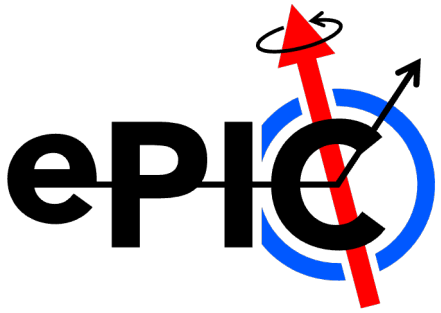
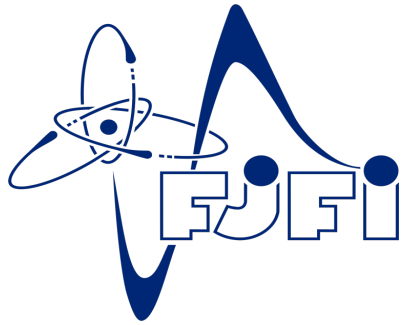
Two-Particle Position Resolution Study from Backward HCal

Leszek Kosarzewski, Alexandr Prozorov, **Subhadip Pal**





ePIC calorimetry meeting – July 10, 2024

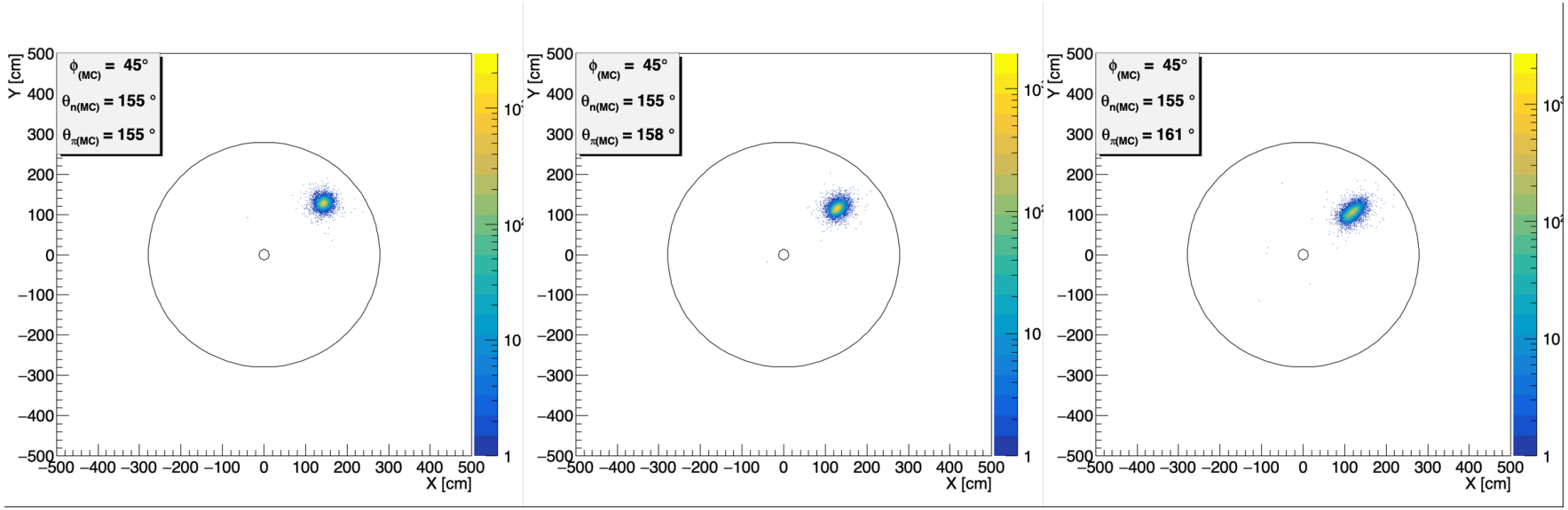
Setup

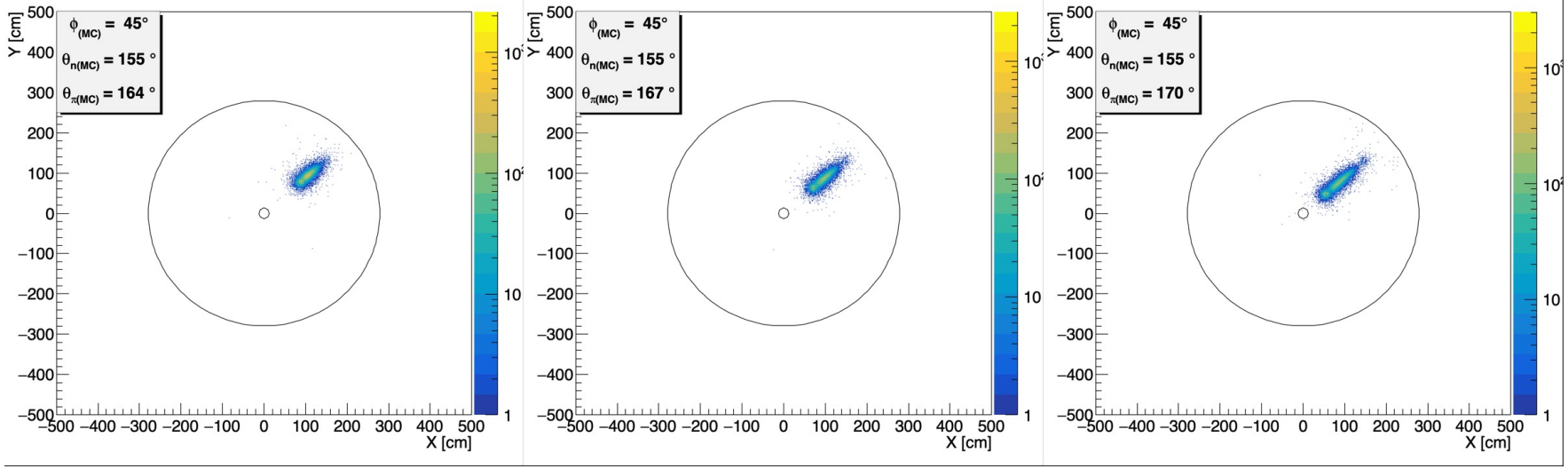
Objective ***:*** *Use clusters to distinguish between neutron/pion shower reconstruction.*

- ❑ (1 n + 1 π^-) / event. ---- *Standalone ddsim*
- ❑ φ = 45°
  - θ_n = 155° (η = -1.51) ------ *fixed*
  - θ_π = 155° (η = -1.51), 158° (η = -1.64), 161° (η = -1.79), 164° (η = -1.96), 167° (η = -2.17), 170° (η = -2.44)

- Only Backward HCal was taken into account [not the whole ePIC geometry – scattering effects neglected]
- −4.14 < η < −1.18
- Alternating Steel and Scintilator slices
- 10 cm. x 10 cm. Polystyrene tiles

Cluster Positions (local xy)





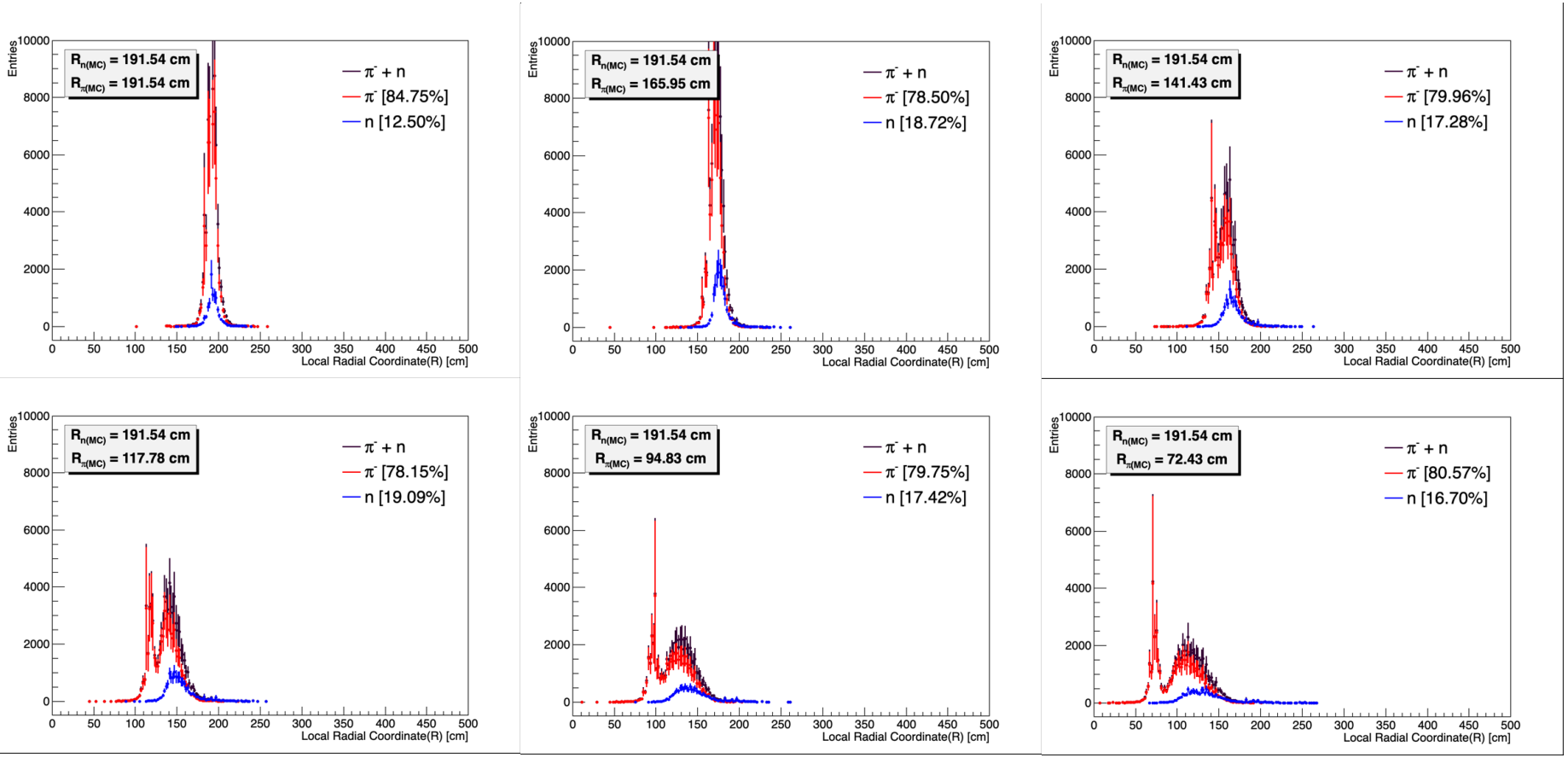
Cluster (x,y) are shown along with simulated angular coordinates

p = 1 GeV/c

[neutron showers in outer region; pion showers in inner region]

Distributions are becoming more smeared as (θ_π - θ_n) increases…

Cluster Radial Coordinates



Percentages are based on ClusterMCParticle associations

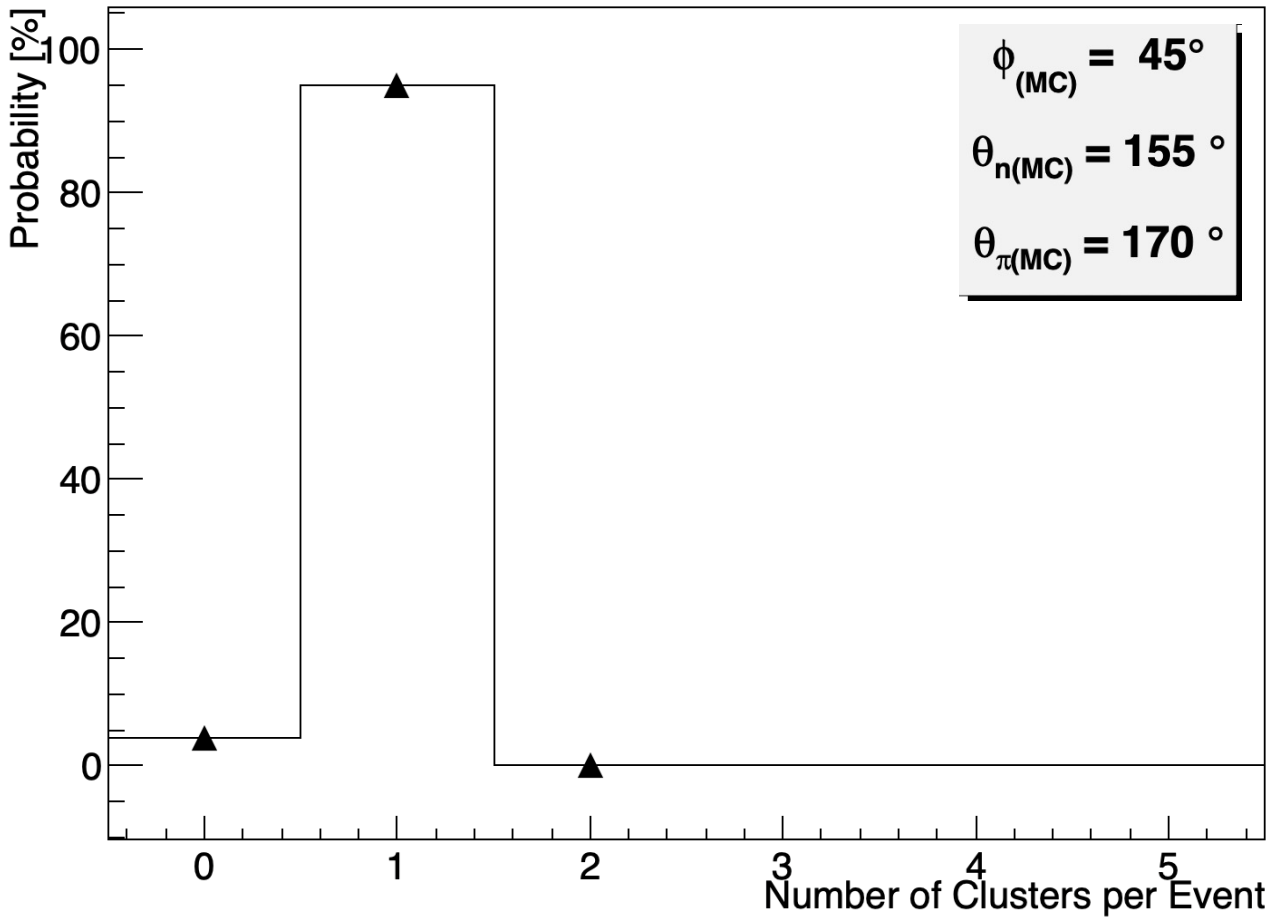
Neutron Clusters start to shift inwards as $(R_n - R_\pi)$ increases

~ 80% of the clusters associated with pions

~ 20% of the clusters associated with neutrons

p = 1 GeV/c

Cluster Reconstruction

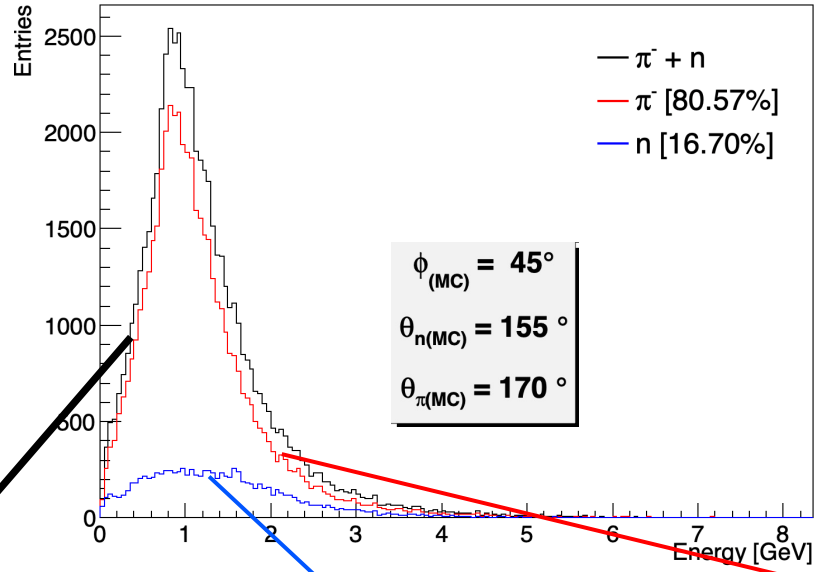


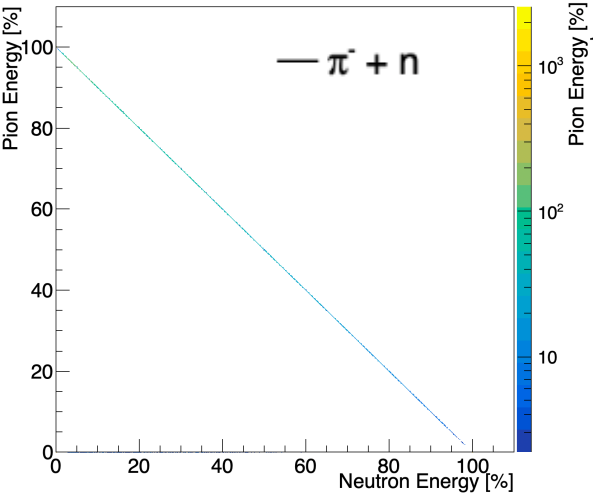
Expectation: 2 clusters per event

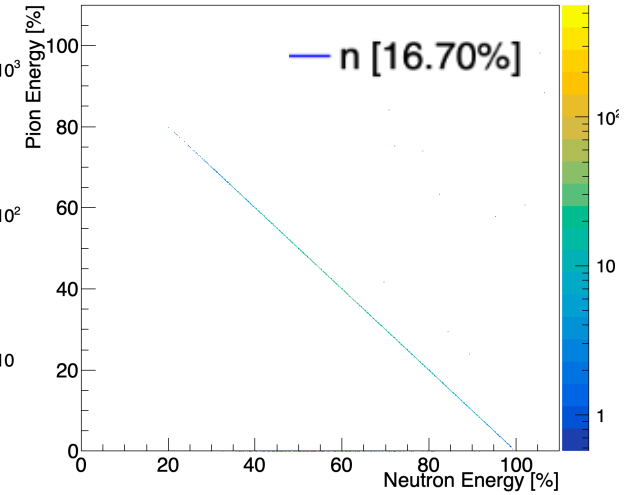
Observation: > 90% events have 1 reconstructed cluster

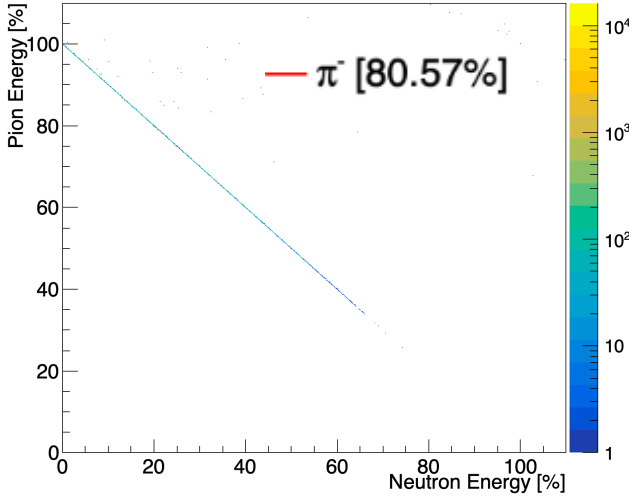
Clusters are being merged...?

Cluster Reconstruction









Thank You