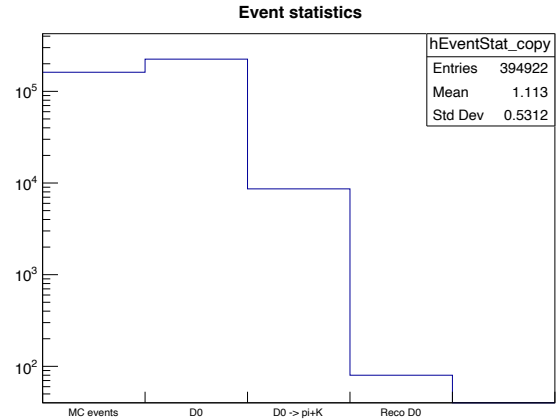# D0 reconstruction in DIS events
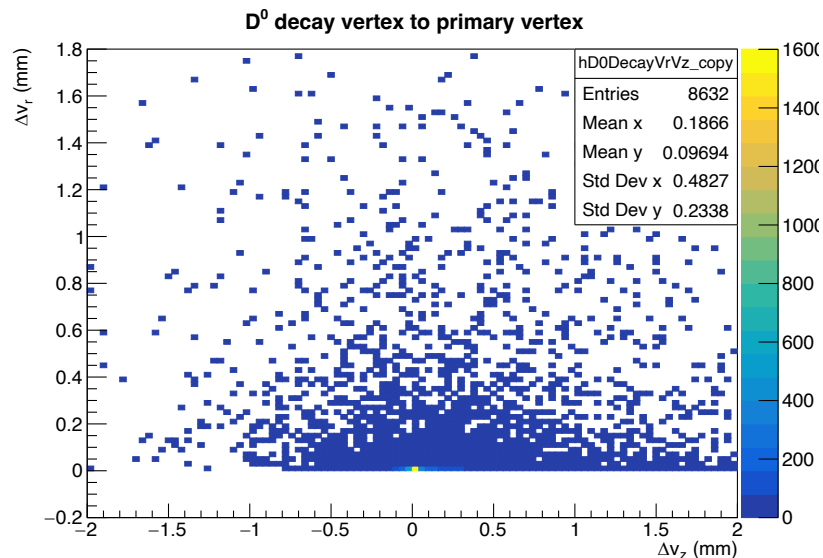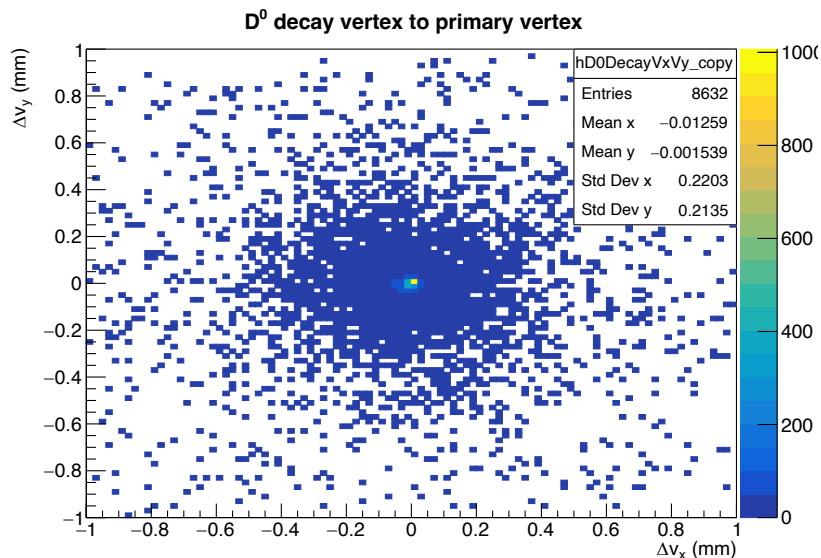
Rongrong Ma

Analysis setup

- PYTHIA 8.306 ep 18x275
- NC, $Q^2_{min} = 100$
- D^0-enriched sample
- Select events with D^0 or anti-D^0 that decays into $\pi + K$
  - Branching ratio: $(3.947 \pm 0.030)\%$

- EIC geometry: *epic-24.09.0*
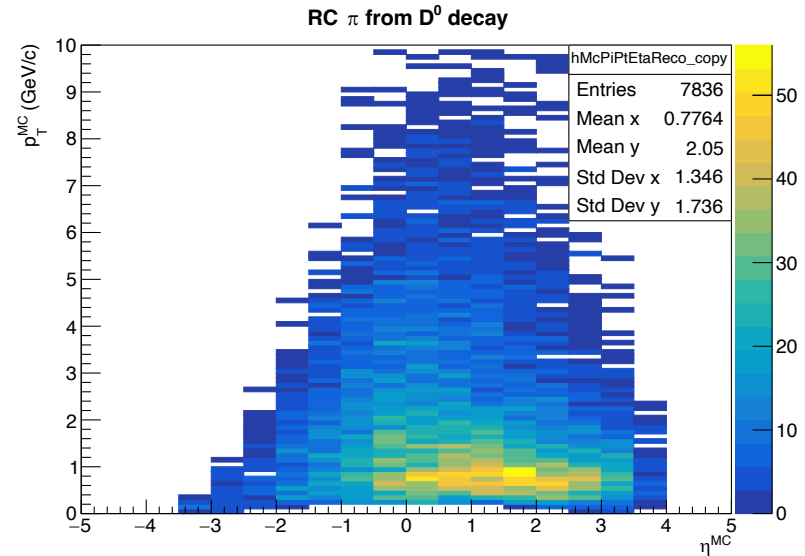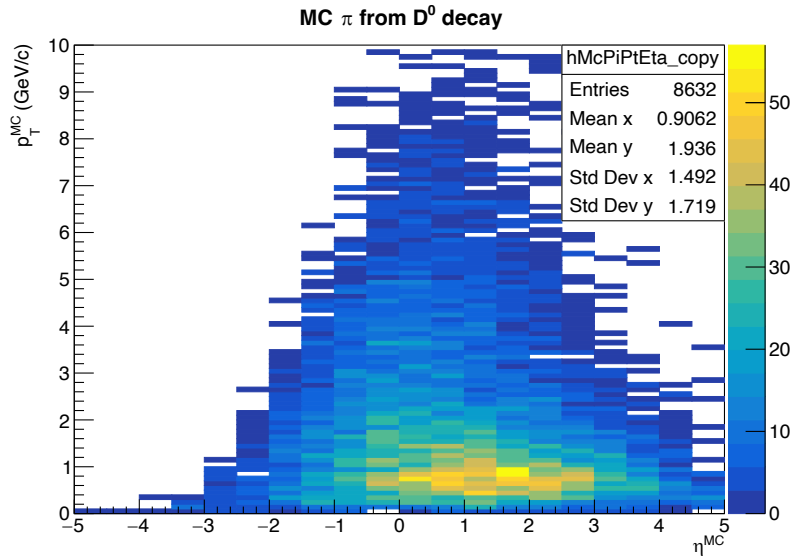- EICrecon: **default realistic seeding**

Event statistics

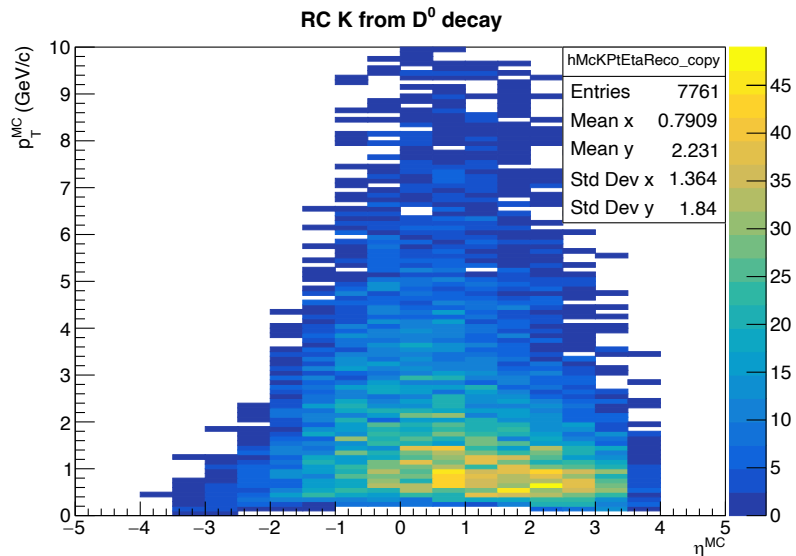| hEventStat_copy	
Entries	394922
Mean	1.113
Std Dev	0.5312

MC events   D0   D0 -> pi+K   Reco D0

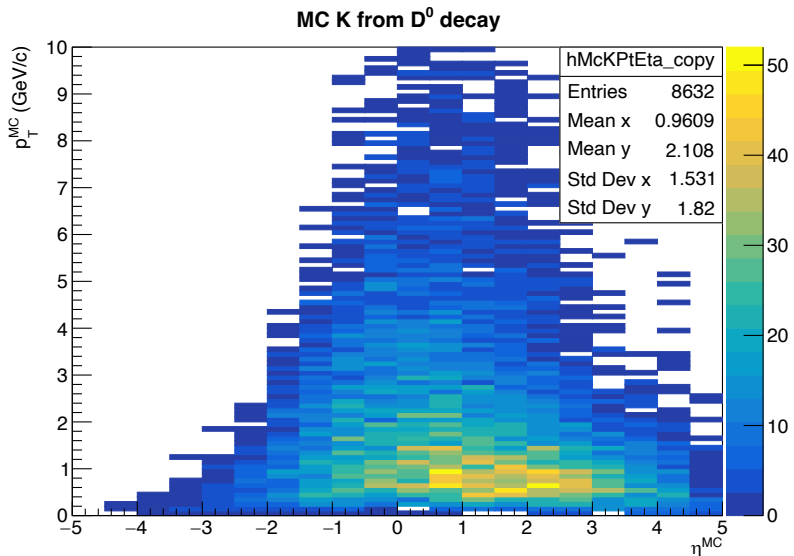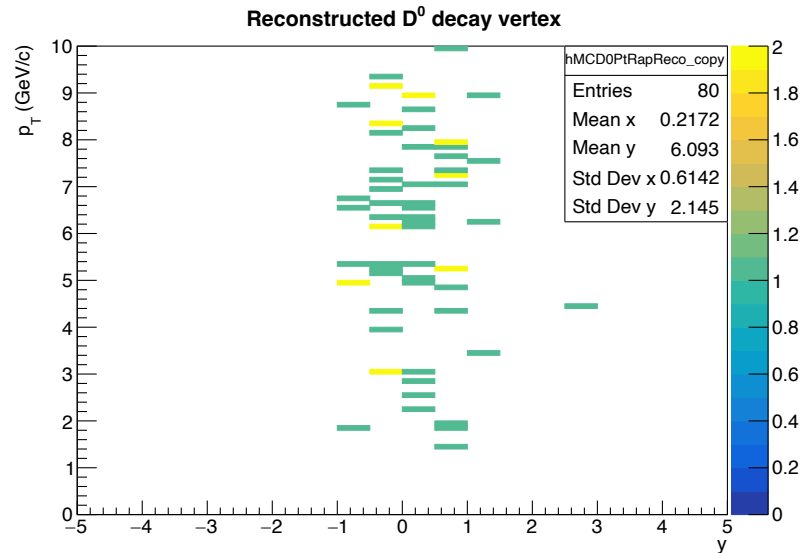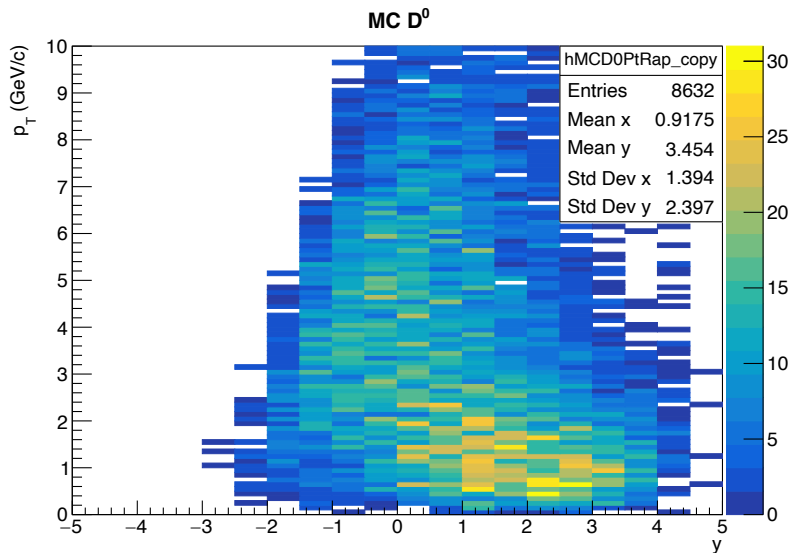# D^0 decay vertex w.r.t. primary vertex

- MC information

D⁰ decayed pion

D^0 decayed Kaon

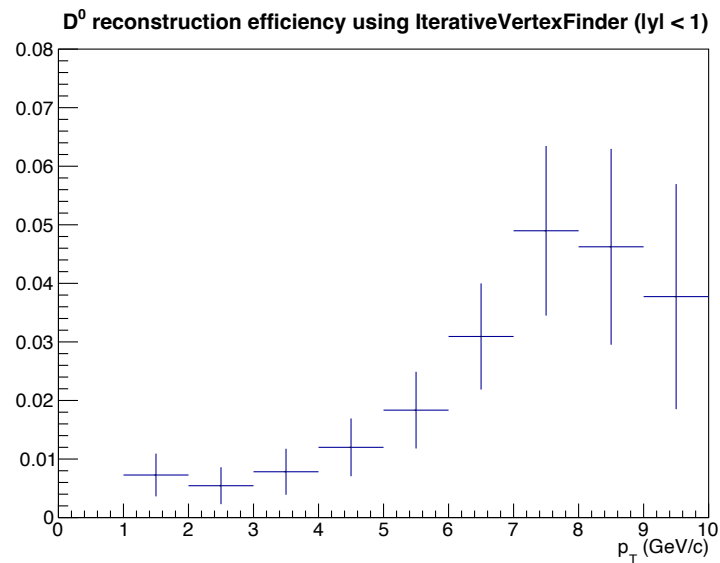# D^0 reconstruction in IterativeVertexFinder

- If a vertex is reconstructed solely out of D^0 decay daughters, the D^0 decay vertex is considered reconstructed
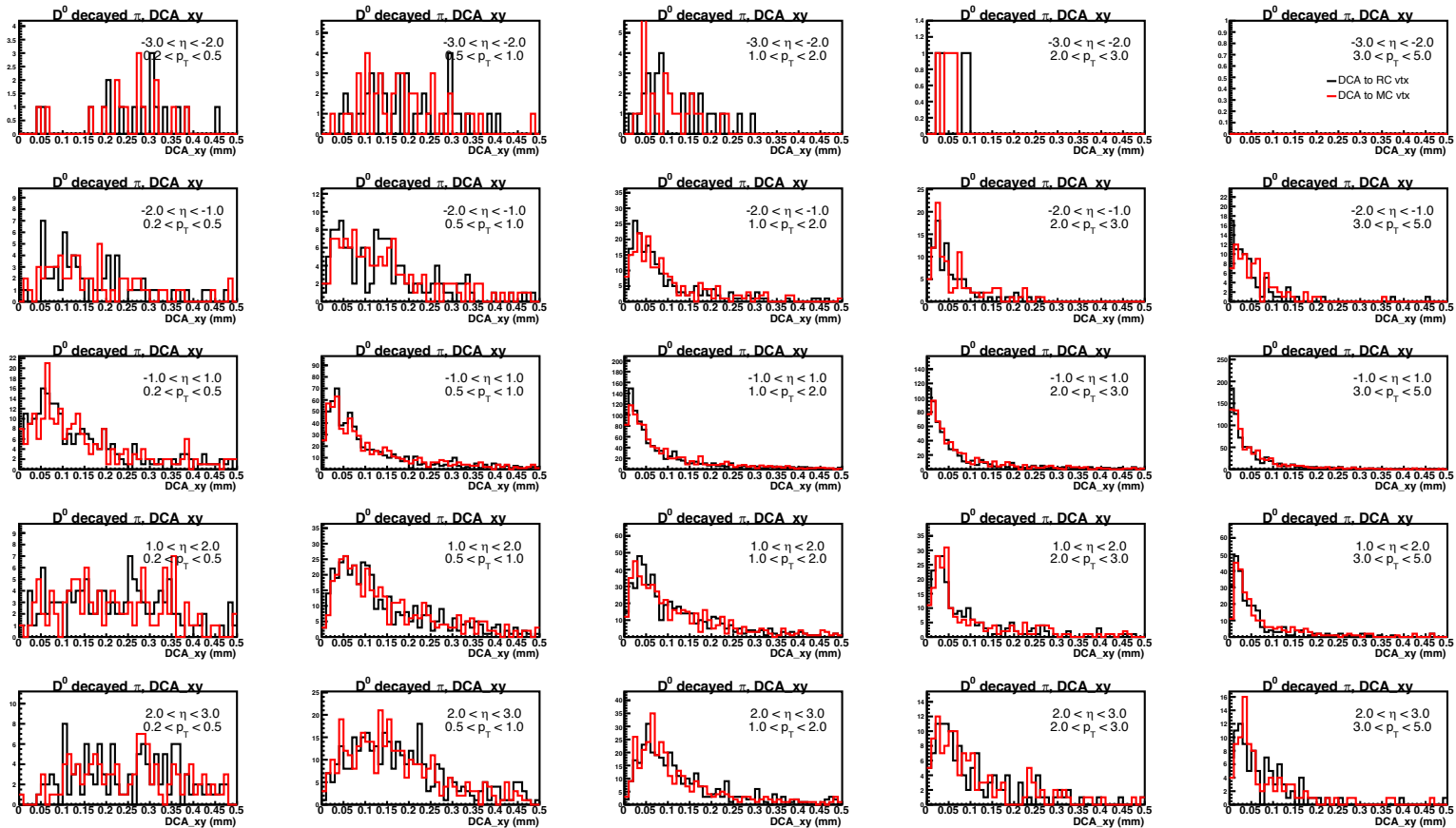
D^0 decay reconstruction

- Inclusive reconstruction efficiency ~ 1%
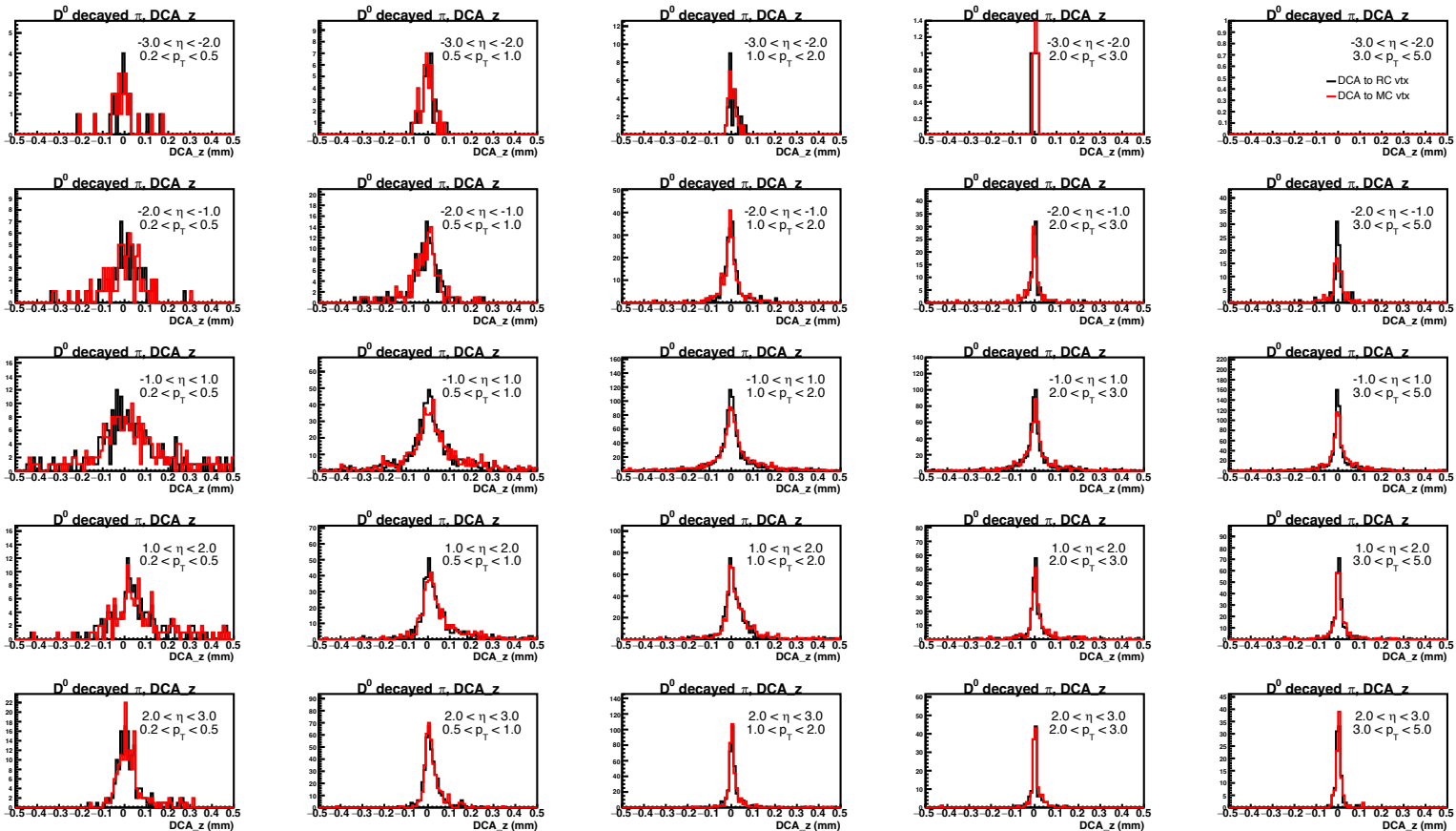
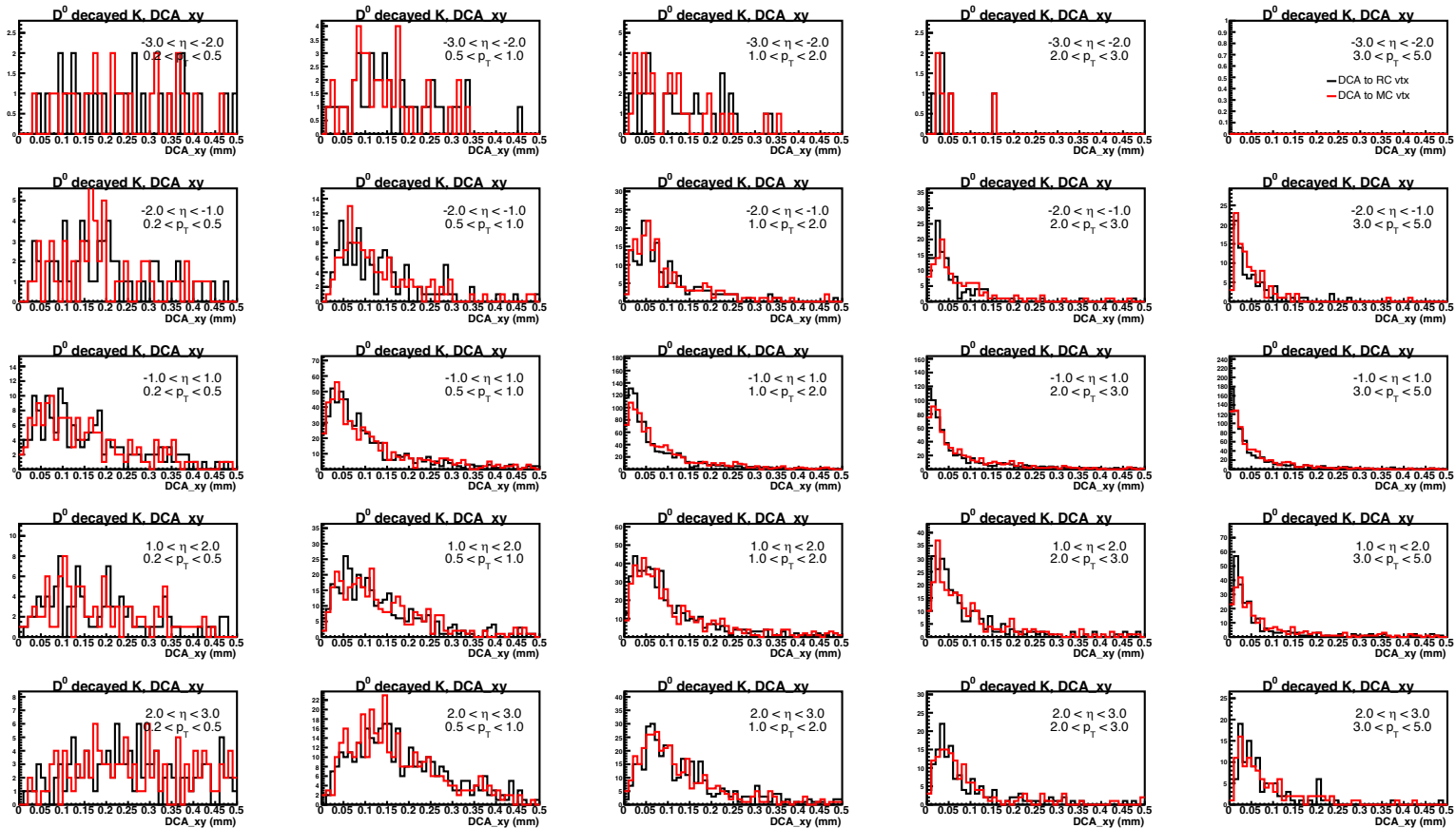# D^0 reconstruction efficiency

D^0 reconstruction efficiency using IterativeVertexFinder (|y| < 1)

D^0 reconstruction based on topology

DCA_{xy} for D^0 decayed pion

DCA$_z$ for D^0 decayed pion

DCA_{xy} for D^0 decayed Kaon
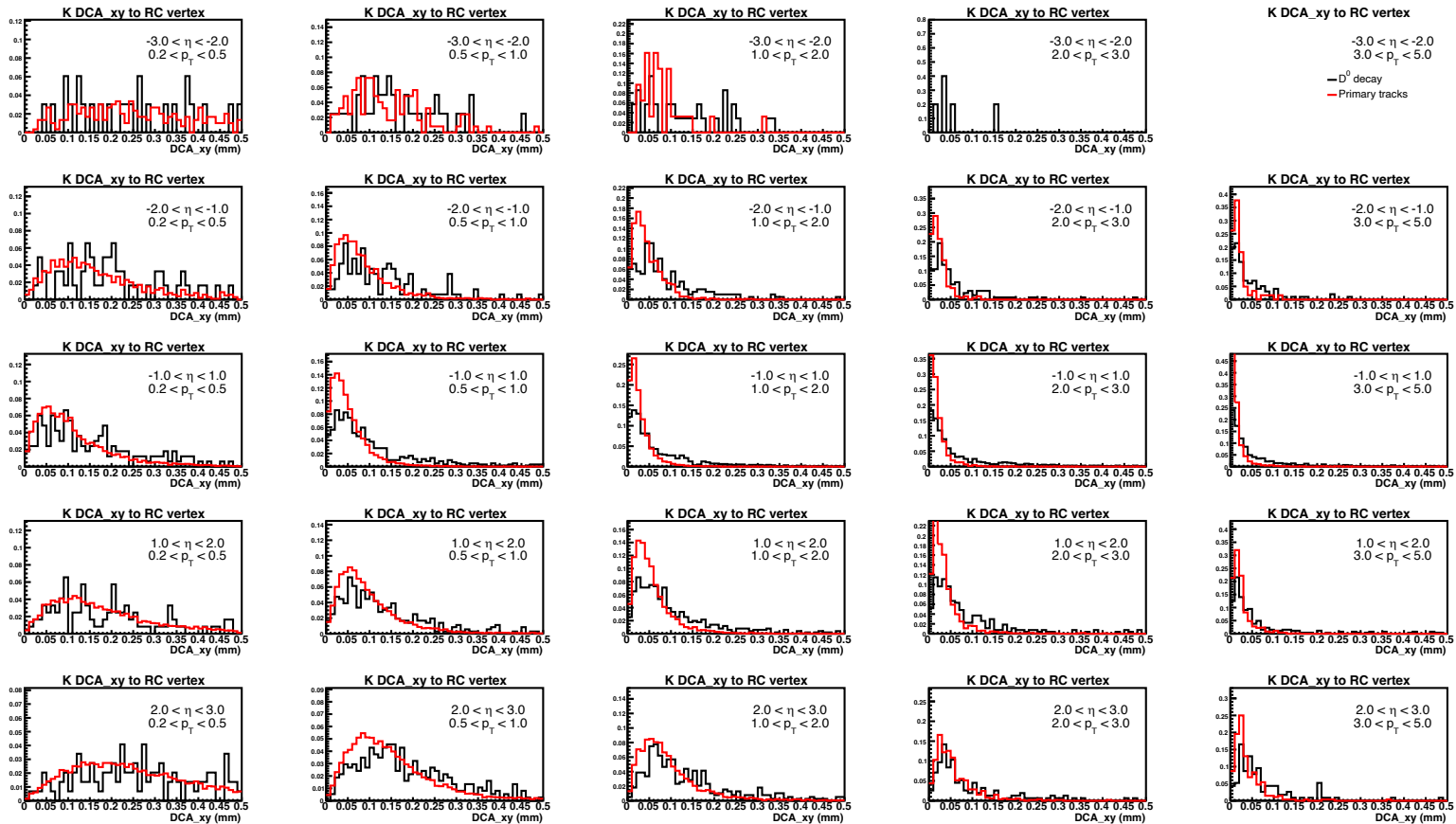
DCA$_z$ for D^0 decayed Kaon
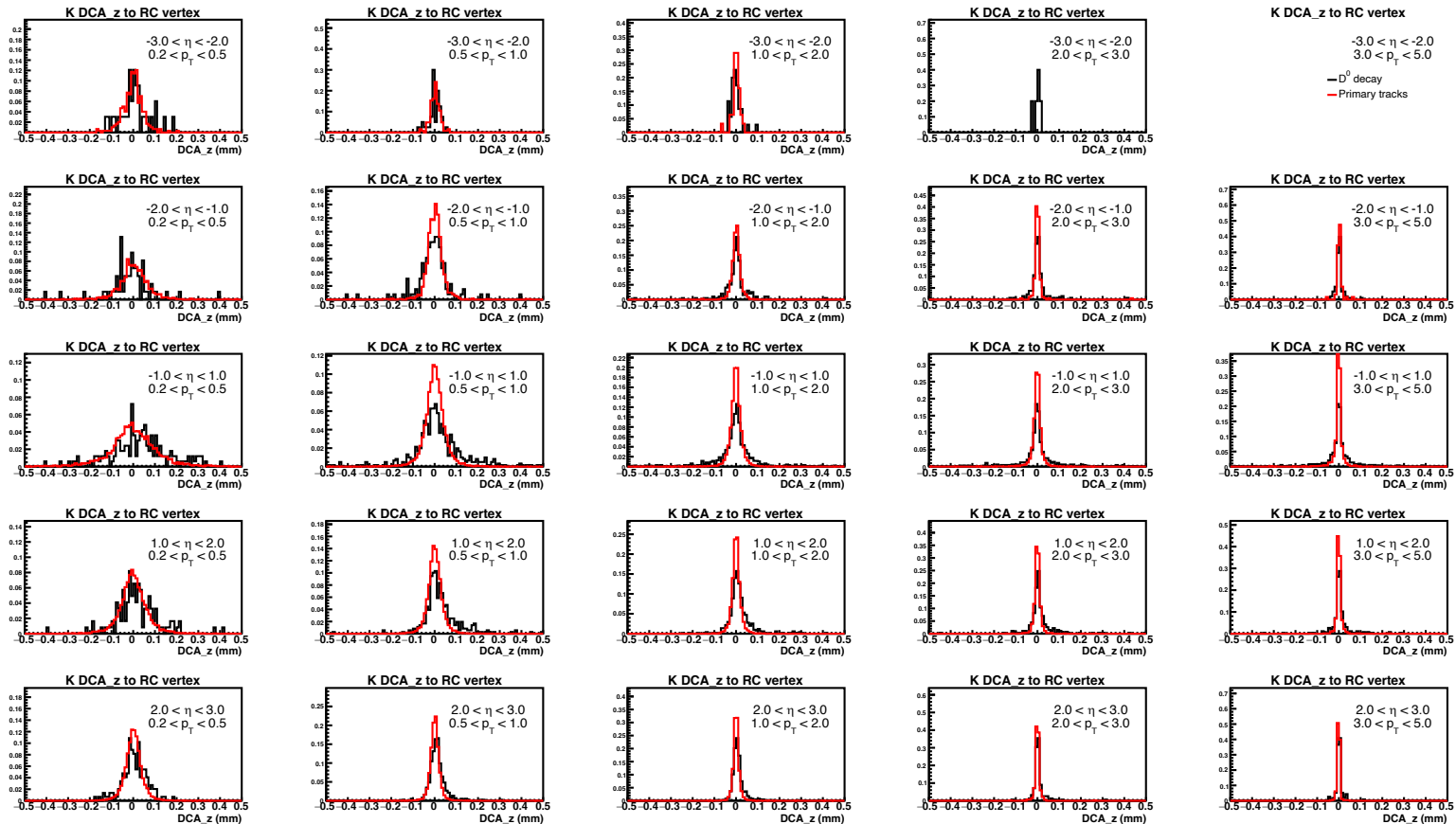
DCA$_{xy}$ for pion: primary vs. secondary
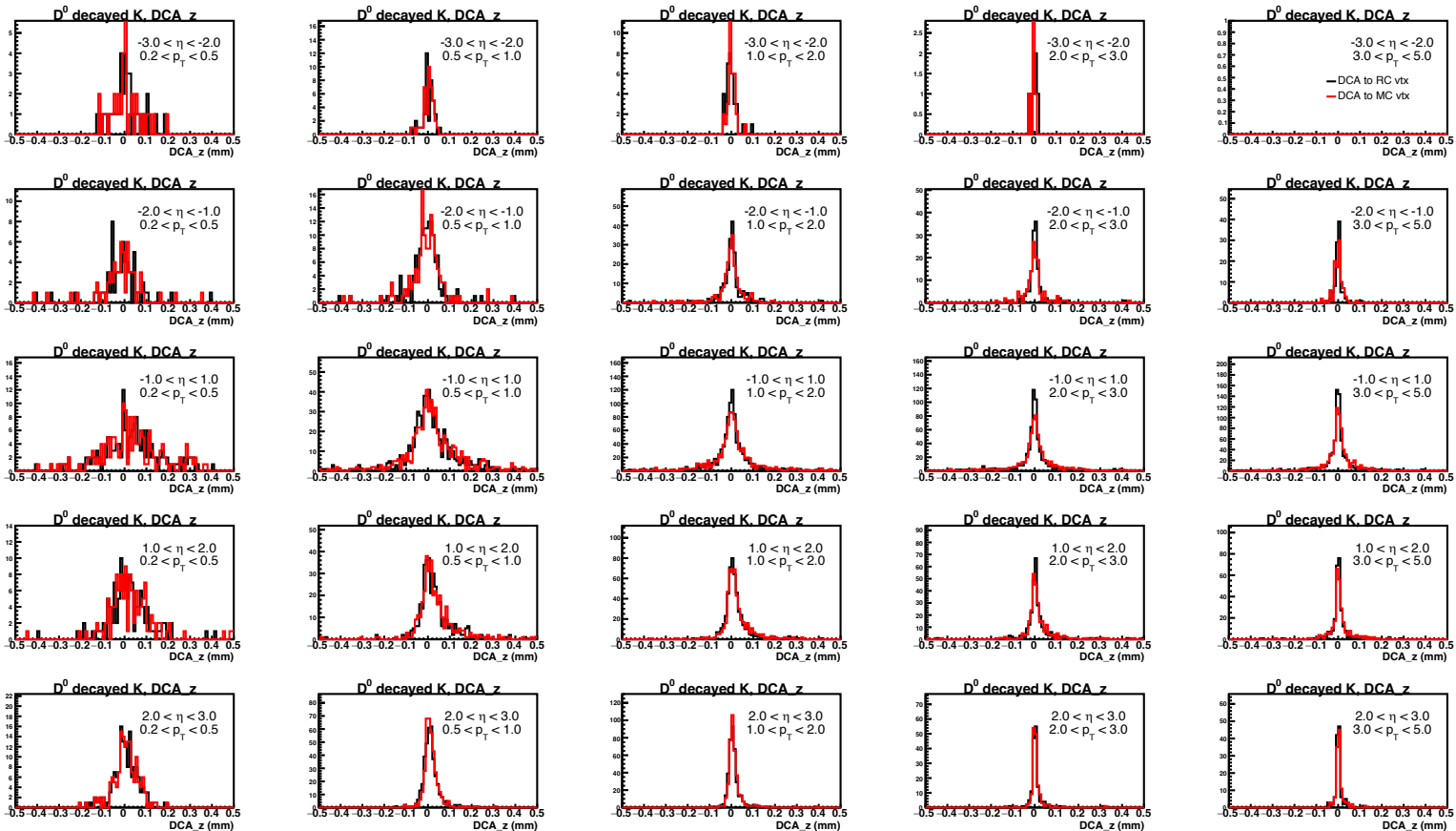
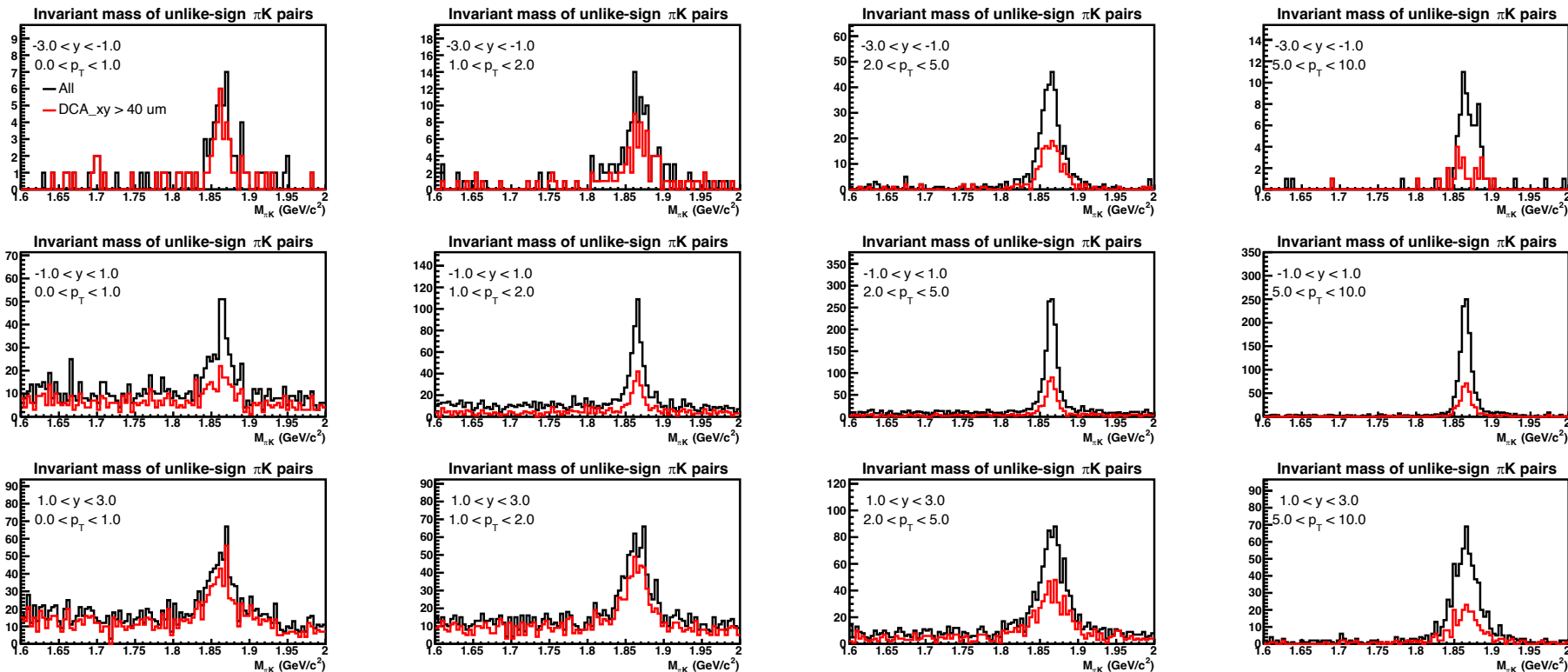# DCA$_z$ for pion: primary vs. secondary
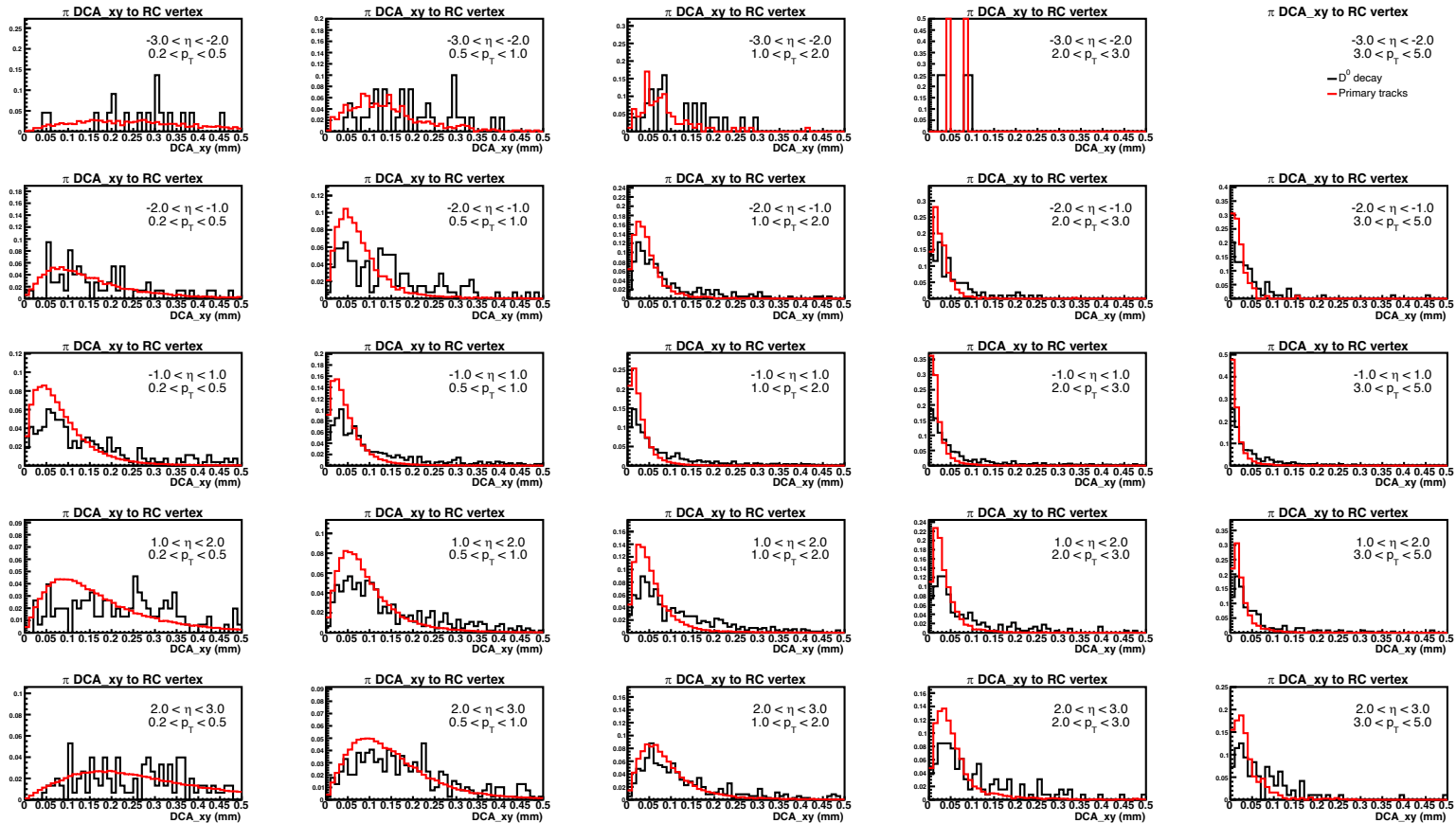
DCA$_{xy}$ for Kaon: primary vs. secondary
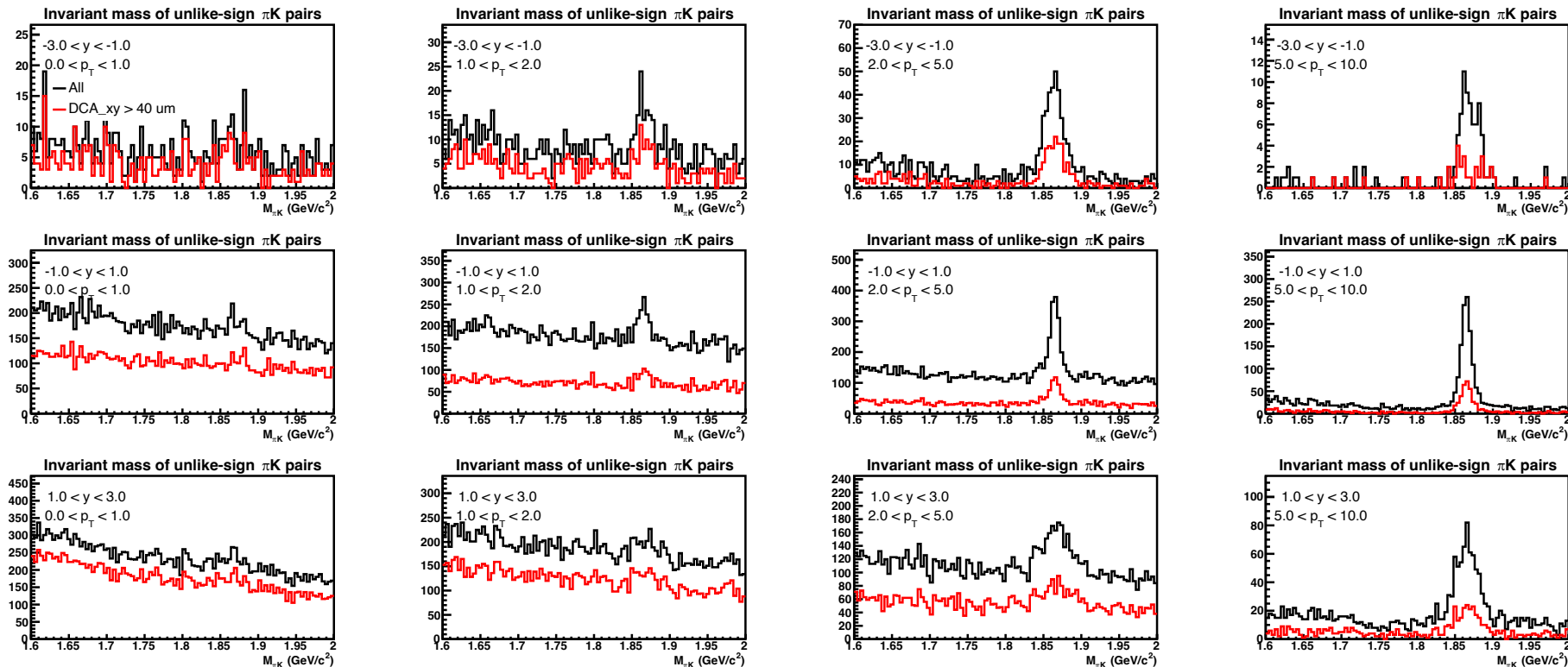
DCA$_z$ for Kaon: primary vs. secondary

Invariant mass distribution

- Events with $D^0 \to K + \pi$

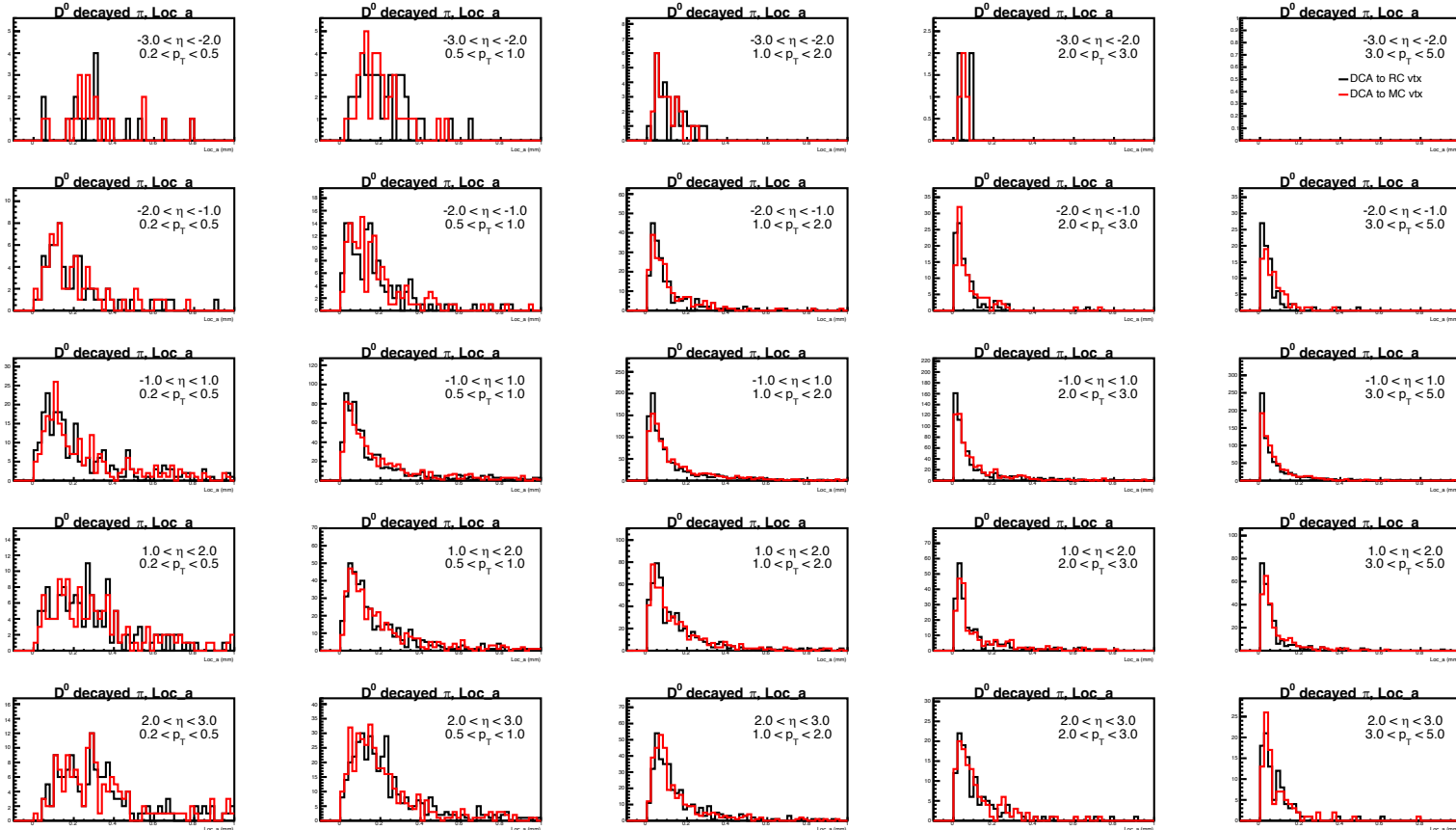# Invariant mass distribution

- All events with D^0

Next

- Get more statistics
- Transverse and longitudinal DCA
- DCA between daughter tracks

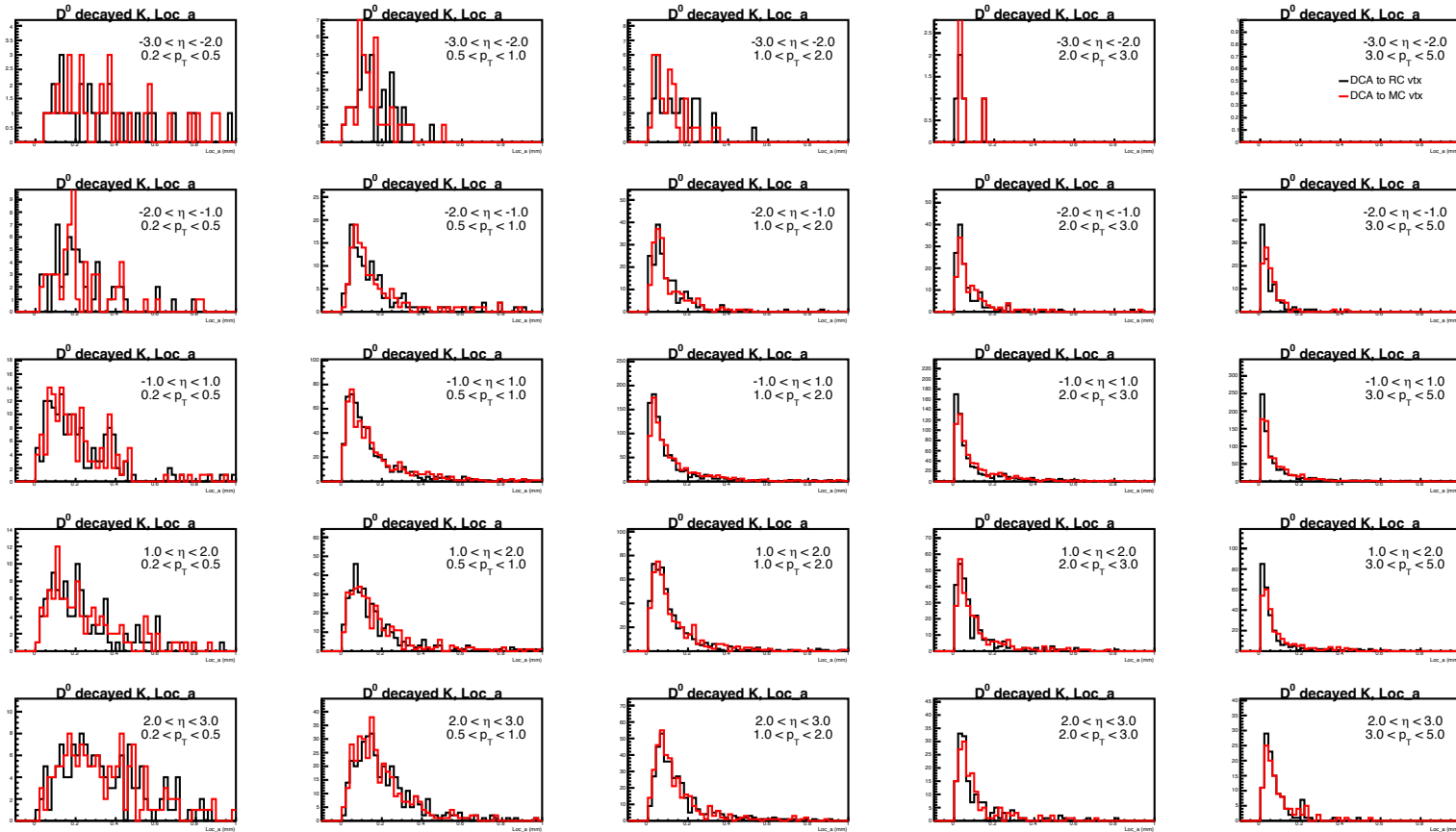# Backup

Loc.a for D^0 decayed pion
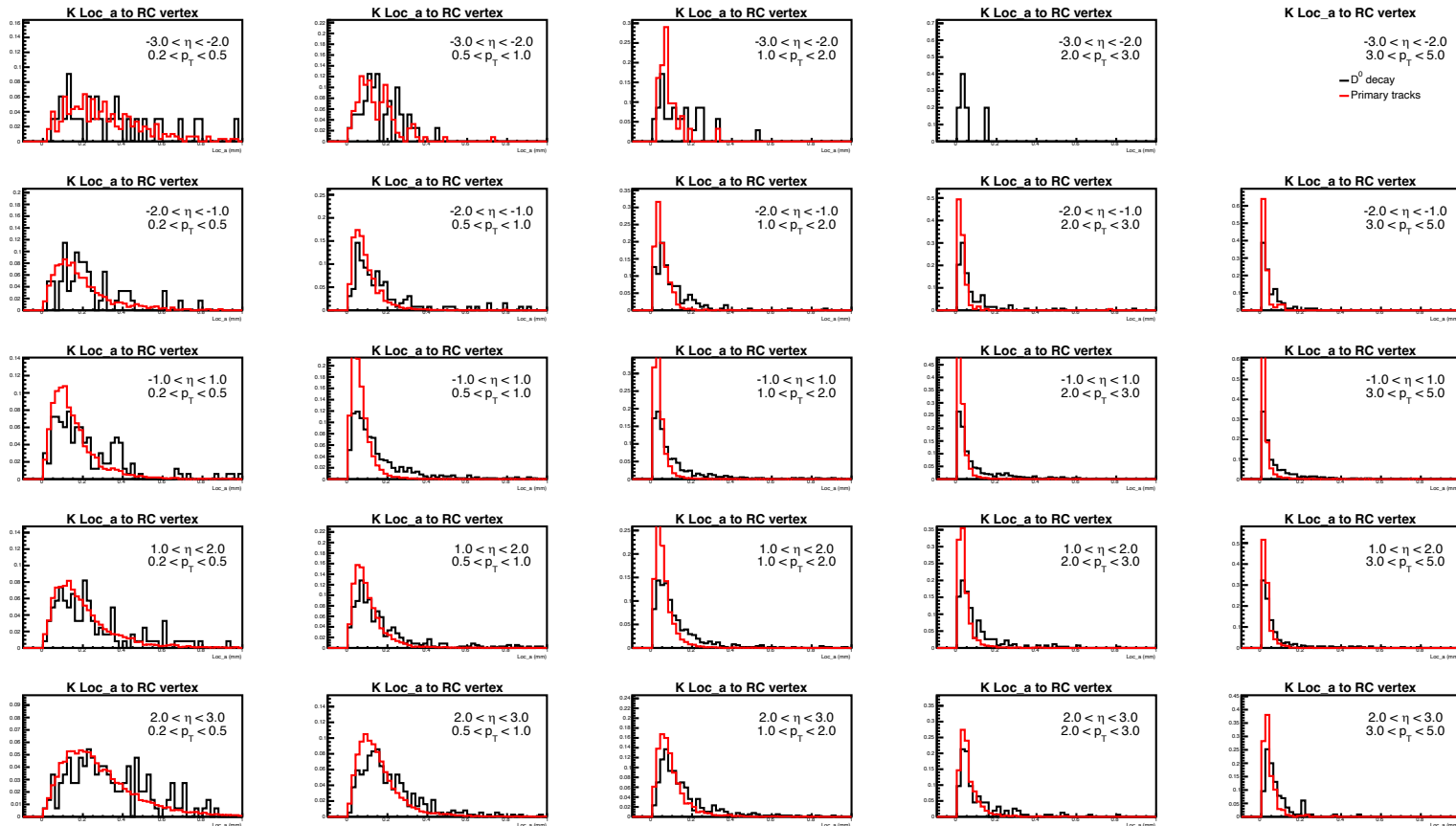
x-axis: -0.1 to 1 mm
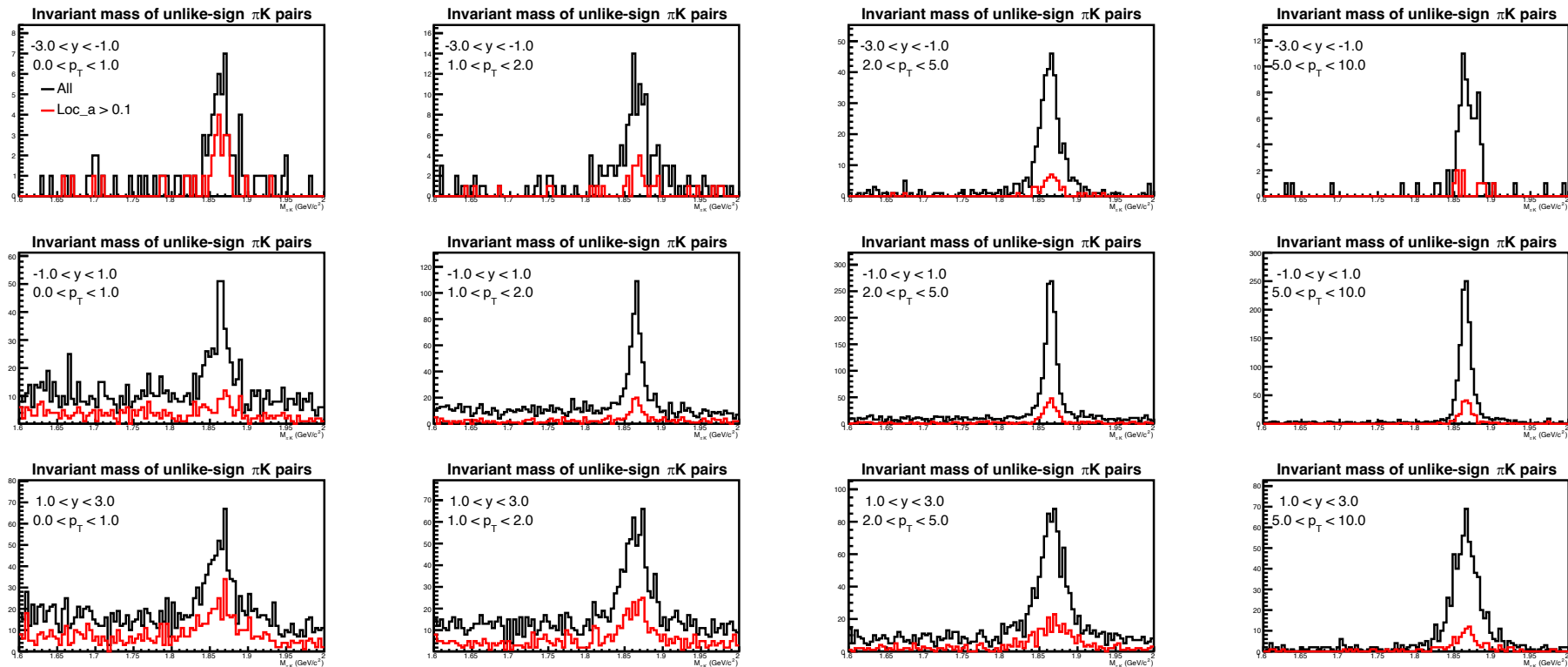
Loc.a is 3D DCA

Loc.a for D^0 decayed Kaon

x-axis: -0.1 to 1 mm

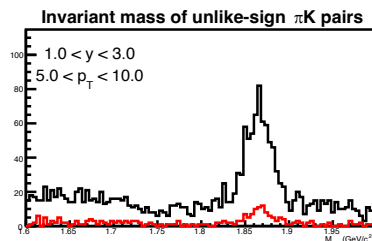# Loc.a for pion: primary vs. secondary

x-axis: -0.1 to 1 mm

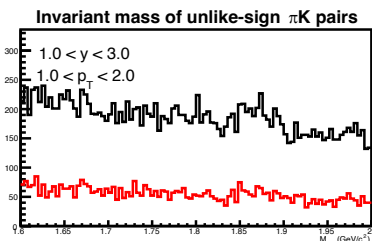# Loc.a for Kaon: primary vs. secondary

x-axis: -0.1 to 1 mm

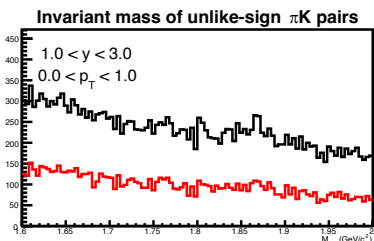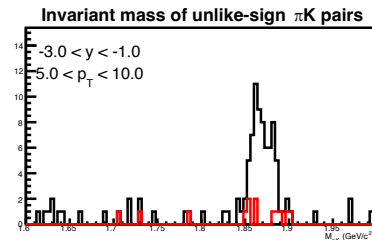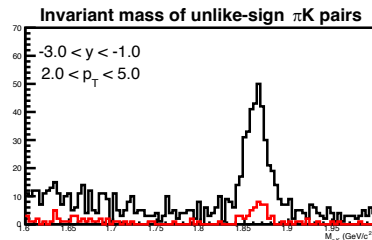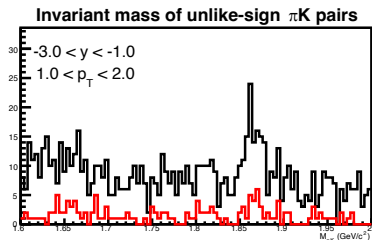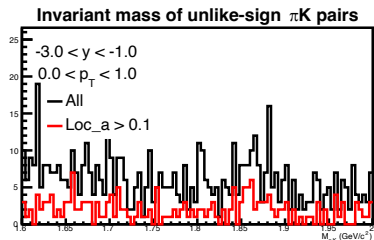# Invariant mass distribution

- Events with $D^0 \rightarrow K + \pi$

Invariant mass distribution

- All events with D^0