Dual-radiator RICH: update

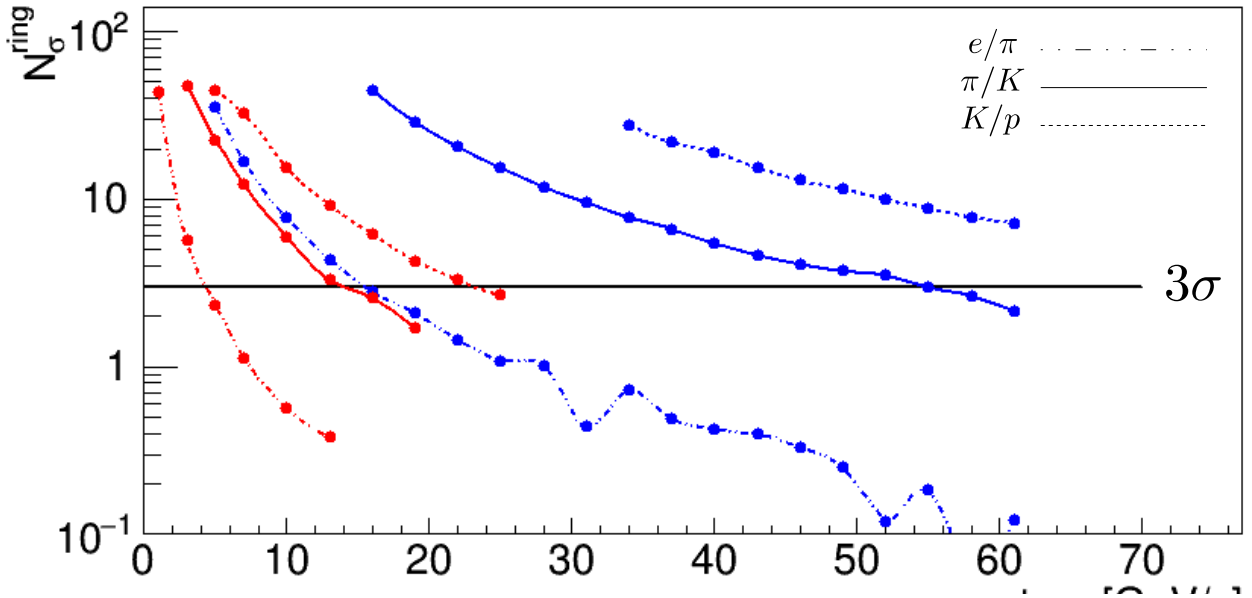
Alessio Del Dotto for the EIC PID/RICH collaboration
May 9, 2016

Particles separation power

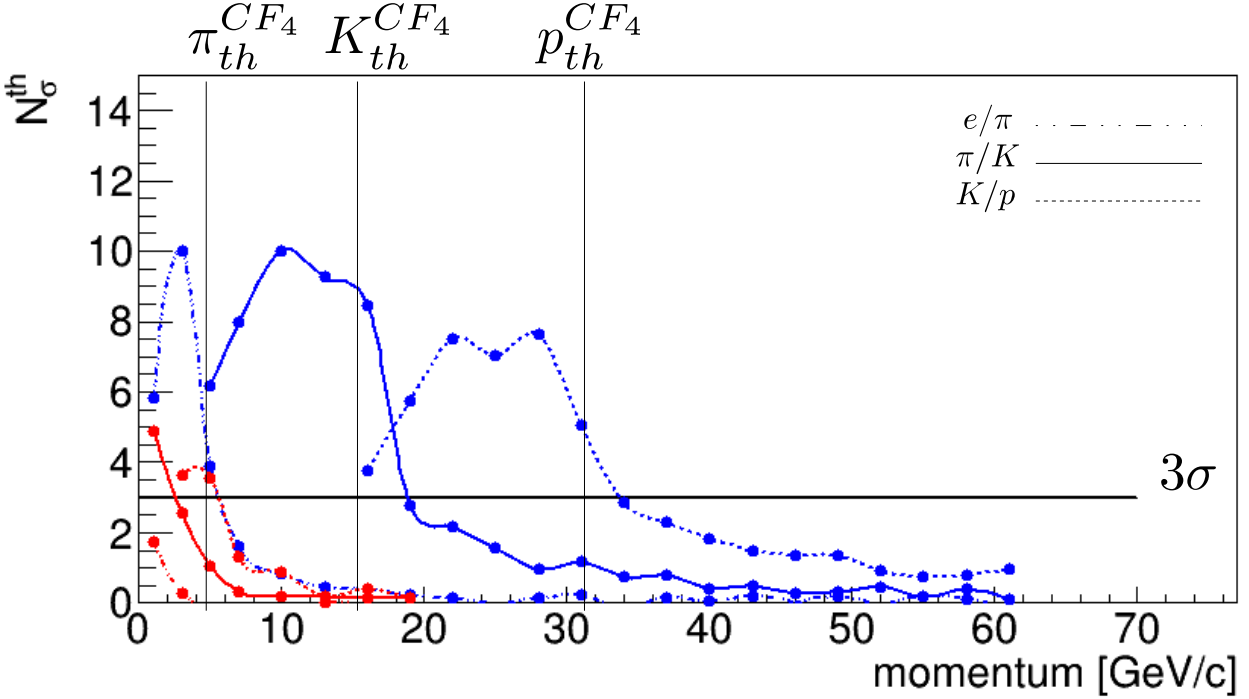
$Aerogerl \mid e_{th}(GeV/c) = 0.002542 \mid \pi_{th}(GeV/c) = 0.67 \mid K_{th}(GeV/c) = 2.46 \mid p_{th}(GeV/c) = 4.89$

$CF_4 \mid e_{th}(GeV/c) = 0.016457 \mid \pi_{th}(GeV/c) = 4.35 \mid K_{th}(GeV/c) = 15.94 \mid p_{th}(GeV/c) = 31.66$

RICH



Threshold Cherenkov



Polar angle = 5°

$n_{Aerogel} = 1.02$

$n_{CF_4} = 1.000482$

Particles separation power

$Aerogerl \mid e_{th}(GeV/c) = 0.002542 \mid \pi_{th}(GeV/c) = 0.67 \mid K_{th}(GeV/c) = 2.46 \mid p_{th}(GeV/c) = 4.89$

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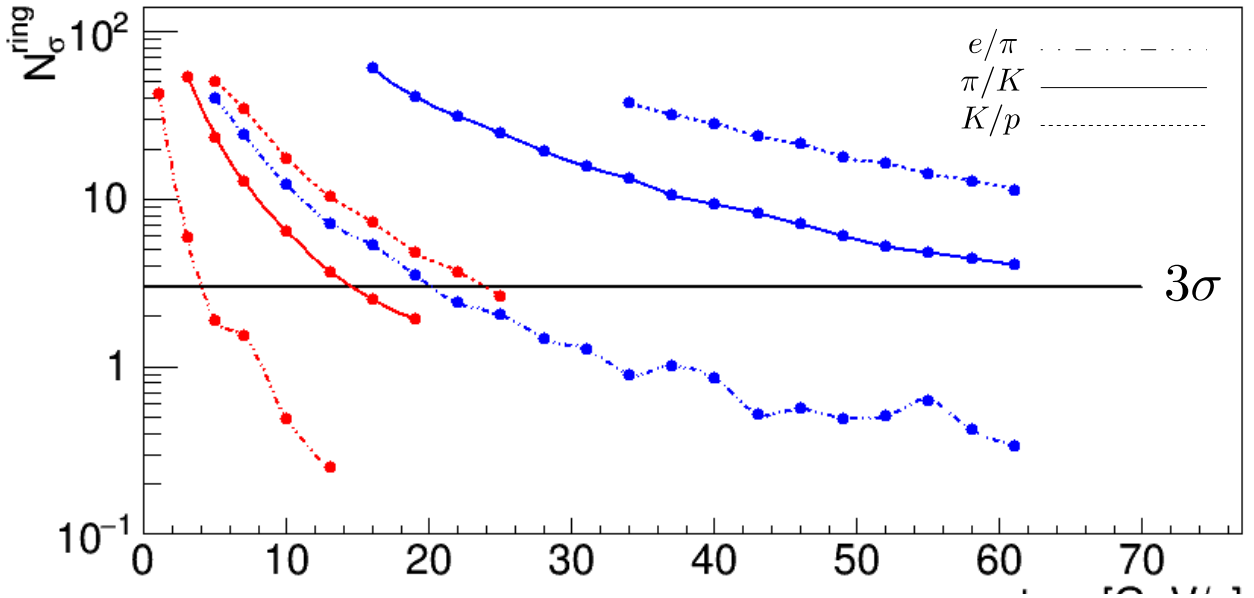
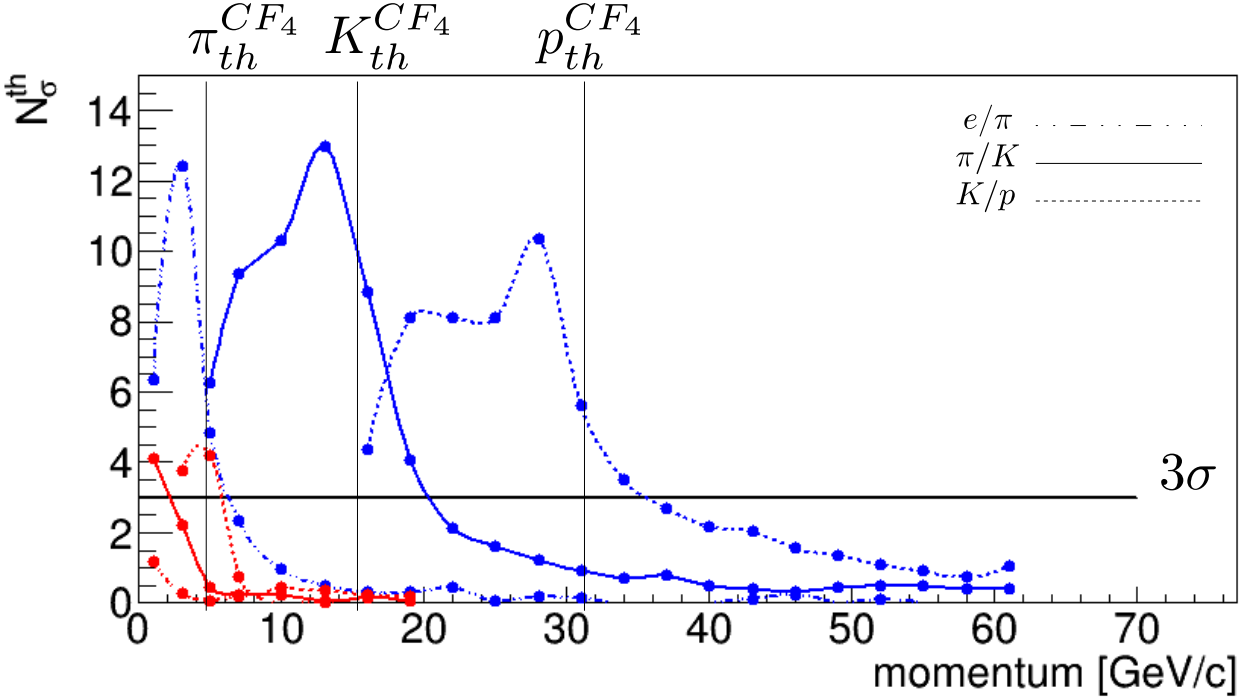
RICH



Threshold Cherenkov



Polar angle = 15°

$n_{Aerogel} = 1.02$

$n_{CF_4} = 1.000482$

Particles separation power

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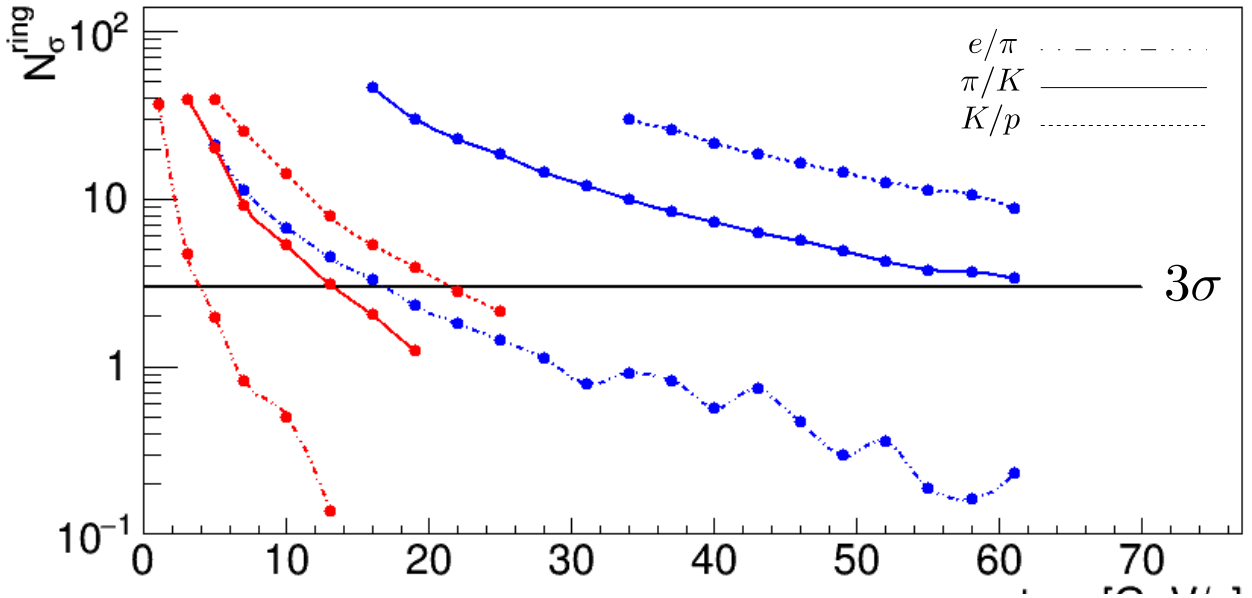
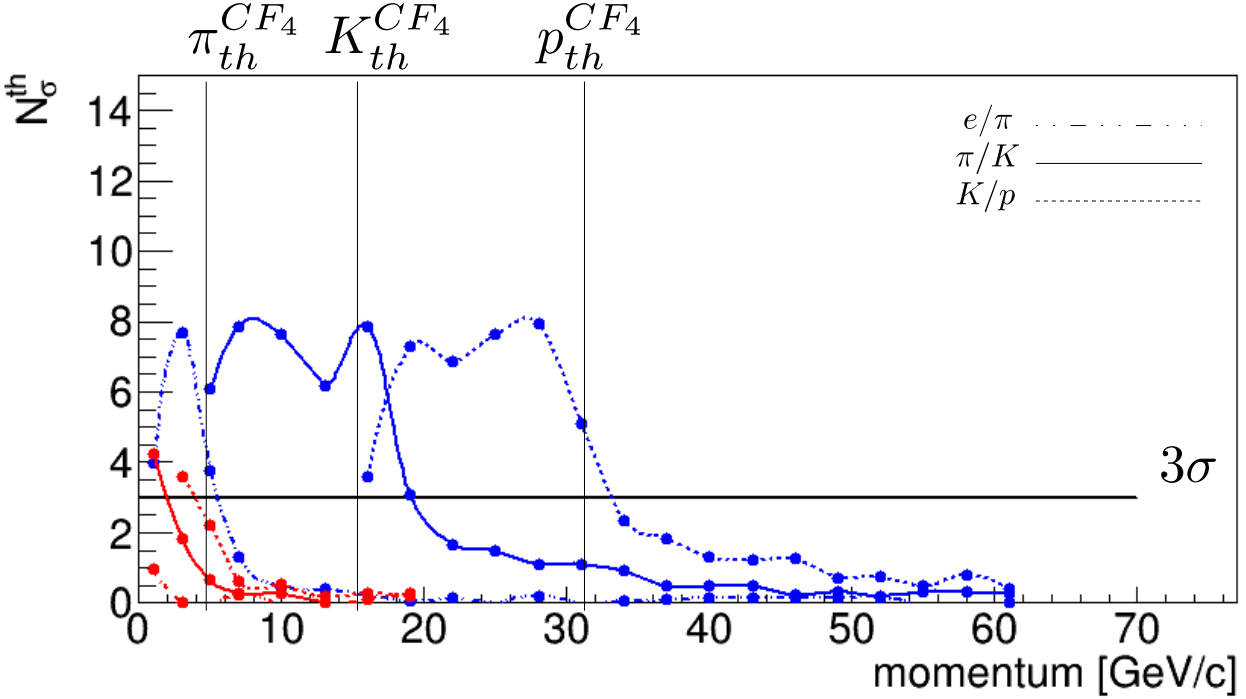
RICH



Threshold Cherenkov



Polar angle = 25°

$n_{Aerogel} = 1.02$

$n_{CF_4} = 1.000482$

Particles separation power CF4 + CO2

$Aerogerl \mid e_{th}(GeV/c) = 0.002542 \mid \pi_{th}(GeV/c) = 0.67 \mid K_{th}(GeV/c) = 2.46 \mid p_{th}(GeV/c) = 4.89$

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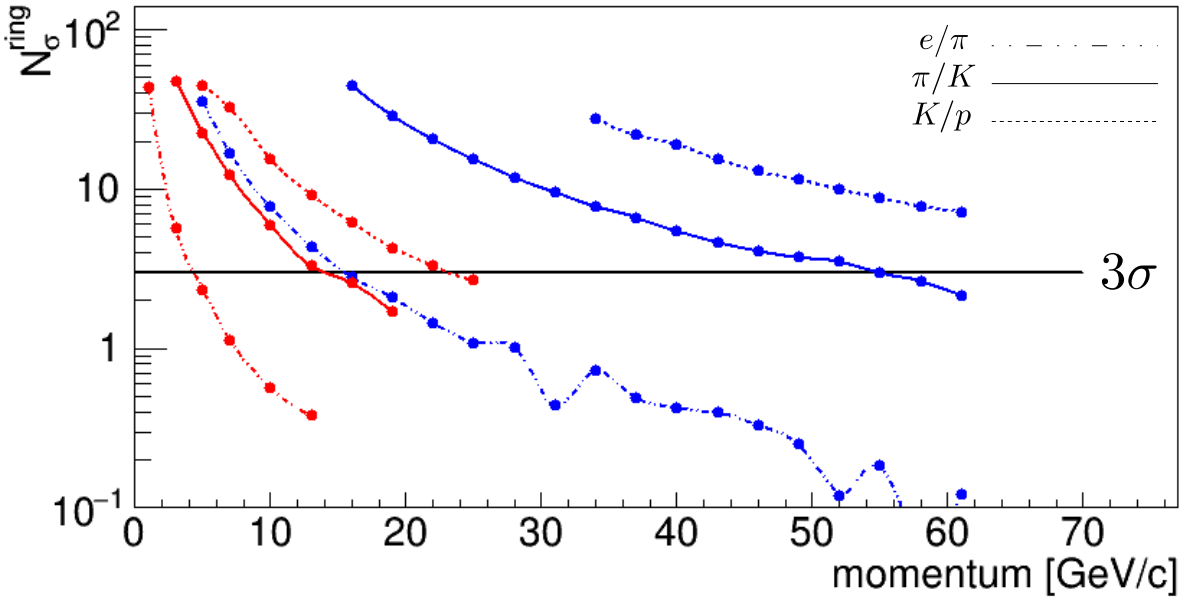
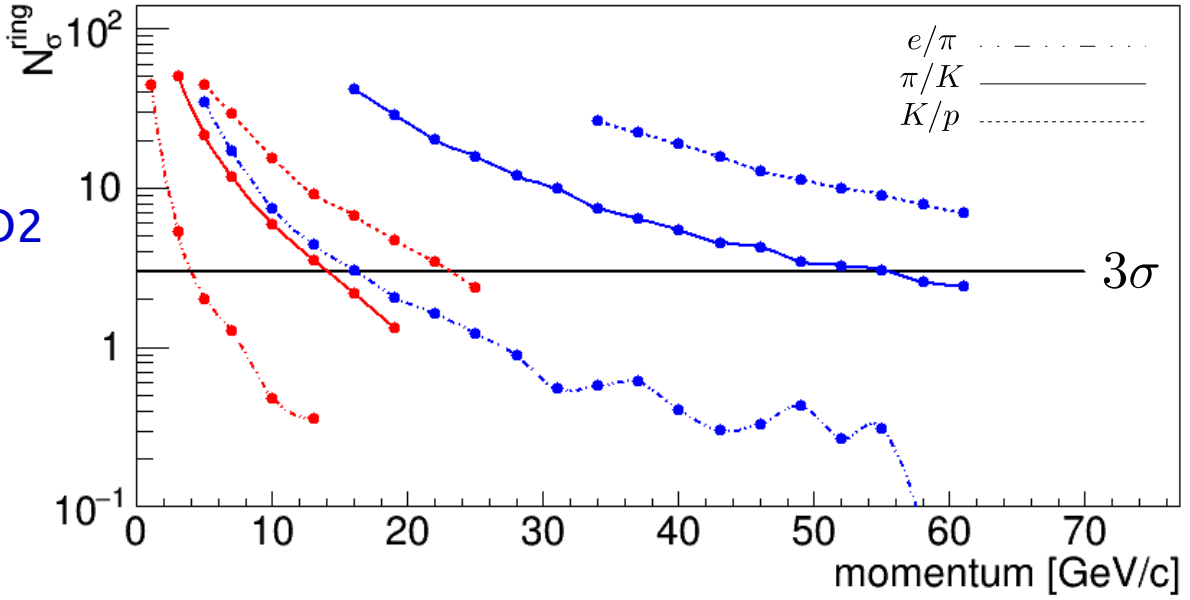
CF4



Polar angle = 5°

$n_{Aerogel} = 1.02$

CF4+CO2



Particles separation power CF4 + CO2

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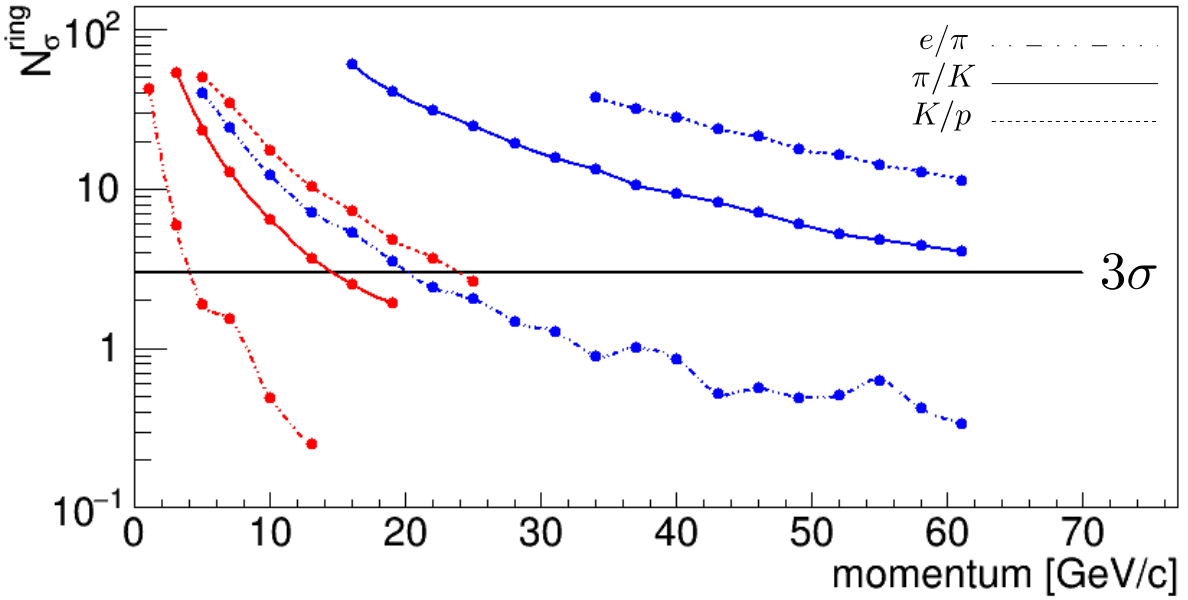
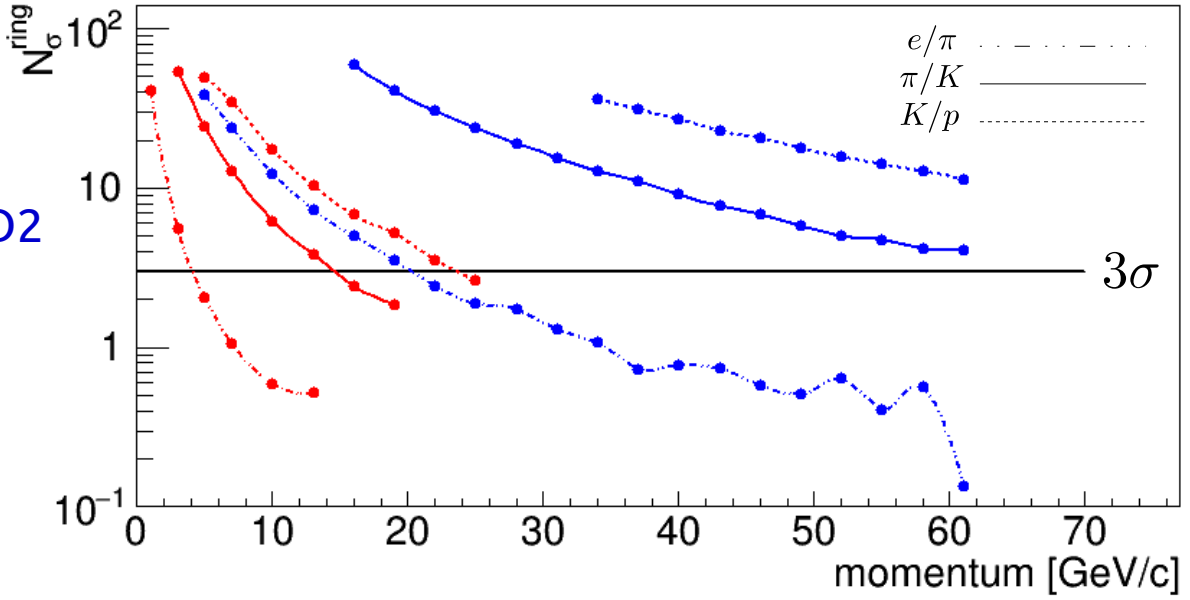
CF4



CF4+CO2



Polar angle = 15°

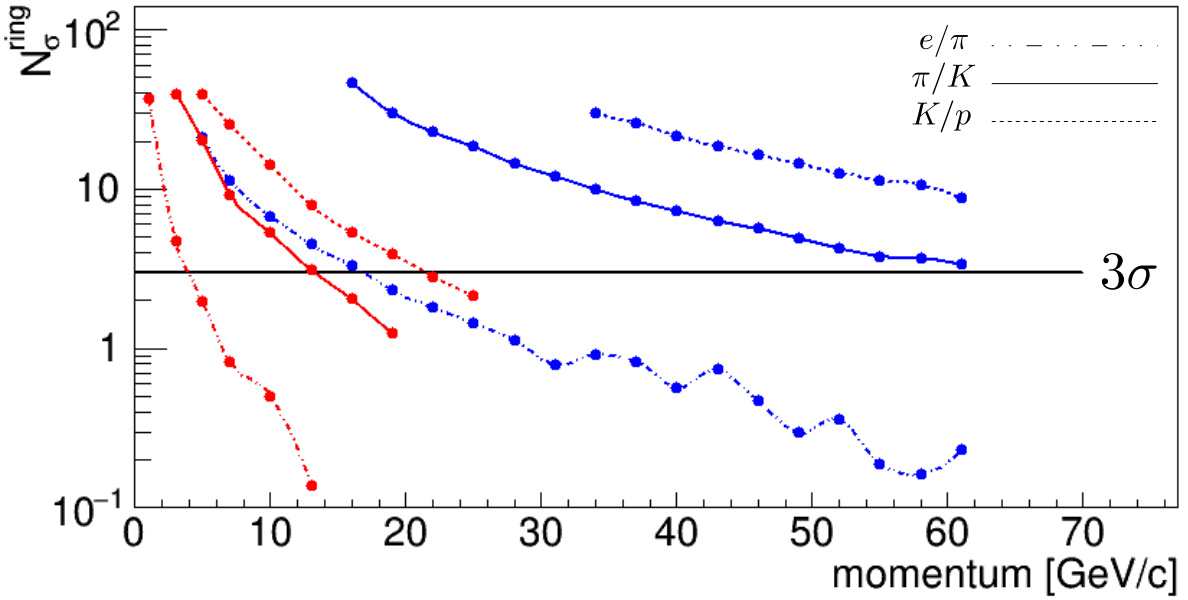
$n_{Aerogel} = 1.02$

Particles separation power CF4 + CO2

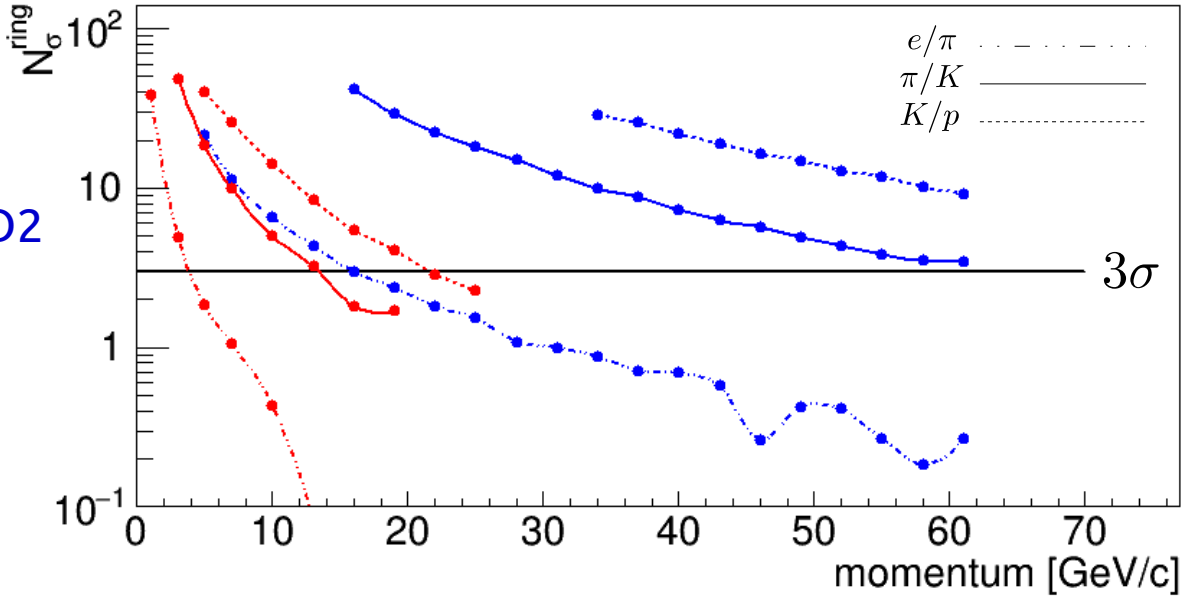
$Aerogerl \mid e_{th}(GeV/c) = 0.002542 \mid \pi_{th}(GeV/c) = 0.67 \mid K_{th}(GeV/c) = 2.46 \mid p_{th}(GeV/c) = 4.89$

$CF_4 \mid e_{th}(GeV/c) = 0.016457 \mid \pi_{th}(GeV/c) = 4.35 \mid K_{th}(GeV/c) = 15.94 \mid p_{th}(GeV/c) = 31.66$

CF4



CF4+CO2



Polar angle = 25°

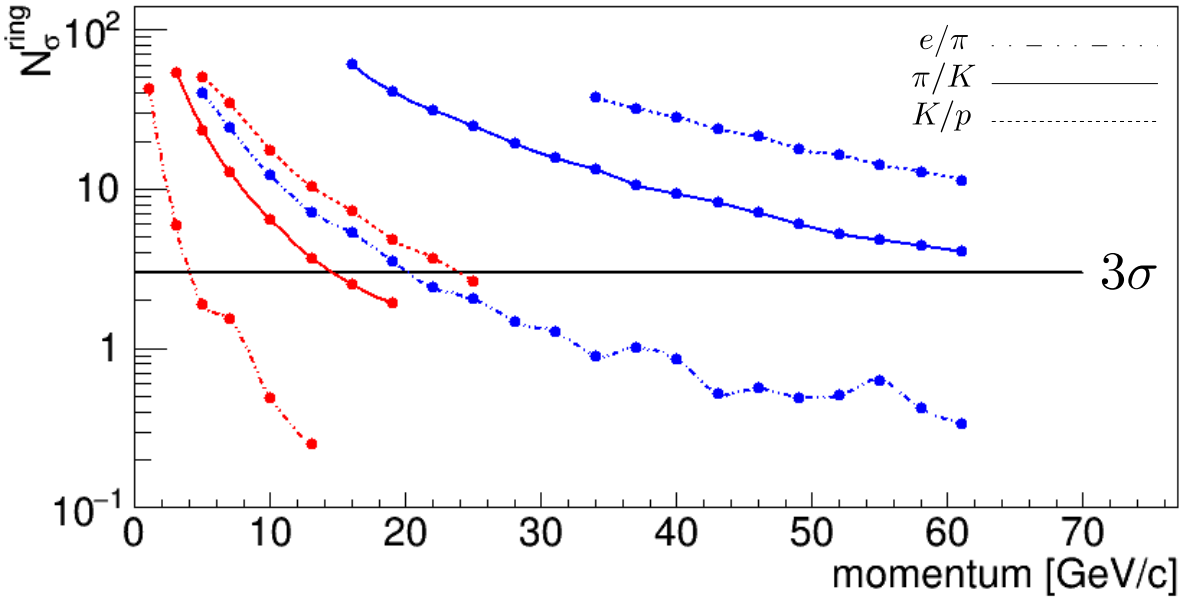
$n_{Aerogel} = 1.02$

Particles separation power CF4 vs C2F6

$Aerogerl \mid e_{th}(GeV/c) = 0.002542 \mid \pi_{th}(GeV/c) = 0.67 \mid K_{th}(GeV/c) = 2.46 \mid p_{th}(GeV/c) = 4.89$

$CF_4 \mid e_{th}(GeV/c) = 0.016457 \mid \pi_{th}(GeV/c) = 4.35 \mid K_{th}(GeV/c) = 15.94 \mid p_{th}(GeV/c) = 31.66$

CF4

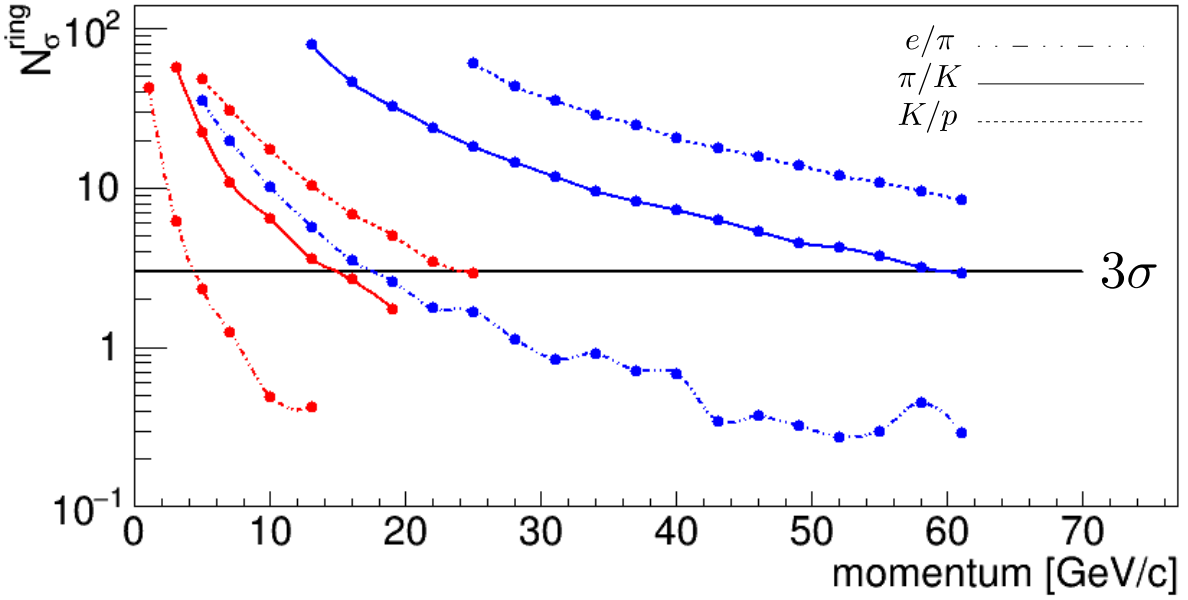


Polar angle = 15°

$n_{Aerogel} = 1.02$

$C_2F_6 \mid e_{th}(GeV/c) = 0.012 \mid \pi_{th}(GeV/c) = 3.48 \mid K_{th}(GeV/c) = 12.3 \mid p_{th}(GeV/c) = 23.4$

C2F6



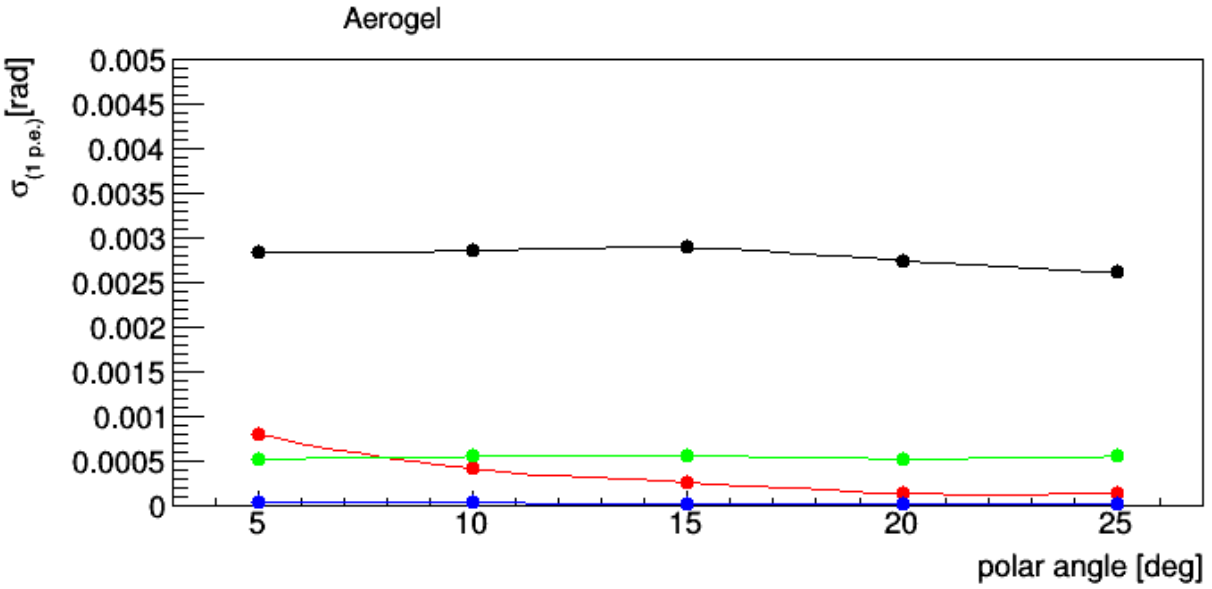
Dual-RICH prototype and test

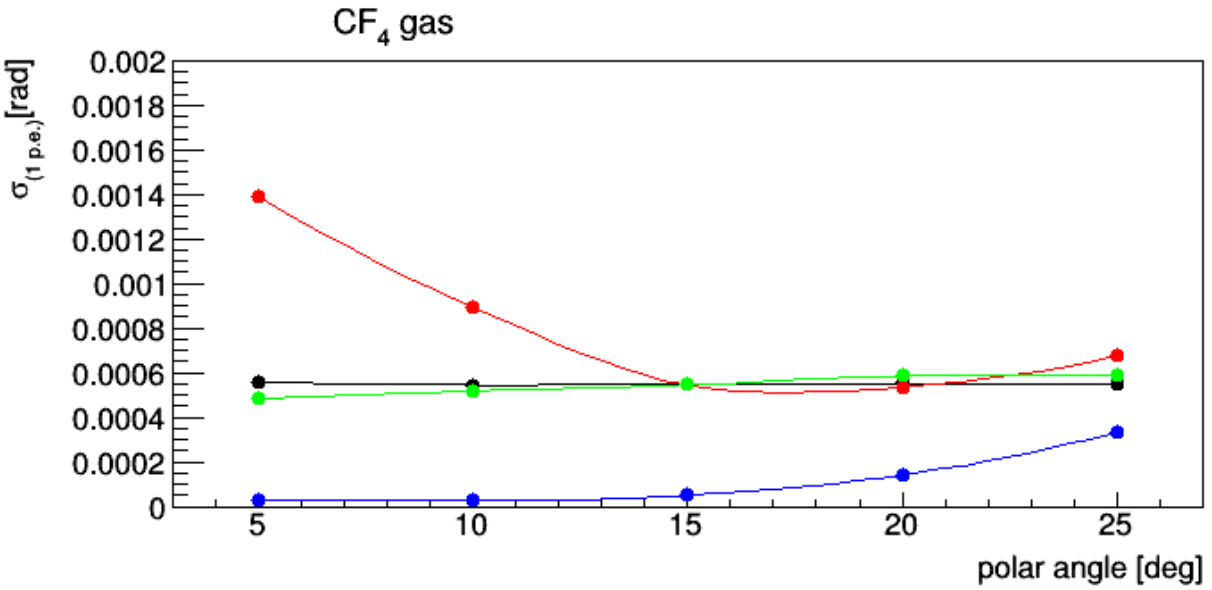
Thinking at a prototype configuration:

- Validate MC
- Important points:

  - Aerogel at n=1.02, test of optical properties
  - Test in magnetic field
  - Non planar shape of the photodetector plane
  - Photodetector and electronics/CLAS12 (SiPM?)
  - Mirror
  - Gas availability

1 p.e. errors comparison (p = 50 GeV/c)





Chromatic
Emission
Pixel 3mm
Field