ALICE

Sphero(i)city technicalities

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ACO meeting

29 de octubre 2016

Outline

- Efficiency comparison multiplicity bins vs MB case for spherocity/sphericity in three different binnings for the cuts and the percentage selection of the event shape.
- Sphericity/Spherocity correlations.
- Transverse momentum spectra was obtained for MC ESD and with the corresponding efficiency and secondaries correction.
- A study for eta and phi distributions was performed to explain efficiency behaviour for isotropic low multiplicity at high pt events.

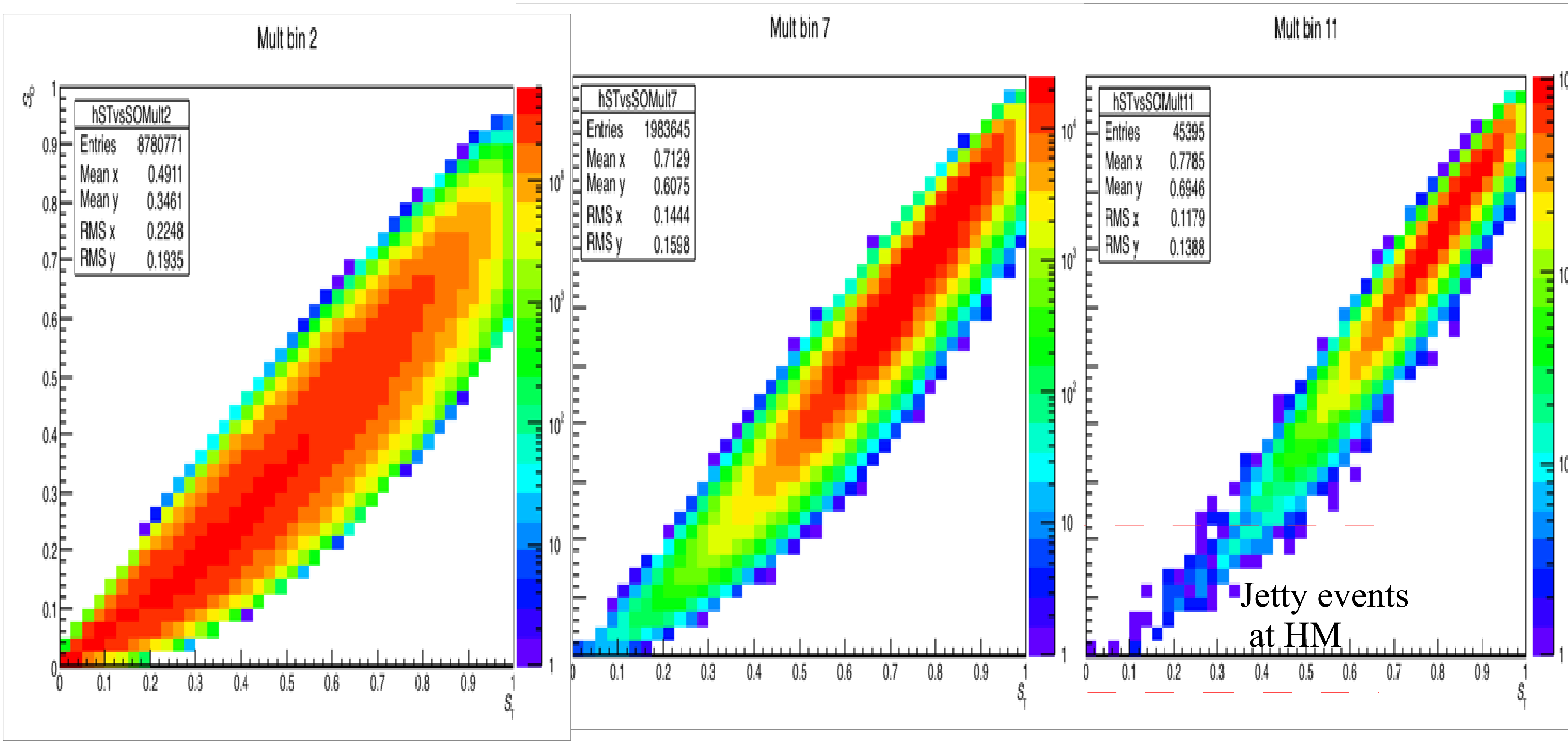
- Software
  - AliRoot: v5-08-13a-1 AliPhysics: vAN−20160716−1 ROOT: v5-34-30-alice5-alice-1
- Datasets
  - Good runs (according with RCT) LHC15f pass2
  - LHC15g3a3 (Pythia 8 - Monash 2013) anchored to LHC15f pass2
- Event selection
  - AliVEvent::kINT7, AnalysisUtils::IsSPDClusterVsTrackletBG(), IsPileupFromSPDInMultBins(), IsIncompleteDAQ()
- Vertex
  - For events with both SPD and Track vertices reconstructed, their separation along the *z*-coordinate was required to be smaller than 5 mm

- Sphero(i)city is reconstructed using more than two tracks with transverse momentum greater than 0.15 GeV/*c* and within $|\eta| < 0.8$. Three sets of cuts were tested:
  - TPC: GetStandardTPCOnlyTrackCuts()+TPCrefit
  - Hybrid: CreateTrackCutsPWGJE(10001008)+CreateTrackCutsPWGJE(10011008)
  - Standard: GetStandardITSTPCTrackCuts2011(kTRUE,1)
- At the end we decided to use the TPC track cuts (global tracks which satisfy GetStandardTPCOnlyTrackCuts()+TPCrefit). More details can be found here:

  https://aliceinfo.cern.ch/Notes/node/529
- In this presentation, results for the reference estimator are discussed
  - **GetReferenceMultiplicity(fESD, AliESDtrackCuts::kTrackletsITSTPC, 0.8)**

What is the correlation Spherocity vs Sphericity for diff. Nch bins

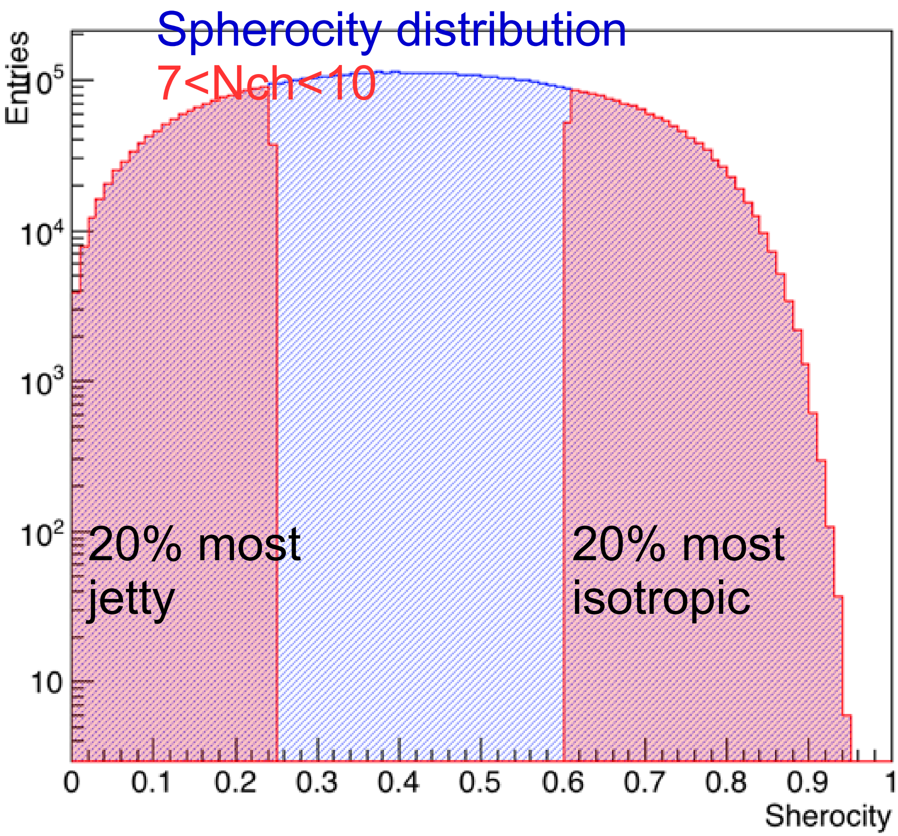
We see the correlation and difference at low and high multiplicity

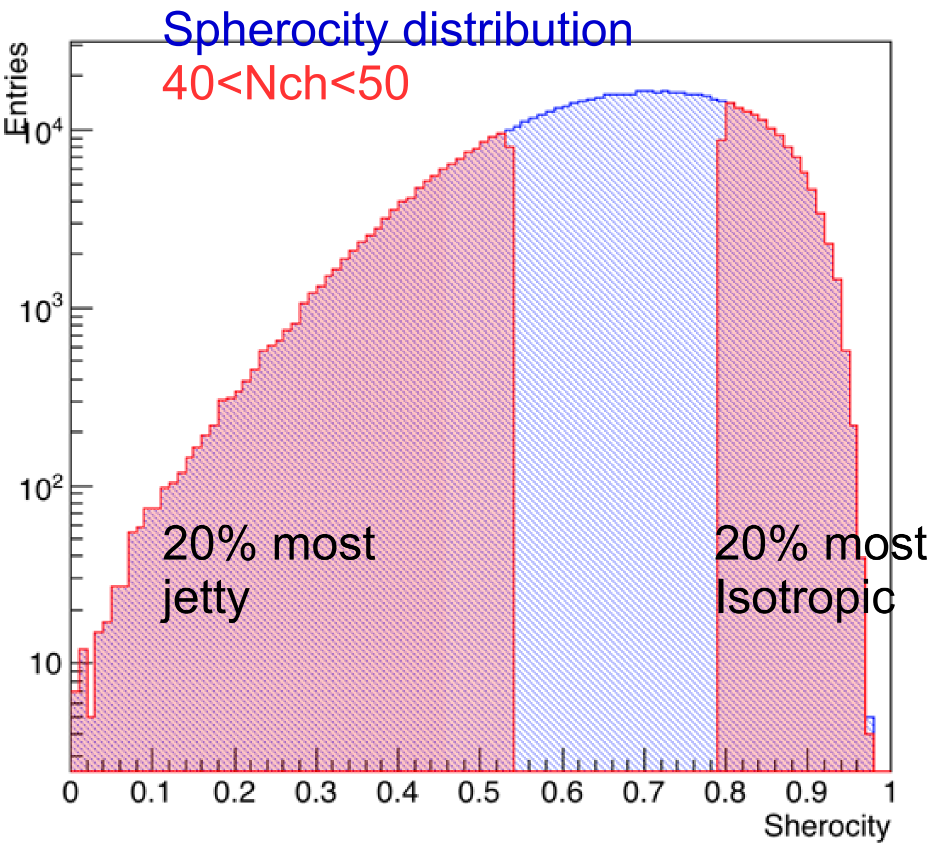


Multbins[14]={0,1, 4, 7,10,15, 20, 25, 30, 40, 50, 60, 70, 140 };

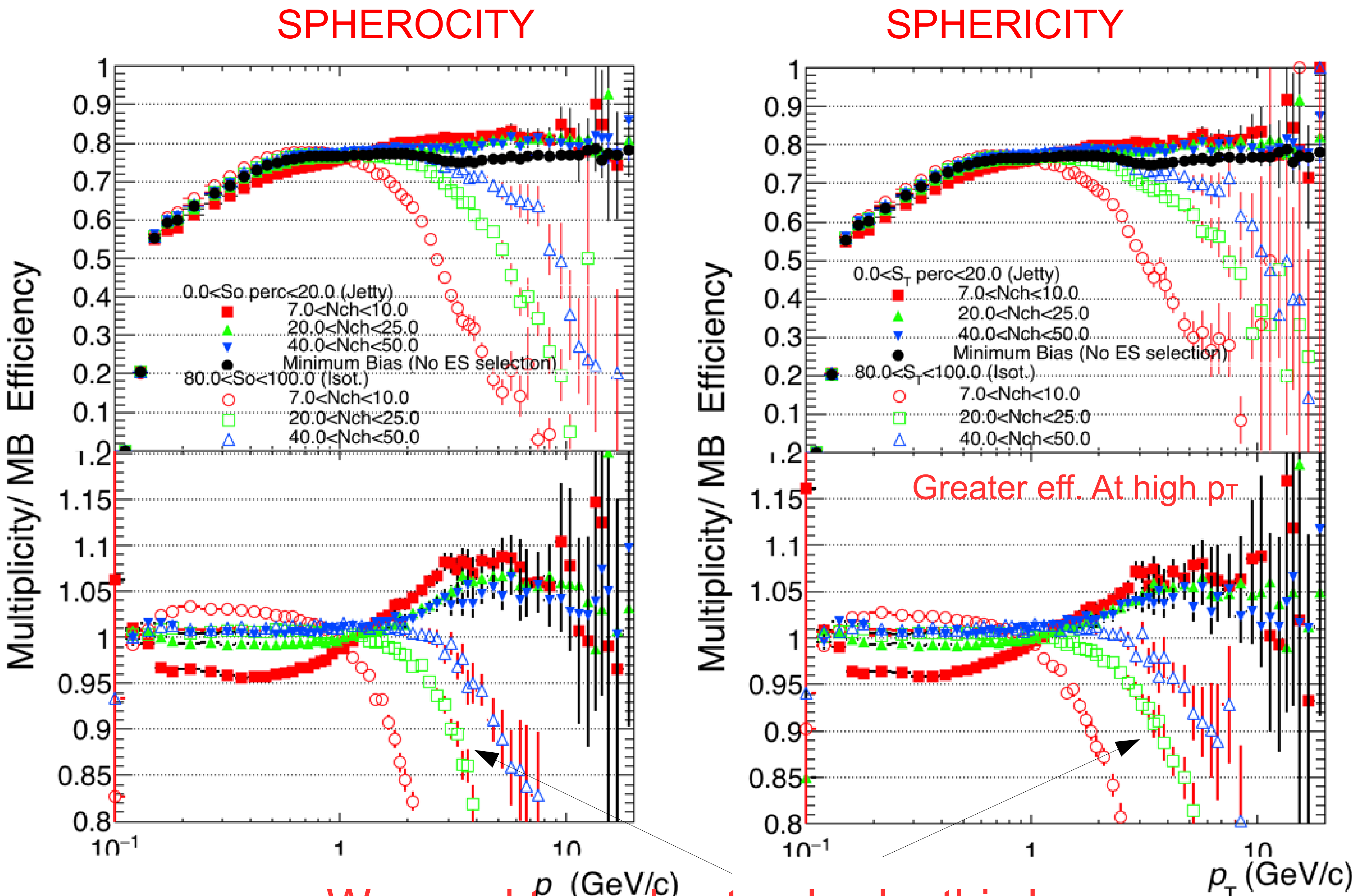
For three different Event Shape binnings and percentiles

- BinA= {0.0,0.1,0.4,0.9,1.0}; BinApc= {0.0,10.0,40.0,90.0,100.0};
- BinB= {0.0,0.2,0.4,0.8,1.0}; BinBpc= {0.0,20.0,40.0,80.0,100.0};
- BinC= {0.0,0.3,0.4,0.7,1.0}; BinCpc= {0.0,30.0,40.0,70.0,100.0};





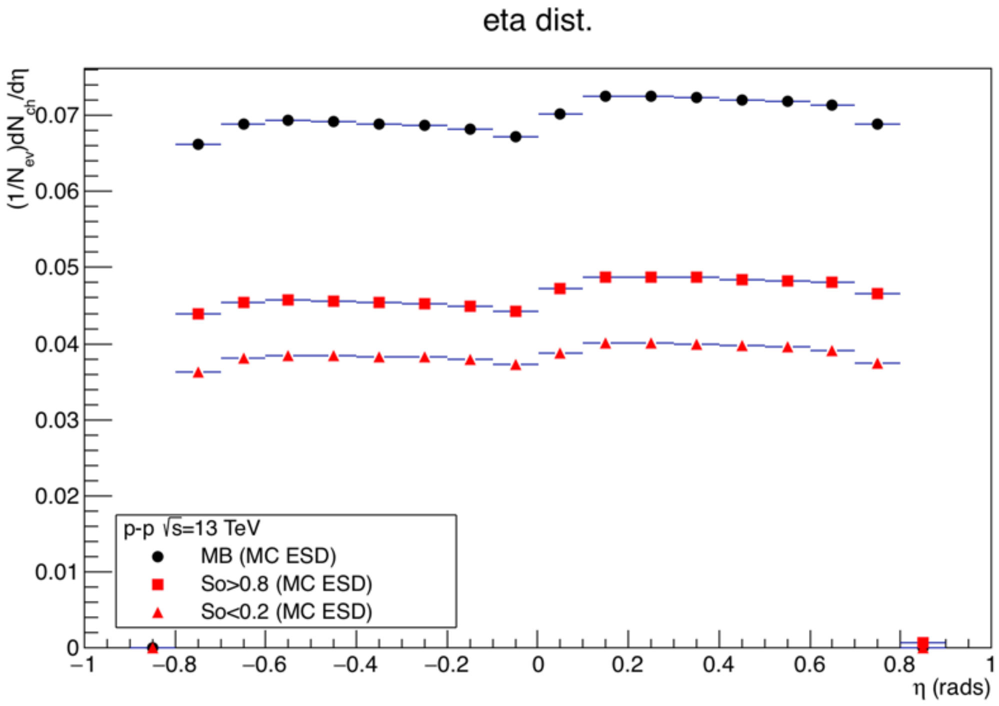
Comparison for percentile bins with best statistics.

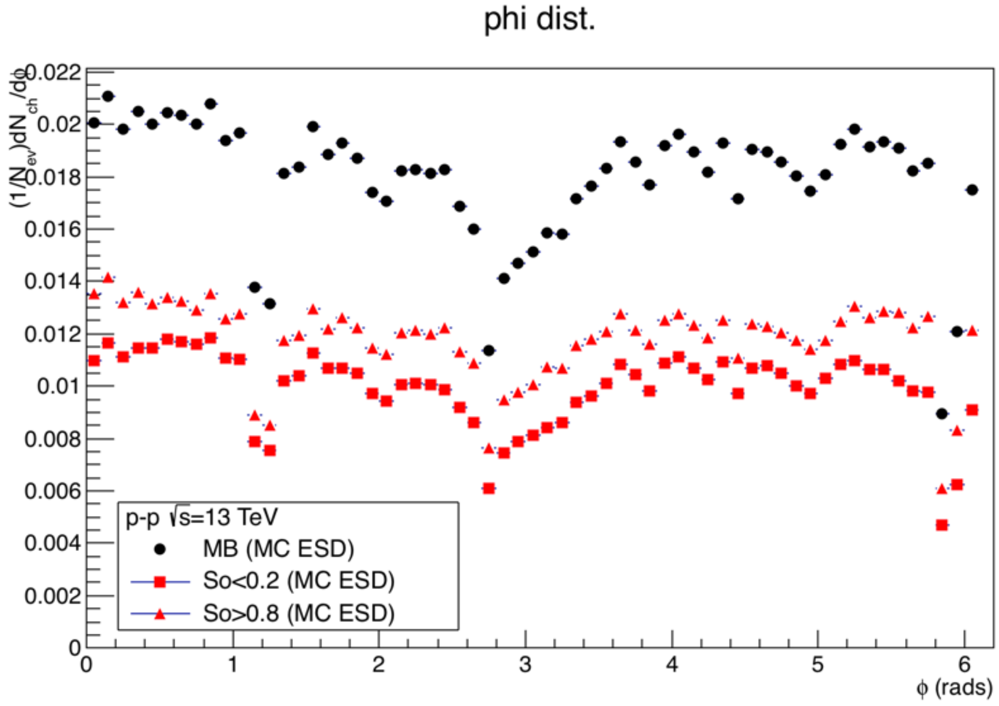


We need to understand why this happen for Isotropic events with low mult

To try to understand the behaviour with respect event shape, for fixed holes.

- Eta and phi due the selection on Spherocity





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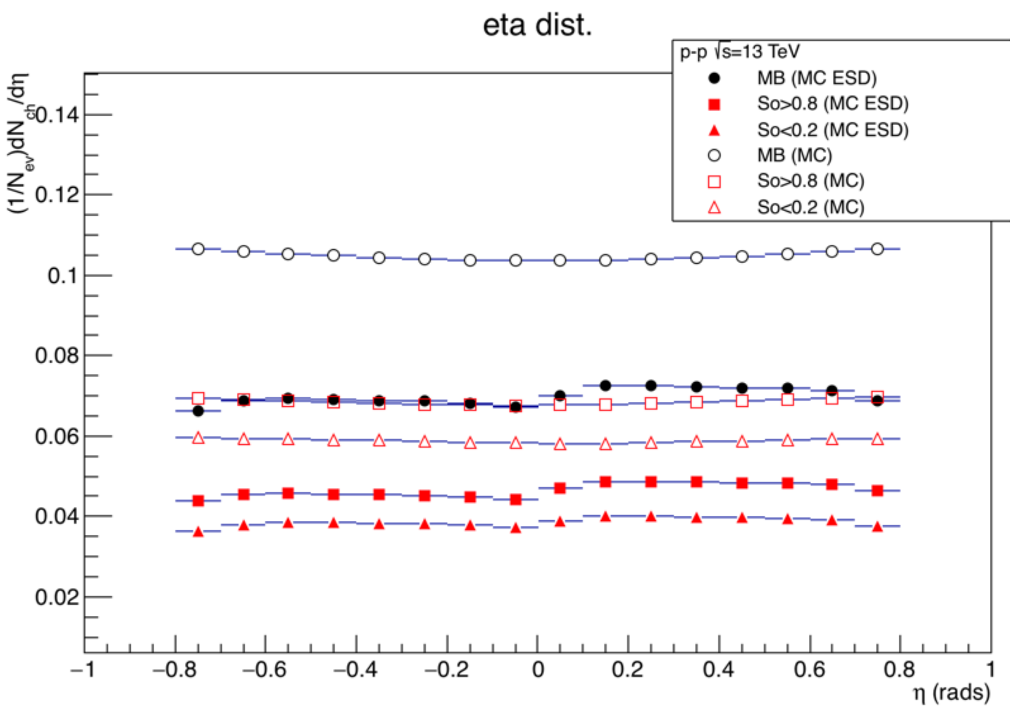
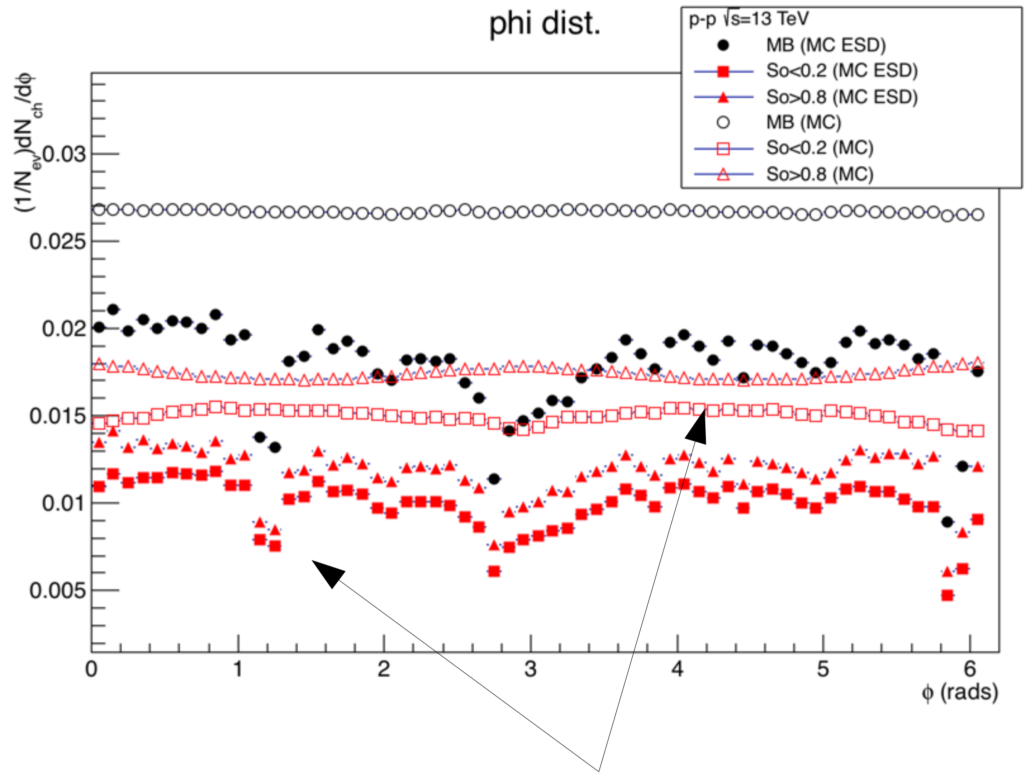
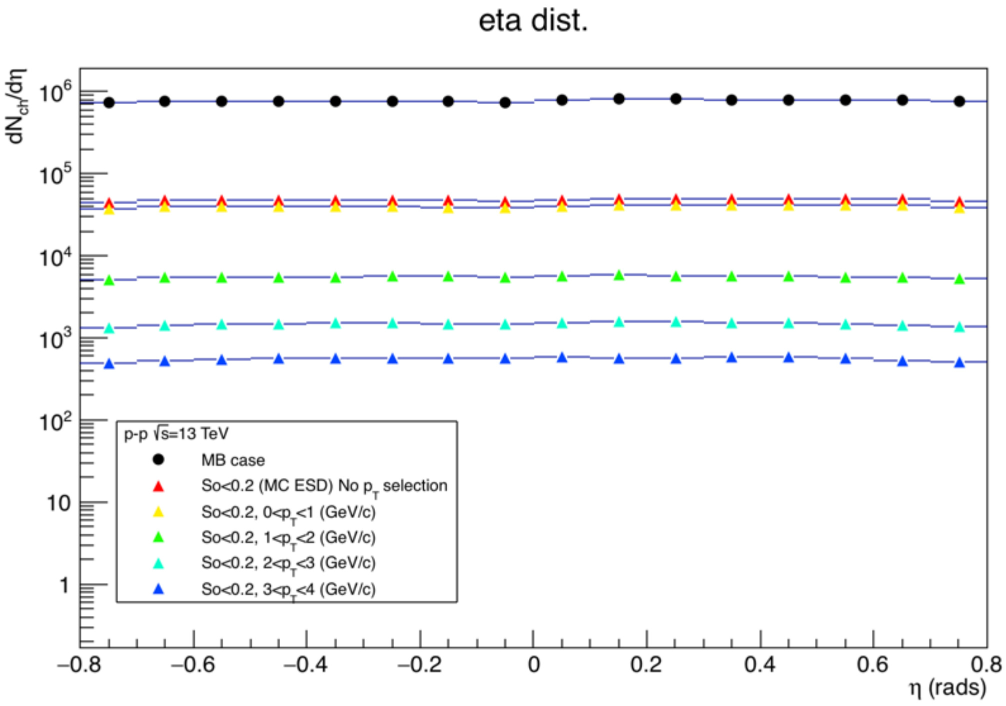


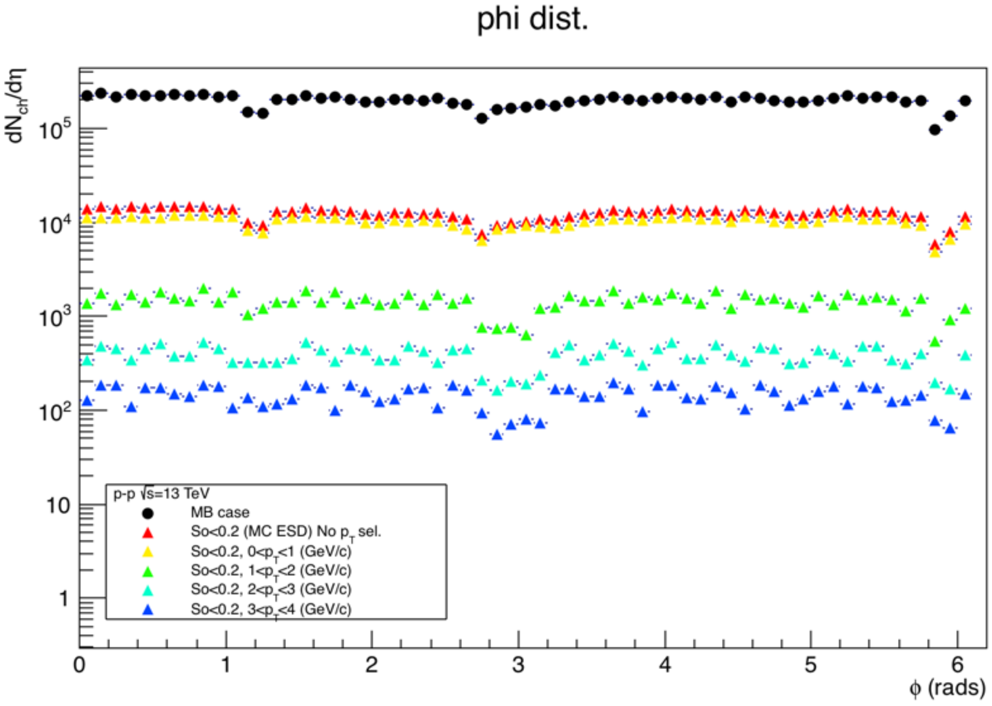


1.- Isotropic events must have Flater phi distributions
So holes are more sensible to eff.

To try to understand the behaviour with respect momentum,for fixed holes.

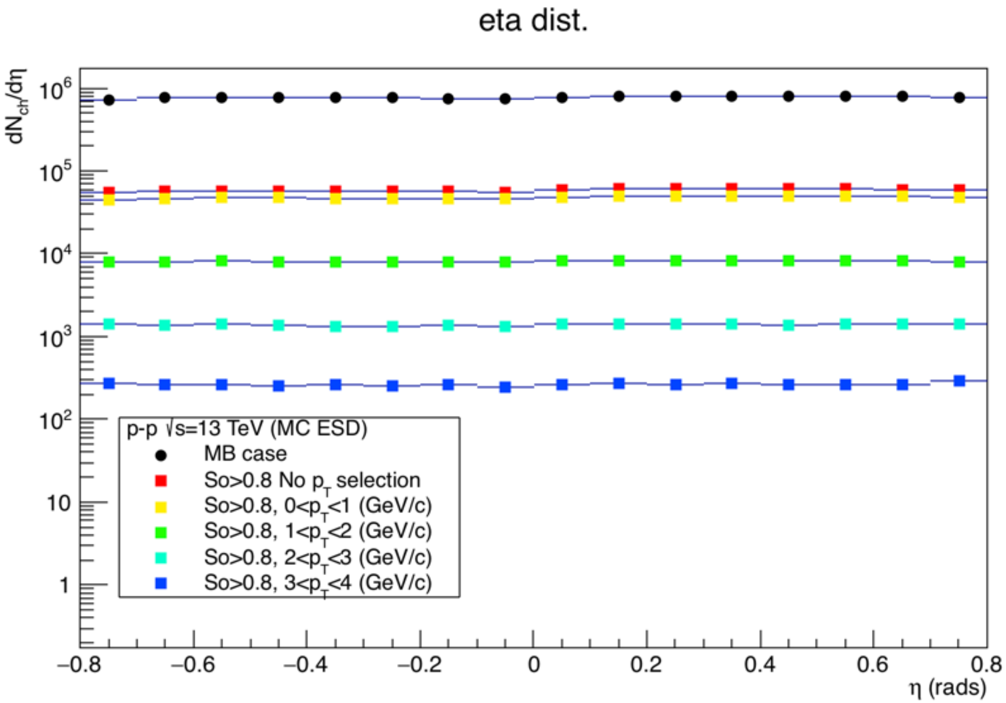
- Eta and phi dependence on the pt selection for dijets

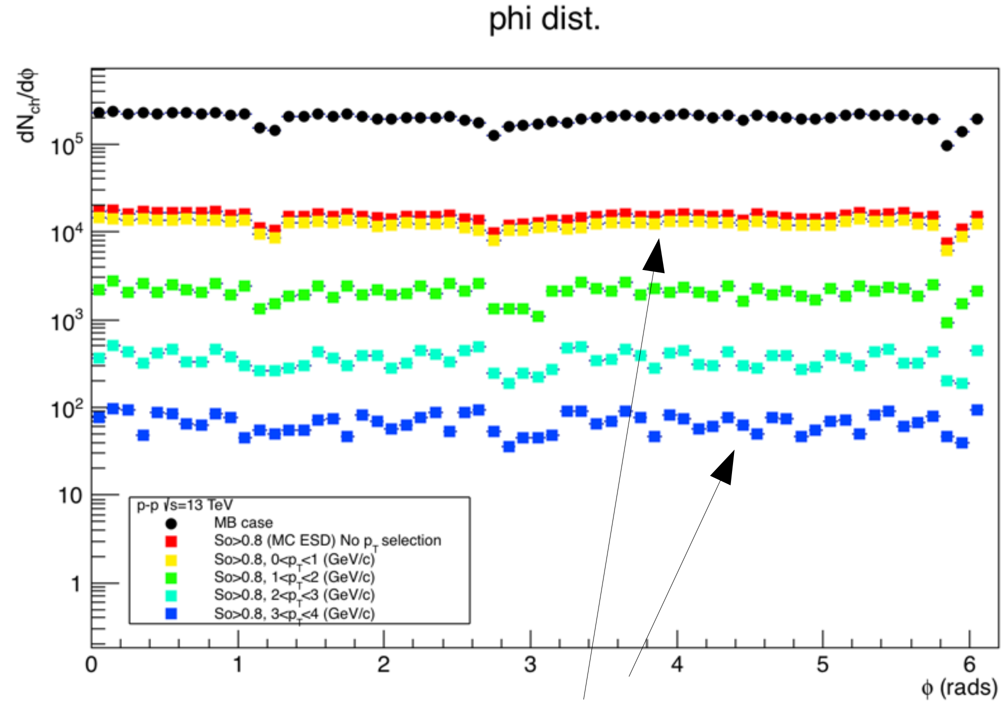




To try to understand the behaviour with respect momentum, for fixed holes.

- Eta and phi dependence on the pt selection for isotropic



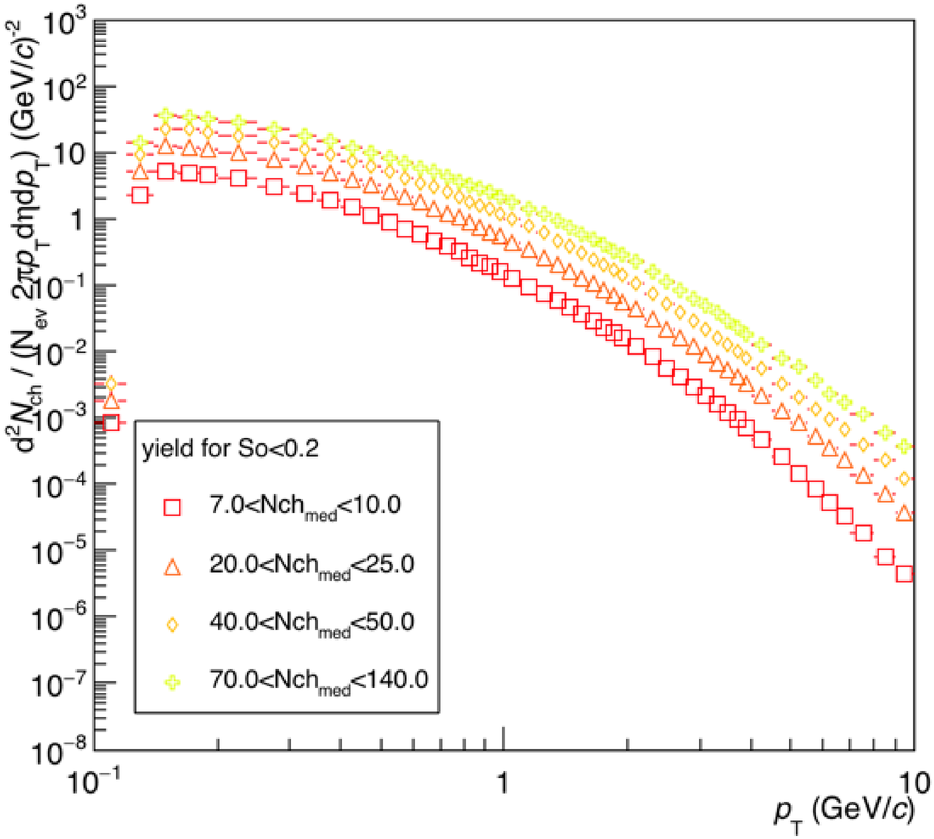


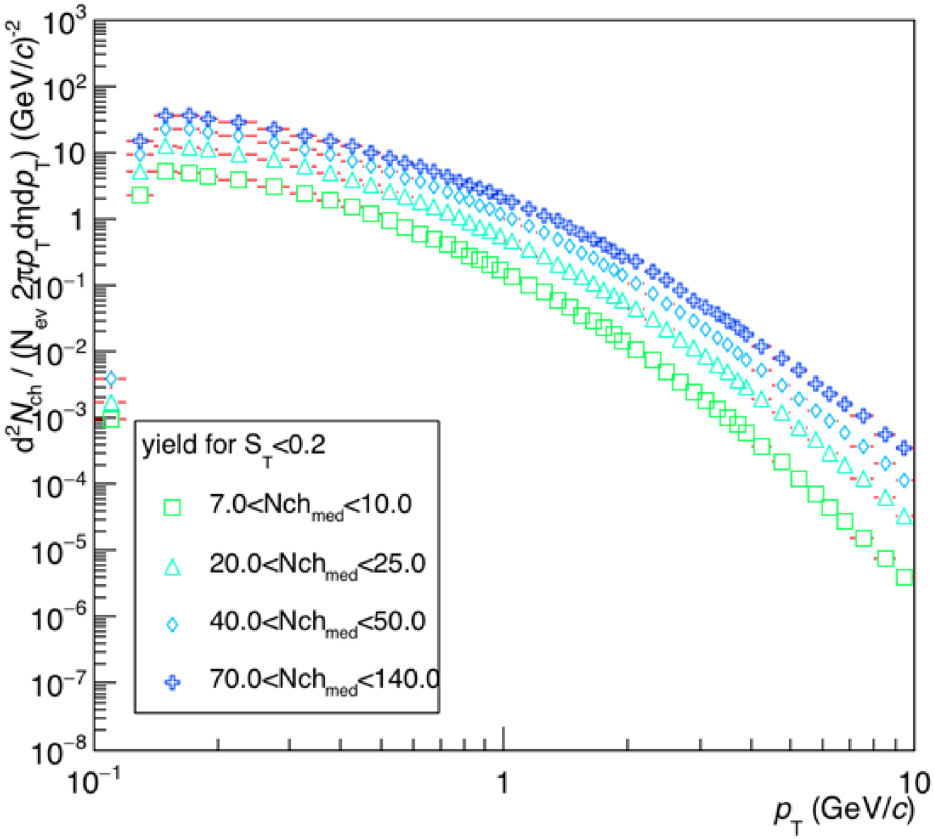
1.-High pT also makes phi distributions sencible to holes. so more sensible to eff.

A study with respect multiplicity cuts is ongoing ...

The spectra for jetty charge particles (MC ESD).

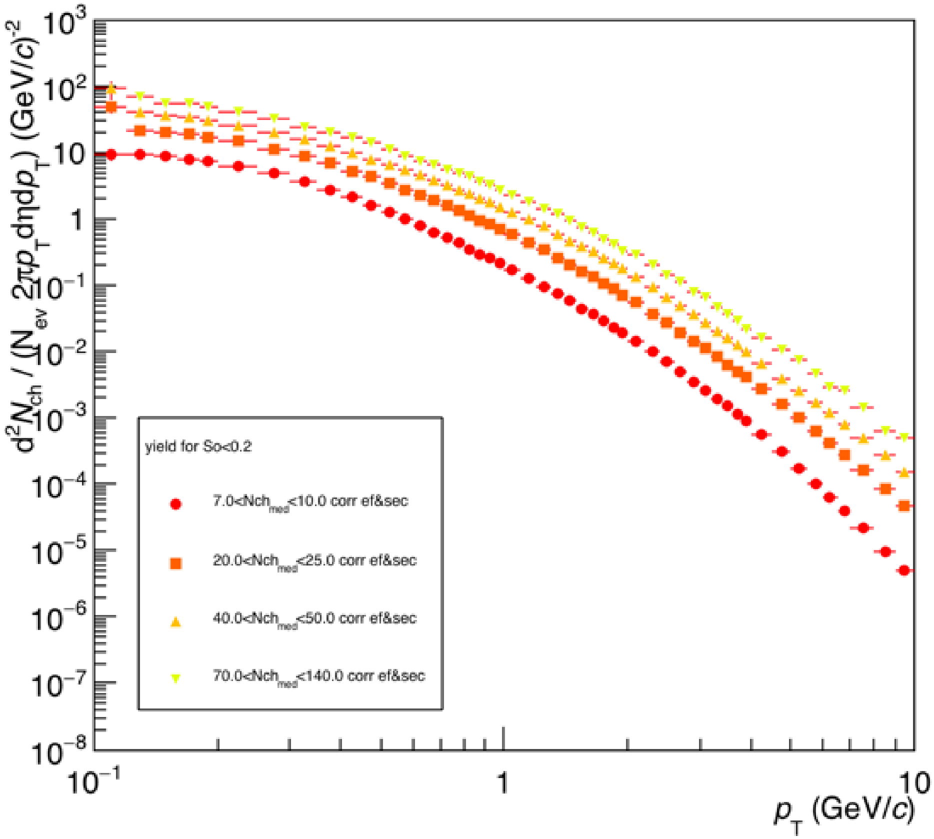
- Selected with SPHEROCITY Selected with SPHERICITY



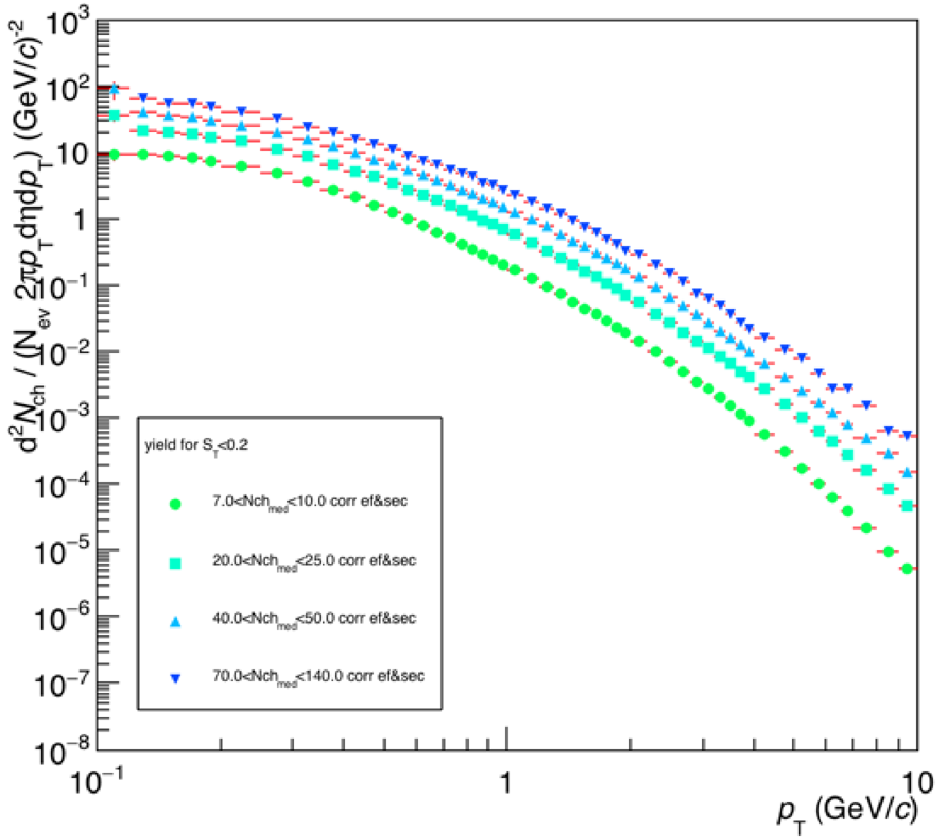


The spectra for jetty charge particles corrected by secondaries and efficiency (jetty efficiency).

- Selected with SPHEROCITY

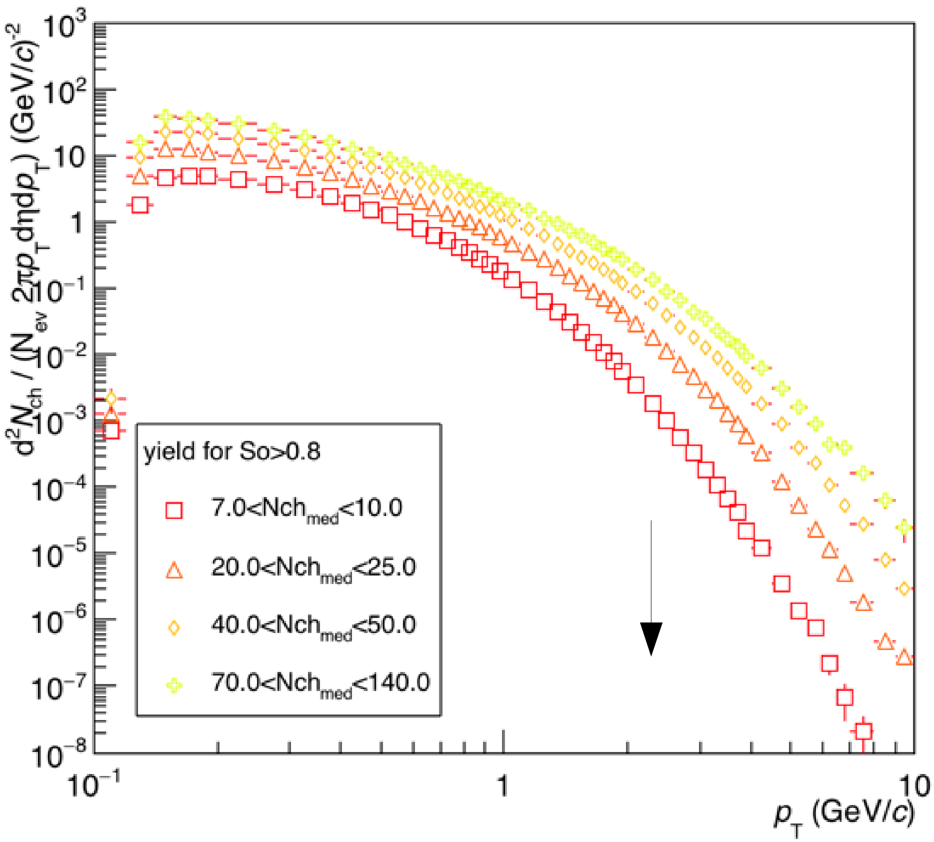


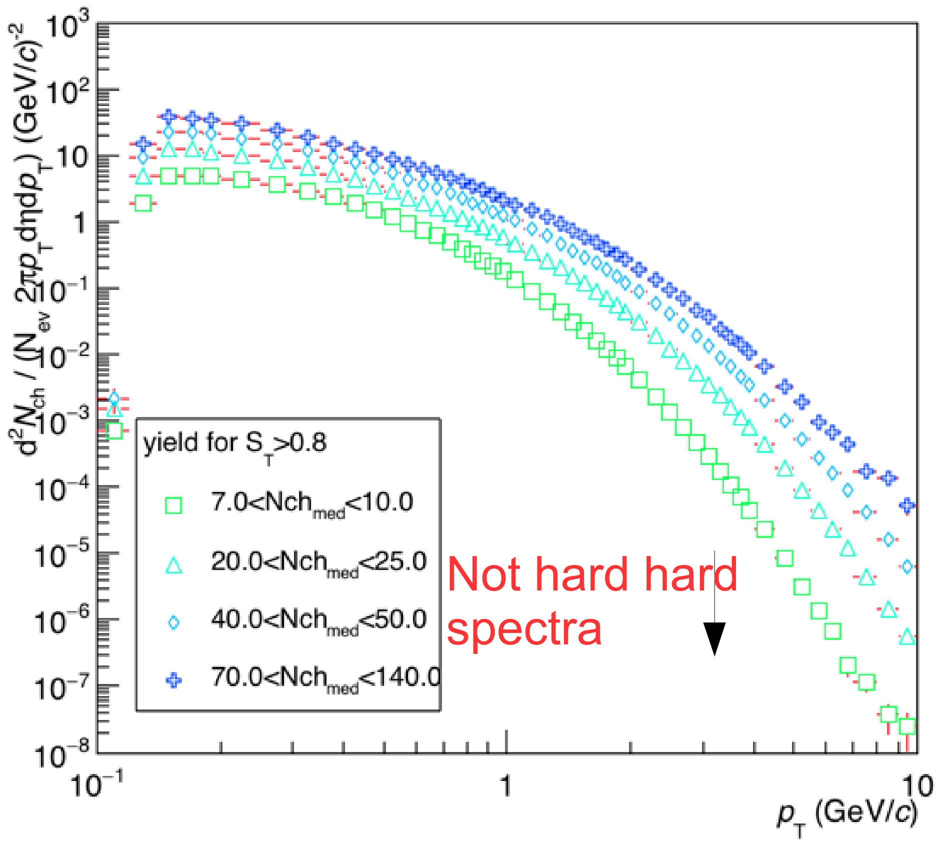
Selected with SPHERICITY



The spectra for isotropic charge particles (MC ESD)

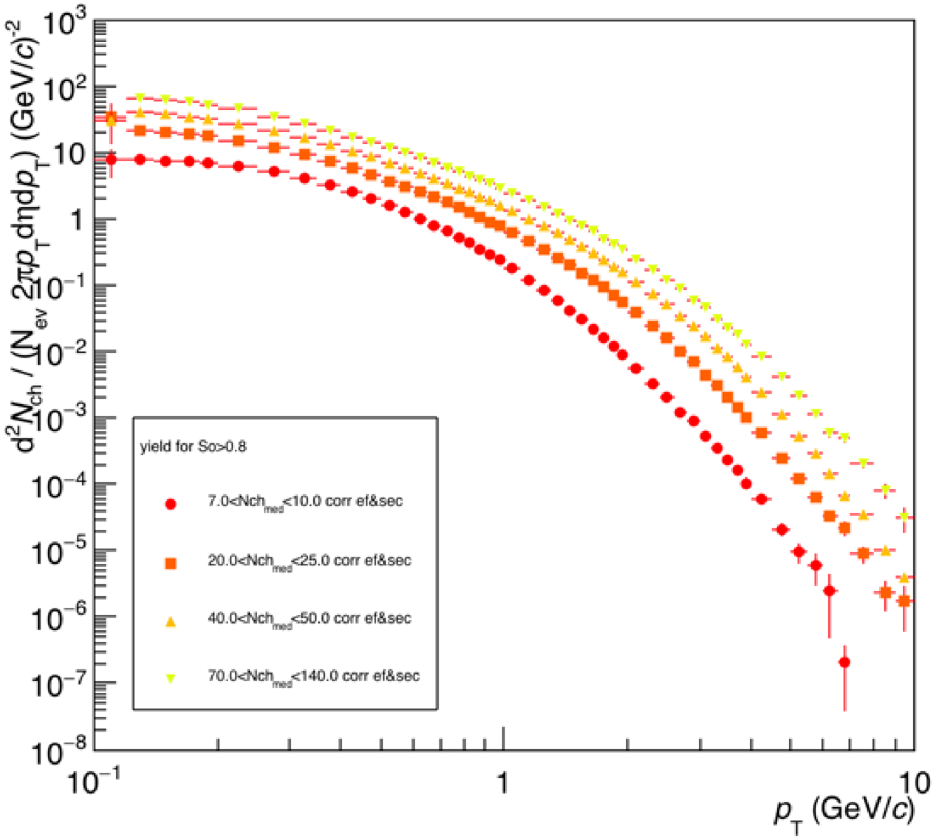
- Selected with SPHEROCITY — Selected with SPHERICITY

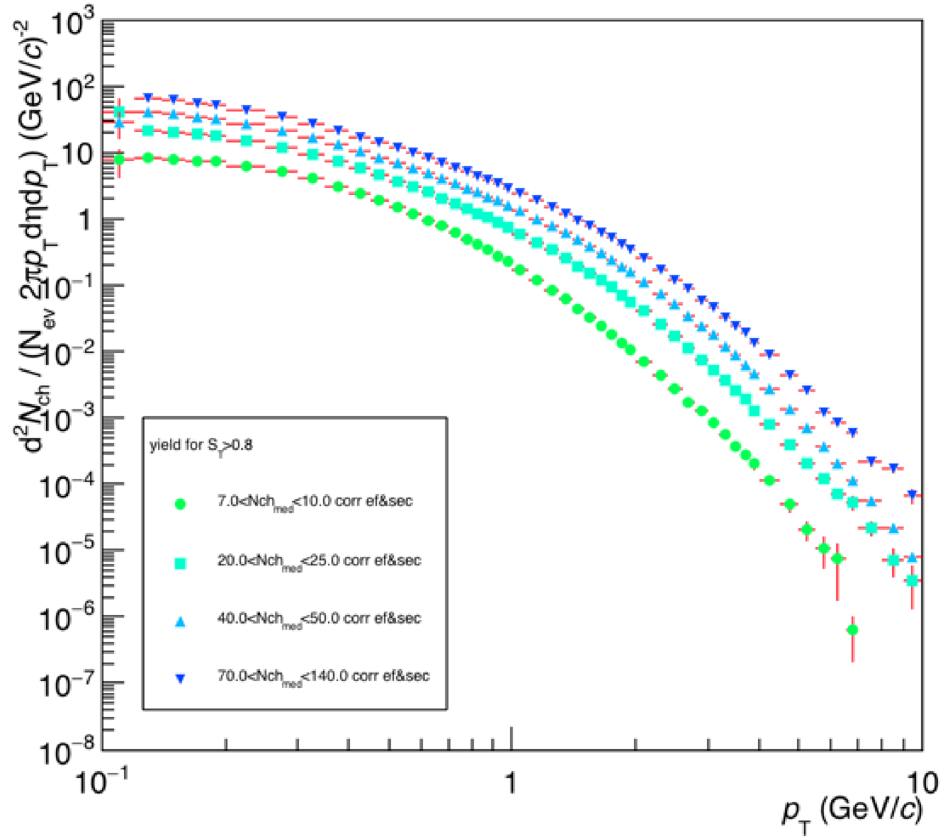




The spectra for isotropic charge particles corrected by secondaries and efficiency (for isotropic cut applied to low dN/deta<25).

- Selected with SPHEROCITY | Selected with SPHERICITY





Conclusions

- Efficiency for jetty events is better than for isotropic ones.
- Jetty events efficiency different than MB sample, but no mult dependence.
- Isotropic events must to have flat phi distribution,

  so this makes efficiency more sensitive.
- High pt makes efficiency sensitive to holes.

To do

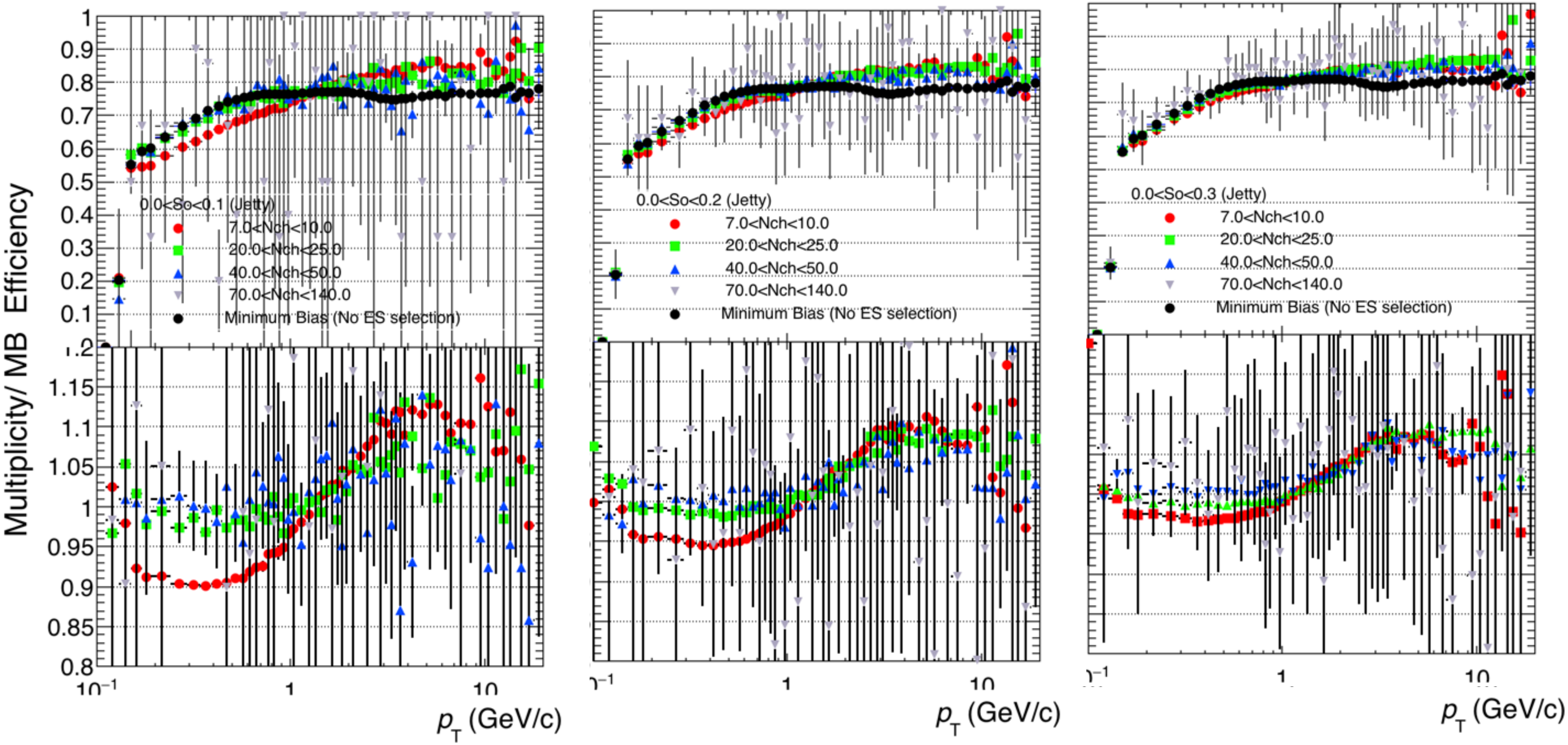
- Get phi and eta distributions adding multiplicity cuts.

Thank you!

Backup

For three different SPHEROCITY binnings for JETTY events

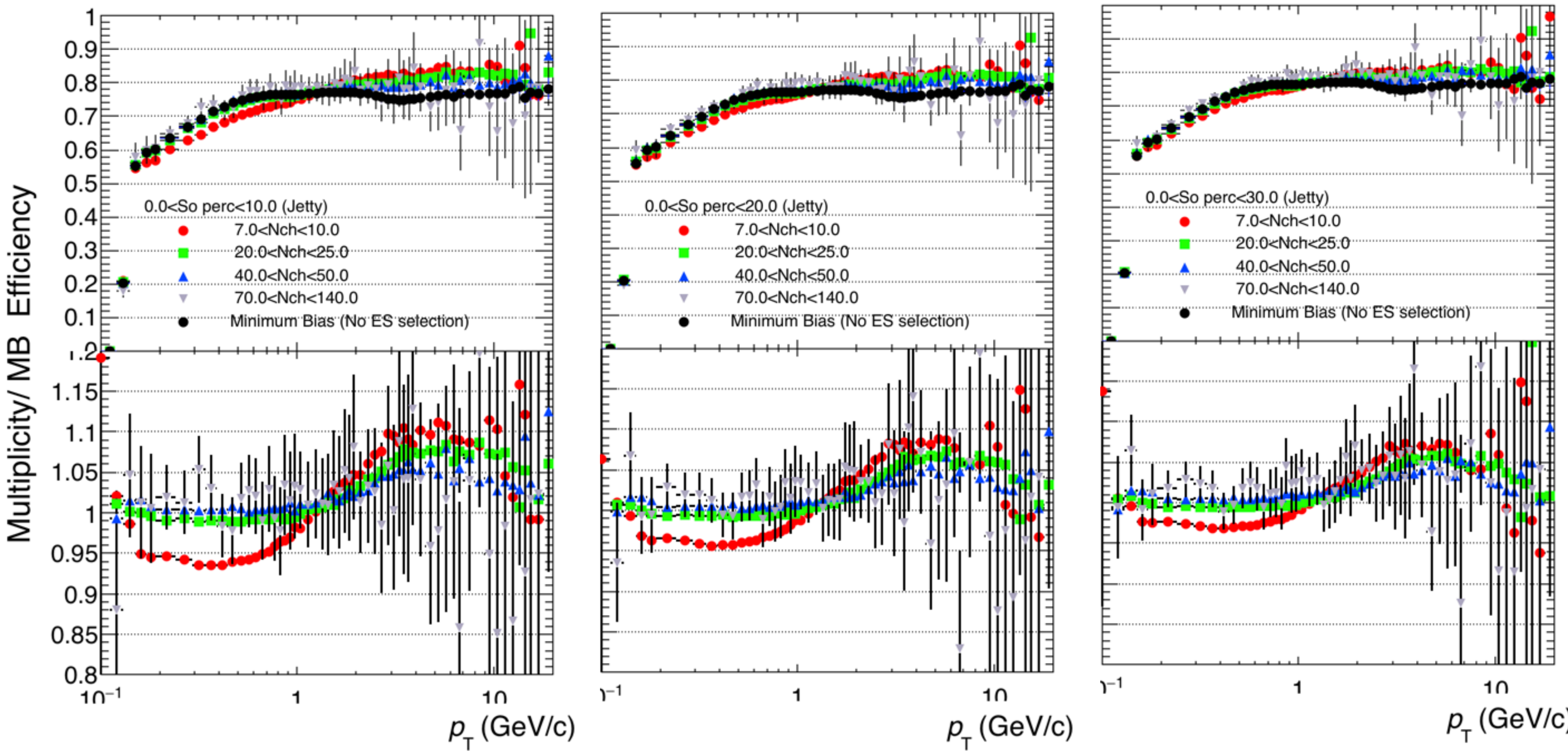
- BinA= {0.0,0.1,0.4,0.9,1.0};
- BinB= {0.0,0.2,0.4,0.8,1.0};
- BinC= {0.0,0.3,0.4,0.7,1.0};



For three different SPHEROCITY percentiles for JETTY events

- BinApc= {0.0,10.0,40.0,90.0,100.0};
- BinBpc= {0.0,20.0,40.0,80.0,100.0};
- BinCpc= {0.0,30.0,40.0,70.0,100.0};

Better statistics for percentiles



For three different SPHEROCITY binnings for ISOTROPIC events

- BinA= {0.0,0.1,0.4,0.9,1.0};
- BinB= {0.0,0.2,0.4,0.8,1.0};
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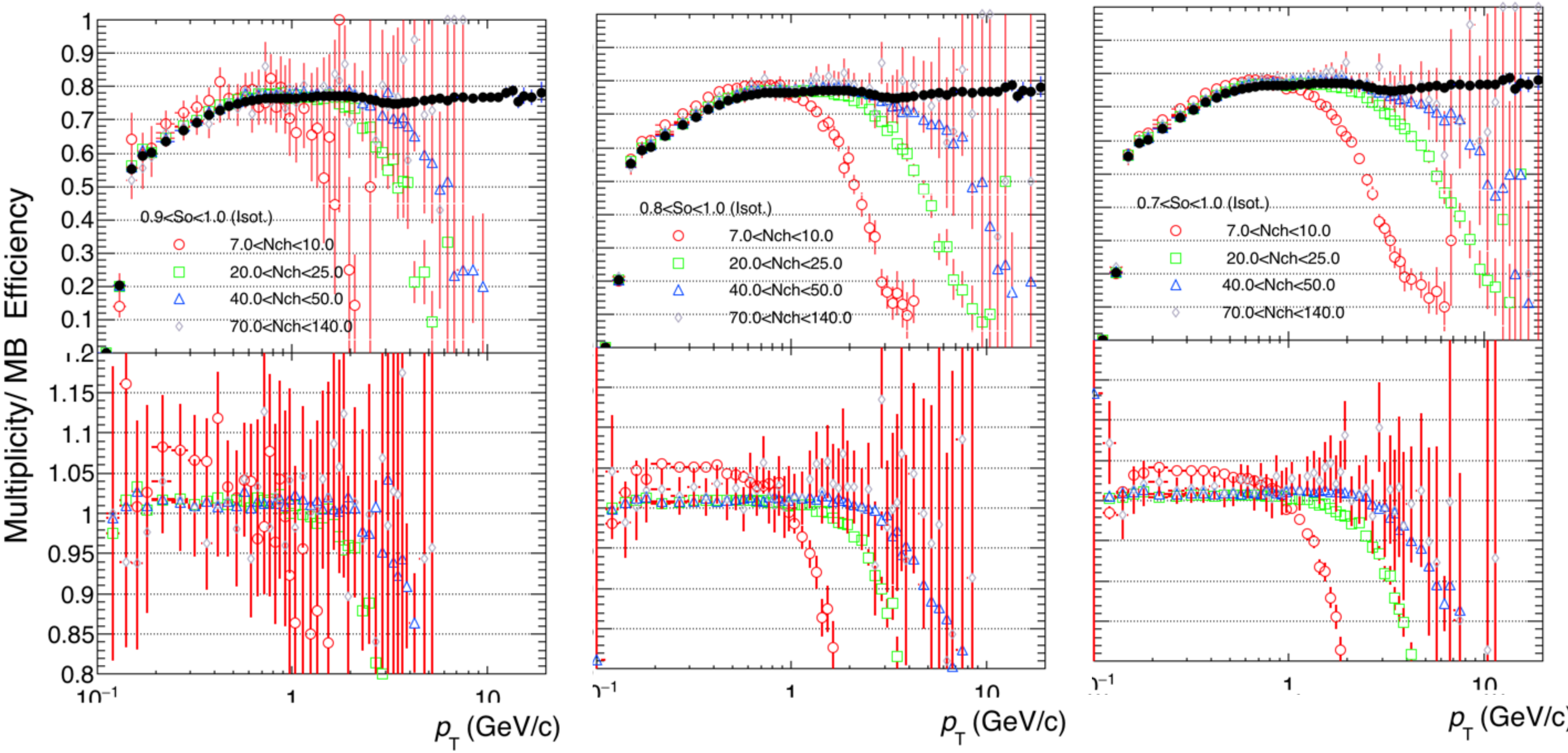

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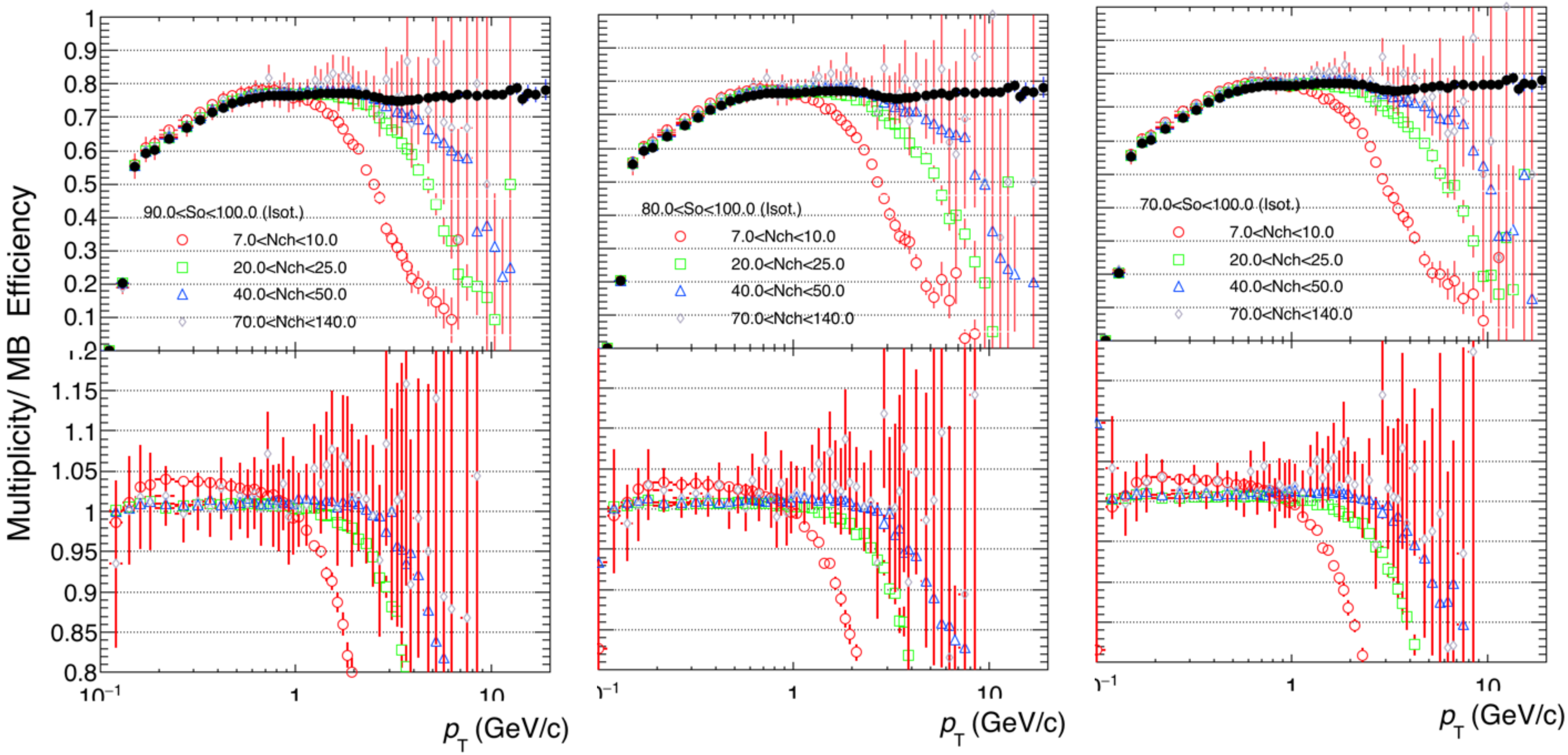

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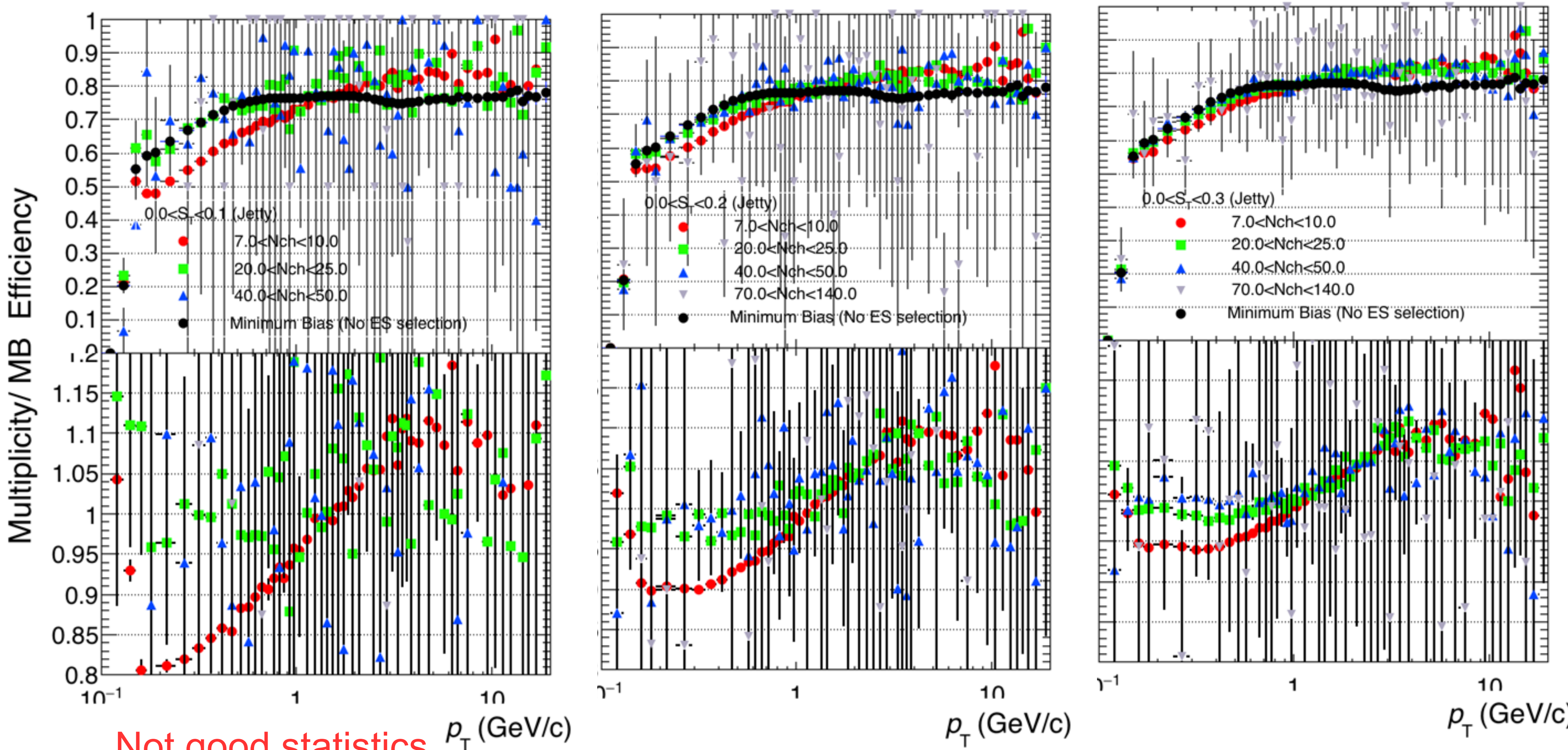

Not good statistics
for small binning

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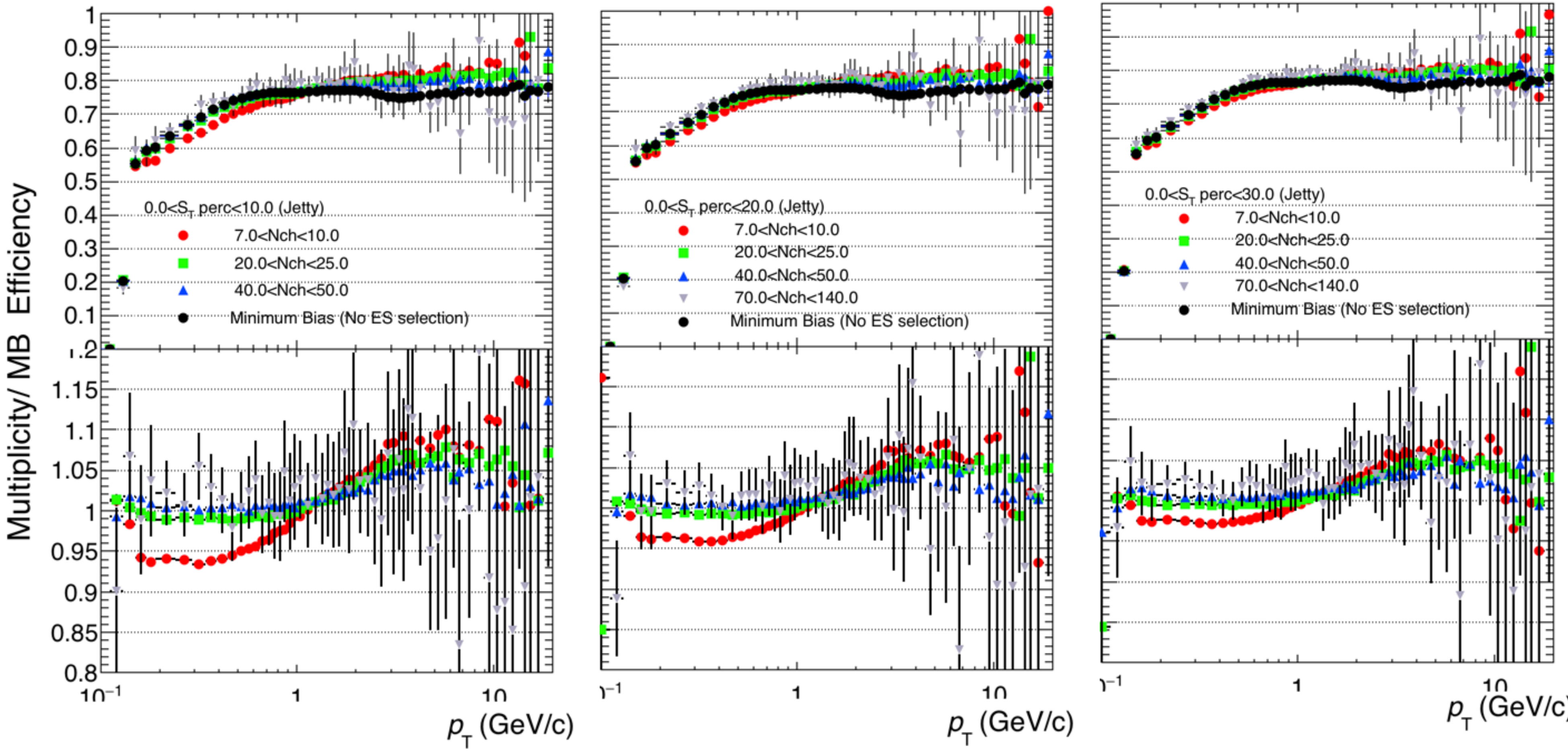

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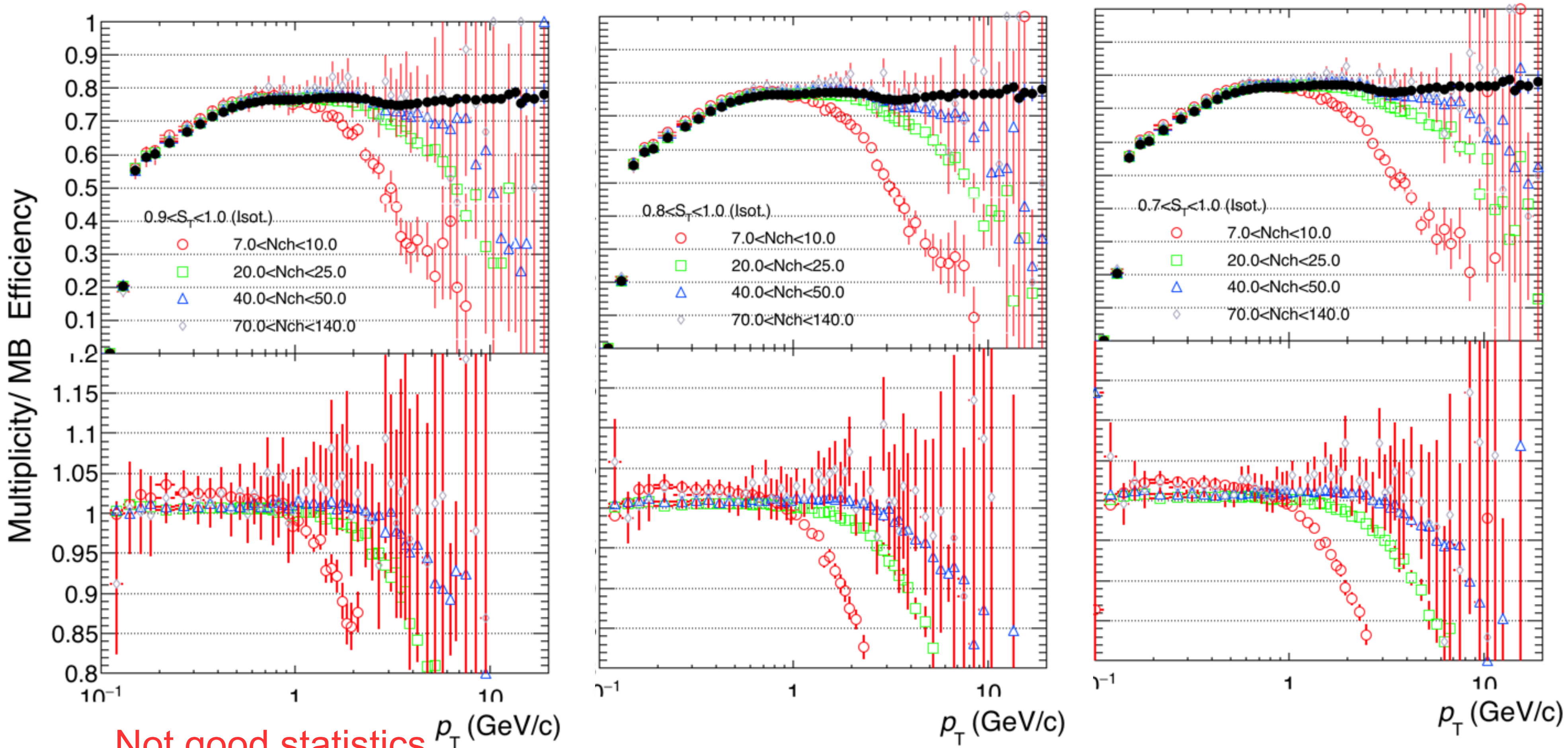

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