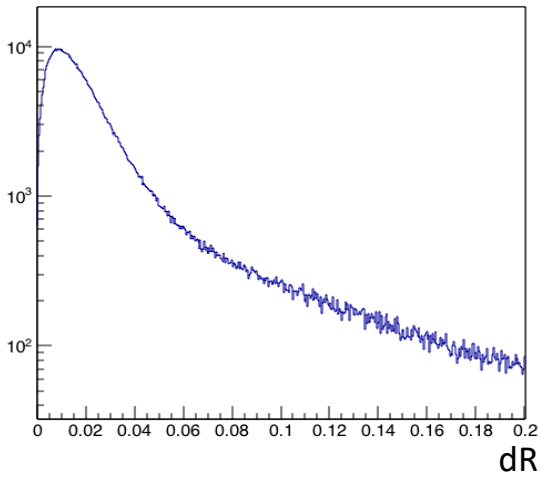
From Sept 25 EW/Onia Meeting

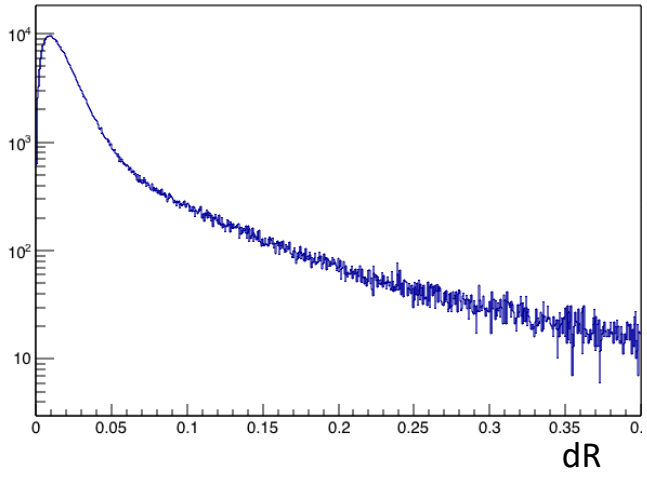
- Check the dR selection for ID efficiency calculation.
- Study the efficiency/scale factors‘ centrality dependence.

Progresses

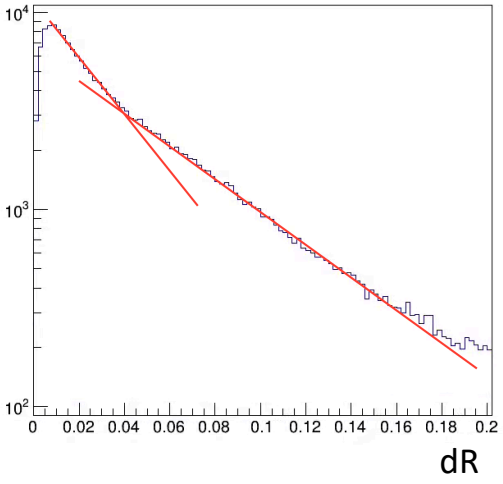
- Looked into dR distribution, observed similar distribution with Qipeng’s study.
  - Efficiency is lowered by ~5-7% (barrel: ~5%, endcap ~7%)
  - Looked into truth efficiency to use as a reference
    - Truth efficiencies are under 70% for both upsilon & J/psi. low efficiency region at 1.2 <|eta|< 2
    - No obvious dependence on charges/centrality.
    - Checked distribution of distances between a pair of tracks those are possibly from the same parent.
    - To do: check the distribution using truth muons, and check how the distribution might change if we require the truth muon to have a matching (dR < 0.2) reco muon.
- Produced data distribution as a function of FCal, written codes for reweighting MC, yet to run since we’re now unsure about our MC.

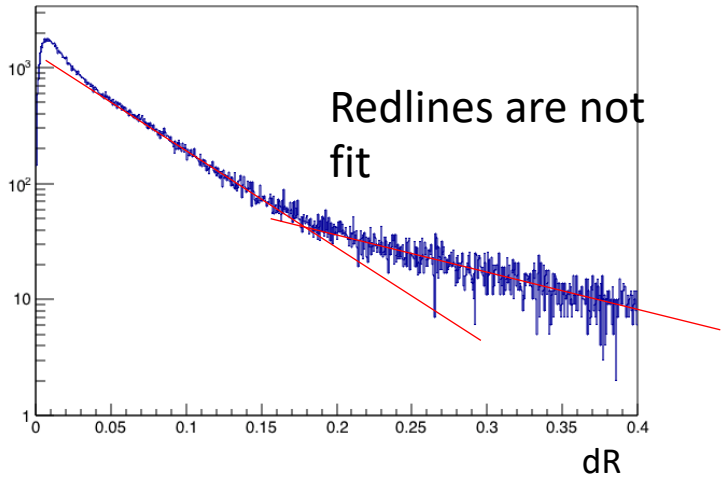
mindR in ID in Prompt J/psi MC

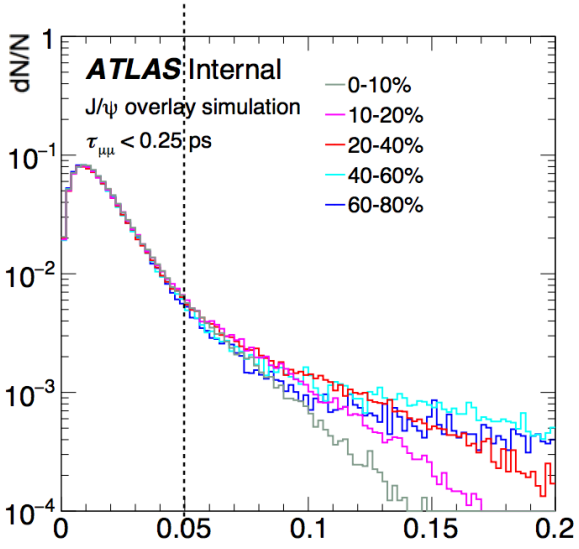


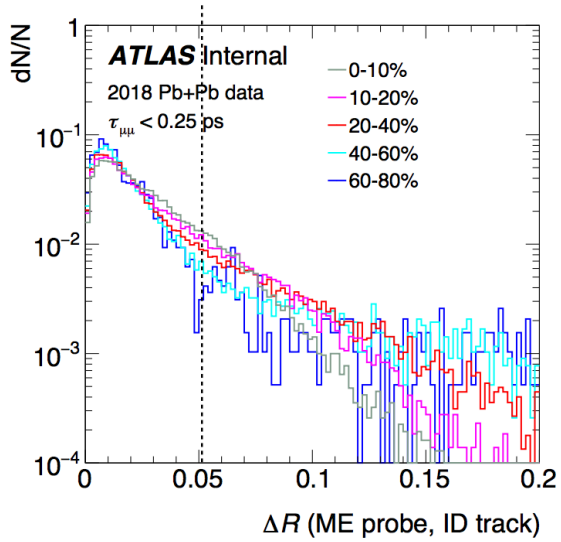


mindR in ID in Data



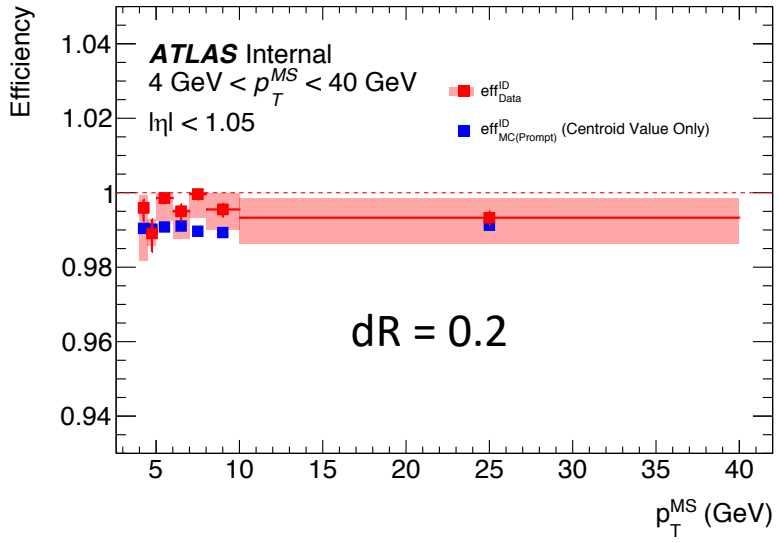


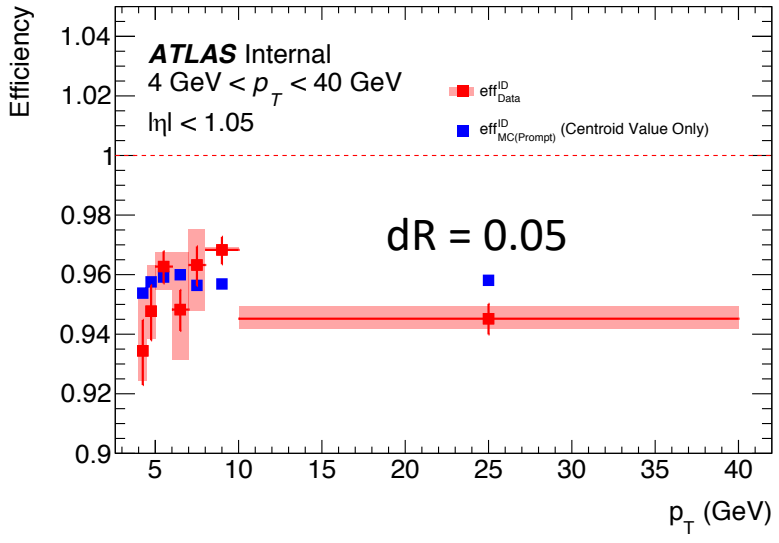




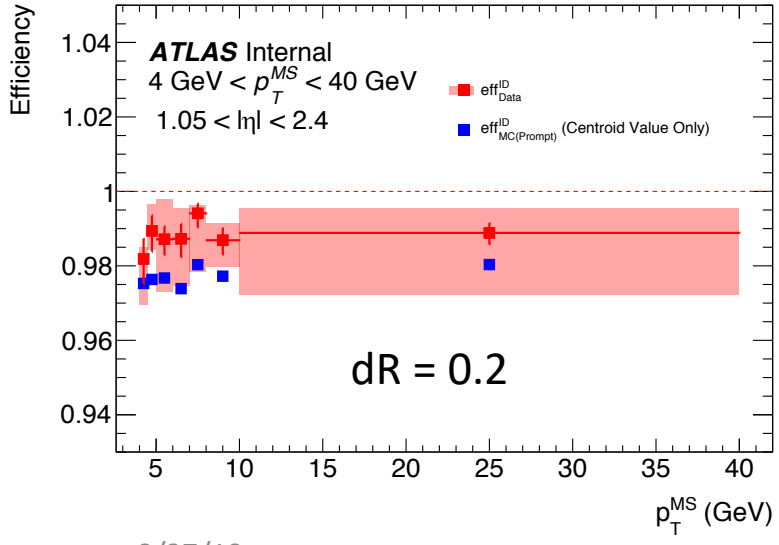
- Top 3 graphs, our data & MC using tight muons (integrated over centrality)
- Bottom 2 graphs, Qipeng's slides using medium muons
- Qualitatively similar.

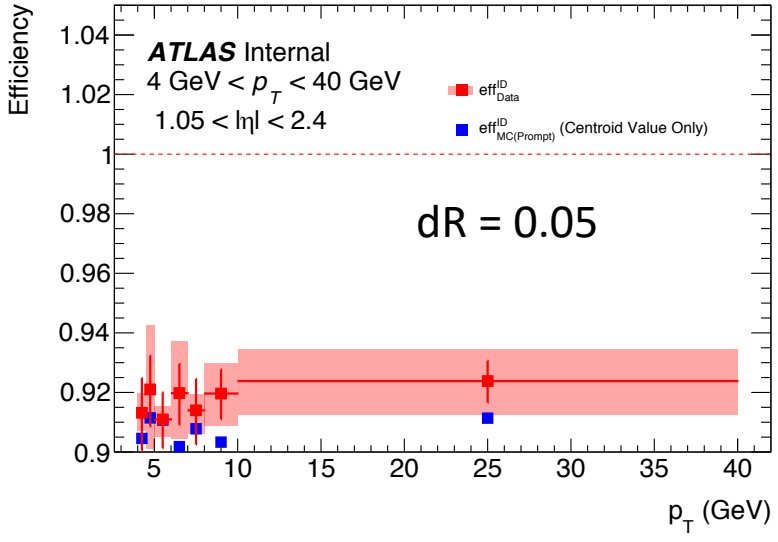
Comparison of Using different dR selection





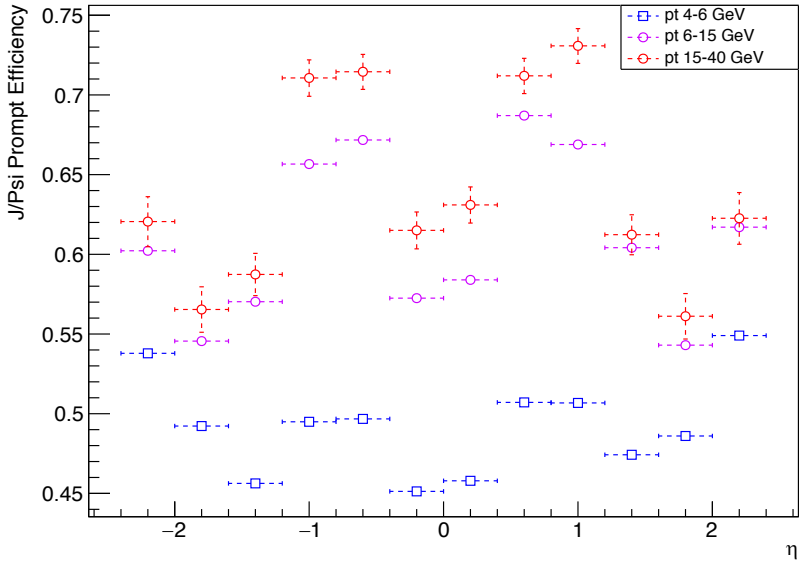
Barrel

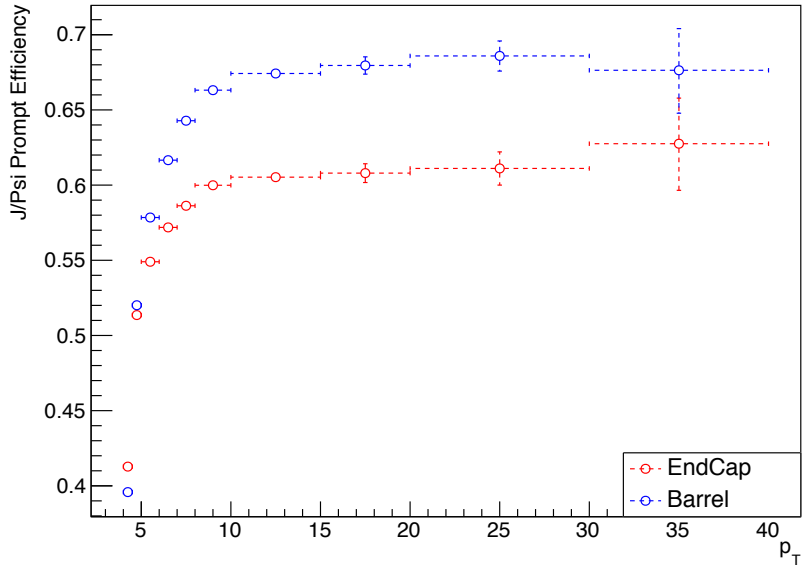


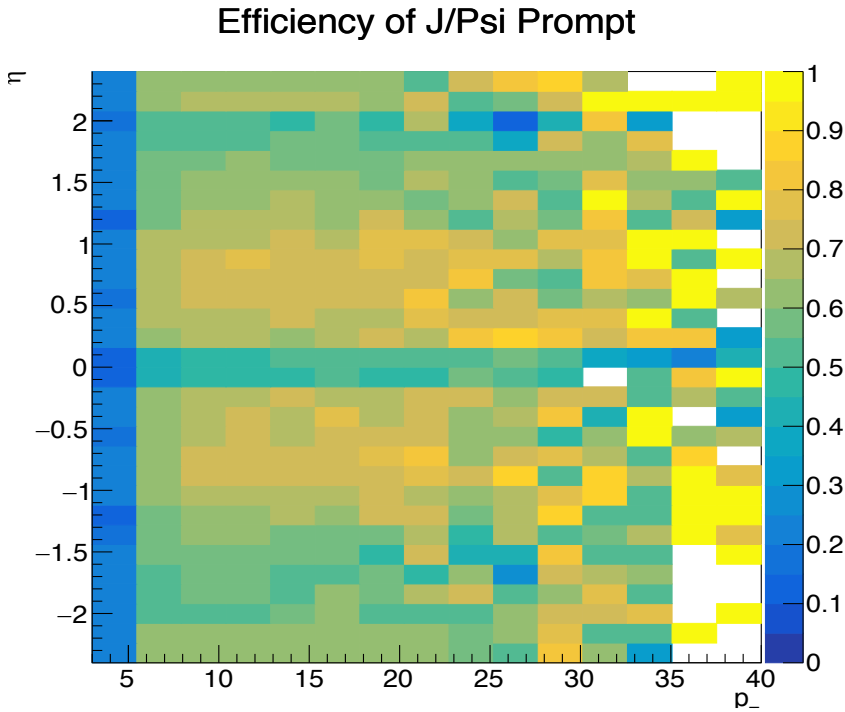


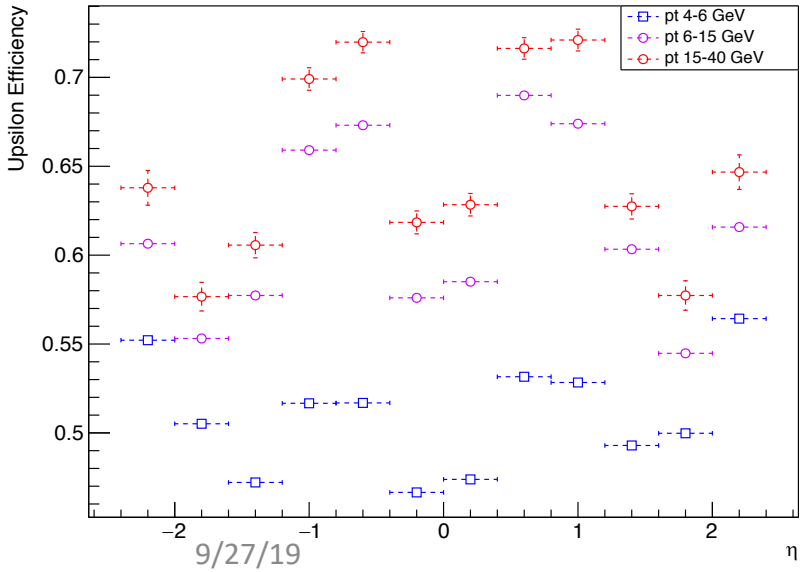
End Cap

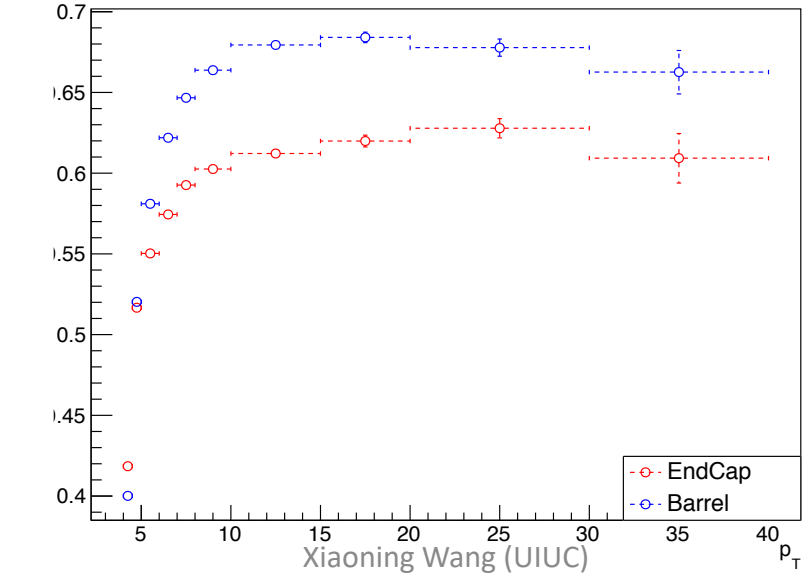
Use Truth Efficiency as a reference?

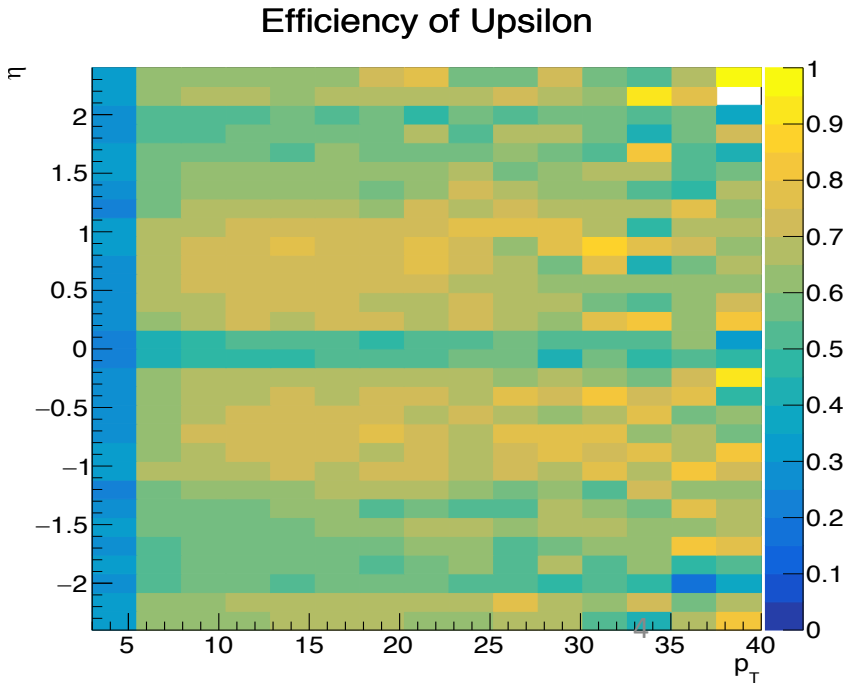




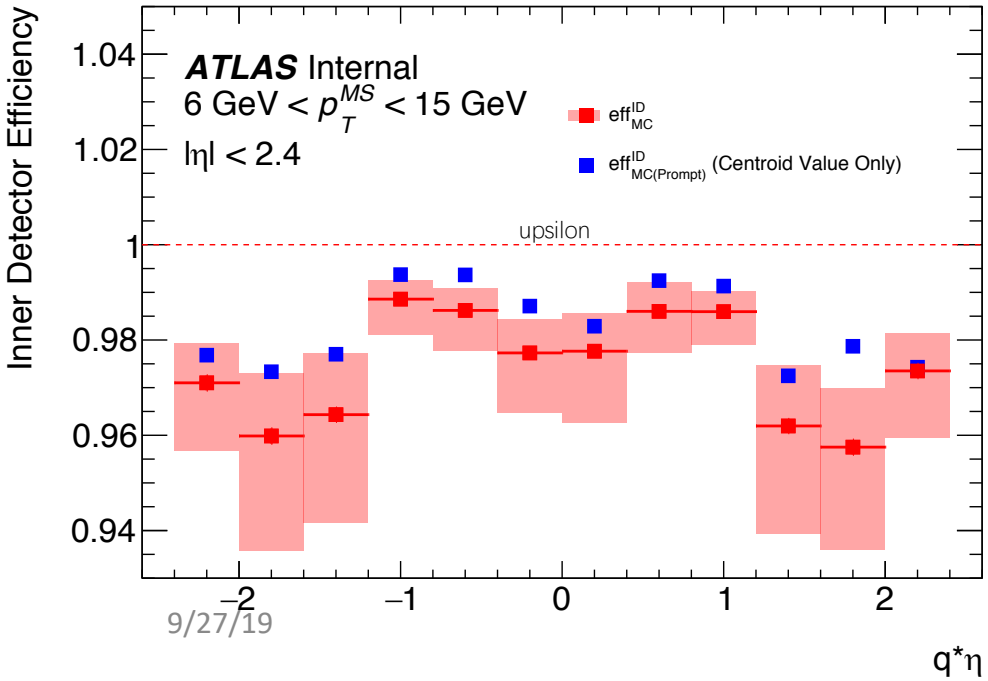




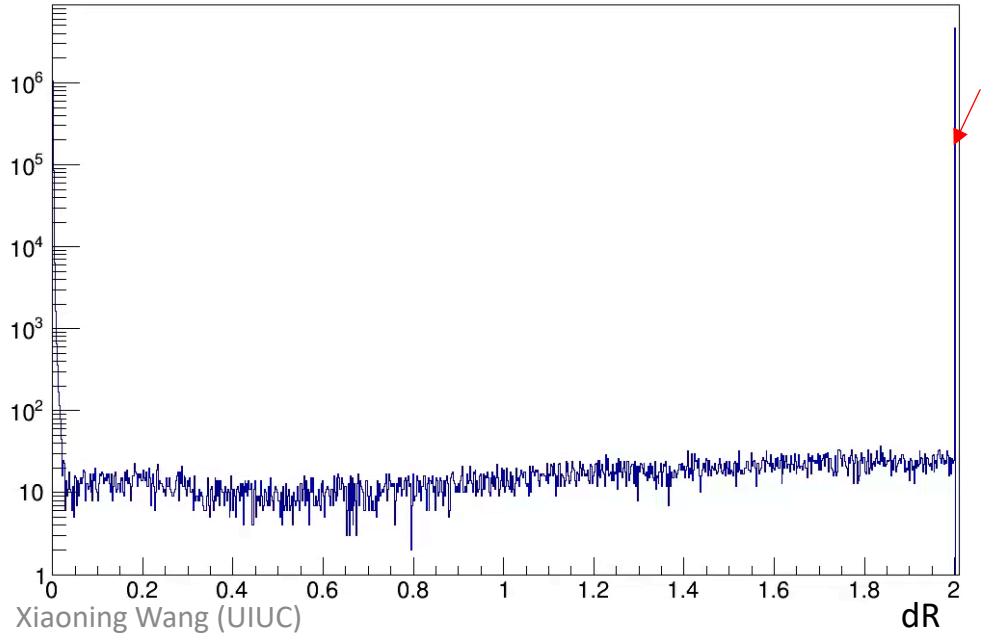




- Truth efficiency follows a reasonable trend as a function of pT.
- Have low efficiency regions around 1.2<|eta|<2, this is also seen in T&P method.
- Separating charges & different centrality does not show obvious differences. (see backup slides)
- Major sources of inefficiency come from truth muons with no reco muons closer than dR=2, so the selection of matching dR threshold is not the reason for overall low efficiency. (see below)

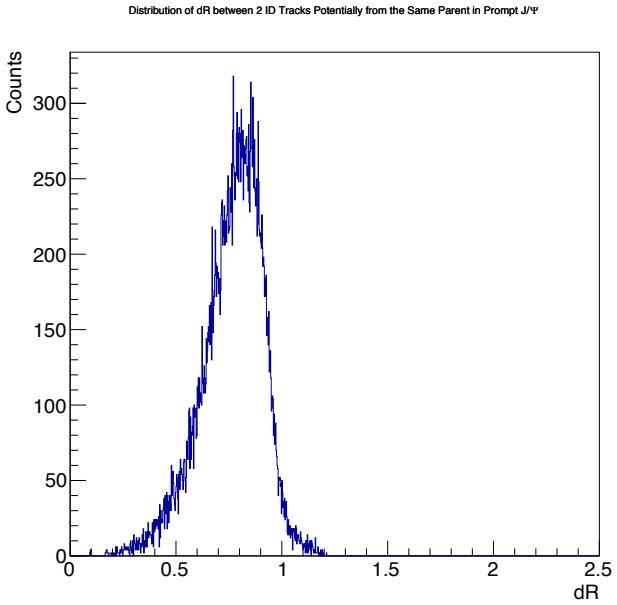


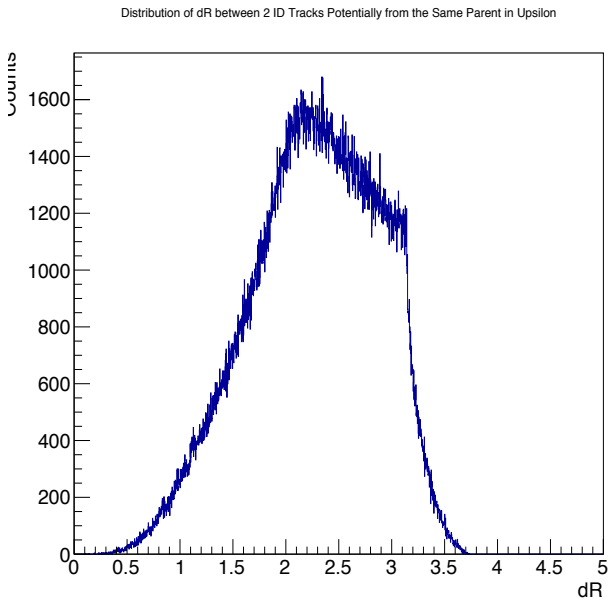
Prompt J/Psi minimum dR of Reco Muons from Truth Muons histogram

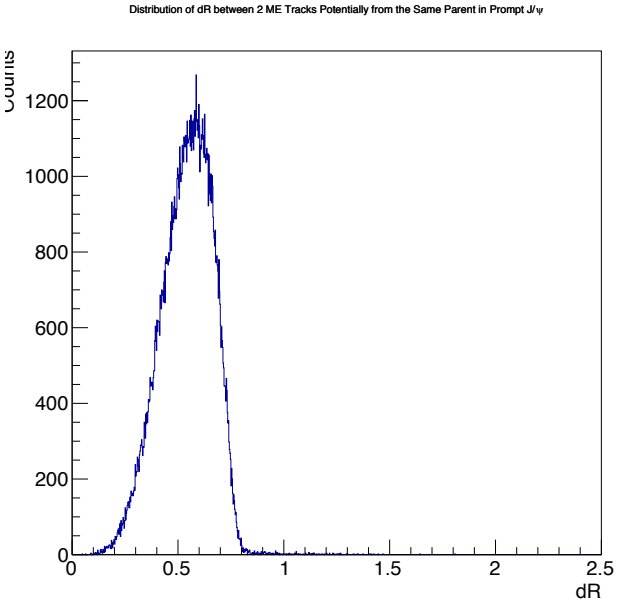


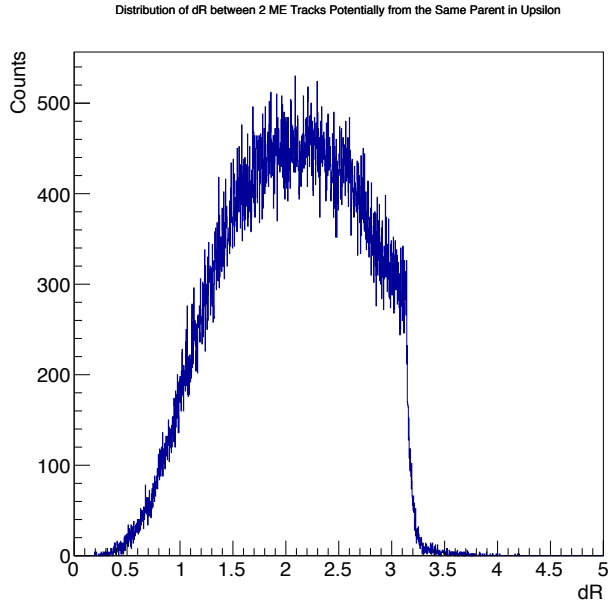
This is the peak for truth muons with no reco muons closer than dR = 2. This peak doesn't go away with increasing pT.

Distribution of distances between a pair of tracks those are possibly from the same parent









- Looped over tracks (ID or MS) in each event, and for J/Psi, plotted the dR between all pairs with an invariant mass in the range of 3.3-3.5 GeV (peak of mass histogram at around 3.4 GeV), or 9.25-9.55 GeV for upsilon (peak of mass histogram at around 9.4 GeV).
- ID tracks are known to have more random matches/background, the peak was shifted to the right in comparison.

Efficiency versus FCal in Data (ID: dR = 0.2, MS: dR = 0.01)