

HI Jet Workfest UIUC 2020

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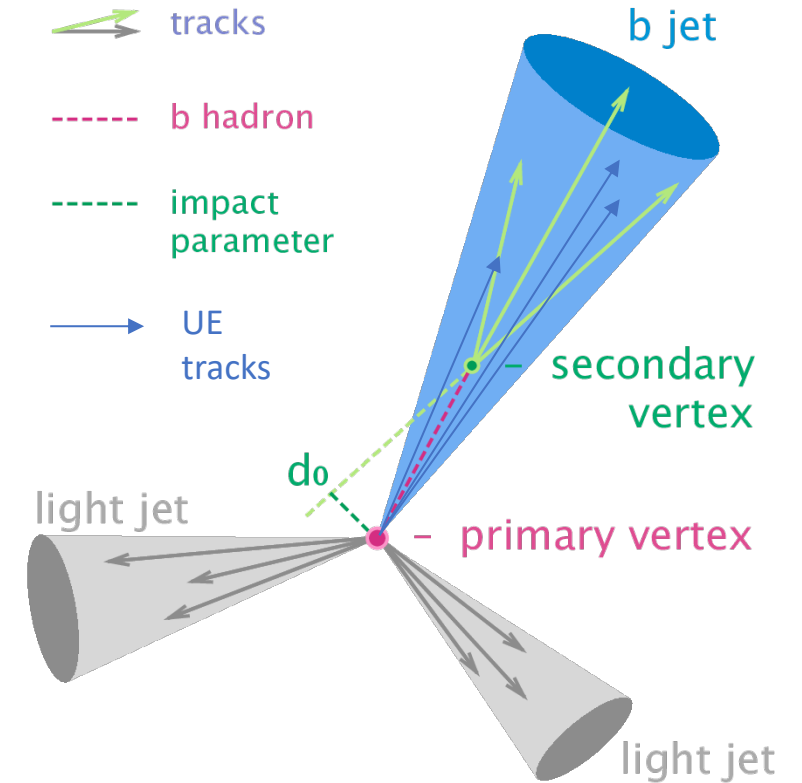
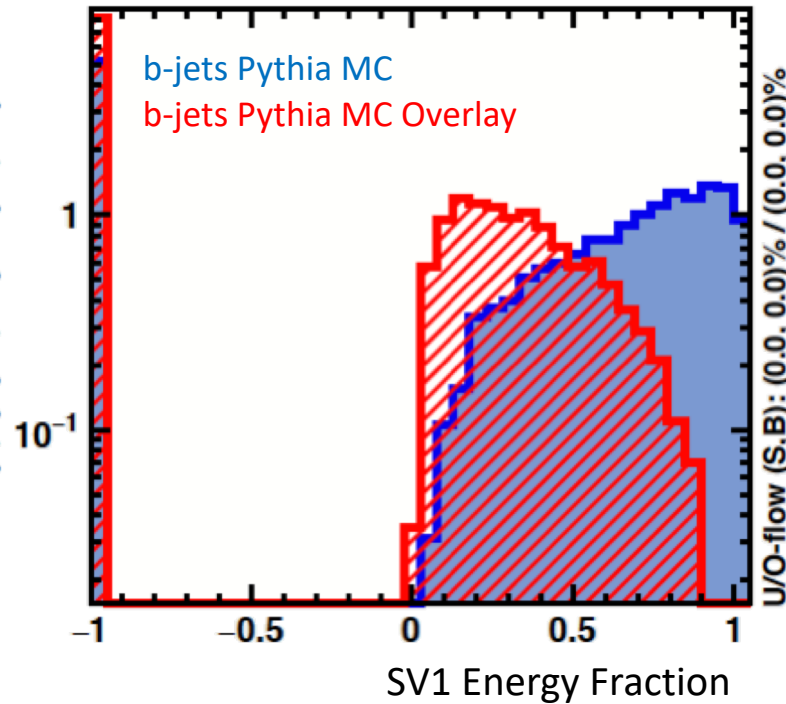
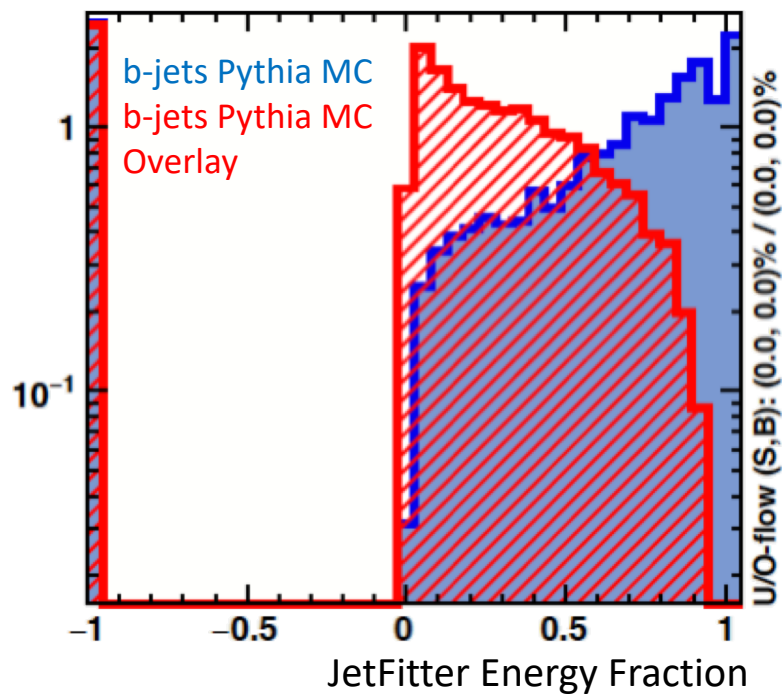
Summary of Plan for Workfest

- Goal: work on qualification task on optimizing the inputs of high-level discriminates (DL1 & MV2) for b-tagging in HI collisions.
- Problem: HI collisions have large number of Underlying Event (UE) tracks that modify some inputs.
- First step plans:
 - Look into current performance of SV reconstruction in HI collisions using MC overlay and compare with MC signal.
 - Experiment with selections on tracks in HI MC for all lower level taggers to see how it affects performance.

“The optimization of the inputs of high-level taggers(DL1 and MV2) for b-tagging in heavy ion collisions, following the work done in a previous QT described in [AFT-233](#). It is known that some inputs for the taggers training are affected (like ipxd probabilities and jet fitter and sv1 energy fraction) by the large number of tracks coming from the HI collision underlying event (UE). This degrades the performance for central collisions and induces a strong centrality dependence. This effect can be reduced by implementing tighter tracking selections or an UE subtraction at the tracking level prior the calculation of the tagger inputs. If time permits, following the optimization, the calibration of the taggers will be done using HI data control samples that have a specific flavor composition e.g. jets with a muon from a heavy flavor semi-leptonic decay. This study will be documented in an internal note and the analysis recommendations will be described on a twiki.”

Improve Second Vertex Reconstruction based inputs

- Tracks from Underlying Events (UE) are mistaken as part of jet tracks.
 - Wrong energy fraction ($\text{efc} = E_{SV.trks} / E_{All\ trks}$), UE are included in denominator.



Goal of the Week

- For b-jet and c-jet using 50k MC overlay and 50k MC signal, for the default options of SV and JF algorithms respectively,
 - Plot decay length (L_{3d}) and x-y plane decay length (L_{xy}) resolution graphs and compare.
 - Plot fake rate (SV in light jet) and efficiency of SV reconstruction in b-jet and c-jet.
 - For MC overlay, add in centrality information
- Compile, test and try more options with track selection tools
 - With small local samples, compile and test the different p_T , cutLevel, etc.
 - If lower tagger inputs are improved, try with large samples.

MC Samples used

- MC Overlay:
 - mc16_5TeV.420271.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ1_bbfilter.recon.AOD.e7383_d1521_r11472
 - mc16_5TeV.420272.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ2_bbfilter.recon.AOD.e7383_d1521_r11472
 - mc16_5TeV.420273.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ3_bbfilter.recon.AOD.e7383_d1521_r11472
 - mc16_5TeV.420274.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ4_bbfilter.recon.AOD.e7383_d1521_r11472
- MC Signal:
 - mc16_5TeV.420274.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ4_bbfilter.recon.AOD.e7383_s3428_r11320
 - mc16_5TeV.420273.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ3_bbfilter.recon.AOD.e7383_s3428_r11320
 - mc16_5TeV.420272.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ2_bbfilter.recon.AOD.e7383_s3428_r11320
 - mc16_5TeV.420271.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ1_bbfilter.recon.AOD.e7383_s3428_r11320