

Low momentum direct photons
in p+p/Au @ 200GeV

— Update

Methodology

Embedding

All tunings done

Data

All calibrations done

$$R_\gamma = \frac{\gamma_{\text{inclusive}}}{\gamma_{\text{decay}}} = \frac{\langle \epsilon f \rangle \left(\frac{N_{\text{incl}}}{N_{\text{tag}}} \right)}{\left(\frac{N_{\text{all}}}{N_{\pi^0}} \right)}$$

Gives the spectra

Exodus

Ongoing

Technical improvements

- For Data and Embedding
 - New geometry
 - Dead maps for EMCal and DC
 - Momentum scale recalibration
 - Beam offset correction (alpha recalibration)
 - Sector-by-sector energy scale recalibration
 - dep recalibration
 - EMCal signalization (for distance veto)
 - Correlated background subtraction for N_{tag} extraction
- For Embedding only
 - Lower magnetic field
 - Non-linearity correction
- For Cocktail
 - Include the updated η/π^0 ratio based on Yuanjie's Master's thesis work

Identifying conversion photons

Loose

- Conversion radius
 $0 < R < 30 \text{ cm}$
- $d\phi^*$

Dzed

- Conversion radius
 $0 < R < 30 \text{ cm}$
- $d\phi$
- dz_{DC}

Default

- Conversion radius
 $0 < R < 30 \text{ cm}$
- $d\phi$
- ϕ_{iv}

Tight

- Conversion radius
 $0 < R < 30 \text{ cm}$
- $d\phi$
- dz_{DC}
- ϕ_{iv}

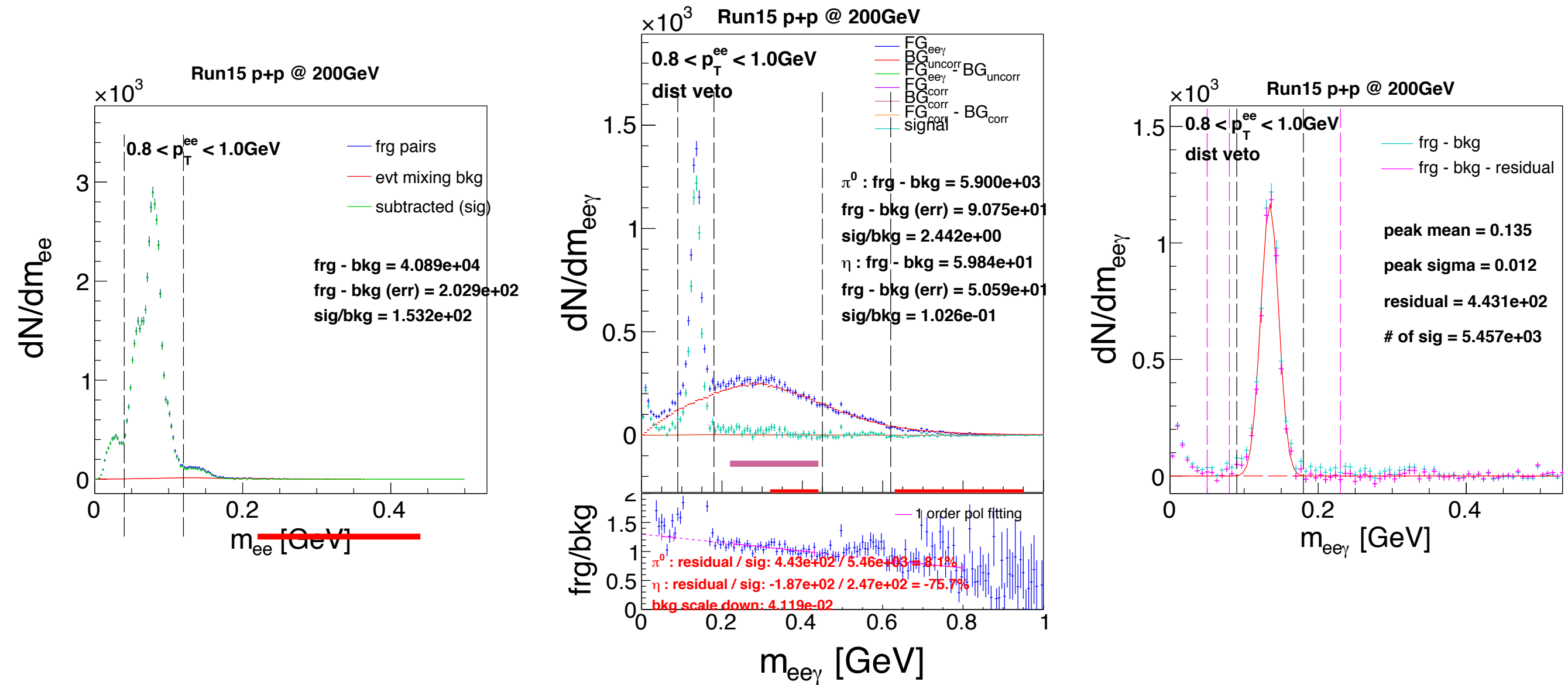
Purity increases

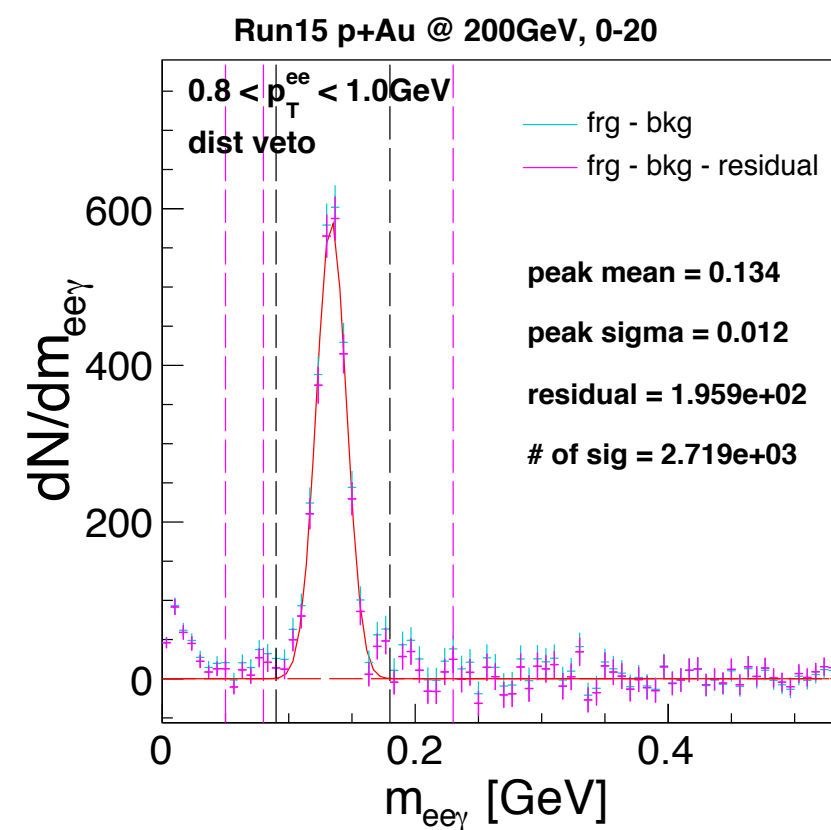
Statistics decreases



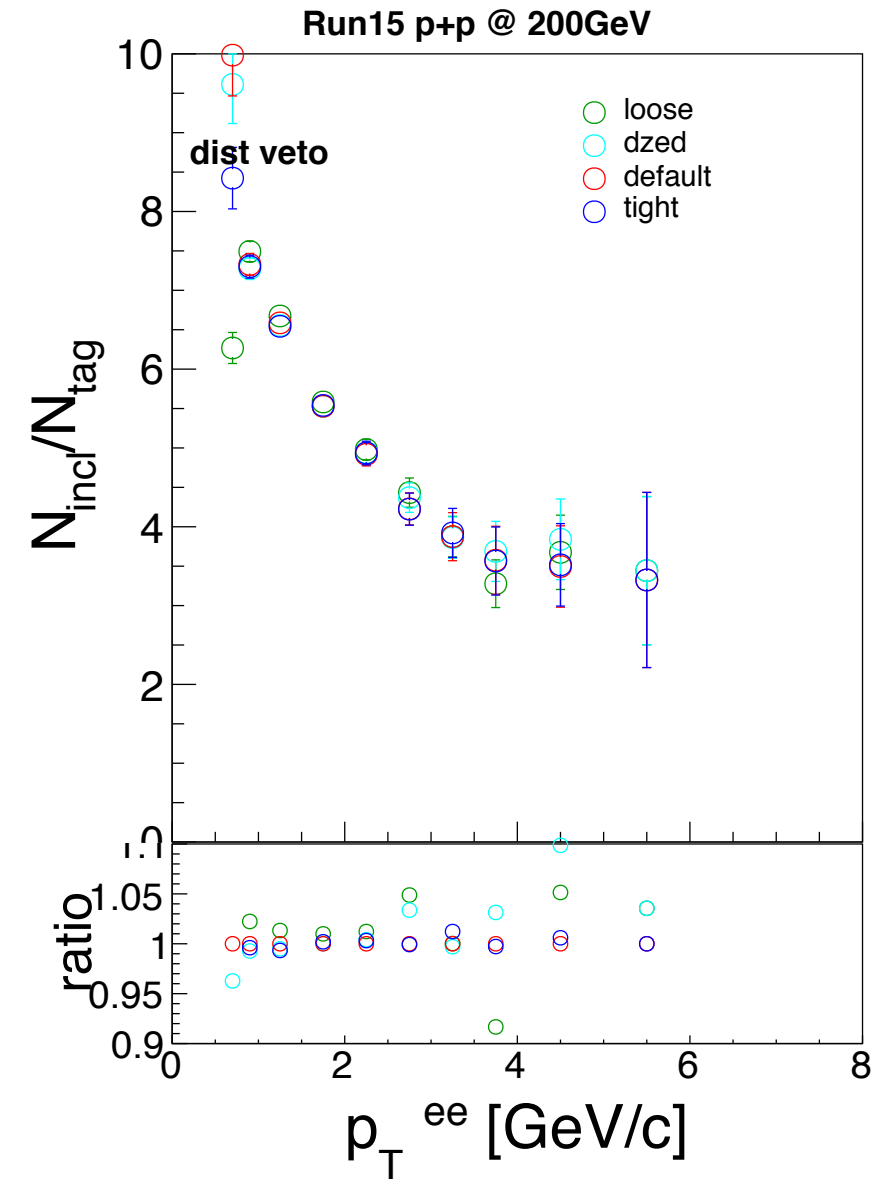
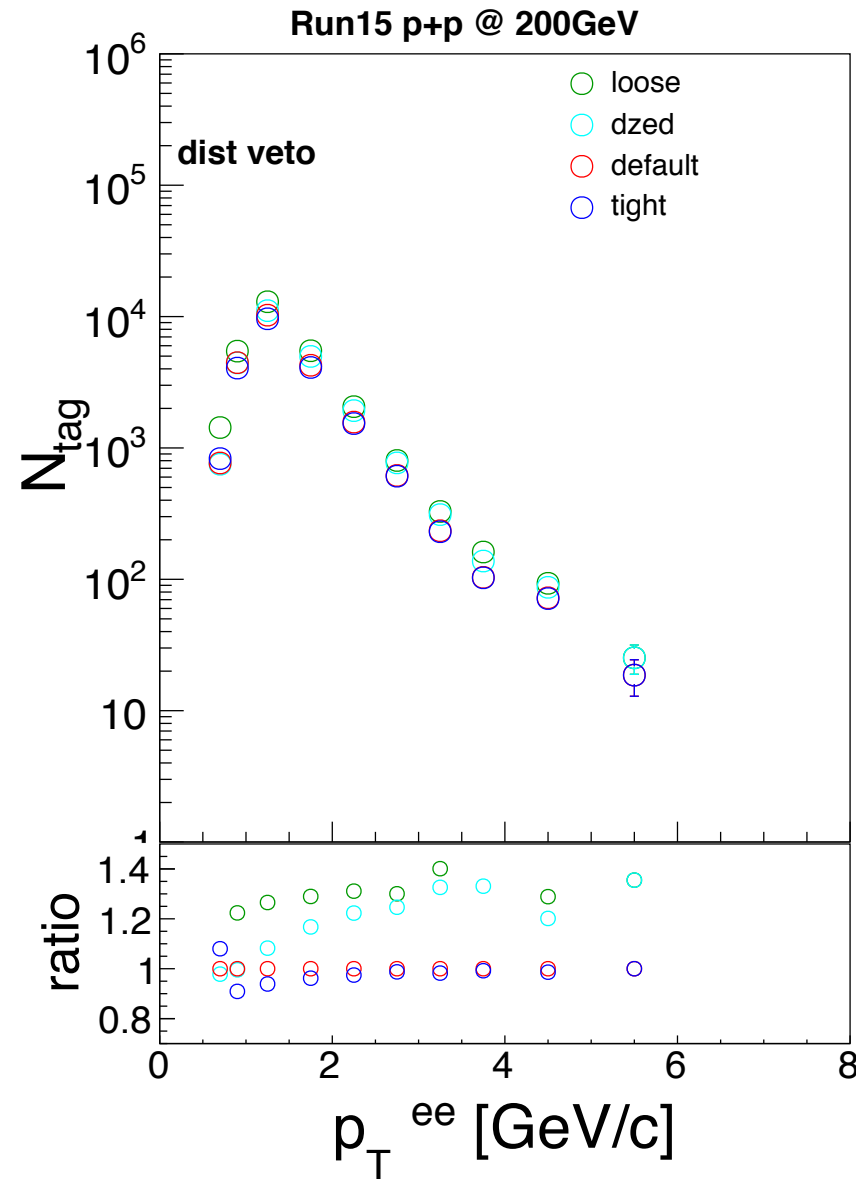
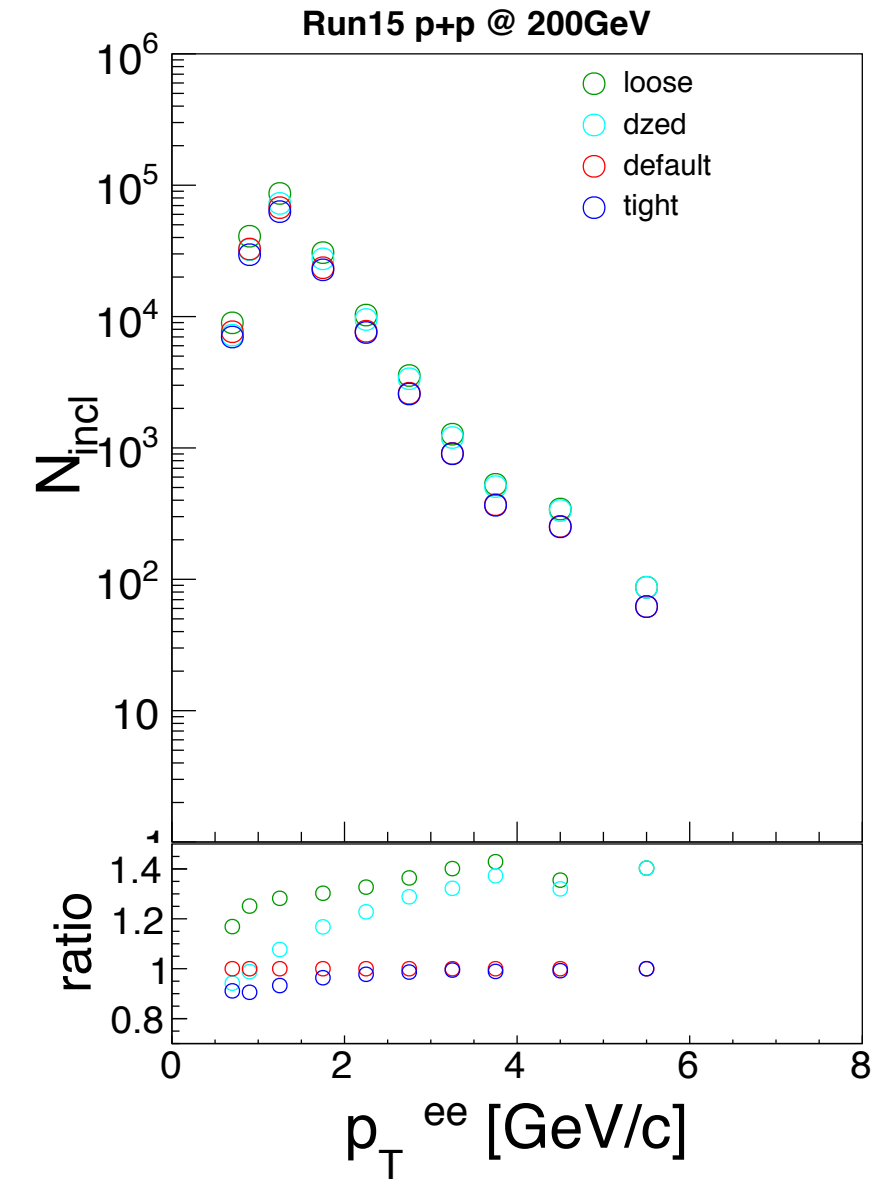
*reconstructed angle between the electron-positron pair at the conversion point

N_{incl} & N_{tag} from p+p @ 200 GeV

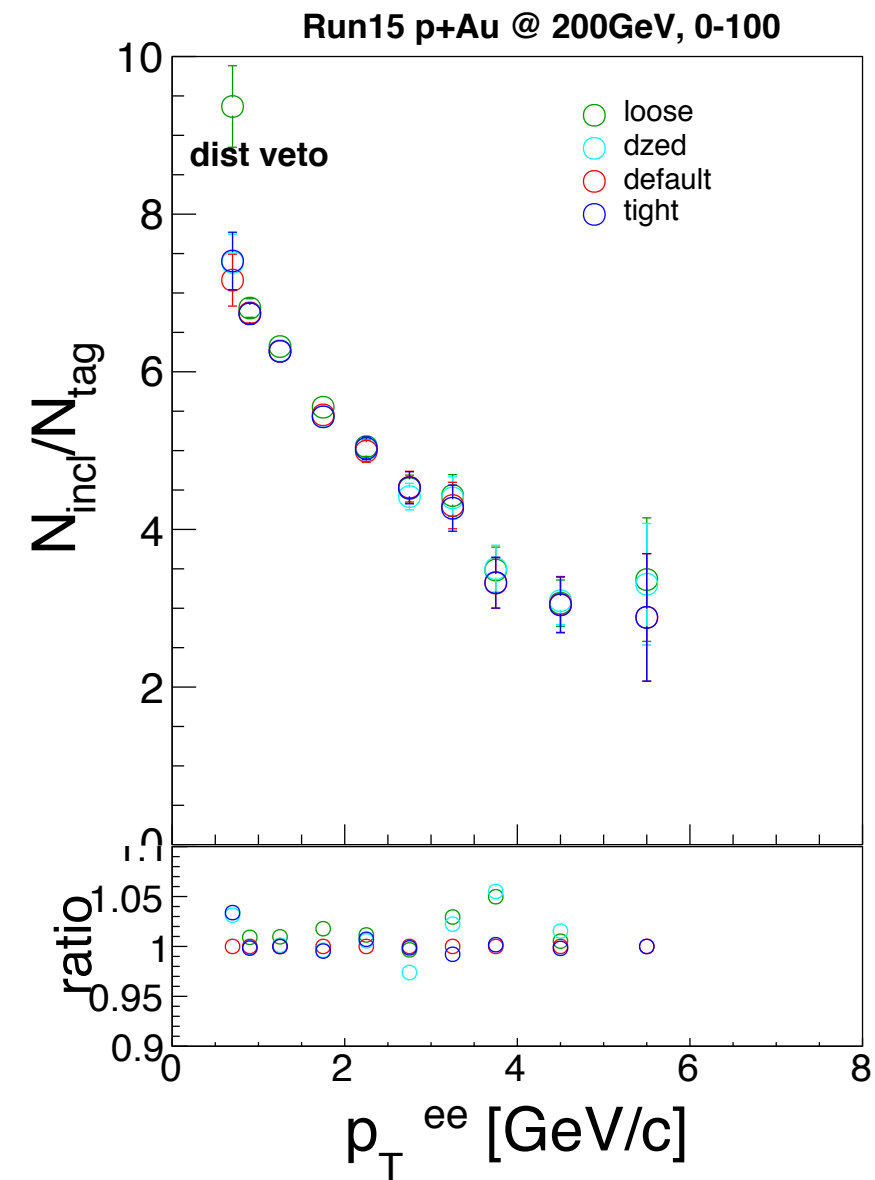
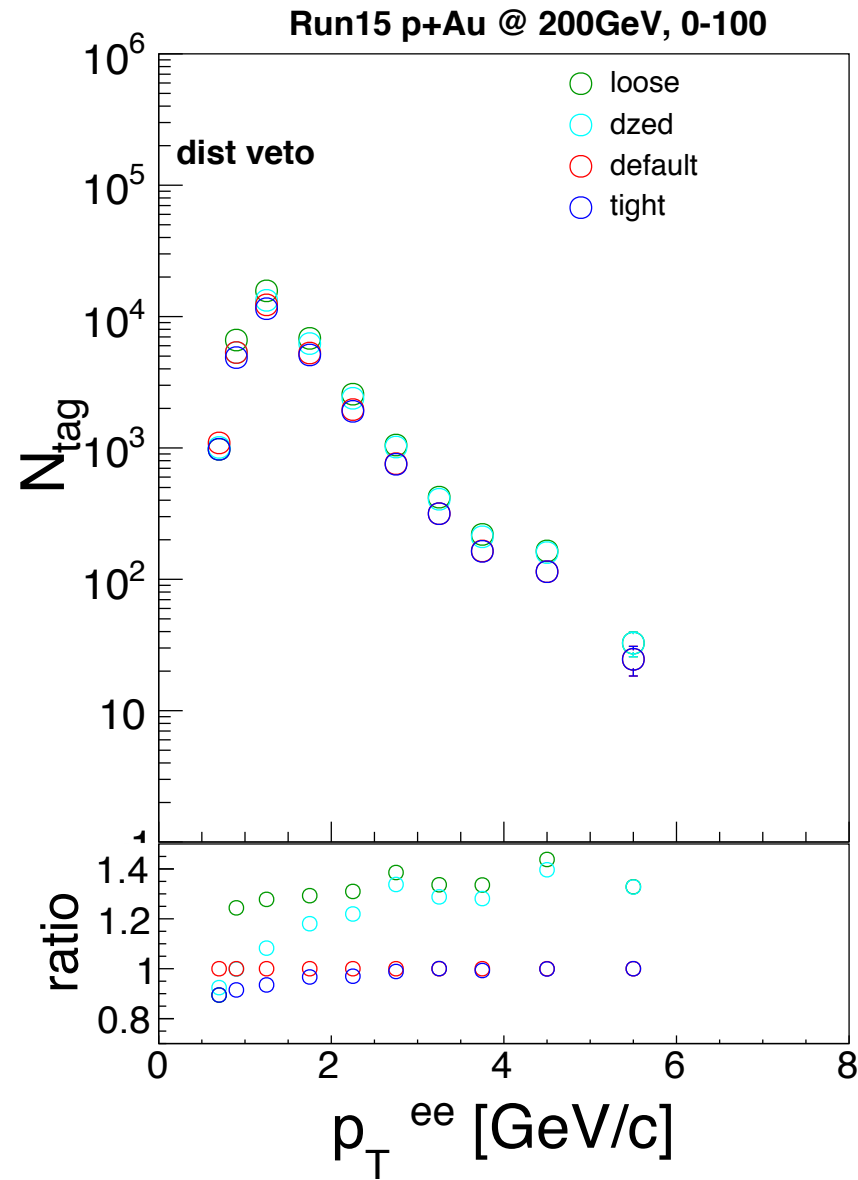
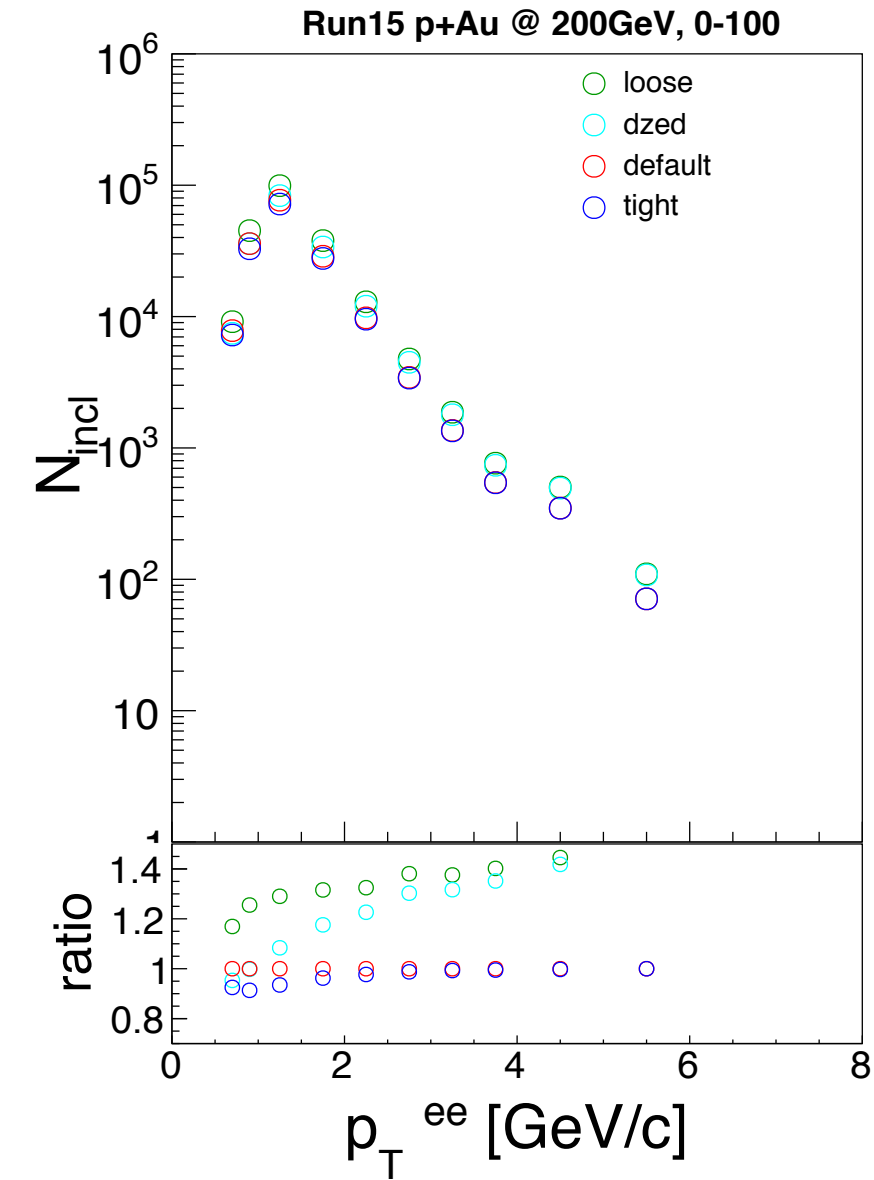




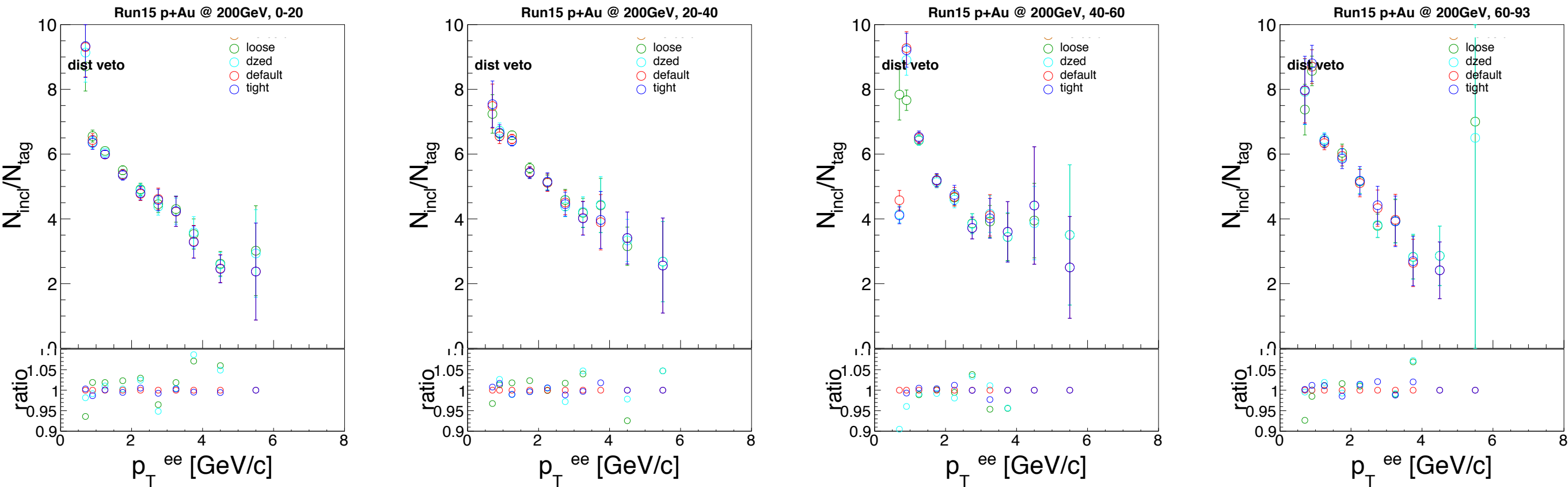
N_{incl} & N_{tag} from p+p @ 200 GeV



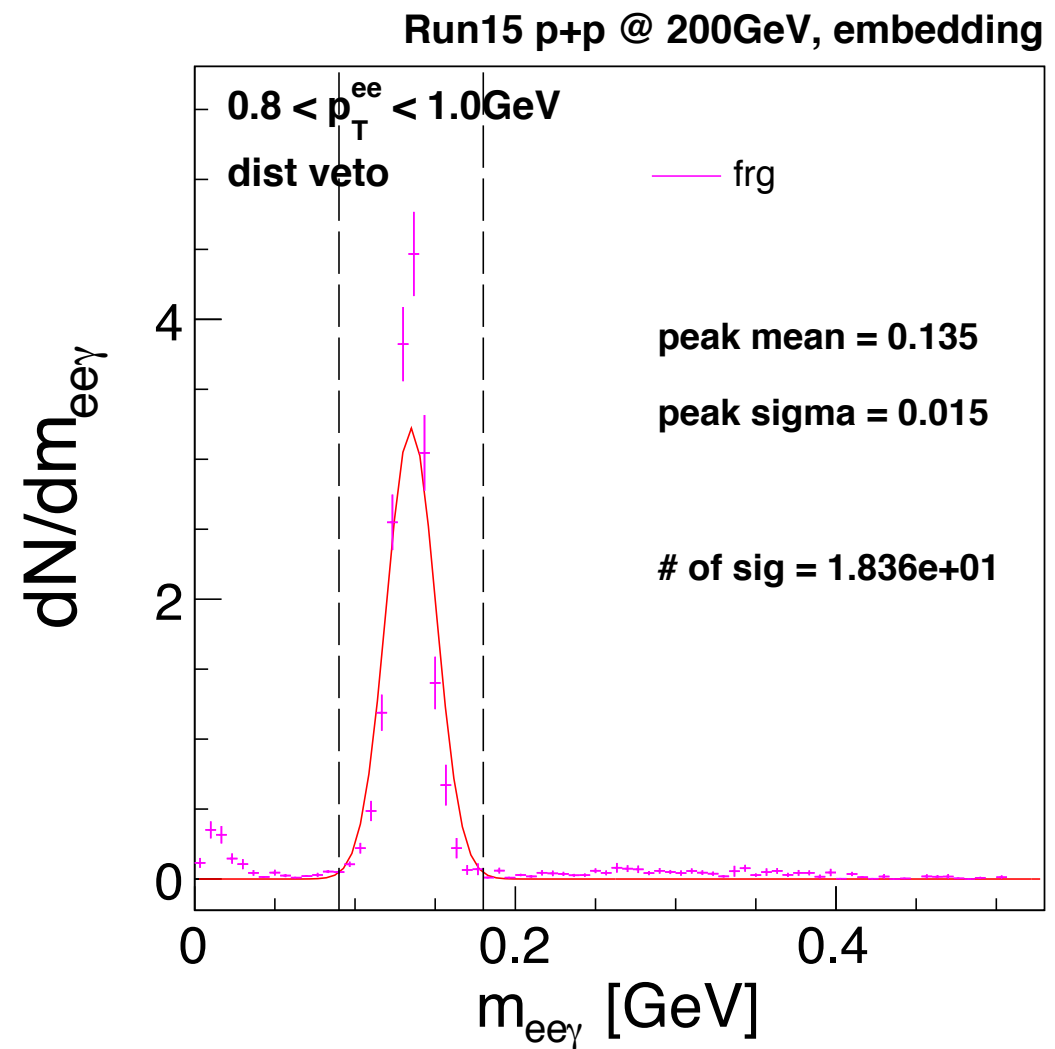
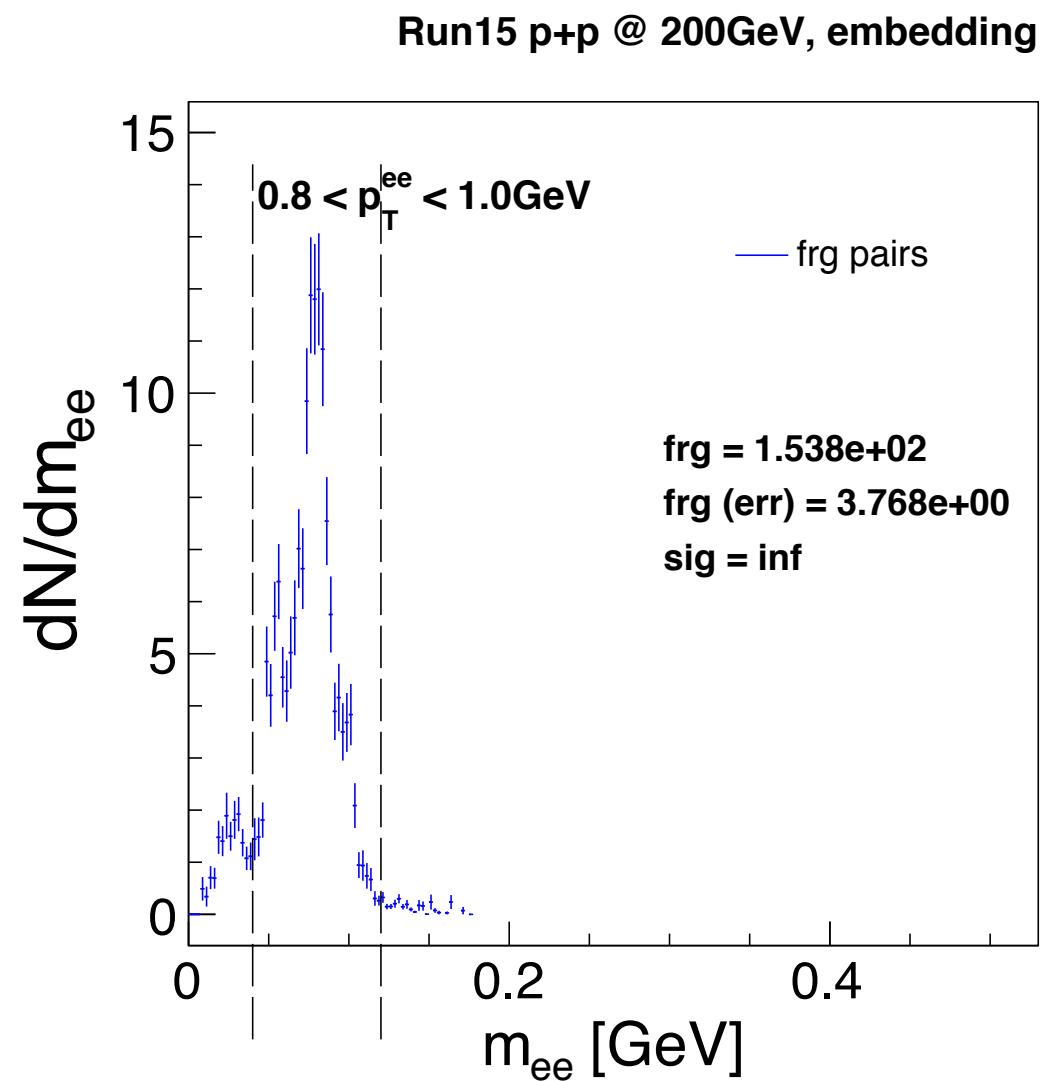
N_{incl} & N_{tag} from p+Au @ 200 GeV



N_{incl} & N_{tag} from p+Au @ 200 GeV

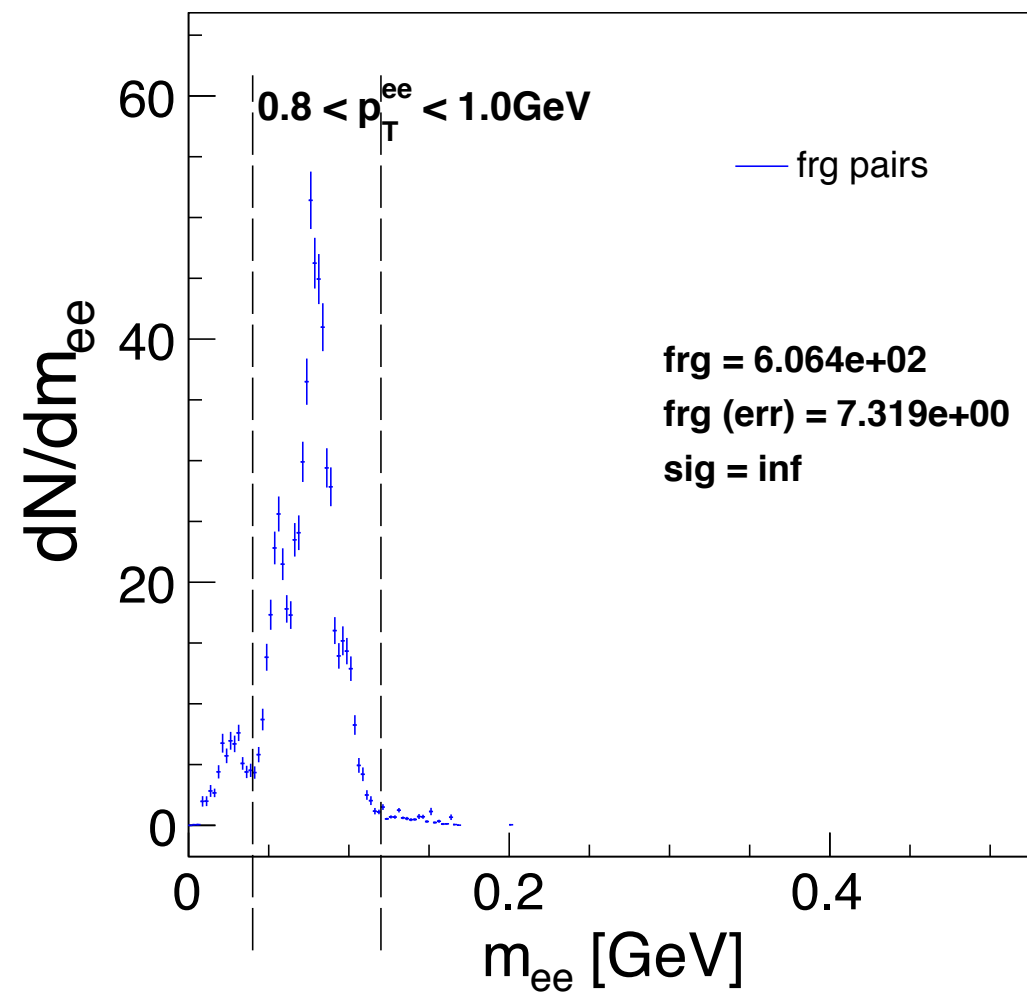


N_{incl} & N_{tag} from p+p @ 200 GeV (embedding)

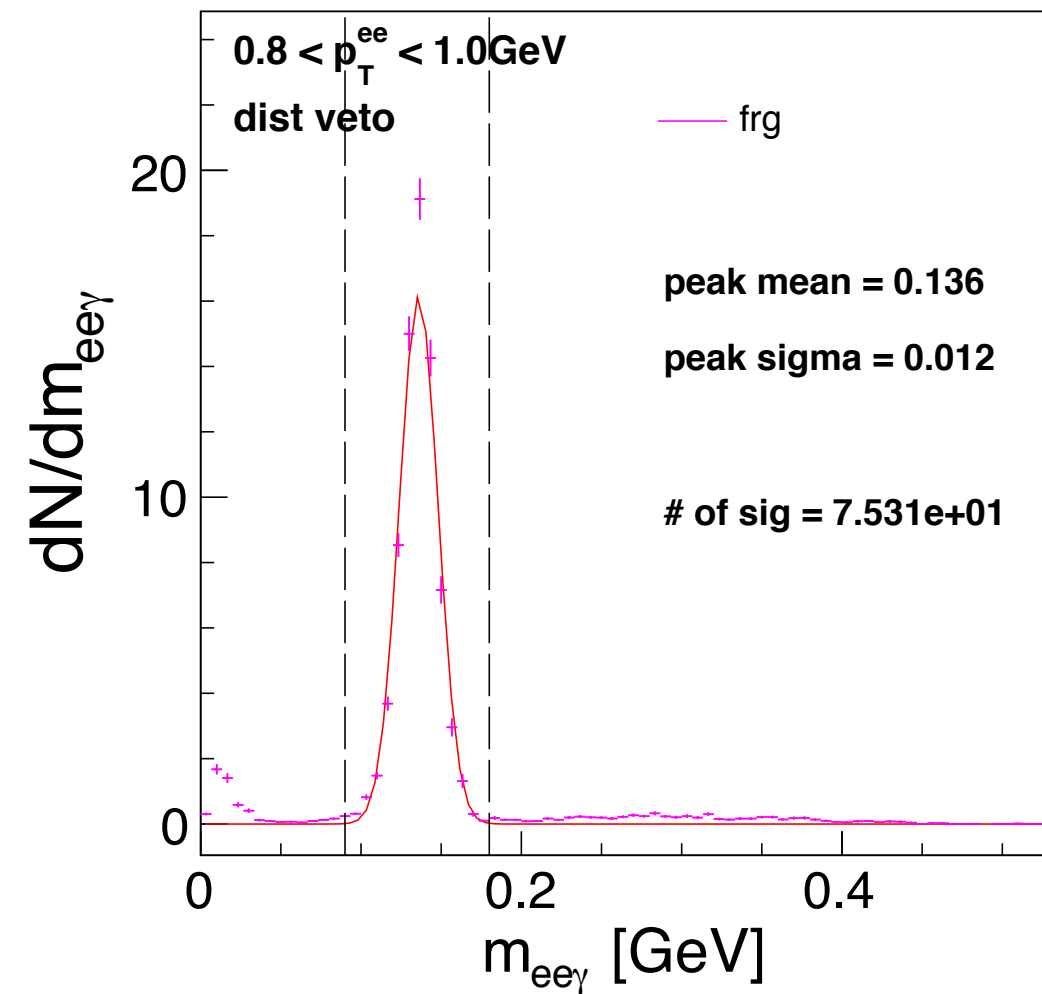


N_{incl} & N_{tag} from p+Au @ 200 GeV (embedding)

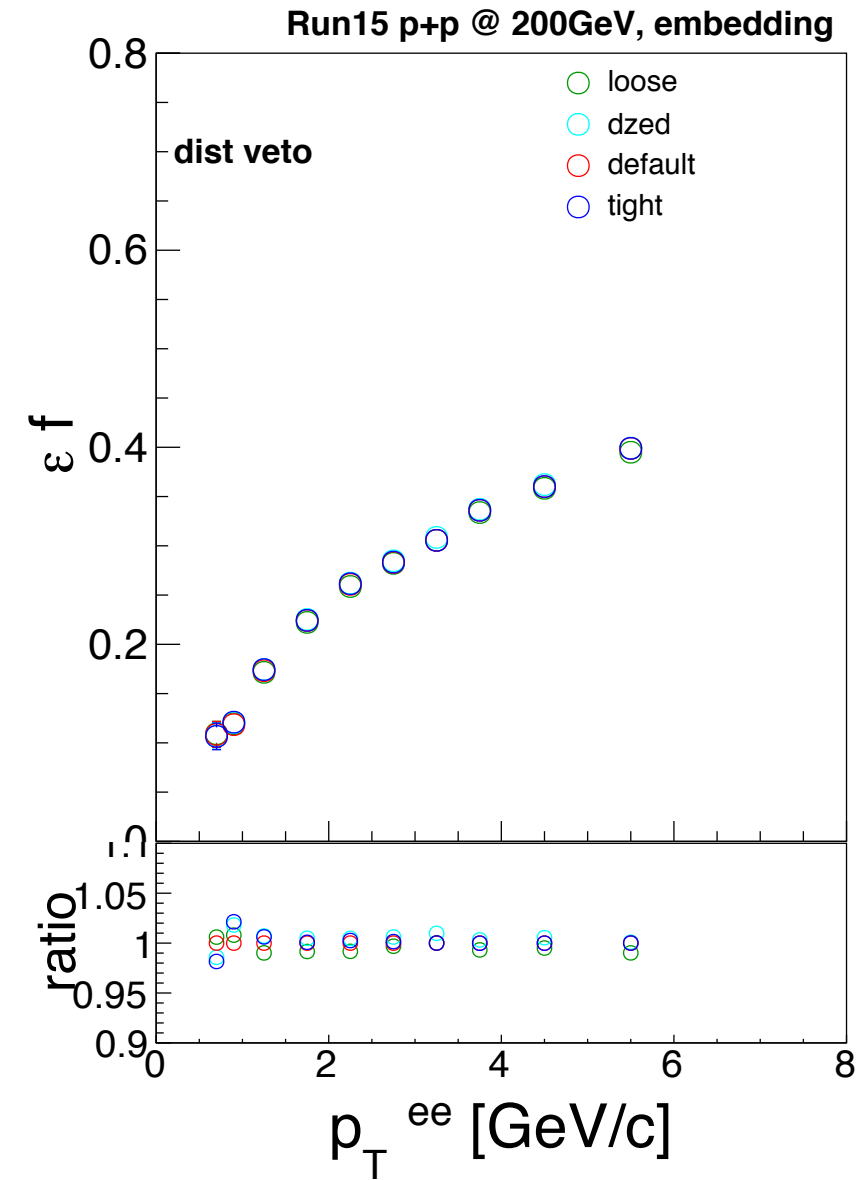
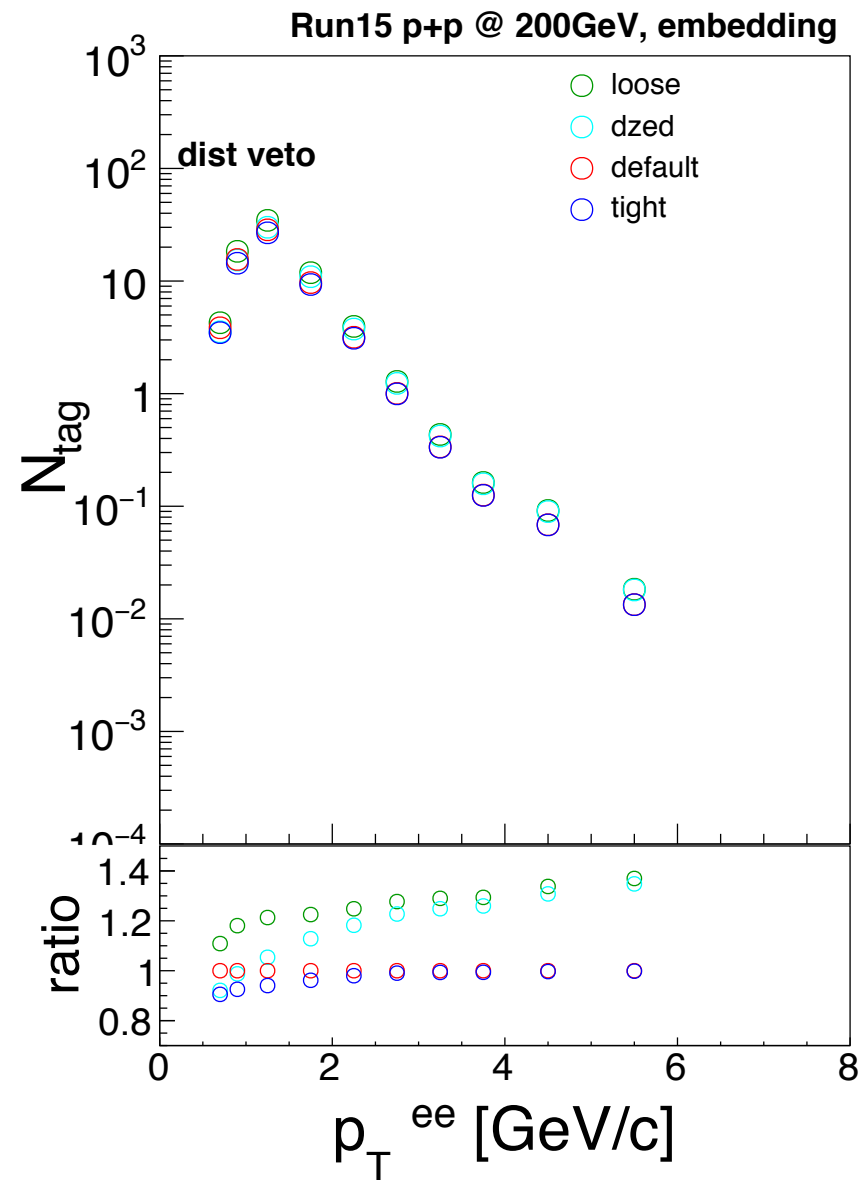
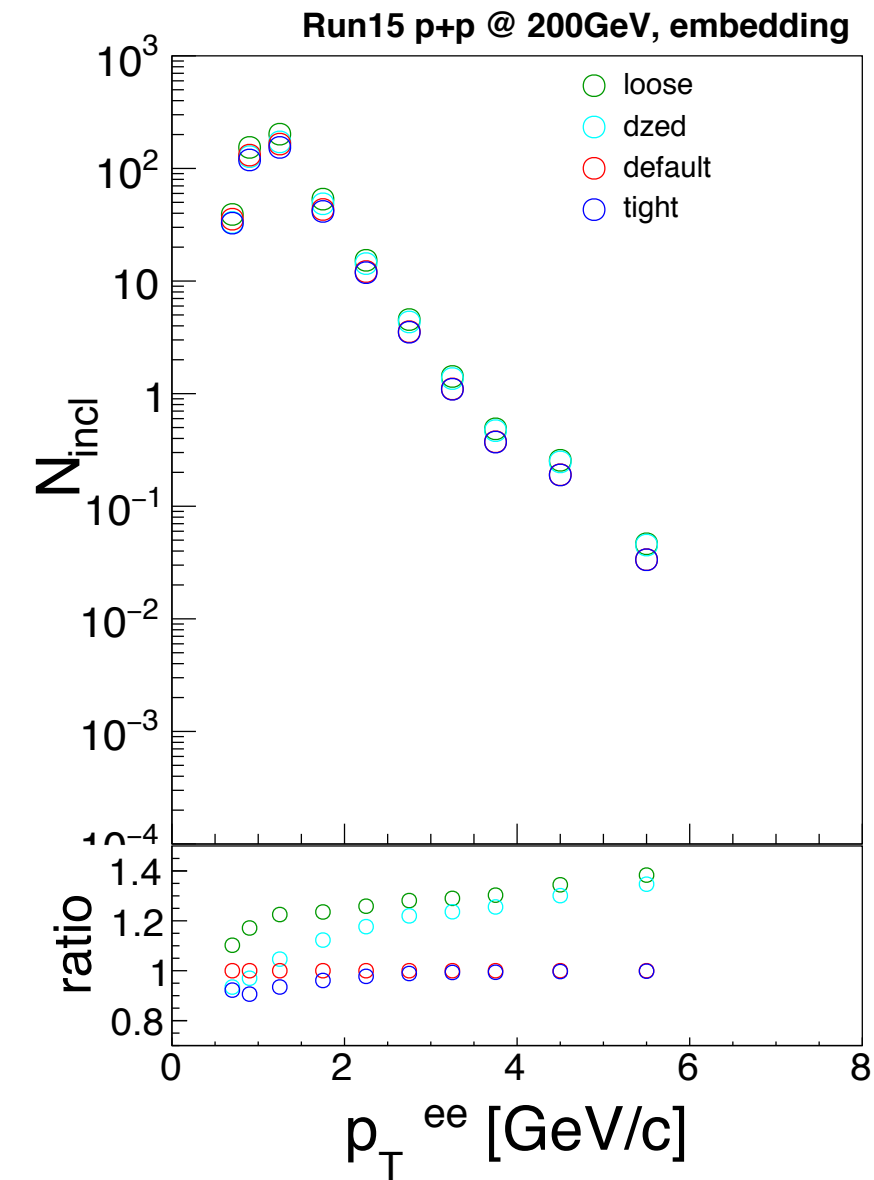
Run15 p+Au @ 200GeV, 0-100, embeddir



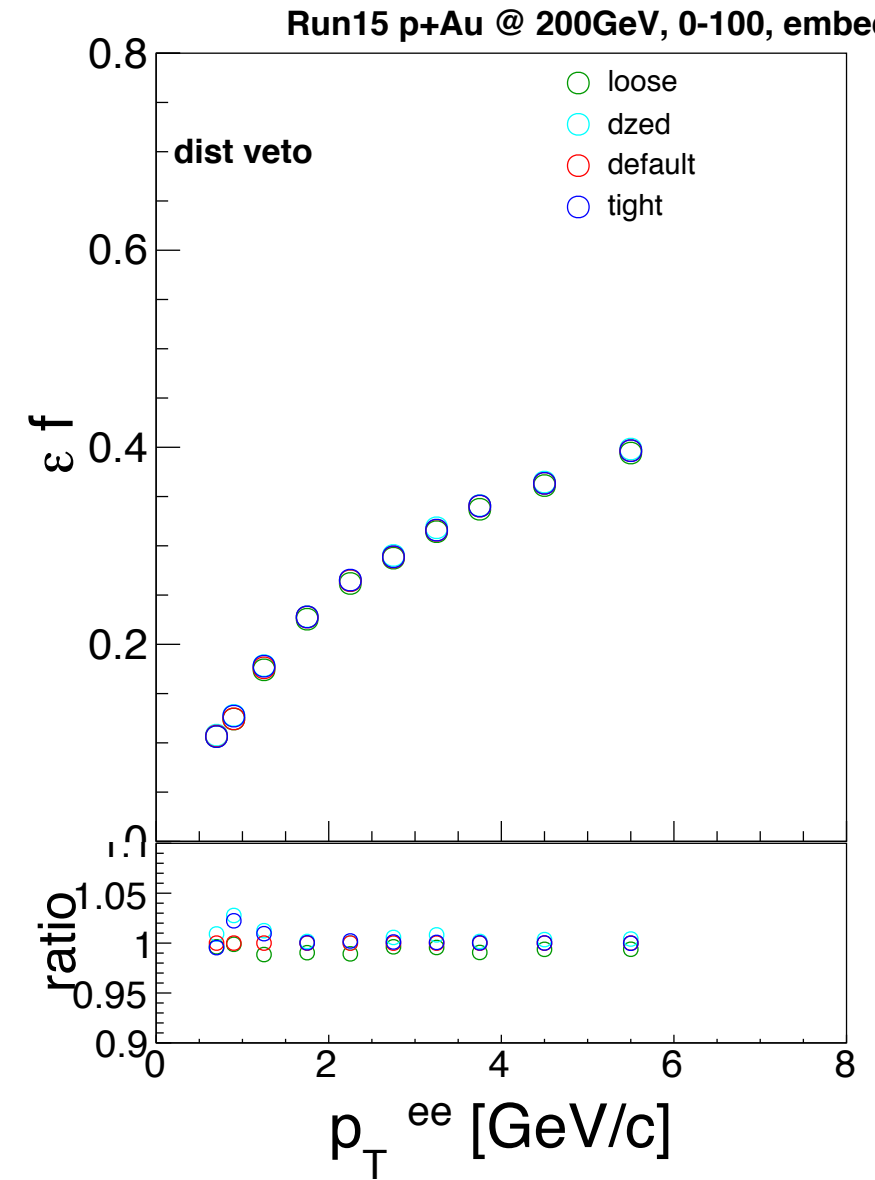
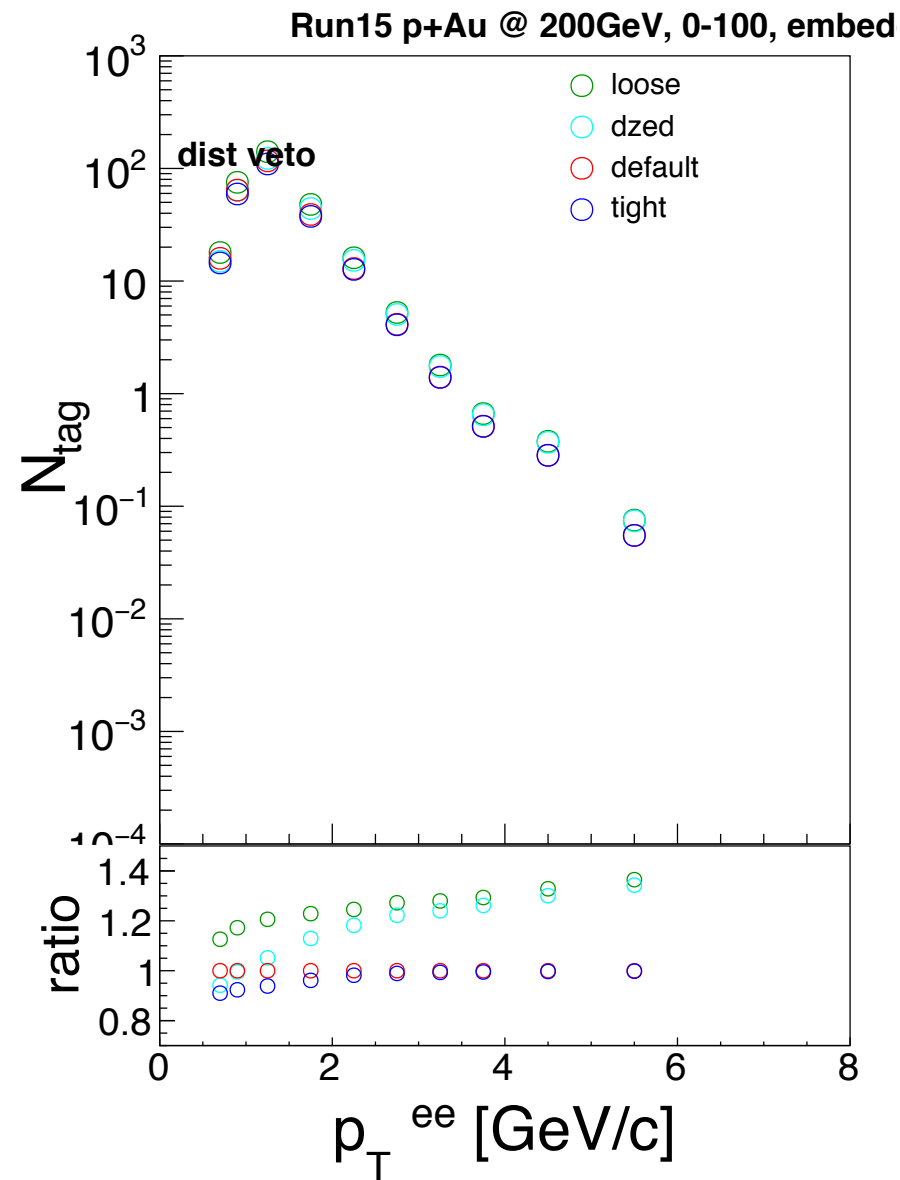
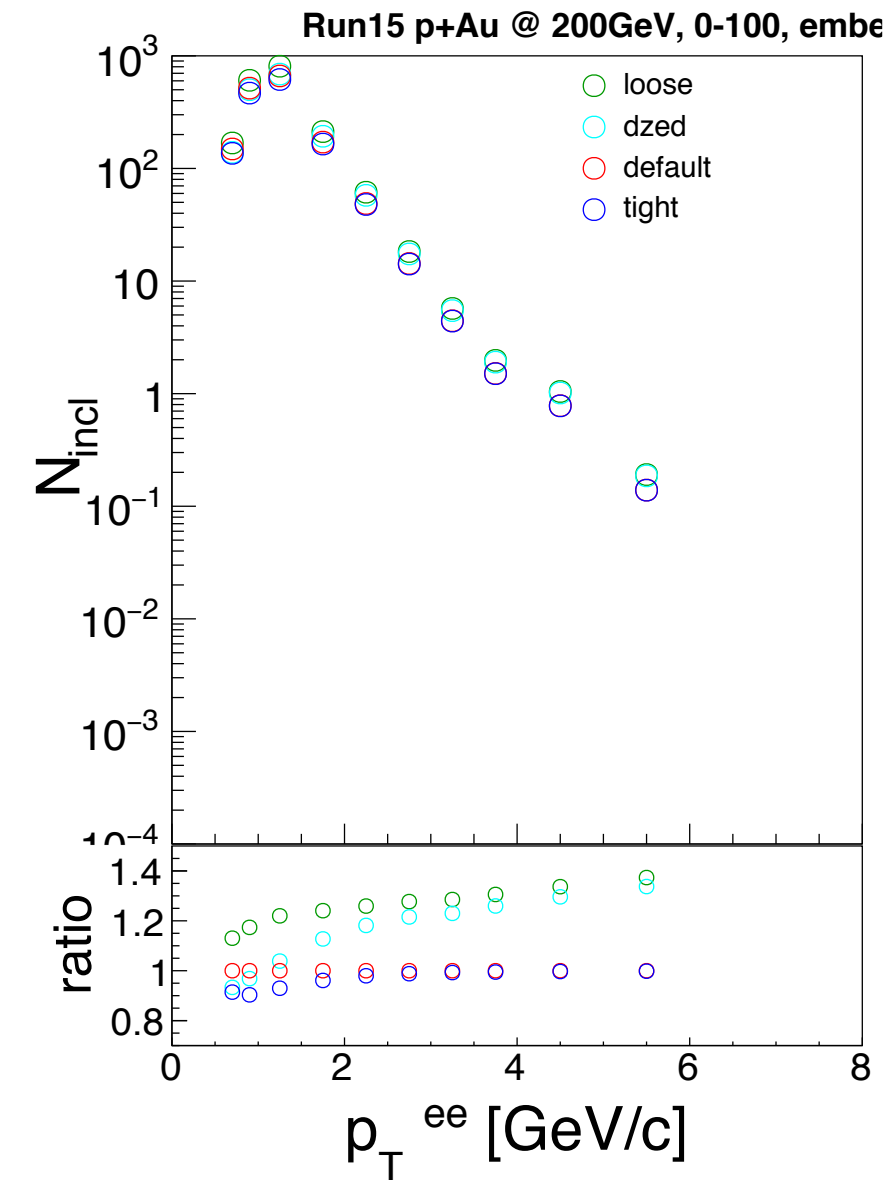
Run15 p+Au @ 200GeV, 0-100, embeddir



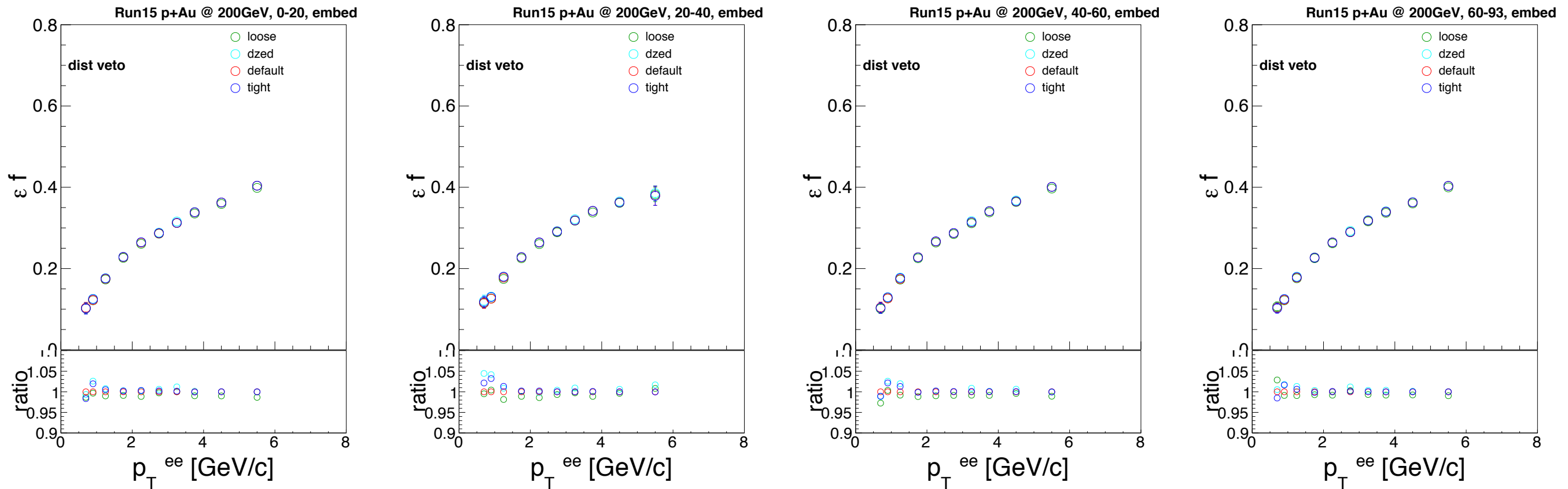
N_{incl} & N_{tag} from p+p @ 200 GeV (embedding)



N_{incl} & N_{tag} from p+Au @ 200 GeV (embedding)



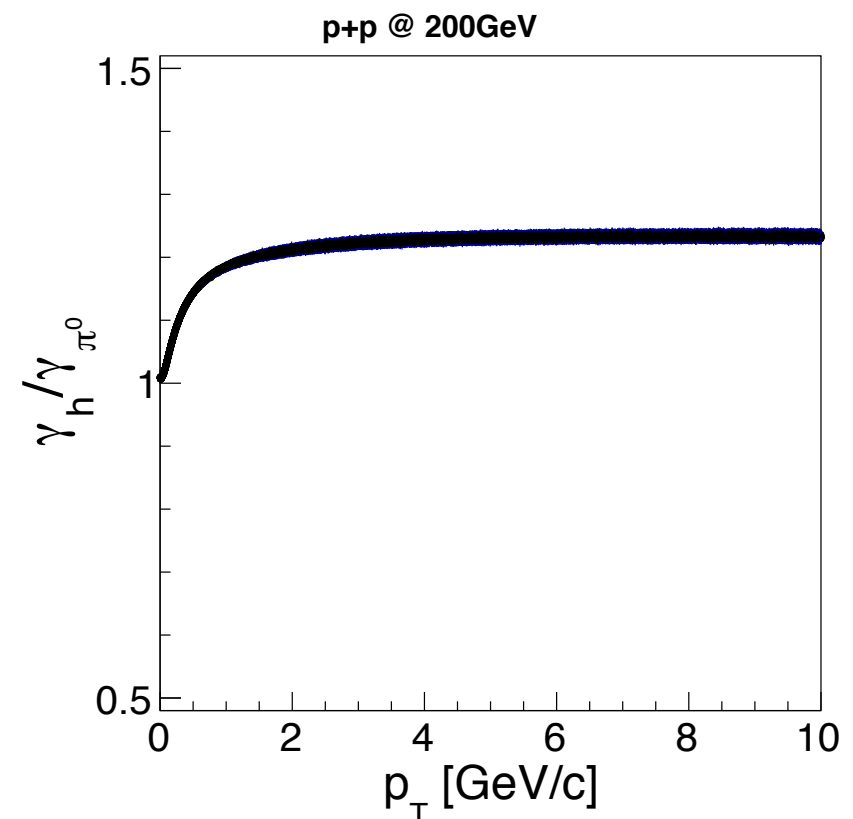
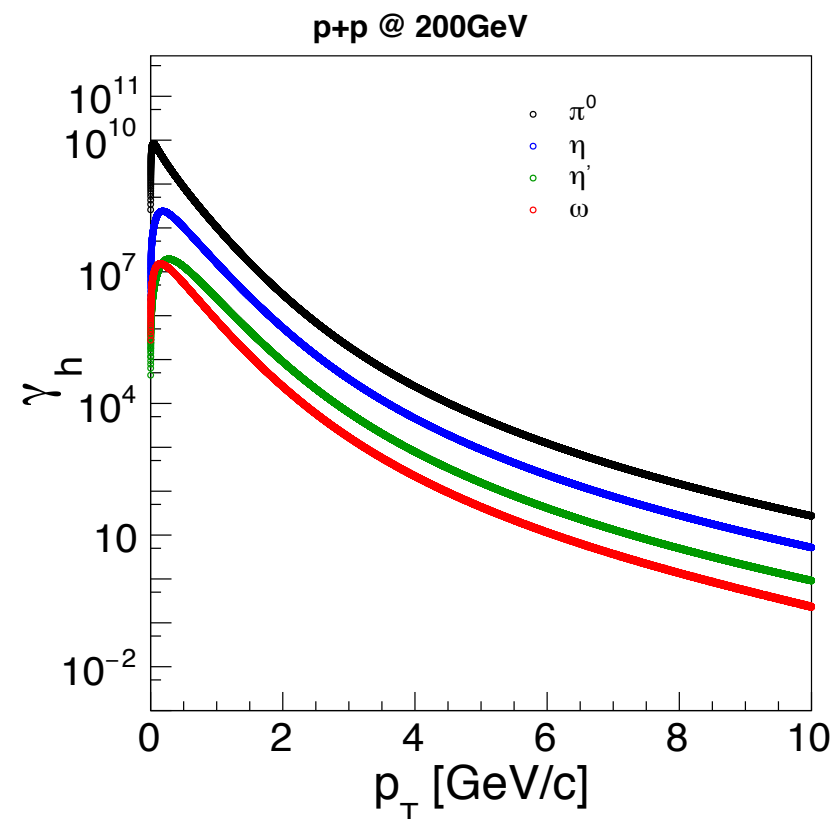
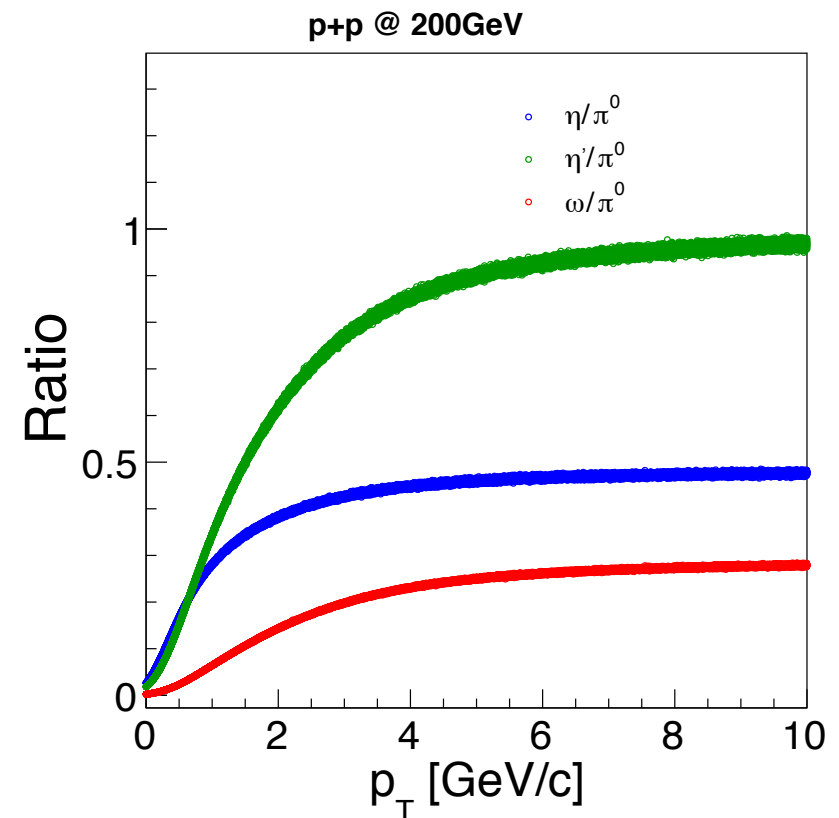
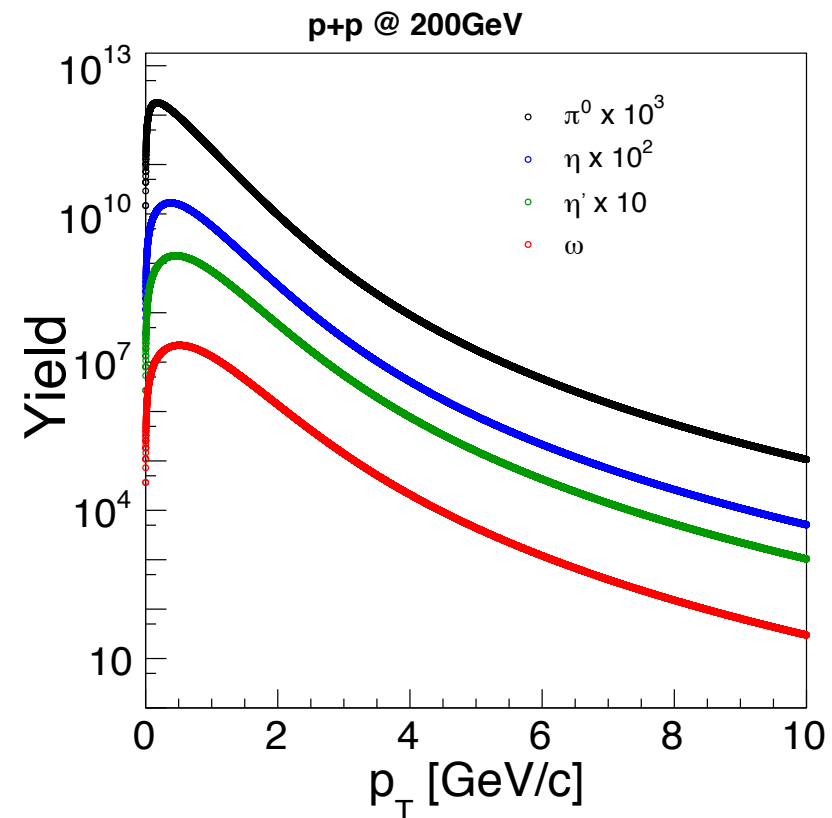
N_{incl} & N_{tag} from p+Au @ 200 GeV (embedding)



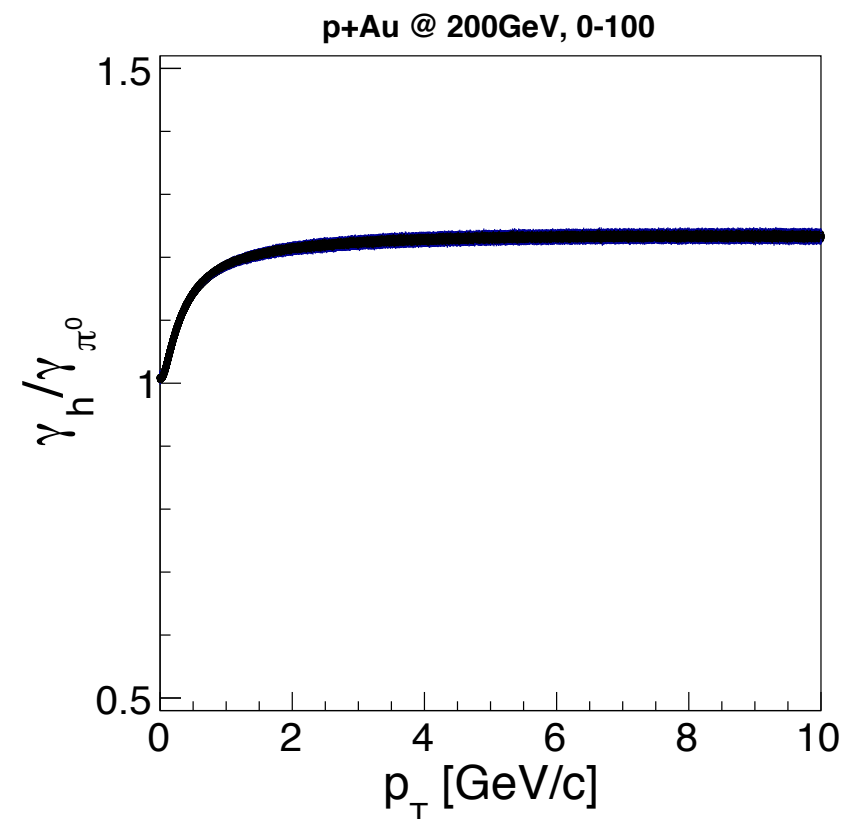
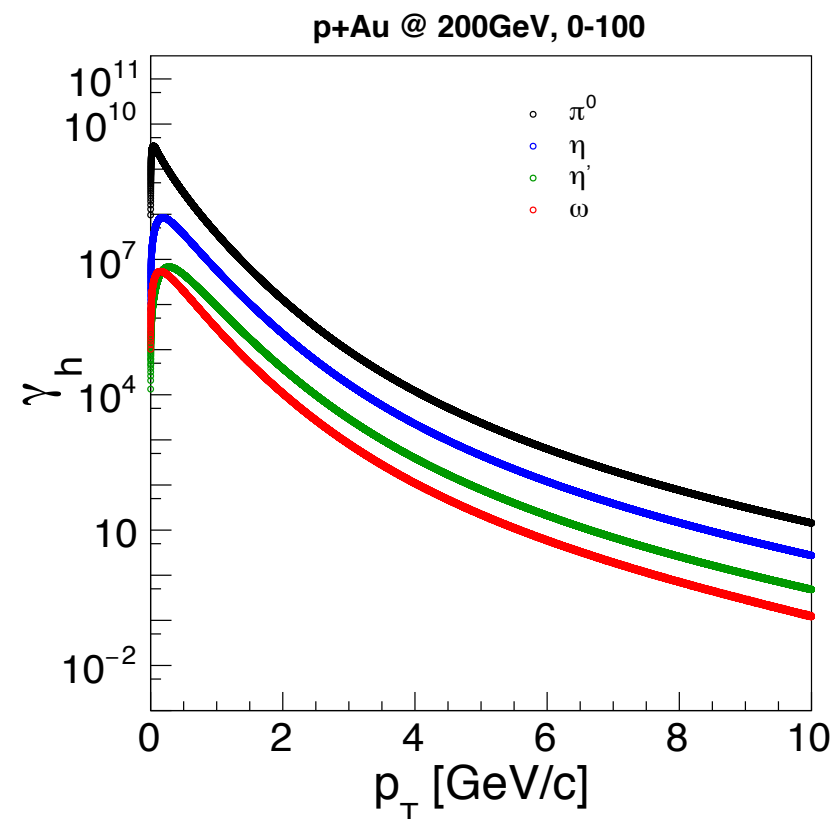
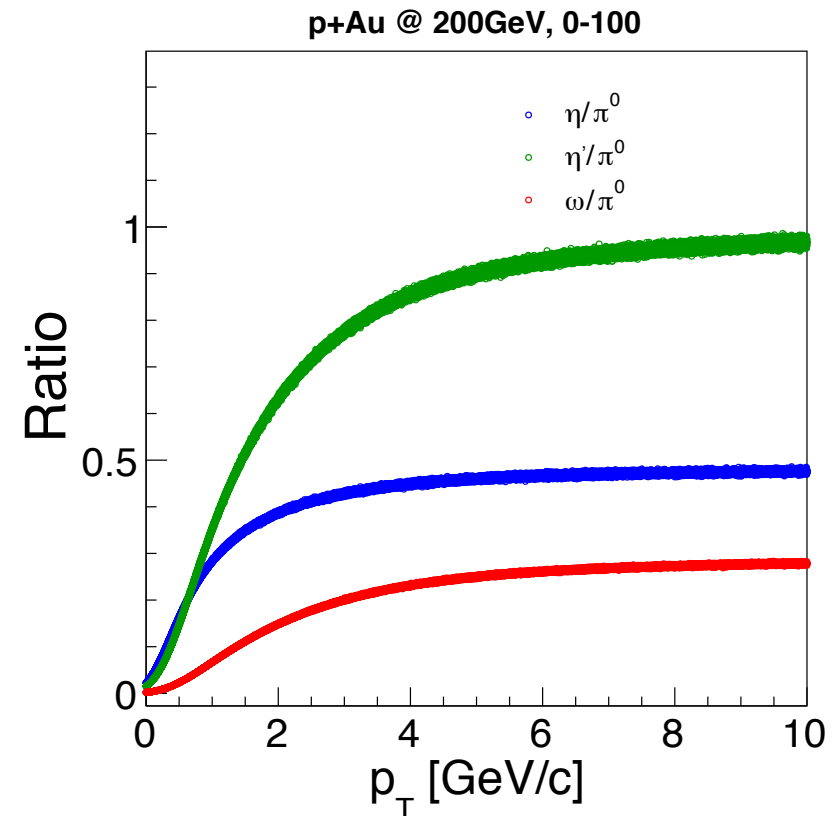
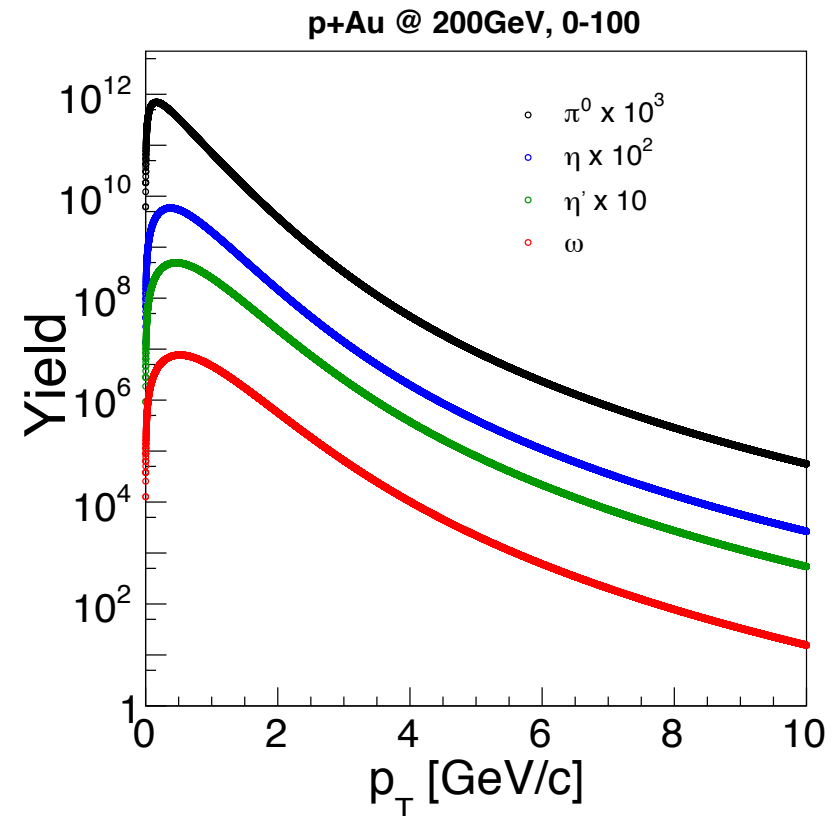
Cocktail

- Exodus - cocktail generator - is used to produce the photon decays from hadrons
- Inputs:
 - π^0 spectra
 - m_T -scaling for the higher mass particles
 - $\eta/\pi = 0.46$
 - $\eta'/\pi = 0.25$
 - $\omega/\pi = 0.9$
- Photon production from different particle species
 - 96% particles come from π^0 and η
 - The ratio doesn't really change in different systems
- To do:
 - Introduce a p_T -dependent η/π^0 ratio

Cocktail for p+p@200



Cocktail for p+Au@200



Next steps

- Improve cocktail ratio
- Finalize systematics