First Look at Week 1 Flavour Tagging

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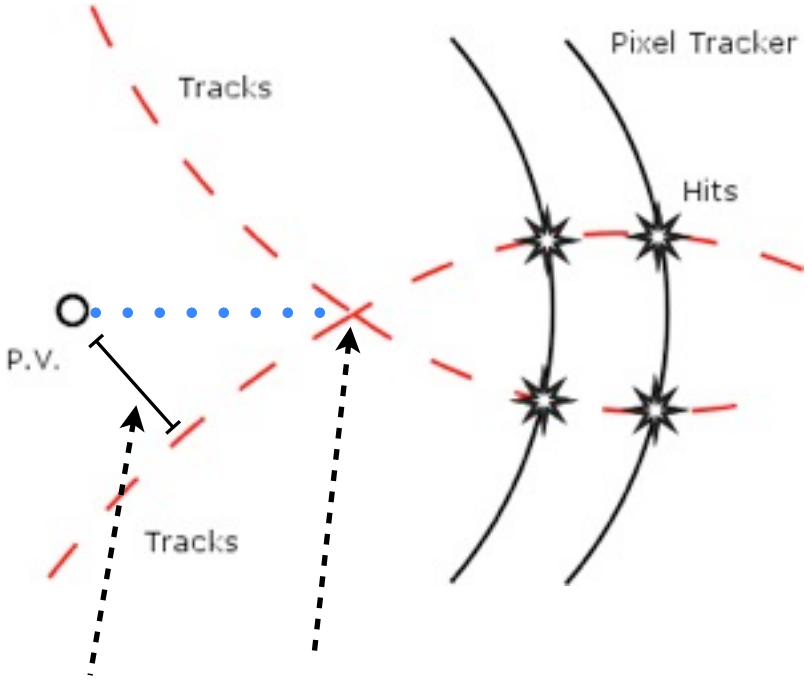
Exotic Dijet Meeting

08/06/15

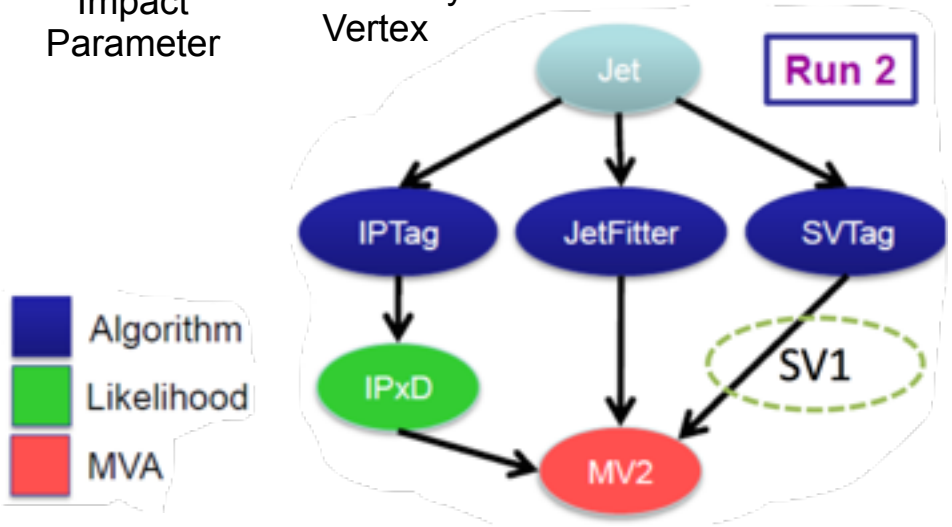
b-Tagging Algorithms



- IP3D
  - Look for large track impact parameters.

- SV1
  - Reconstruct secondary vertices.
  - Look for large flight paths.

- Jet Fitter (JF)
  - Reconstruct secondary and tertiary vertices that lie along a common jet flight axis
  - These correspond to decays of bottom and charmed hadrons.



- MV2
  - Combine basic tagger inputs into a neural network.
  - Leads to improved tagging performance.
  - MV2c20 is trained on sample containing 20% charm jets.

Samples

•`user.vdao.mc15_13TeV.*.Pythia8EvtGen_jetjet_JZ*W.merge.AOD.*.BTAGNTUP_OrigV8full_BTAGSTREAM/`
- JZ1W-JZ7W - No JZ0W
- 1,398,600 Events

•`user.vdao.data15_comm.periodD2.physics_Main.PhysCont.AOD.t0pro17_v01.BTAGNTUP_OrigV8full_BTAGSTREAM.*`
- Collisions before stable beams, cannot use express stream for flavour tagging.
- 706,159 Events

Details/Cuts

- njets ≥ 1
- Leading Jet Only
- Run1MediumBadCuts
- P_T > 35 GeV
- |eta| < 2.5
- abs(truth_PVz - reco_PVz) < 0.1mm

- Not applying (pt_1+pt_2)/2 < 1.4* truth_pt_1

- Run 265545 LB 65-131
- Run 265573 LB 2-107

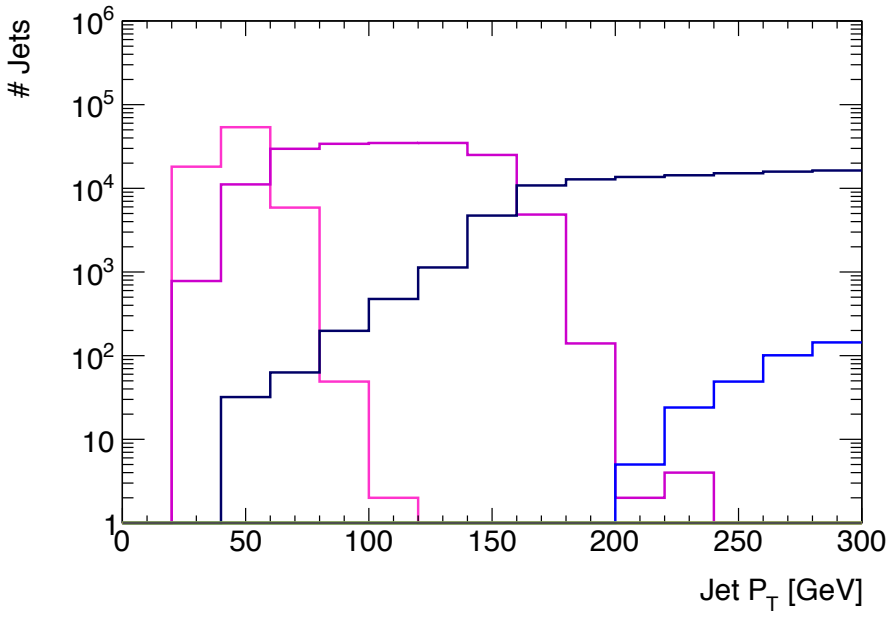
- IBL and Pixels available here.

- LabDr_HadF truth matching.

- AntiKt4EMTopoJets
- AntiKt3PV0TrackJets

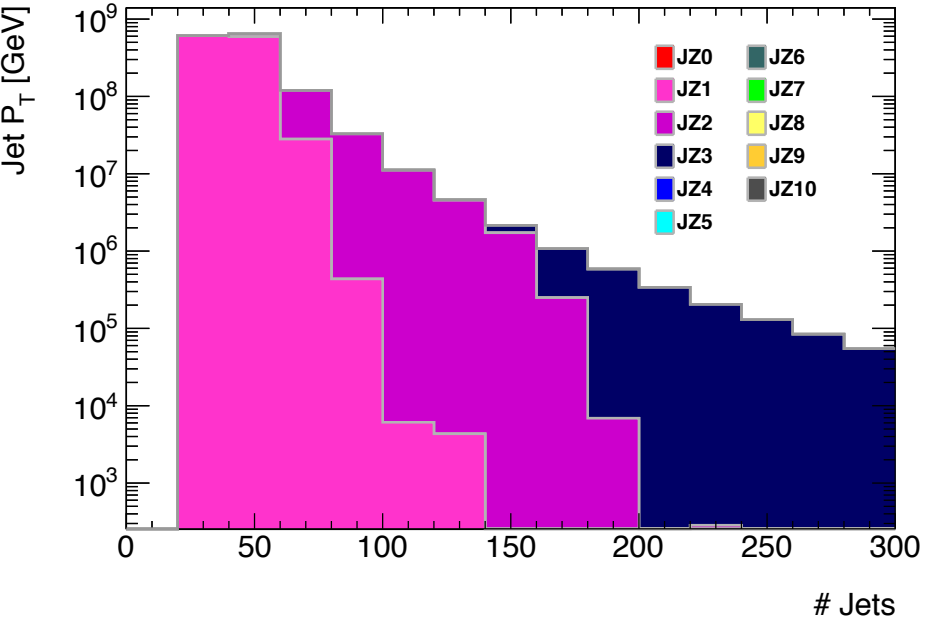
- L1_MBTS_1_1

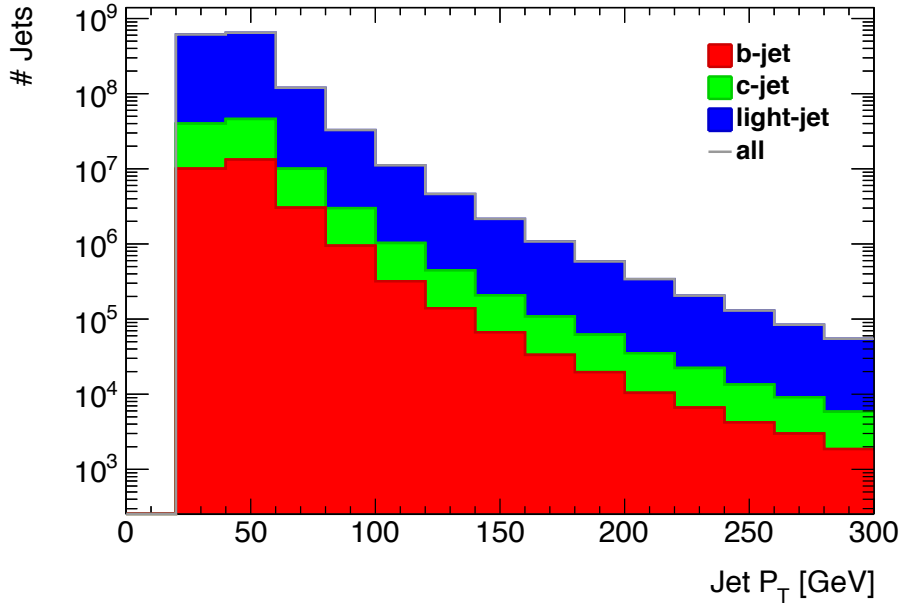
Di-jet sample re-weighting



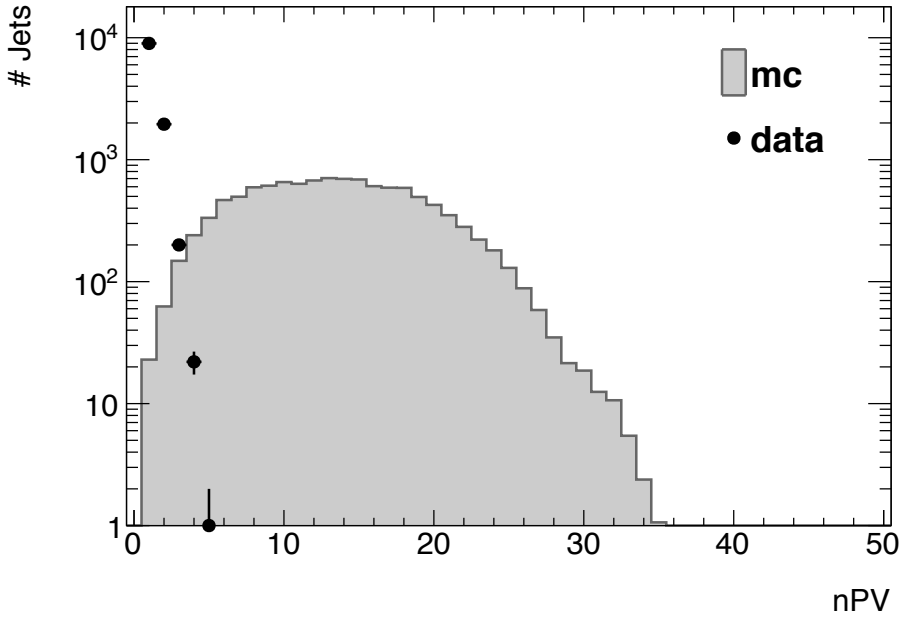
Total Weight = $\frac{\text{mcwg*(Filter Eff.)*(CS[fb])*(Lumi[fb}^{-1}\text{])}}{\text{(\# Events)}}$

Xs(fb)	Eff.	Slice and Energy
7.8420E+13	1.0240E+00	#JZ0W 0-20 GeV
7.8420E+13	6.7198E-04	#JZ1W 20-60 GeV
2.4334E+12	3.3264E-04	#JZ2W 60-160 GeV
2.6454E+10	3.1953E-04	#JZ3W 160-400 GeV
2.5464E+08	5.3009E-04	#JZ4W 400-800 GeV
4.5536E+06	9.2325E-04	#JZ5W 800-1300 GeV
2.5752E+05	9.4016E-04	#JZ6W 1300-1800 GeV
1.6214E+04	3.9282E-04	#JZ7W 1800-2500 GeV

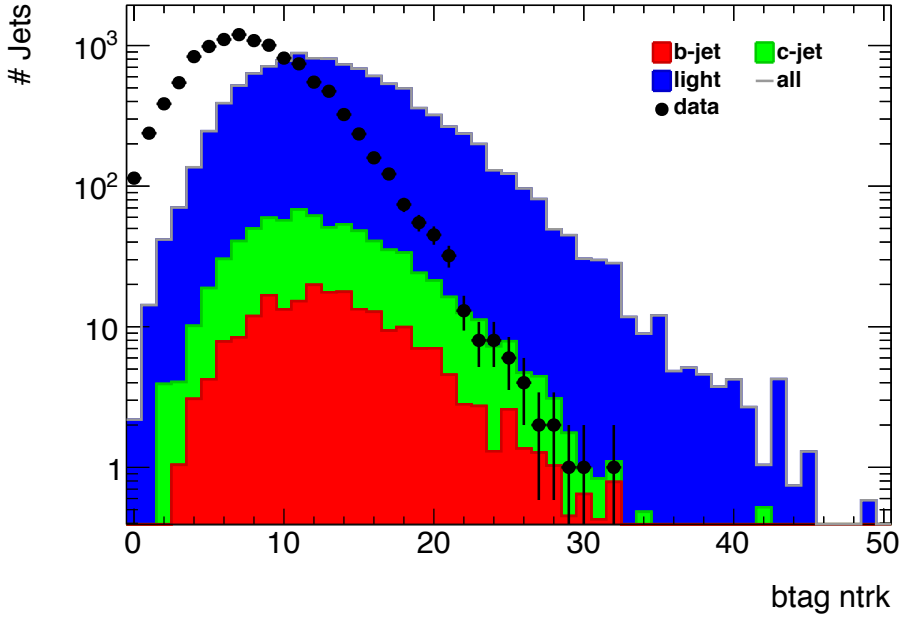


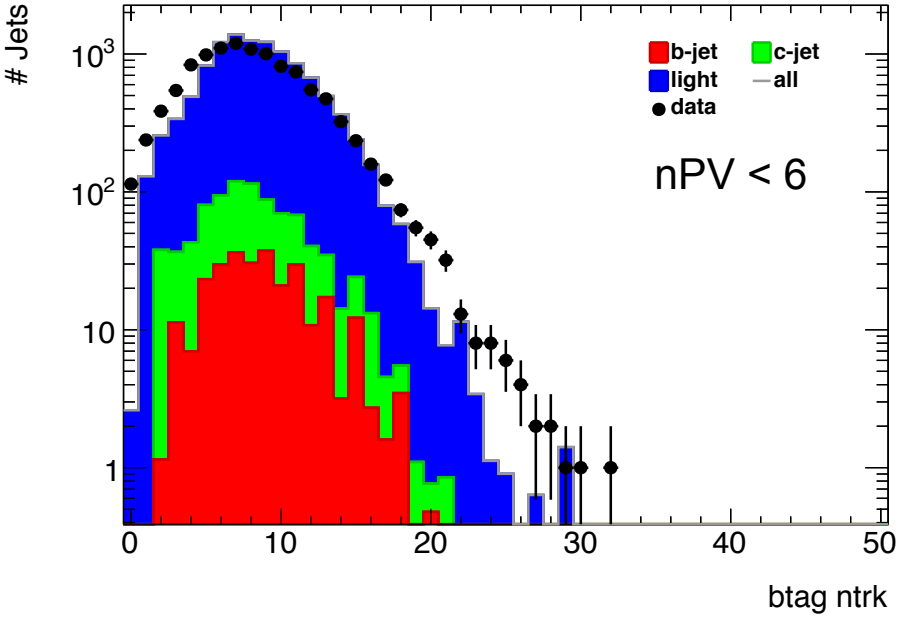


nPV Differences



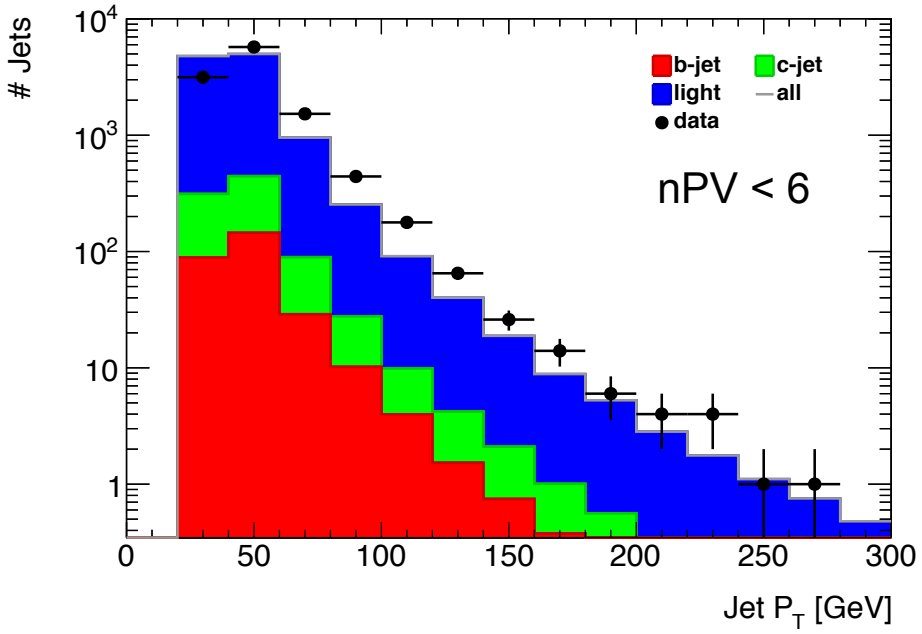
A cut of nPV < 6 can be applied
- This helps reduce differences
- Also reduces statistics.

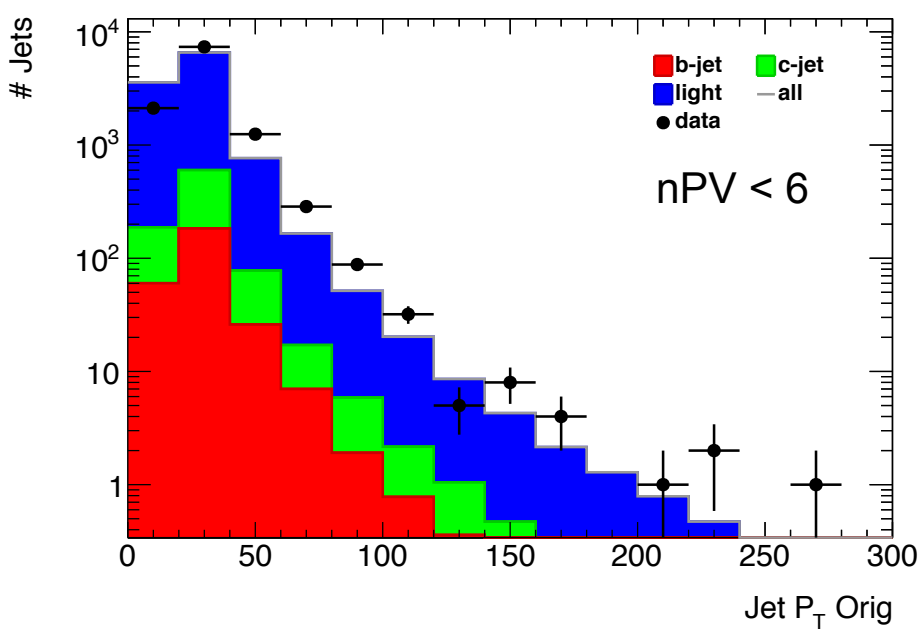


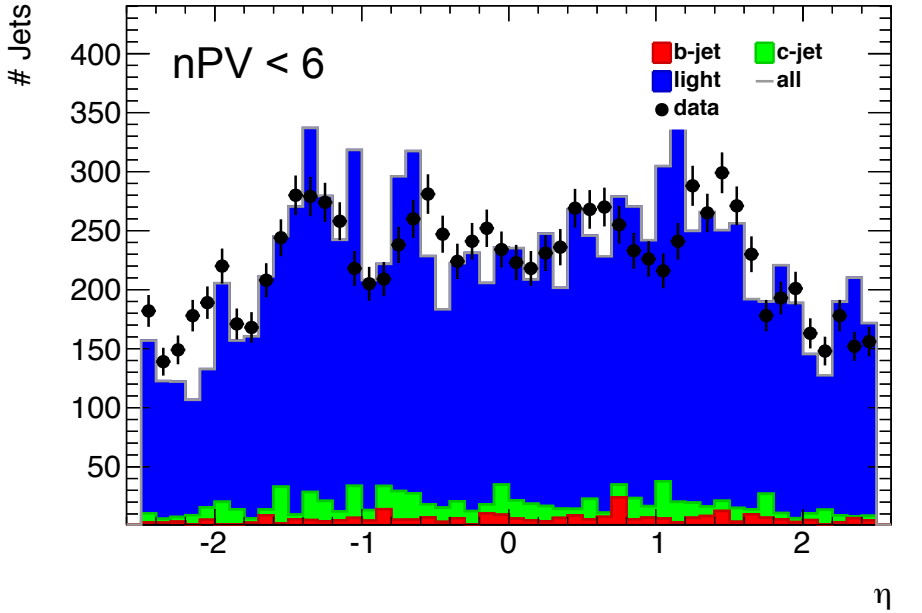


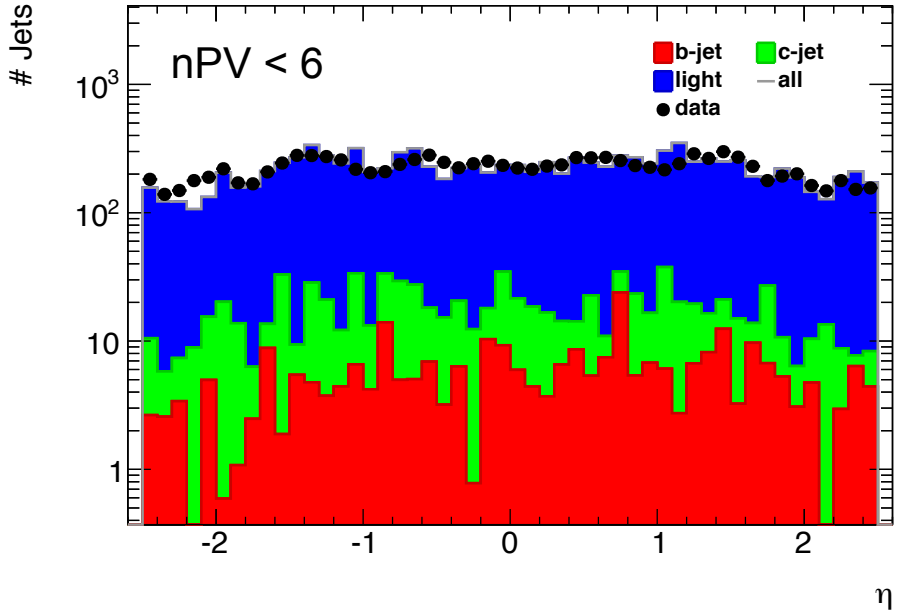
>> No selections on tracks when running track-jet association

Jet Kinematic Distributions









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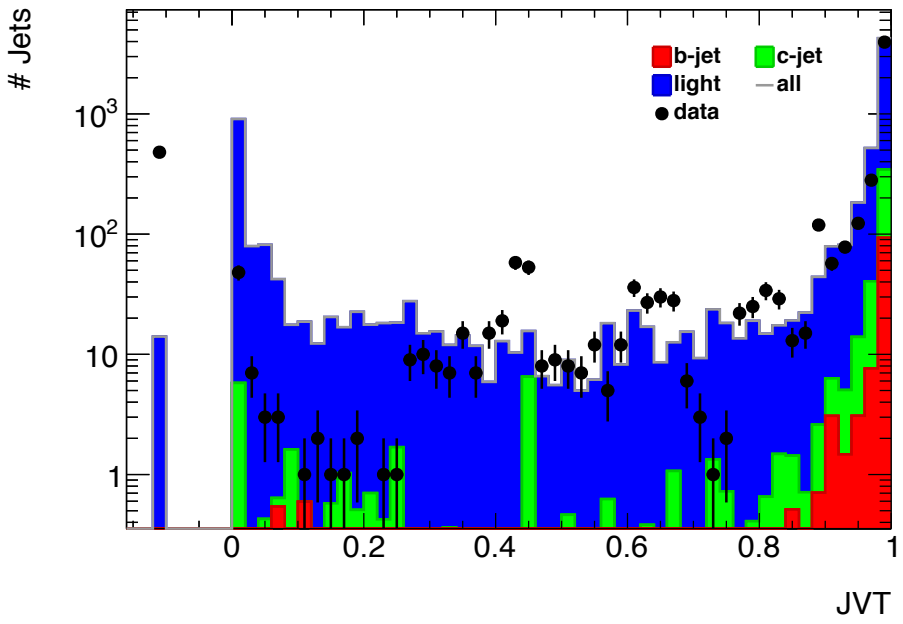
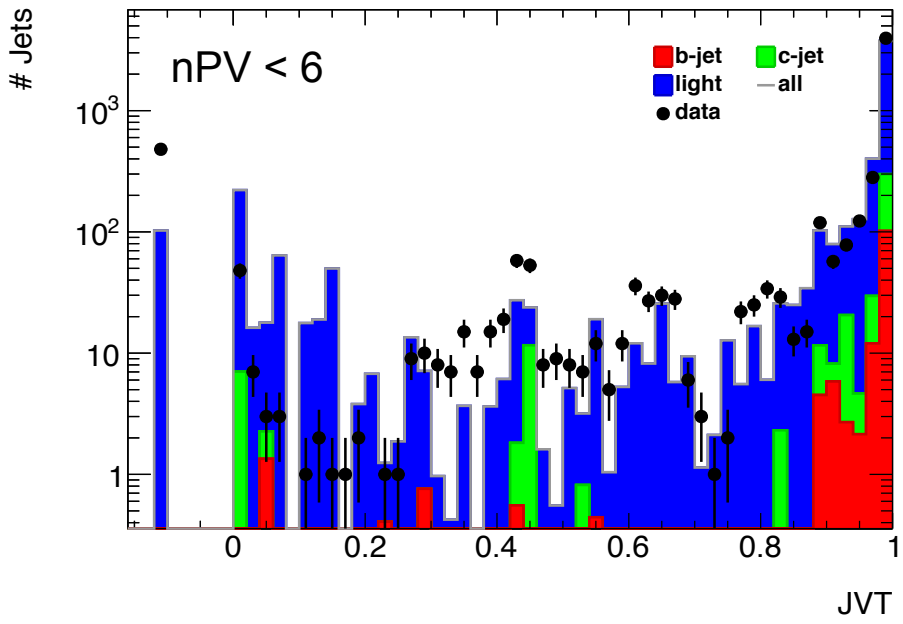
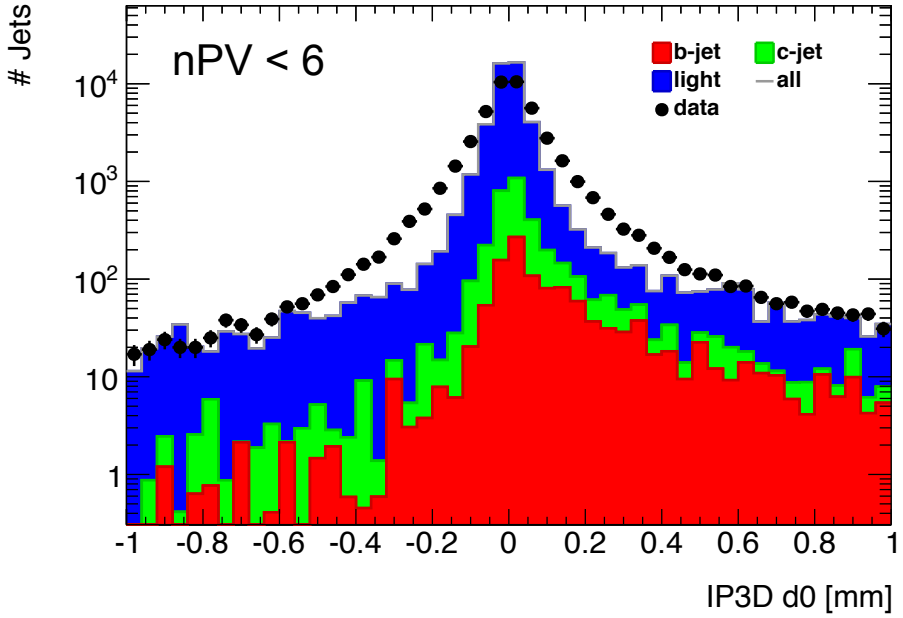
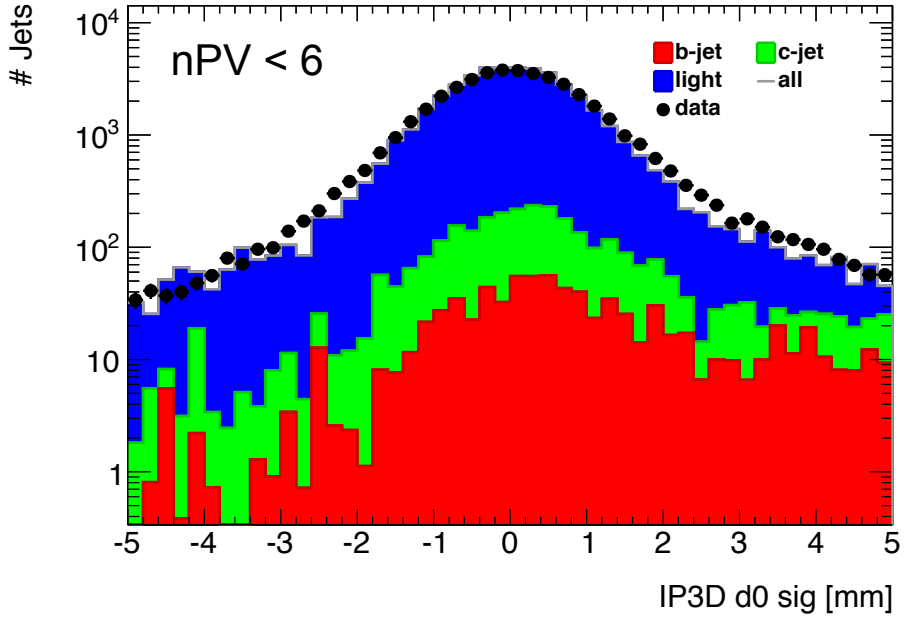
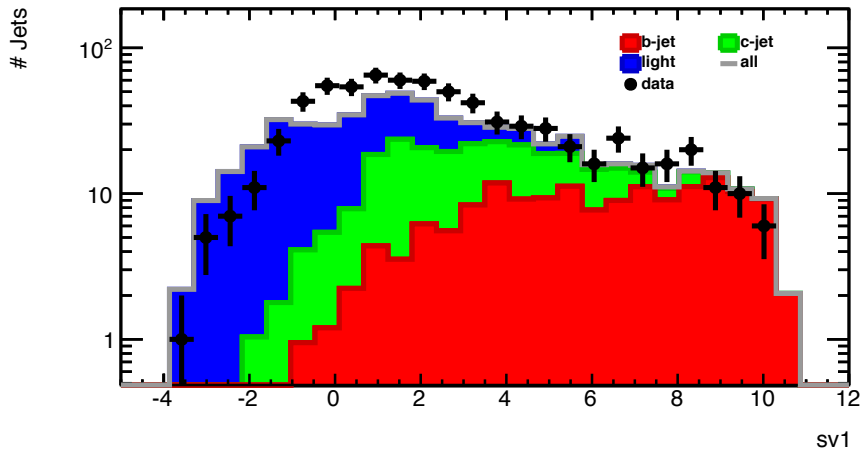


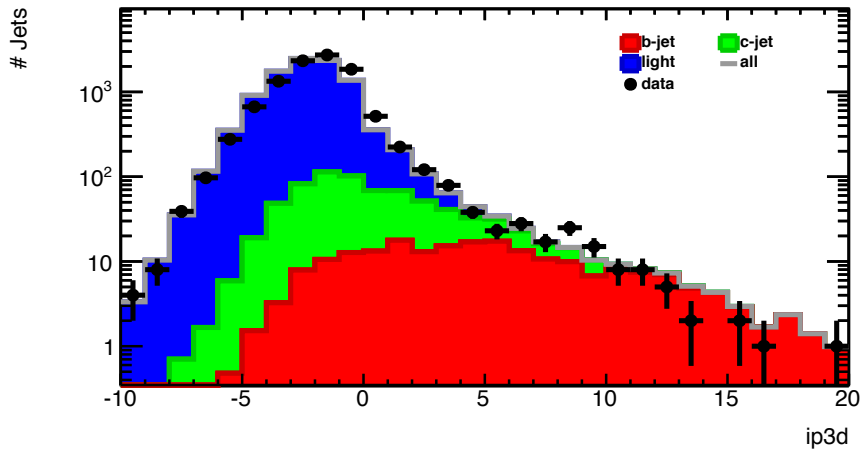


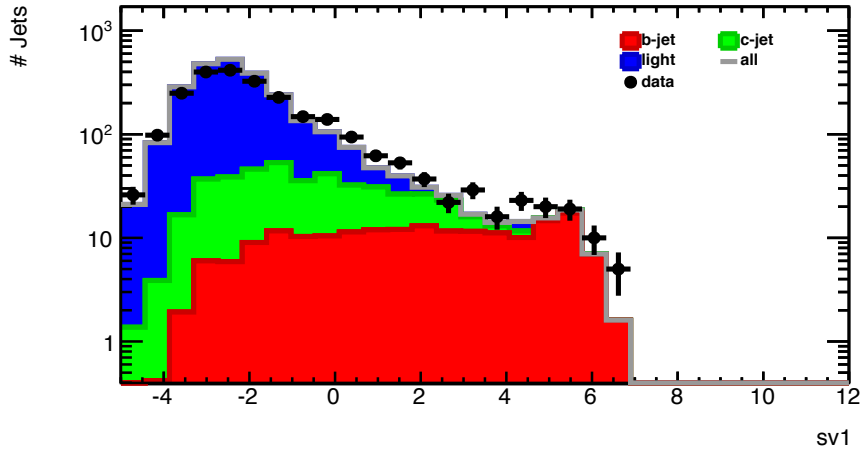


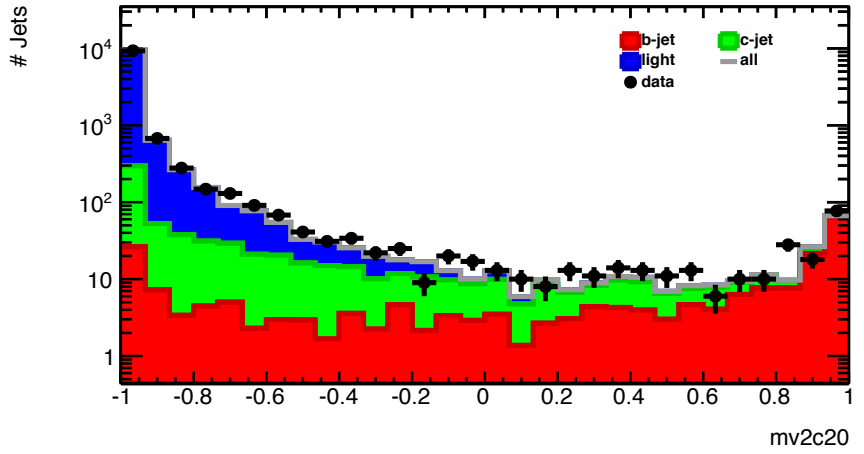


Discriminant Distributions

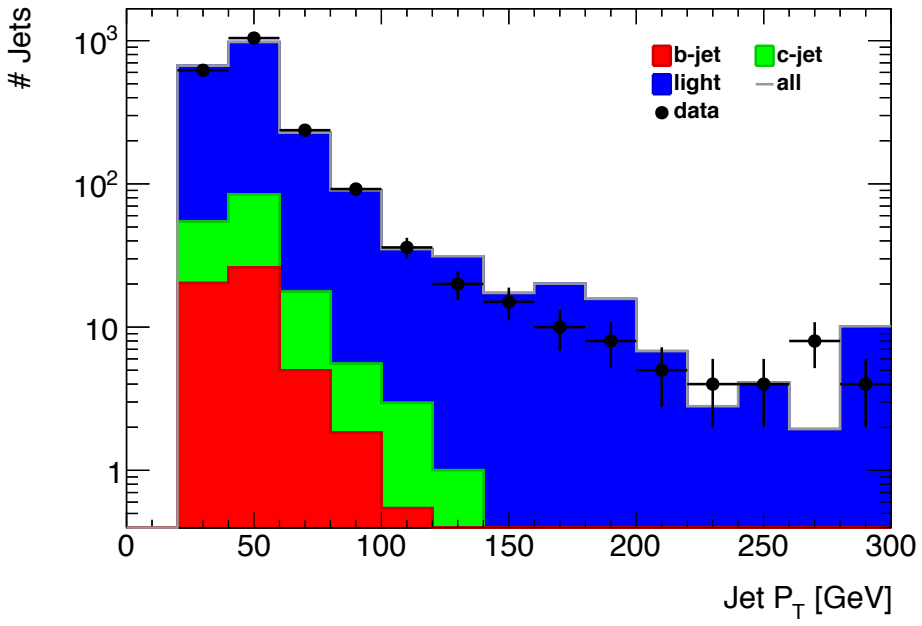


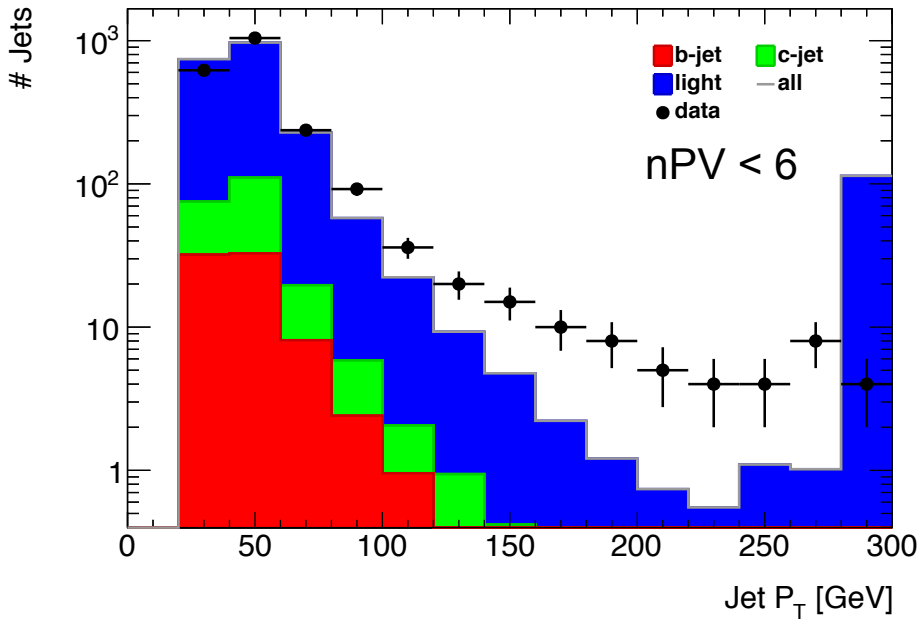


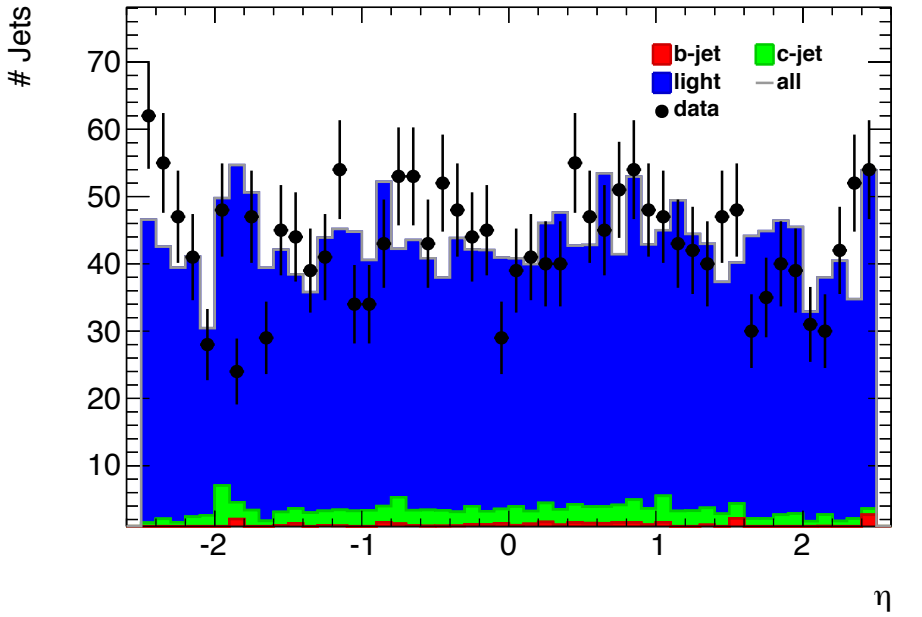




Track Jets


Jets
b-jet
c-jet
light
all
data
Jet P_T [GeV]


Jets
b-jet
c-jet
light
all
data
nPV < 6
Jet P_T [GeV]


Jets
b-jet
c-jet
light
all
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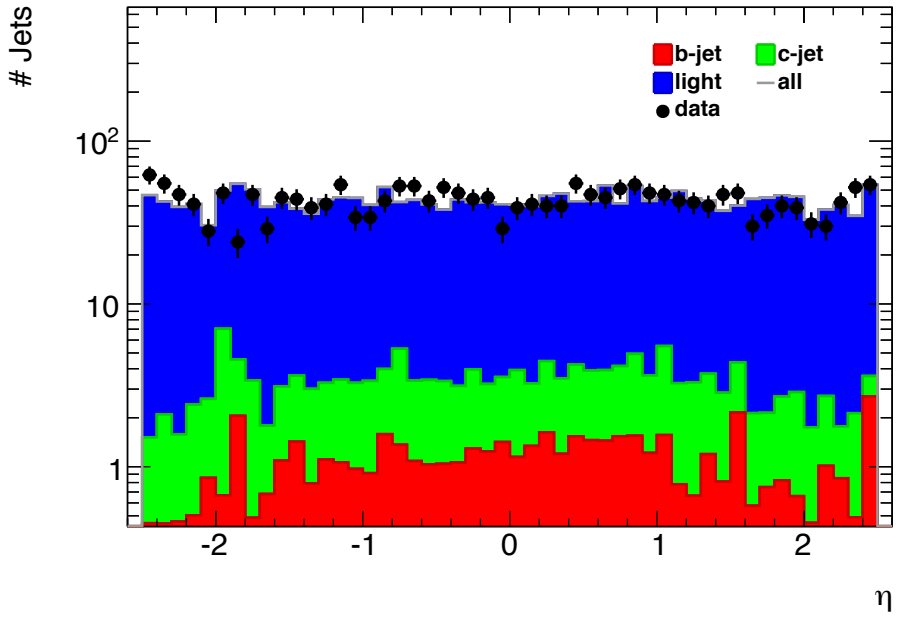
Jets
b-jet
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