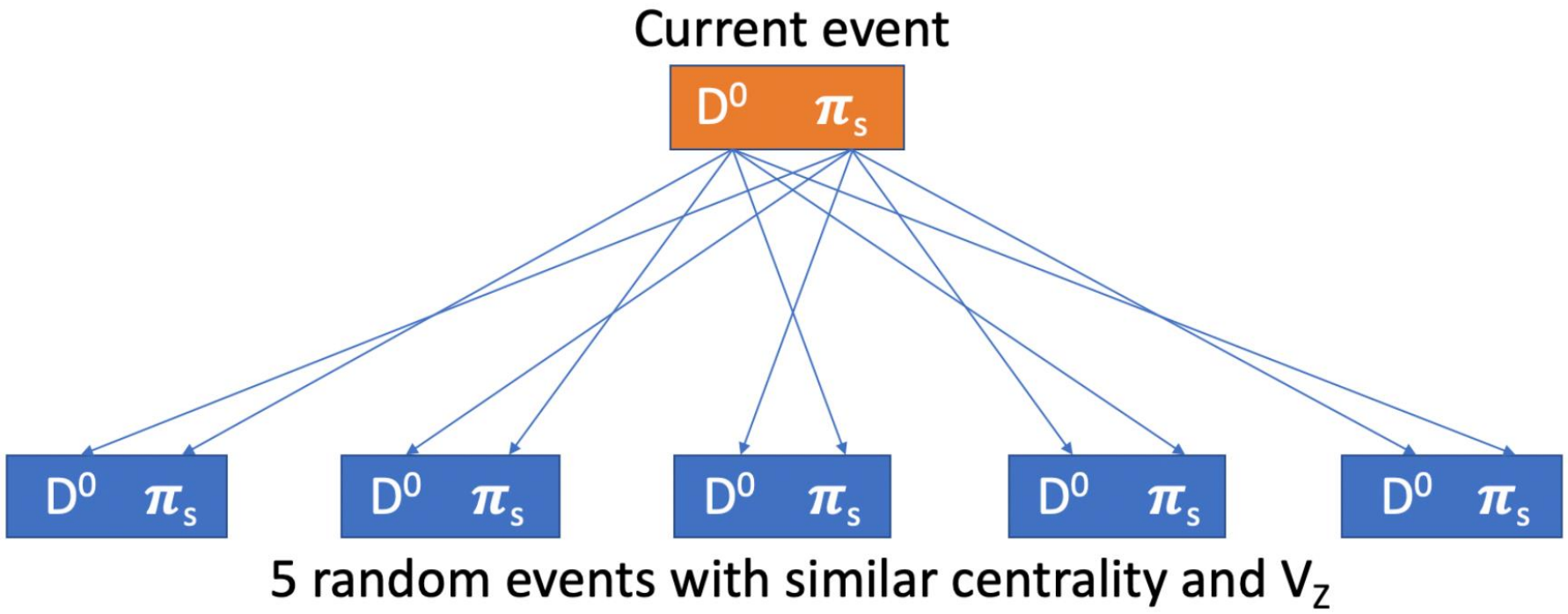
D^* signal in Isobar collisions

2022.9.9

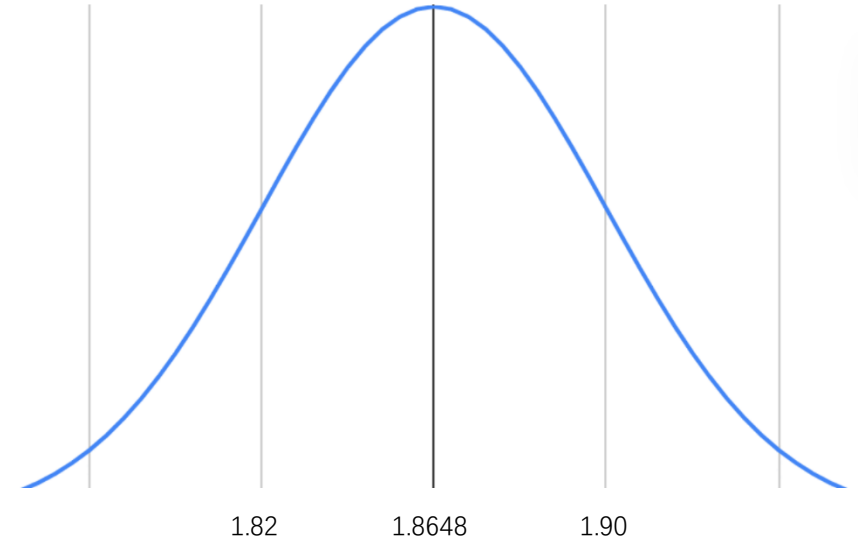
D^{*+}/D^{*-} reconstruction

- Excited charged D meson; $c\bar{d}$; 2010.26 ± 0.06 MeV;
- $D^{*+} \rightarrow D^0 + \pi^+$ (B.R.=67.7%) and its charge conjugates mode;
- $m_{D^{*+/-}} - m_{D^0}$=145.4257 ±0.0017 MeV (minimize the contribution from D^0 mass resolution, but may only two points);

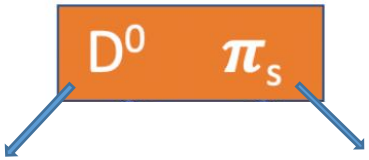


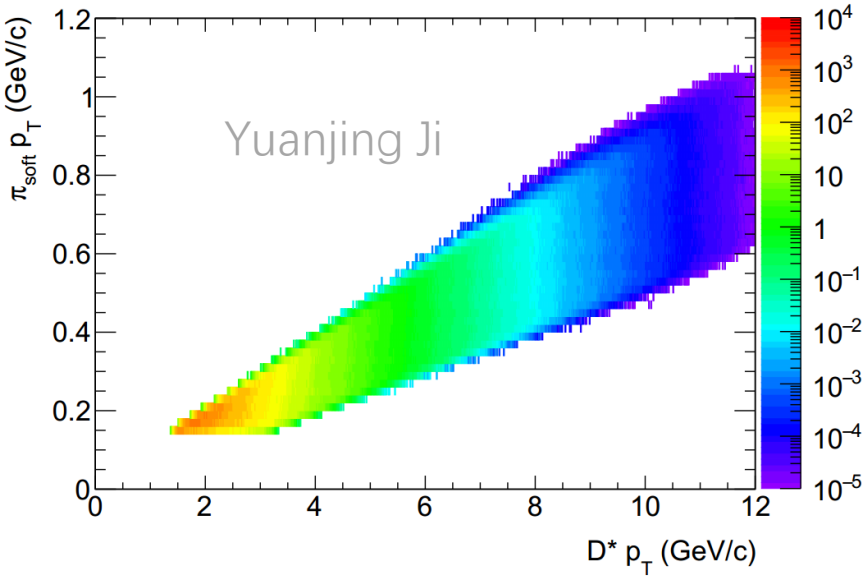
Yuanjing Ji

D^{*+}/D^{*-} reconstruction

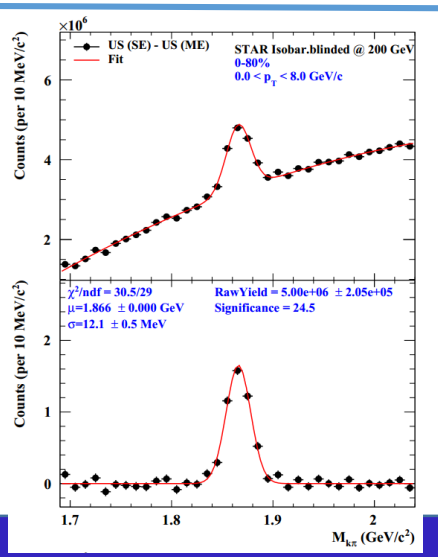


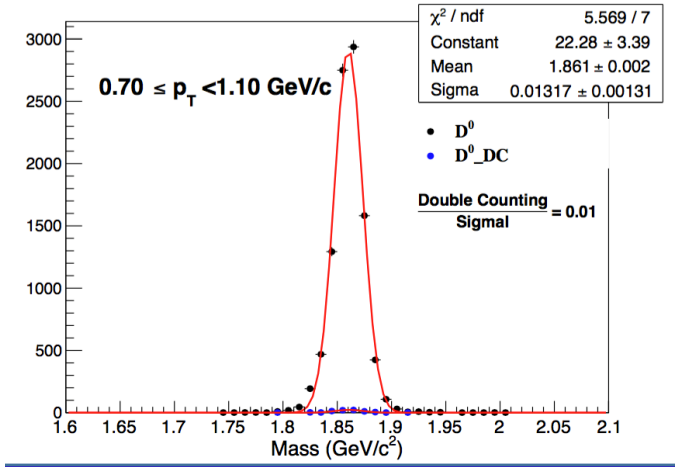
Current event





3σ





Soft pion cuts

~ 0.1

[0.15, 1.2] √ (0-10 GeV/c, 8-10 signal)

Isprimary;

$|n\sigma_{\pi}|$<2.0;

gDCA<3 cm

nHitFit>=20

If TOF available:

if PtBin[i]<p_T<PtBin[i+1] GeV, LowEdge[i]<$\frac{1}{\beta_{th}} - \frac{1}{\beta_{exp}}$<HighEdge[i]

double PtBin[6]={0.15,0.2,0.25,0.3,0.35,10};

float LowEdge[6] = {-0.03,-0.03,-0.03,-0.03,-0.03};

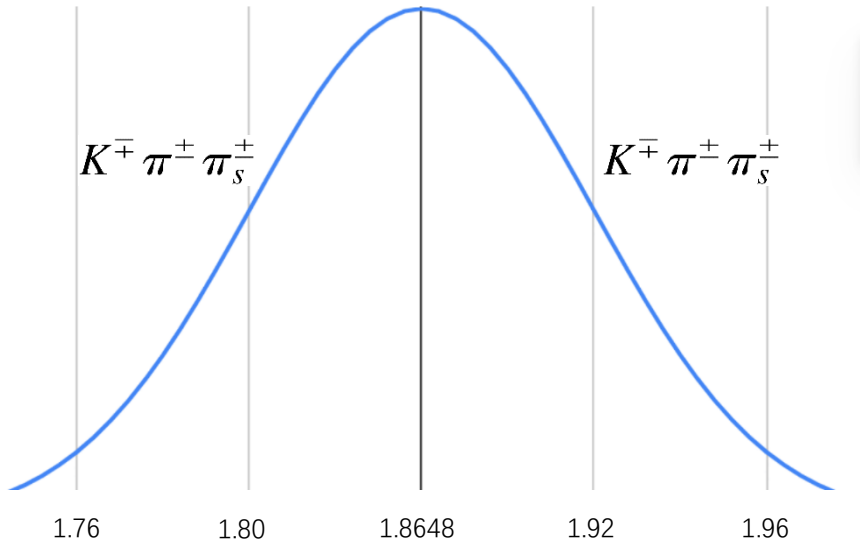
float HighEdge[6] = {0.85,0.05,0.04,0.035,0.03};

Background reconstruction

Wrong sign method

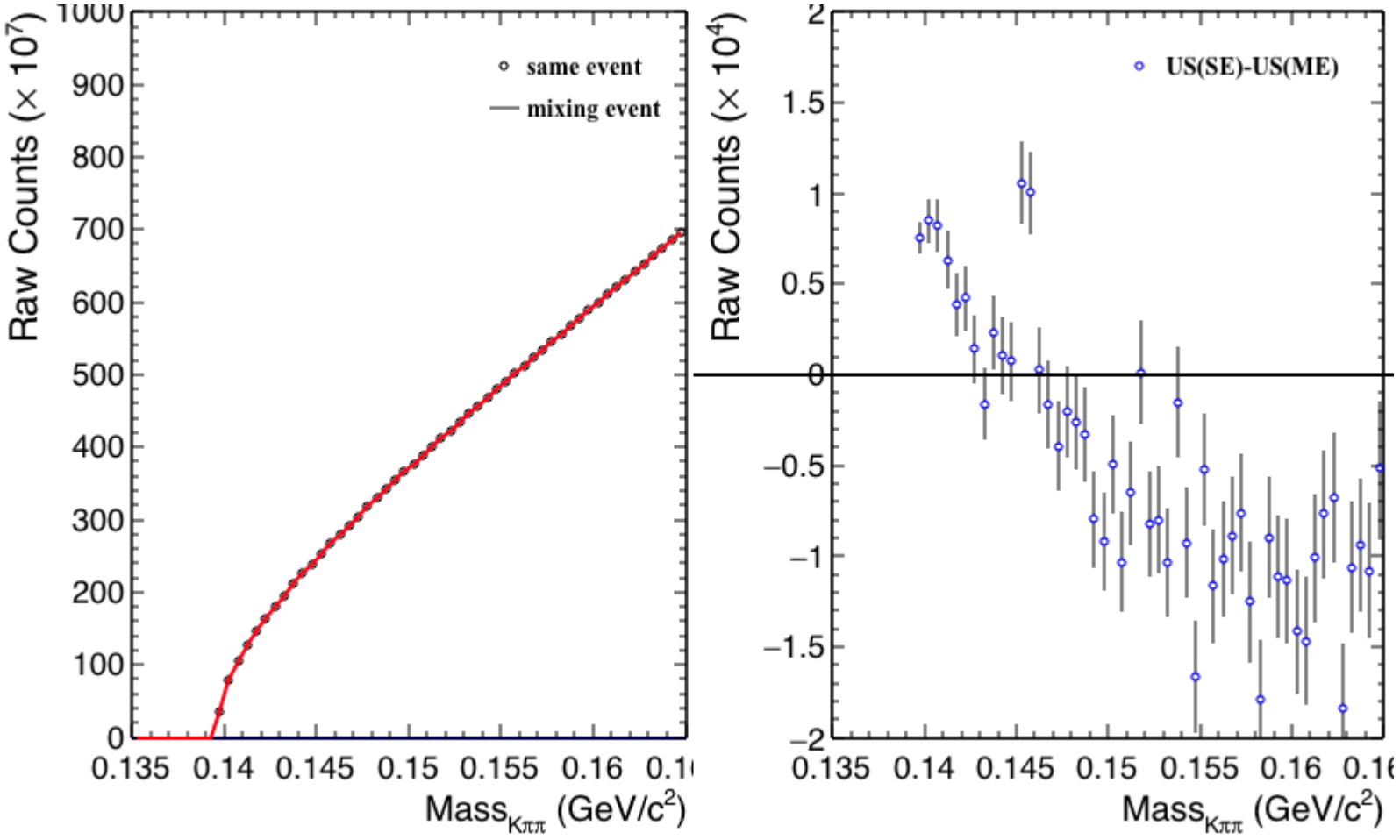
$$K^{\mp}\pi^{\pm}\pi_s^{\pm} \longrightarrow K^{\pm}\pi^{\mp}\pi_s^{\pm}$$

Side band method



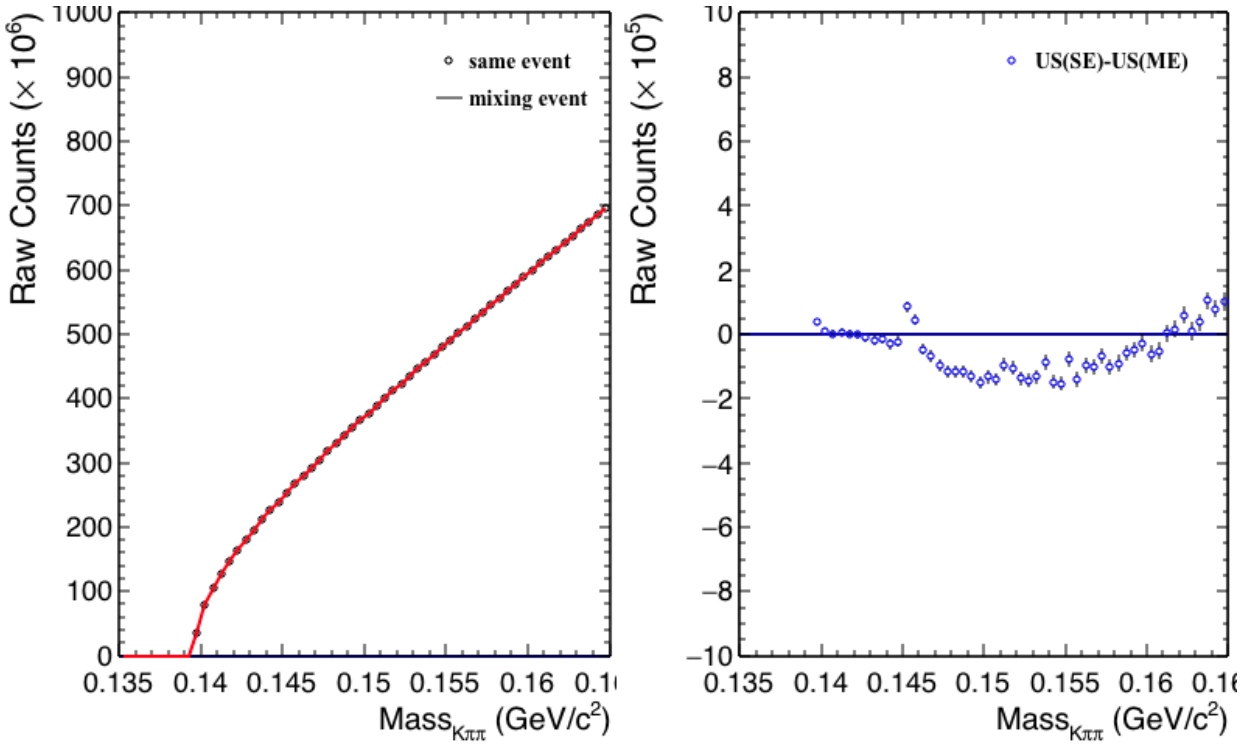
Mixed-event method

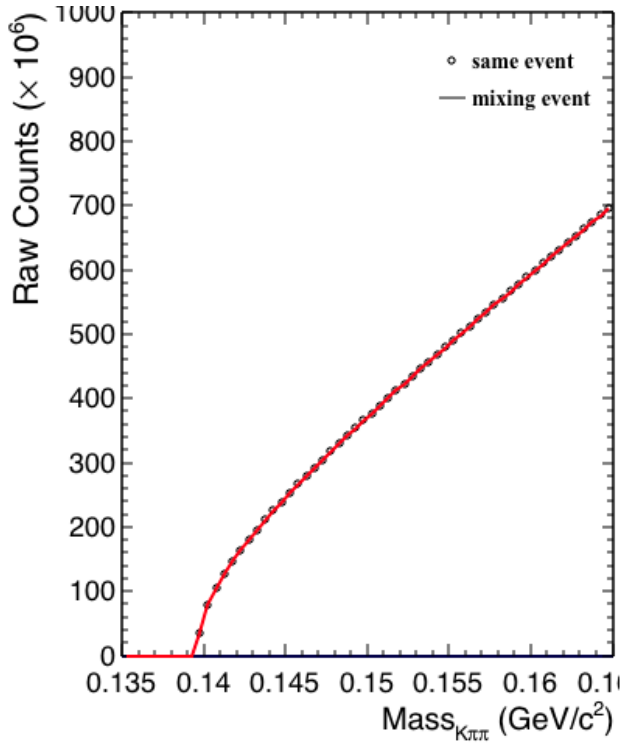
Wrong sign method

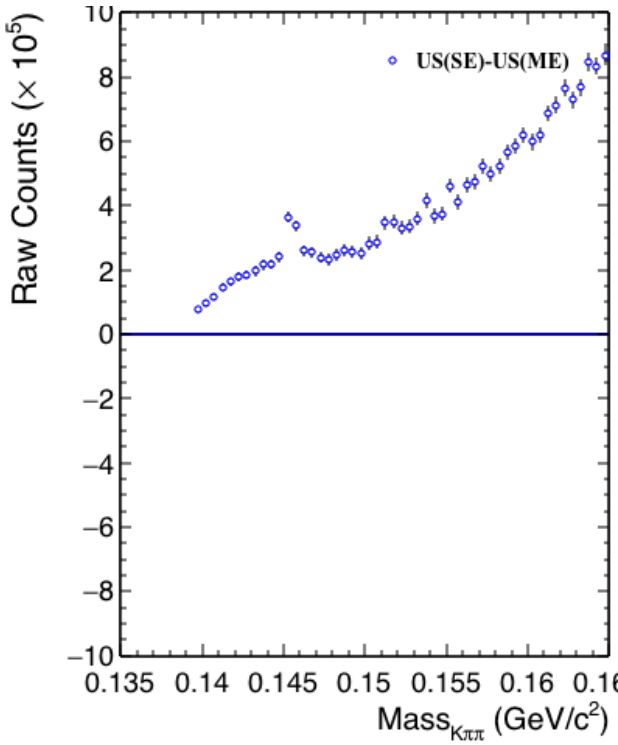


Sideband method

Norm=0.102 (set by hand)

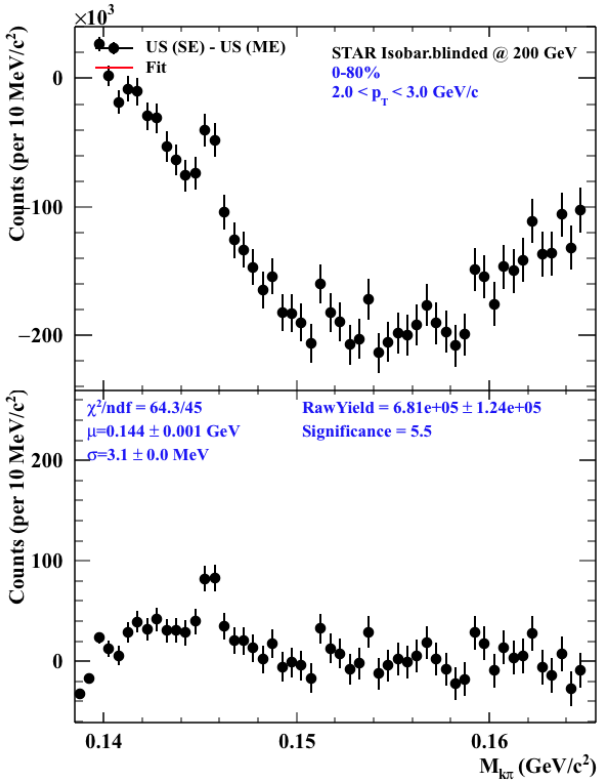


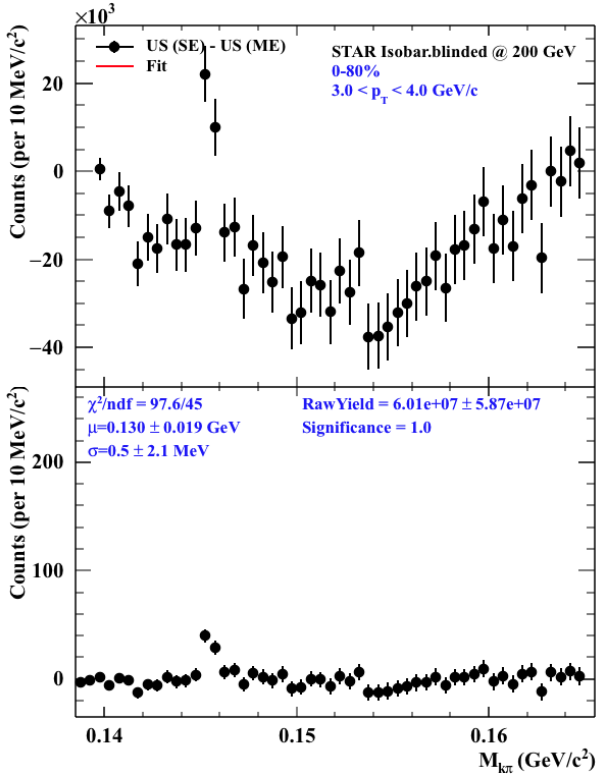


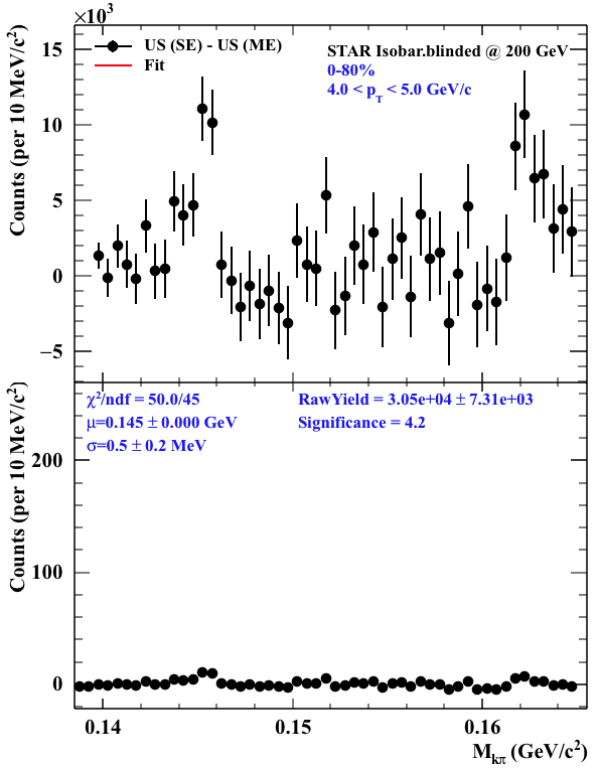


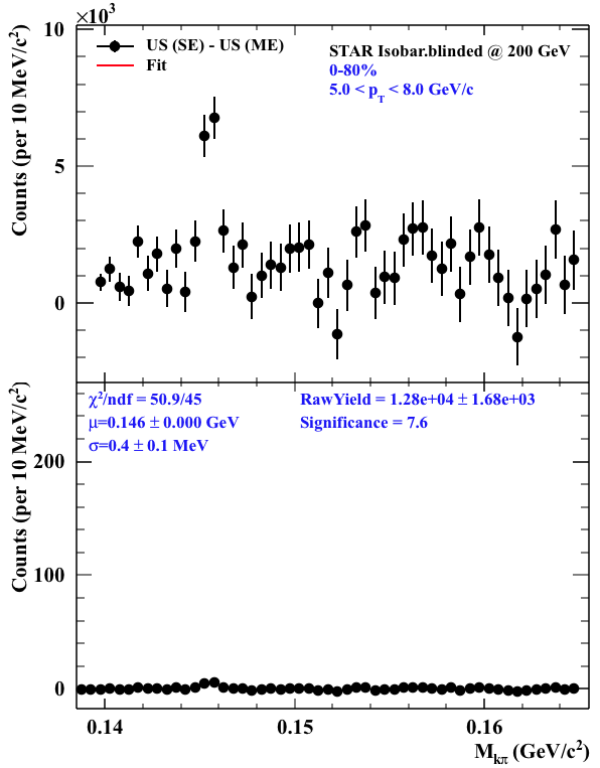
Mixed-event method

0-80%



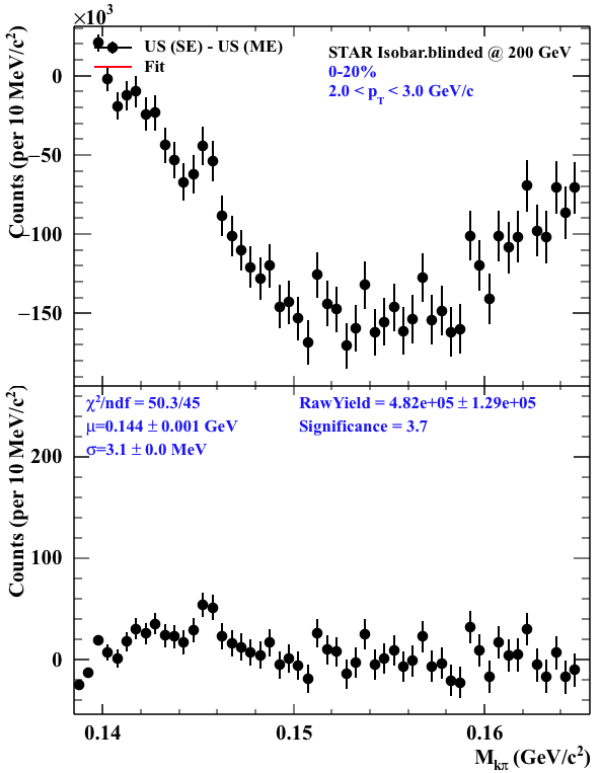


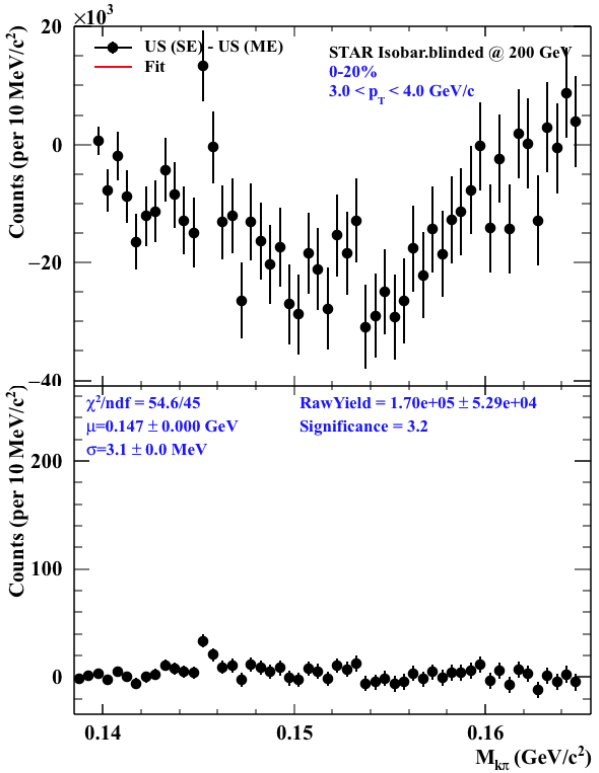


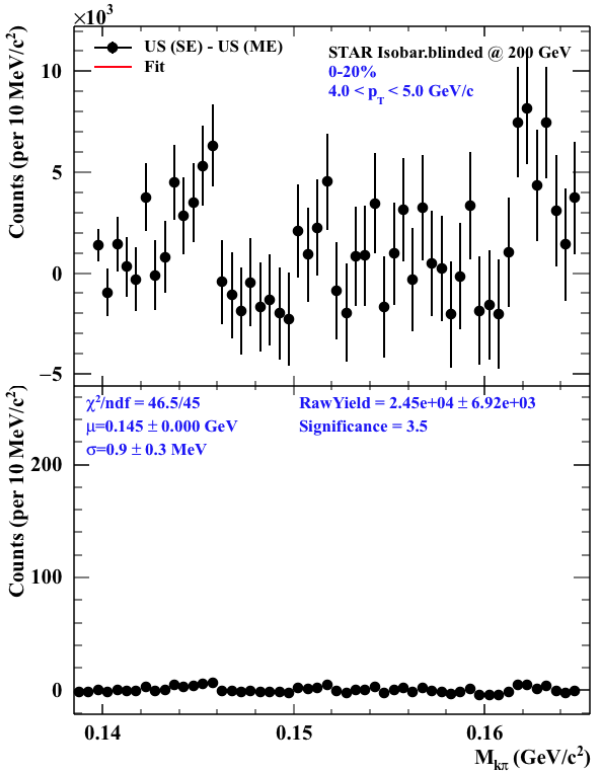


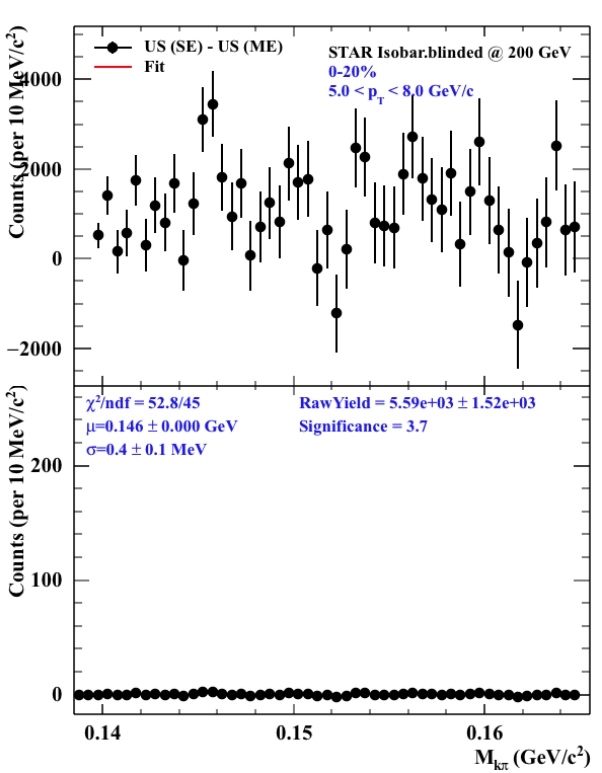
Mixed-event method

0-20%



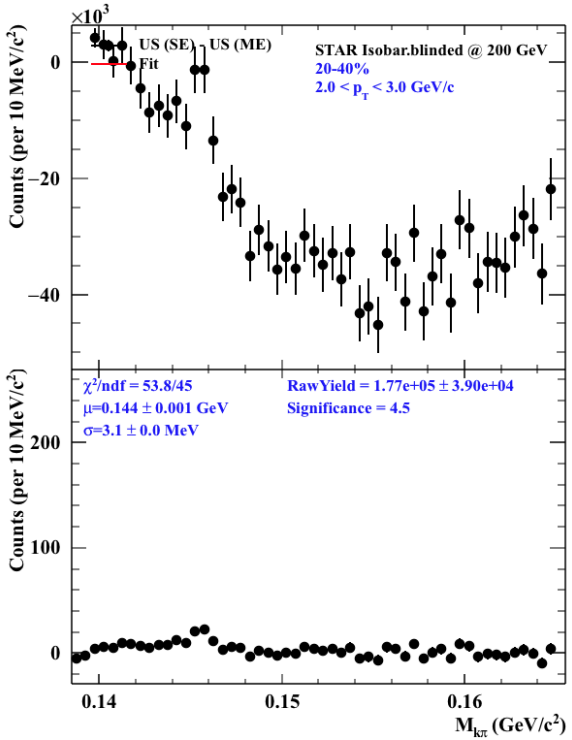


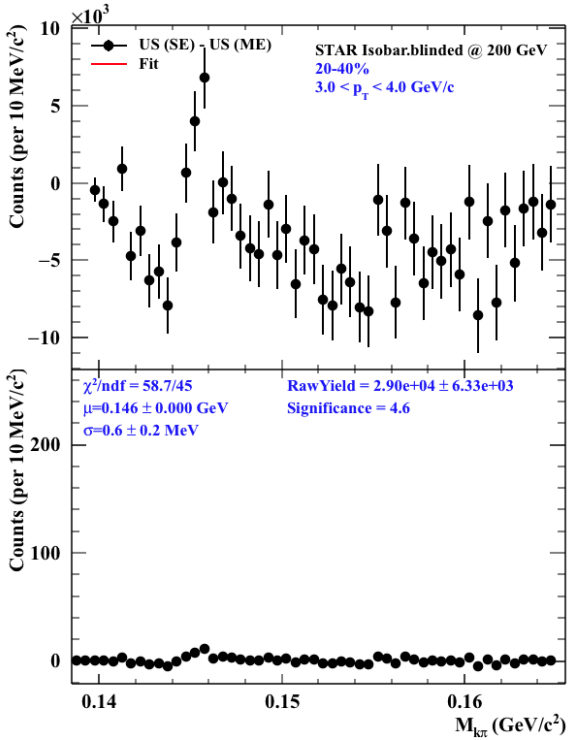


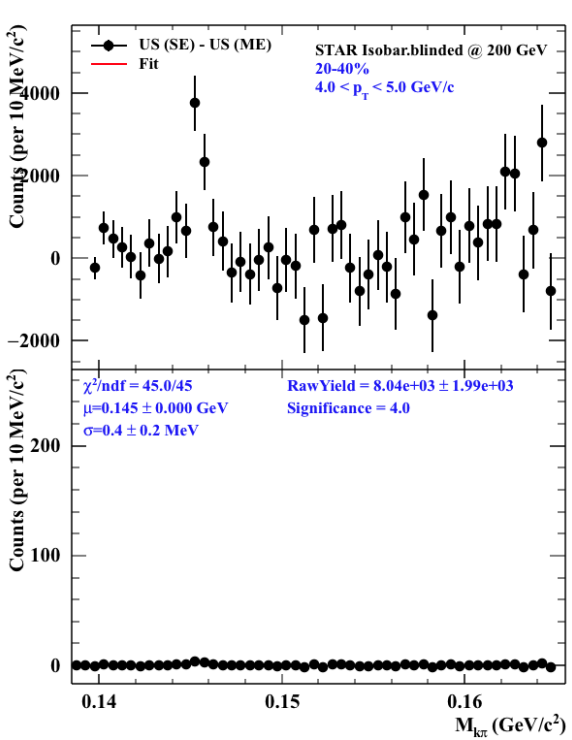


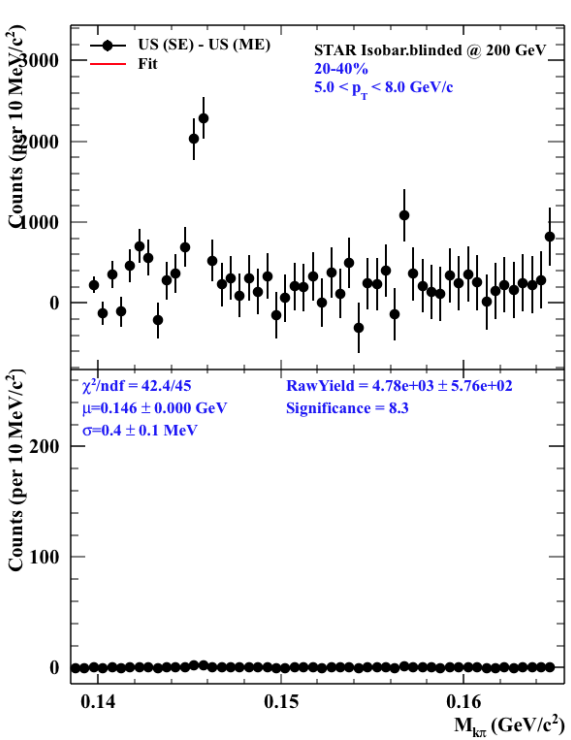
Mixed-event method

20-40%



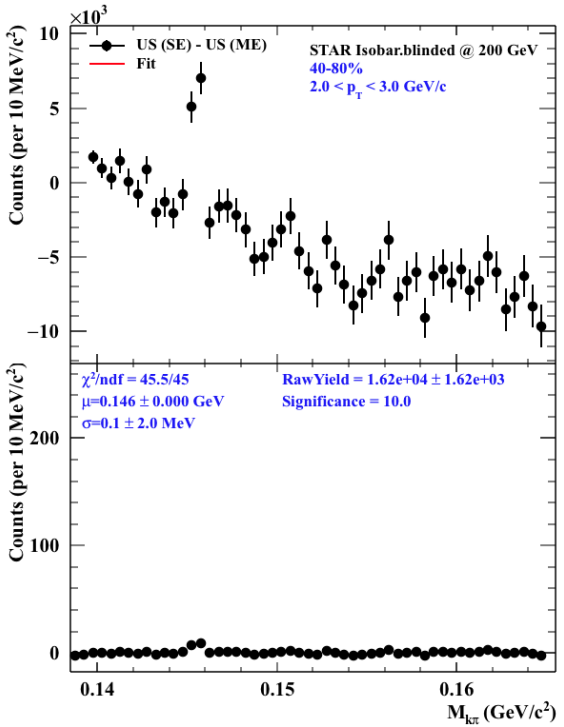


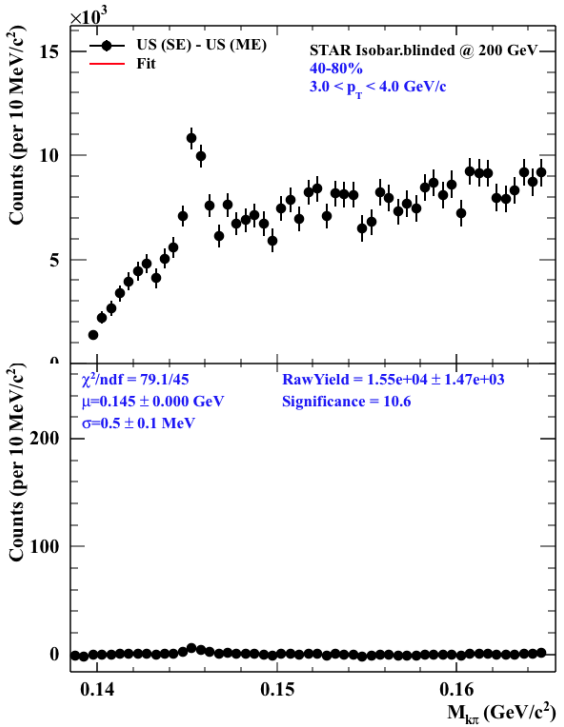


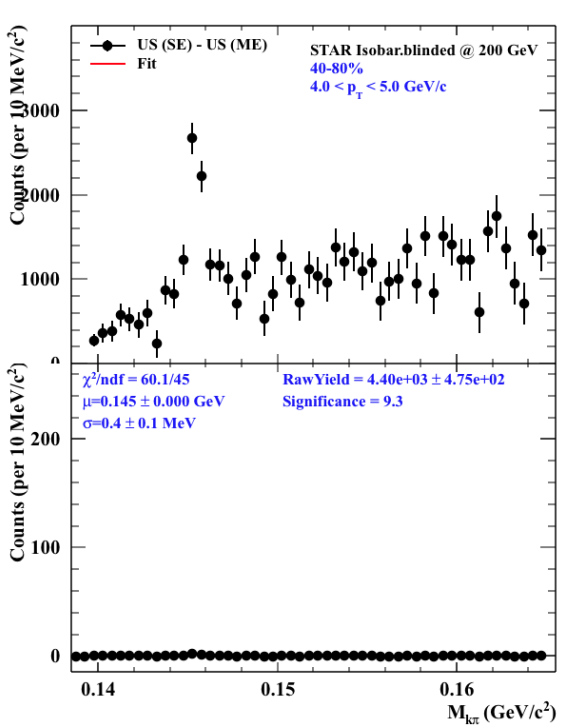


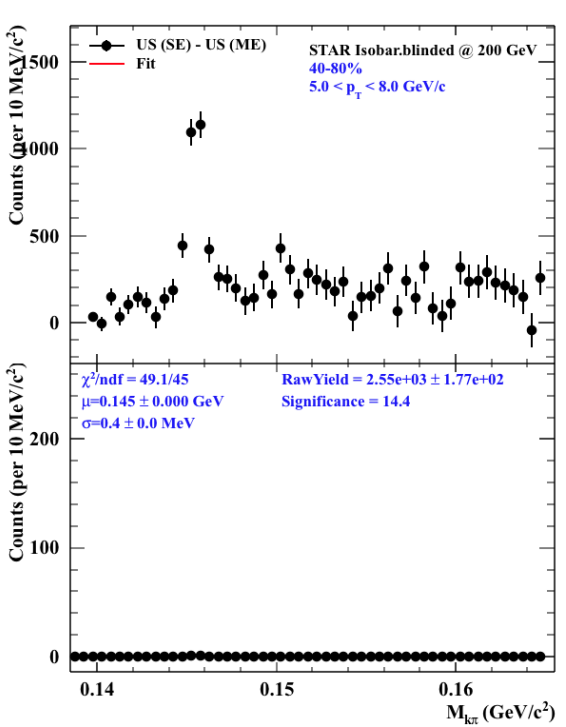
Mixed-event method

40-80%









- Backgrounds are larger for central (or average) collisions, peripheral collisions have better significance;
- Tune normalization scale factors to study a possible scheme for two points signals;
- 8~10 GeV/c signals.

Semester plan

- Waiting N_{bin} systematic uncertainty (9.9-10.1)
- D^* spectra analysis (10.1-12.1)
- v_2 refit (12.1-1.1)