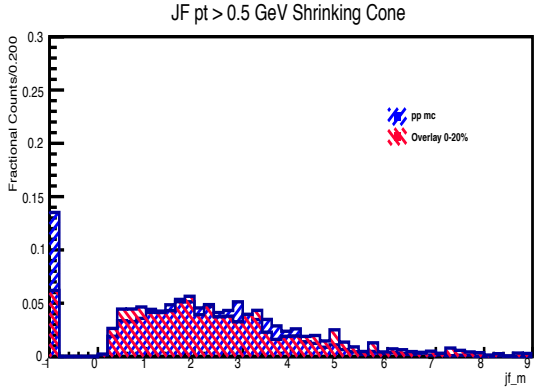
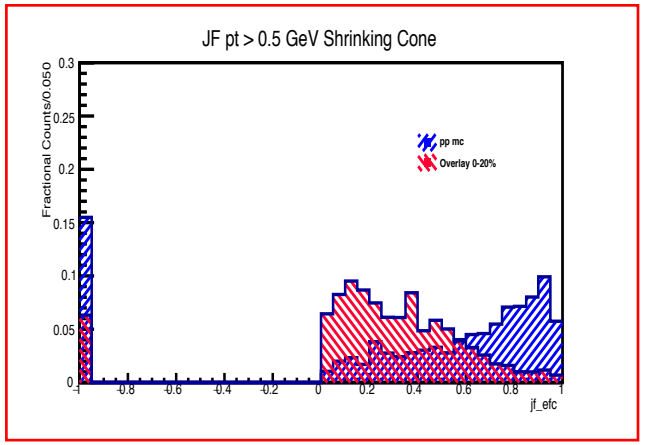
Summary and Plans

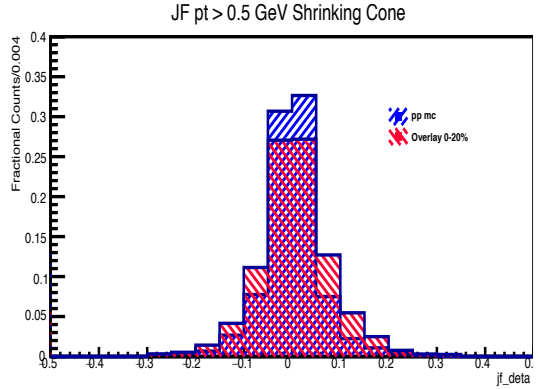
- For SV and JF, physics variables like energy fraction and decay lengths are used as input for higher level taggers.
- The calculation largely depends on raw input tracks.
  - Applying cuts on individual taggers improve vertexing performance
  - Applying cuts prior to lower level taggers can improve performances of these variables.
- Two example plots are shown in the slides.

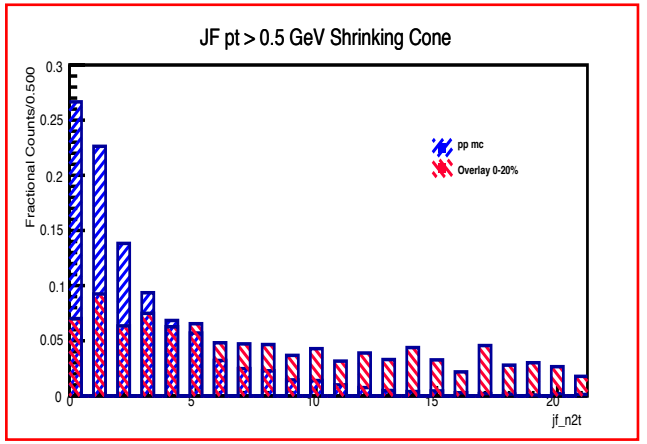
- Plan:
  - waiting for the grid to return 8M inclusive samples and overlay samples
  - https://twiki.cern.ch/twiki/bin/viewauth/AtlasProtected/HIJetMCSamples#Pythia8_dijets_8M_per_sample_in, will plot the same thing.
  - Make IPxD templates using these samples.
  - https://gitlab.cern.ch/fdibello/IPtagTuning

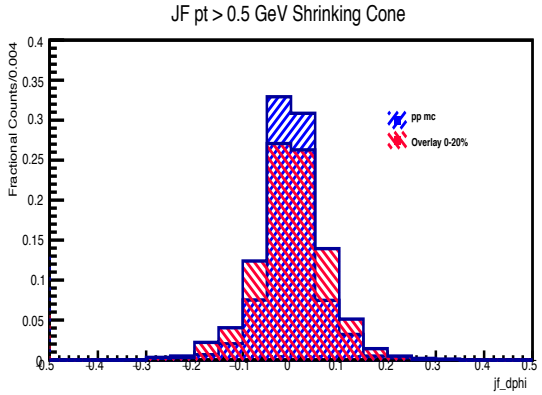
JF Variables at Default Setup

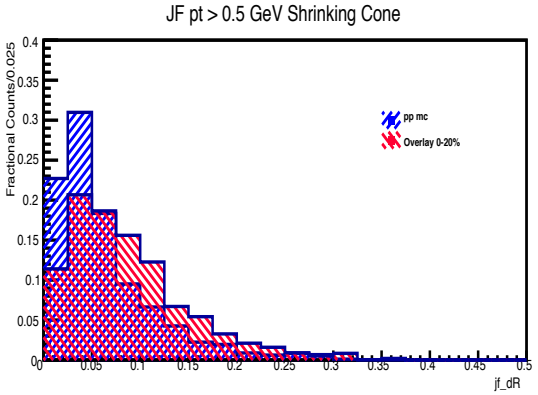


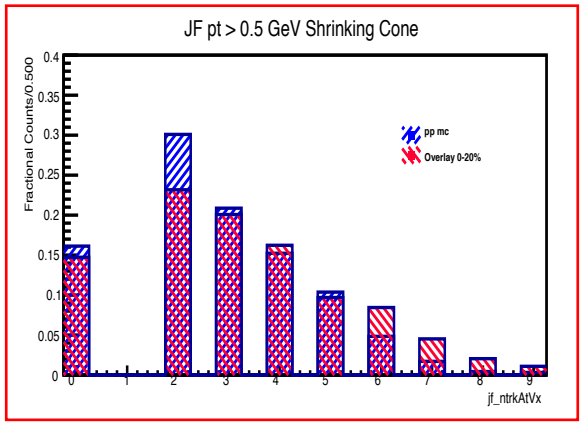




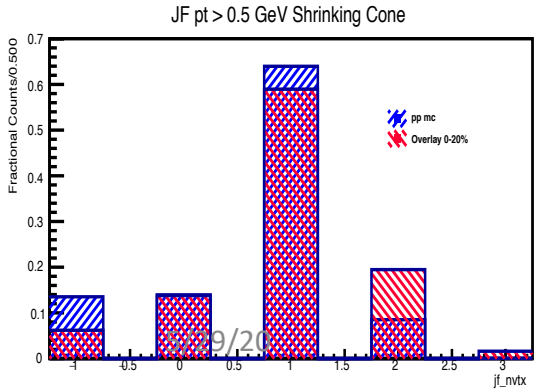


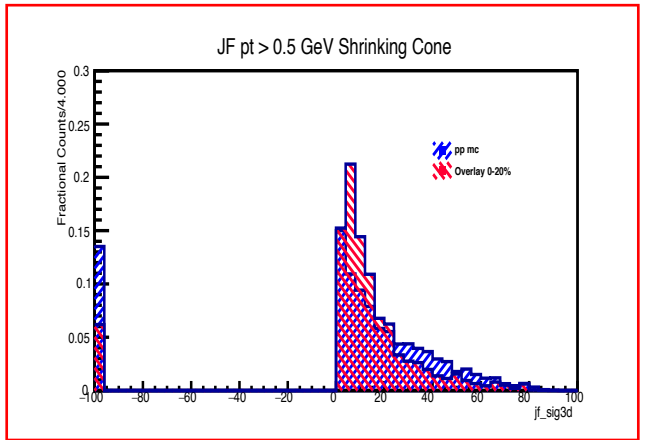


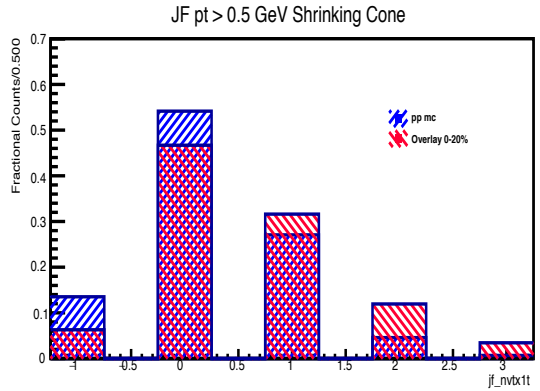




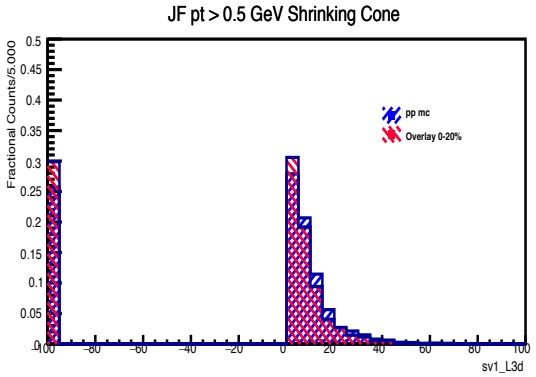
- Energy fraction and number of 2-track vertices are heavily modified.

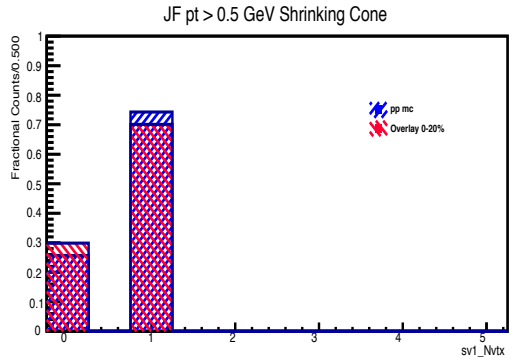


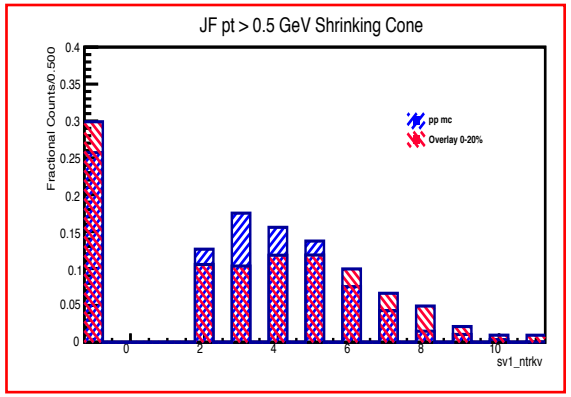


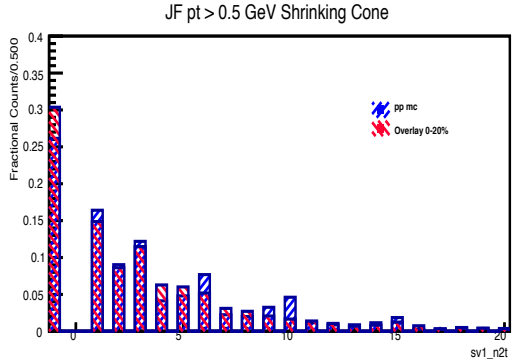


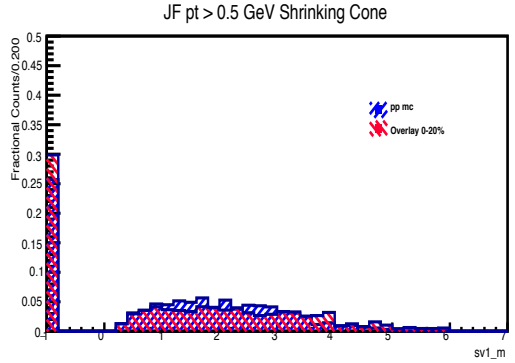
SV Variables at Default Setup

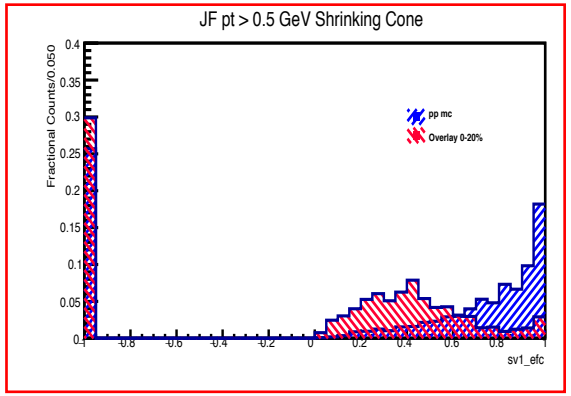


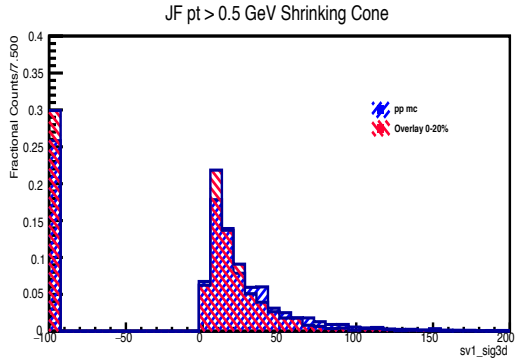


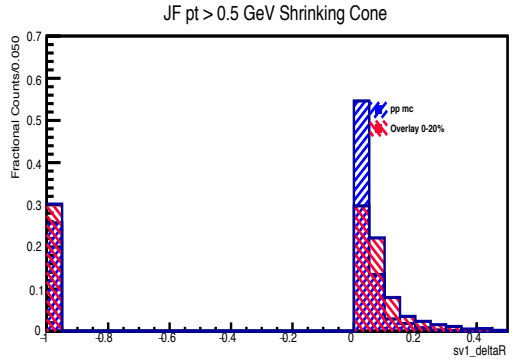


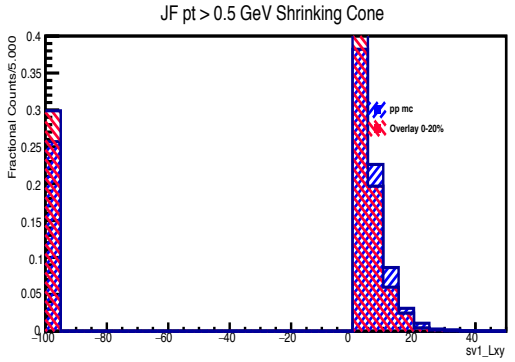




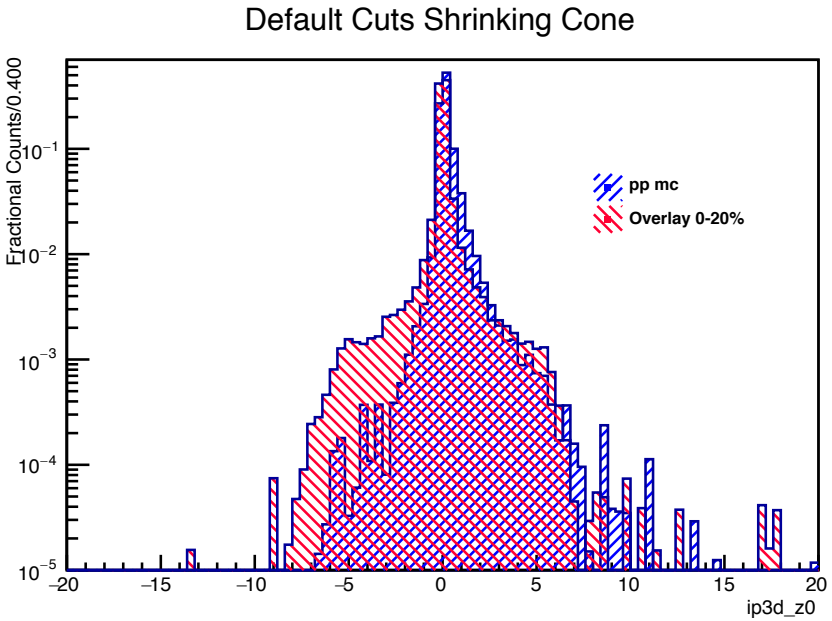


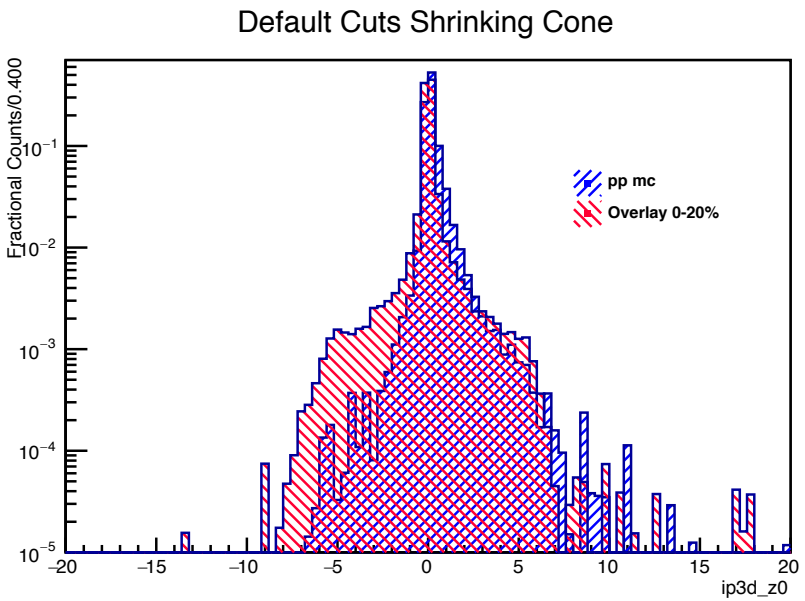


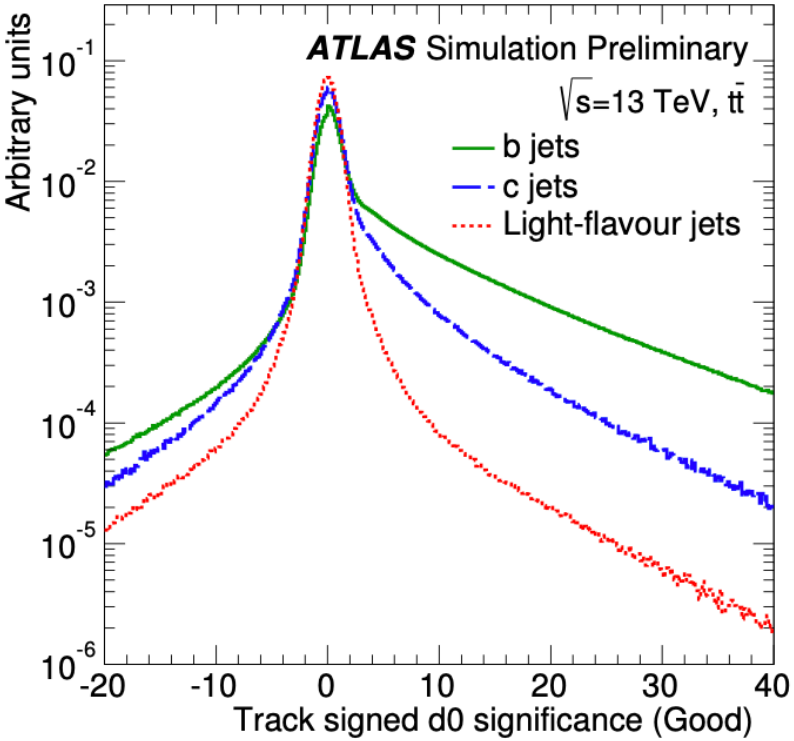


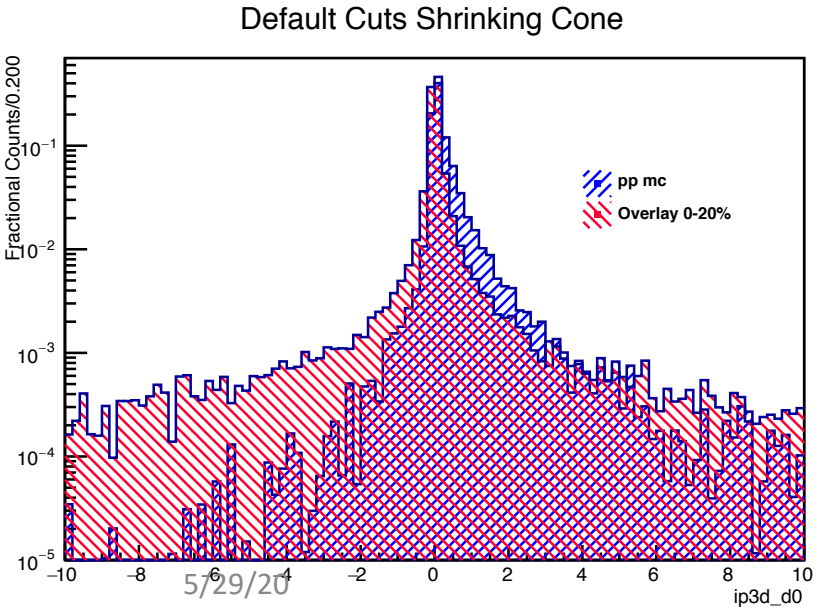


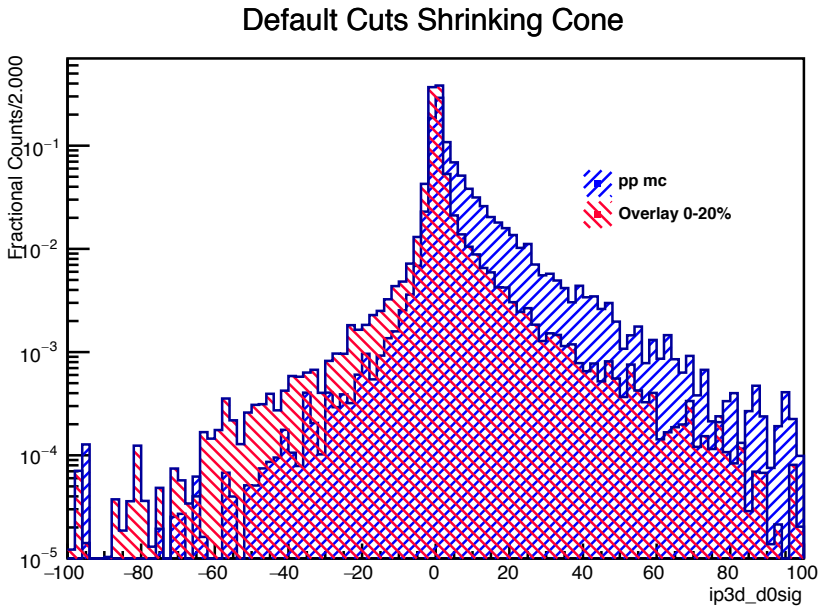
IPxD Variables





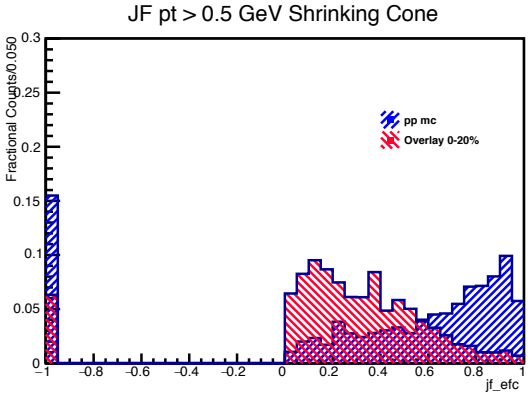


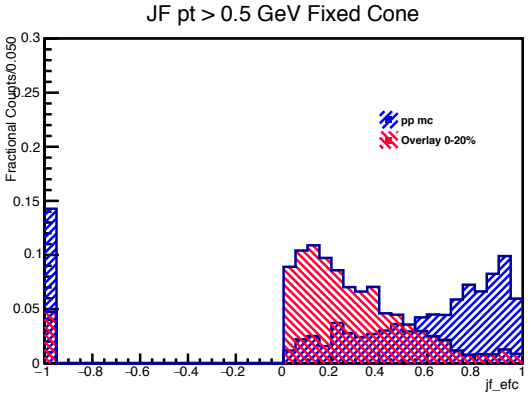


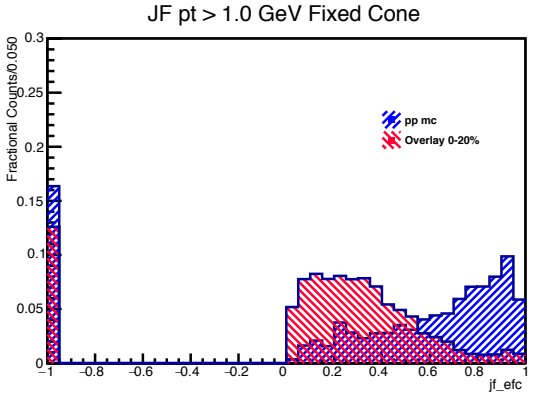


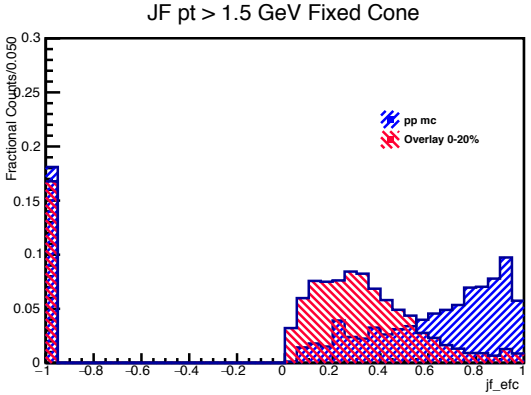
- Overlay samples have almost symmetric distribution of d0 and z0.

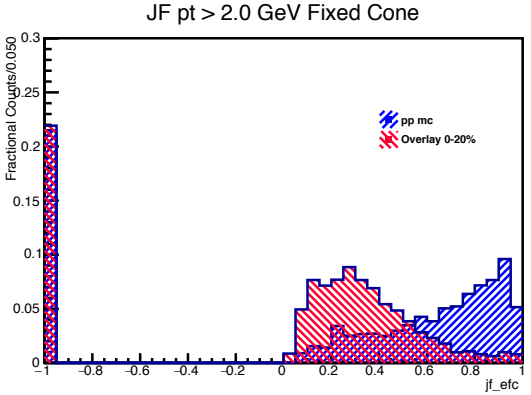
JF Energy Fraction

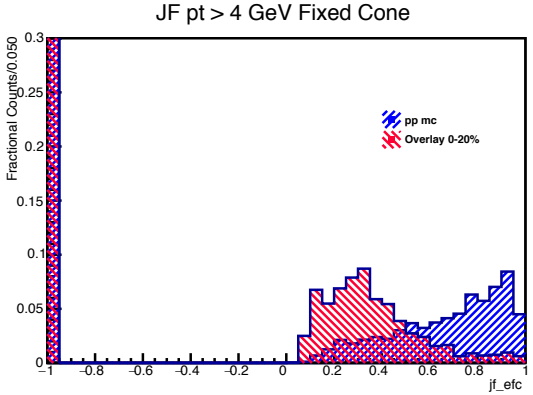


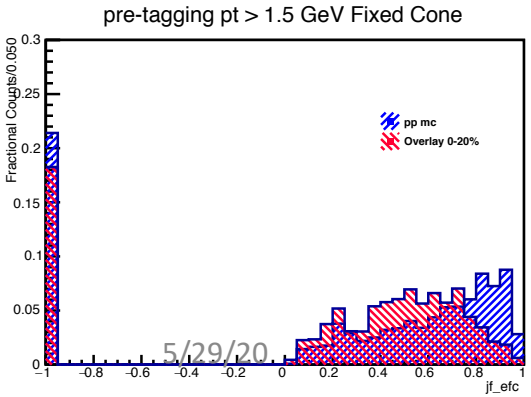


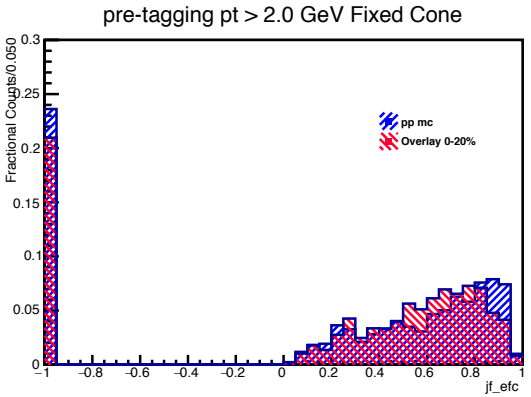


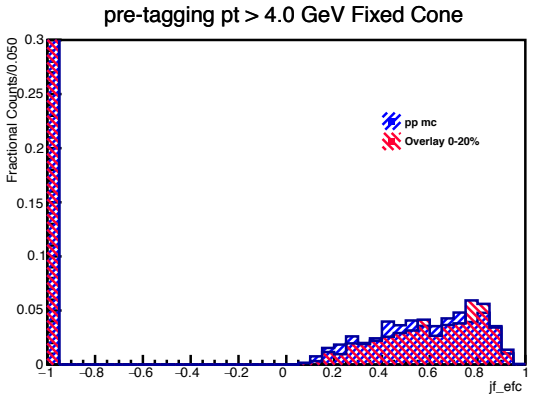








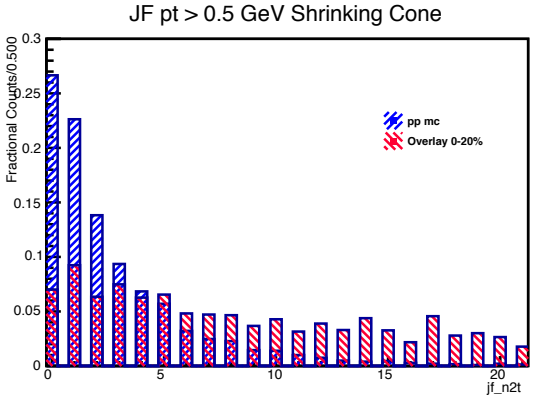


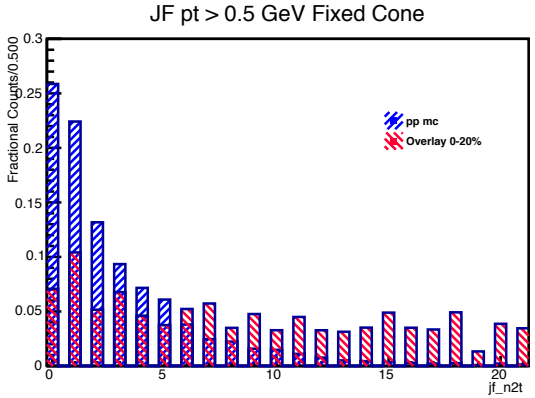


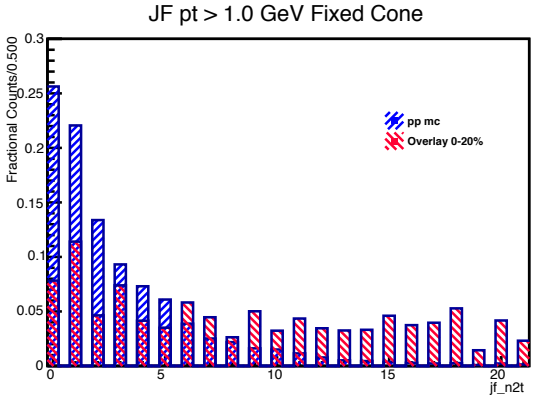
- Cuts applied at only JetFitter is not helping much.
- (first 6 graphs)

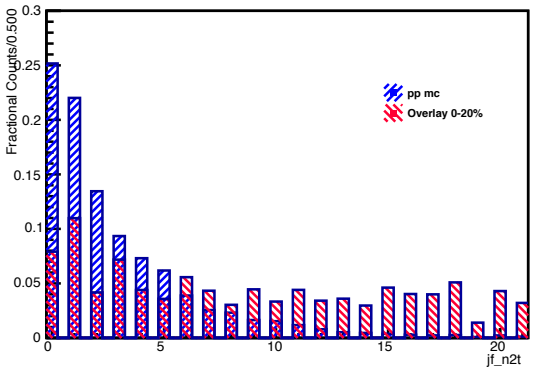
- Cutting at 1.5 GeV for pT before going into individual taggers helps.
- (last 3 graphs)

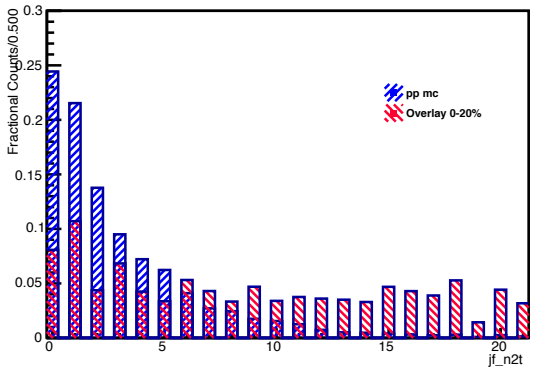
JF Number of 2-Track Vertices

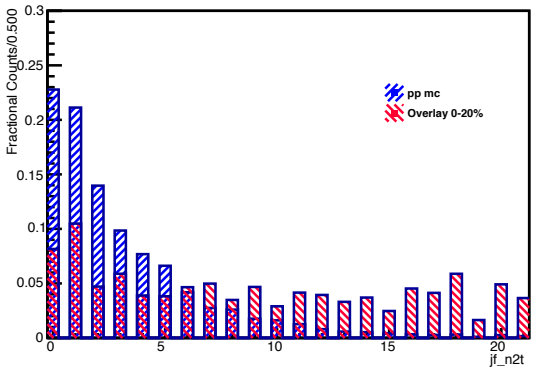


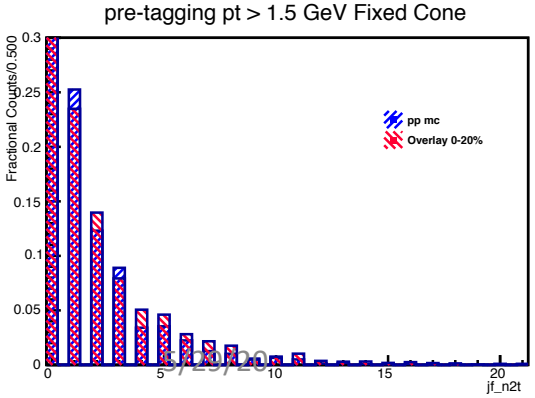


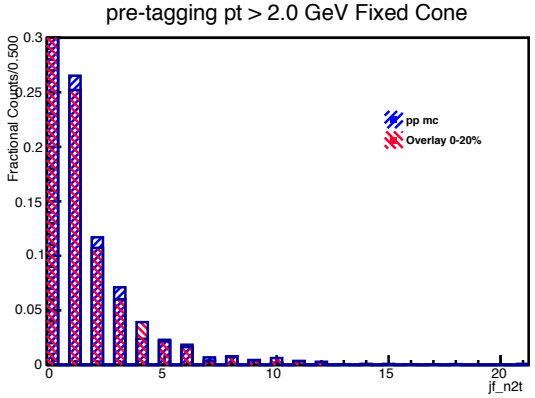


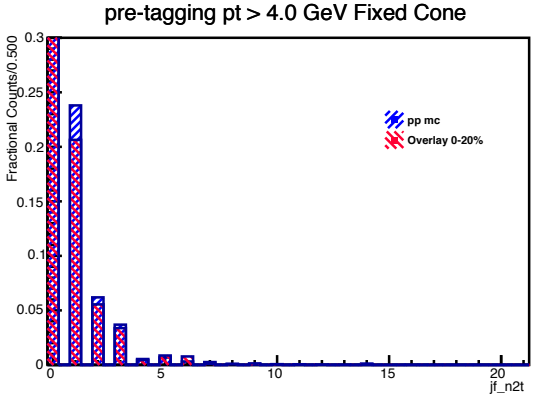








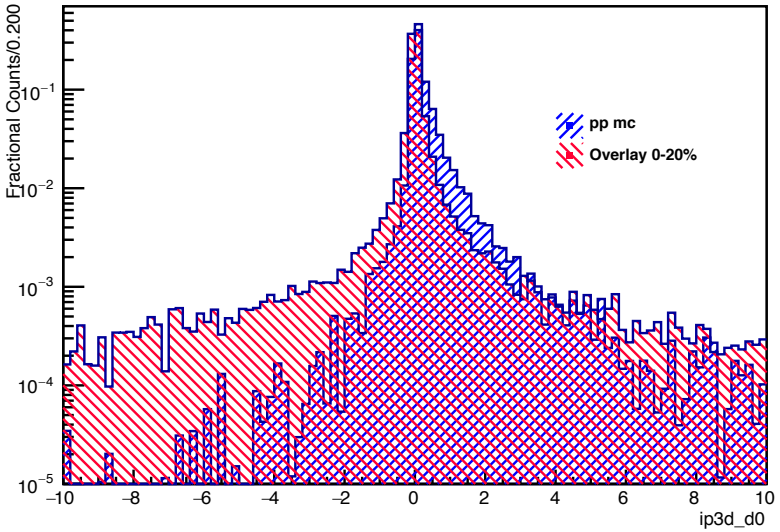




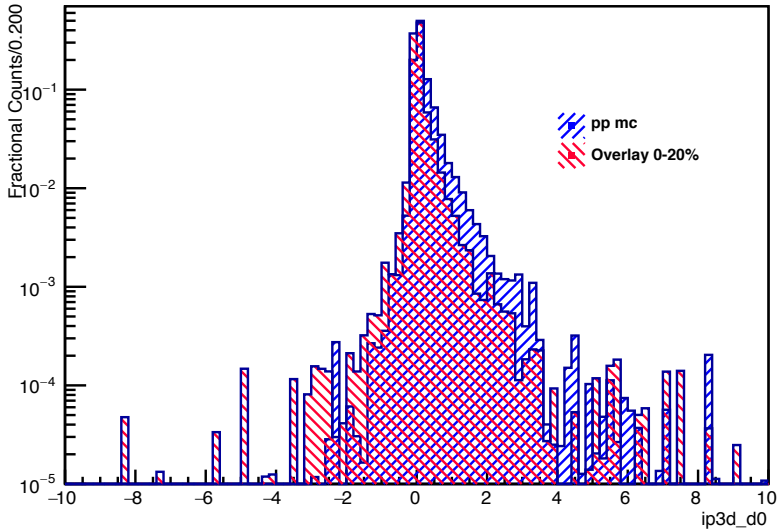
- Cuts applied at only JetFitter is not helping much.
- (first 6 graphs)
- Cutting at 1.5 GeV for pT before going into individual taggers helps.
- (last 3 graphs)
- Similar to energy fraction

IPxD Variables improvements over pT cuts

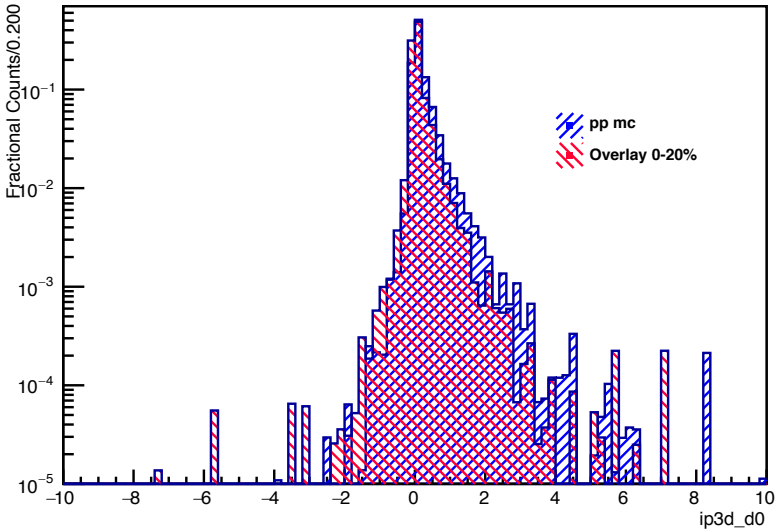
Default Cuts Shrinking Cone



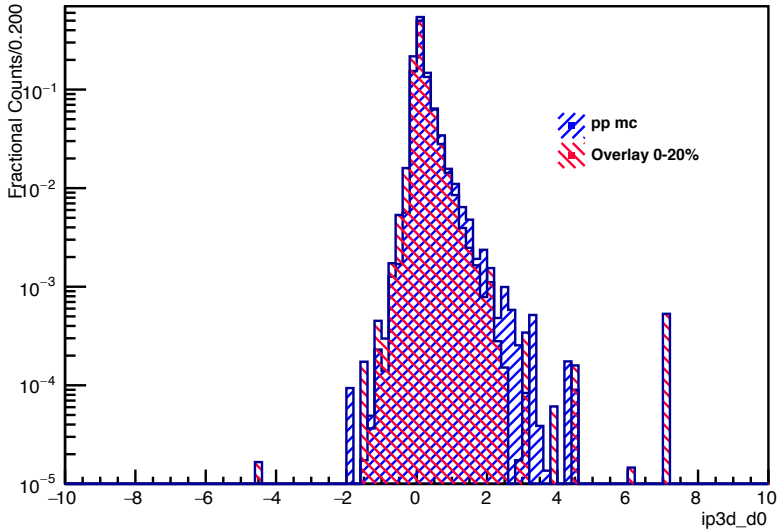
Pre-tagging min pT 1.5 GeV FC4



Pre-tagging min pT 2 GeV FC4



Pre-tagging min pT 4 GeV FC4

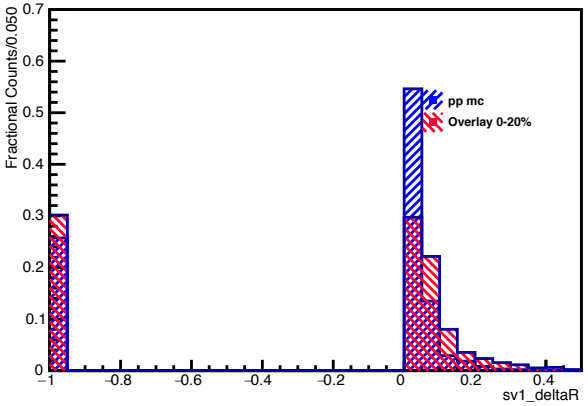


- d0 significance distributions assimilate at pT cut ~= 2 GeV.
- Similarly for z0 and z0sig.

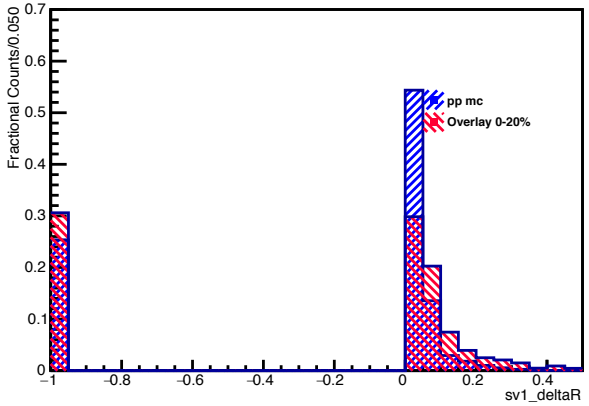
Back-up

Jet Fitter

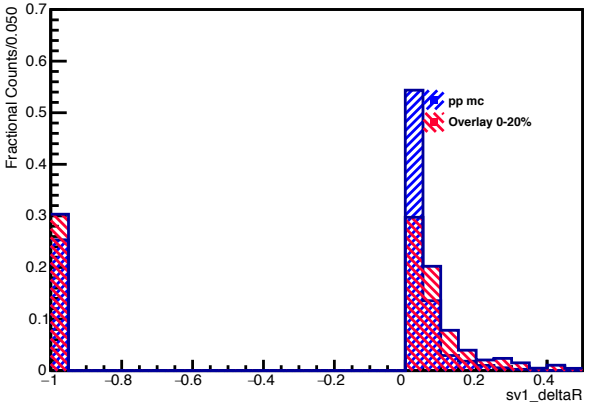
JF pt > 0.5 GeV Shrinking Cone



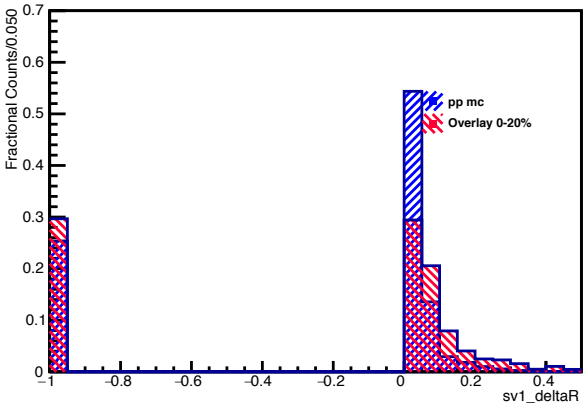
JF pt > 0.5 GeV Fixed Cone



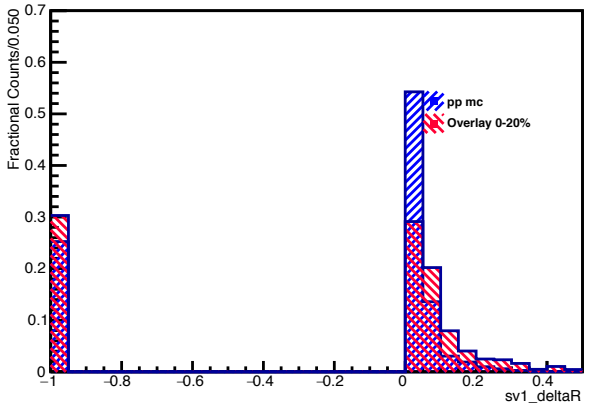
JF pt > 1.0 GeV Fixed Cone



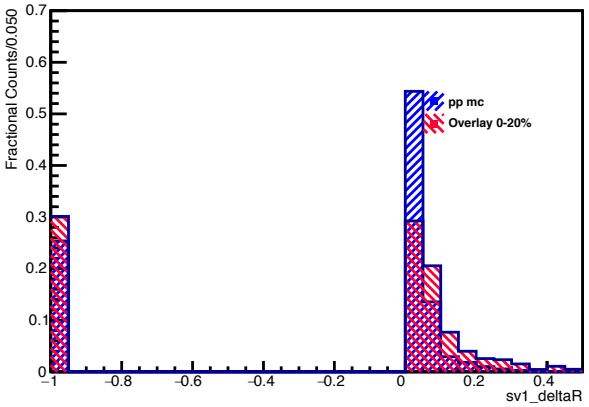
JF pt > 1.5 GeV Fixed Cone



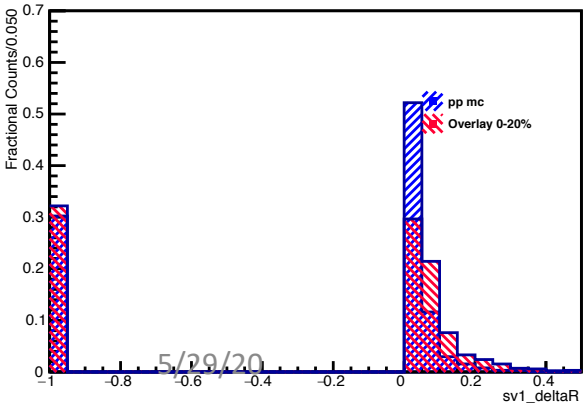
JF pt > 2.0 GeV Fixed Cone



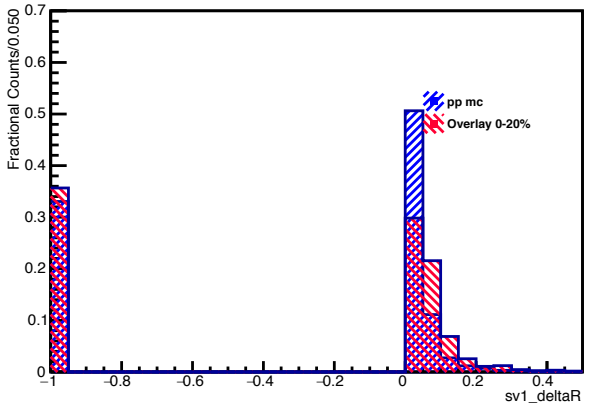
JF pt > 4 GeV Fixed Cone



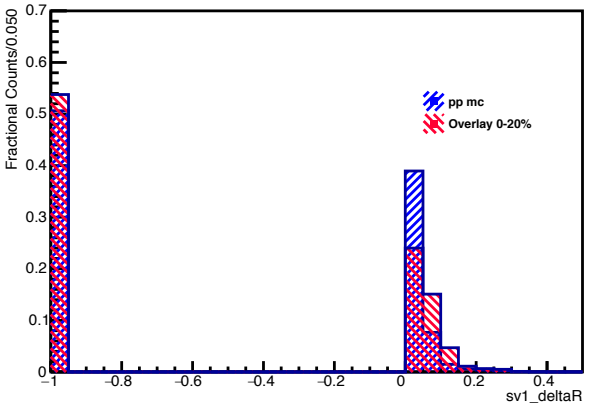
pre-tagging pt > 1.5 GeV Fixed Cone



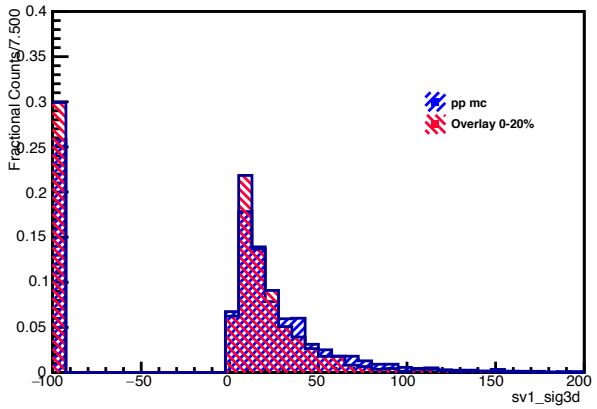
pre-tagging pt > 2.0 GeV Fixed Cone



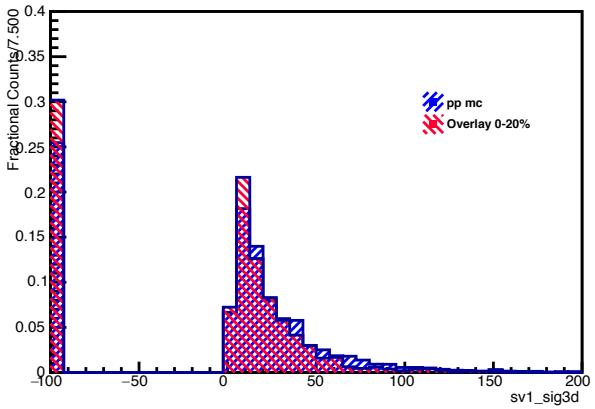
pre-tagging pt > 4.0 GeV Fixed Cone



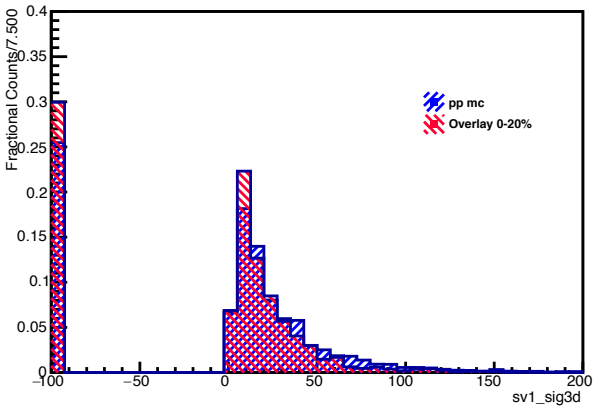
JF pt > 0.5 GeV Shrinking Cone



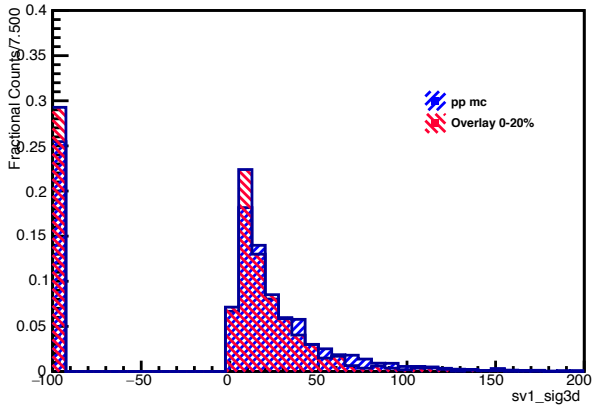
JF pt > 0.5 GeV Fixed Cone



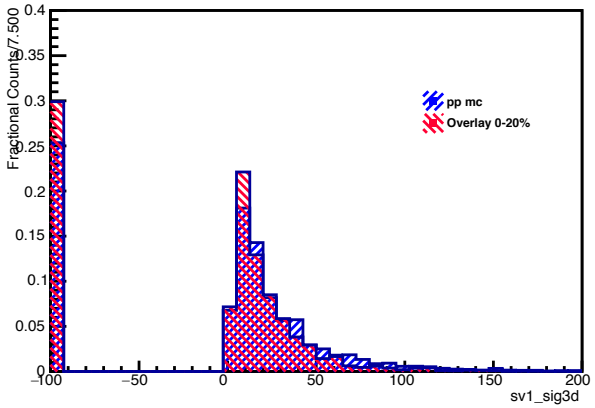
JF pt > 1.0 GeV Fixed Cone



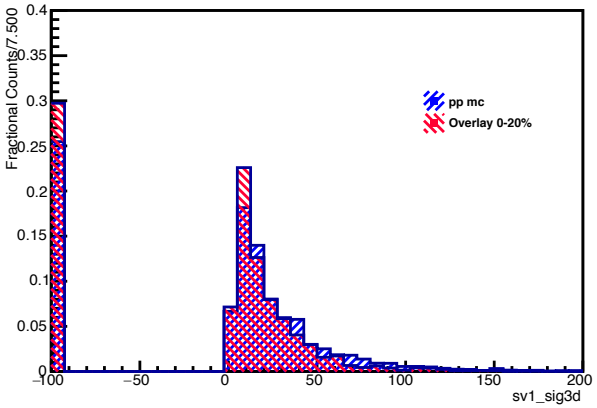
JF pt > 1.5 GeV Fixed Cone



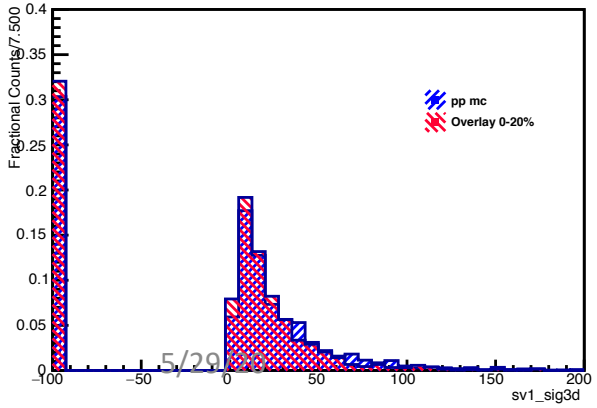
JF pt > 2.0 GeV Fixed Cone



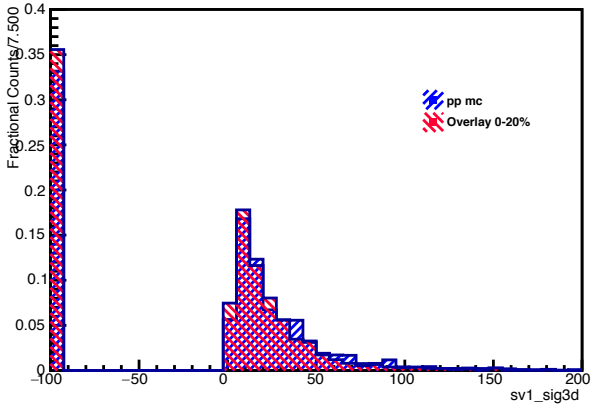
JF pt > 4 GeV Fixed Cone



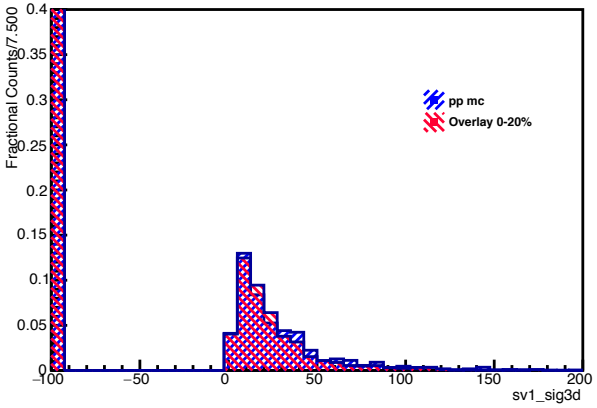
pre-tagging pt > 1.5 GeV Fixed Cone



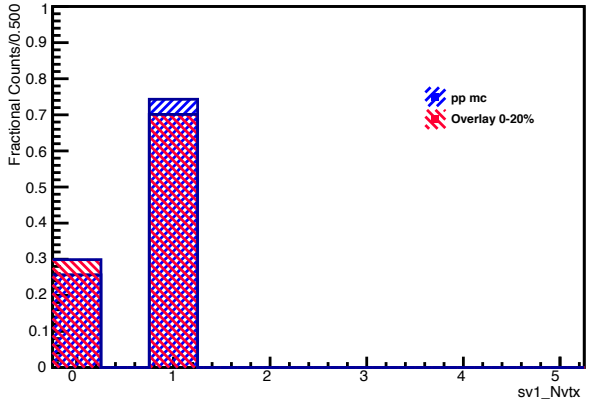
pre-tagging pt > 2.0 GeV Fixed Cone



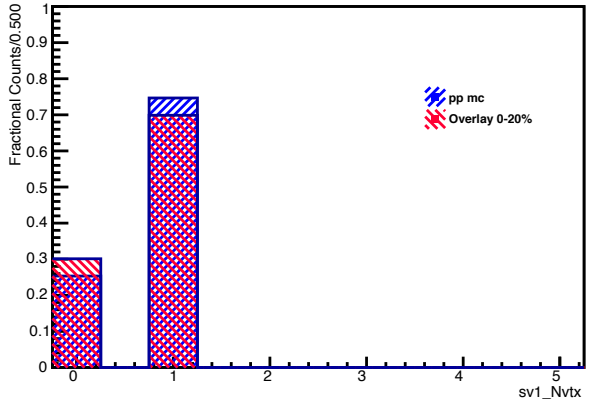
pre-tagging pt > 4.0 GeV Fixed Cone



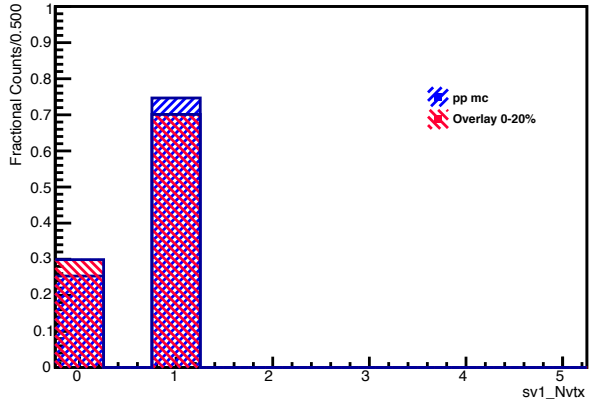
JF pt > 0.5 GeV Shrinking Cone



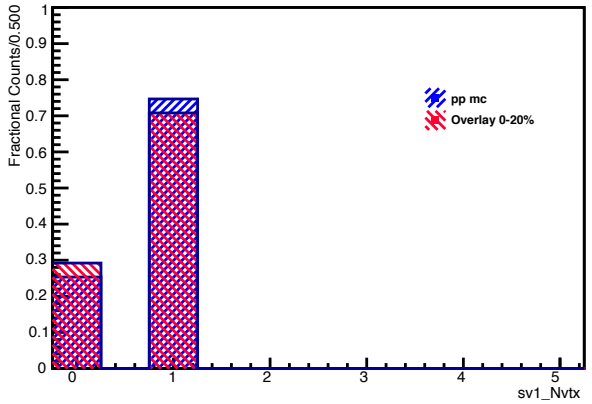
JF pt > 0.5 GeV Fixed Cone



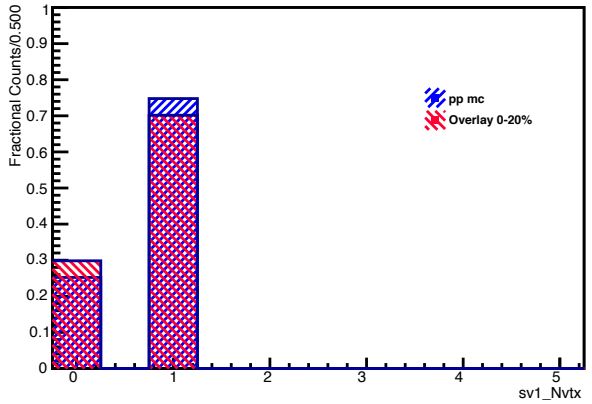
JF pt > 1.0 GeV Fixed Cone



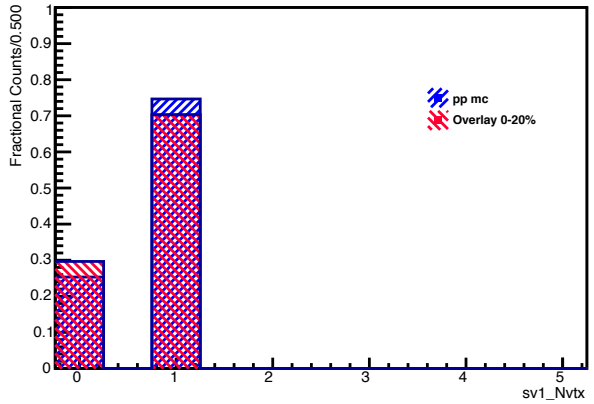
JF pt > 1.5 GeV Fixed Cone



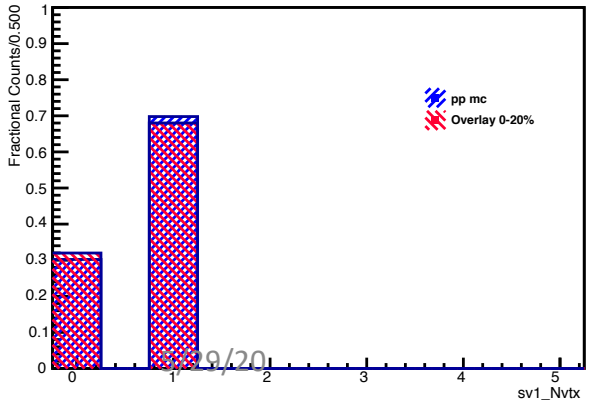
JF pt > 2.0 GeV Fixed Cone



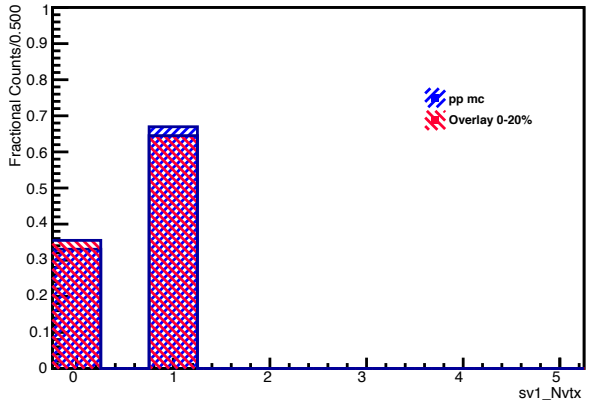
JF pt > 4 GeV Fixed Cone



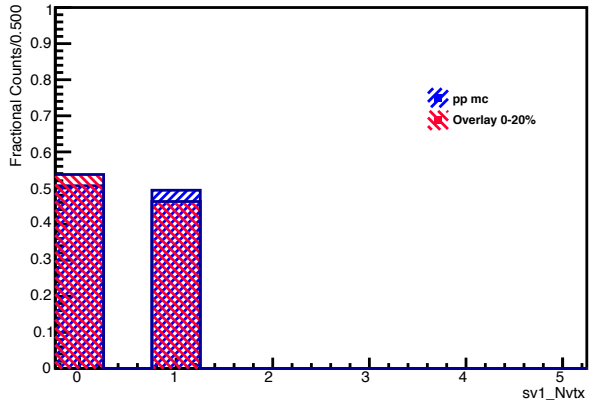
pre-tagging pt > 1.5 GeV Fixed Cone



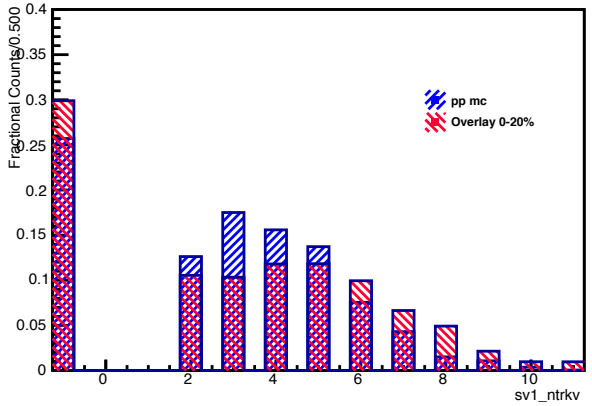
pre-tagging pt > 2.0 GeV Fixed Cone



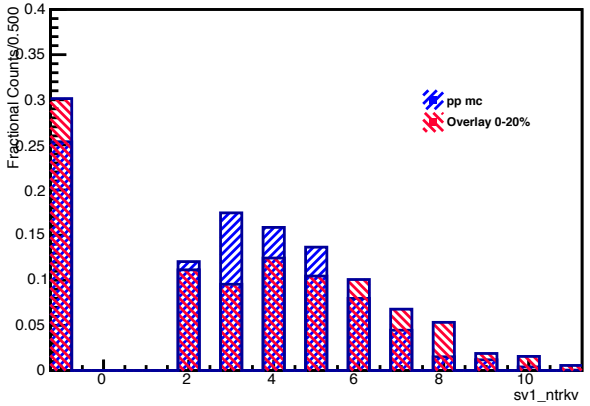
pre-tagging pt > 4.0 GeV Fixed Cone



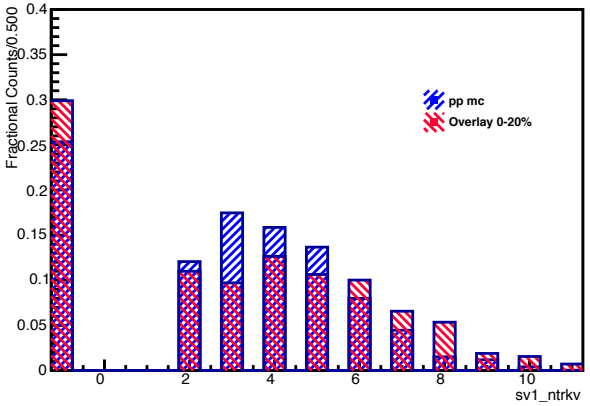
JF pt > 0.5 GeV Shrinking Cone



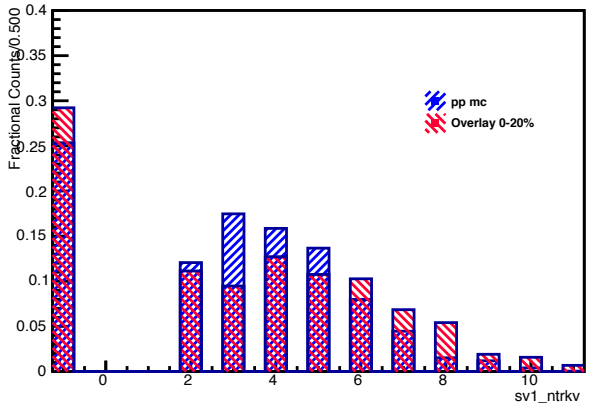
JF pt > 0.5 GeV Fixed Cone



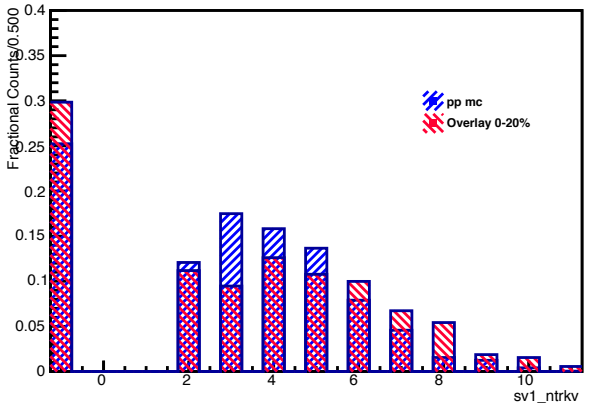
JF pt > 1.0 GeV Fixed Cone



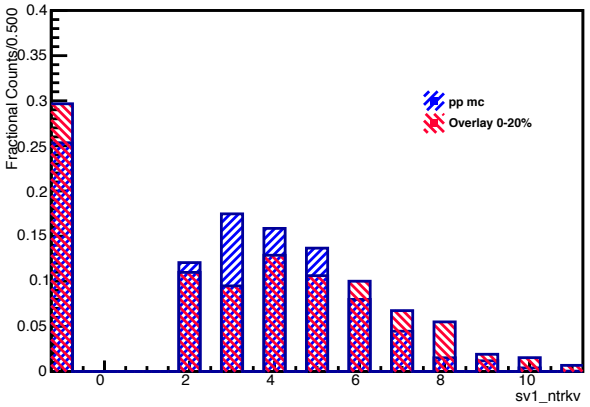
JF pt > 1.5 GeV Fixed Cone



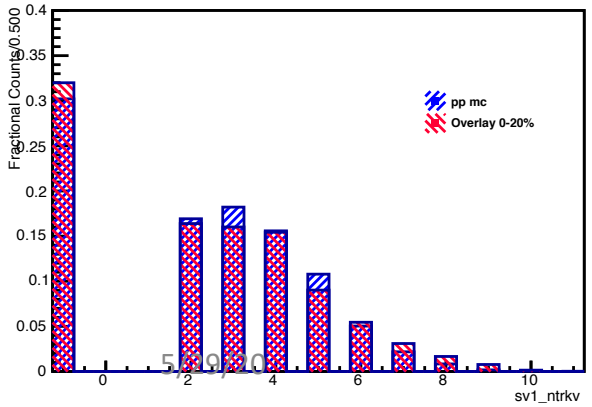
JF pt > 2.0 GeV Fixed Cone



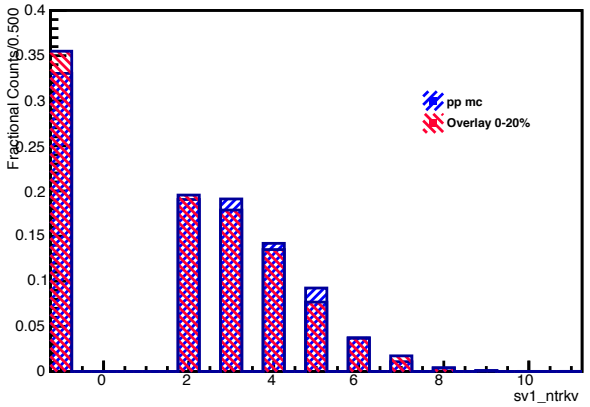
JF pt > 4 GeV Fixed Cone



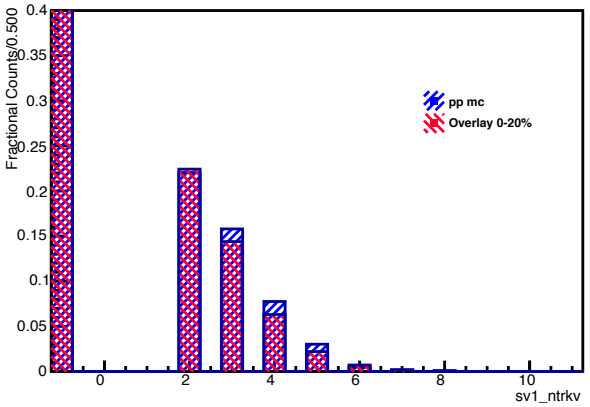
pre-tagging pt > 1.5 GeV Fixed Cone



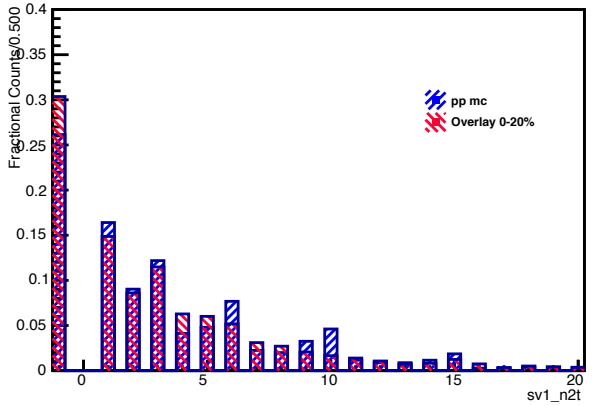
pre-tagging pt > 2.0 GeV Fixed Cone



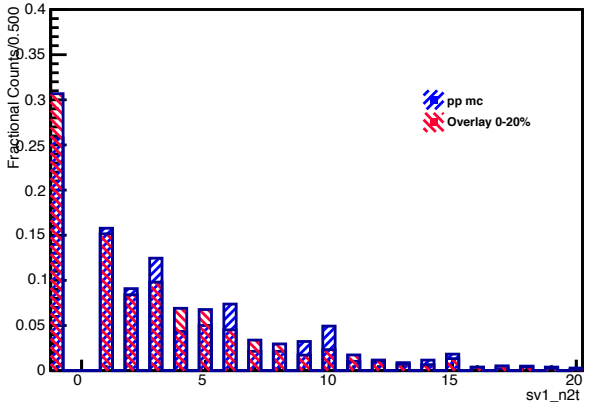
pre-tagging pt > 4.0 GeV Fixed Cone



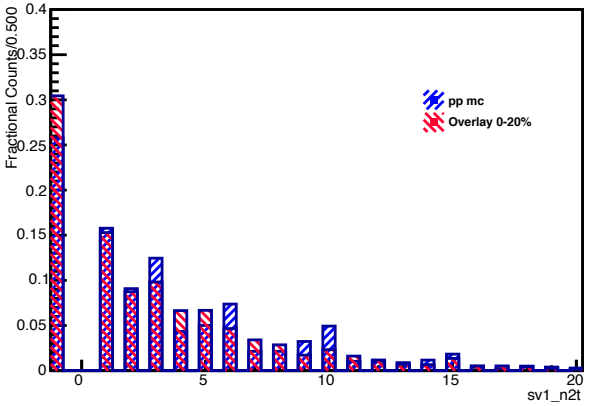
JF pt > 0.5 GeV Shrinking Cone



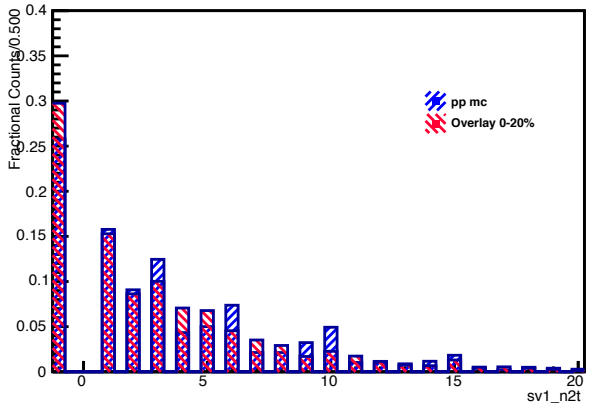
JF pt > 0.5 GeV Fixed Cone



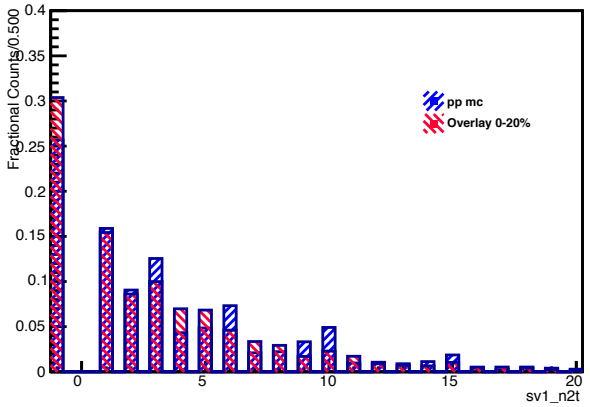
JF pt > 1.0 GeV Fixed Cone



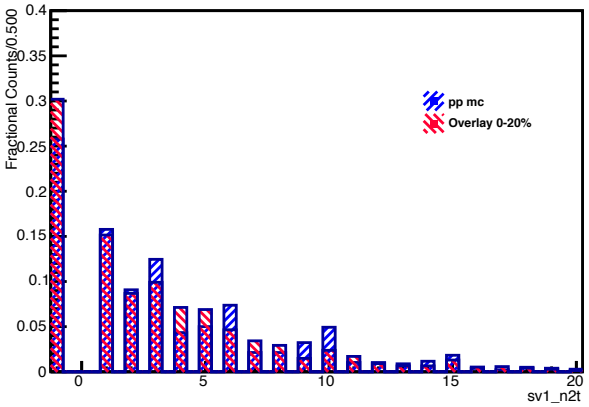
JF pt > 1.5 GeV Fixed Cone



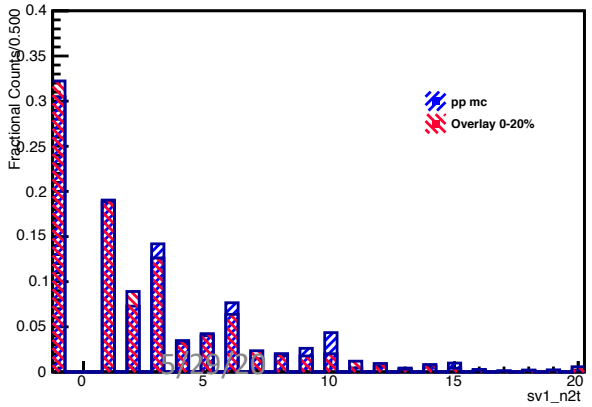
JF pt > 2.0 GeV Fixed Cone



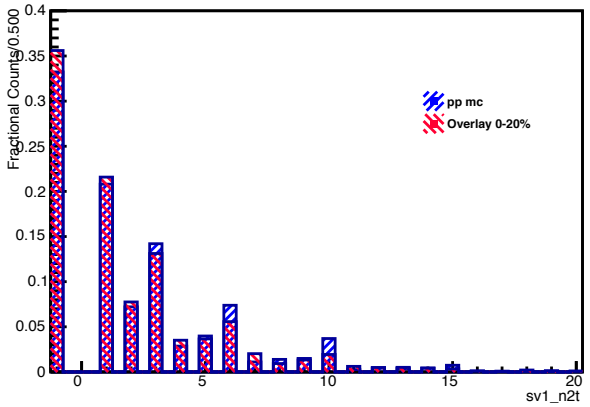
JF pt > 4 GeV Fixed Cone



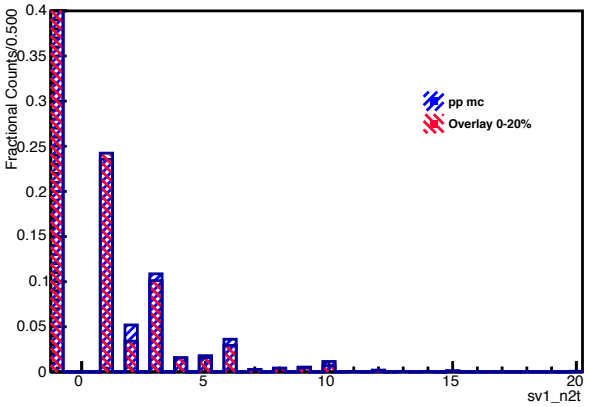
pre-tagging pt > 1.5 GeV Fixed Cone



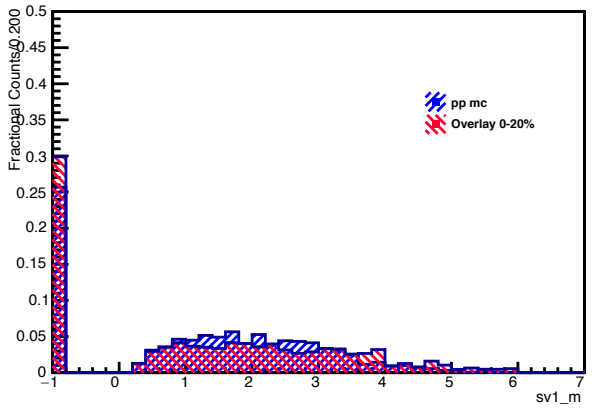
pre-tagging pt > 2.0 GeV Fixed Cone



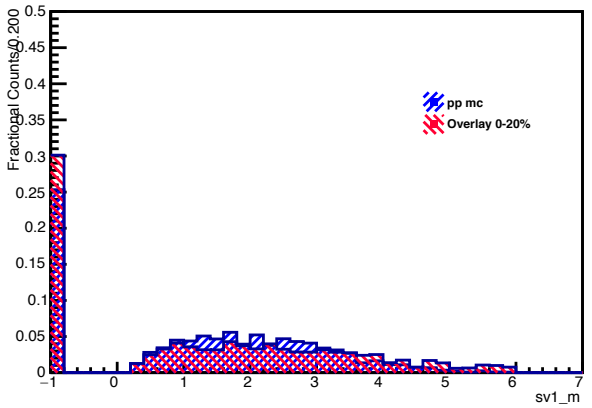
pre-tagging pt > 4.0 GeV Fixed Cone



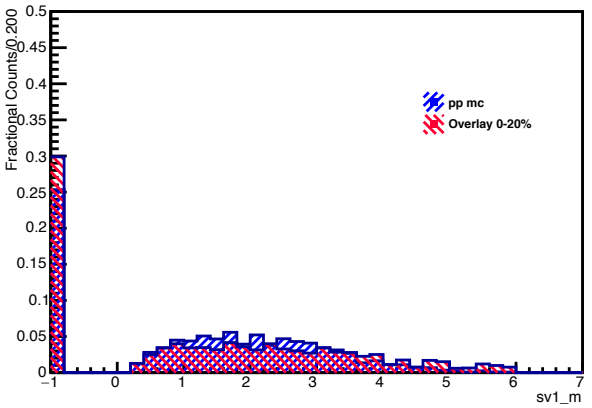
JF pt > 0.5 GeV Shrinking Cone



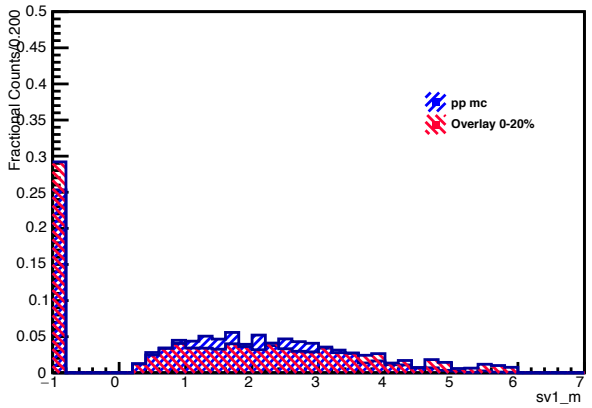
JF pt > 0.5 GeV Fixed Cone



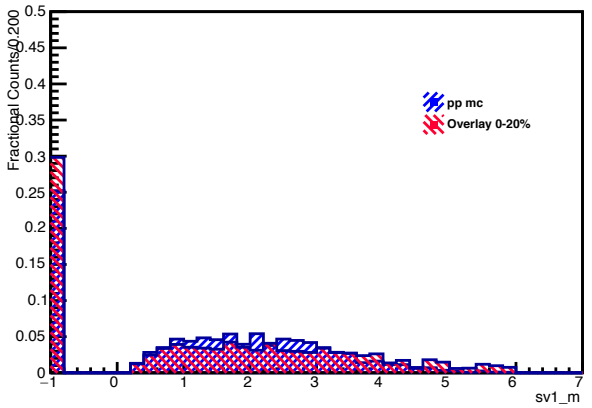
JF pt > 1.0 GeV Fixed Cone



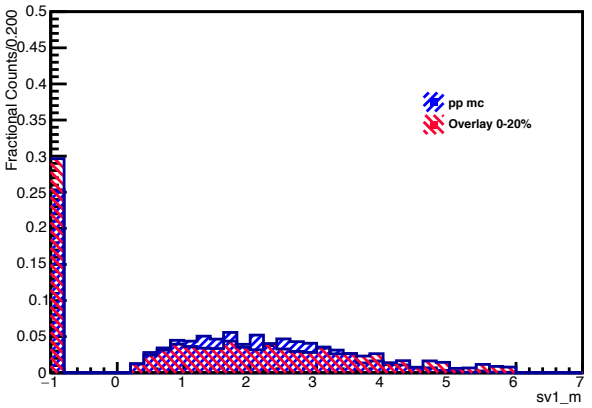
JF pt > 1.5 GeV Fixed Cone



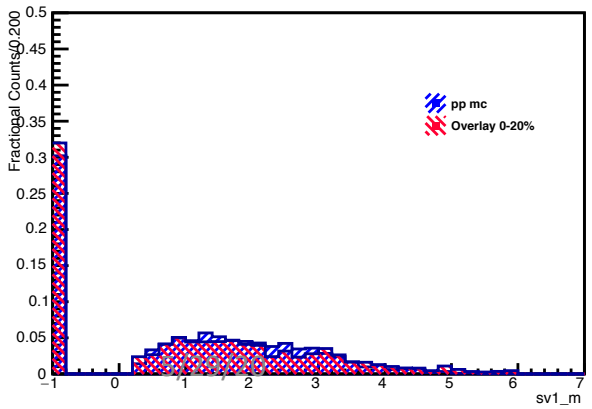
JF pt > 2.0 GeV Fixed Cone



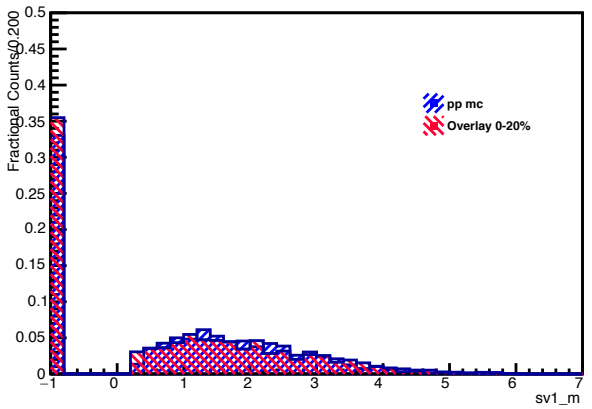
JF pt > 4 GeV Fixed Cone



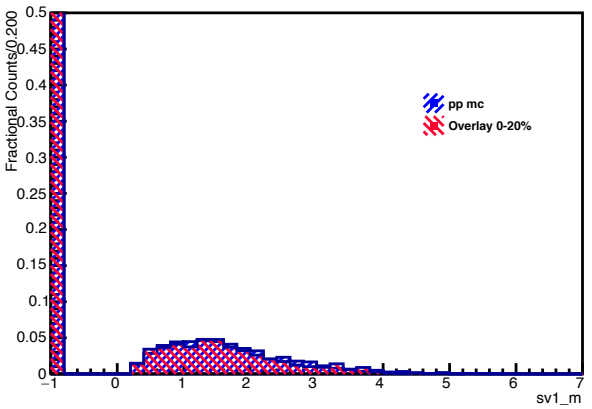
pre-tagging pt > 1.5 GeV Fixed Cone



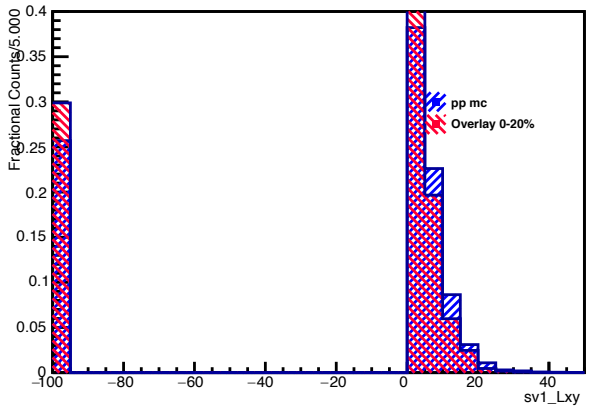
pre-tagging pt > 2.0 GeV Fixed Cone



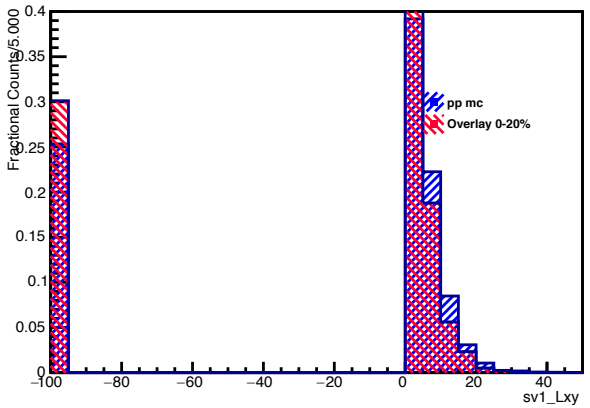
pre-tagging pt > 4.0 GeV Fixed Cone



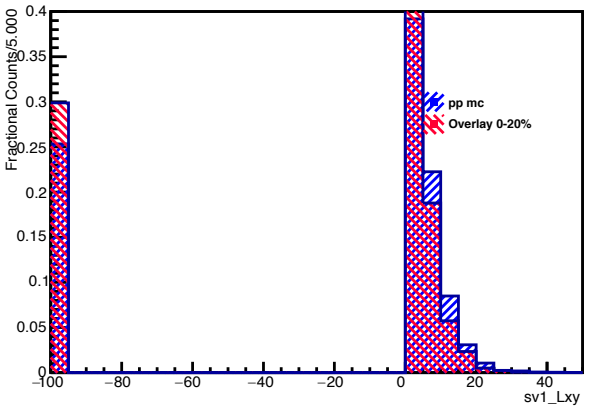
JF pt > 0.5 GeV Shrinking Cone



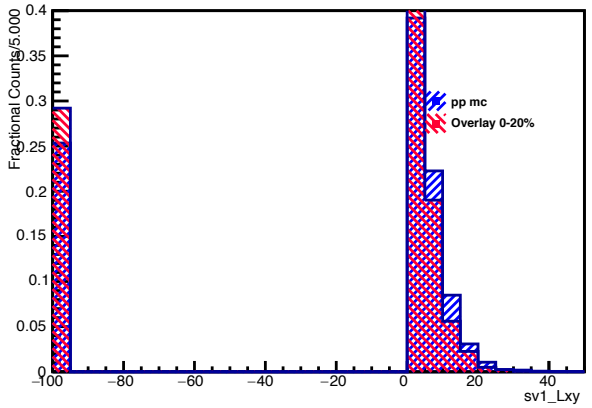
JF pt > 0.5 GeV Fixed Cone



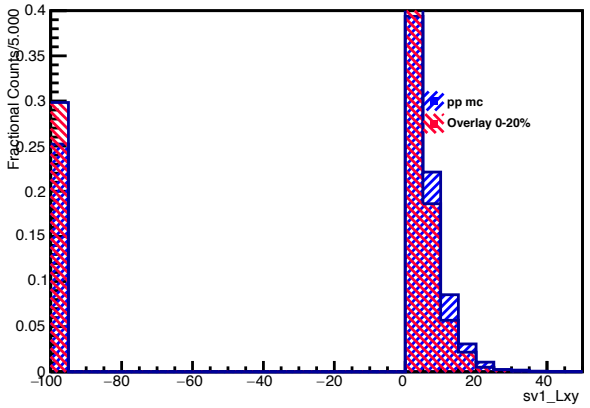
JF pt > 1.0 GeV Fixed Cone



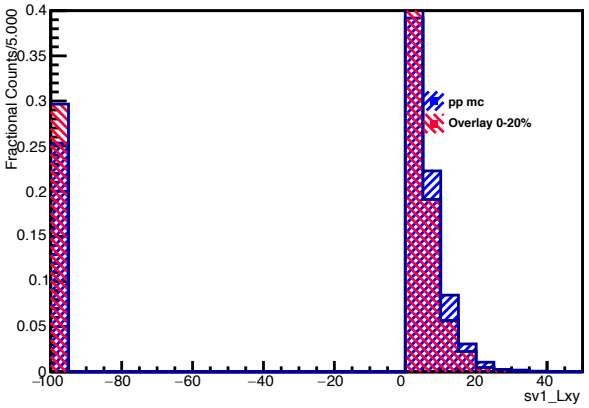
JF pt > 1.5 GeV Fixed Cone



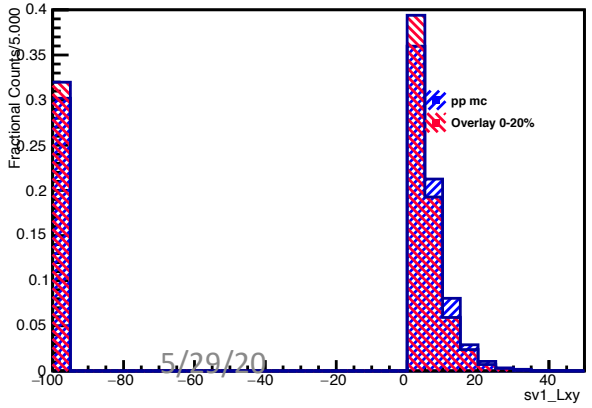
JF pt > 2.0 GeV Fixed Cone



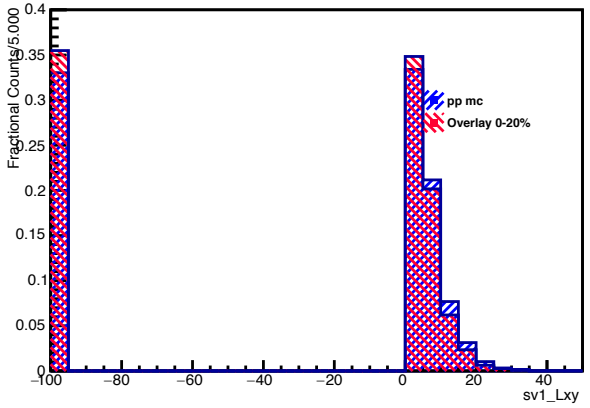
JF pt > 4 GeV Fixed Cone



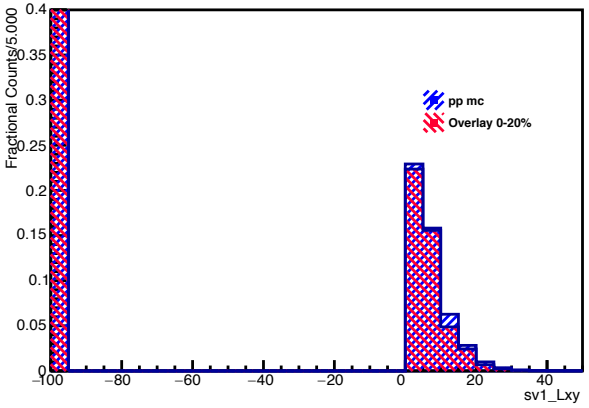
pre-tagging pt > 1.5 GeV Fixed Cone



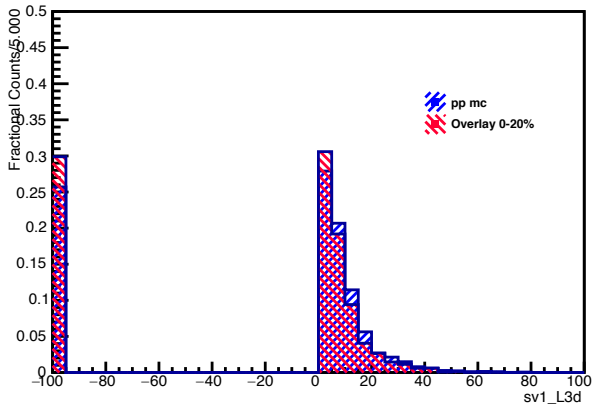
pre-tagging pt > 2.0 GeV Fixed Cone



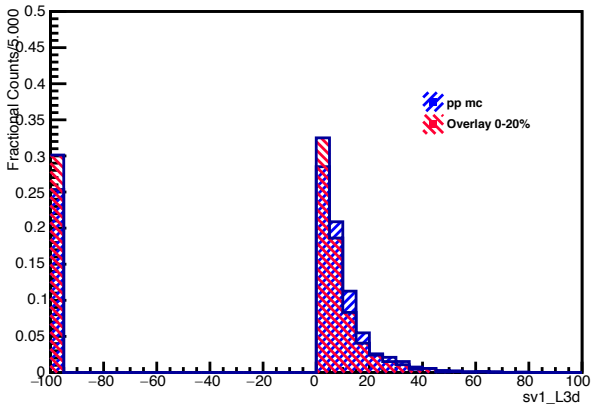
pre-tagging pt > 4.0 GeV Fixed Cone



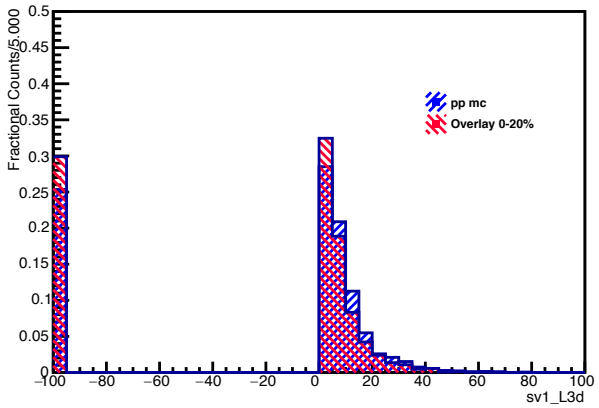
JF pt > 0.5 GeV Shrinking Cone



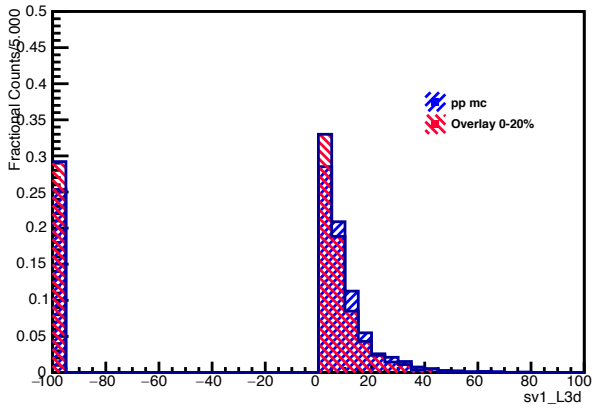
JF pt > 0.5 GeV Fixed Cone



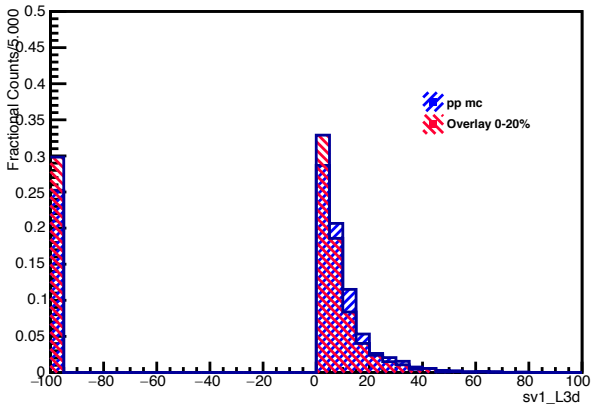
JF pt > 1.0 GeV Fixed Cone



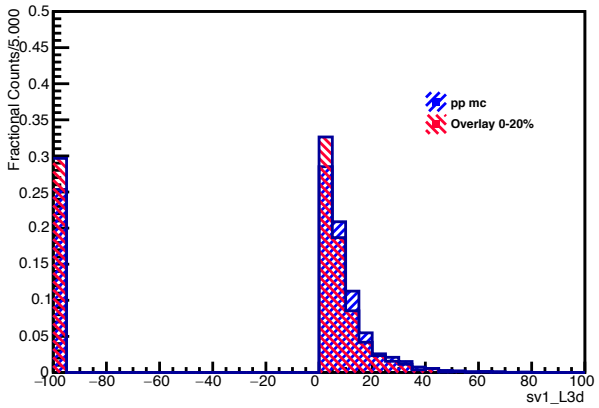
JF pt > 1.5 GeV Fixed Cone



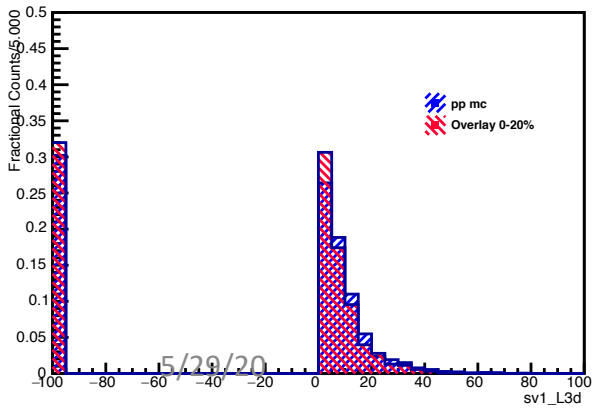
JF pt > 2.0 GeV Fixed Cone



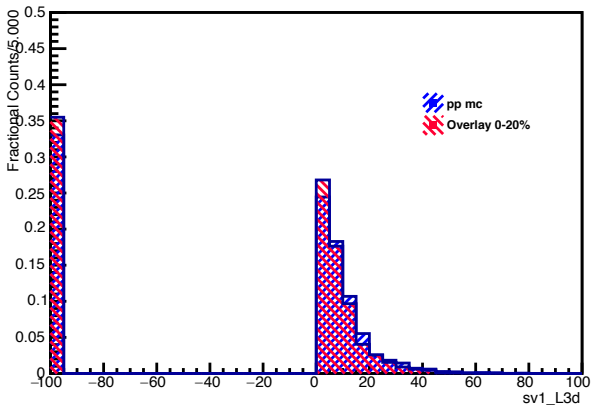
JF pt > 4 GeV Fixed Cone



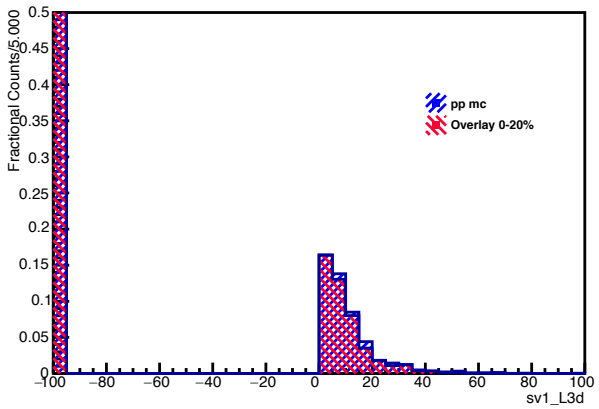
pre-tagging pt > 1.5 GeV Fixed Cone



pre-tagging pt > 2.0 GeV Fixed Cone

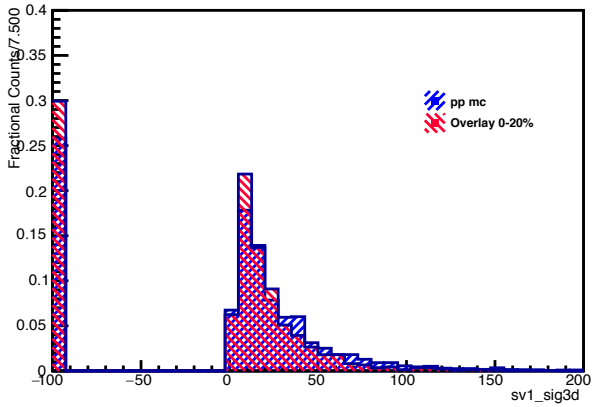


pre-tagging pt > 4.0 GeV Fixed Cone

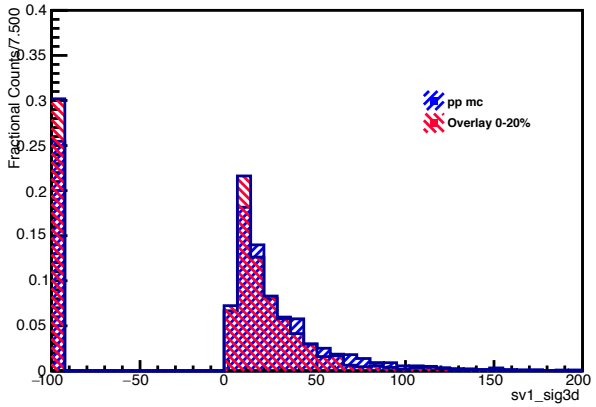


Secondary Vertex

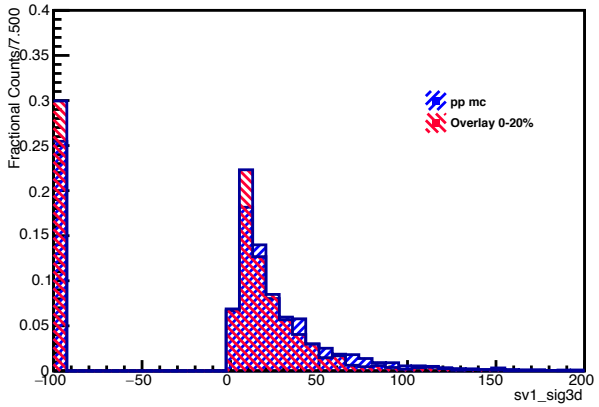
JF pt > 0.5 GeV Shrinking Cone



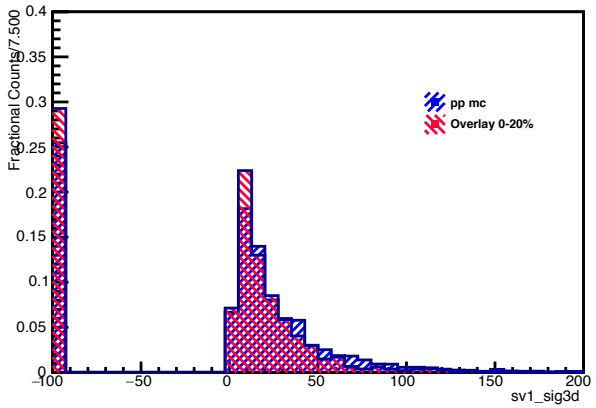
JF pt > 0.5 GeV Fixed Cone



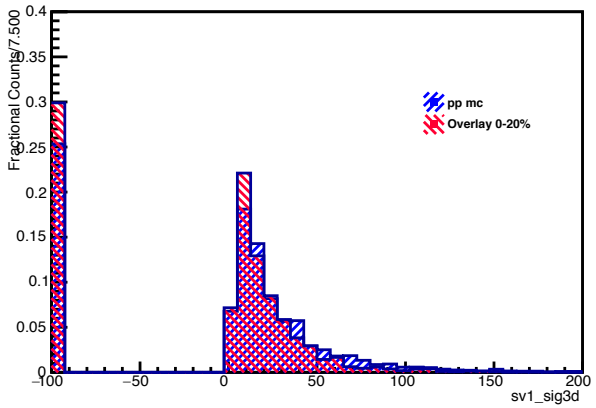
JF pt > 1.0 GeV Fixed Cone



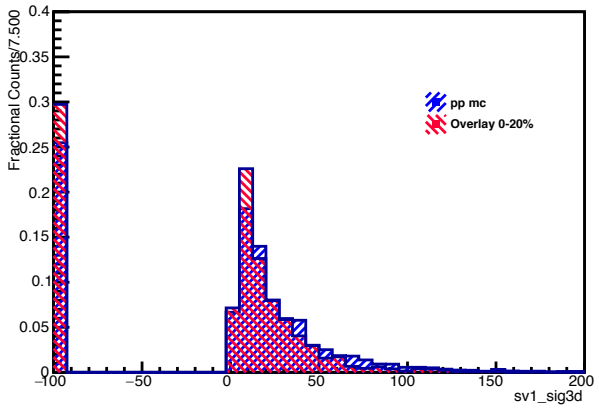
JF pt > 1.5 GeV Fixed Cone



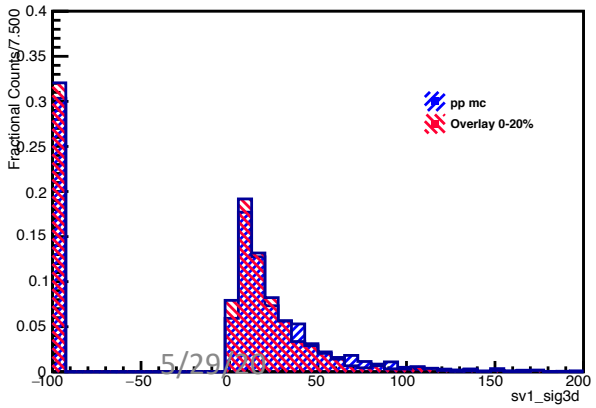
JF pt > 2.0 GeV Fixed Cone



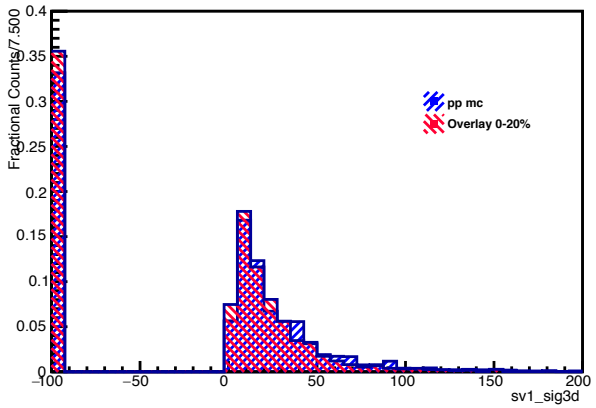
JF pt > 4 GeV Fixed Cone



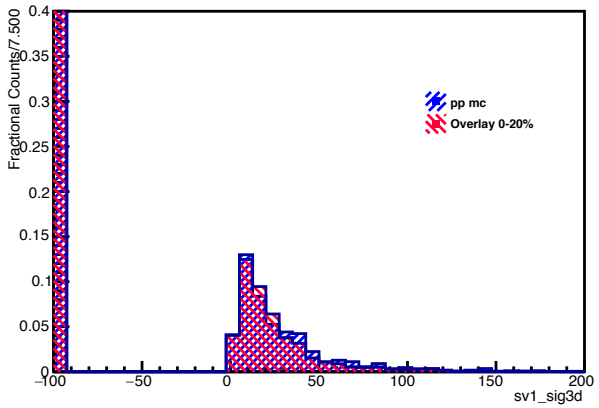
pre-tagging pt > 1.5 GeV Fixed Cone



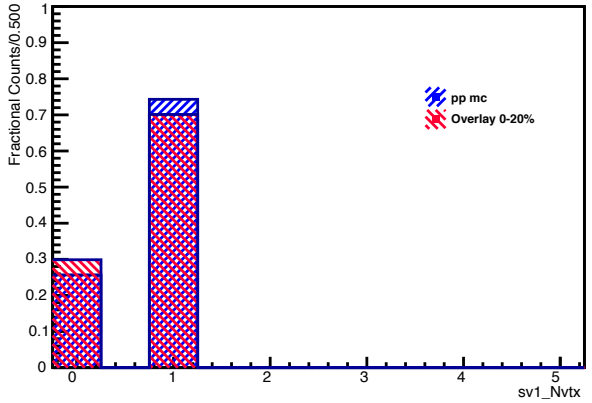
pre-tagging pt > 2.0 GeV Fixed Cone



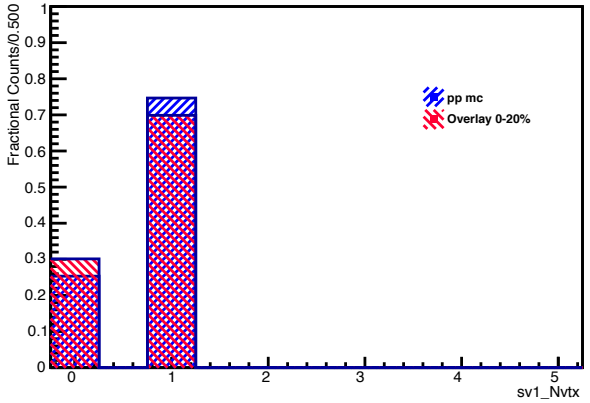
pre-tagging pt > 4.0 GeV Fixed Cone



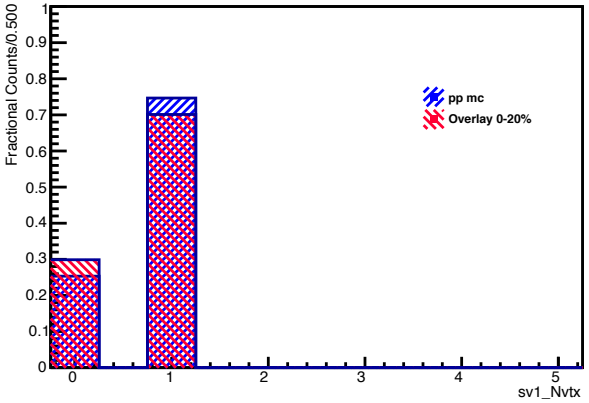
JF pt > 0.5 GeV Shrinking Cone



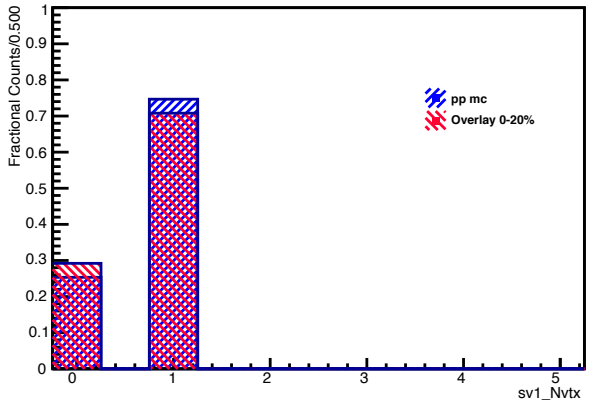
JF pt > 0.5 GeV Fixed Cone



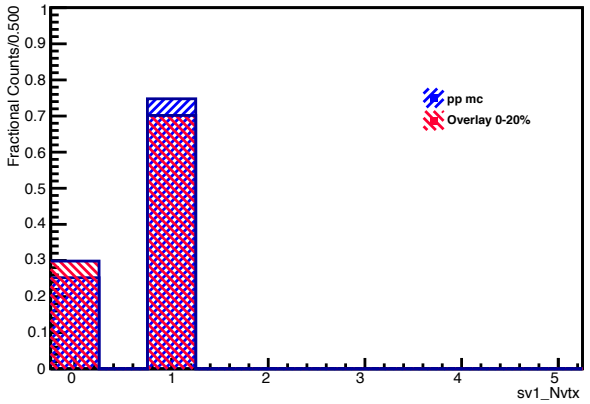
JF pt > 1.0 GeV Fixed Cone



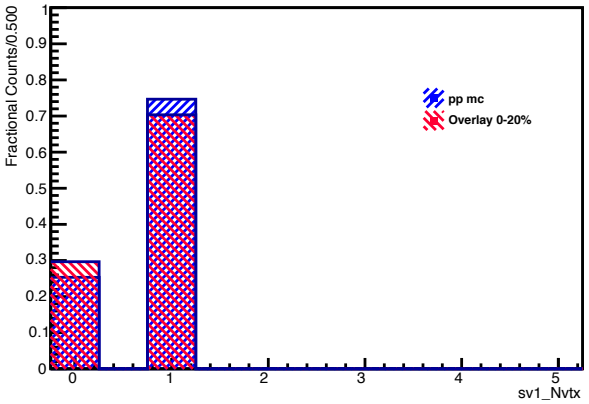
JF pt > 1.5 GeV Fixed Cone



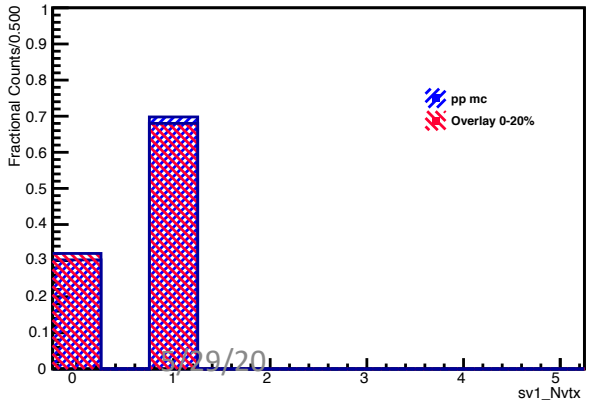
JF pt > 2.0 GeV Fixed Cone



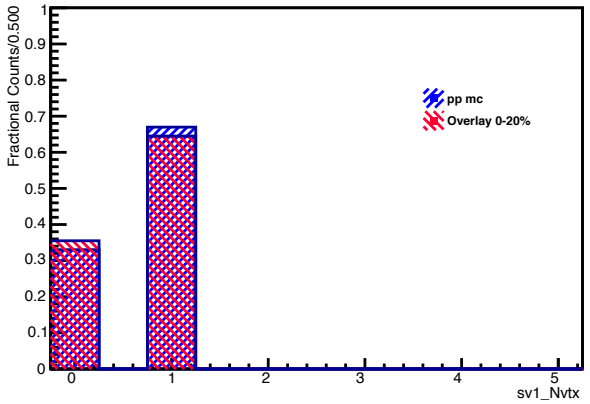
JF pt > 4 GeV Fixed Cone



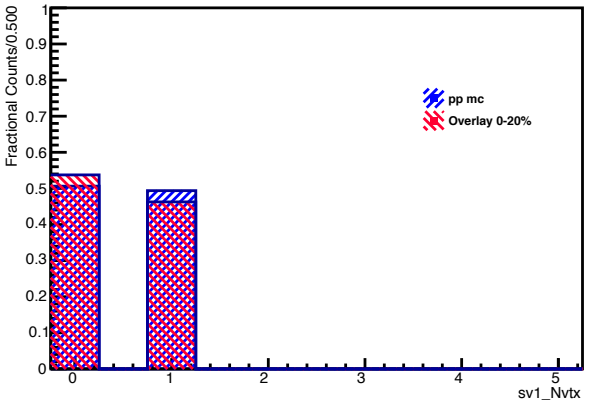
pre-tagging pt > 1.5 GeV Fixed Cone



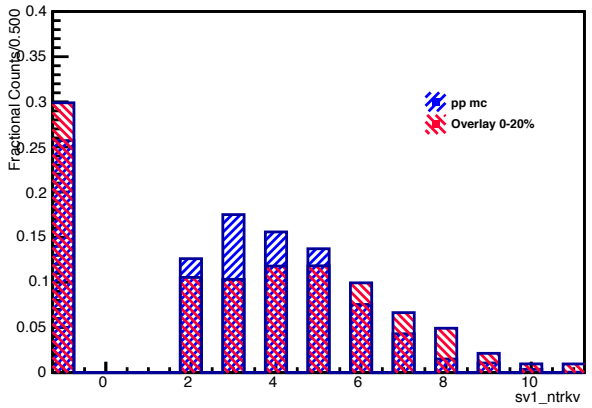
pre-tagging pt > 2.0 GeV Fixed Cone



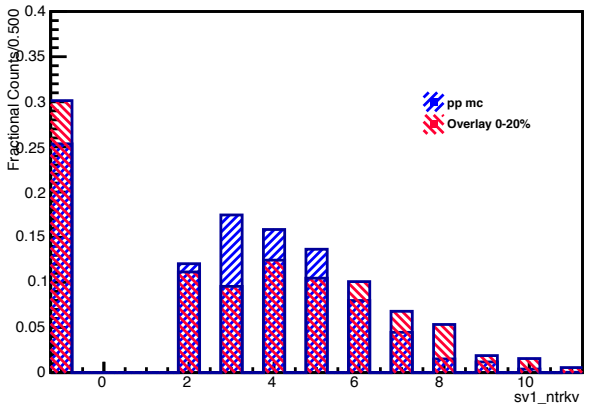
pre-tagging pt > 4.0 GeV Fixed Cone



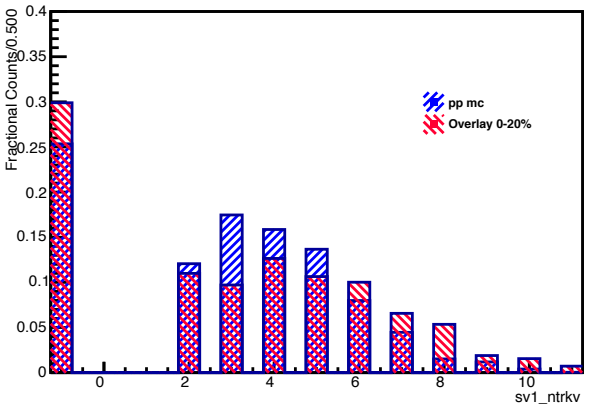
JF pt > 0.5 GeV Shrinking Cone



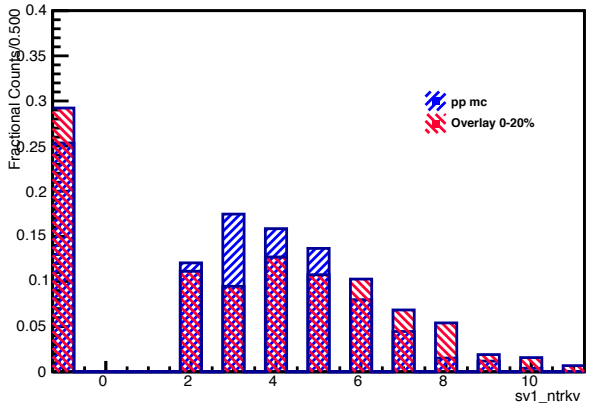
JF pt > 0.5 GeV Fixed Cone



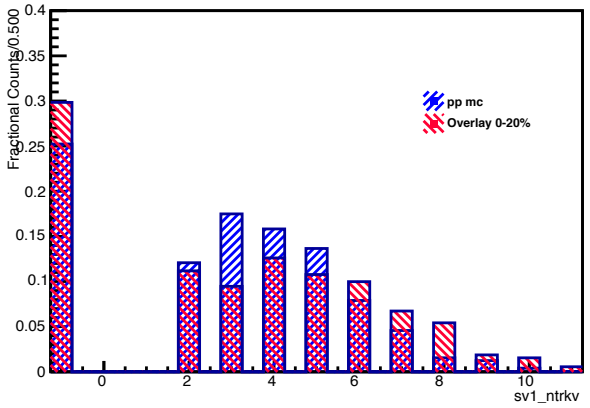
JF pt > 1.0 GeV Fixed Cone



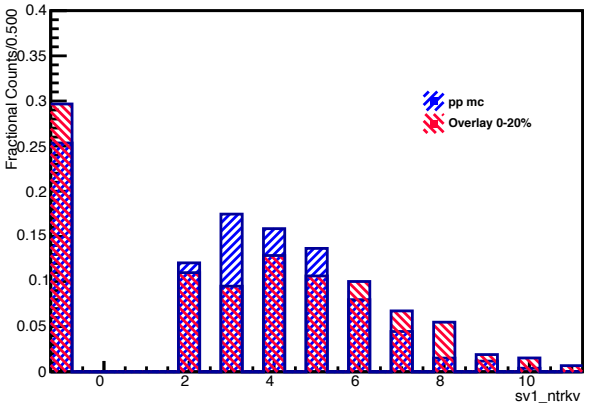
JF pt > 1.5 GeV Fixed Cone



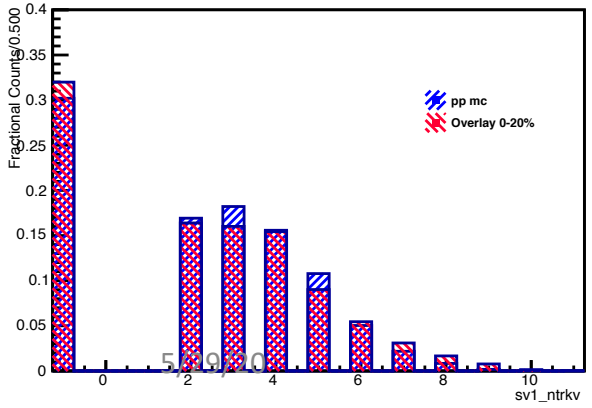
JF pt > 2.0 GeV Fixed Cone



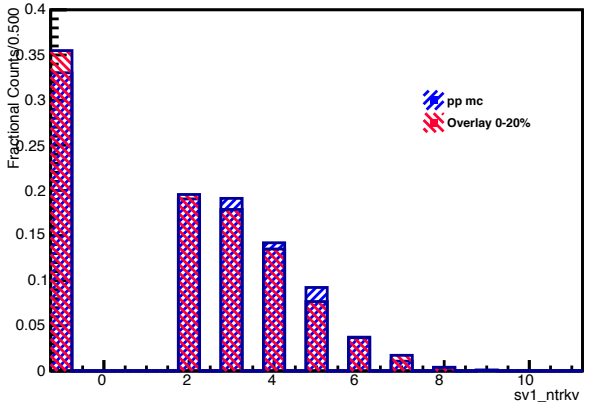
JF pt > 4 GeV Fixed Cone



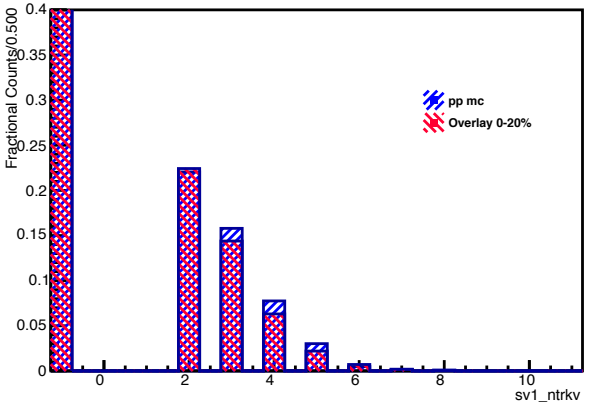
pre-tagging pt > 1.5 GeV Fixed Cone



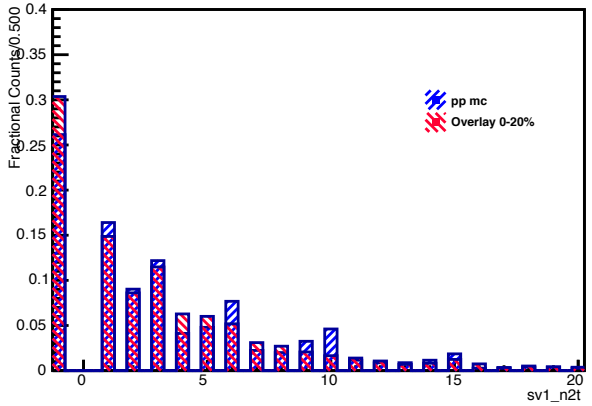
pre-tagging pt > 2.0 GeV Fixed Cone



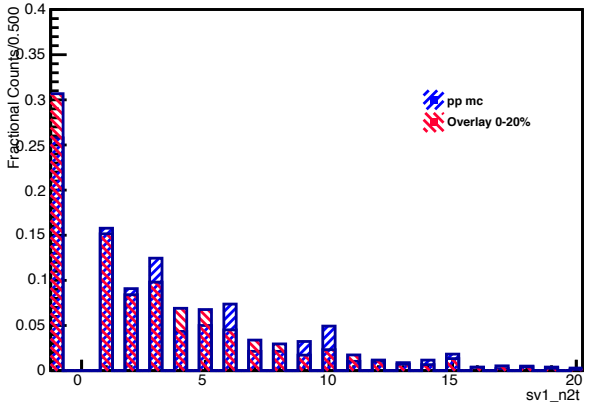
pre-tagging pt > 4.0 GeV Fixed Cone



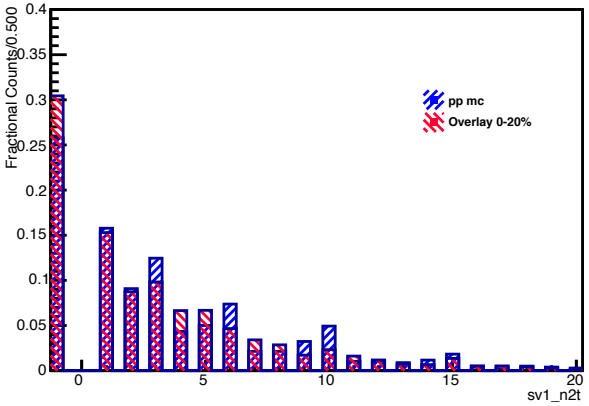
JF pt > 0.5 GeV Shrinking Cone



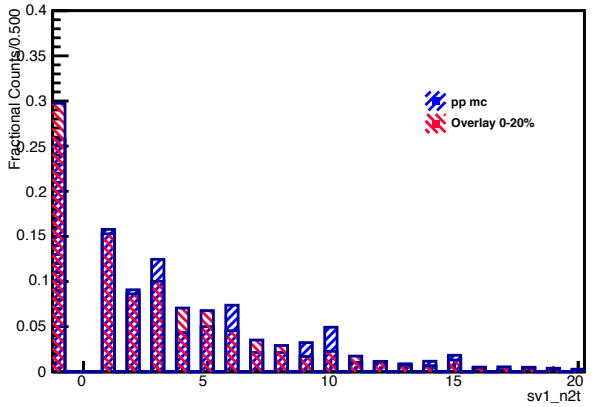
JF pt > 0.5 GeV Fixed Cone



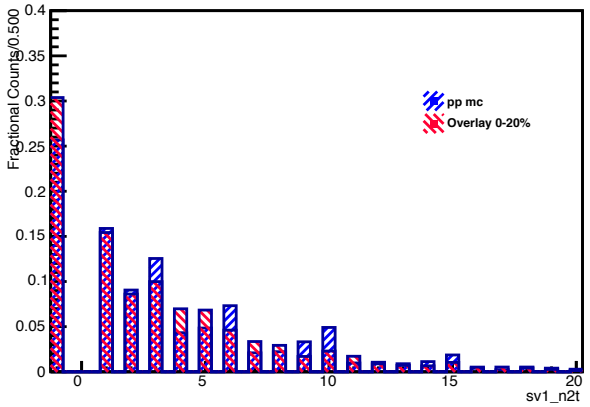
JF pt > 1.0 GeV Fixed Cone



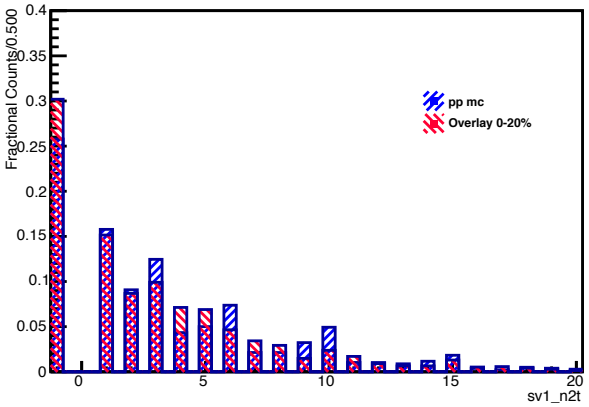
JF pt > 1.5 GeV Fixed Cone



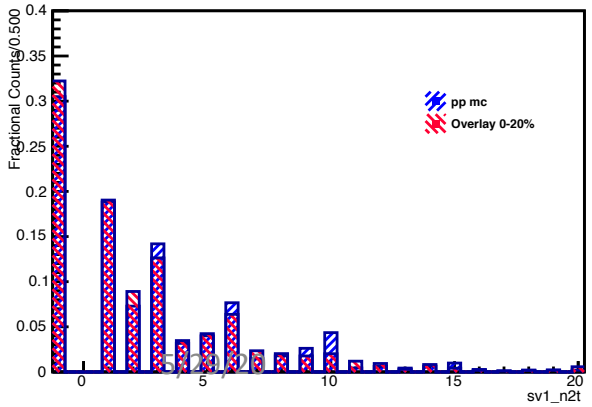
JF pt > 2.0 GeV Fixed Cone



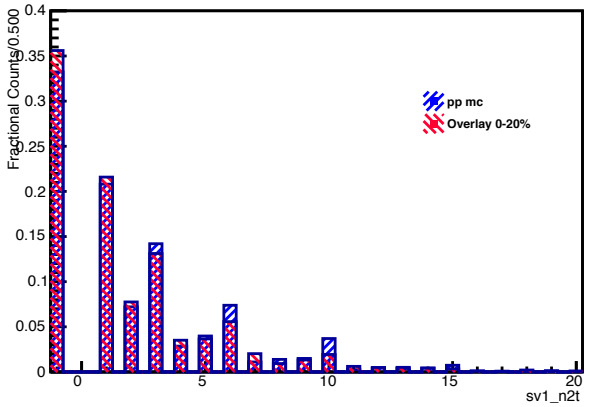
JF pt > 4 GeV Fixed Cone



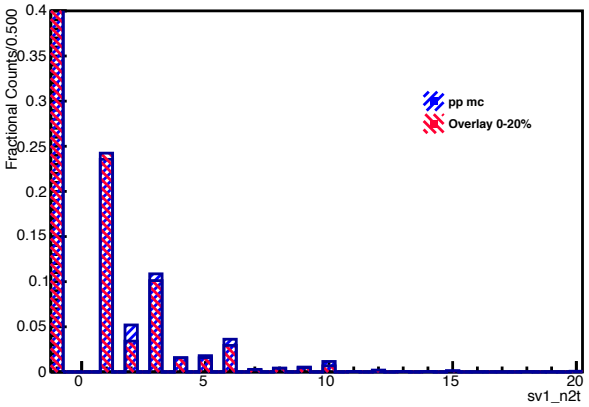
pre-tagging pt > 1.5 GeV Fixed Cone



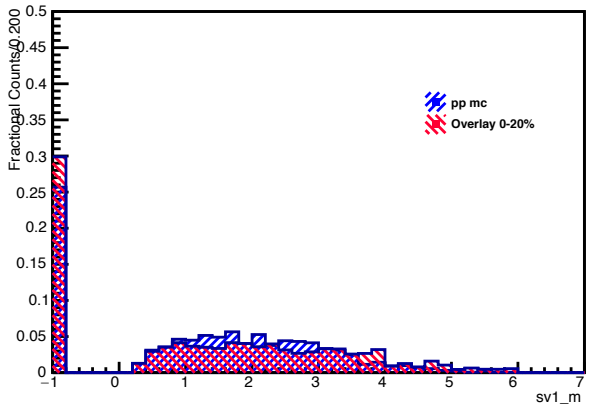
pre-tagging pt > 2.0 GeV Fixed Cone



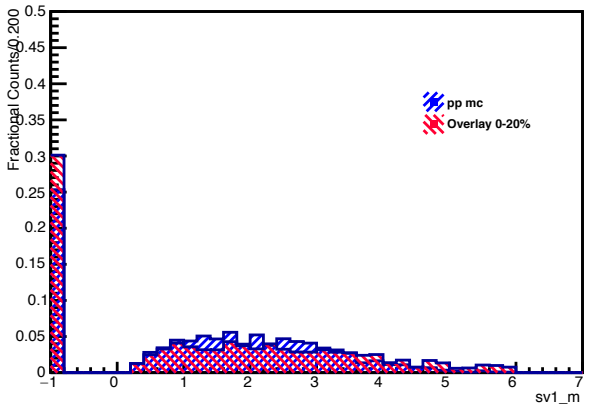
pre-tagging pt > 4.0 GeV Fixed Cone



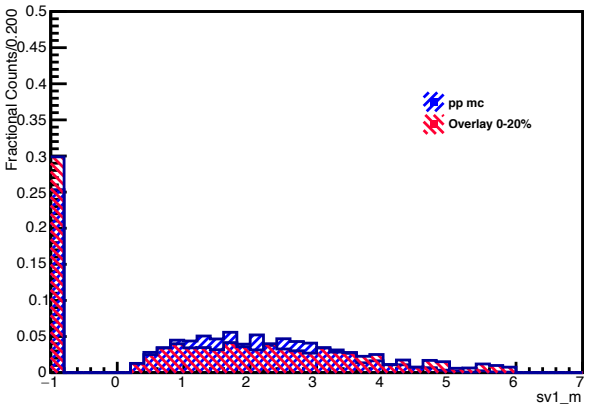
JF pt > 0.5 GeV Shrinking Cone



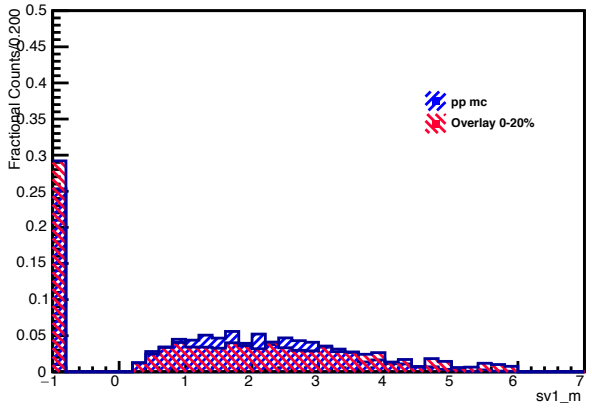
JF pt > 0.5 GeV Fixed Cone



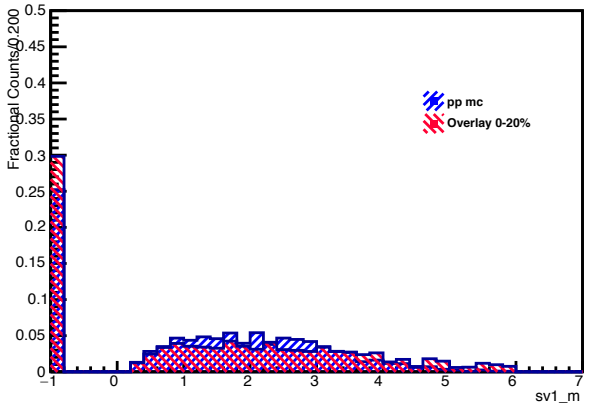
JF pt > 1.0 GeV Fixed Cone



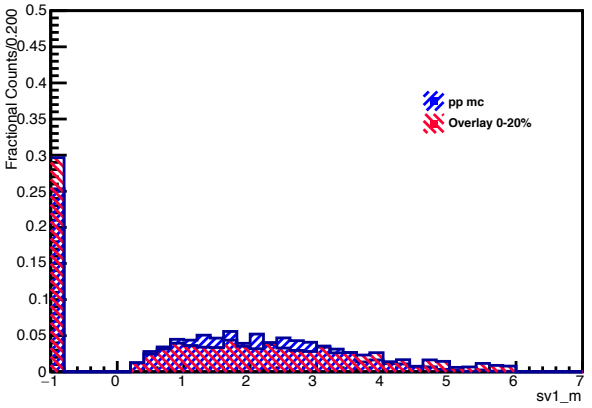
JF pt > 1.5 GeV Fixed Cone



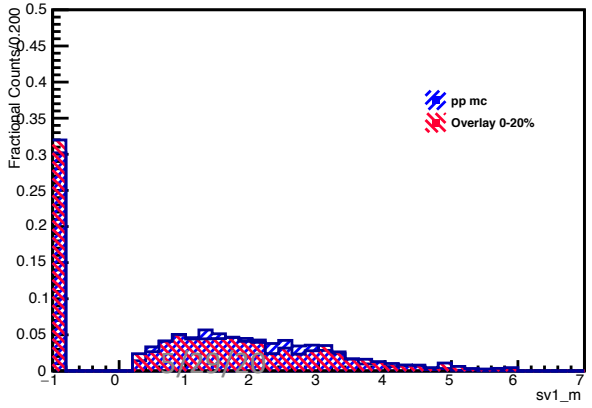
JF pt > 2.0 GeV Fixed Cone



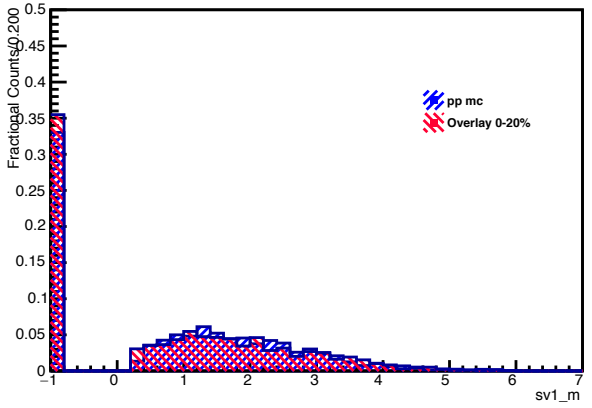
JF pt > 4 GeV Fixed Cone



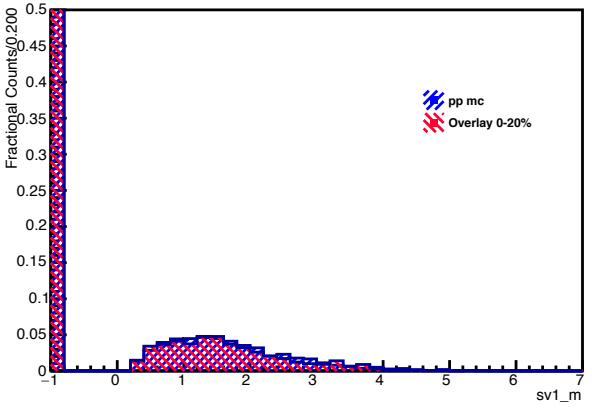
pre-tagging pt > 1.5 GeV Fixed Cone



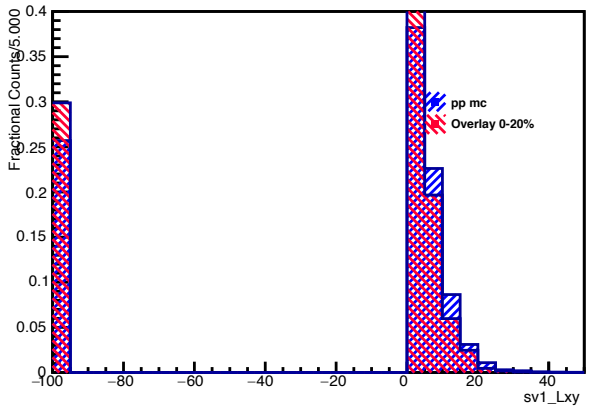
pre-tagging pt > 2.0 GeV Fixed Cone



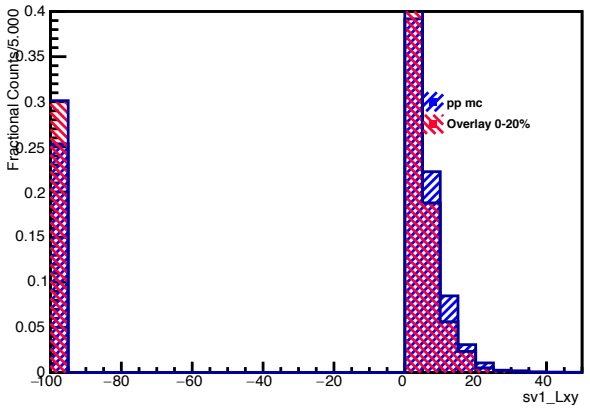
pre-tagging pt > 4.0 GeV Fixed Cone



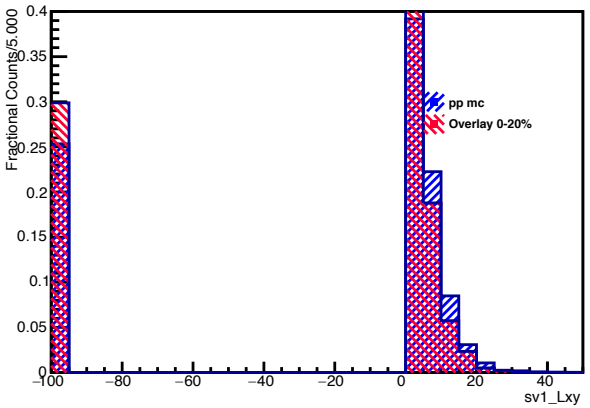
JF pt > 0.5 GeV Shrinking Cone



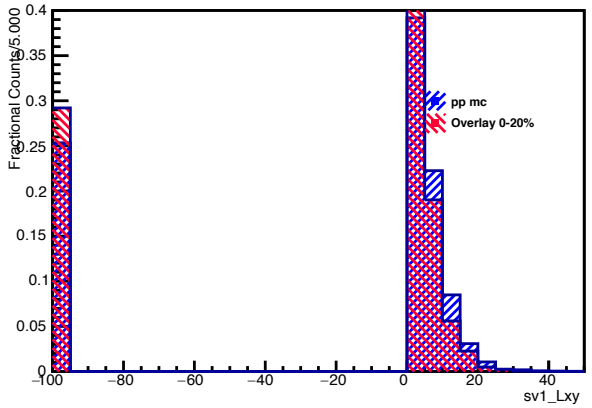
JF pt > 0.5 GeV Fixed Cone



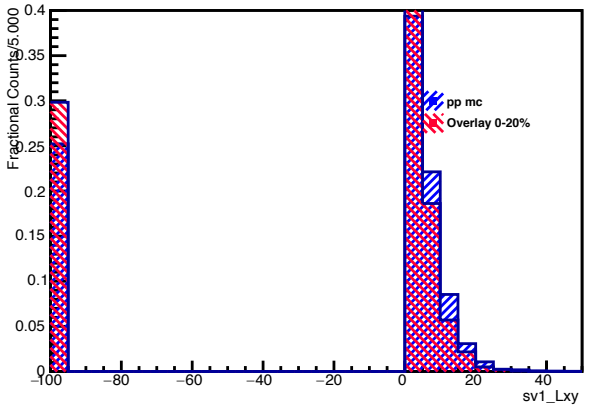
JF pt > 1.0 GeV Fixed Cone



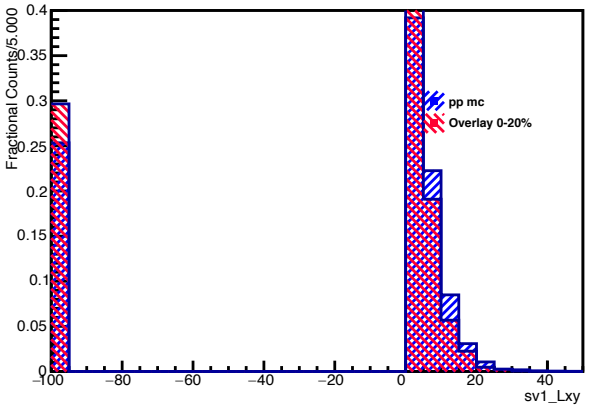
JF pt > 1.5 GeV Fixed Cone



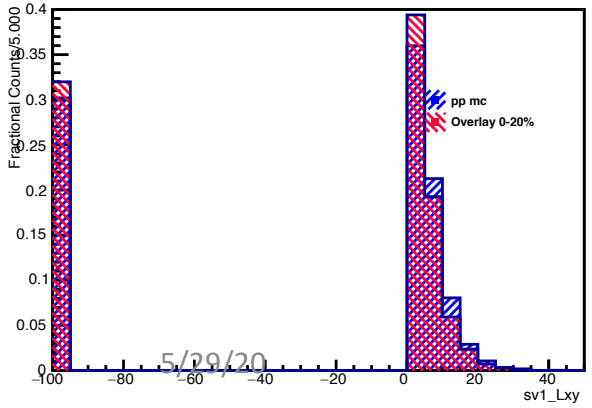
JF pt > 2.0 GeV Fixed Cone



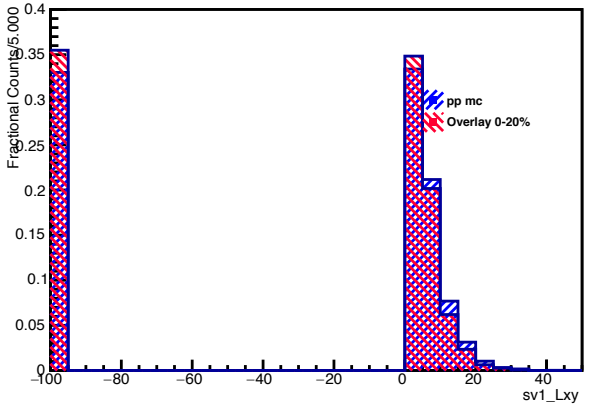
JF pt > 4 GeV Fixed Cone



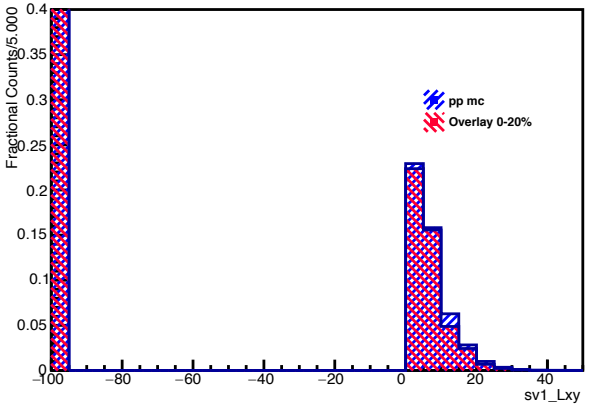
pre-tagging pt > 1.5 GeV Fixed Cone



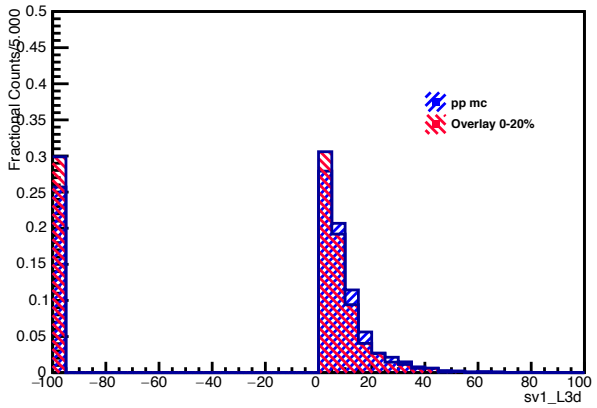
pre-tagging pt > 2.0 GeV Fixed Cone



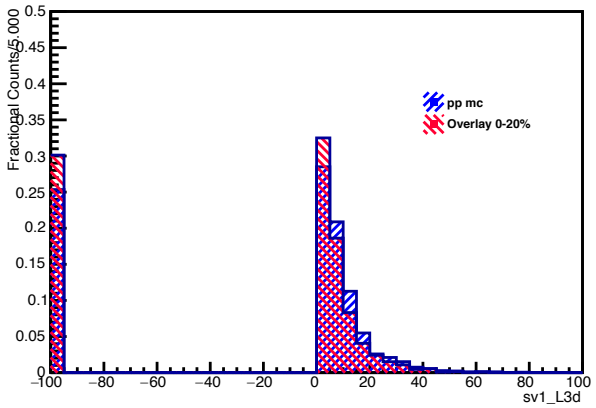
pre-tagging pt > 4.0 GeV Fixed Cone



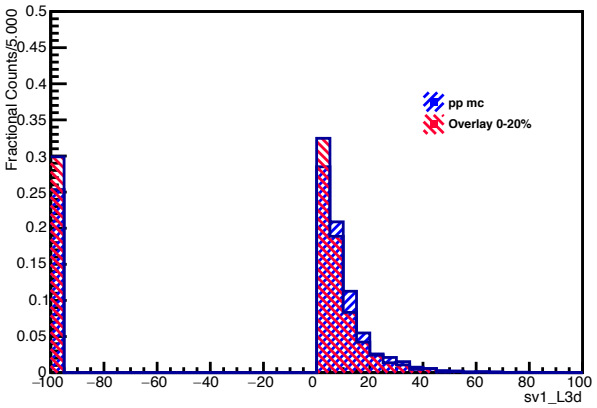
JF pt > 0.5 GeV Shrinking Cone



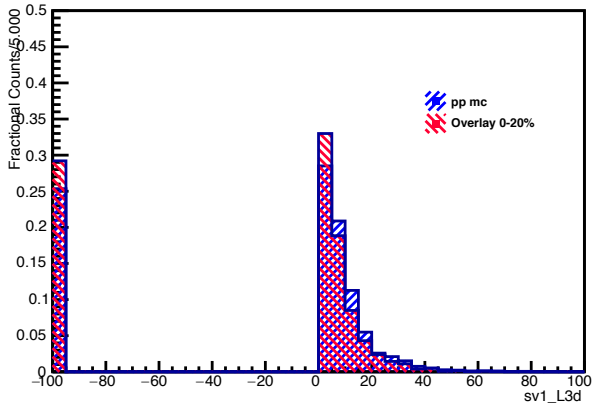
JF pt > 0.5 GeV Fixed Cone



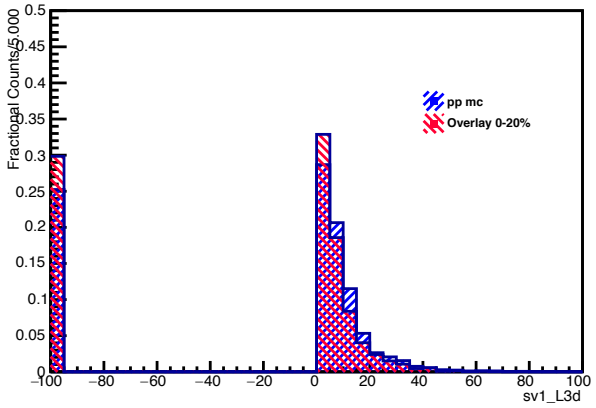
JF pt > 1.0 GeV Fixed Cone



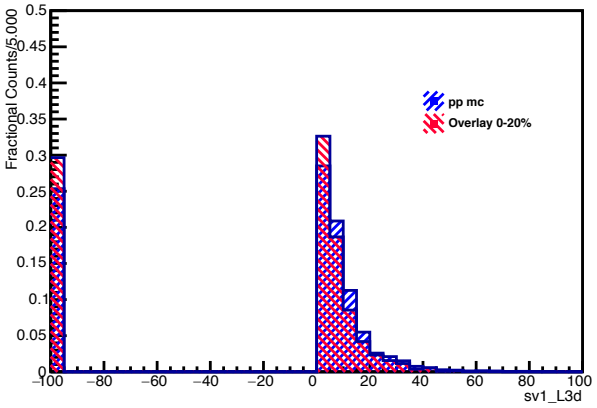
JF pt > 1.5 GeV Fixed Cone



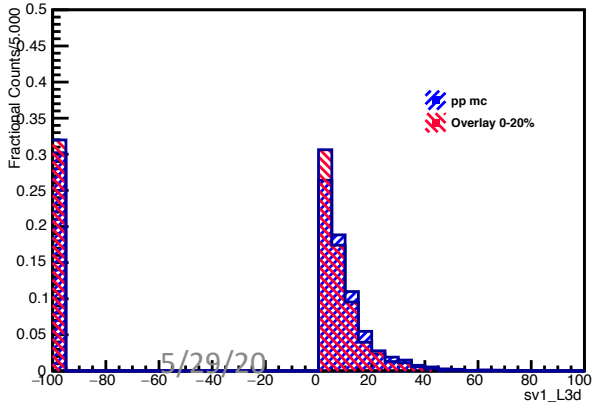
JF pt > 2.0 GeV Fixed Cone



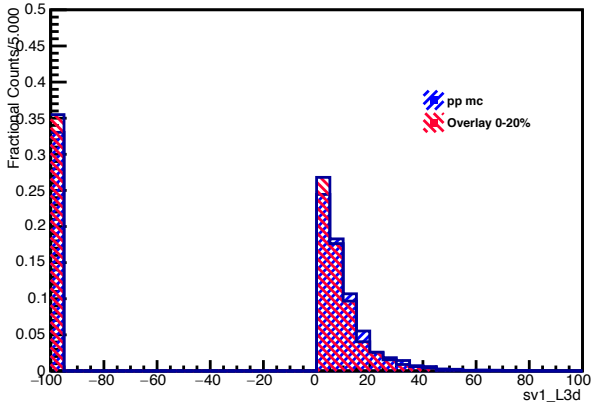
JF pt > 4 GeV Fixed Cone



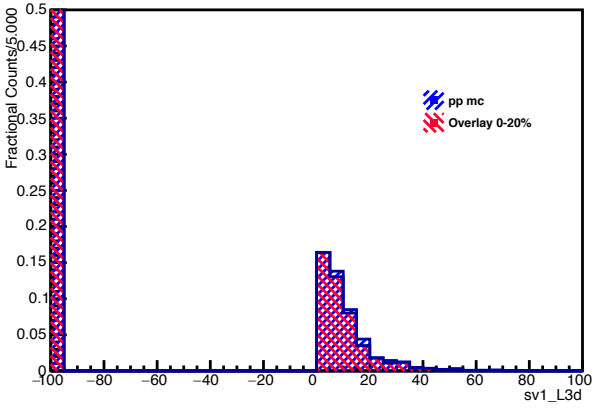
pre-tagging pt > 1.5 GeV Fixed Cone



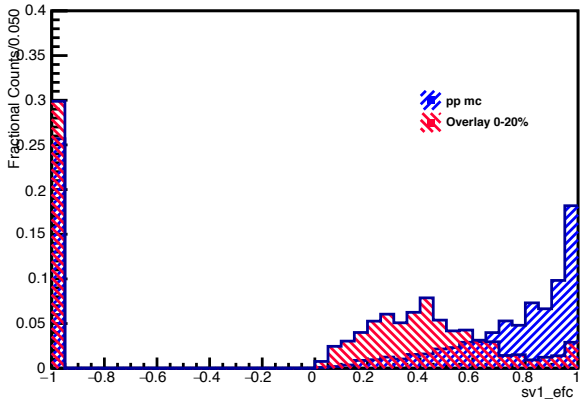
pre-tagging pt > 2.0 GeV Fixed Cone



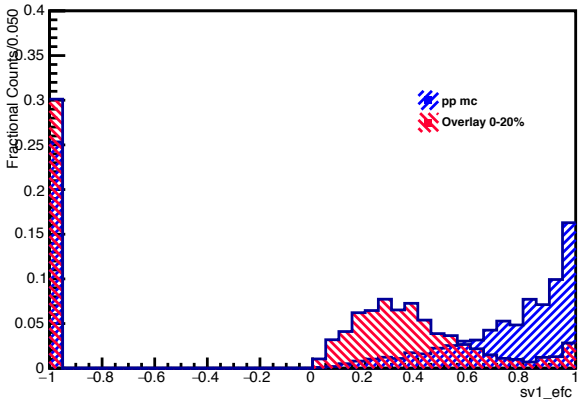
pre-tagging pt > 4.0 GeV Fixed Cone



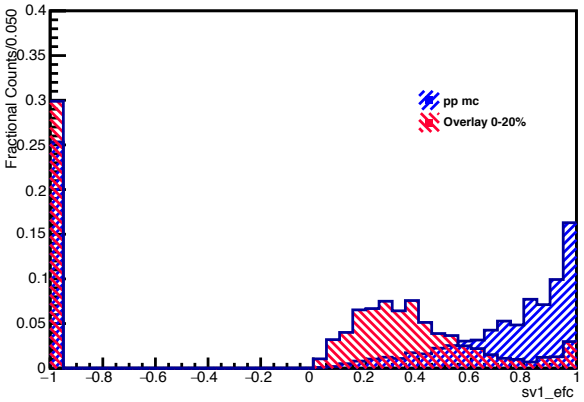
JF pt > 0.5 GeV Shrinking Cone



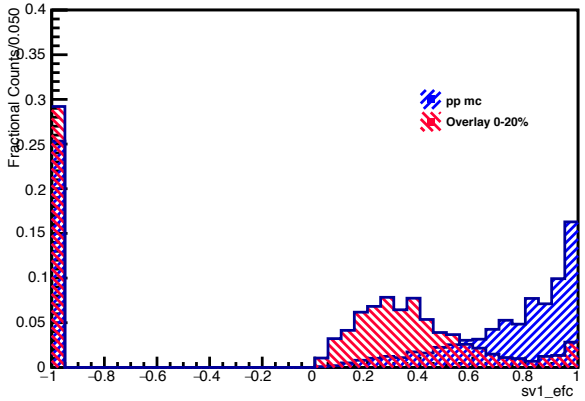
JF pt > 0.5 GeV Fixed Cone



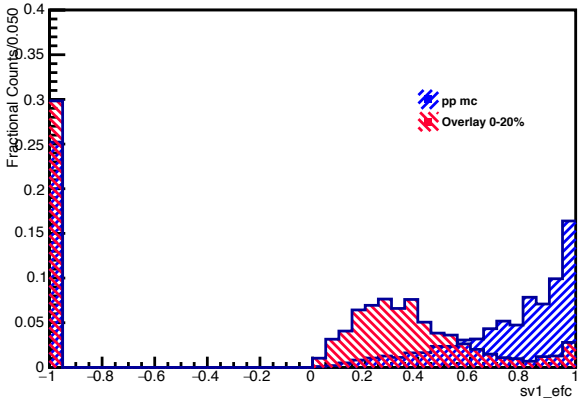
JF pt > 1.0 GeV Fixed Cone



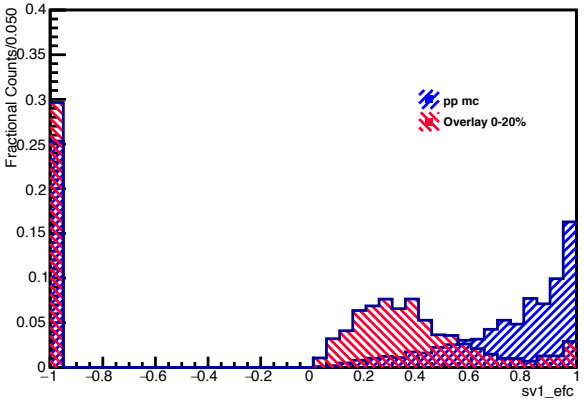
JF pt > 1.5 GeV Fixed Cone



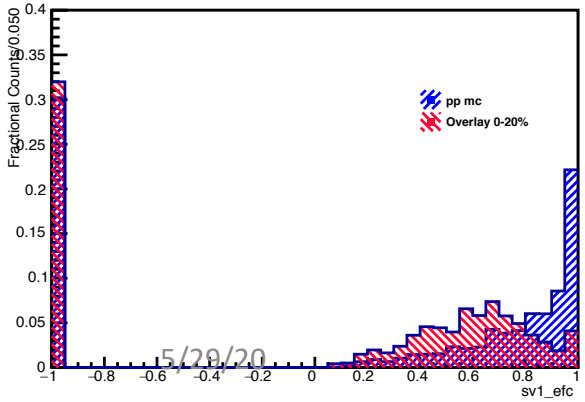
JF pt > 2.0 GeV Fixed Cone



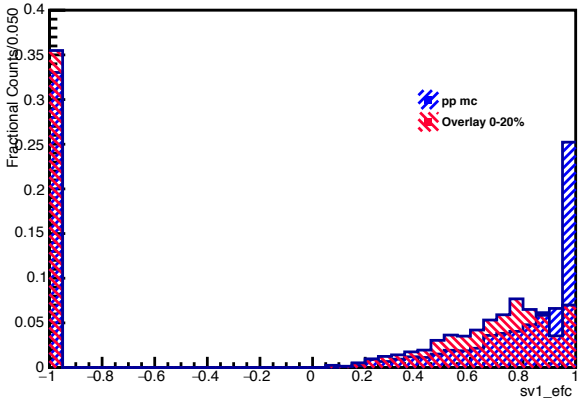
JF pt > 4 GeV Fixed Cone



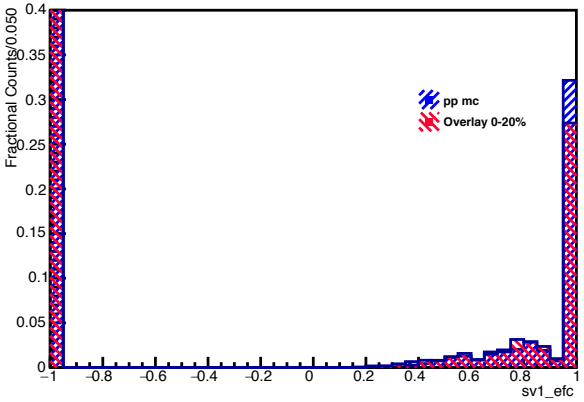
pre-tagging pt > 1.5 GeV Fixed Cone



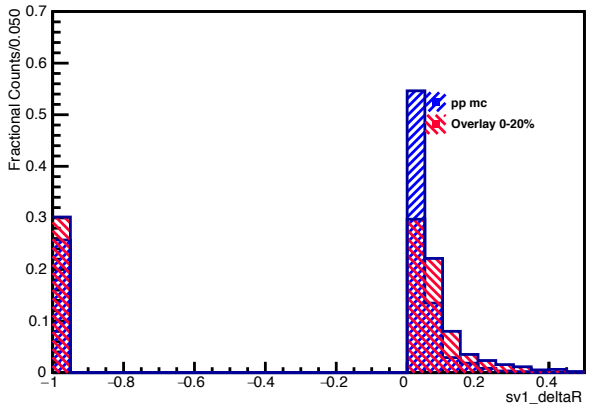
pre-tagging pt > 2.0 GeV Fixed Cone



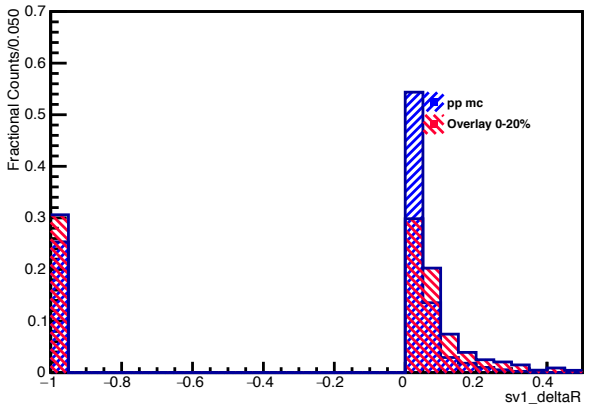
pre-tagging pt > 4.0 GeV Fixed Cone



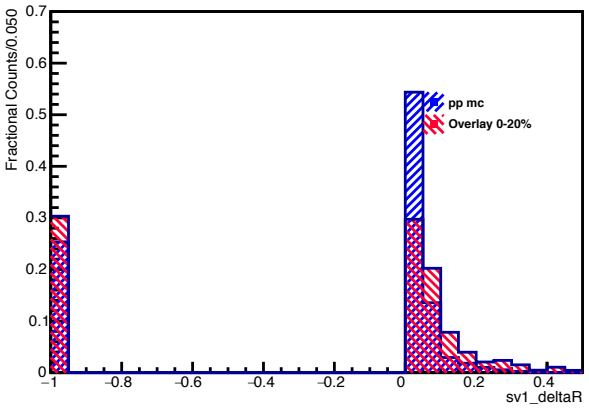
JF pt > 0.5 GeV Shrinking Cone



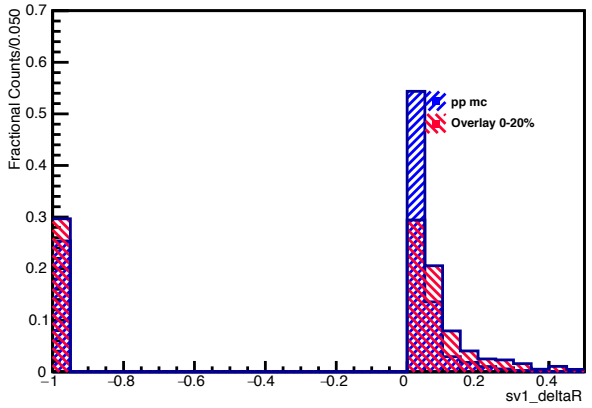
JF pt > 0.5 GeV Fixed Cone



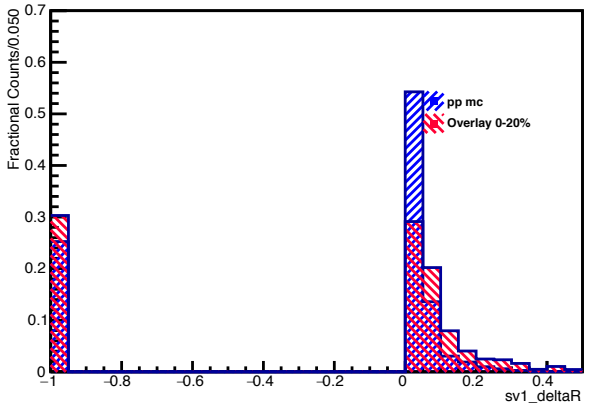
JF pt > 1.0 GeV Fixed Cone



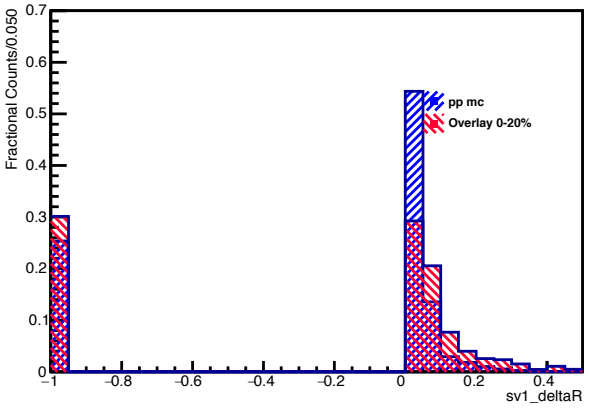
JF pt > 1.5 GeV Fixed Cone



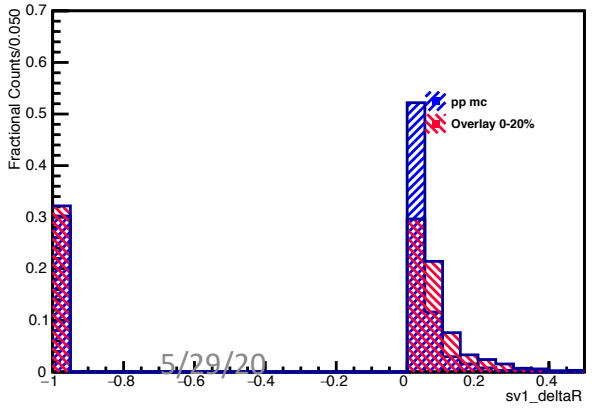
JF pt > 2.0 GeV Fixed Cone



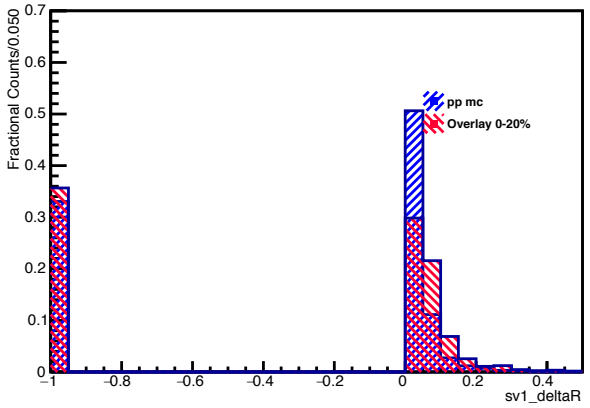
JF pt > 4 GeV Fixed Cone



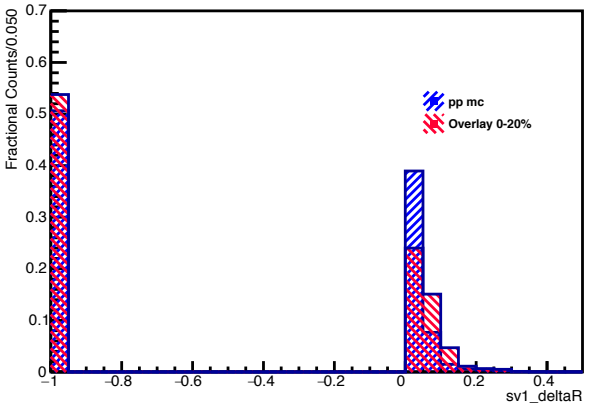
pre-tagging pt > 1.5 GeV Fixed Cone



pre-tagging pt > 2.0 GeV Fixed Cone

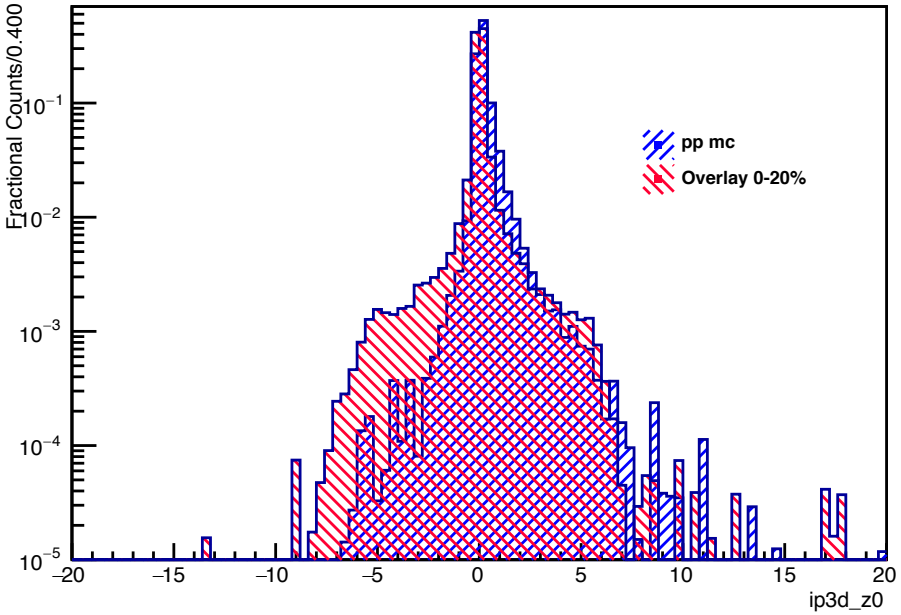


pre-tagging pt > 4.0 GeV Fixed Cone

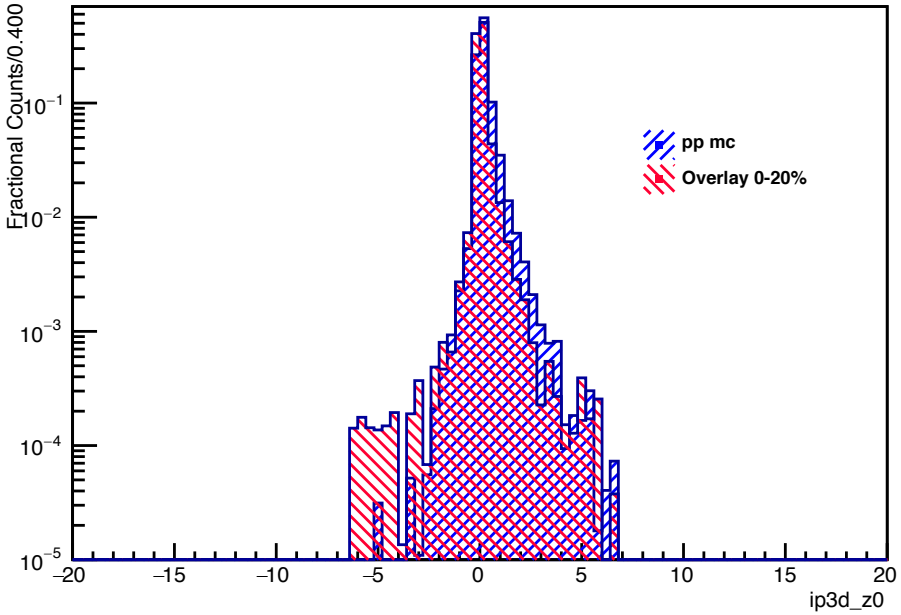


IPxD

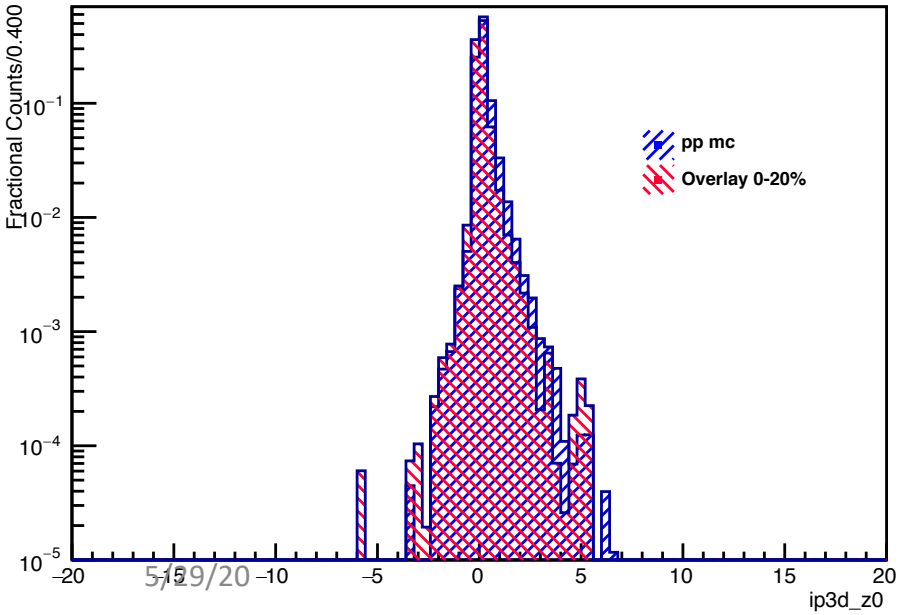
Default Cuts Shrinking Cone



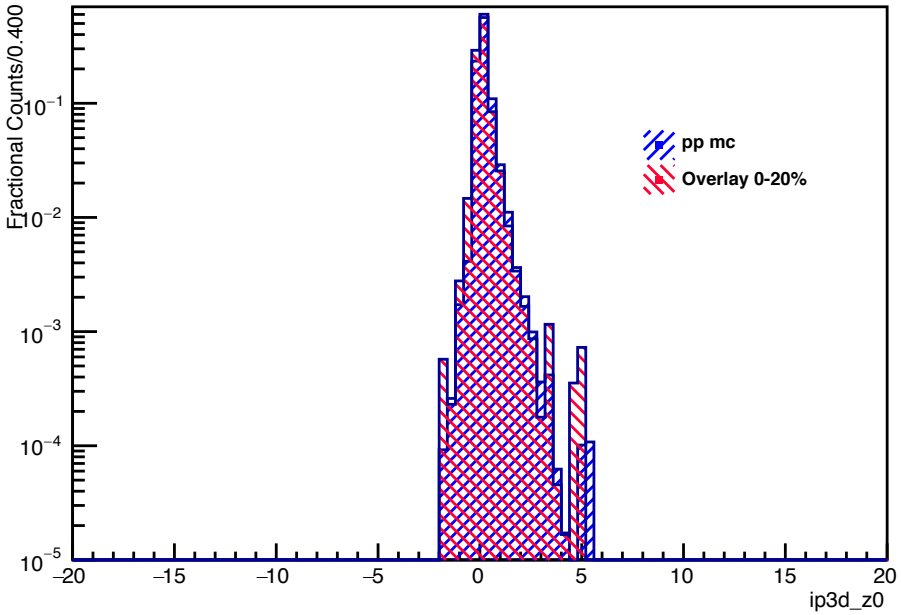
Pre-tagging min pT 1.5 GeV FC4



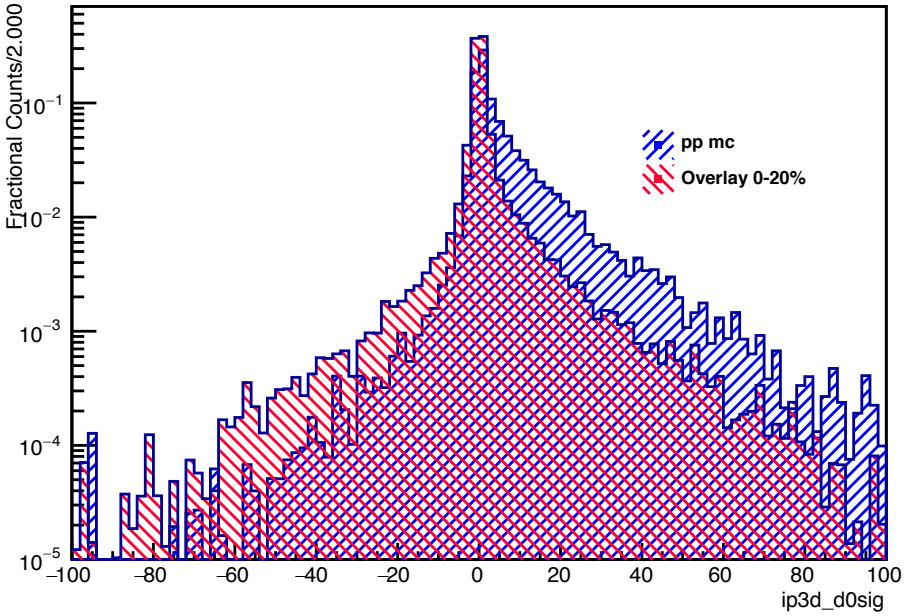
Pre-tagging min pT 2 GeV FC4



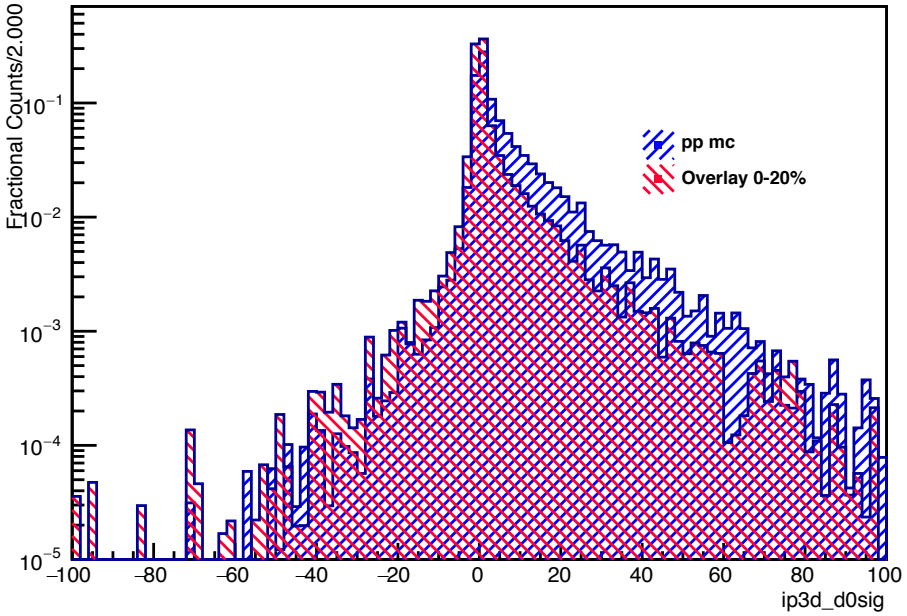
Pre-tagging min pT 4 GeV FC4



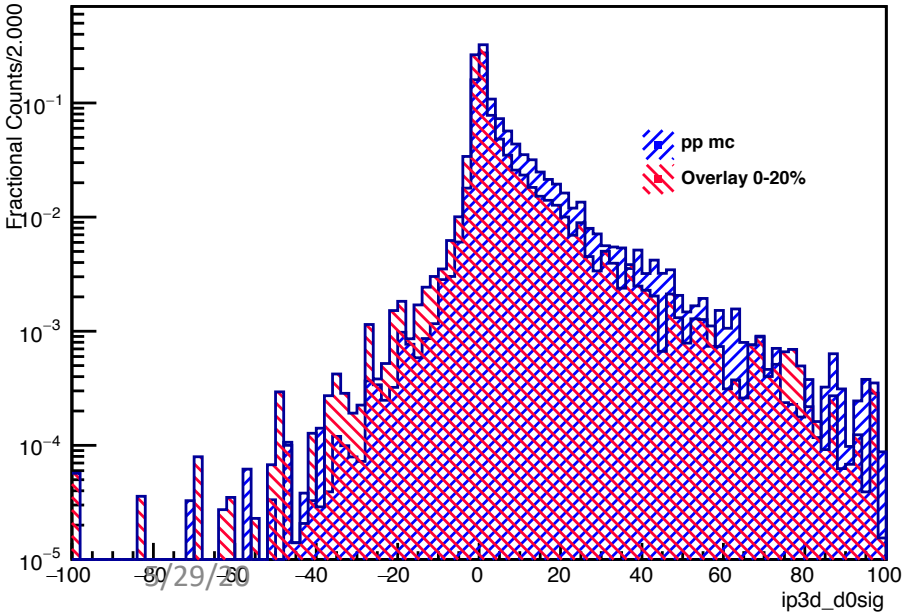
Default Cuts Shrinking Cone



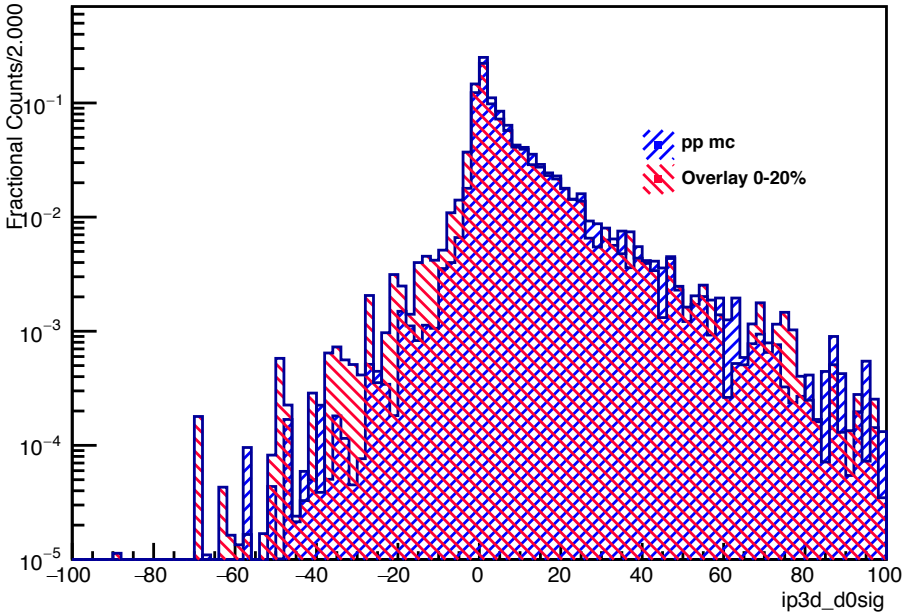
Pre-tagging min pT 1.5 GeV FC4



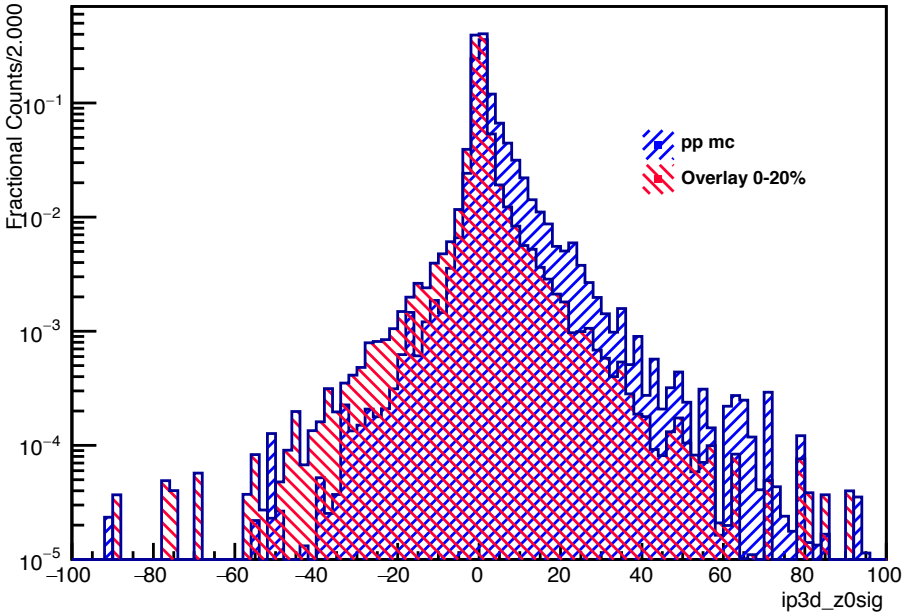
Pre-tagging min pT 2 GeV FC4



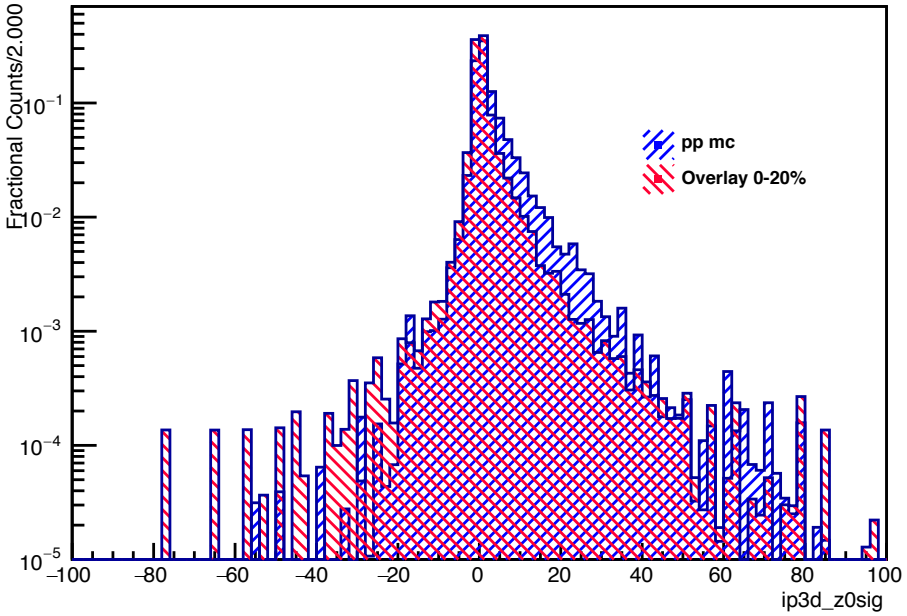
Pre-tagging min pT 4 GeV FC4



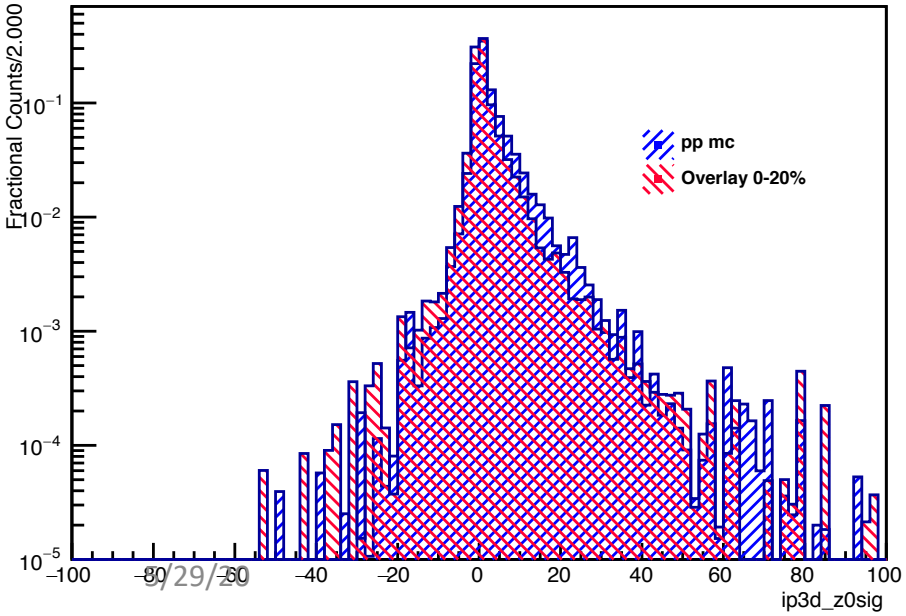
Default Cuts Shrinking Cone



Pre-tagging min pT 1.5 GeV FC4



Pre-tagging min pT 2 GeV FC4



Pre-tagging min pT 4 GeV FC4