



Tracking and vertexing efficiencies with a $p\pi$ sample on 2005 data

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Outline

- **Data sample**
- **Sample selection**
- **Tracking efficiency**
- **Vertexing efficiency**



Data sample

Data:

UFO-05 DBV-23+	48 pb ⁻¹
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MC:

all_phys mcr (dtr_gb_nr=0)	47 pb ⁻¹
ppg DBV-23 (mc_mccard_id=413)	147 pb ⁻¹
eeg10 mcr (mc_mccard_id=418)	84 pb ⁻¹
eeg100 mcr (mc_mccard_id=415)	380 pb ⁻¹



Sample preselection

At least 2 clusters with:

$$E_{cl} > 10 \text{ MeV}$$

$$\theta_{cl} > 23 \text{ degrees}$$

$$t_{cl} - r_{cl}/c < \min(2 \text{ ns}, 5\sigma_t)$$

At least 1 pair with:

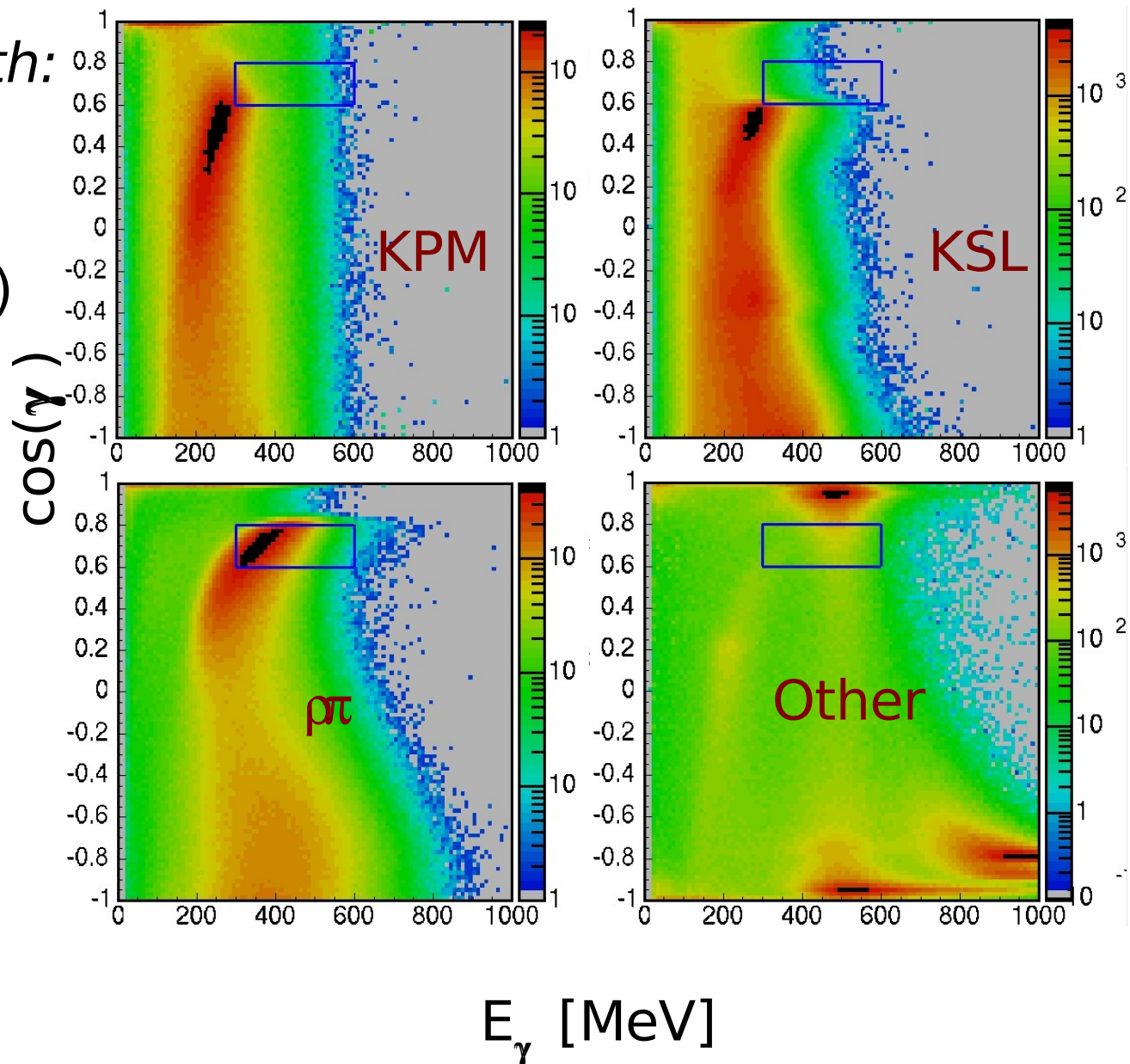
$$0.6 < \cos(\gamma) < 0.8$$

$$300 < E_\gamma < 600 \text{ MeV}$$

$$\text{No cut on } |m_{\pi^0} - m_\gamma|$$

At least 1 track
(safe wrt DC off)

Other includes also $\pi\pi\gamma$
and radiative Bhabha's





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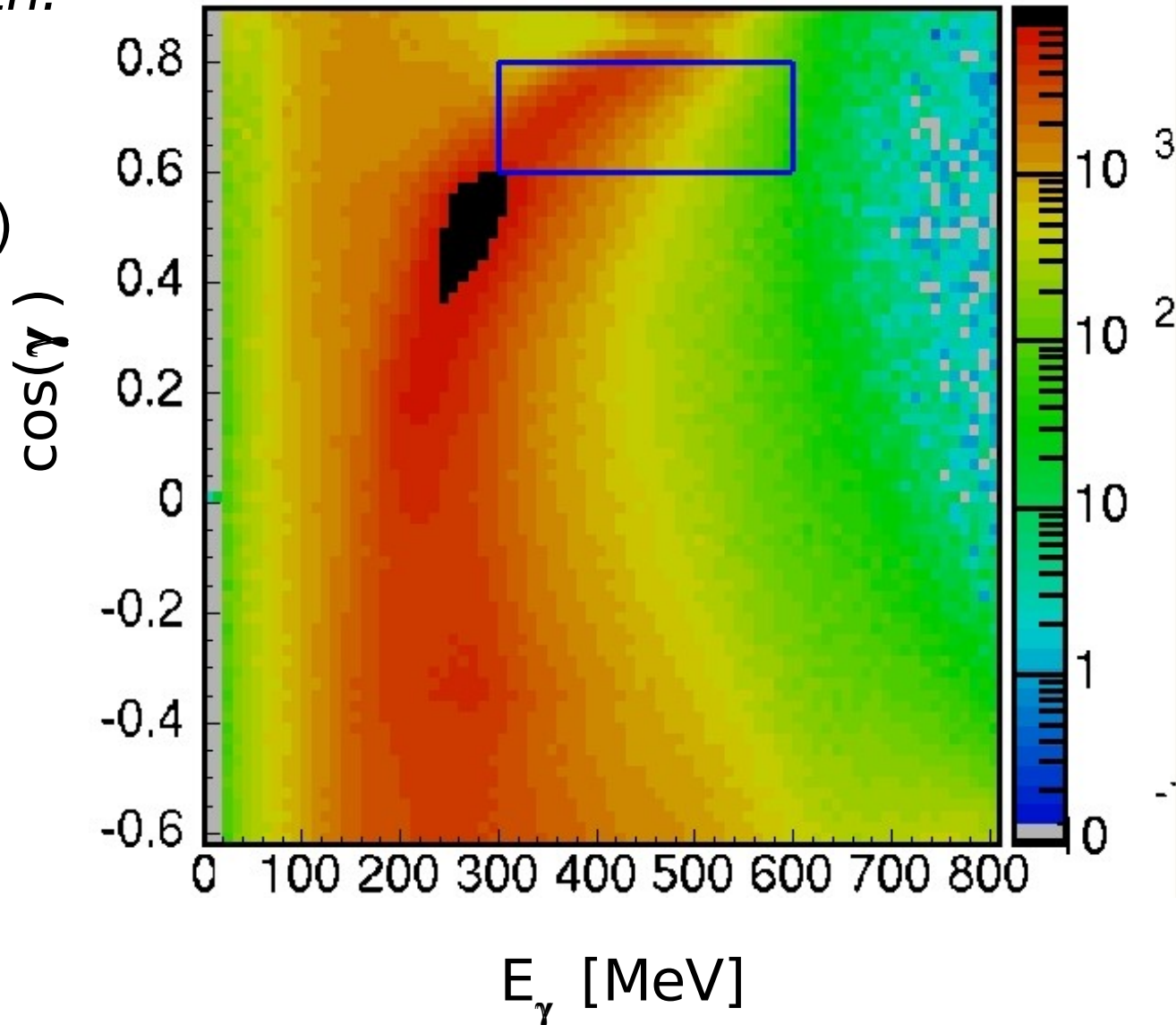
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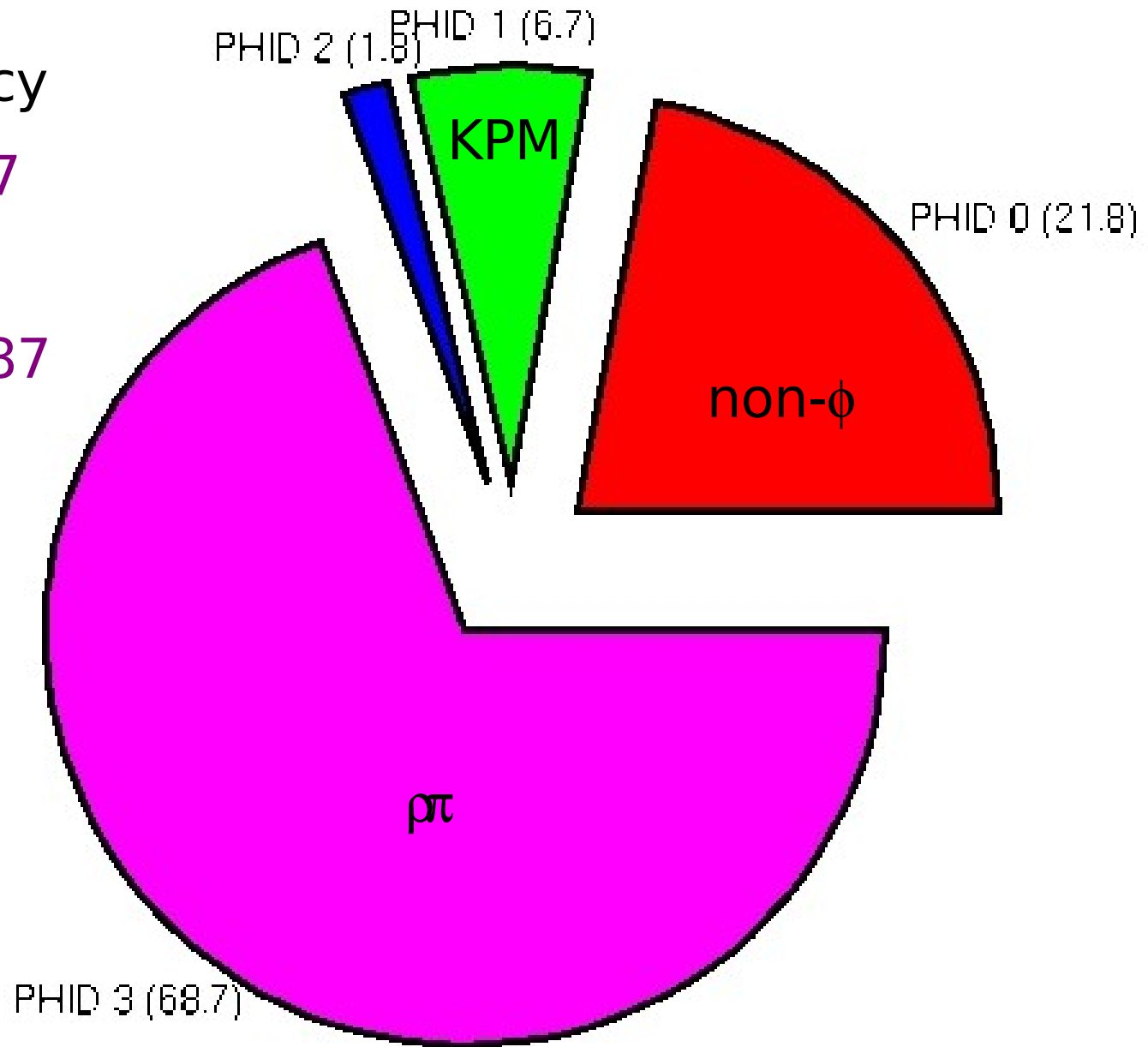




Efficiency & purity: step 1

Preselection efficiency
on $\rho\pi$ stream ~ 0.27

Sample purity ~ 0.687





Sample selection

Previous cluster pair clusters have to be:

in-time (3σ)

w/o associated tracks (Official TCLO)

self-triggering (on the barrel and $E_{cl} > 70$ MeV)

$$|m_{\pi^0} - m_{\gamma}| < 40 \text{ MeV}$$

No other in-time cluster pairs with $|m_{\pi^0} - m_{\gamma}| < 40$ MeV

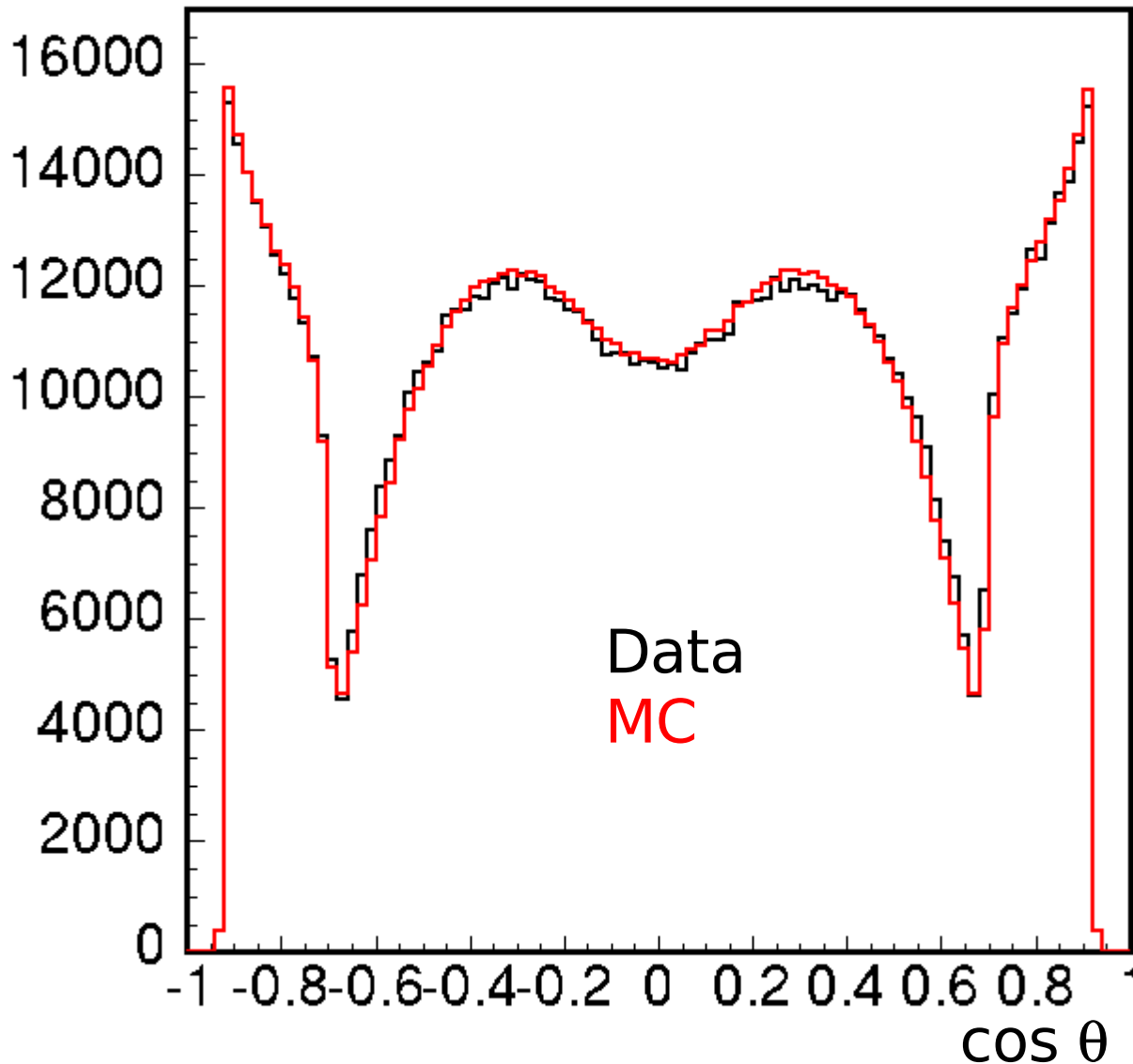
#tracks from IP = 1 or 2

$$\text{IP : } \Delta\phi_{\text{PCA}} < 4 \text{ cm and } \Delta z_{\text{PCA}} < 6 \text{ cm}$$



Sample selection

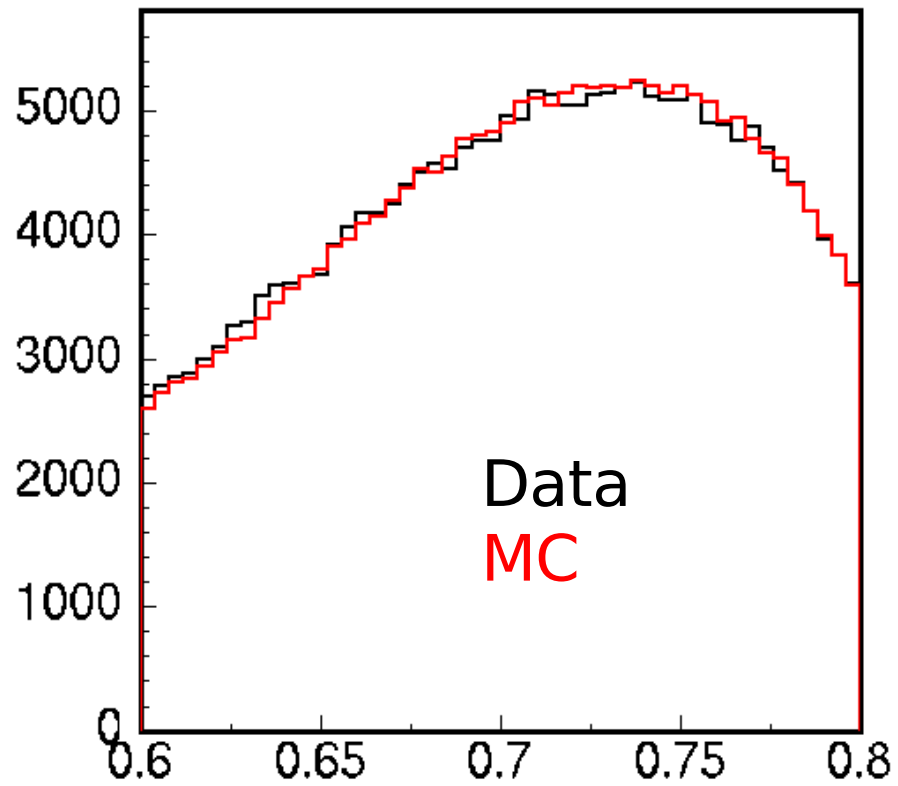
Polar angle of selected clusters before cuts on tracks



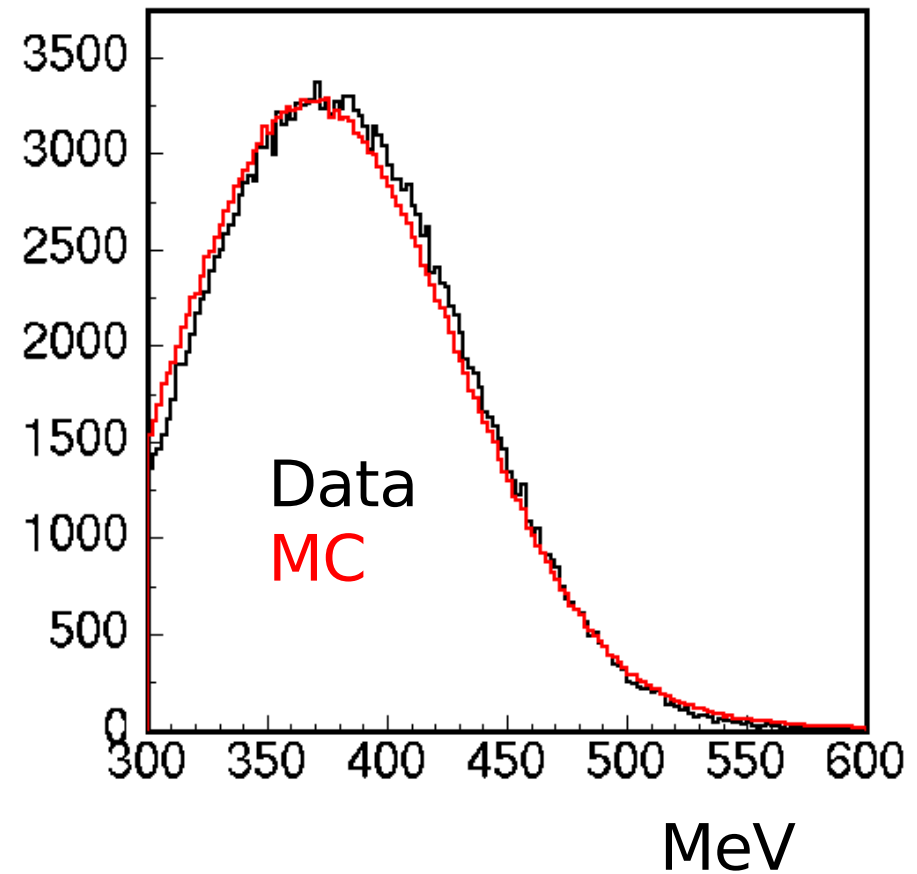


Sample selection

$\cos \theta_\gamma$



E_γ



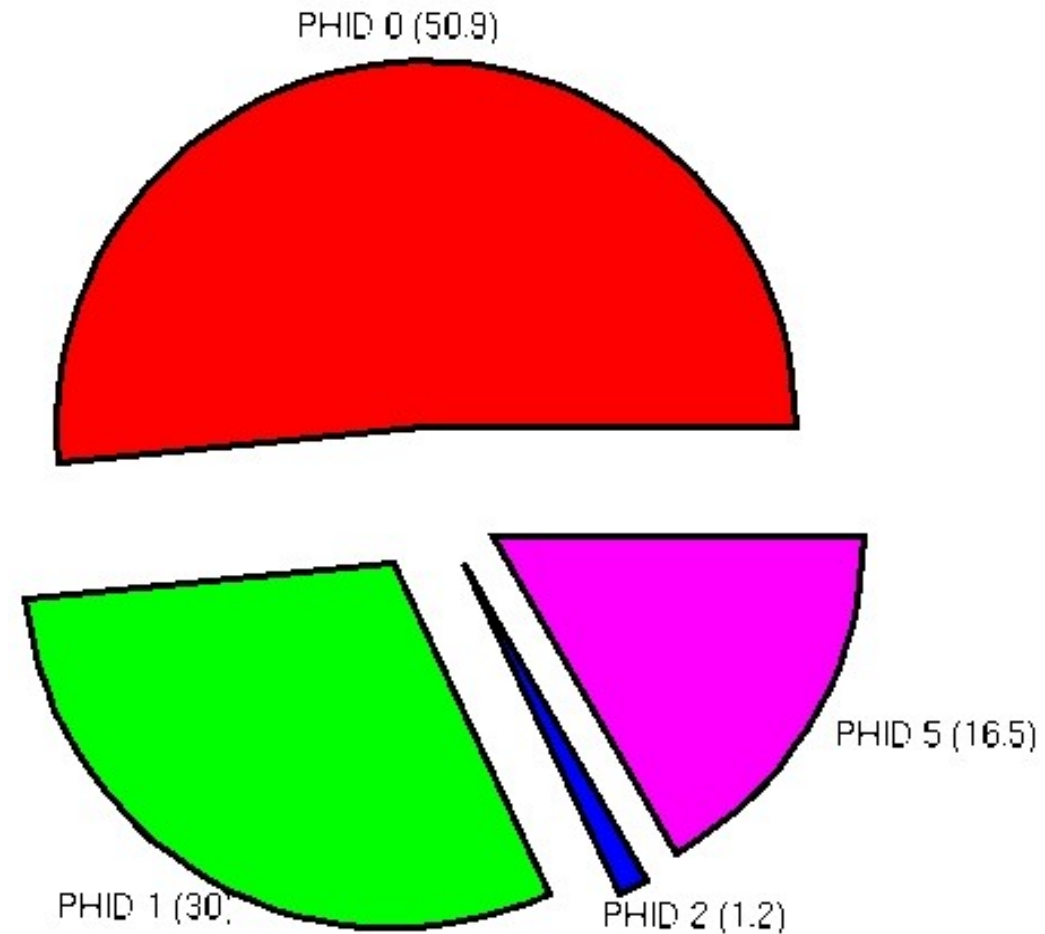


Efficiency & purity: final

Background composition

Selection efficiency
on $\rho\pi$ stream ~ 0.046

Sample purity ~ 0.997

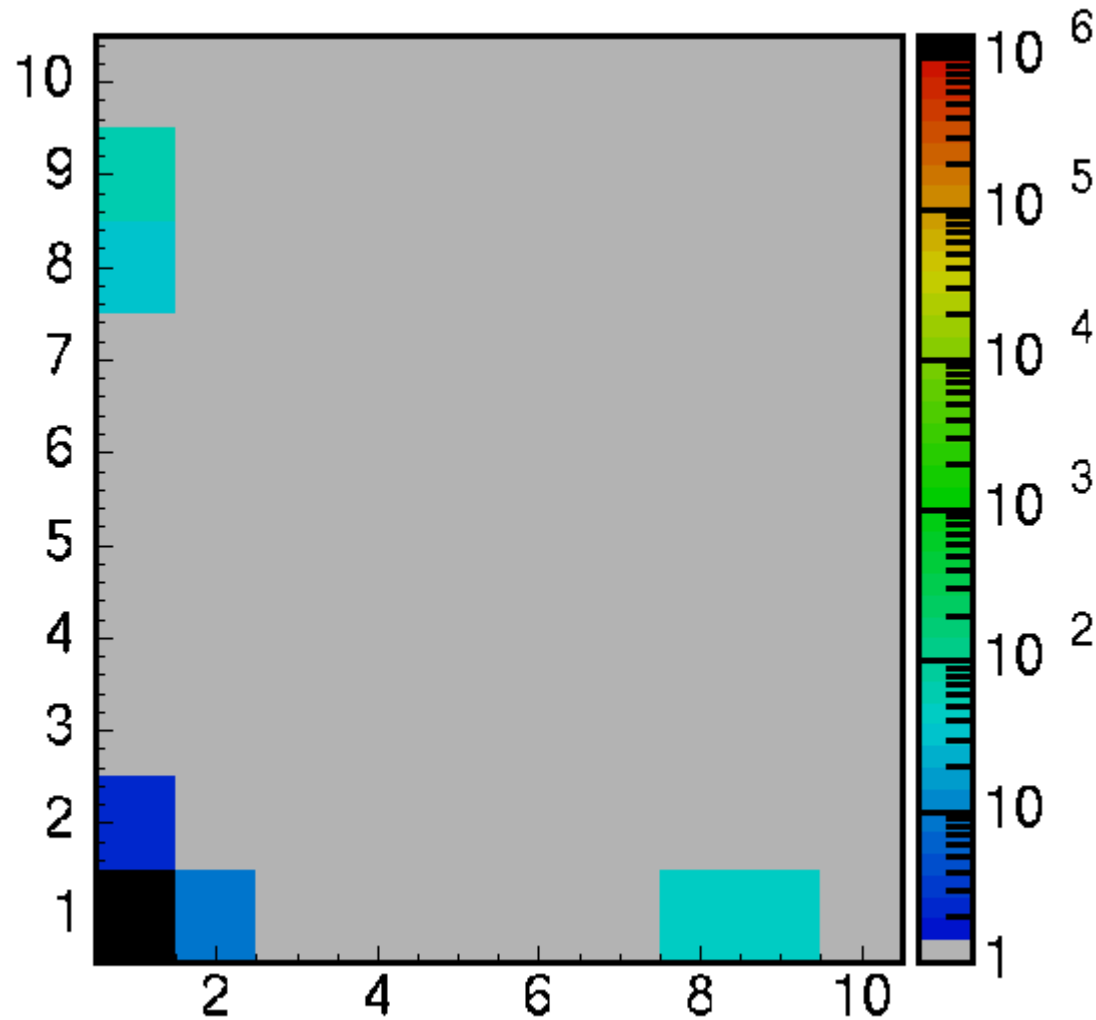


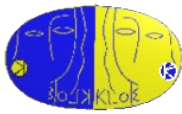
final non rho



Sample selection

pid1 (Id GEANT) of selected clusters: clu2 vs clu1





Tracking efficiency

Normalization is given by:

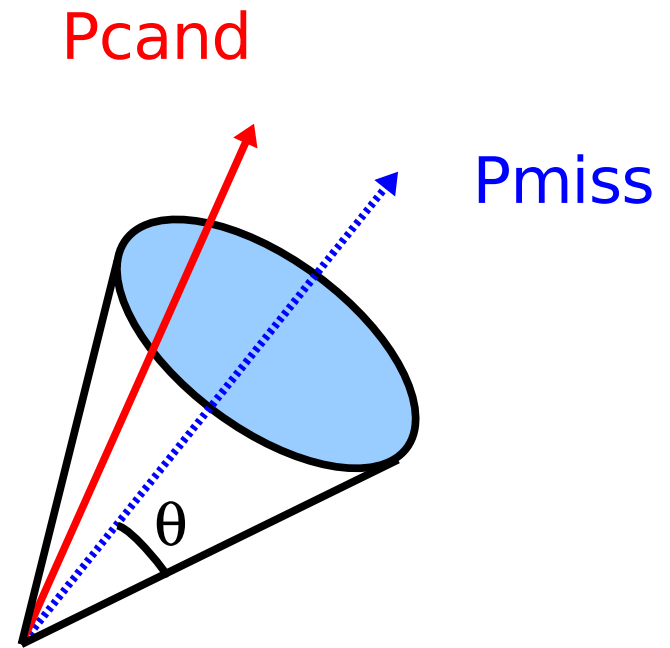
Tagging track randomly chosen

Quality cut applied on the tag:

$$R_{LH} - R_{FH} > 100 \text{ cm}$$

Look for **second track (candidate)** around **Pmiss**

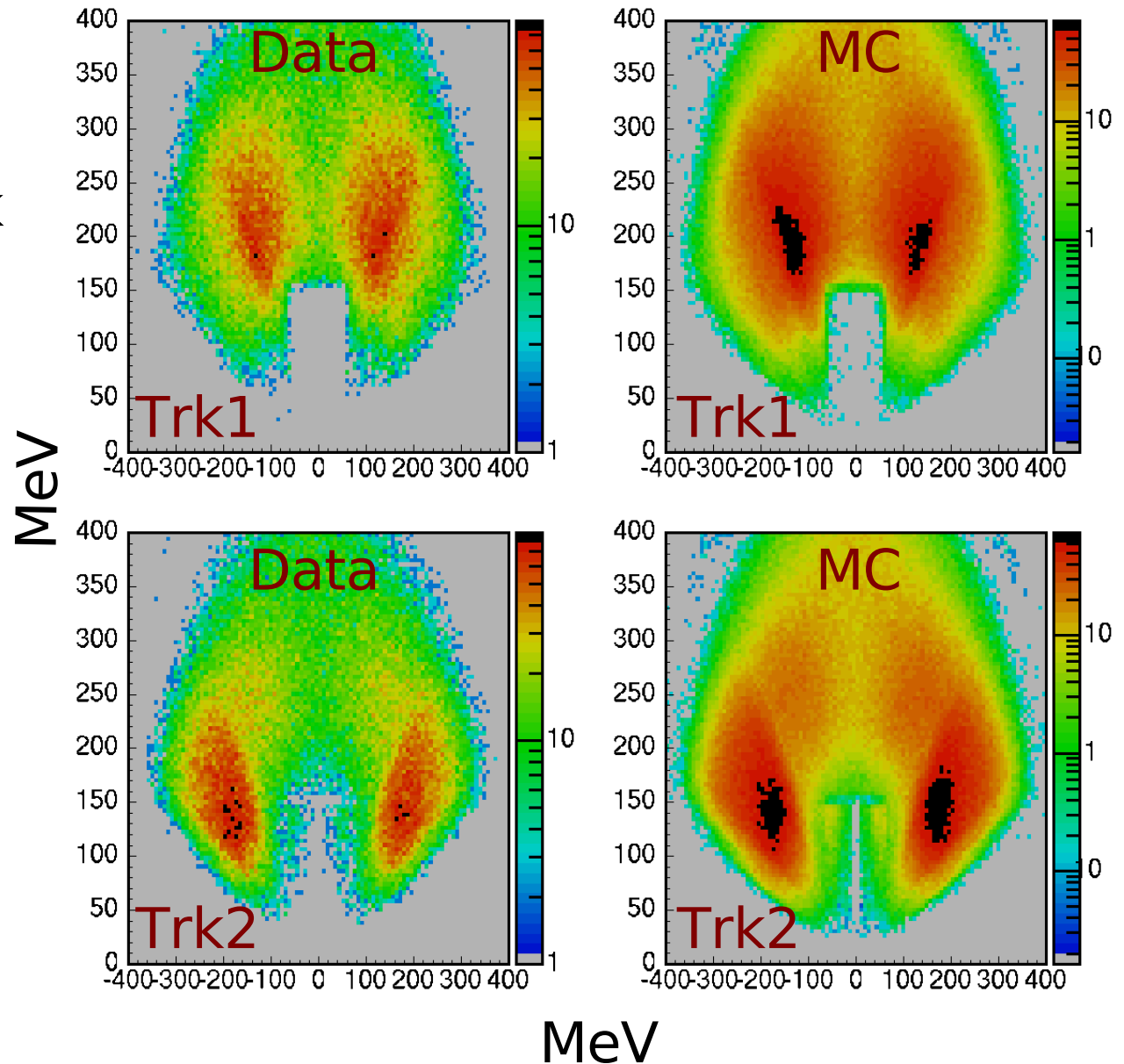
$$\cos \theta > 0.8$$



Tracking efficiency



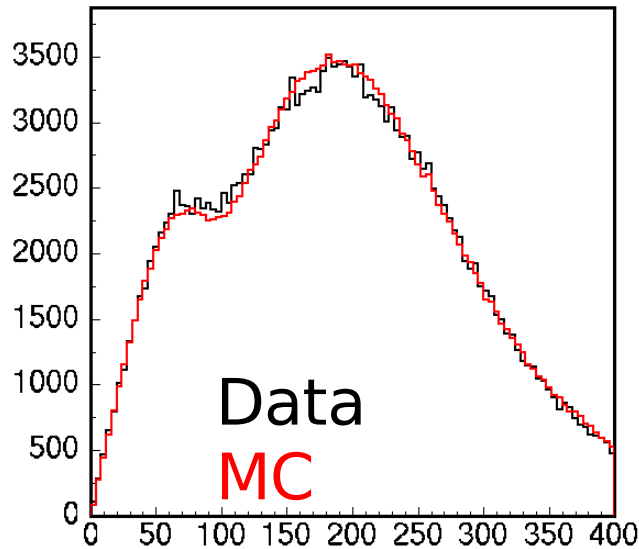
Why the tagging track is randomly chosen?
Otherwise a spectrum **distorsion** in the P_T vs P_z plane is introduced





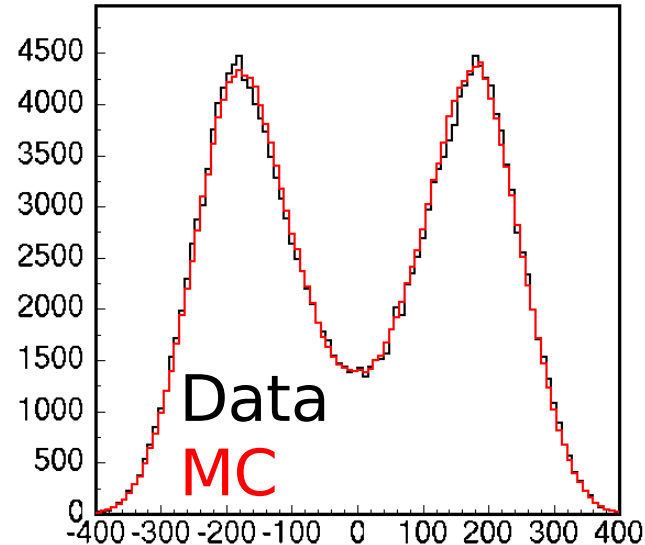
Tracking efficiency

P_T miss



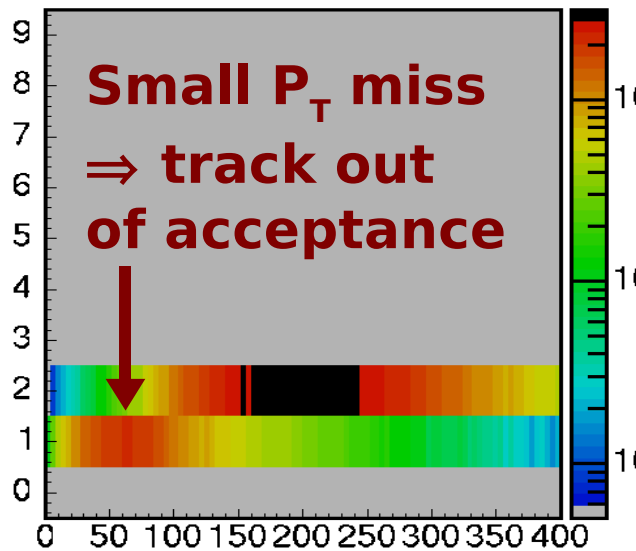
MeV

P_z miss



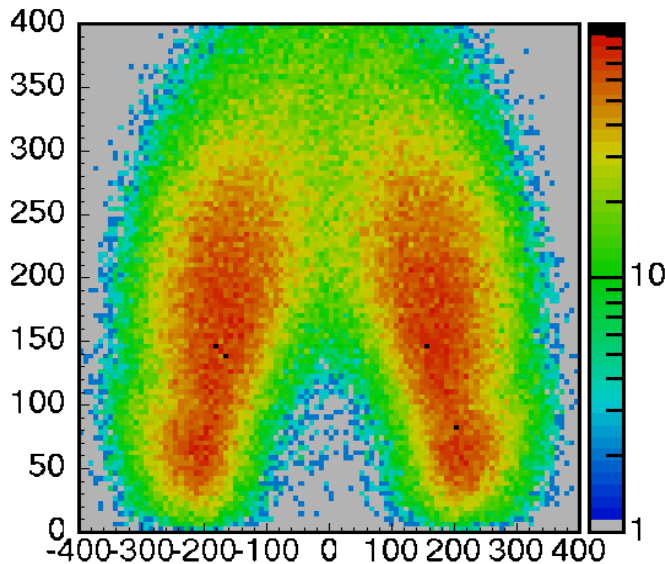
MeV

#tracks
from IP
vs
 P_T miss



MeV

P_T miss vs
 P_z miss
Data



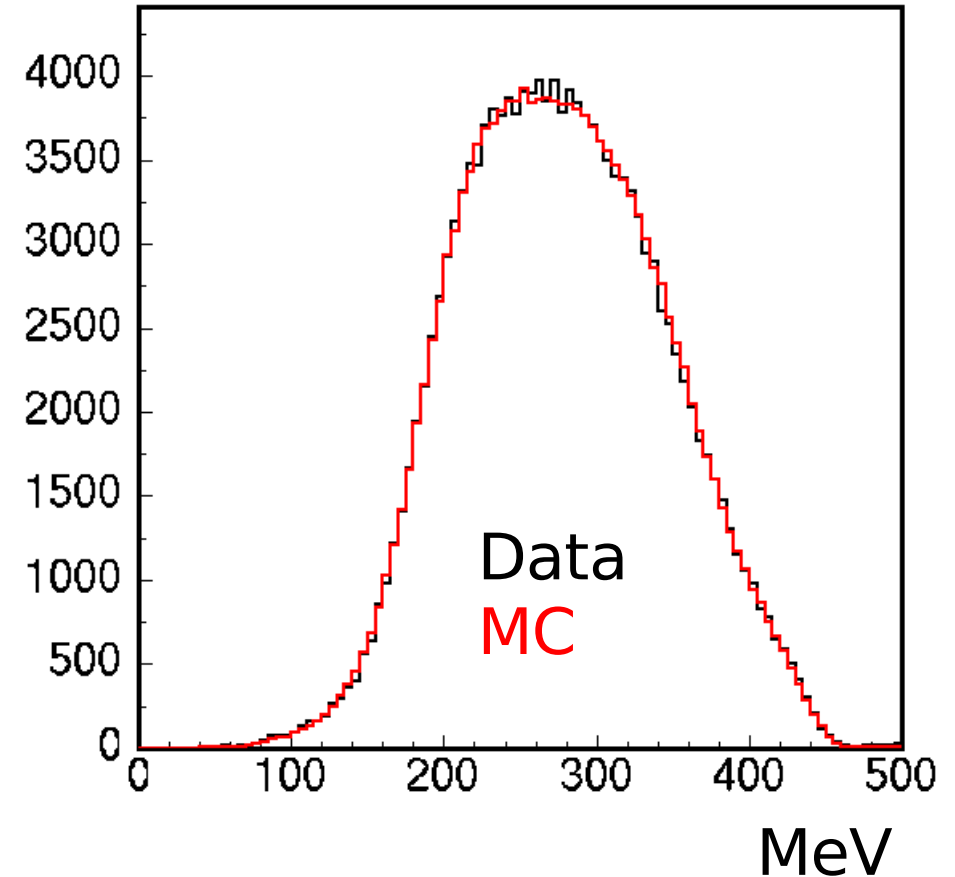
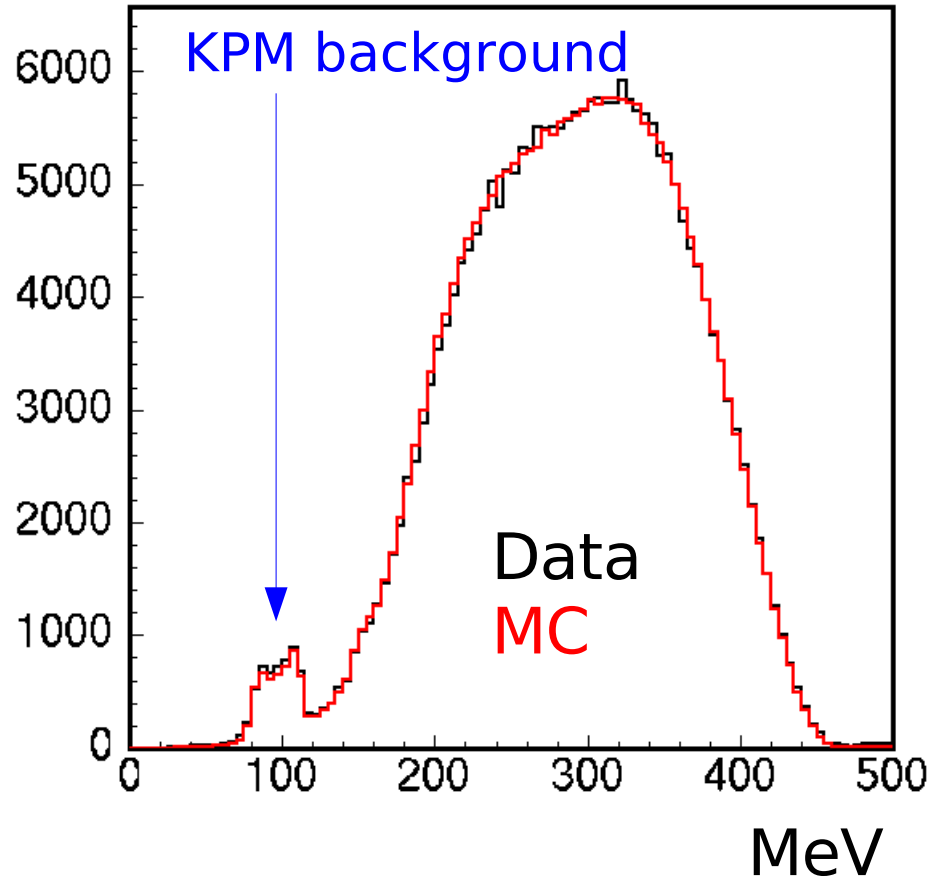
MeV



Tracking efficiency

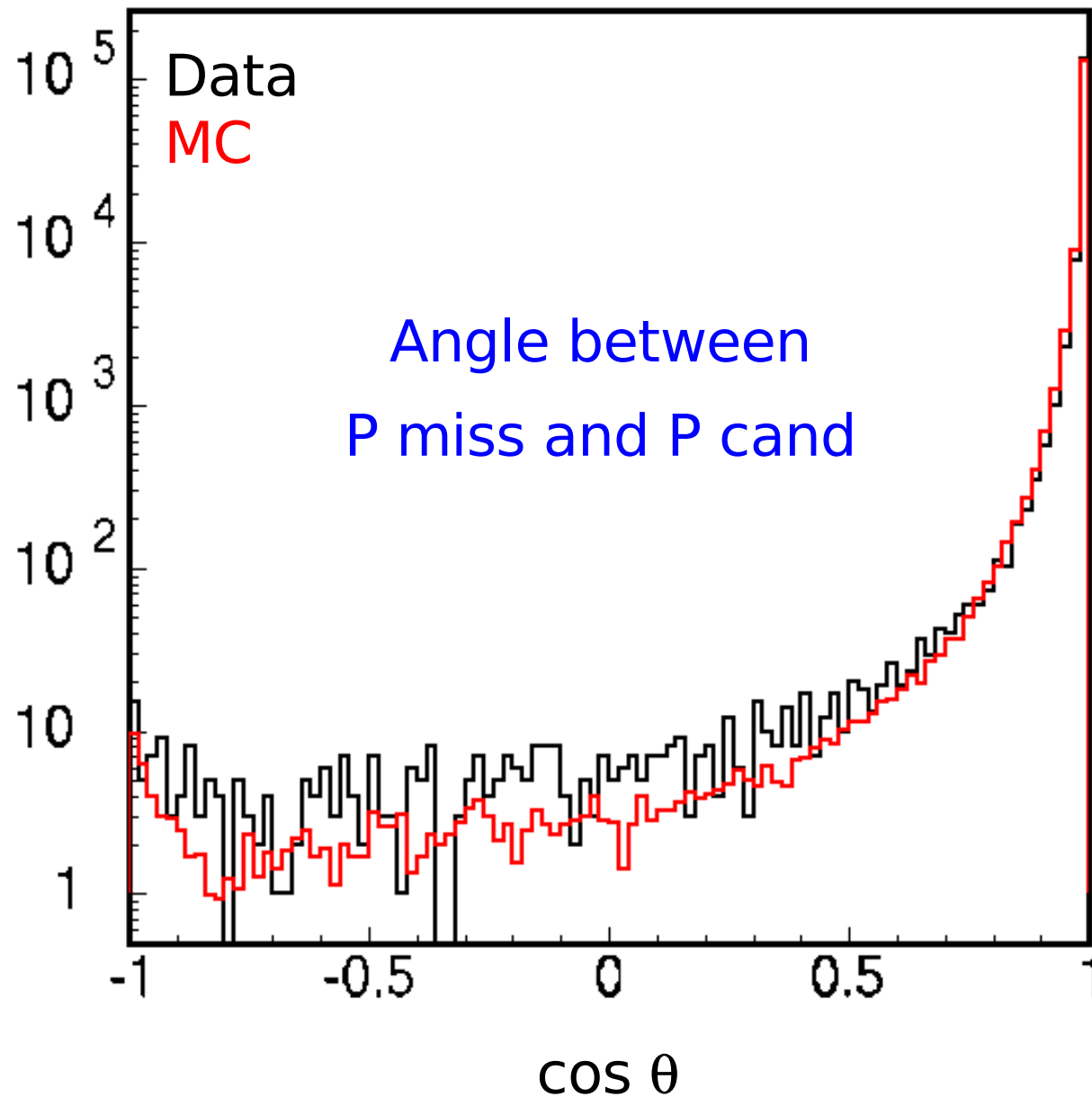
|P| tagging track
before quality cut

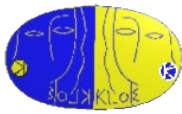
|P| second track
(candidate track)



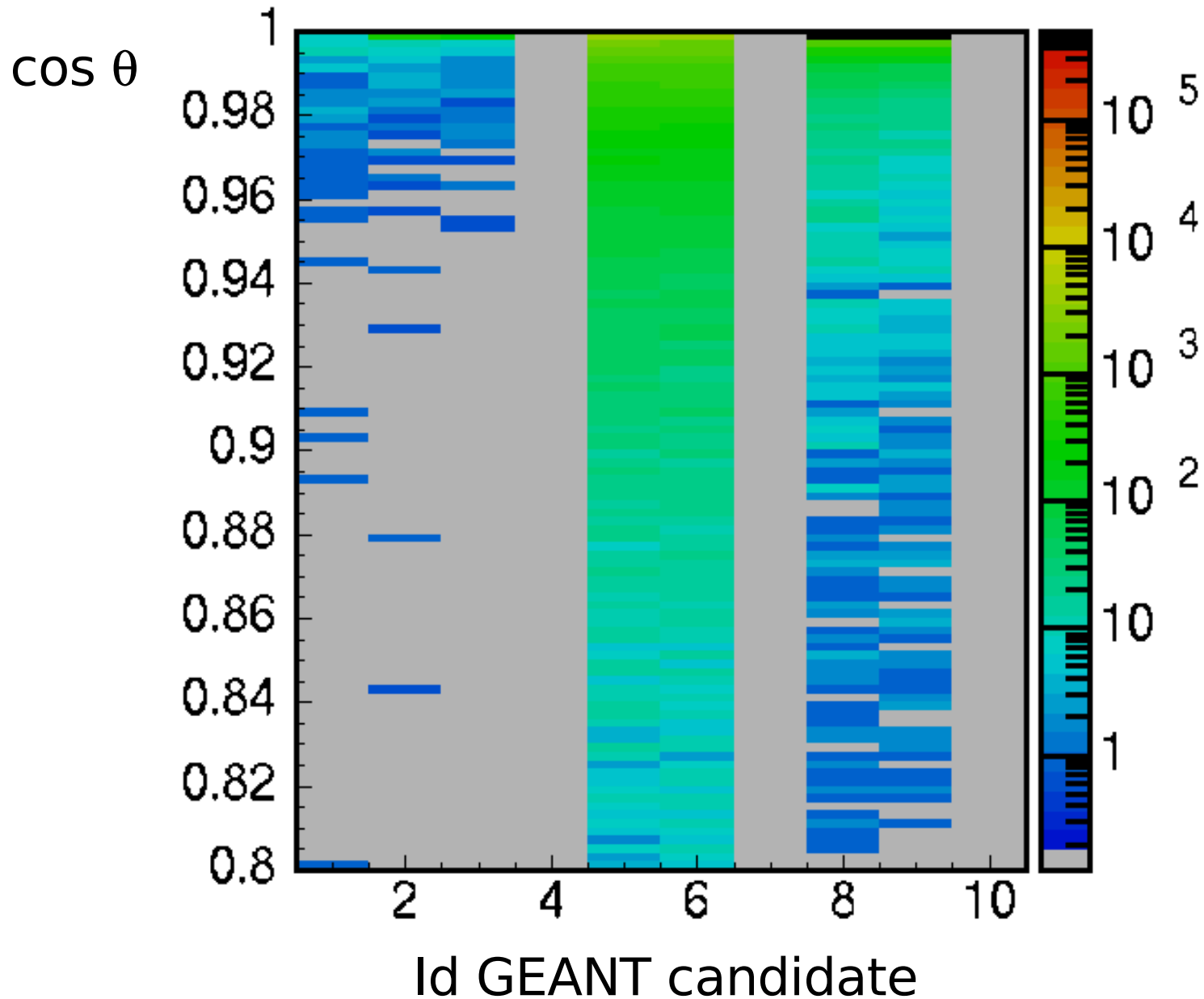


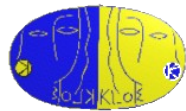
Tracking efficiency



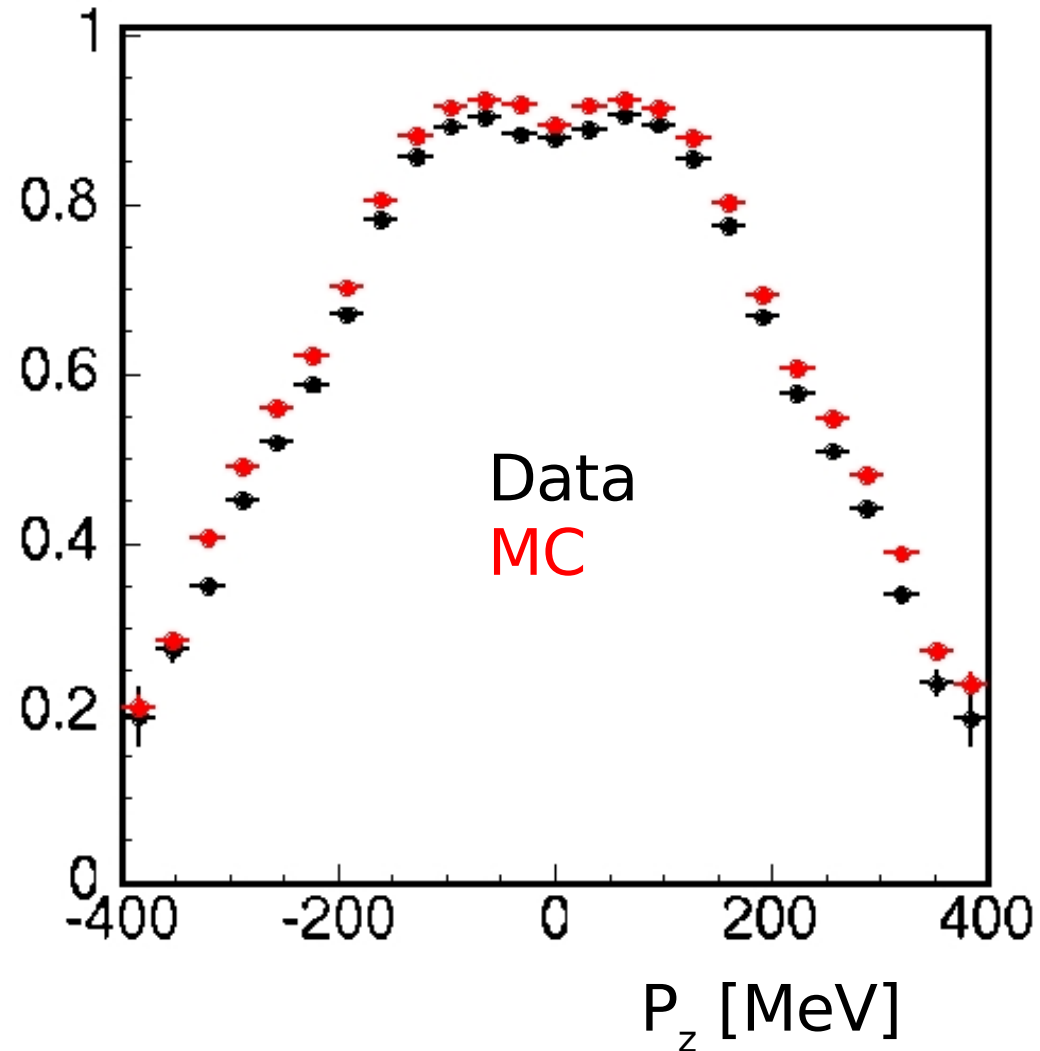
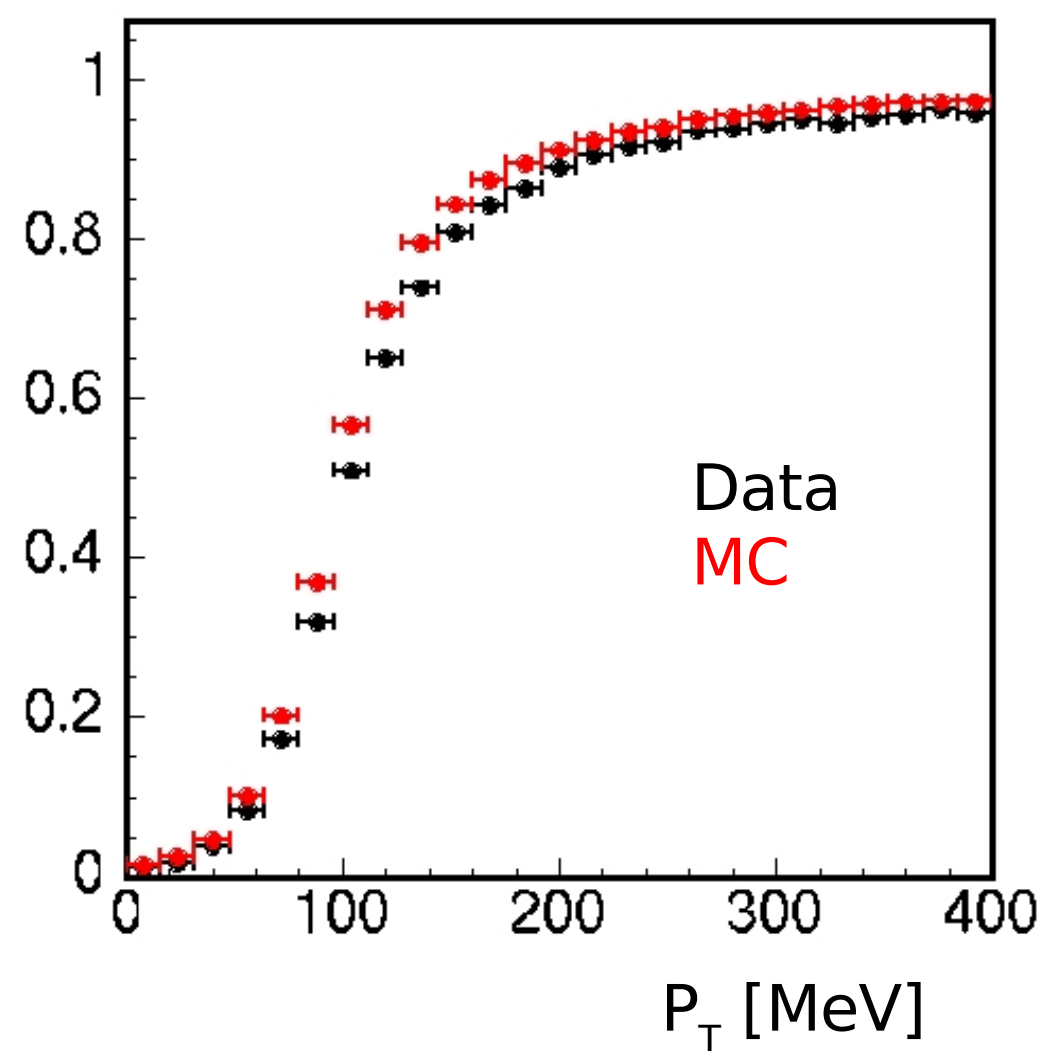


Tracking efficiency





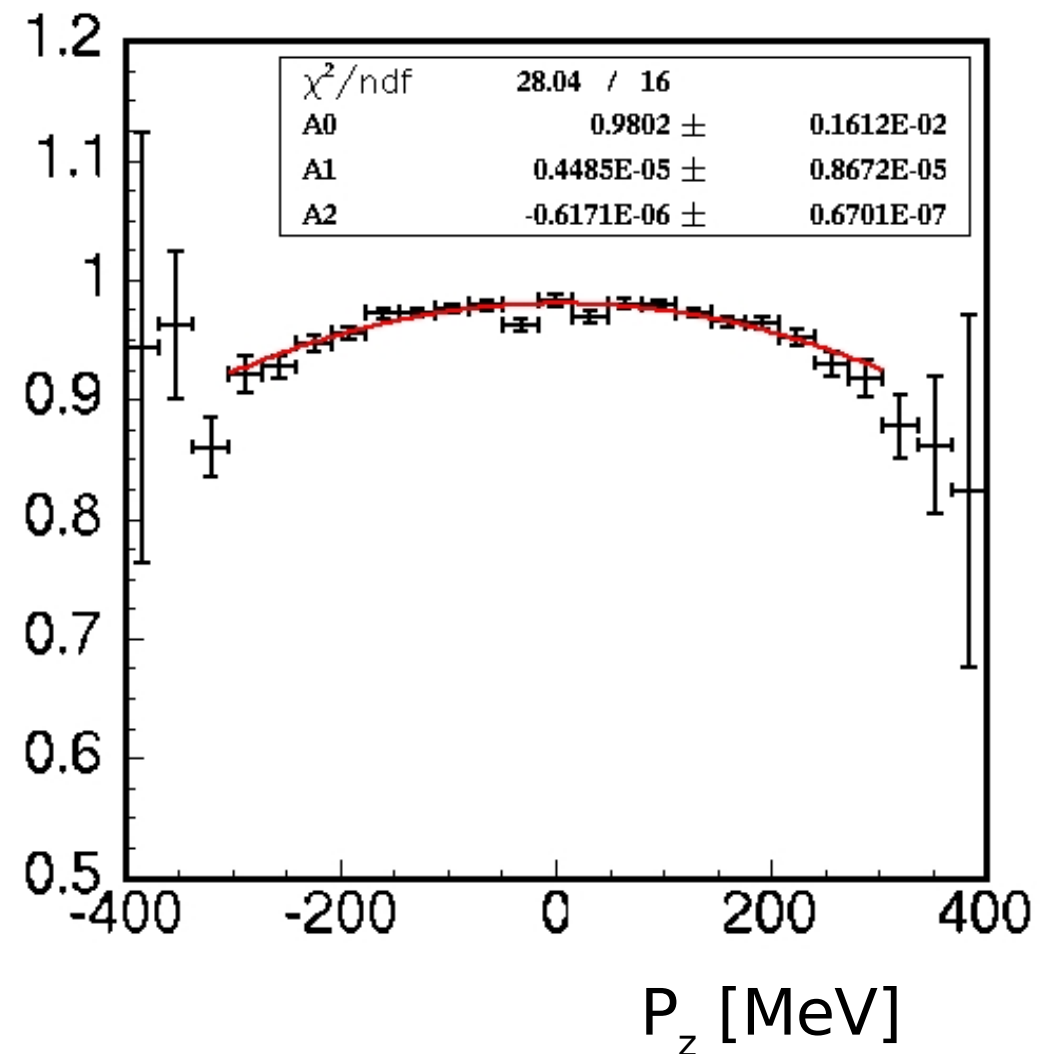
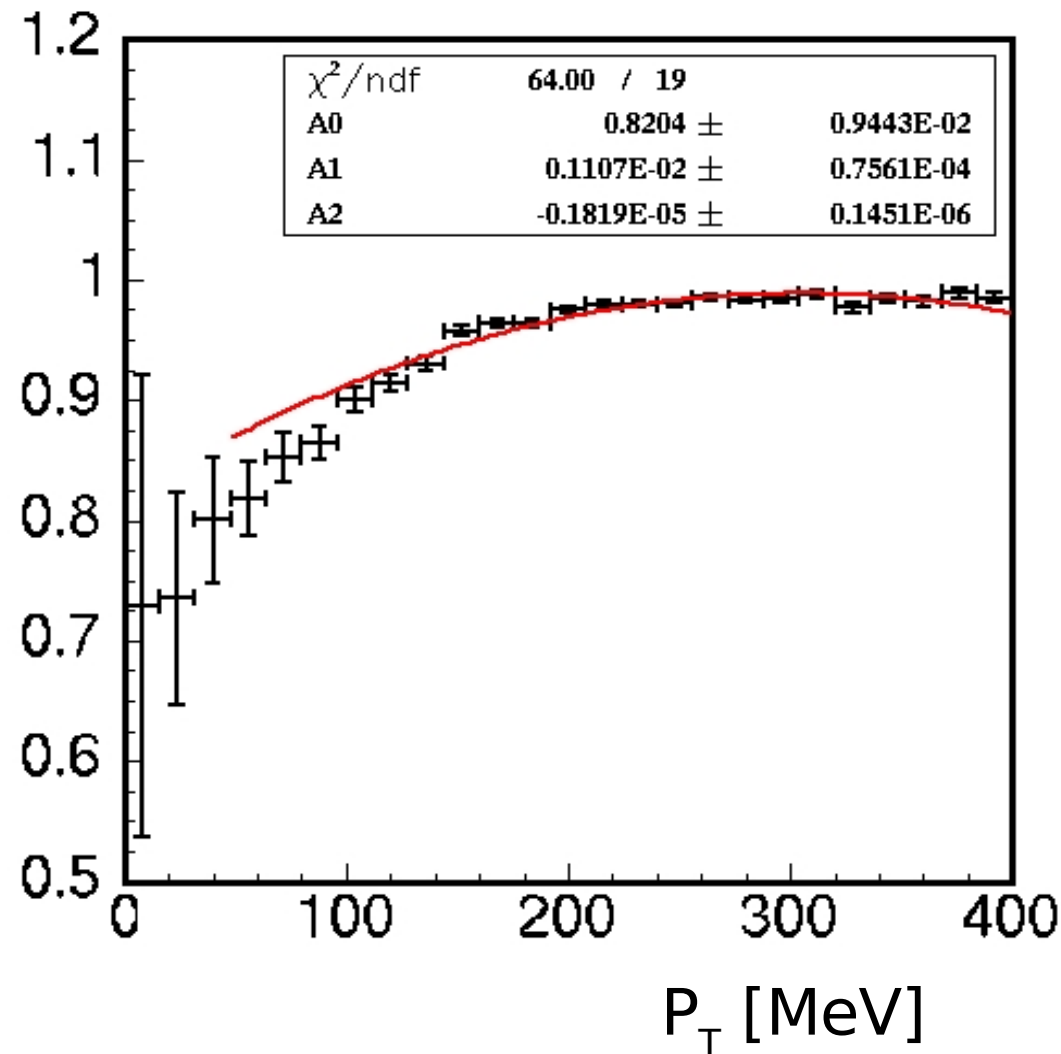
Tracking efficiency





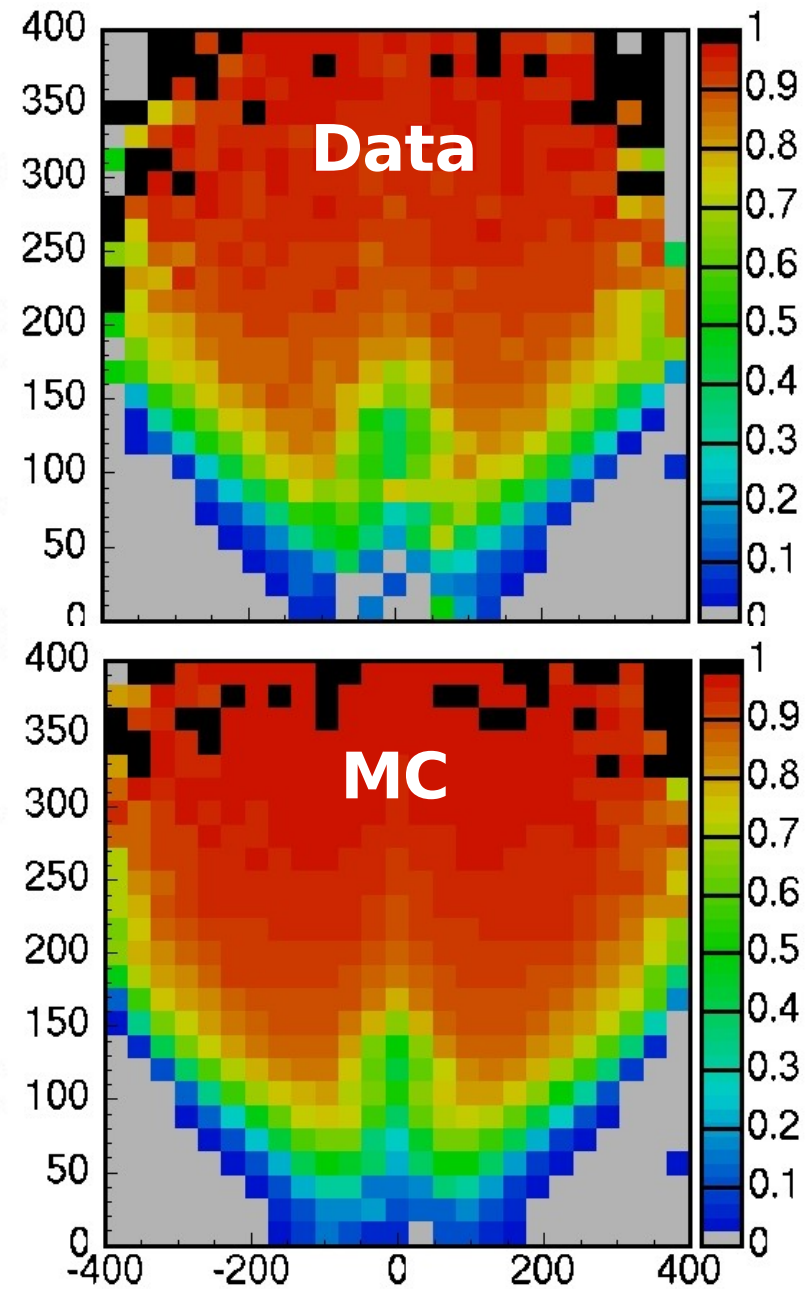
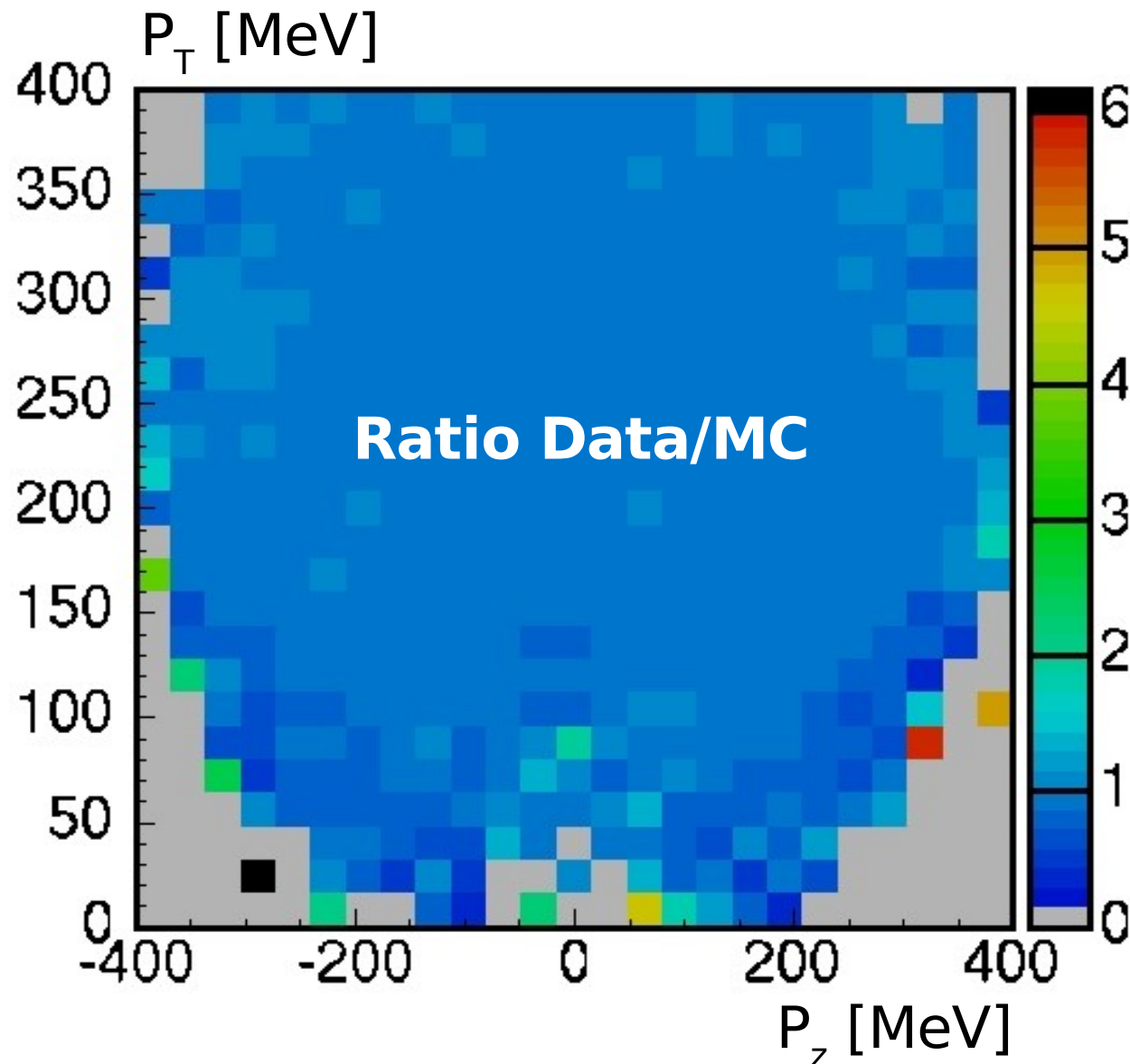
Tracking efficiency

Ratio Data/MC





Tracking efficiency





Vertexing efficiency

Given two tracks then look for a vertex
(quite simple, I would say)

