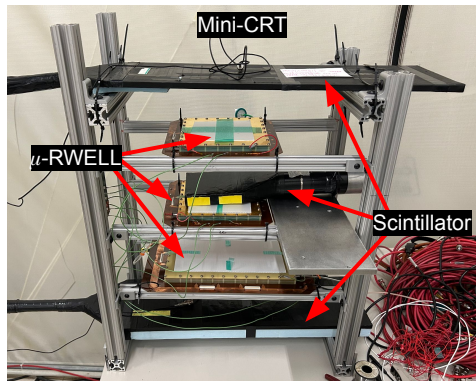
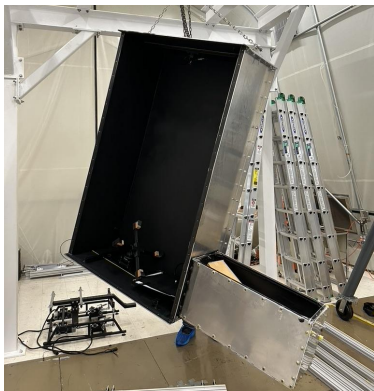


Dark Box

- Minimize external light
- User friendly
- Motion Platform
 - Multiple incident angles
 - 40° Pitch and Roll (capability)



Construction



Summary

- hpDIRC
 - Charged hadron PID in the barrel region
 - 3σ π/K separation at 6 GeV/c
- CRT for characterization of hpDIRC radiators and optics
- Current work:
 - Trackers
 - Hardware
 - DAQ
- Future work:
 - Readout
 - Hardware
 - DAQ
 - Coincidence
 - Cosmic data taking
 - Insertion of the pfRICH prototype?

