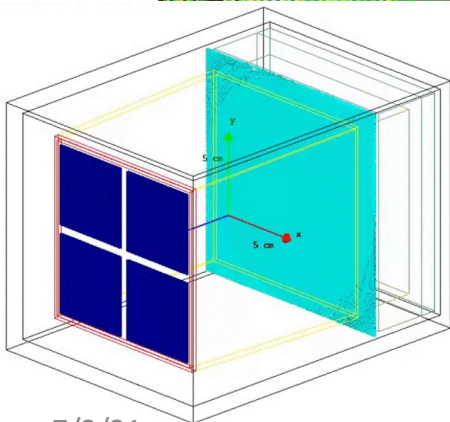
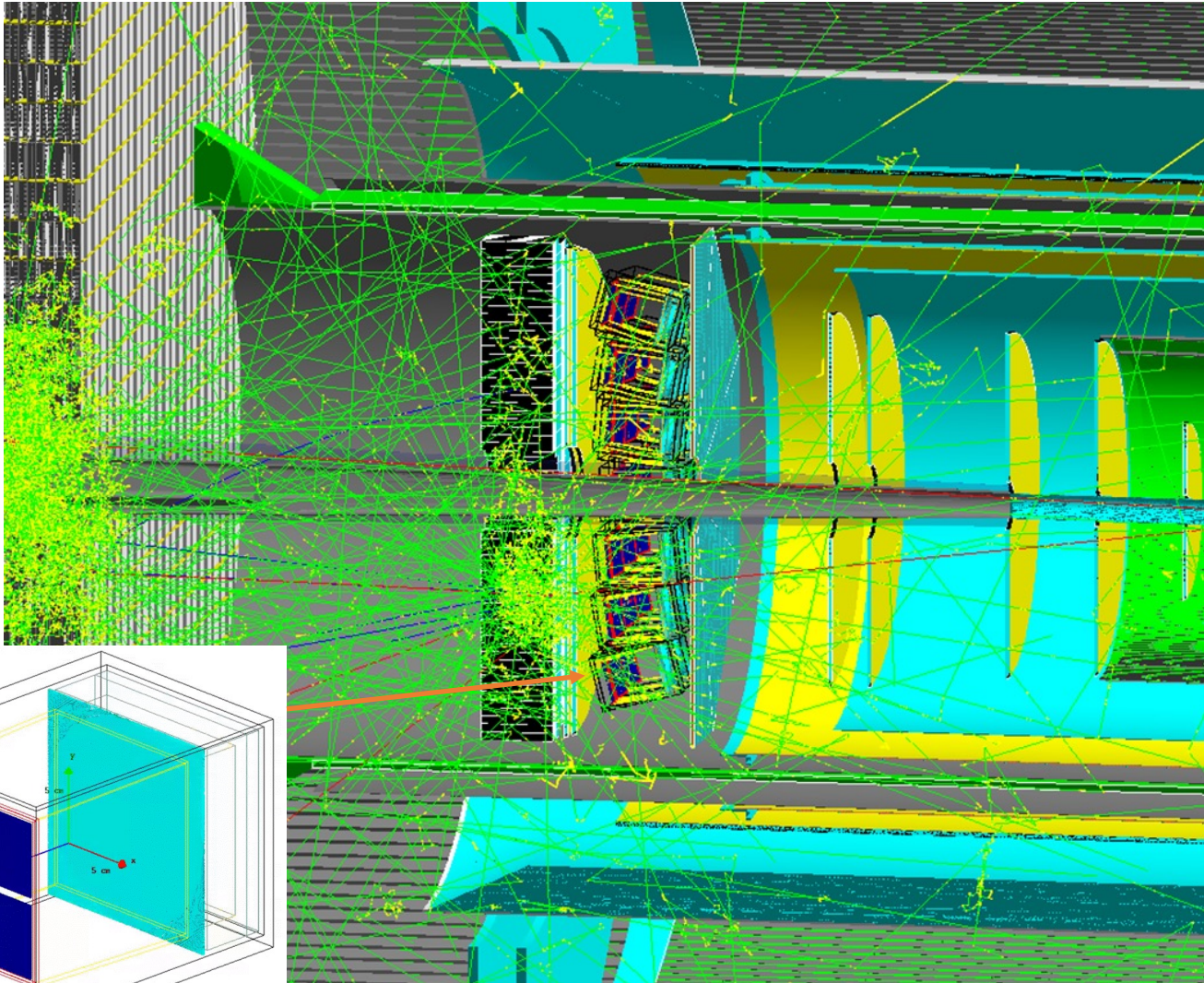


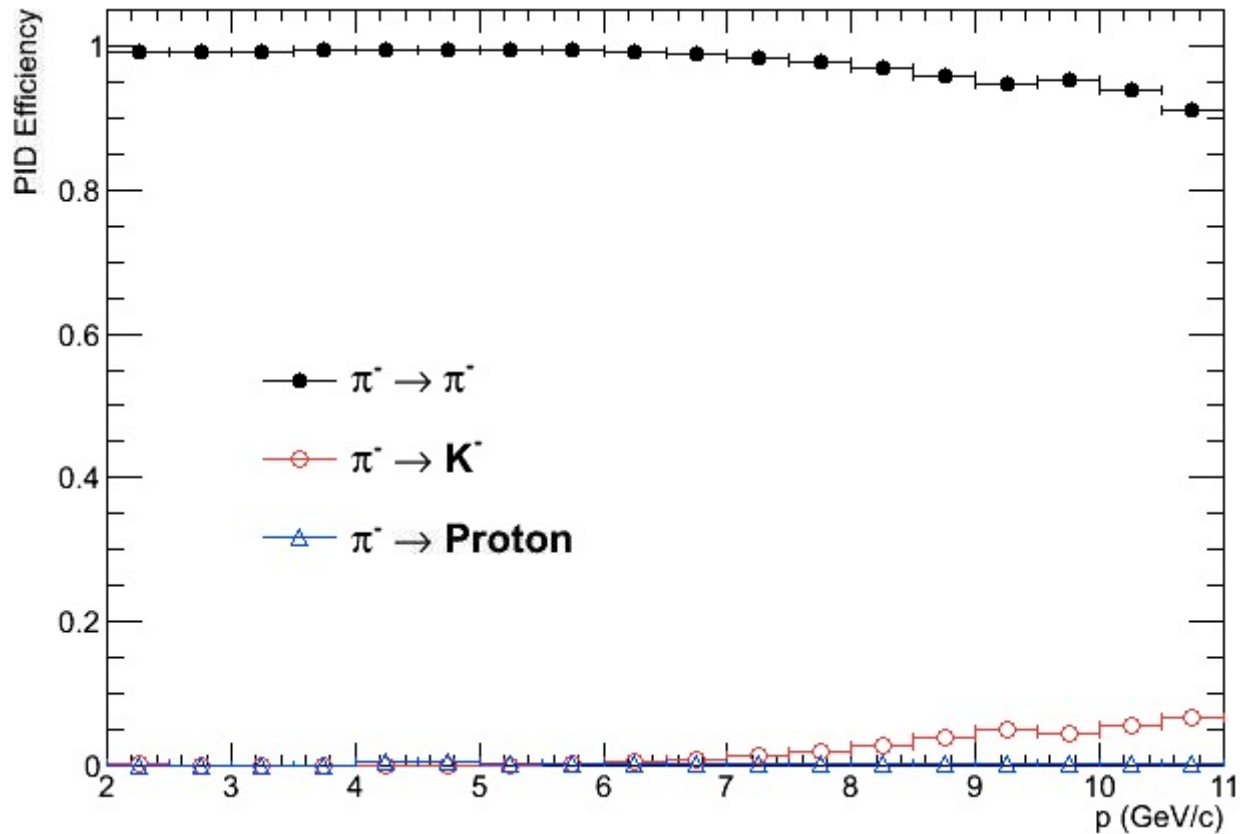
Modular Ring Imaging Cherenkov Detector (mRICH)

M. Sarsour (GSU)



mRICH PID Performance / Single Module

- Construction code output: $\mathcal{L}_e, \mathcal{L}_\pi, \mathcal{L}_K, \mathcal{L}_p$
- $\pi^- \rightarrow \pi^-$: $\mathcal{L}_\pi - \mathcal{L}_K > 0 \&\& \mathcal{L}_\pi - \mathcal{L}_p > 0$

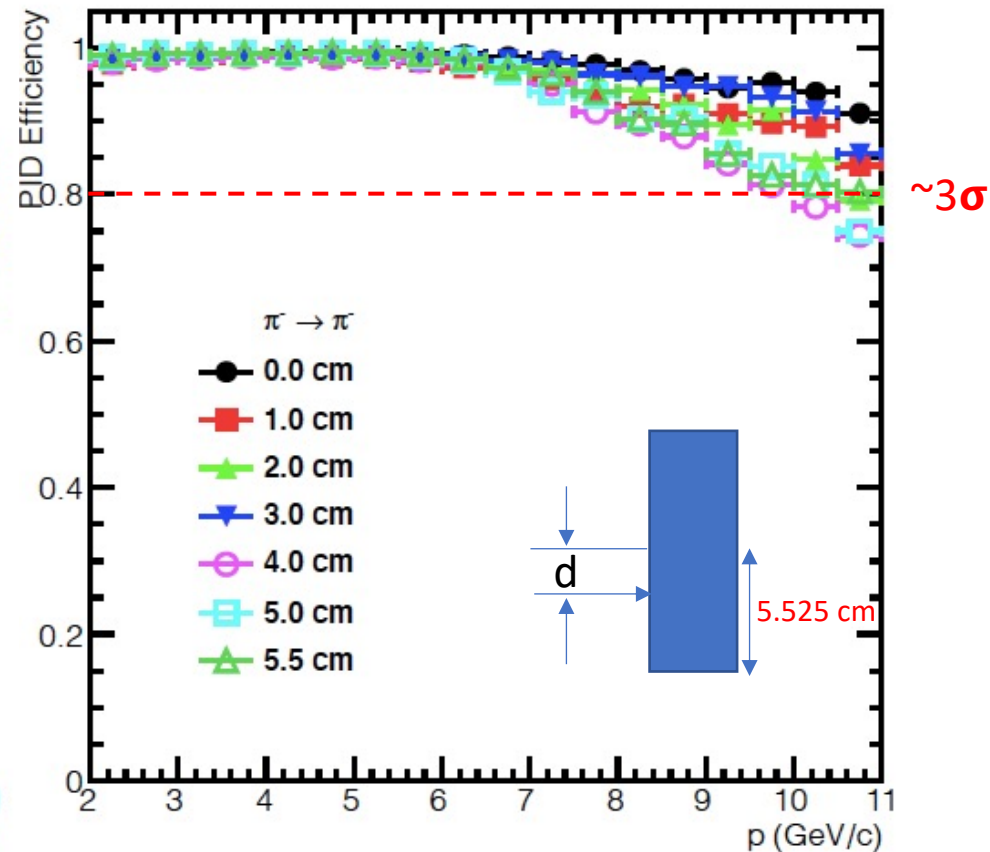
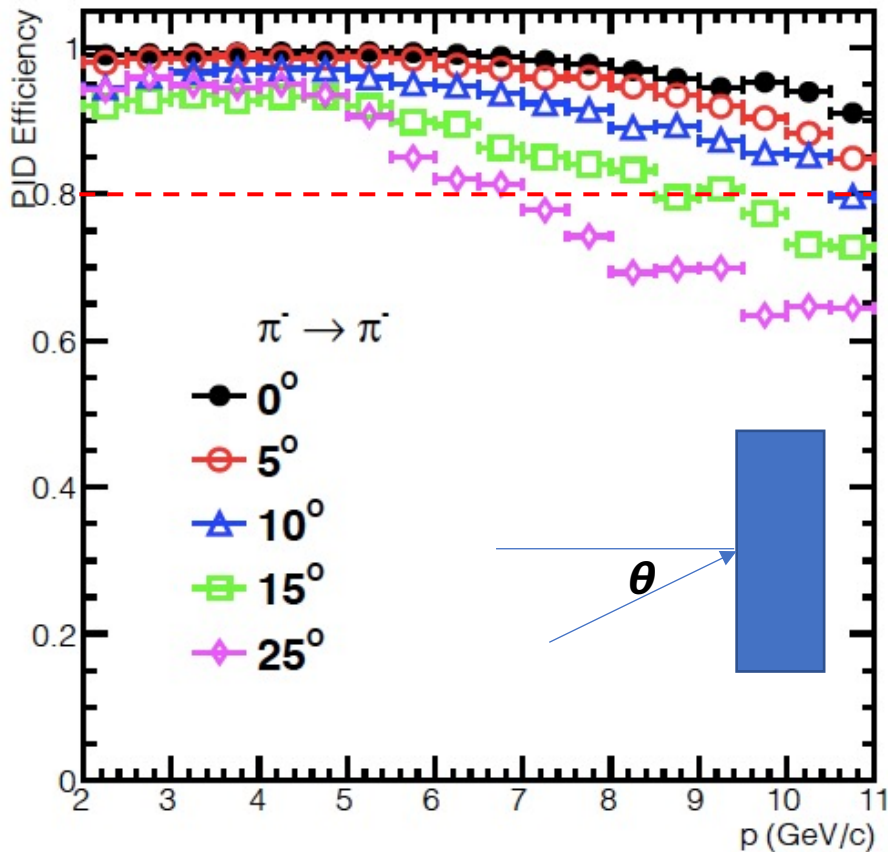


@ 8 GeV/c

$\mathcal{L}_\pi$	$\mathcal{L}_K$	$\mathcal{L}_p$
-101.4	-137.7	-207.7
-78.3	-87.9	-156.8
-105.7	-118.2	-195.5
-110.7	-164.9	-223.9
-112.6	-132.8	-228.8
-142.1	-174.8	-298.7
-91.7	-109.0	-206.3
-118.9	-138.9	-236.4
-86.3	-110.9	-168.6
-78.0	-107.0	-169.0

mRICH PID Performance: π^-/K^-

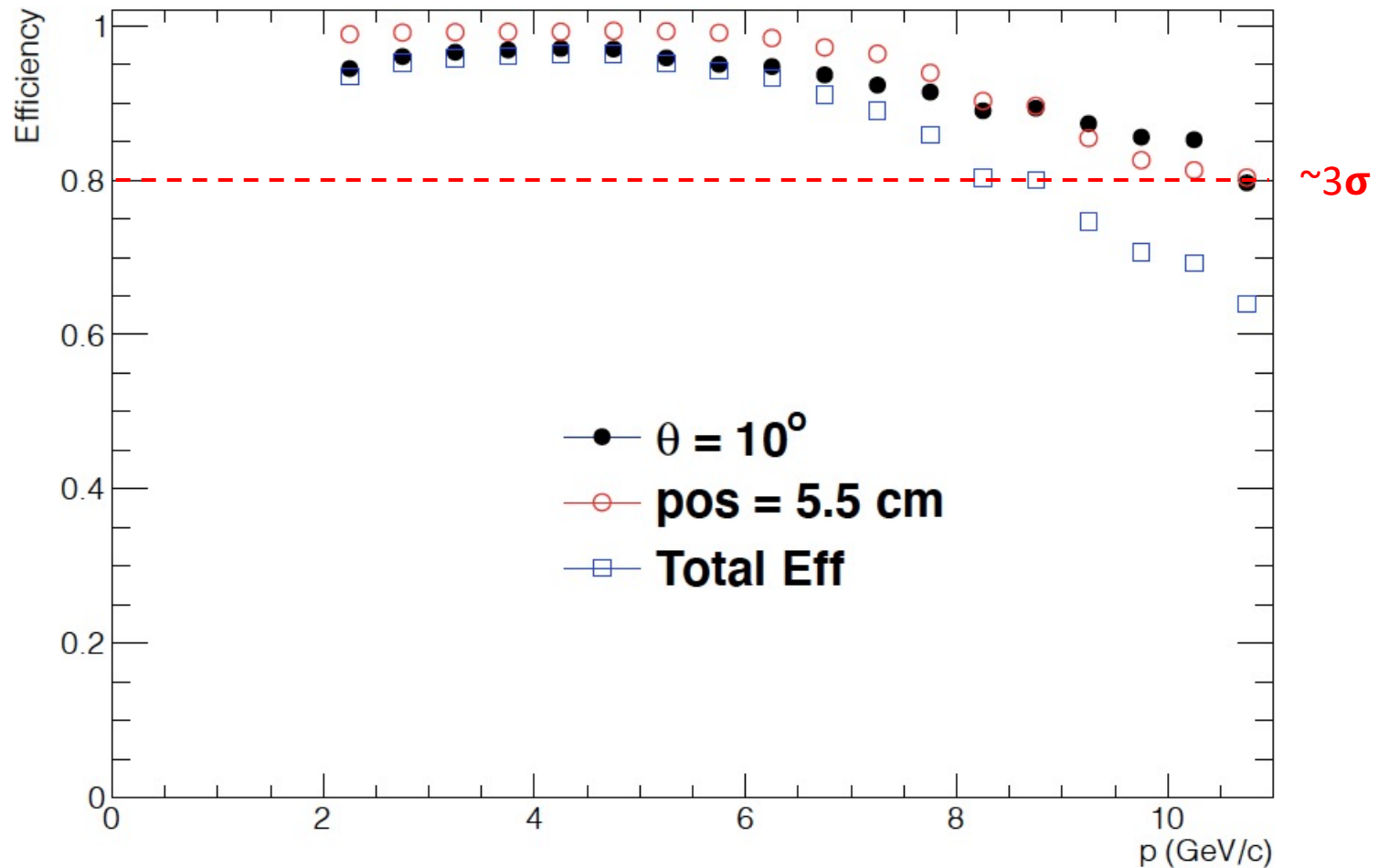
- Construction code output: $\mathcal{L}_\pi, \mathcal{L}_K, \mathcal{L}_p$
- $\pi^- \rightarrow \pi^-: \mathcal{L}_\pi - \mathcal{L}_K > 0 \&\& \mathcal{L}_\pi - \mathcal{L}_p > 0$



- Efficiency drops beyond 15°
- When incident perpendicular no impact even at the edge of the Aerogel
- ➡ Projective setup if preferable!

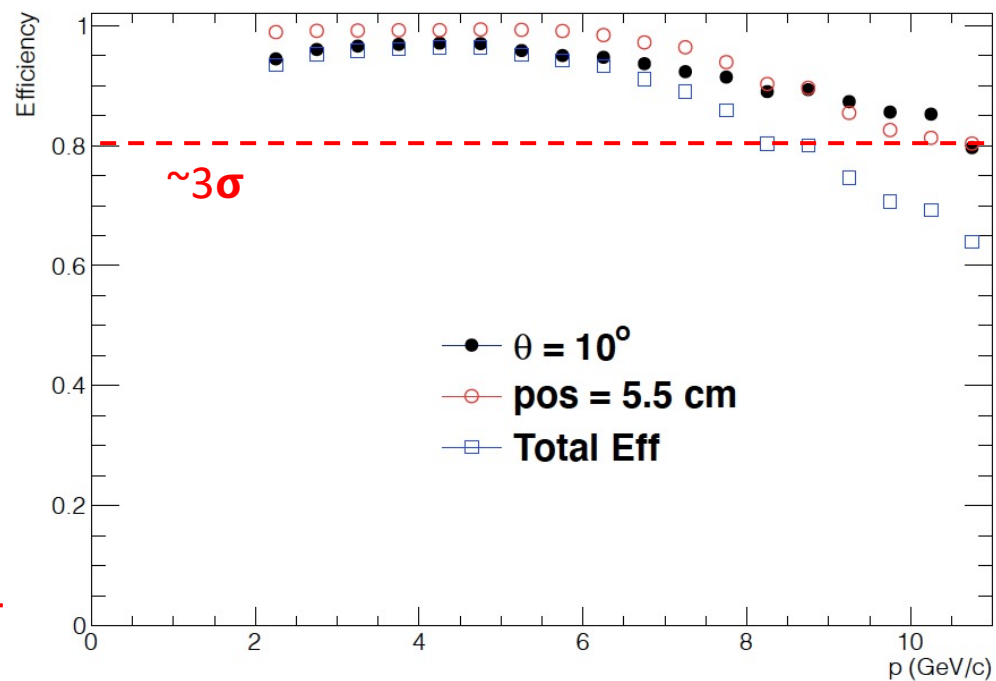
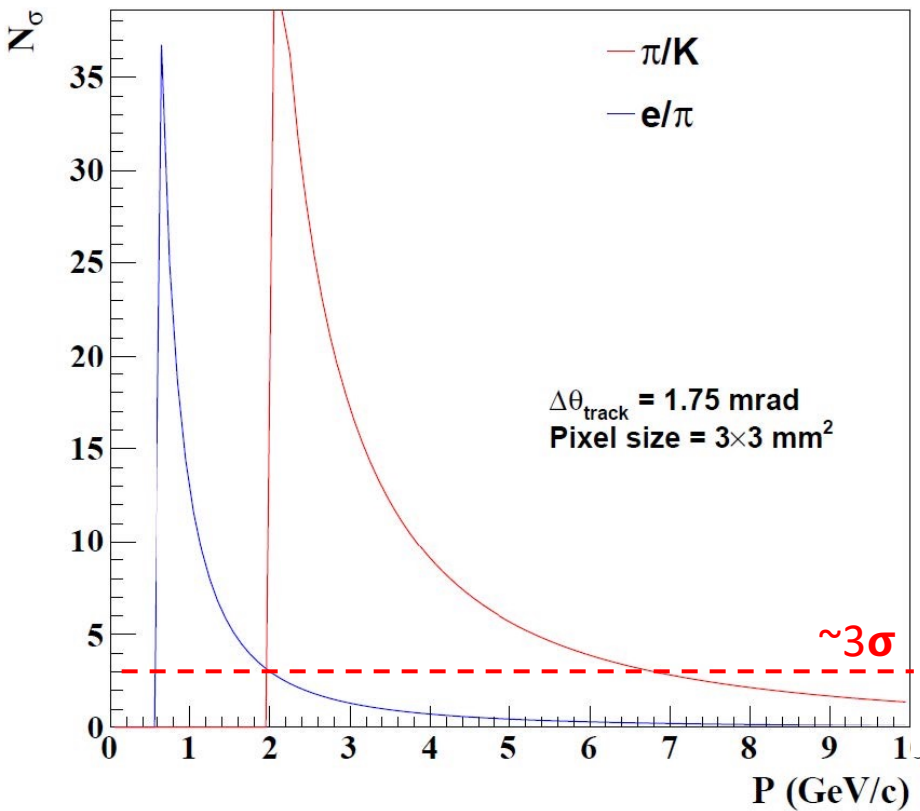
mRICH PID Performance: π^-/K^-

- Construction code output: $\mathcal{L}_\pi, \mathcal{L}_K, \mathcal{L}_p$
- $\pi^- \rightarrow \pi^-: \mathcal{L}_\pi - \mathcal{L}_K > 0 \&\& \mathcal{L}_\pi - \mathcal{L}_p > 0$



mRICH PID Performance: e^-/π^-

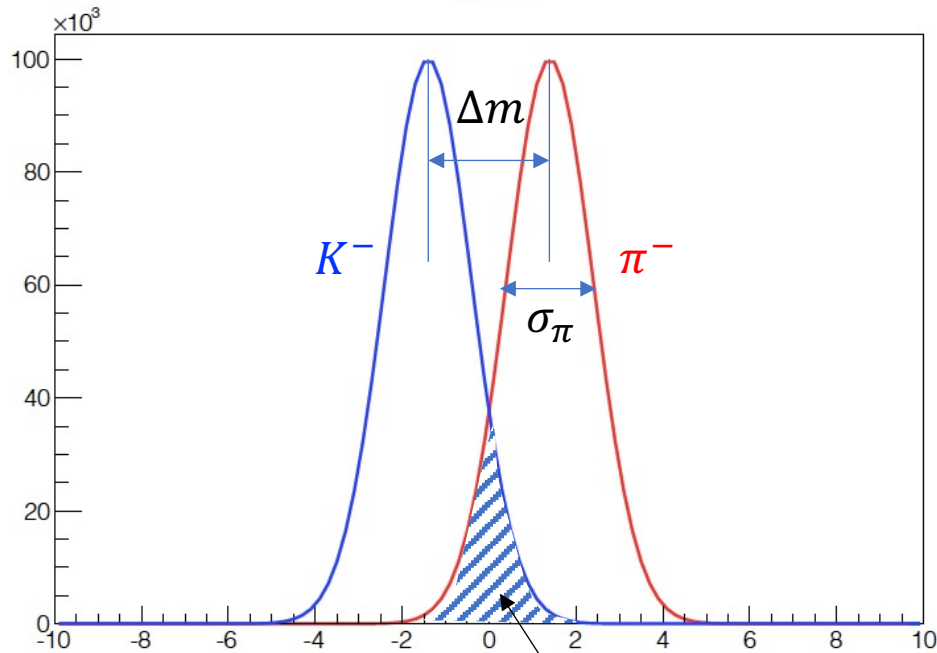
- Construction code output: $\mathcal{L}_\pi, \mathcal{L}_K, \mathcal{L}_p$
- $\pi^- \rightarrow \pi^-: \mathcal{L}_\pi - \mathcal{L}_K > 0 \&\& \mathcal{L}_\pi - \mathcal{L}_p > 0$



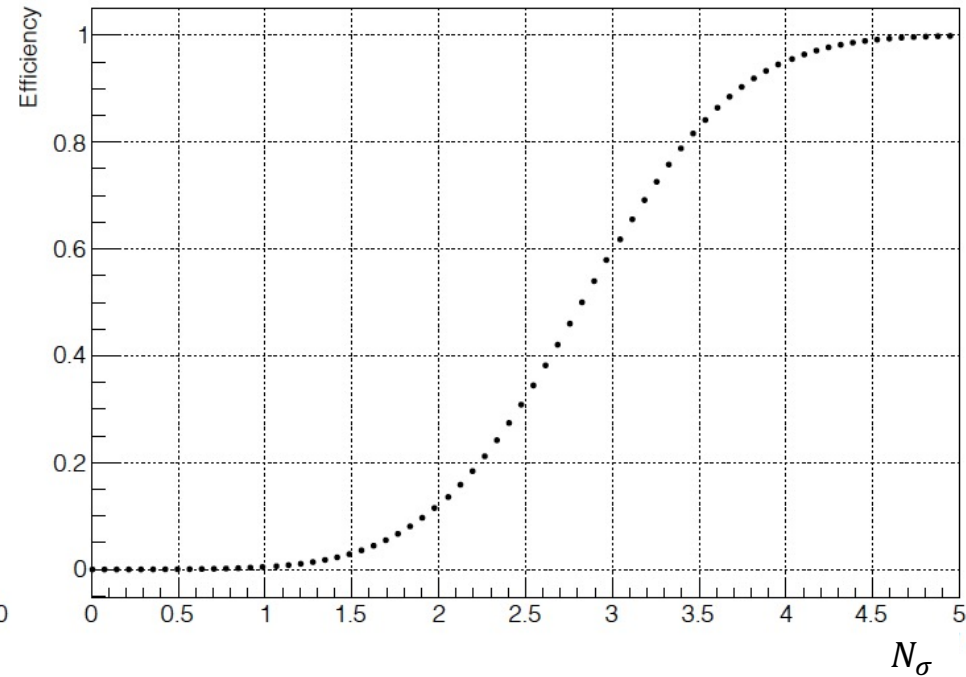
Summary

- Construction code is running with Fun4all -
- Need help from software team to have **local coordinates** before full implementation in the reconstruction software
 - Allows using one DB for all modules
 - Easy to implement calibration
- ...

Understanding the Efficiency Plots!



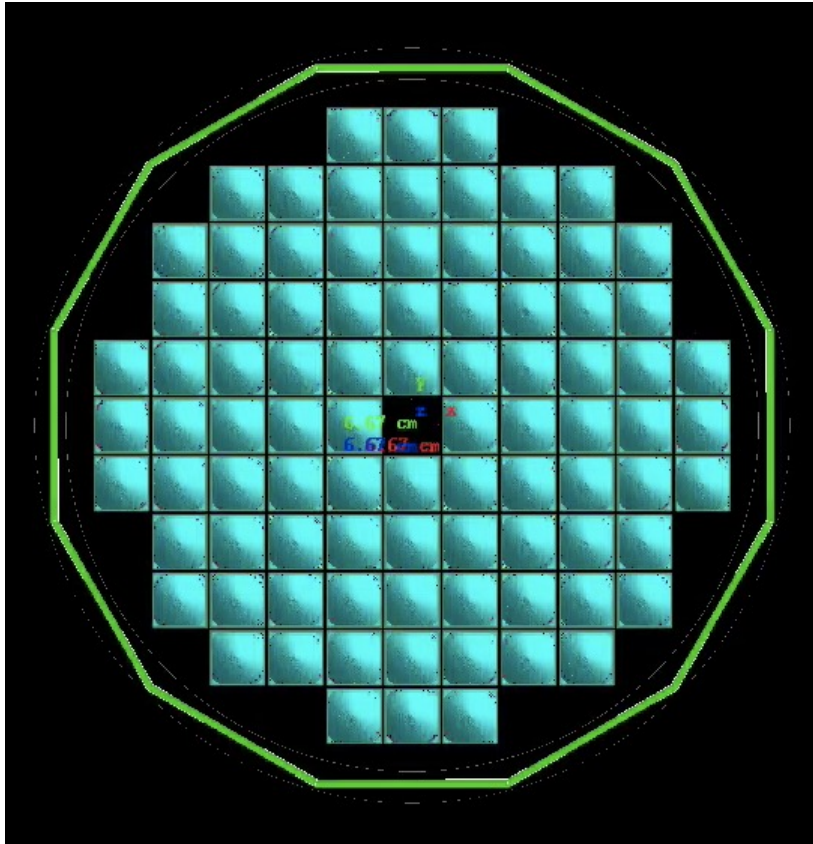
$$N_\sigma = \frac{\Delta m}{\sqrt{\sigma_\pi^2 + \sigma_K^2}}$$



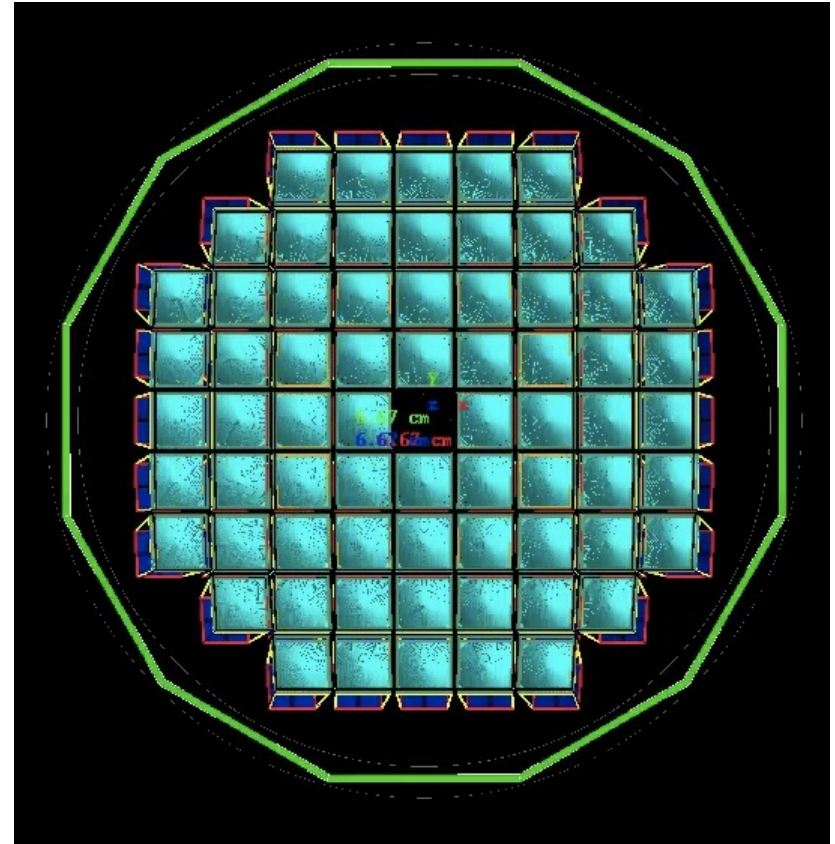
$$Eff = \frac{N_\pi - N_{\pi K}}{N_\pi}$$

mRICH Setup in e-arm

Flat



Projective

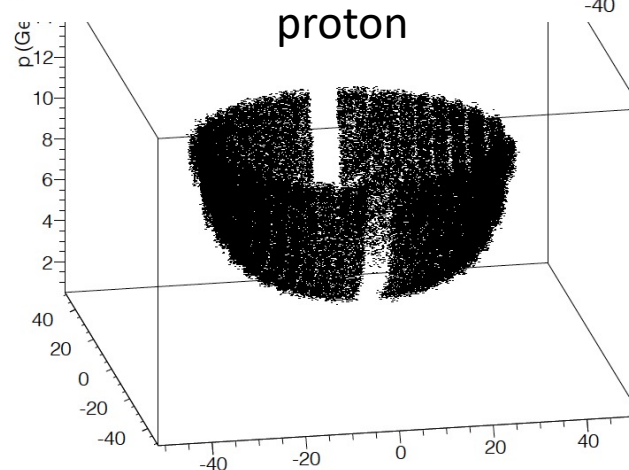
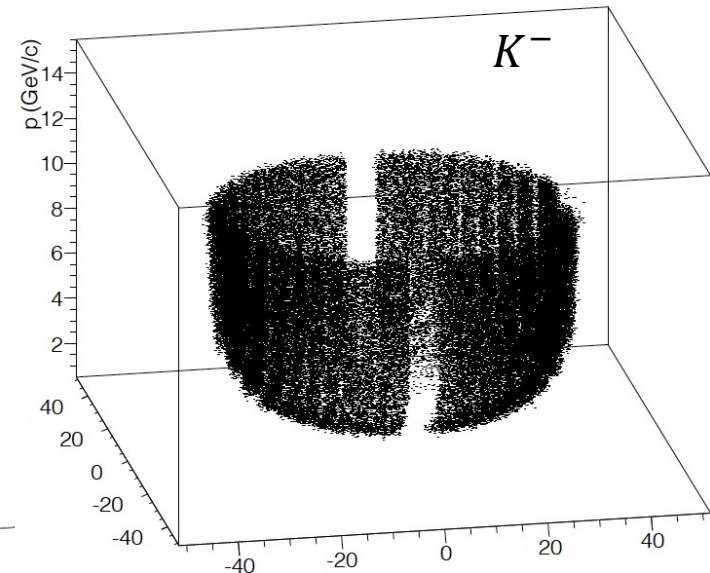
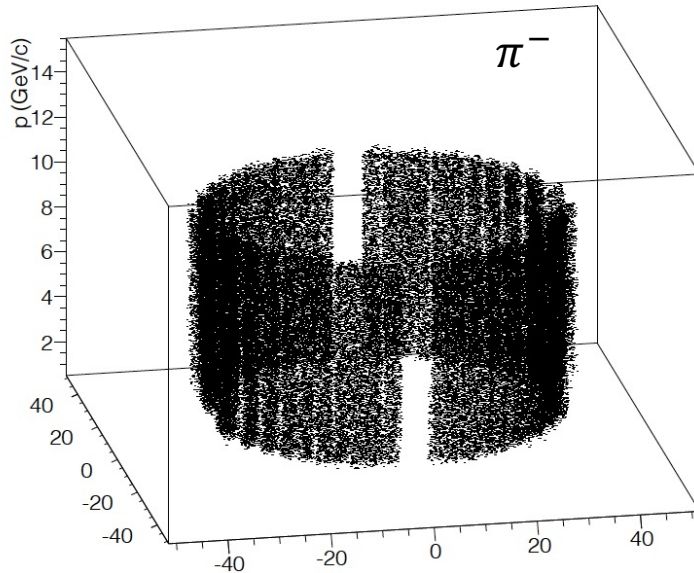


- Current setup uses the minimum space between modules without overlap to fill up the space up to DIRC's frame. It required 88 modules for the flat case and 68 for projective; assuming DIRC's inner radius at 82 cm

Analysis Code/ PID

Focusing on a single module for performance studies!

- ❖ Adding sensor pixelization complicates things! Likelihood method
- ❖ Establish a DB and match patterns based on Likelihood!



Analysis Code/ PID

Focusing on a single module for performance studies!

❖ Ring radius without considering the sensor pixelization!

