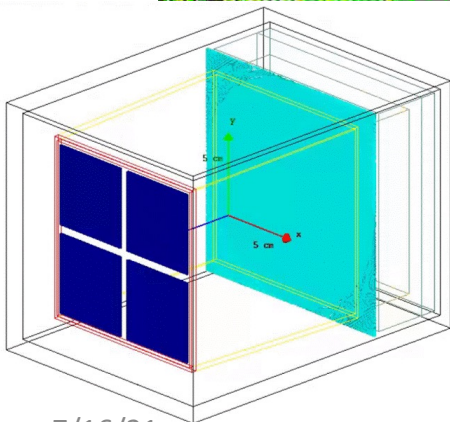
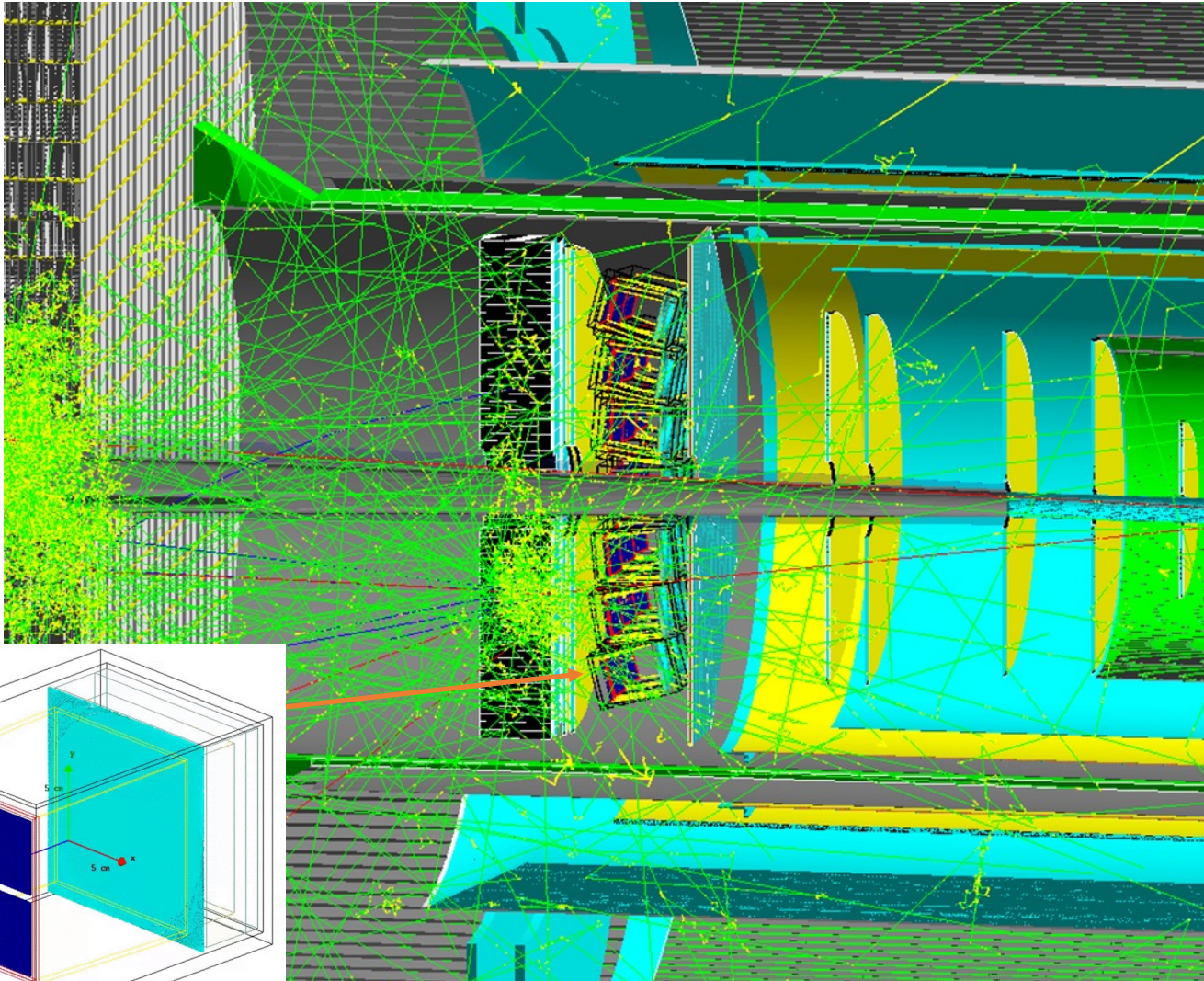


Modular Ring Imaging Cherenkov Detector (mRICH)

M. Sarsour (GSU)

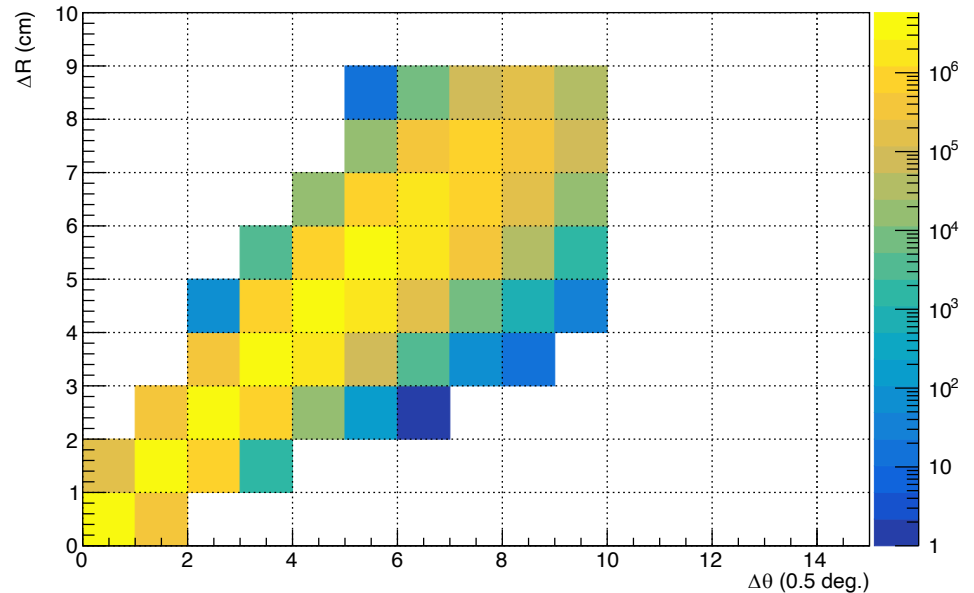
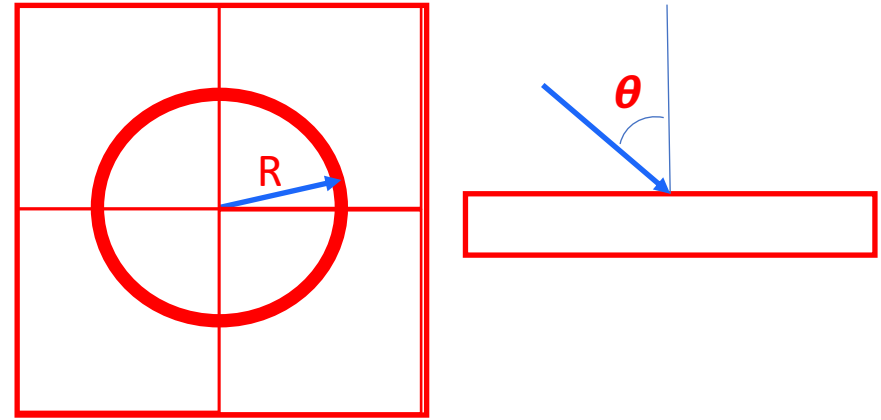
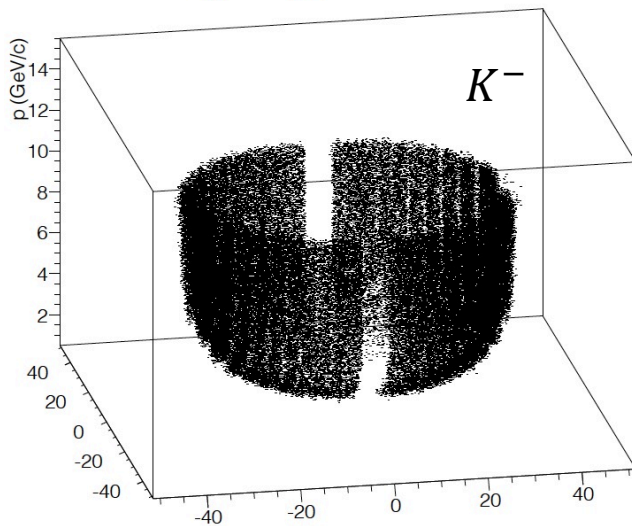
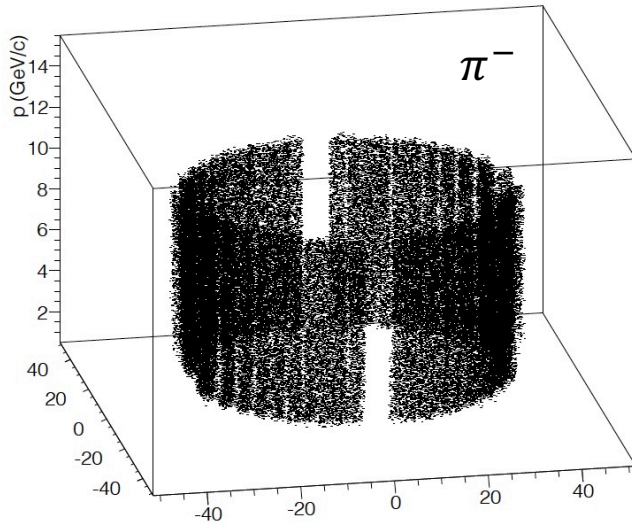


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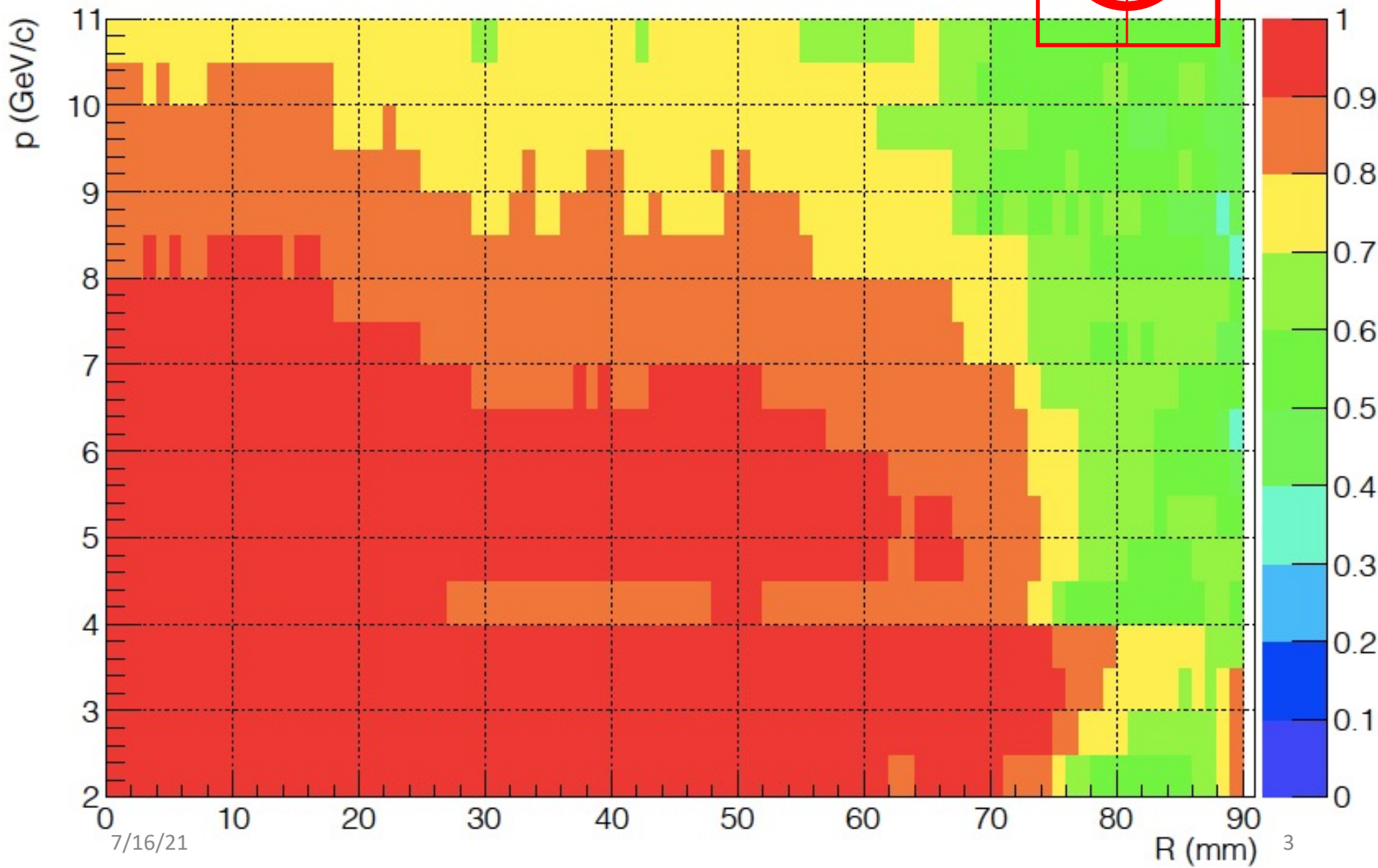
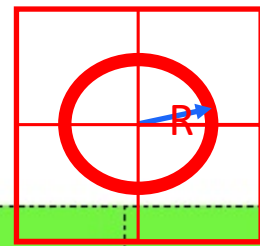
Analysis Code/ PID

❖ Likelihood method

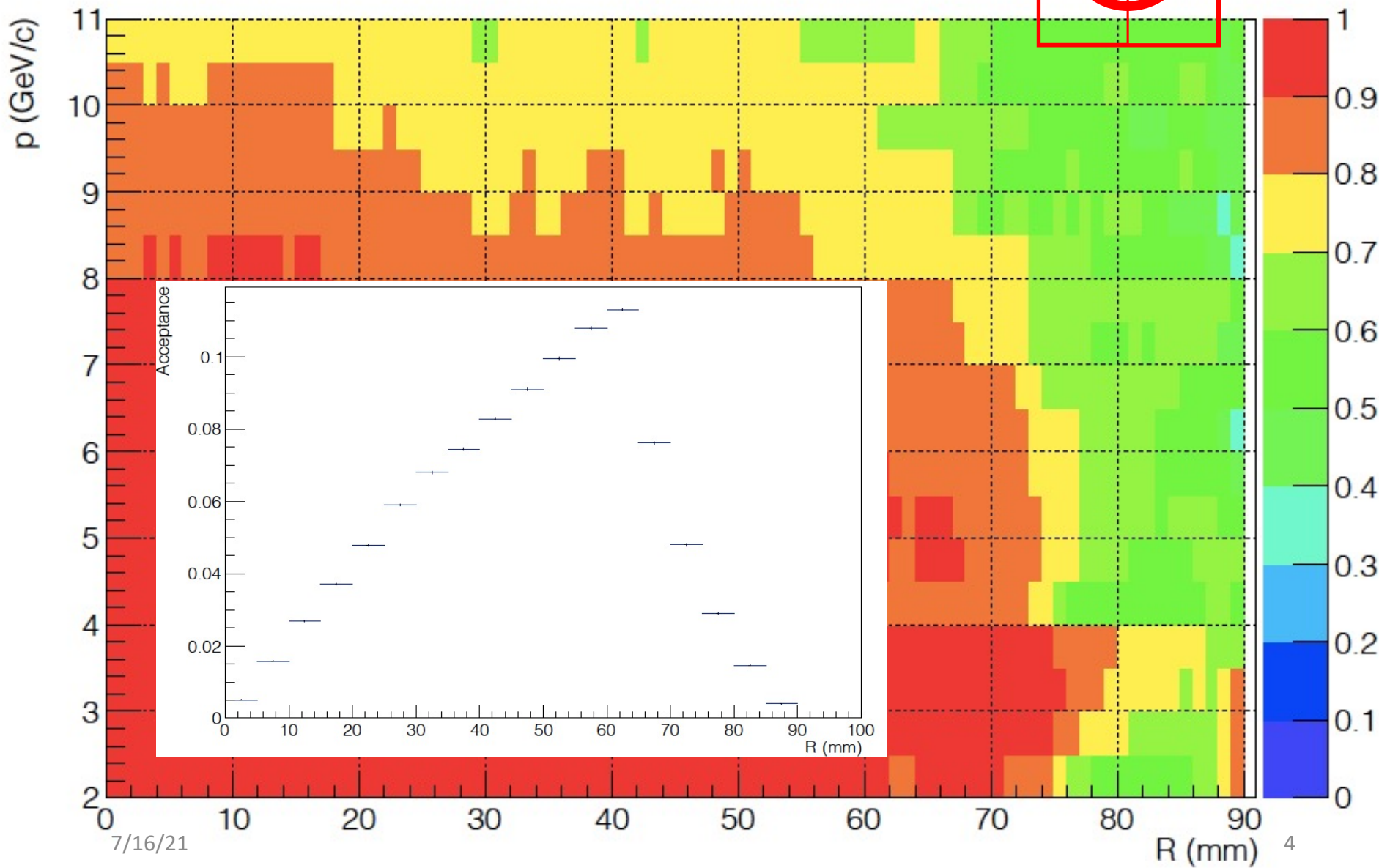
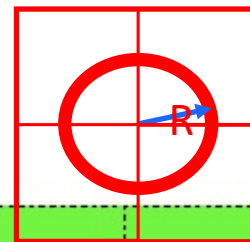
❖ Establish a DB and match patterns based on Likelihood!



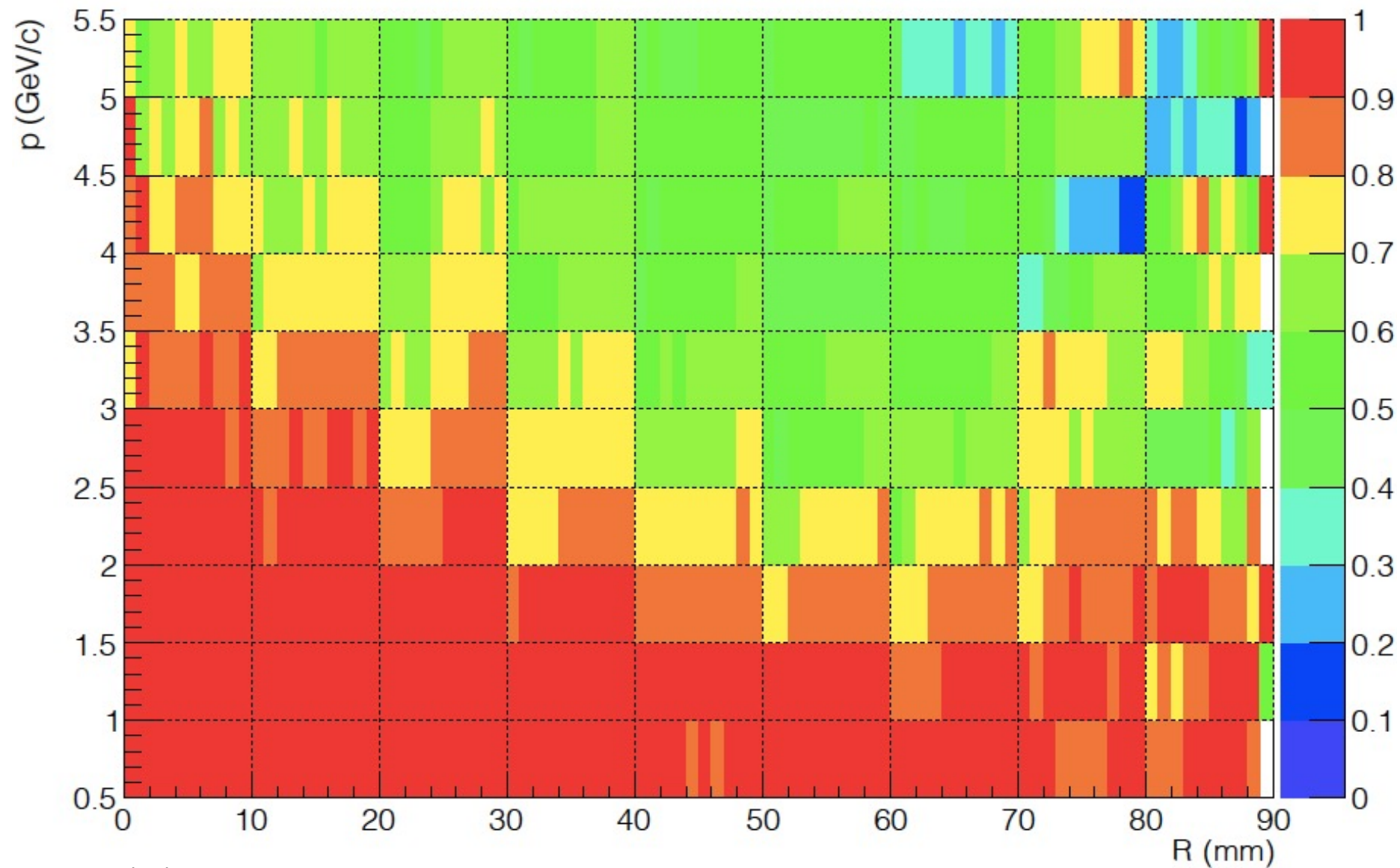
mRICH PID Performance: π^-/K^-



mRICH PID Performance: π^-/K^-



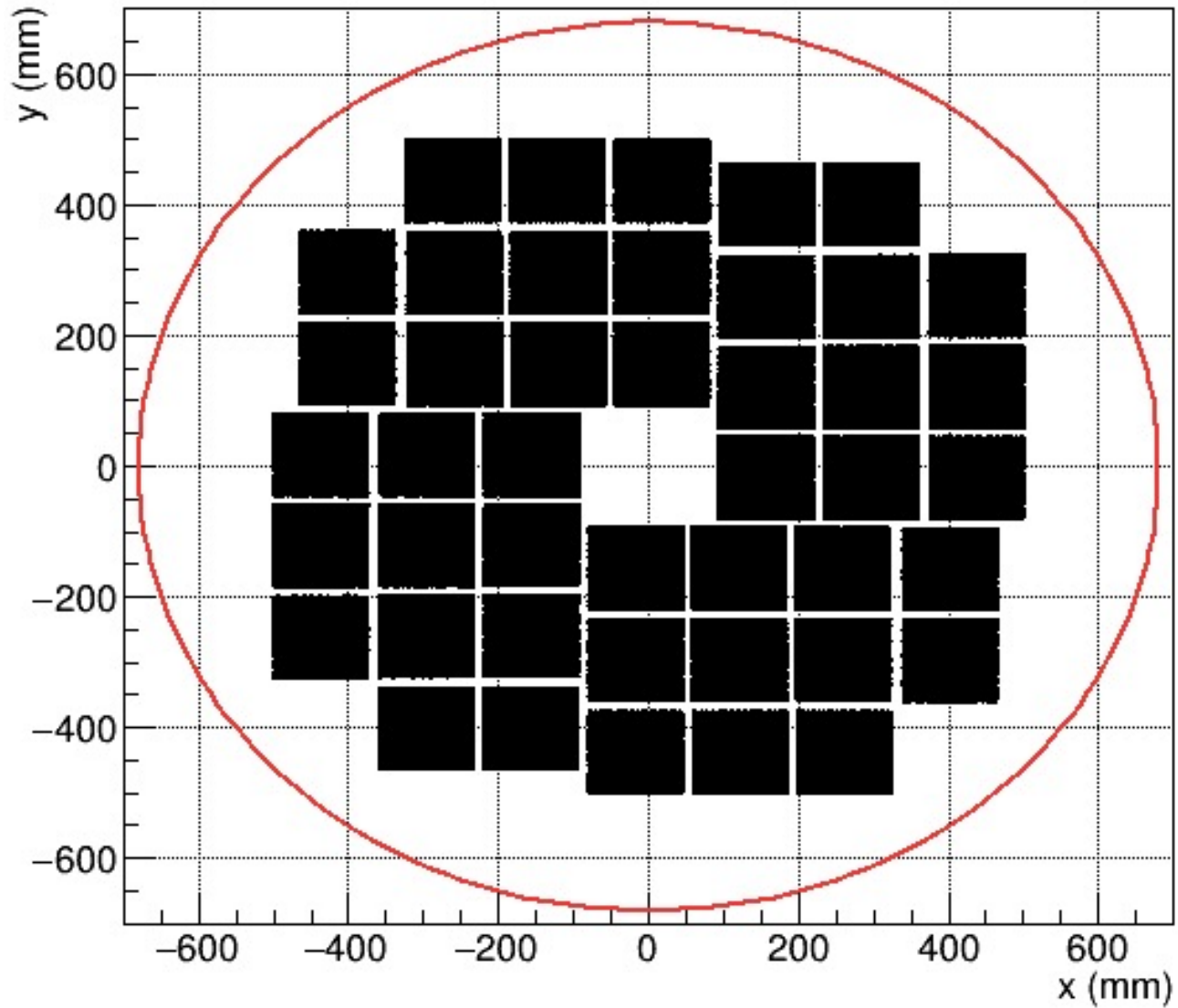
mRICH PID Performance: e^-/π^-



Summary

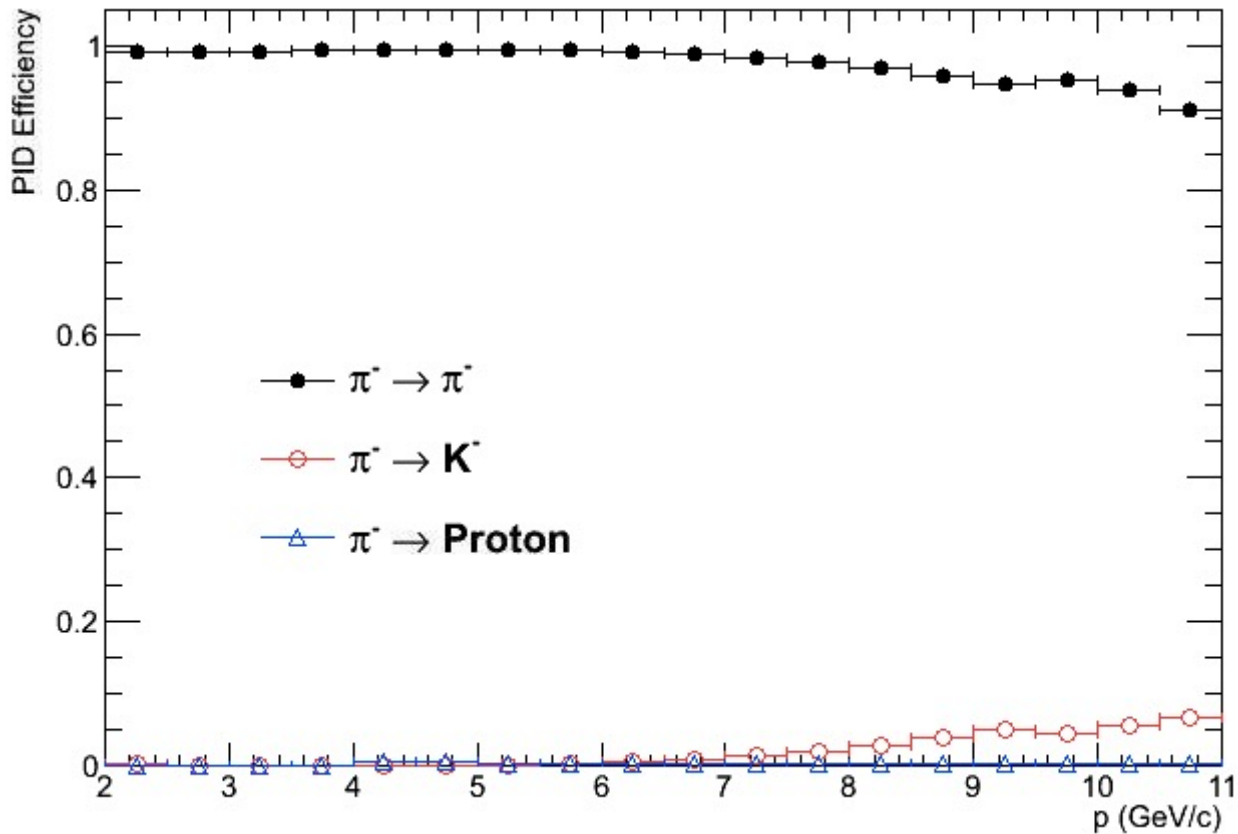
- Construction code is running with Fun4all -
- Used one module DB for all modules
- Still working on using projection software!
 - Allows to understand the effect of the magnetic field

mRICH Acceptance



mRICH PID Performance / Single Module

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

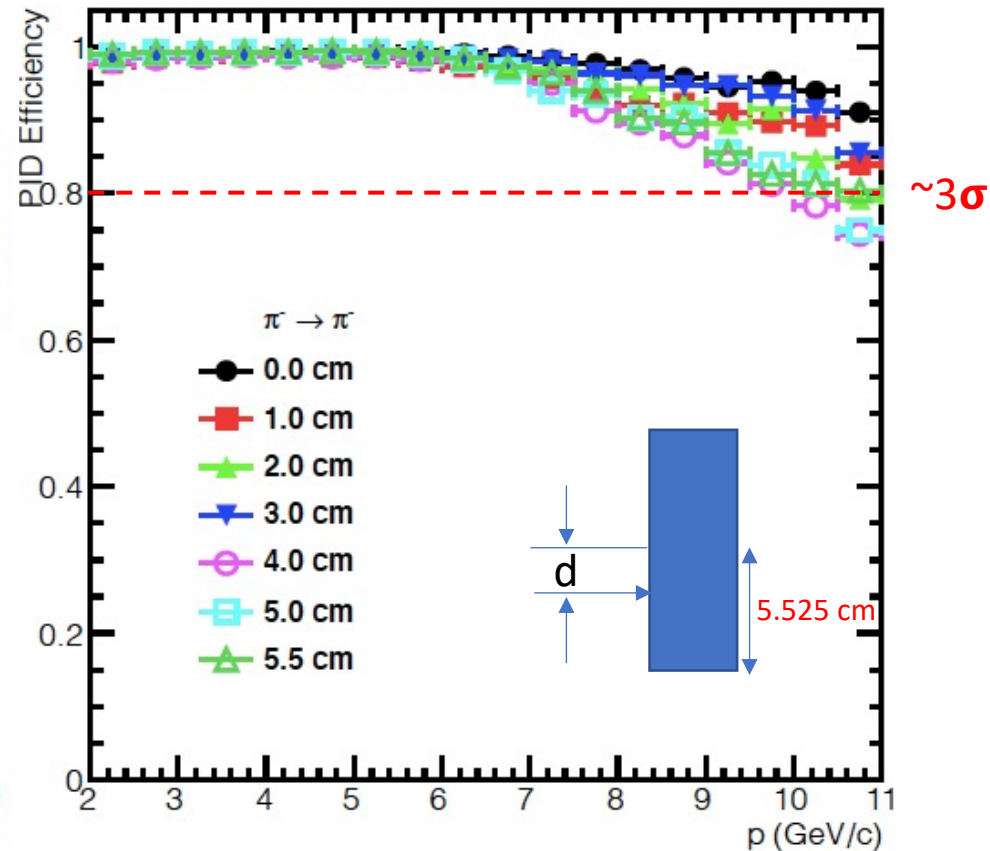
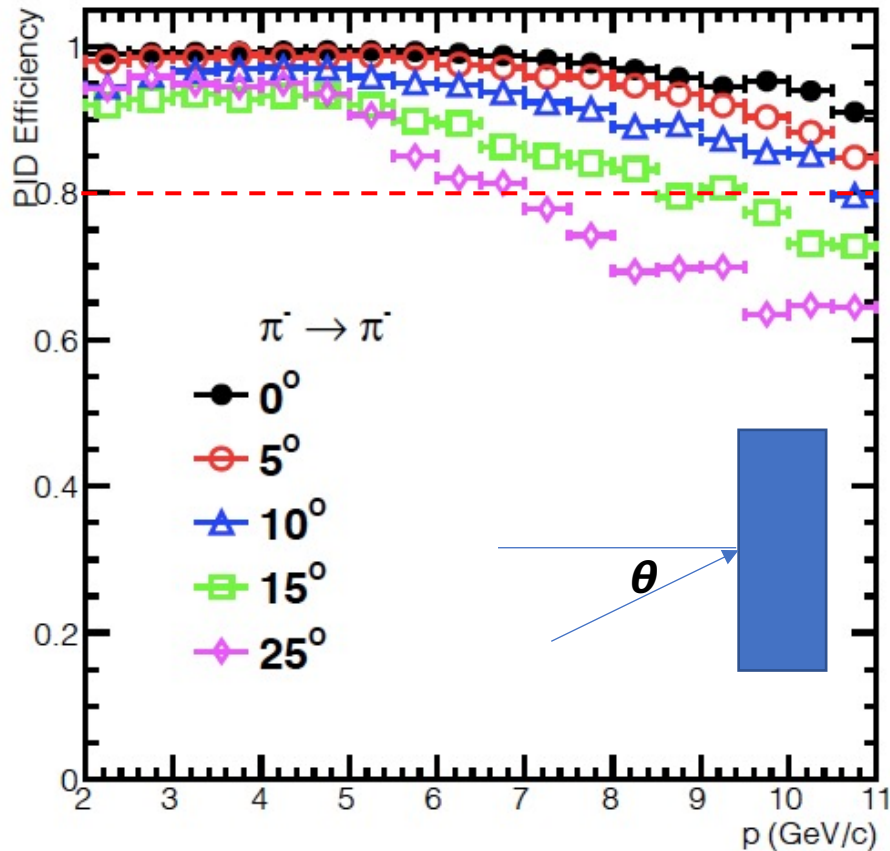


@ 8 GeV/c

\mathcal{L}_π	\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^-

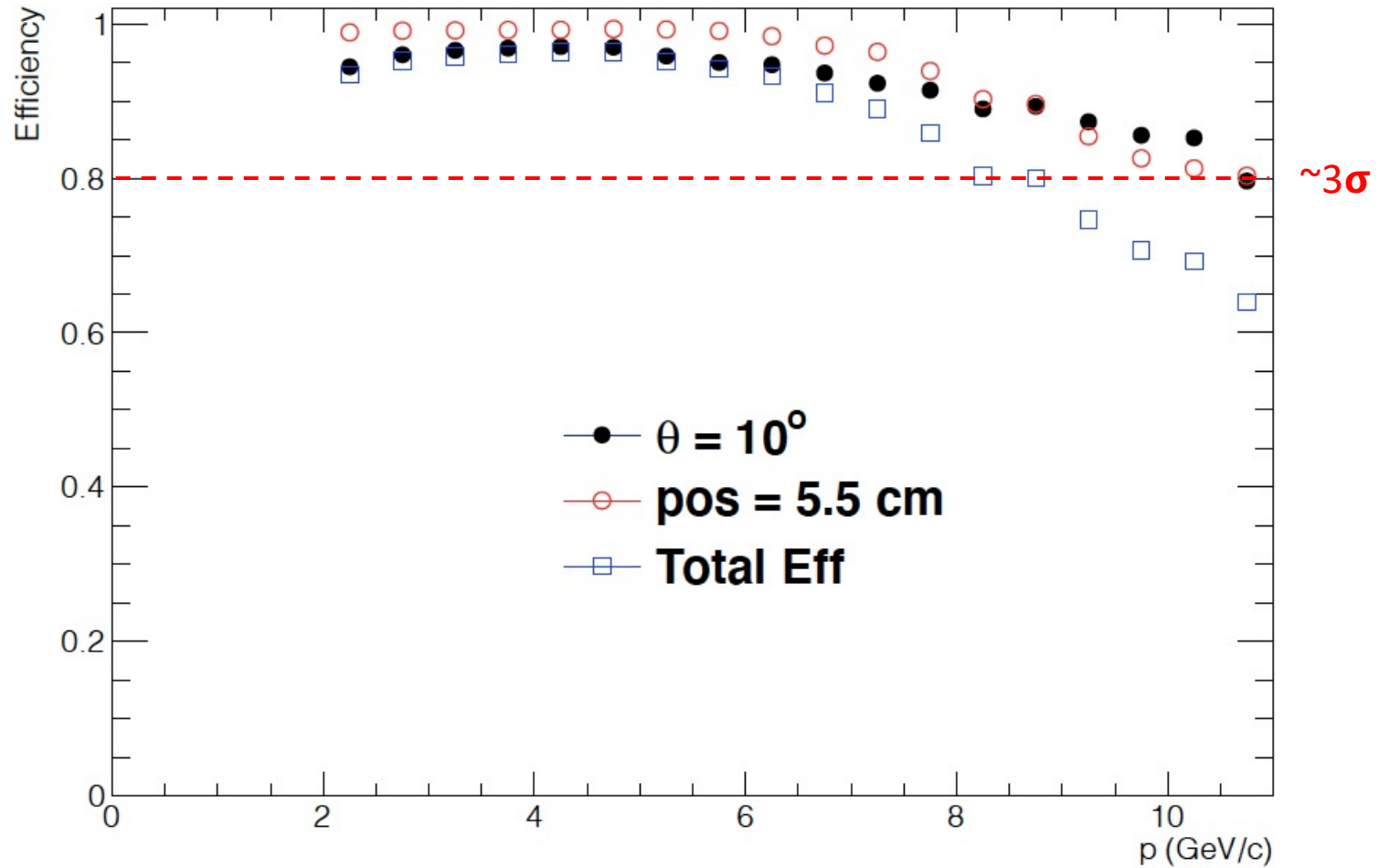
- Construction code output: $\mathcal{L}_\pi, \mathcal{L}_K, \mathcal{L}_p$
- $\pi^- \rightarrow \pi^-$: $\mathcal{L}_\pi - \mathcal{L}_K > 0 \&\& \mathcal{L}_\pi - \mathcal{L}_p > 0$



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

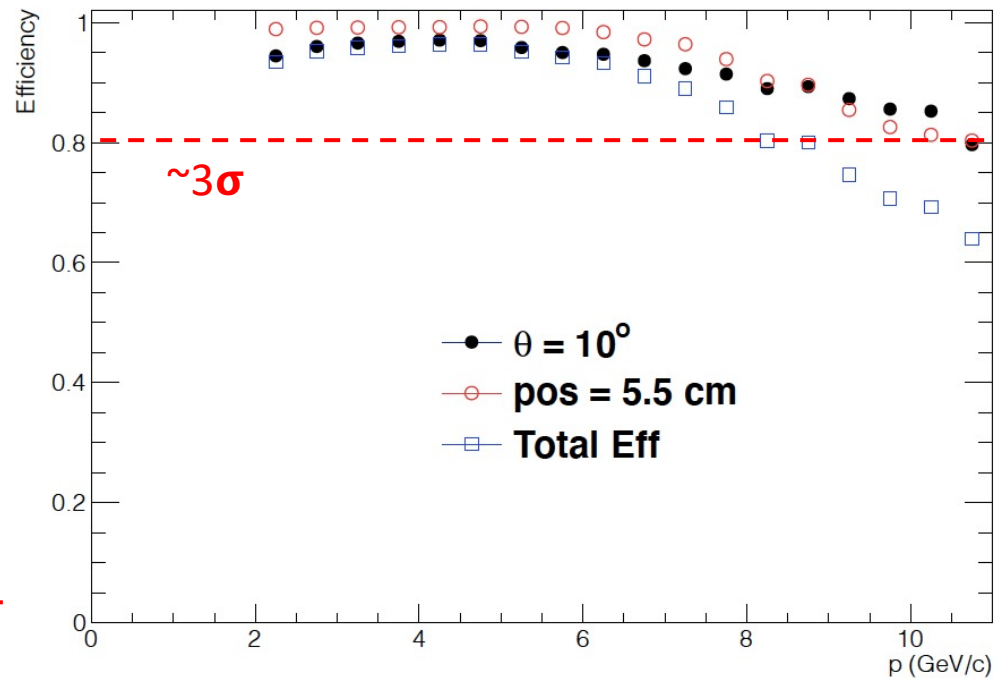
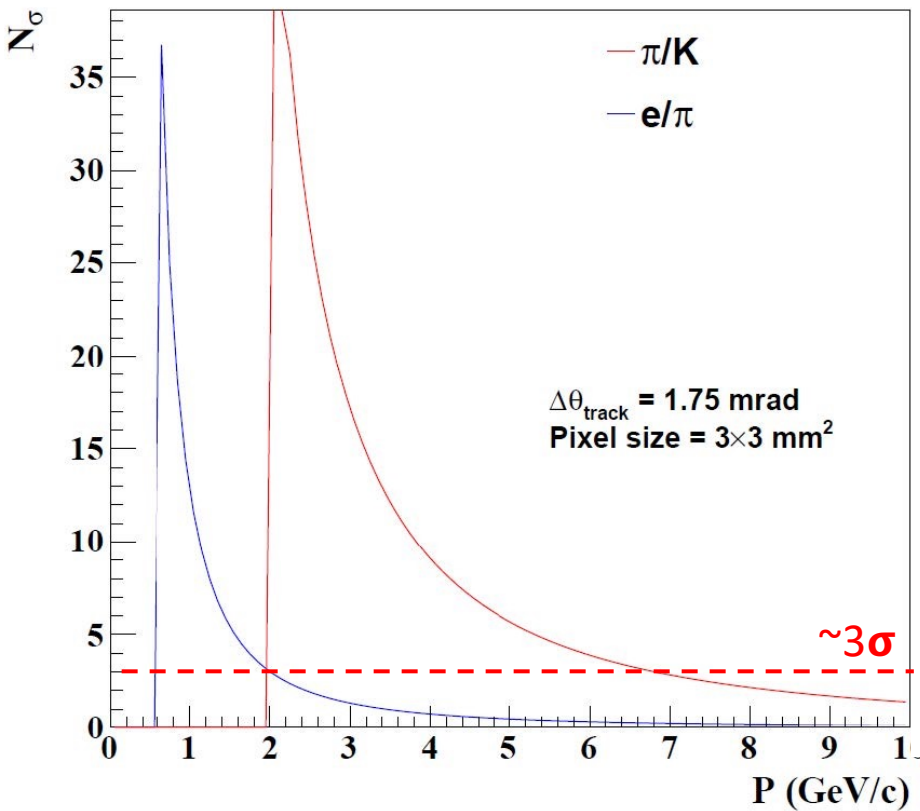
mRICH PID Performance: π^-/K^-

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

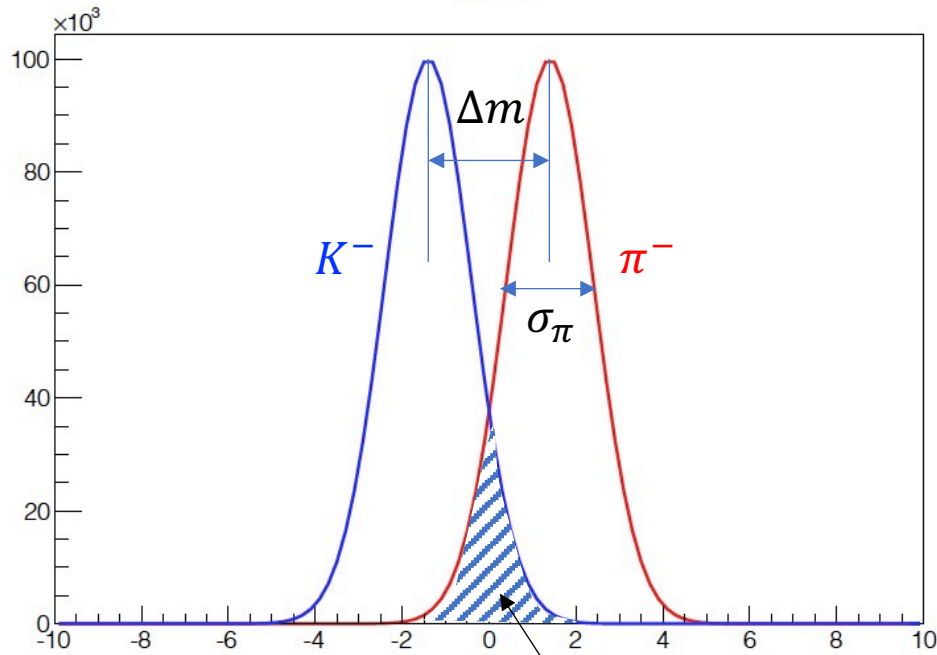


mRICH PID Performance: e^-/π^-

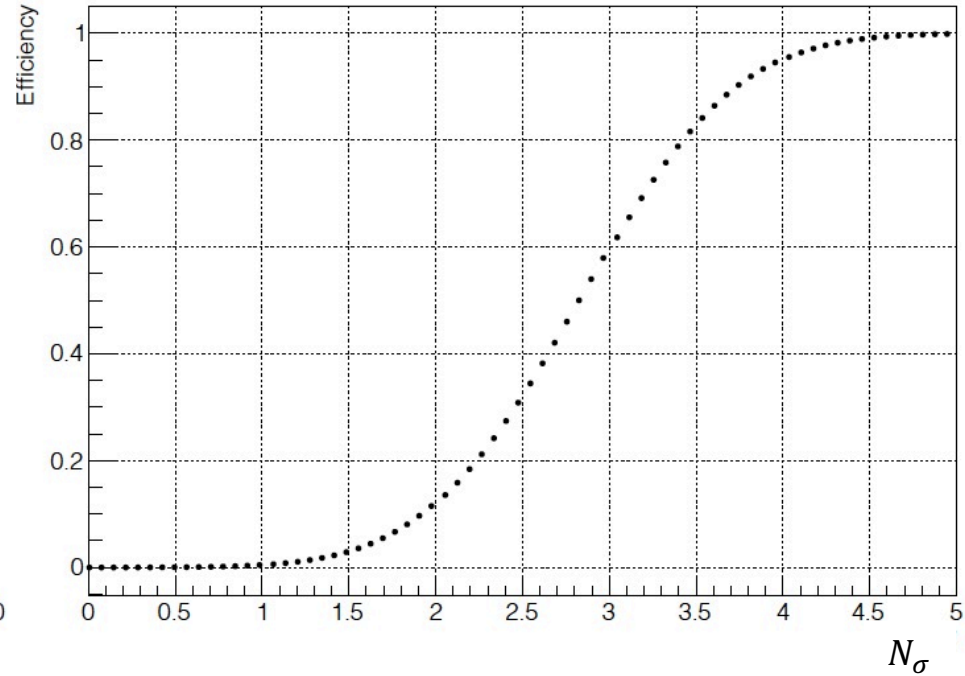
- Construction code output: $\mathcal{L}_\pi, \mathcal{L}_K, \mathcal{L}_p$
- $\pi^- \rightarrow \pi^-$: $\mathcal{L}_\pi - \mathcal{L}_K > 0 \&\& \mathcal{L}_\pi - \mathcal{L}_p > 0$



Understanding the Efficiency Plots!



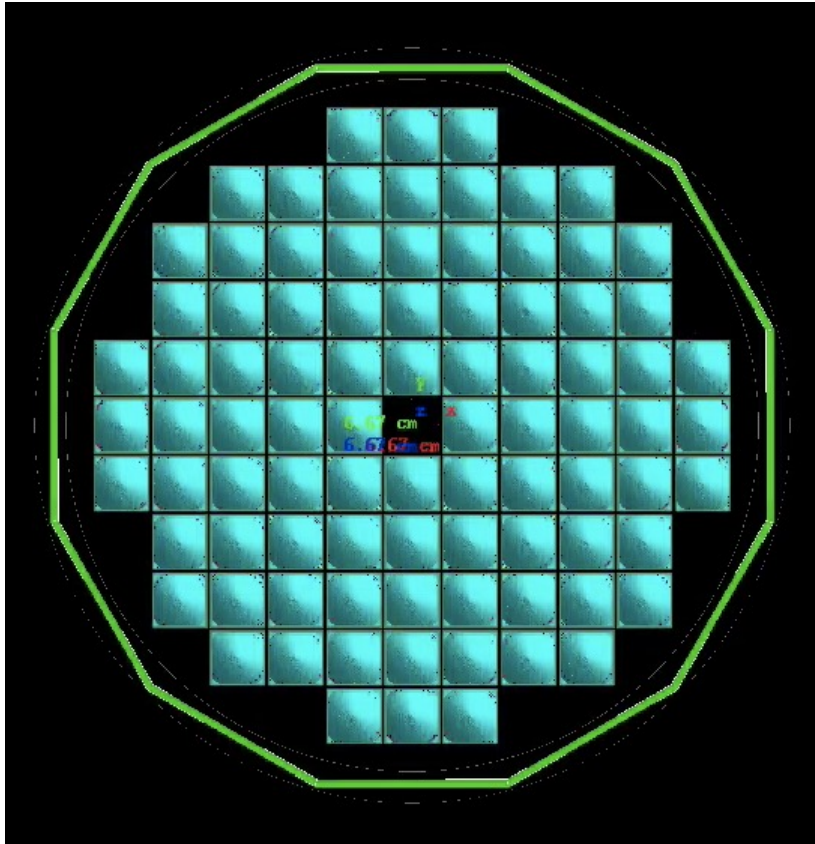
$$N_\sigma = \frac{\Delta m}{\sqrt{\sigma_\pi^2 + \sigma_K^2}}$$



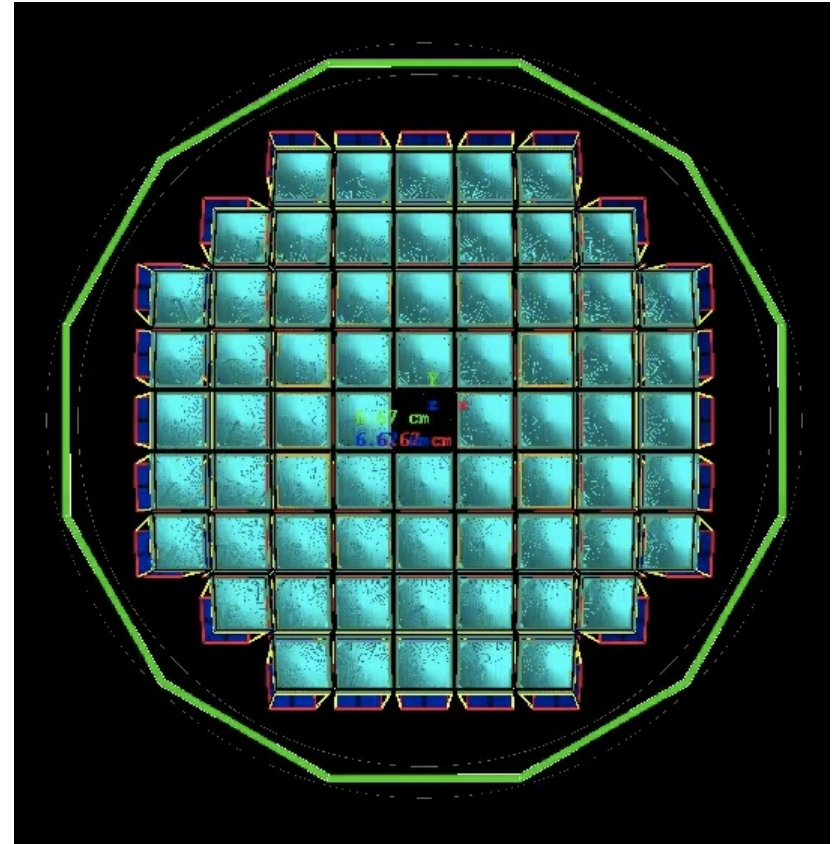
$$Eff = \frac{N_\pi - N_{\pi K}}{N_\pi}$$

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!

❖ Ring radius without considering the sensor pixelization!

