dRICH and gas RICH update

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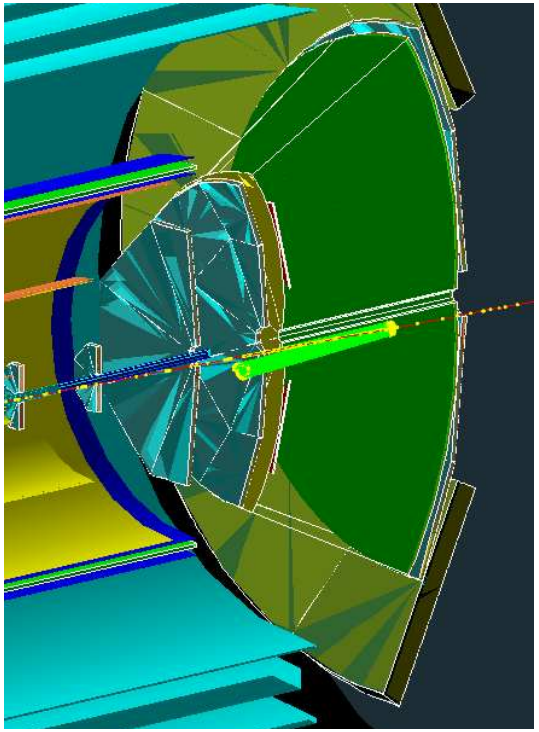
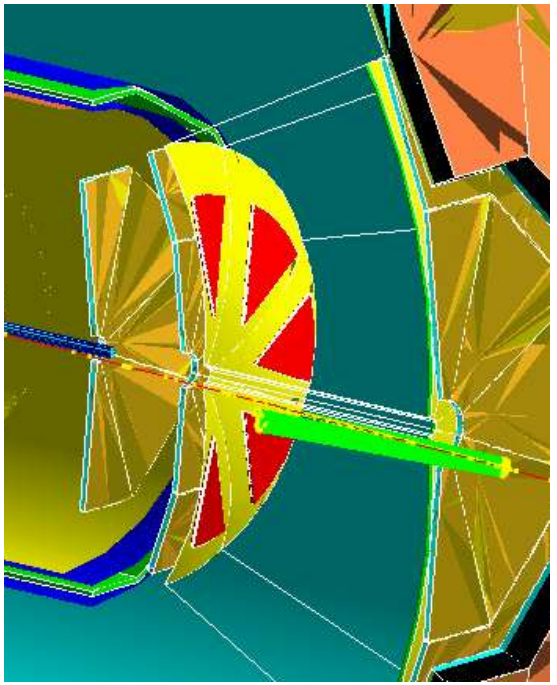
ePHENIX gas RICH simulation





PHENIX GEANT MC based simulation:

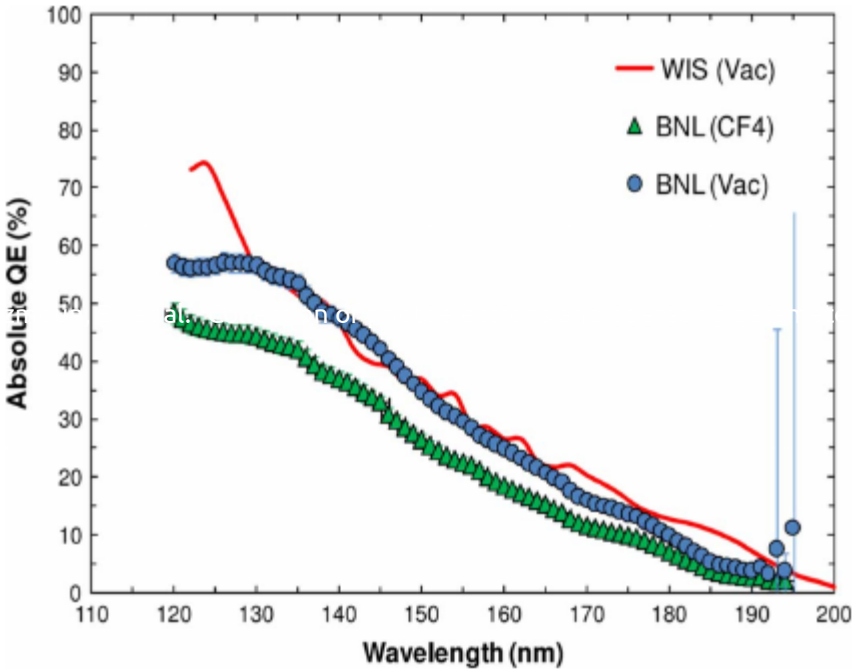
- Gas RICH, CF_4
- inward reflecting mirrors, eight sectors in azimuthal angle
- eight detector planes
- The RICH is in sizable magnetic field

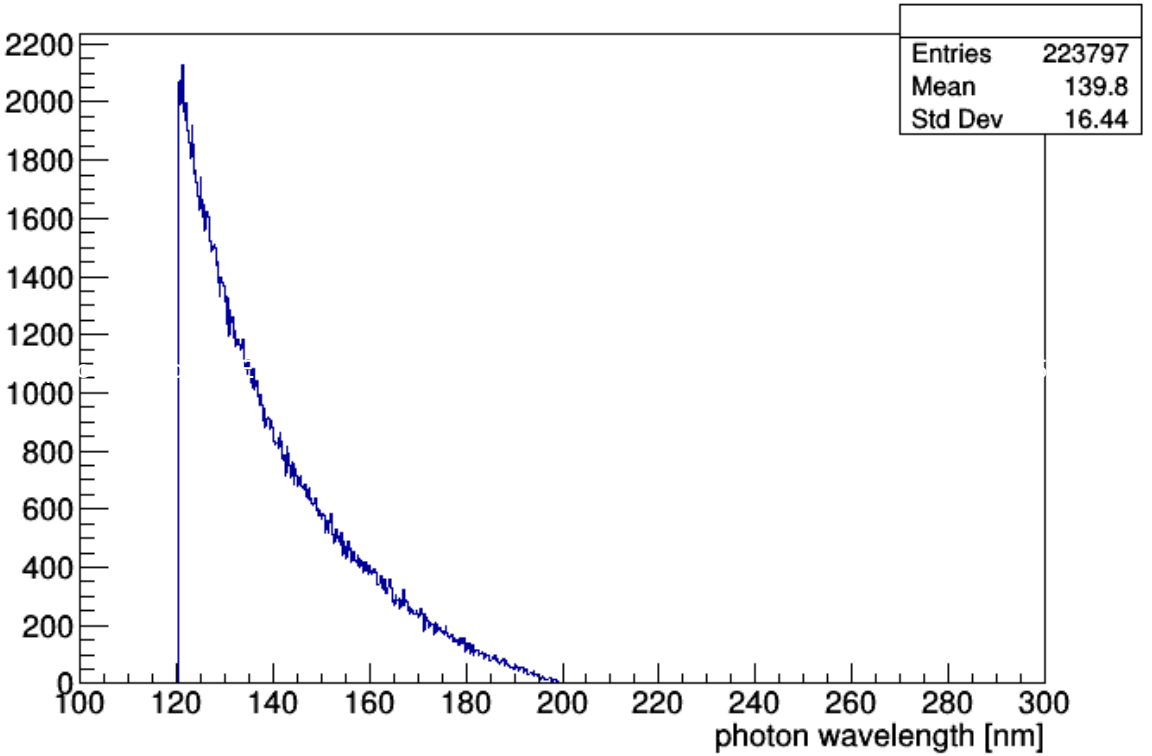
Our goals:

- Set up a reconstruction code(s) usable to characterize the system (PID capability)
- Do a comparison, in the same framework, with a dual-radiator RICH arranged in the ePHENIX geometrical constraints

Simulated sperctrum

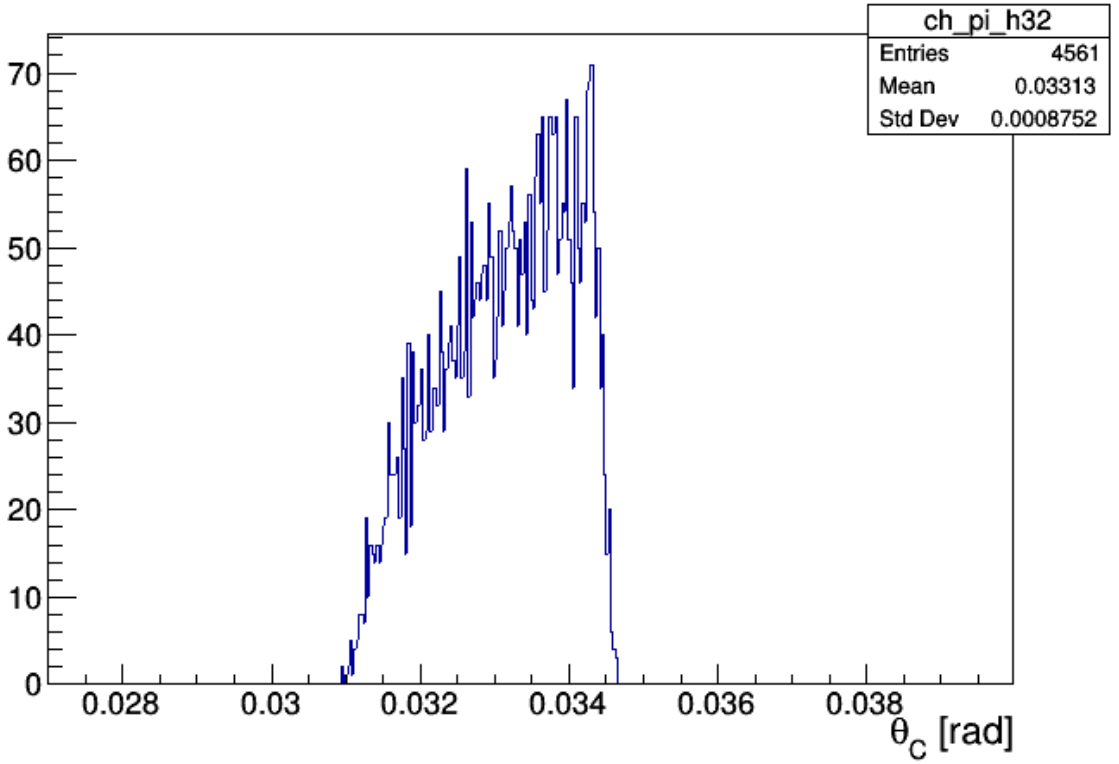
Azmoun, B., et al. IEEE Transactions on Nuclear Science 56.3 (2009): 1544-1549



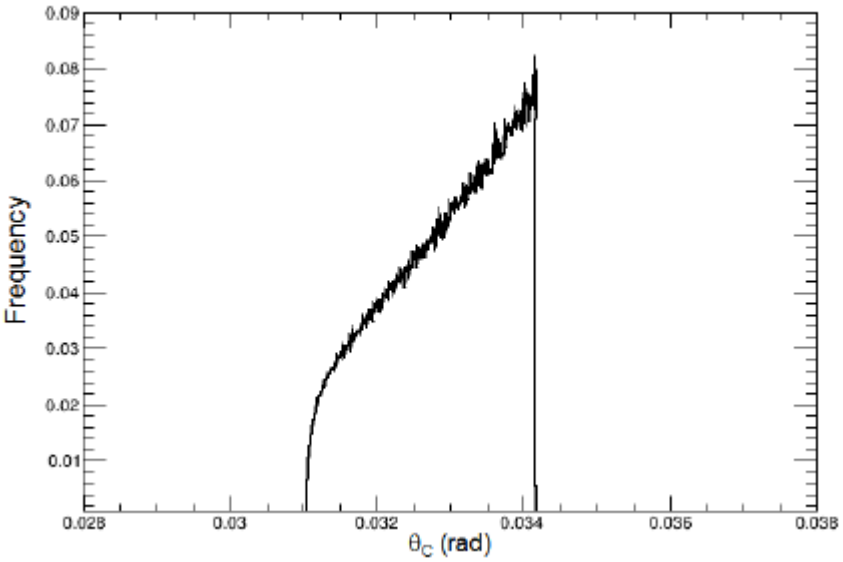


- The BNL (CF4) quantum efficiency applied to the simulated spectrum

Chromatic dispersion

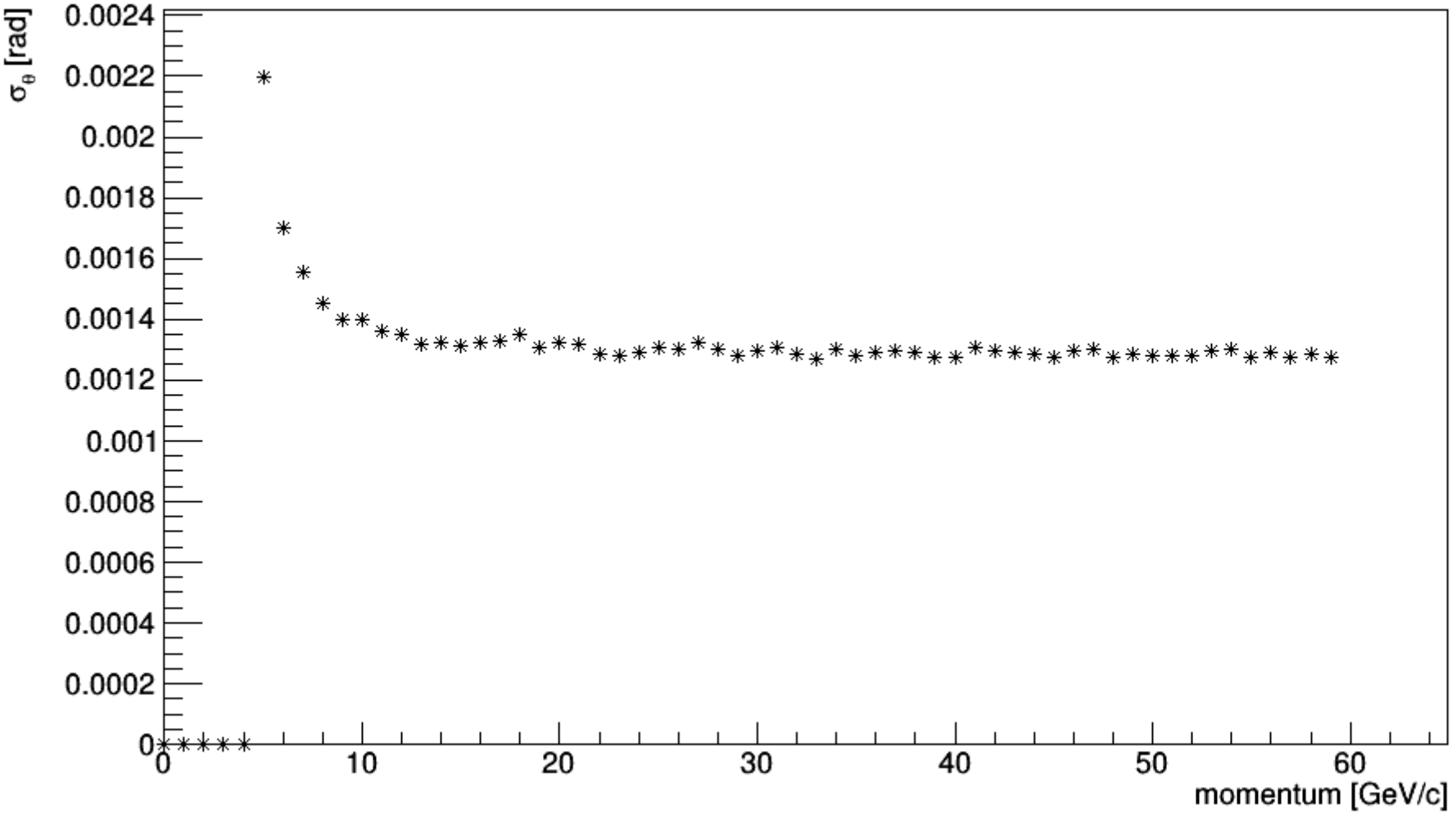


Blatnik, Marie, et al.
IEEE Transactions on Nuclear Science 62.6 (2015): 3256-3264.



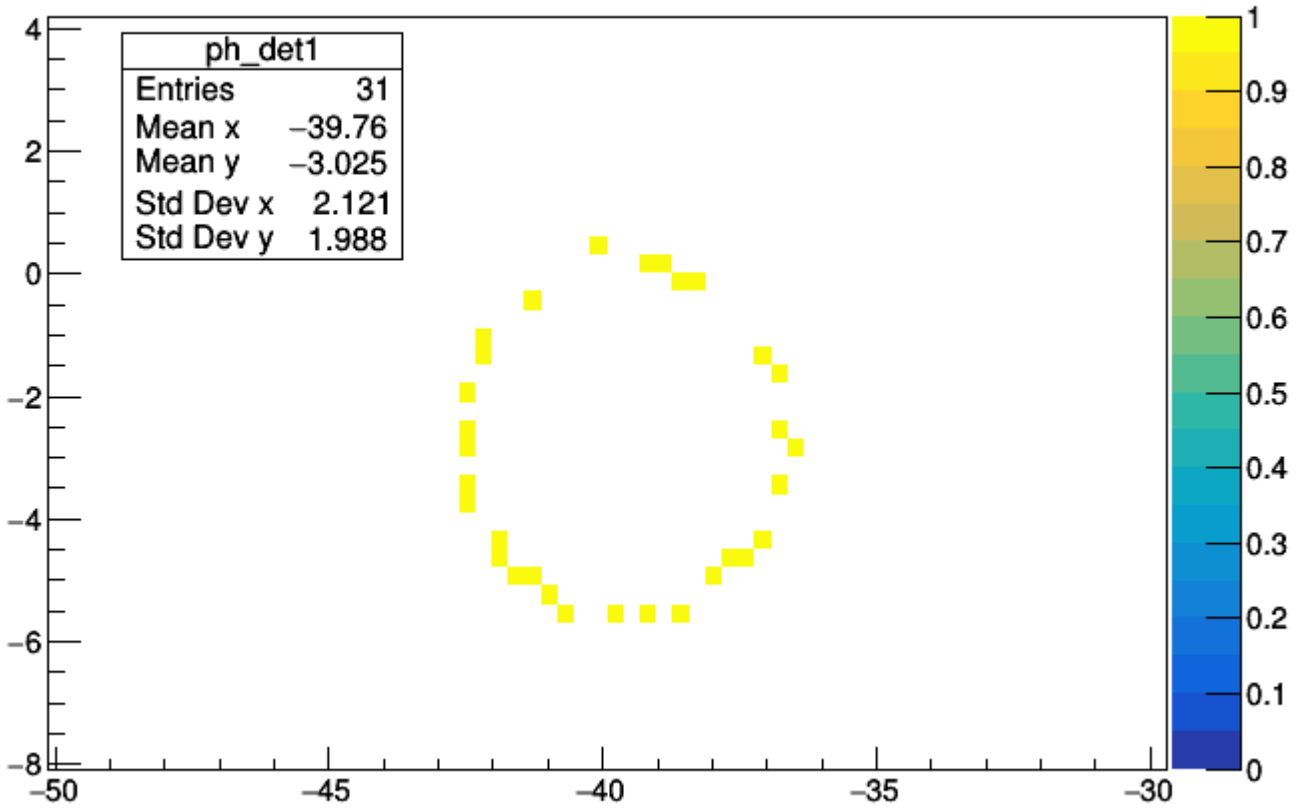
- Comparison of the chromatic dispersion obtained by GEANT with the one obtained with data from GEM Based RICH Detector Prototype
- ✔ The results are compatible!

Cherekov angle dispersion



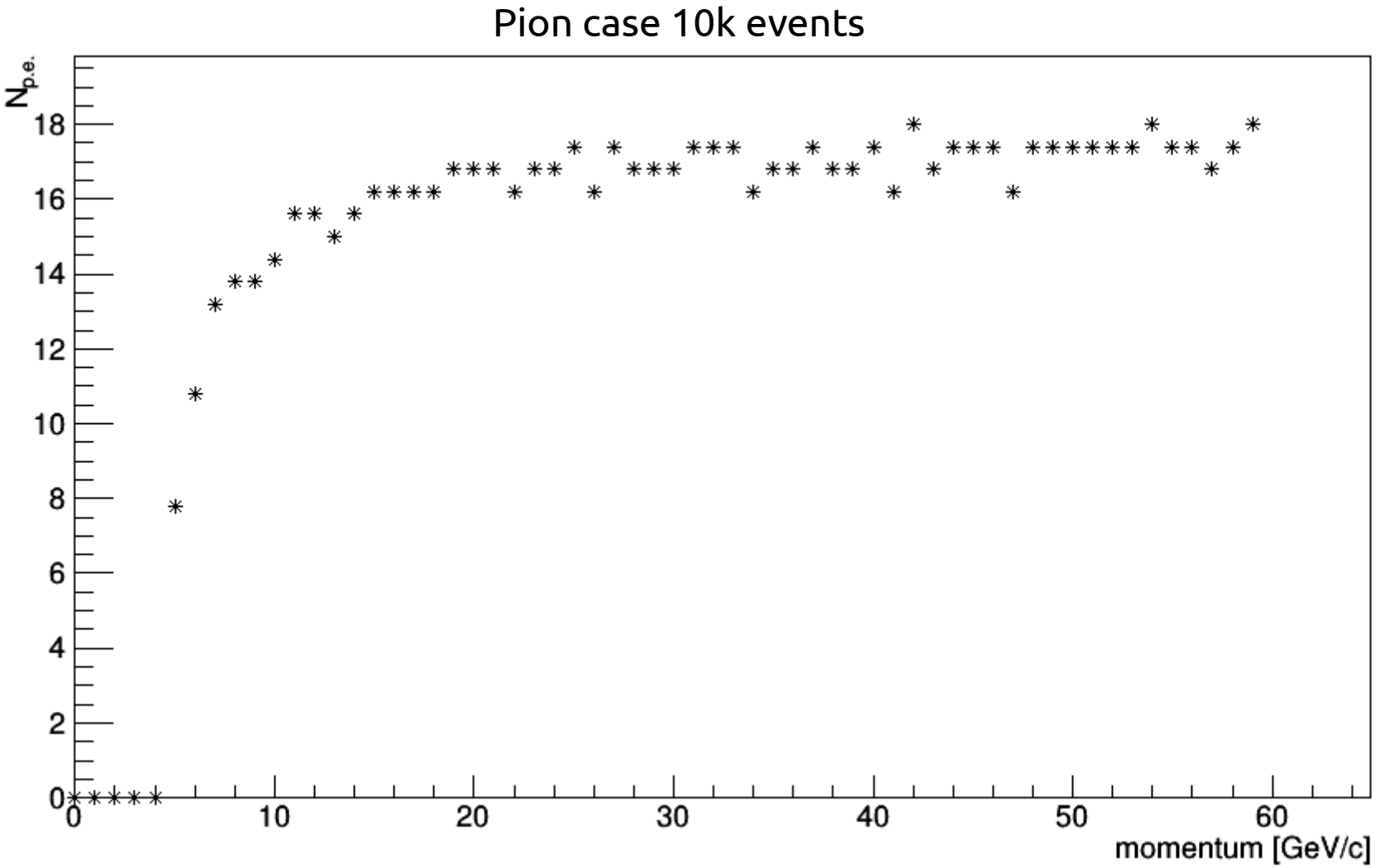
- Pixel size 3 mm
- Magnetic field off

Number of p.e.



The number of p.e. is about 30 after QE being applied.
It seems to high if compared with prototype measurements.
Is the realistic mirror reflectivity applied in the simulation?
(in particular i the UV region)

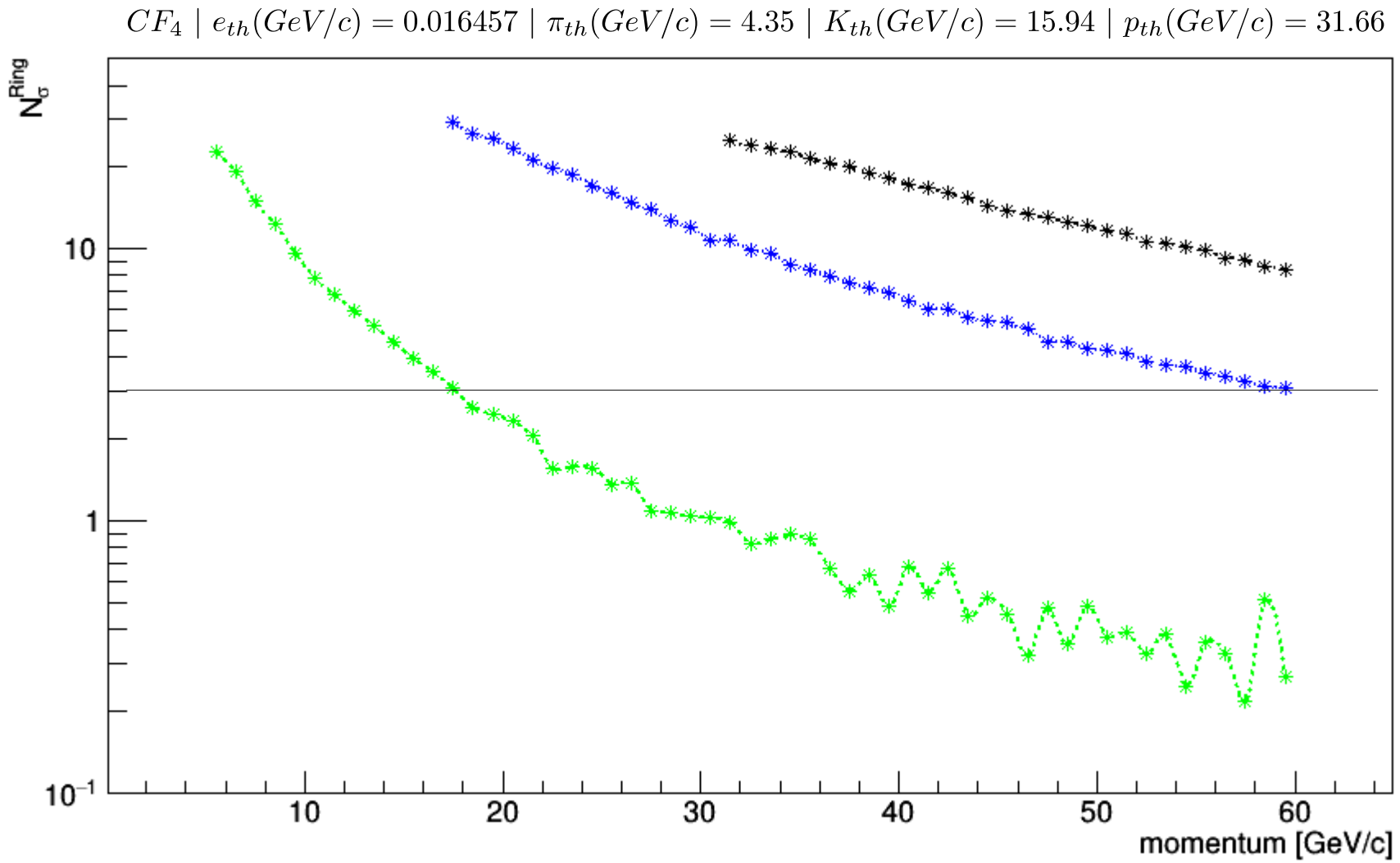
Number of p.e. - scaled value



(GEANT + reco + QE) results scaled with a factor 0.6.

PID capability

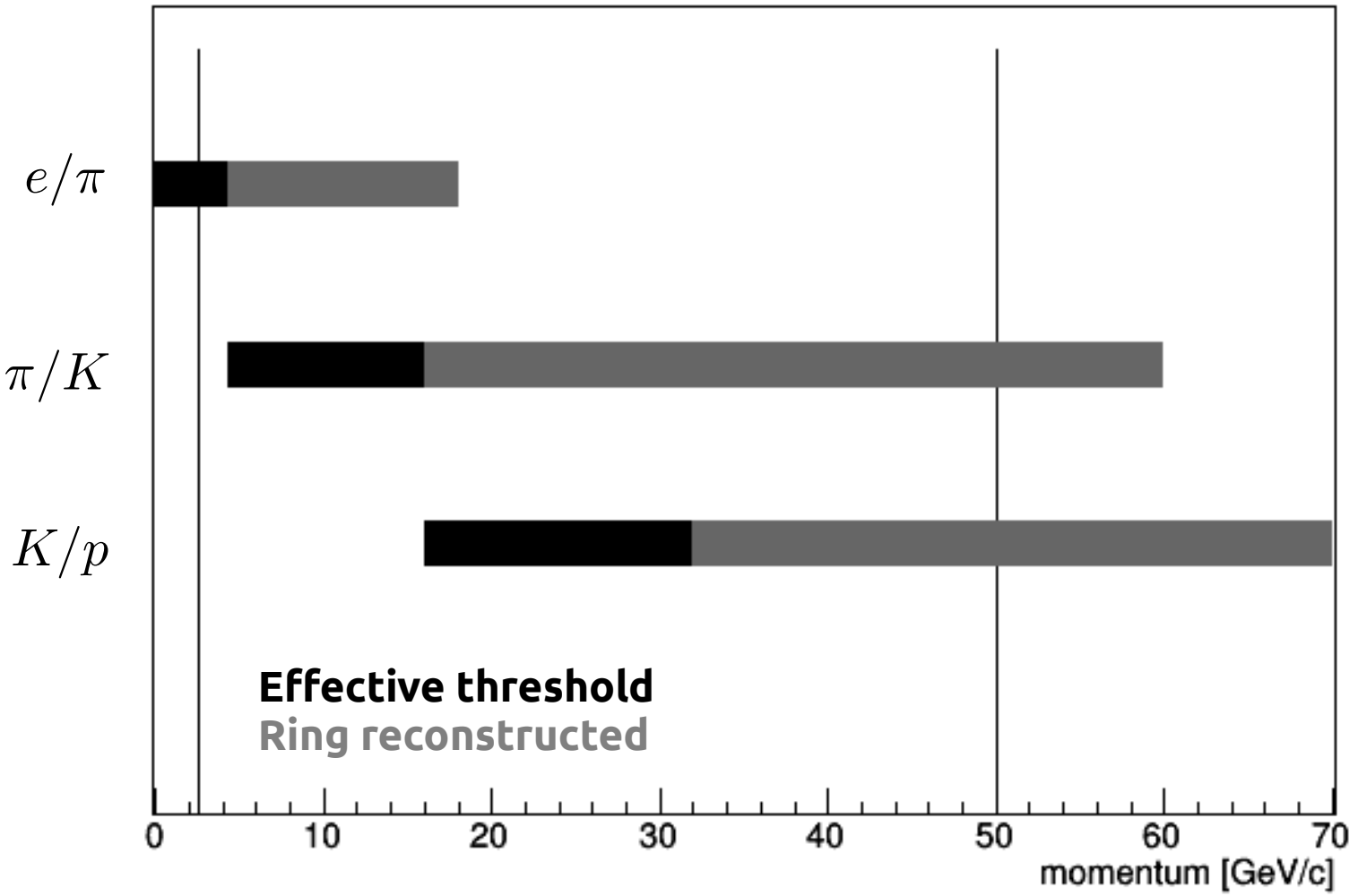
e/pi
pi/K
K/p



3σ

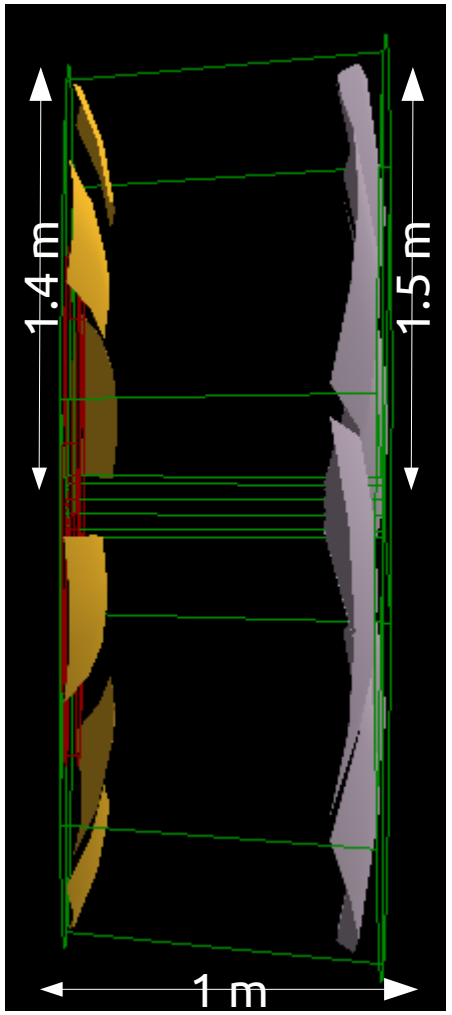
- Pixel sixe 3 mm
- Magnetic field on

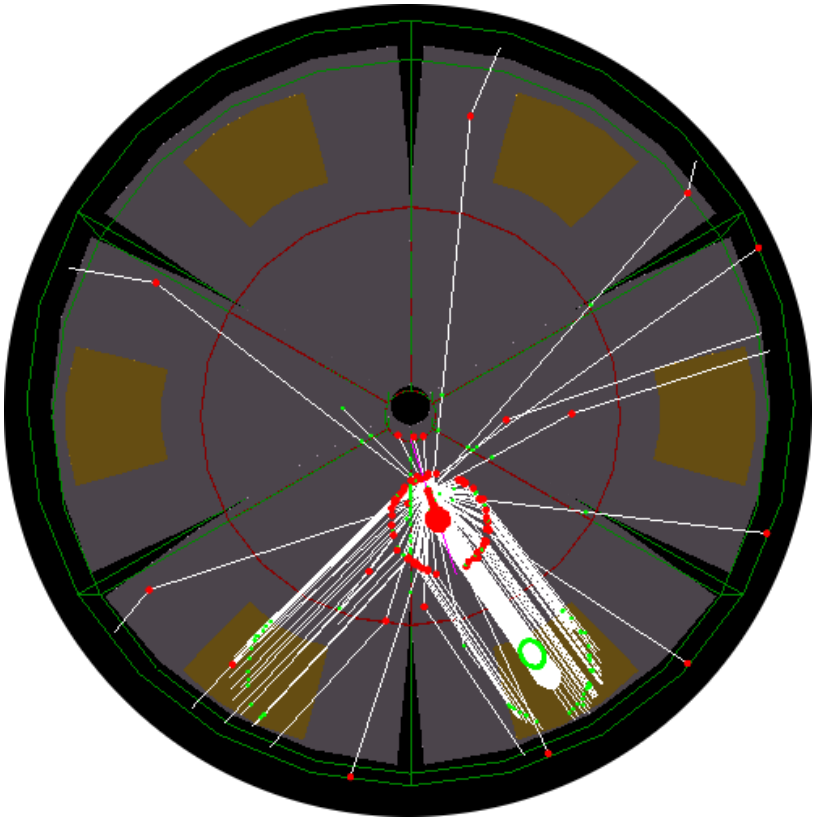
PID capability



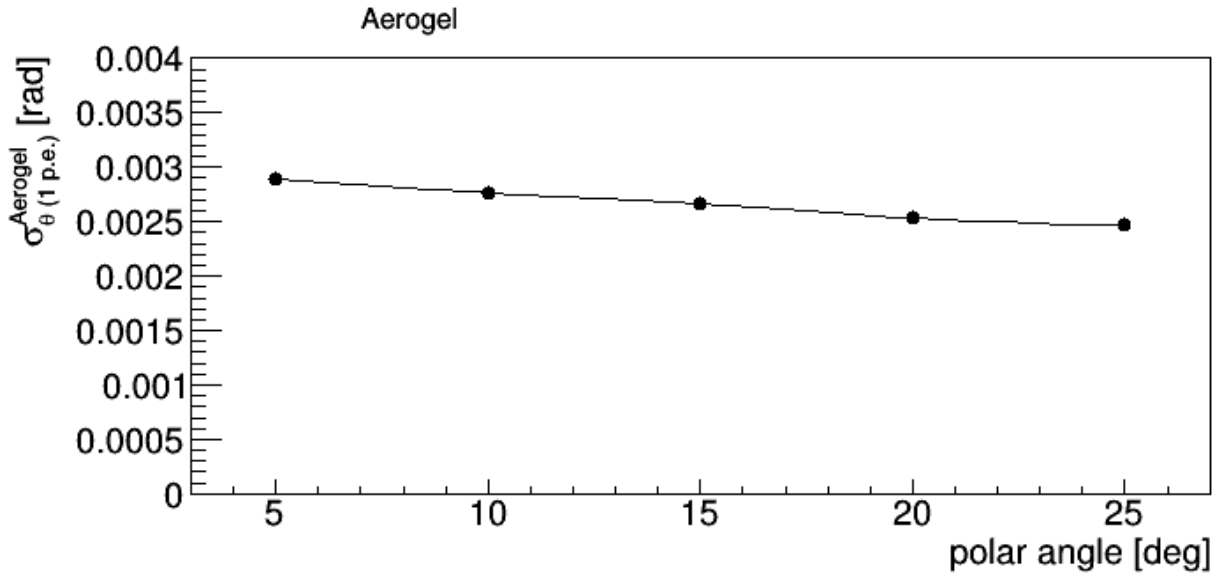
- **Pi/K only by threshold up to 16 GeV/c**
- **K/p cannot be separated up to 16 GeV/c**

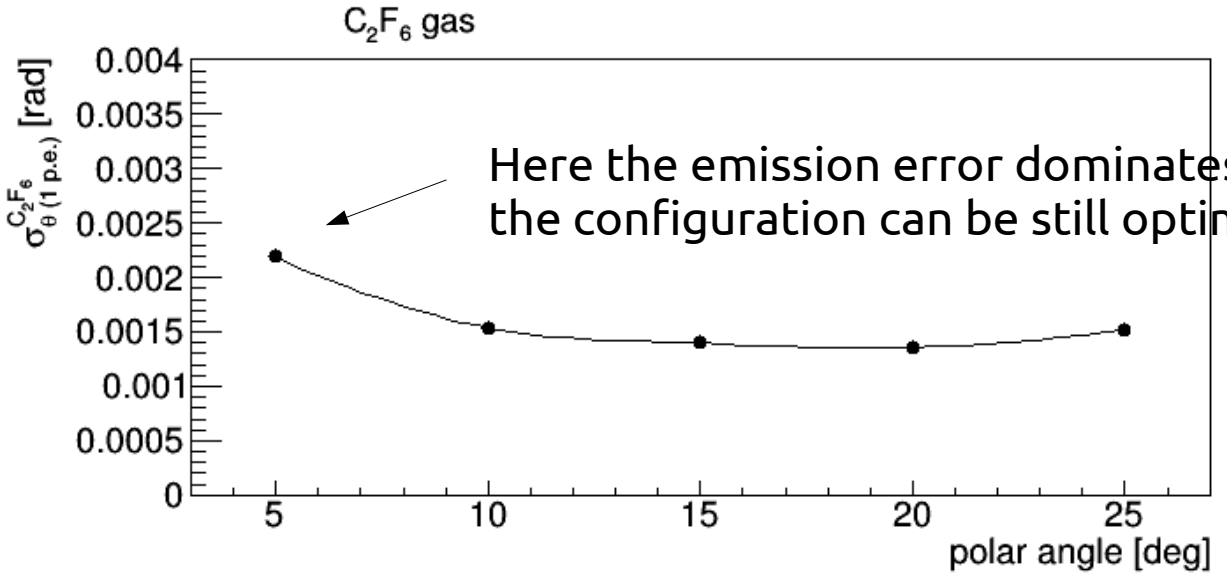
dRICH in a ePHENIX-like contex





Angular resolution (pion at 30 GeV/c)





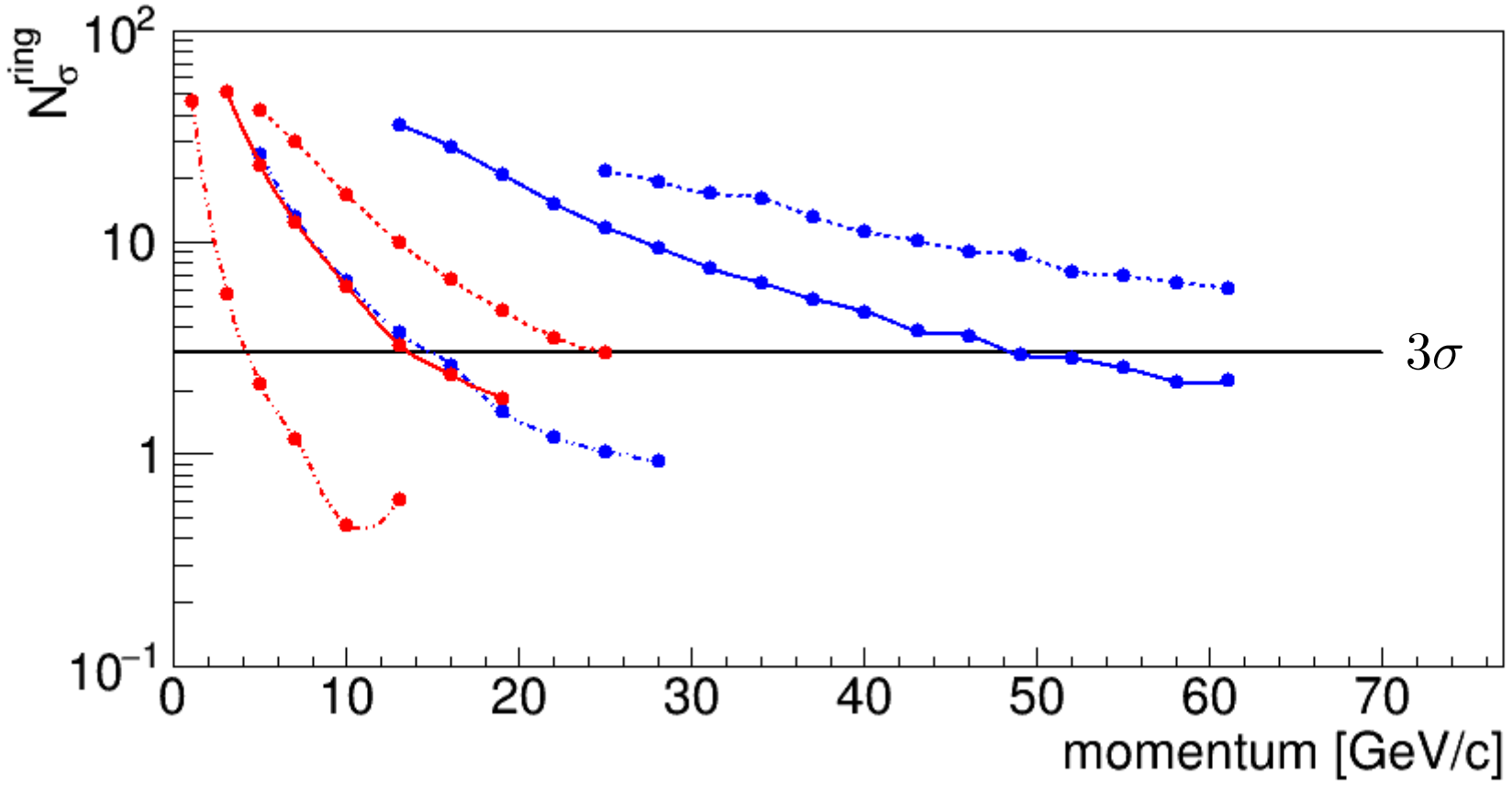
Here the emission error dominates,
the configuration can be still optimized

- Pixel size 3 mm
- Magnetic field off

PID capability at 10° (preliminary)

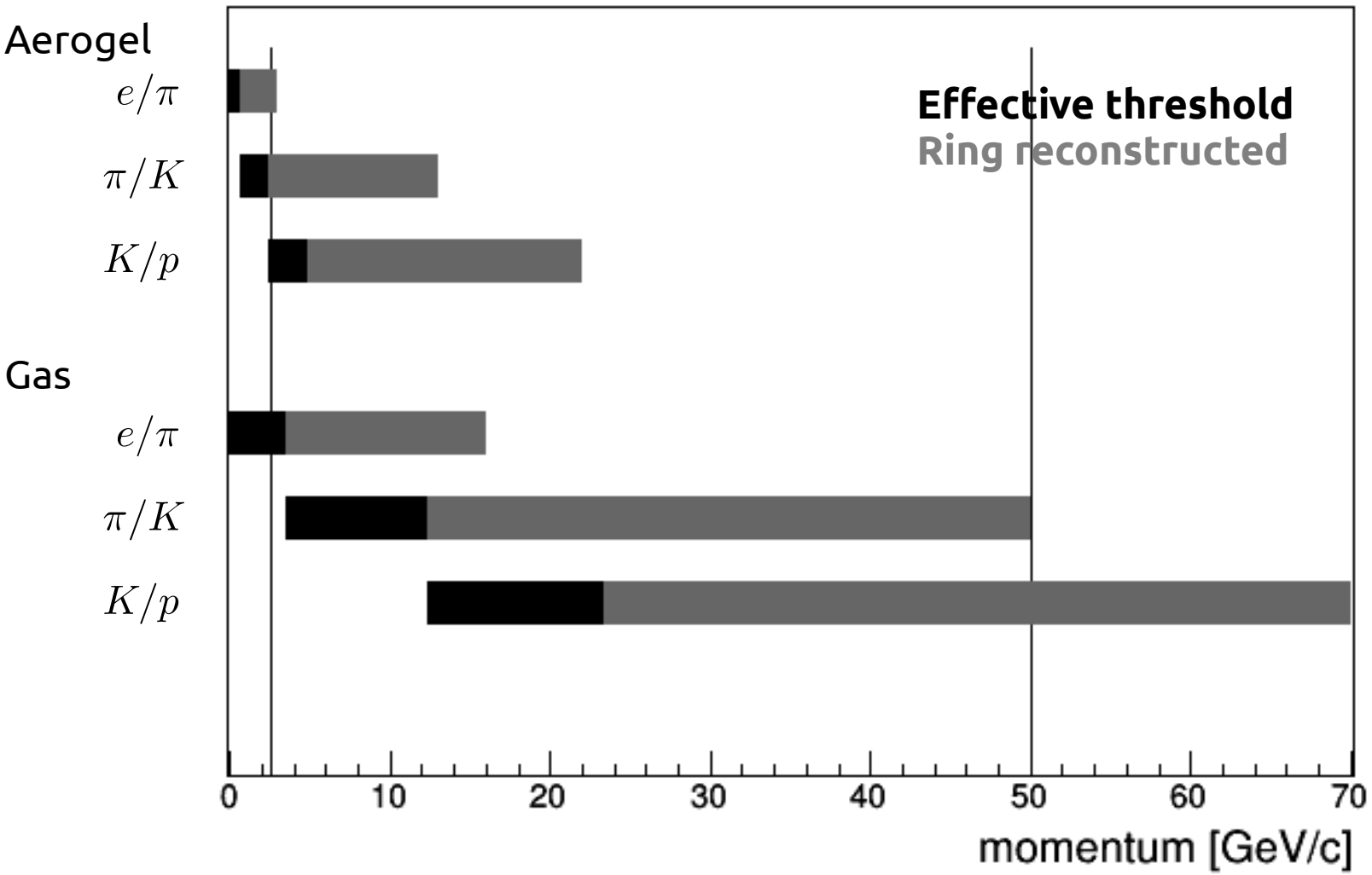
$Aerogerl(n = 1.015) \mid e_{th}(GeV/c) = 0.0029 \mid \pi_{th}(GeV/c) = 0.80 \mid K_{th}(GeV/c) = 2.84 \mid p_{th}(GeV/c) = 5.40$

$C_2F_6(n = 1.00082) \mid e_{th}(GeV/c) = 0.0123 \mid \pi_{th}(GeV/c) = 3.48 \mid K_{th}(GeV/c) = 12.3 \mid p_{th}(GeV/c) = 23.4$



- QE of standard multianode-PMTs
- Pixel size 3 mm
- Magnetic field off

dRICH continuum coverage



Thanks!