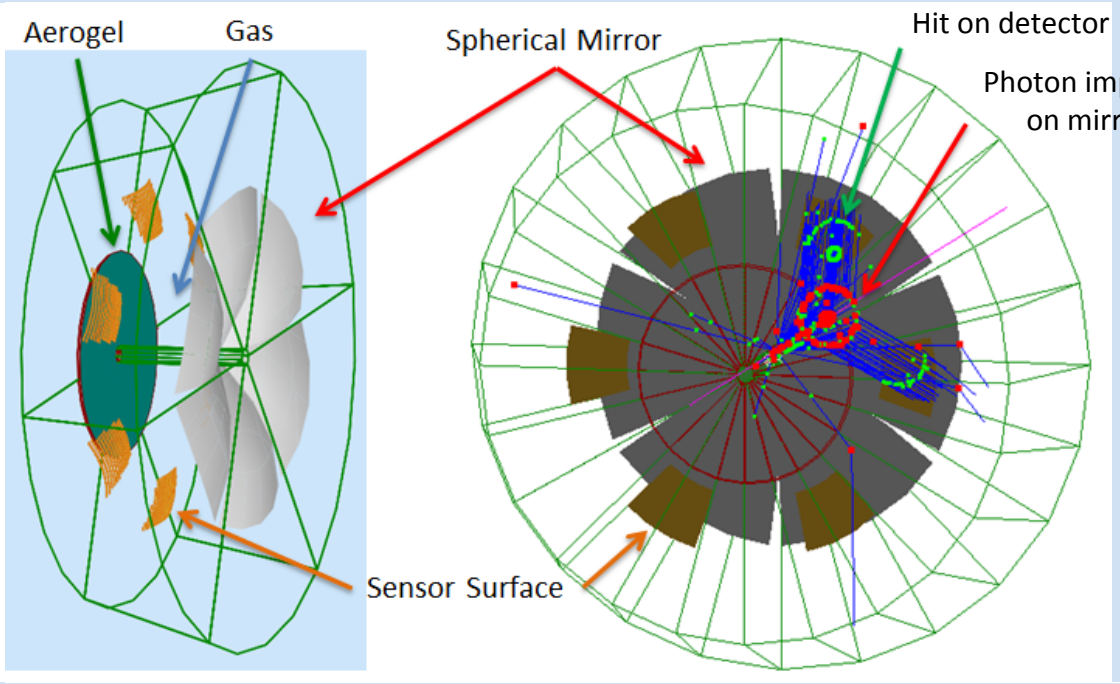
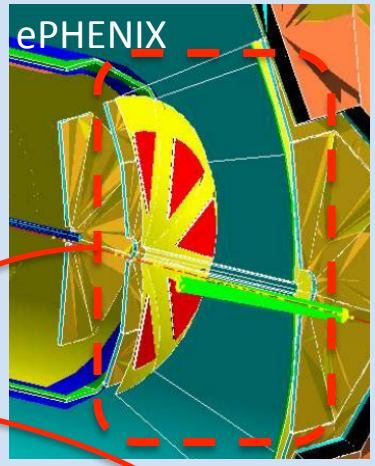
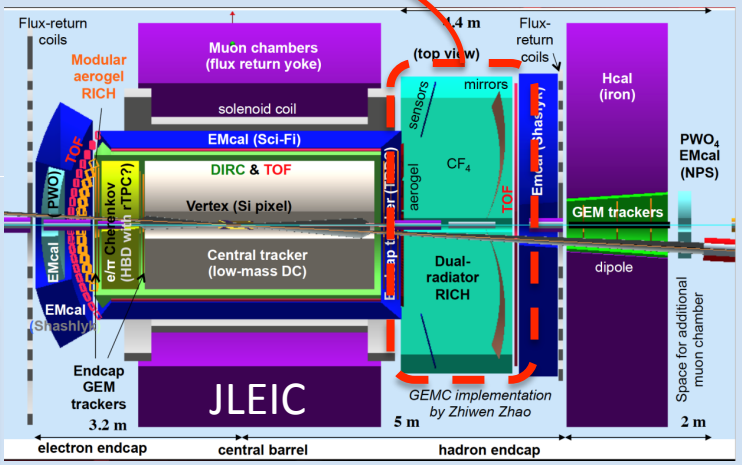
Dual Radiator RICH in EIC Hadron-endcap







dRICH: flexible configuration (JLEIC, ePHENIX)

Radiators: Aerogel (n_{AERO}~1.02) + Gas (n_{C2F6} ~ 1.0008)

Detector: 0.5 m²/sector , 3x3 mm² pixel

Single-photon detection in ~1T magnetic field

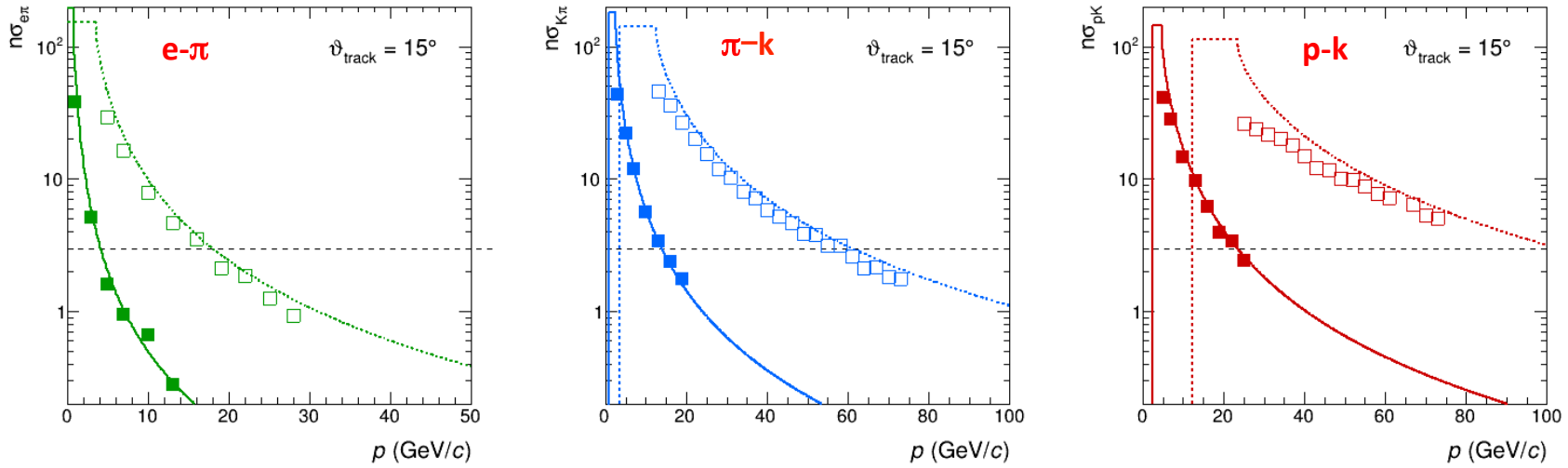
Outside acceptance, reduced constraints

→ best candidate for SiPM option

Phase Space:
- Polar angle: 5-25 deg
- Momentum: 3-60 GeV/c

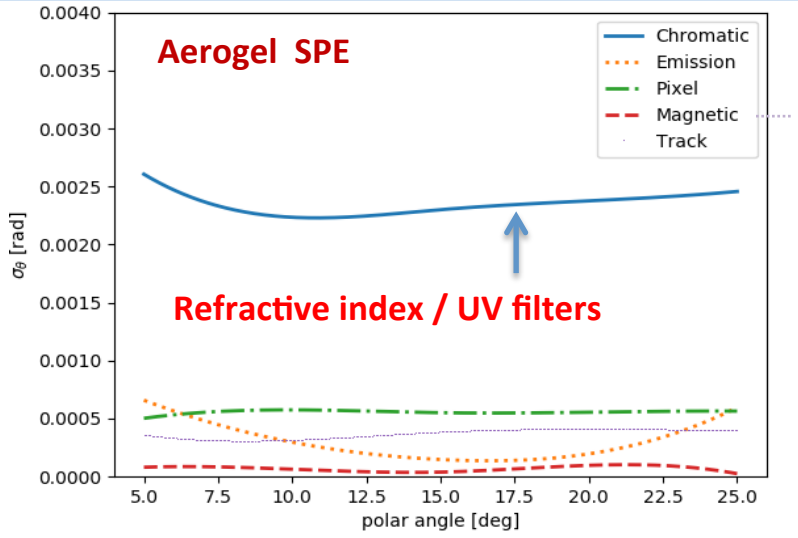
dRICH Feasibility Study

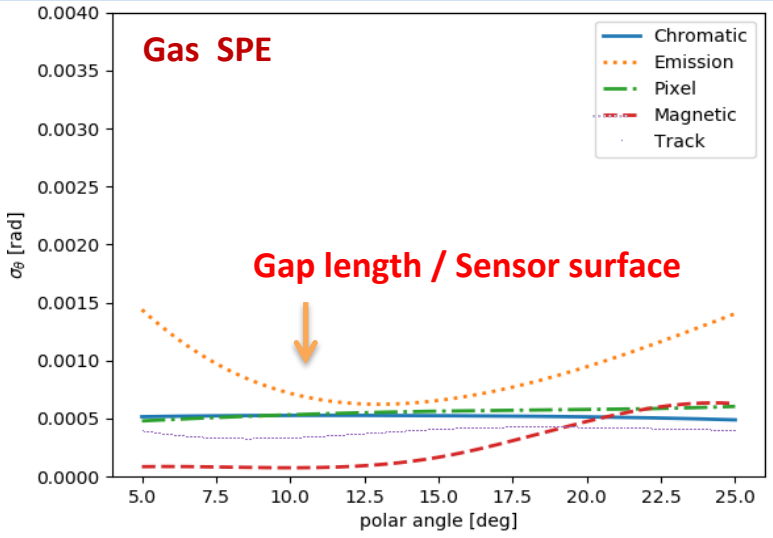
Compact and cost-effective solution for continuous momentum coverage (3-60 GeV/c)
Strong interest in the dRICH electron-pion separation capability



Studied with full Geant4 simulation, with Bayesian optimization and analytic parameterizations

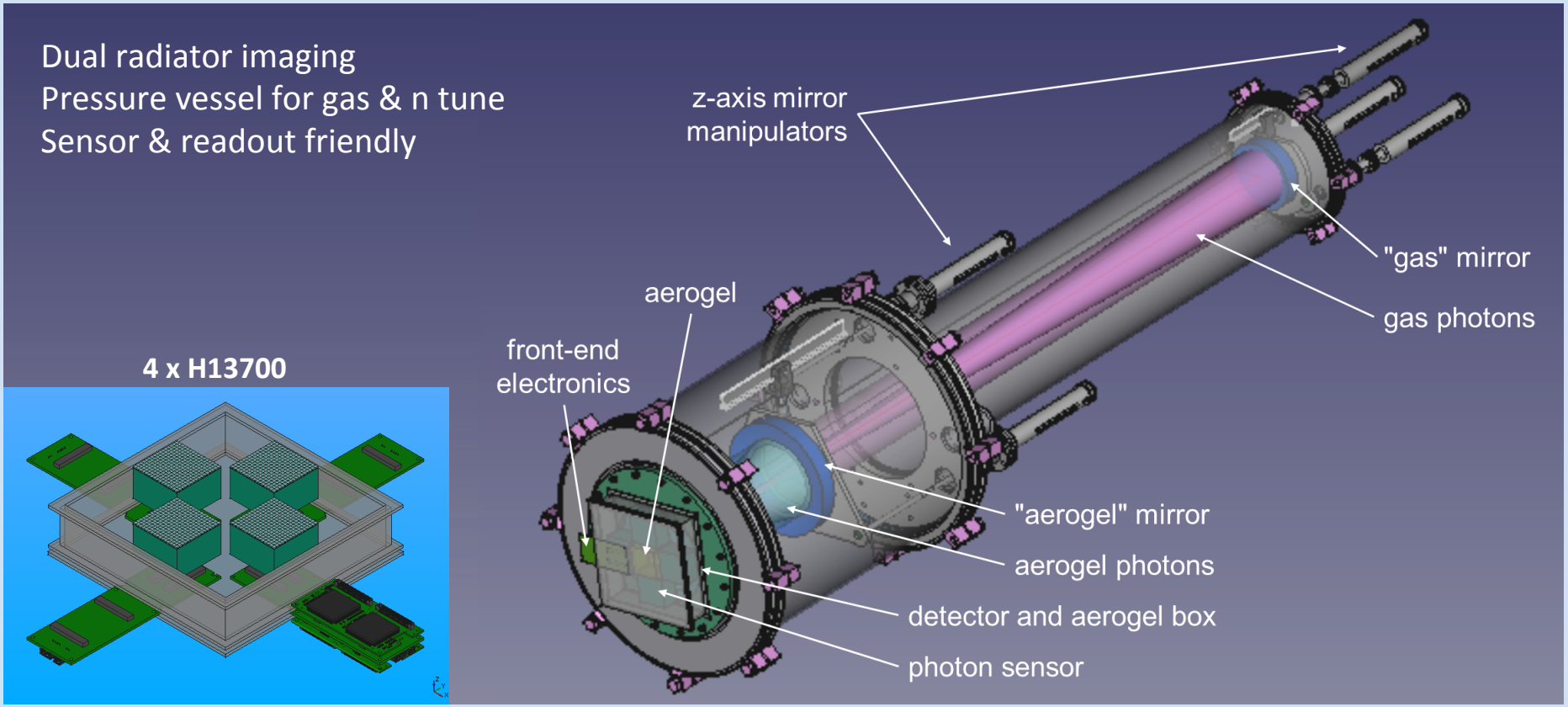
L. Barion et al., JINST 15 (2020) 02, C02040
E. Cisbani et al., JINST 15 (2020) 05, P05009



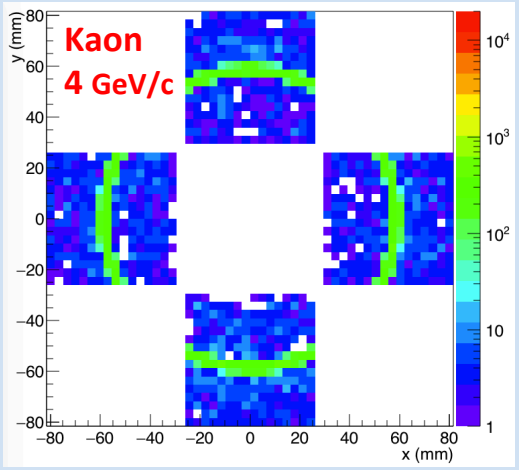


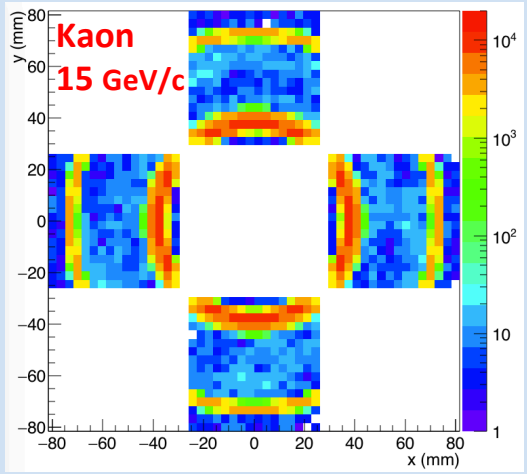
dRICH Prototype

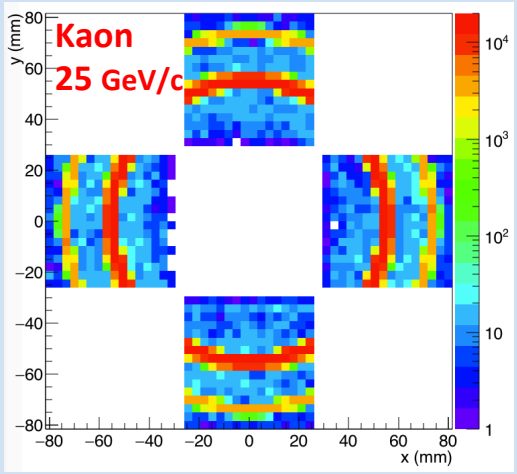
Dual radiator imaging
Pressure vessel for gas & n tune
Sensor & readout friendly



4 x H13700







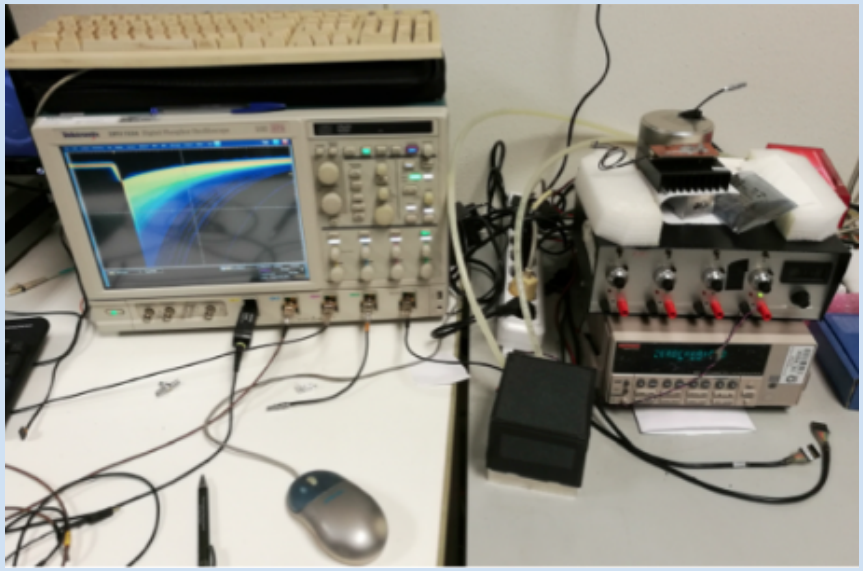
SiPM Program

SiPM: sampled for vendor, type and dose (at groups of 4)
organized in 8 x 4 matrices for imaging
to be irradiated up to 10^{11} n_{eq}/cm^2

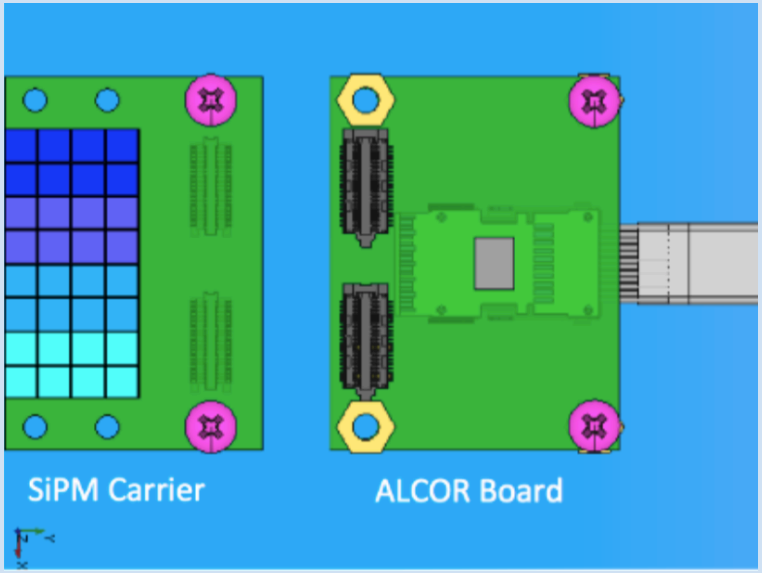
ALCOR: ASICS under development at INFN:
ToT architecture for cryogenic application
32 channels, 50 ps TDC, >500 kHz/channel

Readout: bias distributors and signal pre-conditioning
compatible with temperature treatments,
laboratory characterization, and firefly
high-data rate DAQ

Laboratory characterization



Readout test with ALCOR chip



Imaging test with dRICH prototype