Qualification Task AFT 455:

Optimization of Inputs for High Level Discriminants (DL1 and MV2) to Improve Performance of B-Tagging in Heavy Ion Collisions

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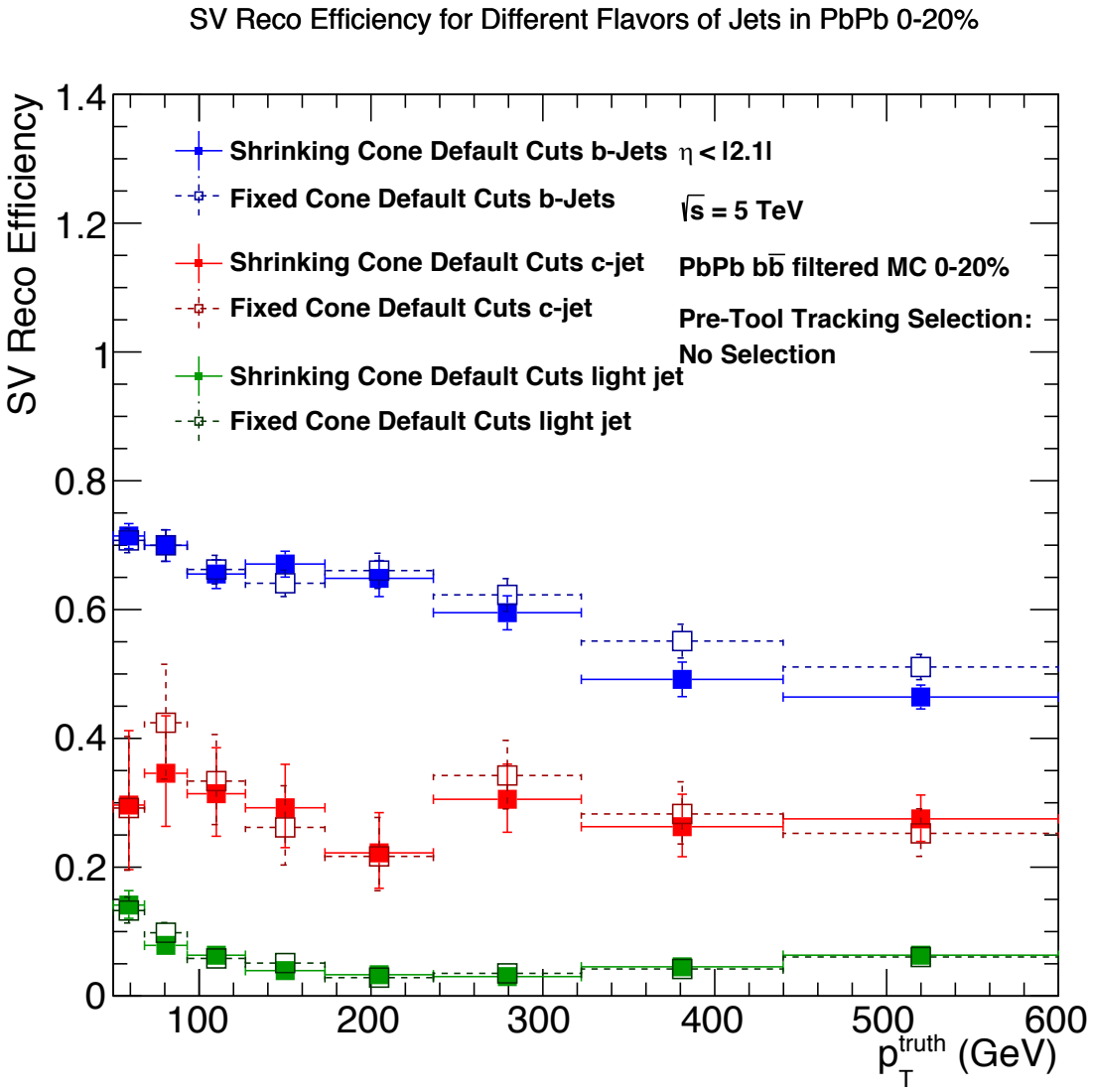
Effects of Cuts on Overlay

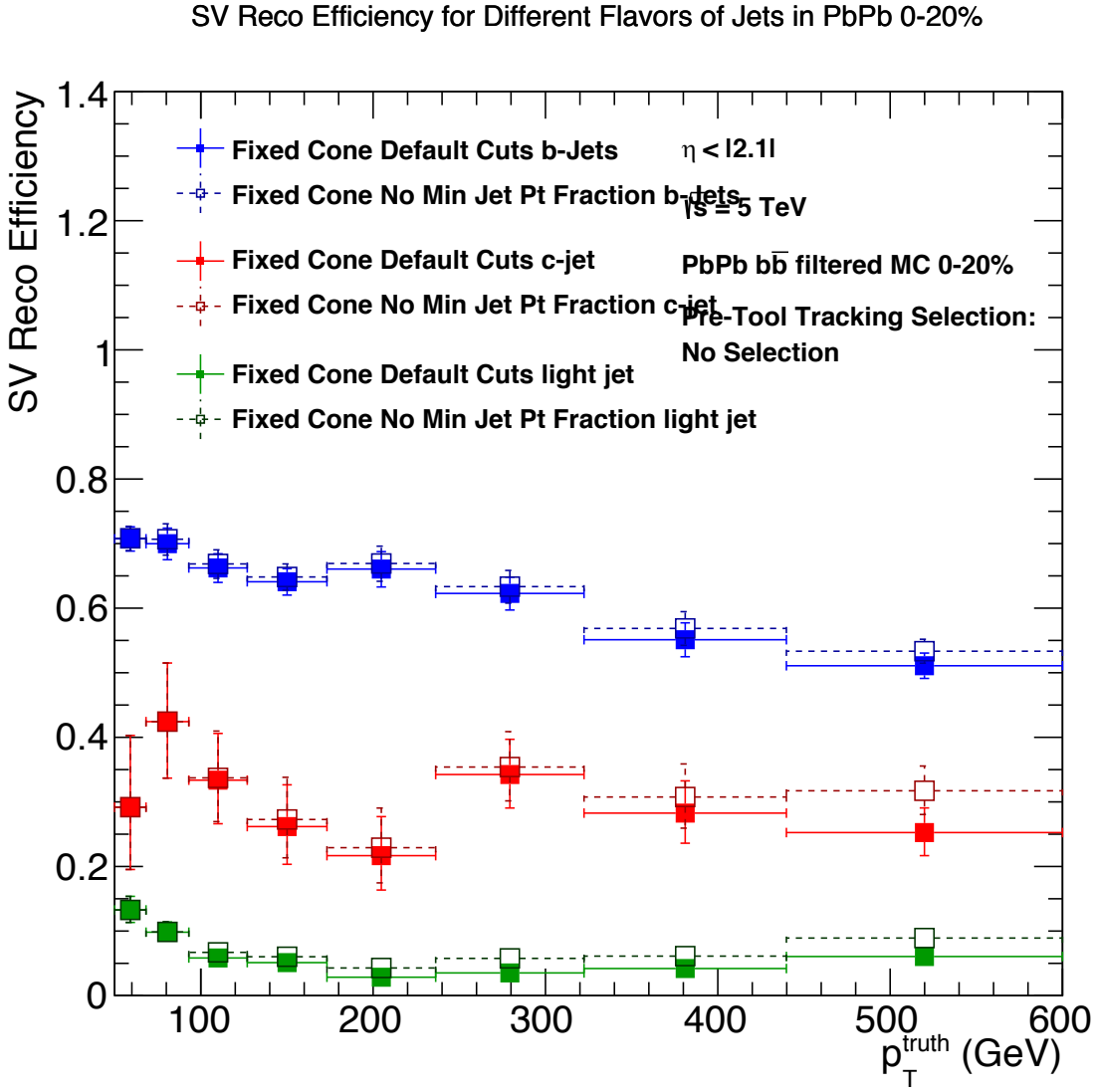
- Cuts those are effective in improving efficiency at pp MC were used in overlay.
- Fixed Cone: Using Fixed cone at 0.4 for tracks to jet association in contrast to shrinking cone algorithm optimized for pp.
- Minimum pT fraction:
  - 2-trk vertices candidates are created.
  - For tracks those are not in the candidates' tracks, if they pass minfraction*jet_Pt, then the common fitting algorithm will also use them.
- Anti Pile Up tool:
  - Remove tracks with small xy impact parameter and big z impact parameter those are presumably from pileup.
- IP Selection:
  - Maximum xy-plane and z-plane impact parameter selections.

- Things to look at :
  - Min number of shared hits. (the algorithm is not directly using it, still confirming its effect)
  - Min Pt for each track.
  - Chi-square selections.

Summary of Effects of Cuts on Overlay (0-20%)

Cuts (original) **(New)**	Efficiency	Purity	Comment	Action
Fixed Cone (0.4)	+(~5%) at high pT	No change	Safer to use for HI jets	Keep using
Min pT Fraction(0.01) (0.00)	+(~2%) at high pT b +(~3%) at high pT c	+(~3%) fake ☹		Tuning or not use this cut
Anti Pile Up tool (On) (Off)	+(~2%) at high pT c	No change	Does it make sense to use in HI?	Keep using
IP Selection(On) (Off)	No significant Effect	No change		Plot and compare IP distributions with pp for further adjustment


SV Reco Efficiency for Different Flavors of Jets in PbPb 0-20%
SV Reco Efficiency
Shrinking Cone Default Cuts b-Jets
Fixed Cone Default Cuts b-Jets
Shrinking Cone Default Cuts c-jet
Fixed Cone Default Cuts c-jet
Shrinking Cone Default Cuts light jet
Fixed Cone Default Cuts light jet
η < |2.1|
√s = 5 TeV
PbPb bb̄ filtered MC 0-20%
Pre-Tool Tracking Selection:
No Selection
p_T^truth (GeV)


SV Reco Efficiency for Different Flavors of Jets in PbPb 0-20%
SV Reco Efficiency
Fixed Cone Default Cuts b-Jets
Fixed Cone No Min Jet Pt Fraction b-jets
Fixed Cone Default Cuts c-jet
Fixed Cone No Min Jet Pt Fraction c-jet
Fixed Cone Default Cuts light jet
Fixed Cone No Min Jet Pt Fraction light jet
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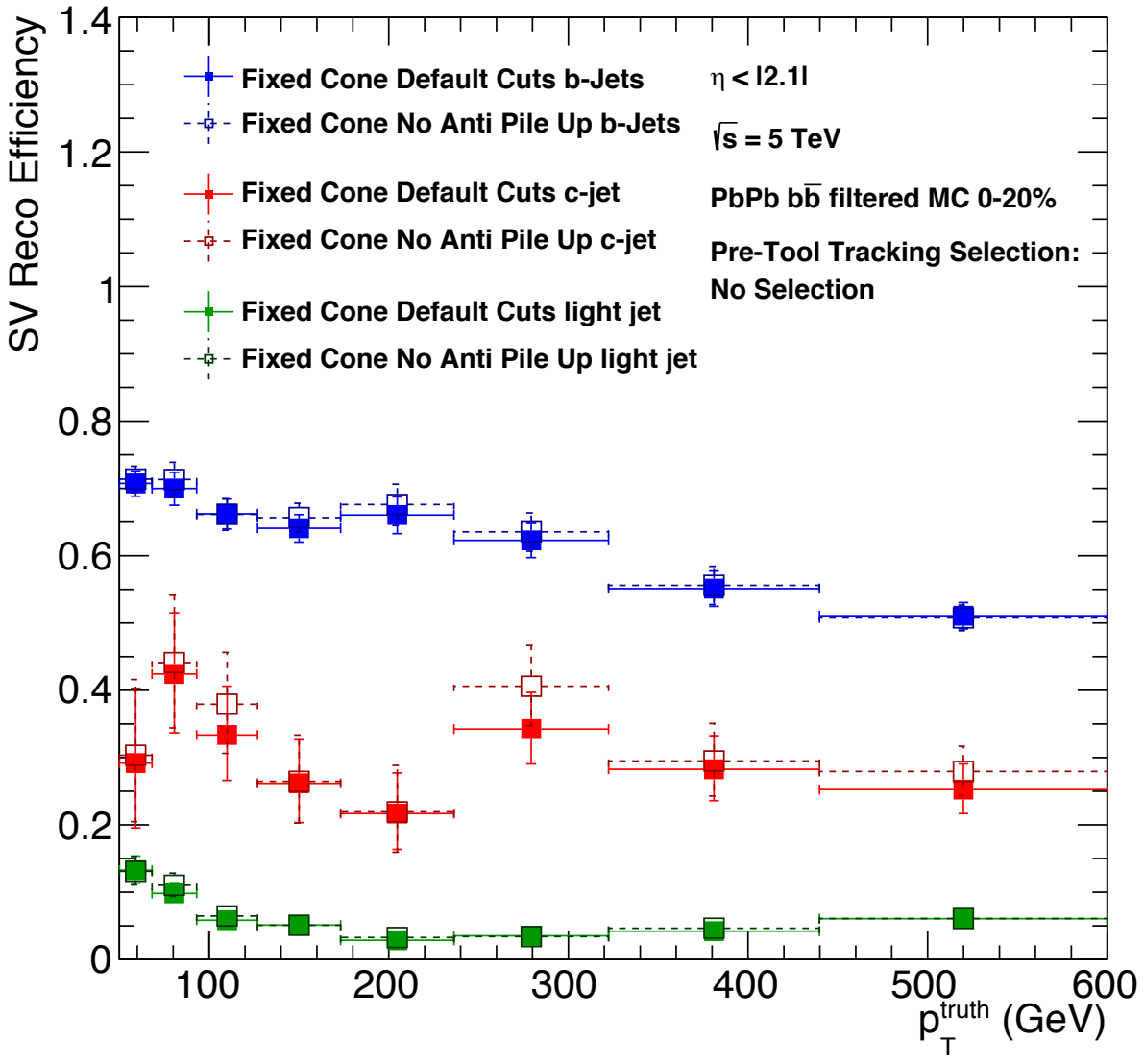

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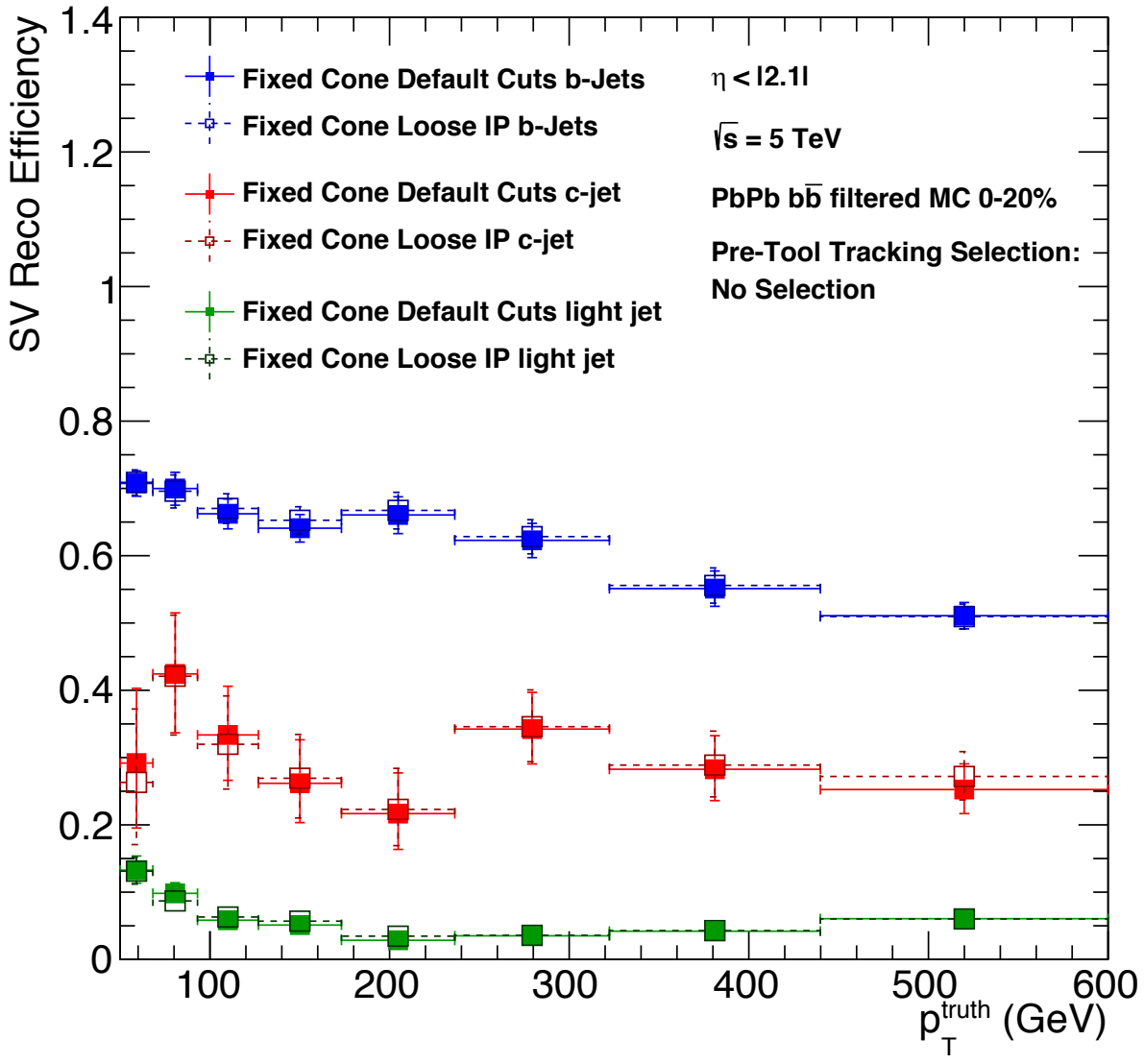

Other to-do

- Reproduce plots from JetFitter performance with our MC.
- Plan on summary of progress for flavour tagging group.