



First Look at Flavour Tagging In Stable Beam Collisions

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Flavour Tagging Weekly
16/06/15



Aims

- Use dijets to compare data to MC.
- Get an early indication performance of the b-tagging algorithms in Run2 Collisions

Samples

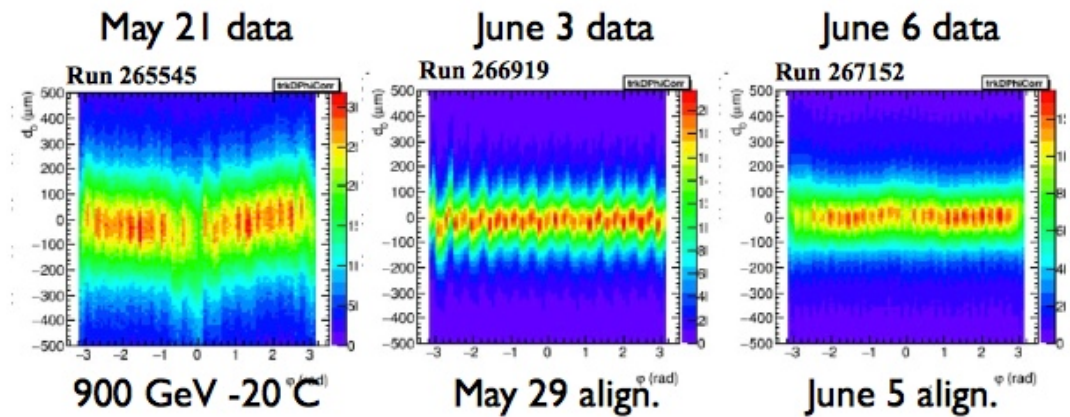
- `user.vdao.mc15_13TeV.*.Pythia8EvtGen_jetjet_JZ*W.merge.AOD.*.BTAGNTUP_OrigV8full_BTAGSTREAM/`
 - JZ1W-JZ6W - No JZ0W
 - ~ 1M Events
- `user.vdao.data15_13TeV.00267073.physics_Main.merge.AOD.f594_m1435.BTAGNTUP_V9full_BTAGSTREAM.30598468`
 - First stable beam collisions!
 - ~11M Events from Run 267073
 - 29th May Alignment

Beam Spot Quality
- Eric Torrence

Express Stream
 d_0 vs. Φ

Expect new alignment
later this week
for low- μ bulk reco

Eric Torrence





Trigger Selections

- L1_RD0_Filled Trigger with $P_T > 35$ GeV.
 - Less stringing cuts on data allow us to more data (and MC) points to reduce statistical effects.
- L1_J50 Trigger with $P_T > 175$ GeV - In the Backup
 - This trigger is used with a large P_T cut such that the trigger is at optimal efficiency

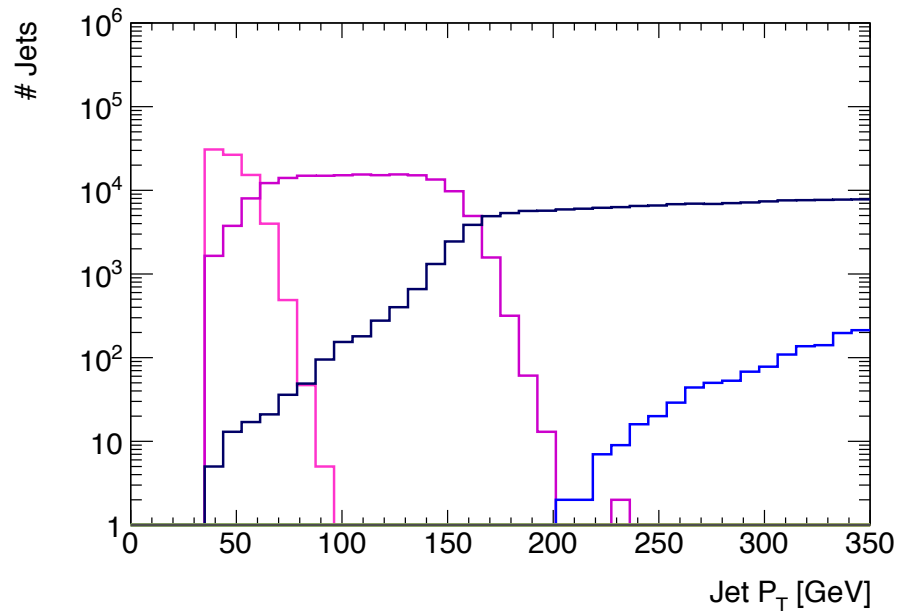
Details/Cuts

- $n_{\text{jets}} \geq 1$
- Leading Jet Only (Unless otherwise specified)
- Run1MediumBadCuts == 0
- $|\eta| < 2.5$
- Truth PV Check for MC
 - $\text{abs}(\text{truth_PVz} - \text{reco_PVz}) < \underline{0.5\text{mm}}$
- Truth Dijet Test for MC
 - $(\text{pt}_1 + \text{pt}_2)/2 < 1.4 * \text{truth_pt}_1$, for $n_{\text{jet}} > 1$
 - $(\text{pt}_1 < 1.4 * \text{truth_pt}_1)$, for $n_{\text{jet}} = 1$
- Good Run Cut for Data
 - Run 267073
 - LBN: 368-410, 413-416, 442-466, 471-485 and 491 to 724
- LabDr_HadF truth matching.
- AntiKt4EMTopoJets.



4 Di-jet sample re-weighting

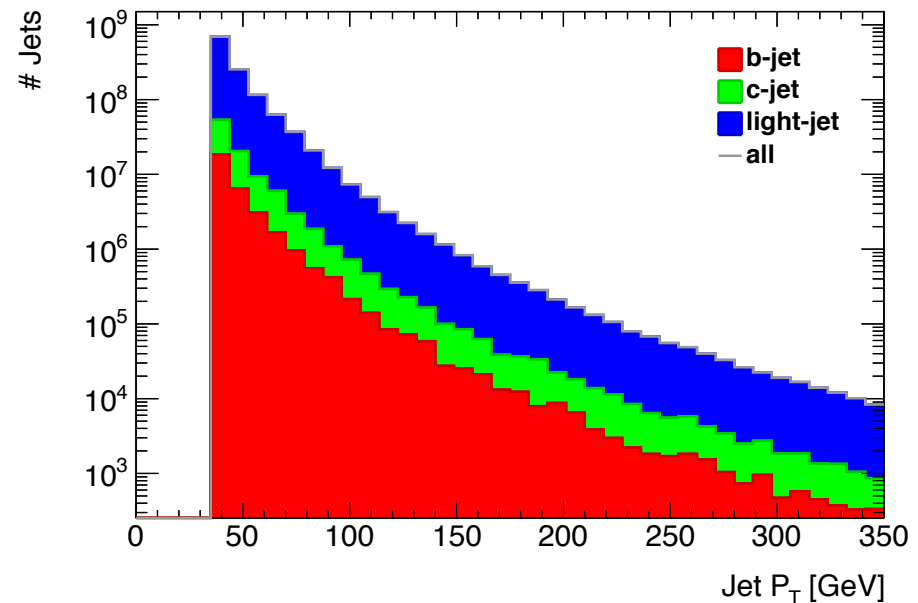
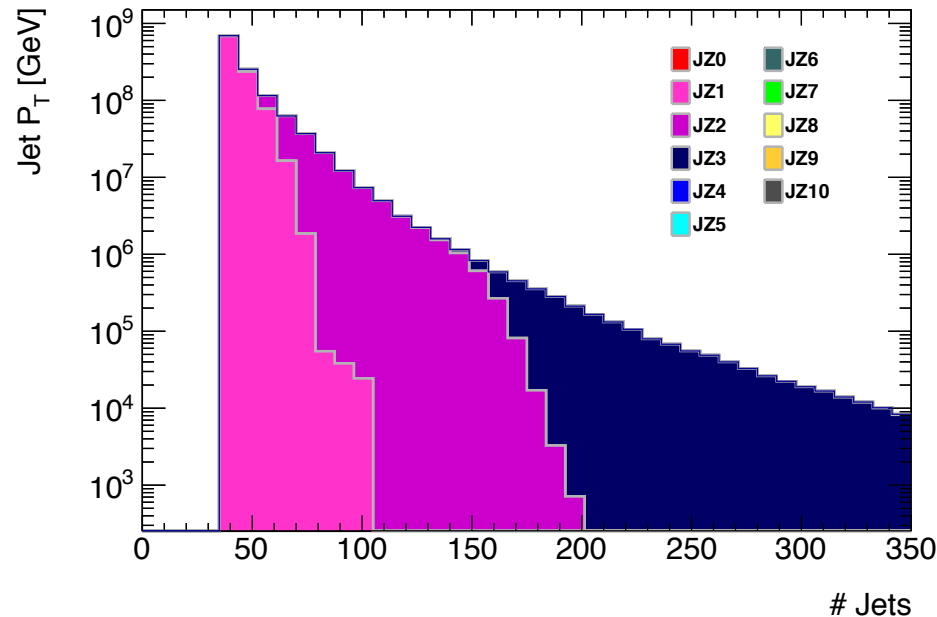
L1_RD0_Filled

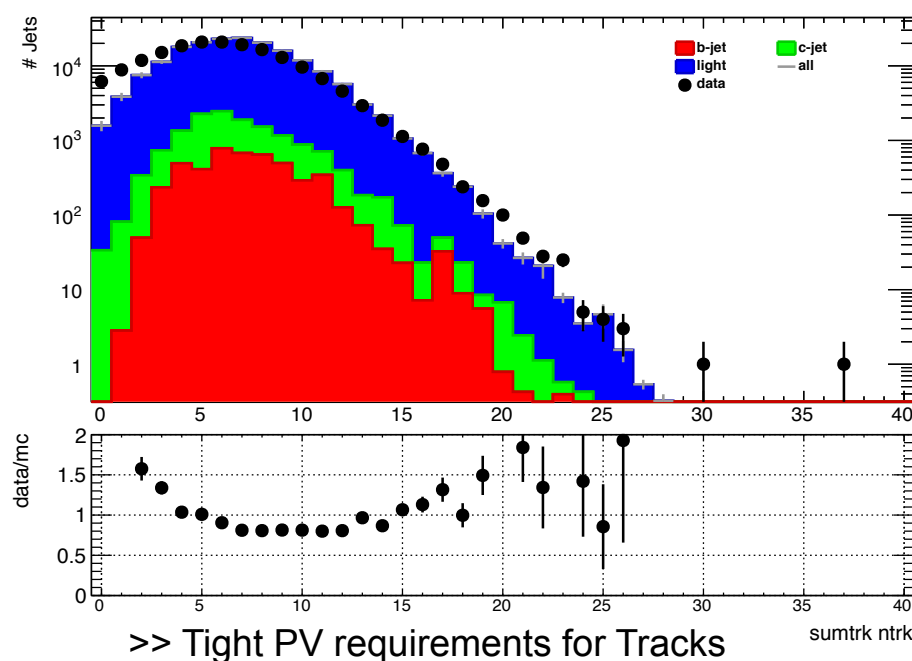
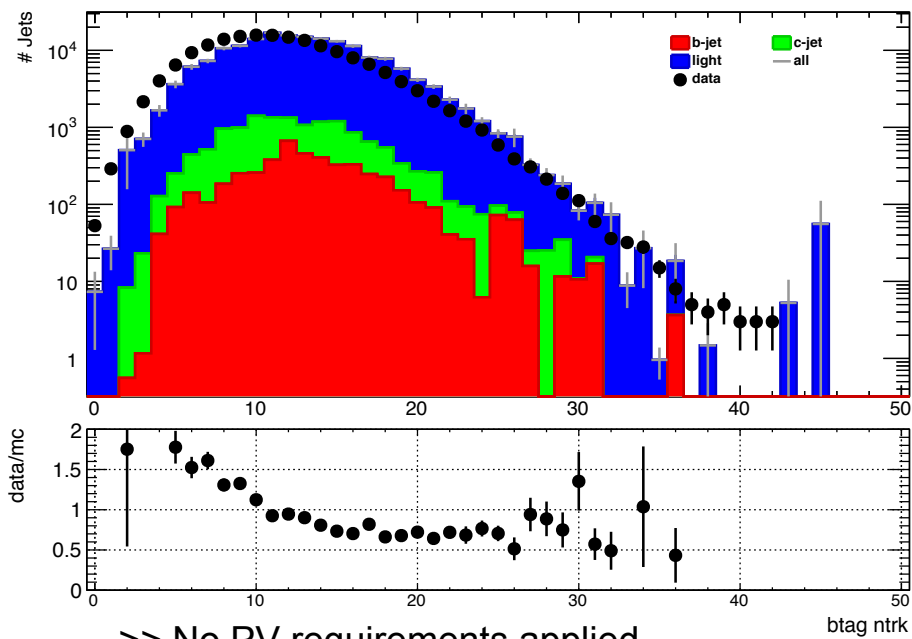
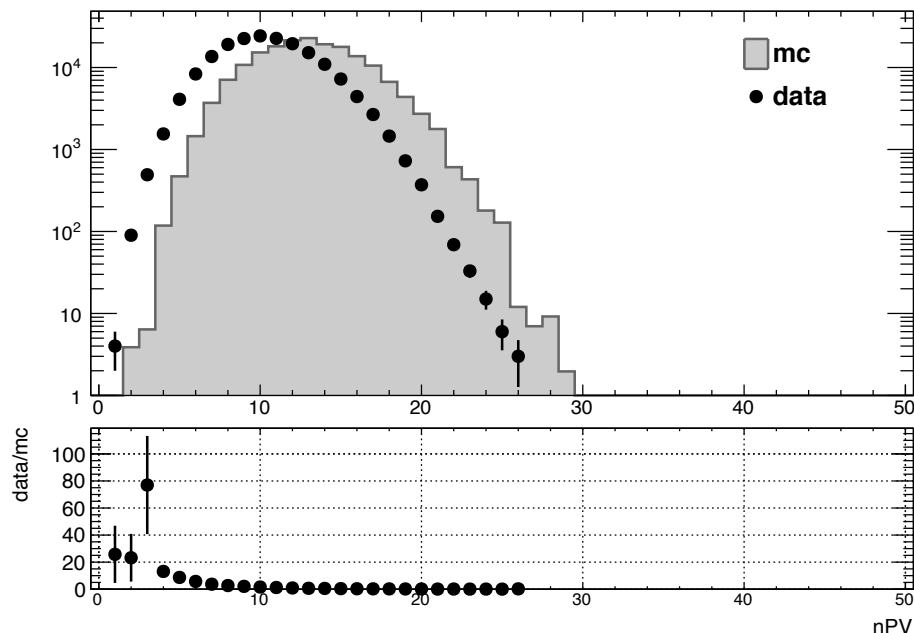
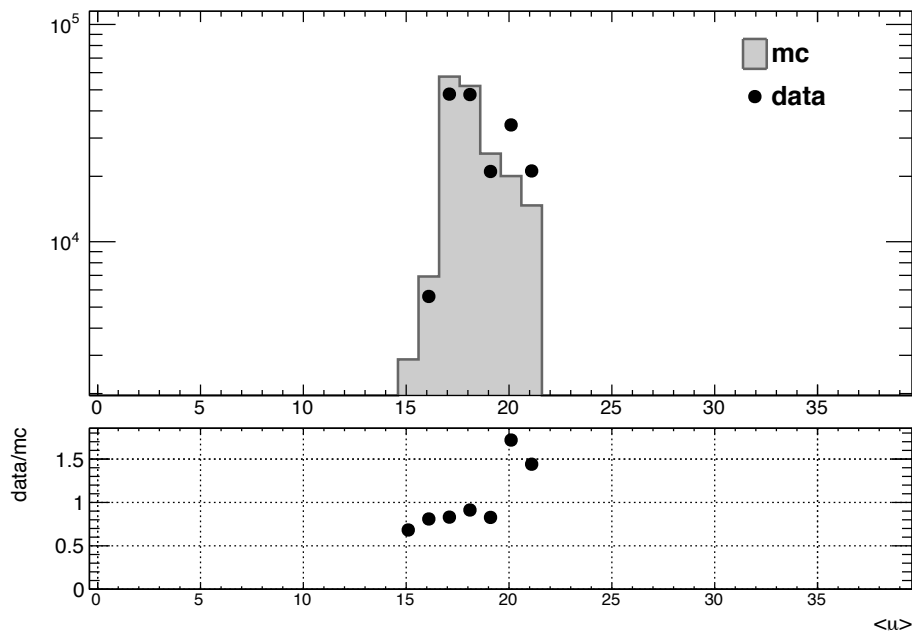


$$\text{Total Weight} = \frac{mcwg * (\text{Filter Eff.}) * (CS[fb]) * (Lumi[fb^{-1}])}{(\# \text{ Events})}$$

I think #events is right but we will do tests.

<u>Xs(fb)</u>	<u>Eff.</u>	<u>Slice and Energy</u>
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

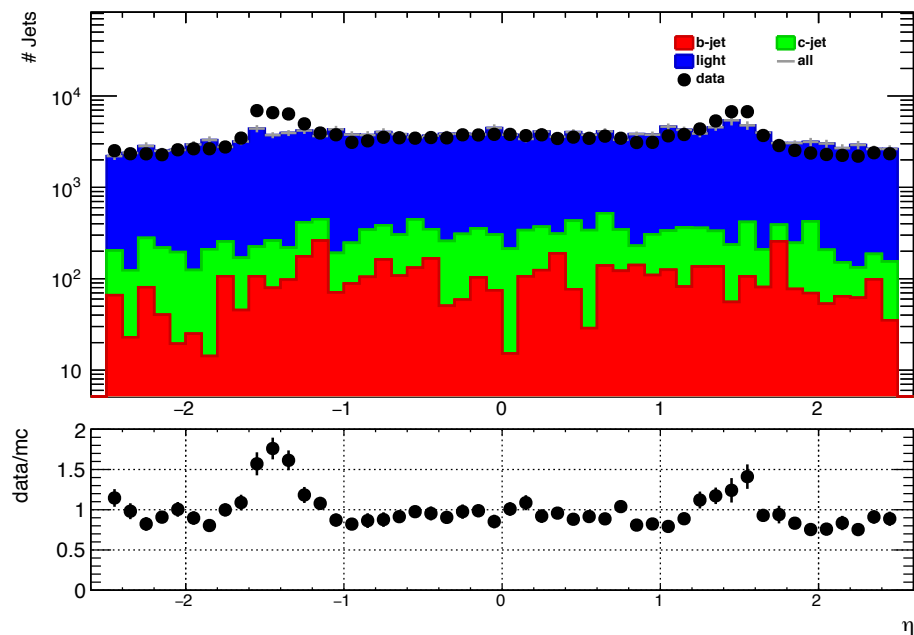
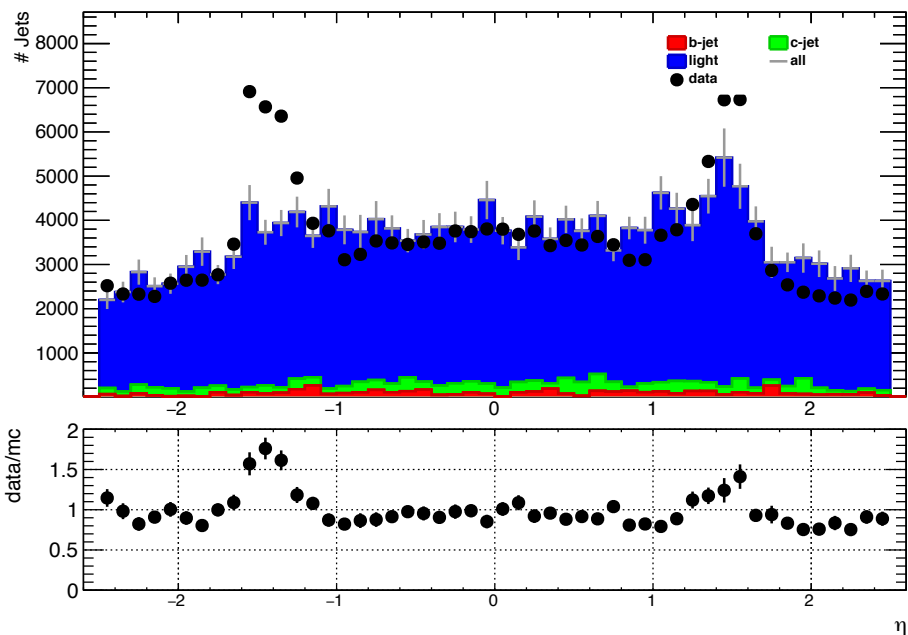
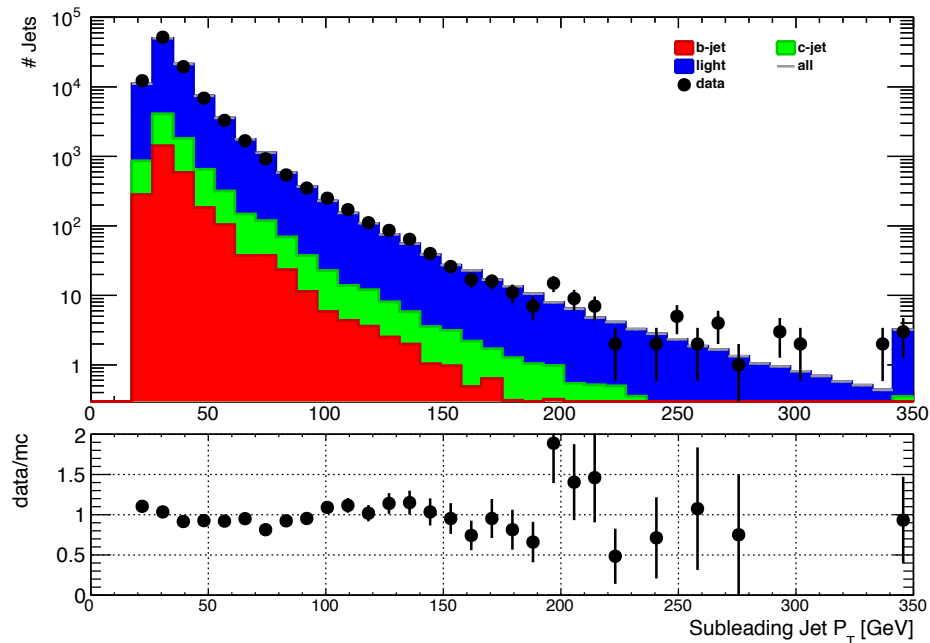
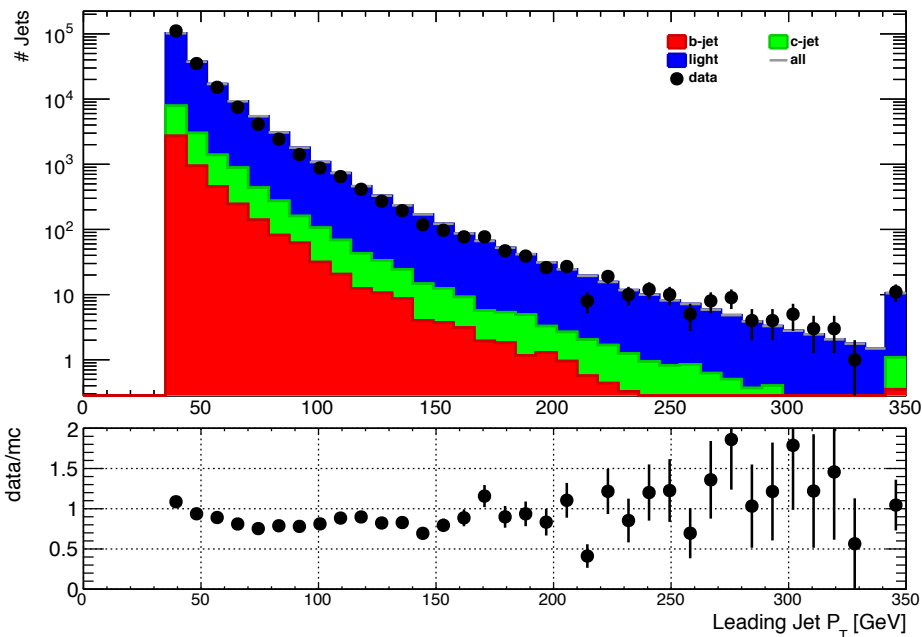






6 Jet Kinematic Distributions

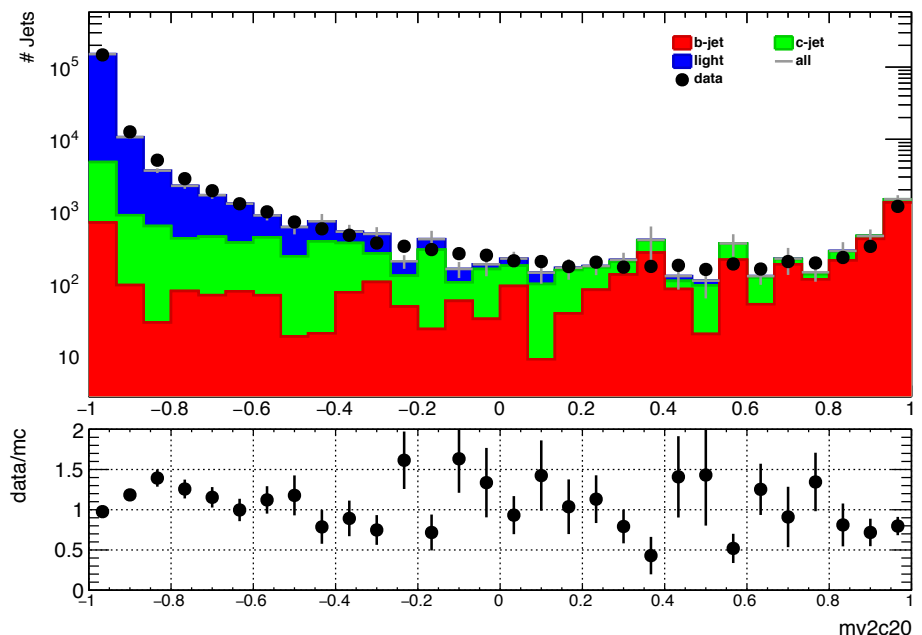
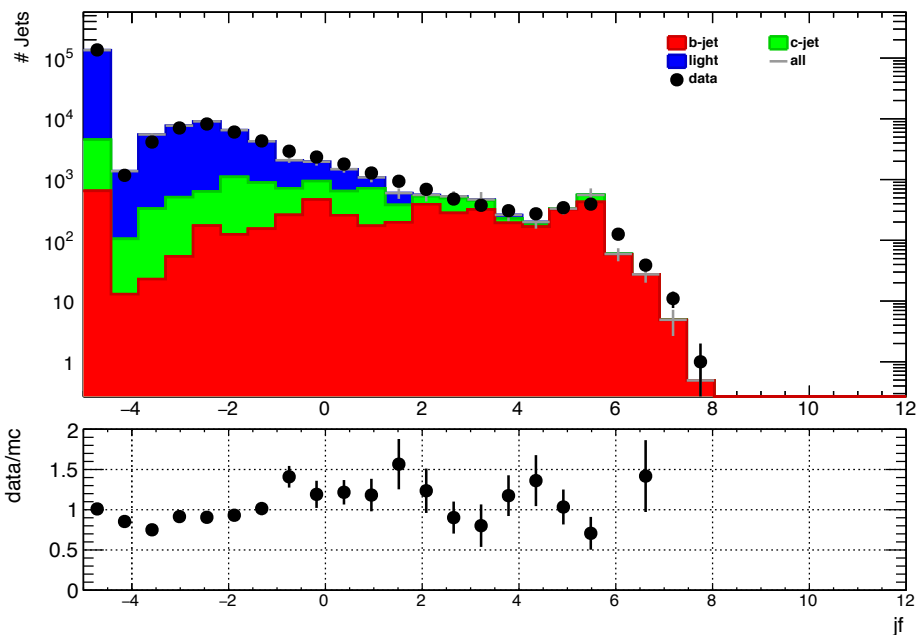
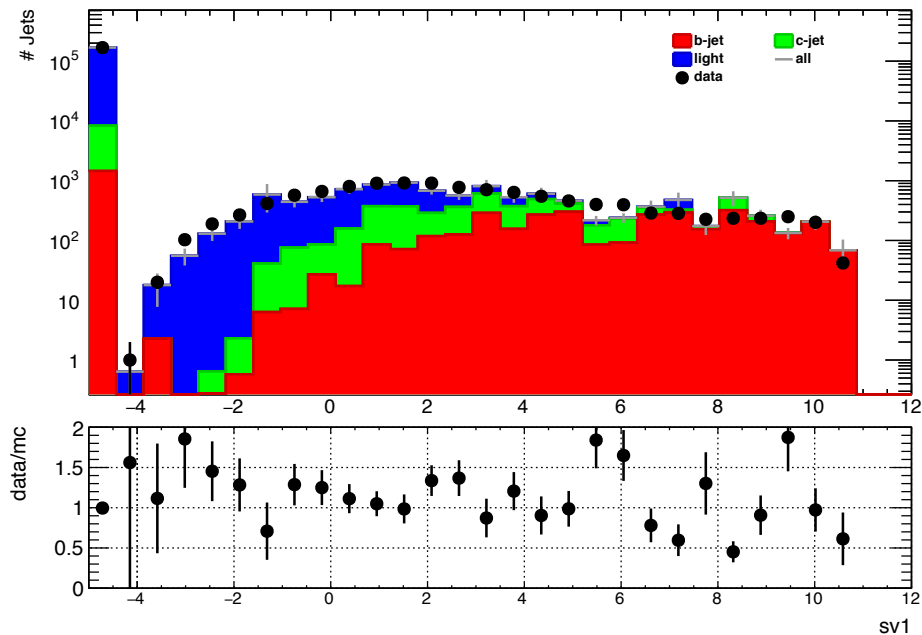
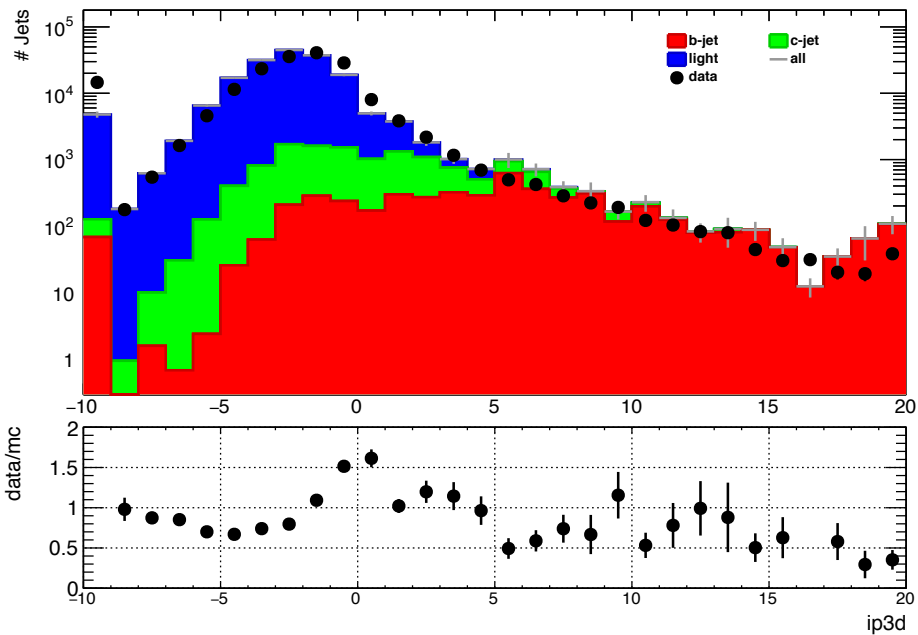
L1_RD0_Filled

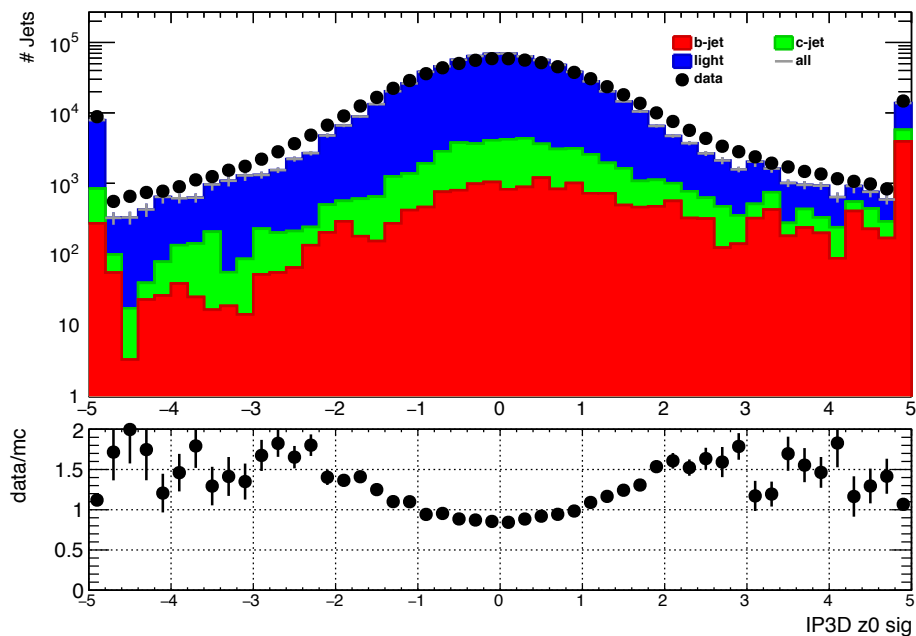
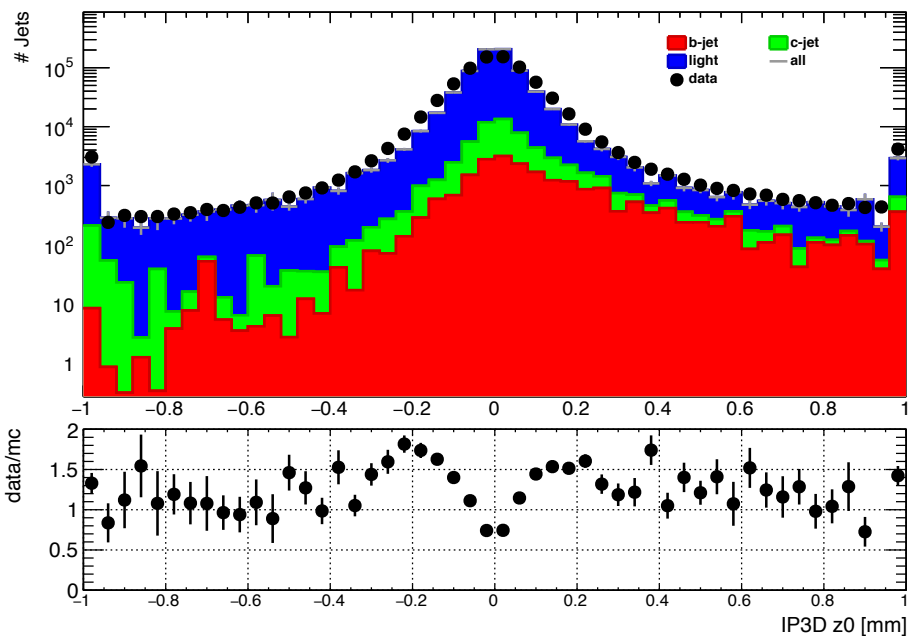
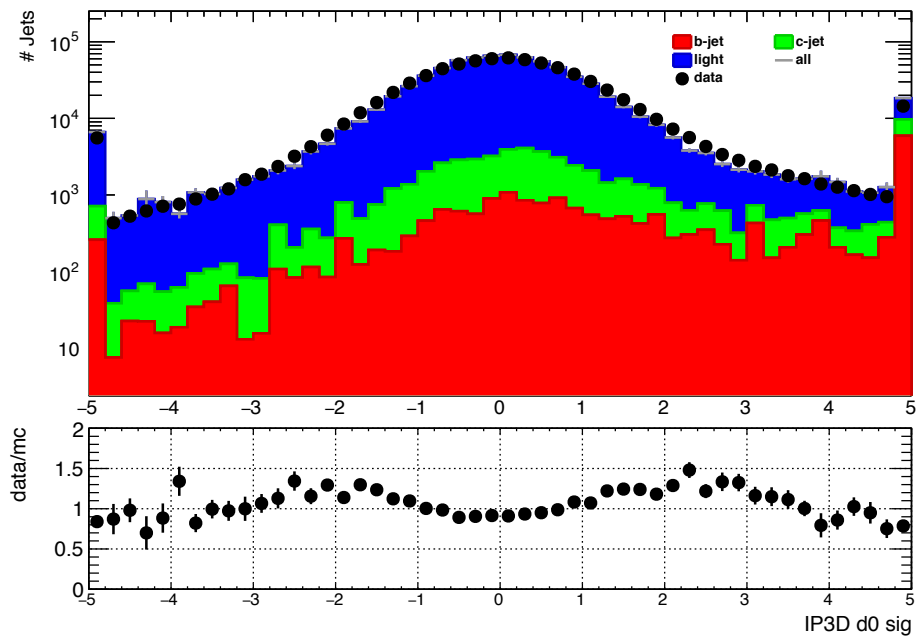
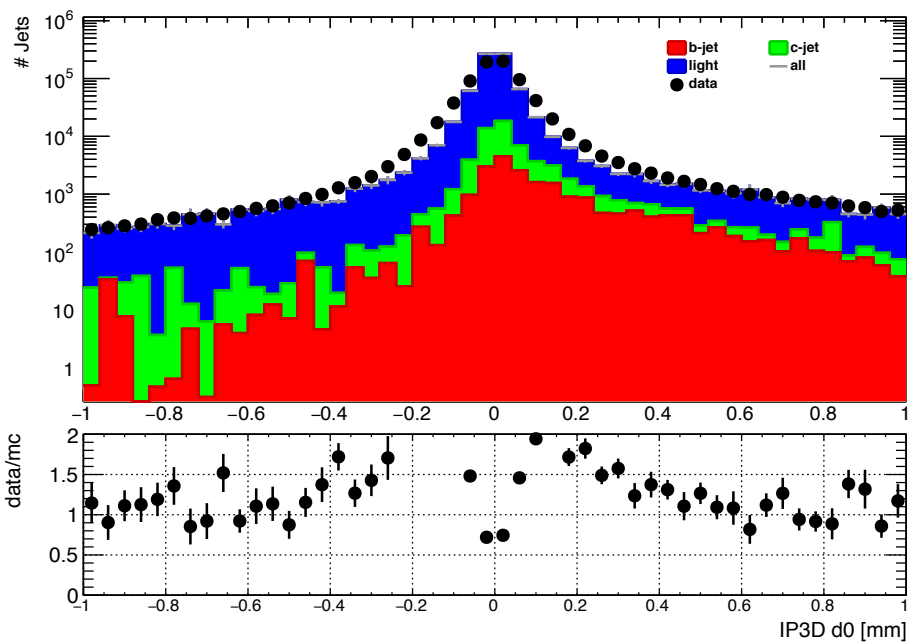


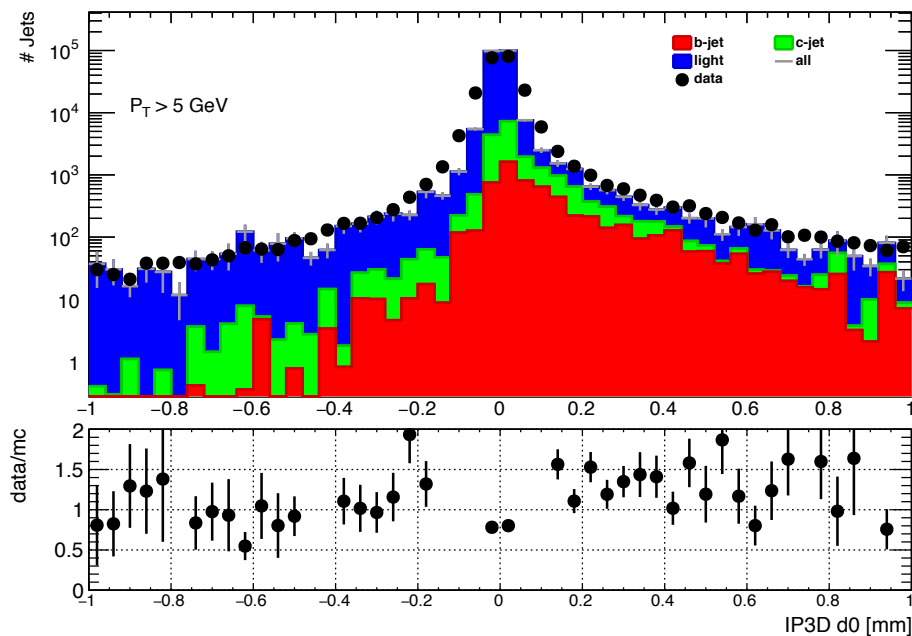
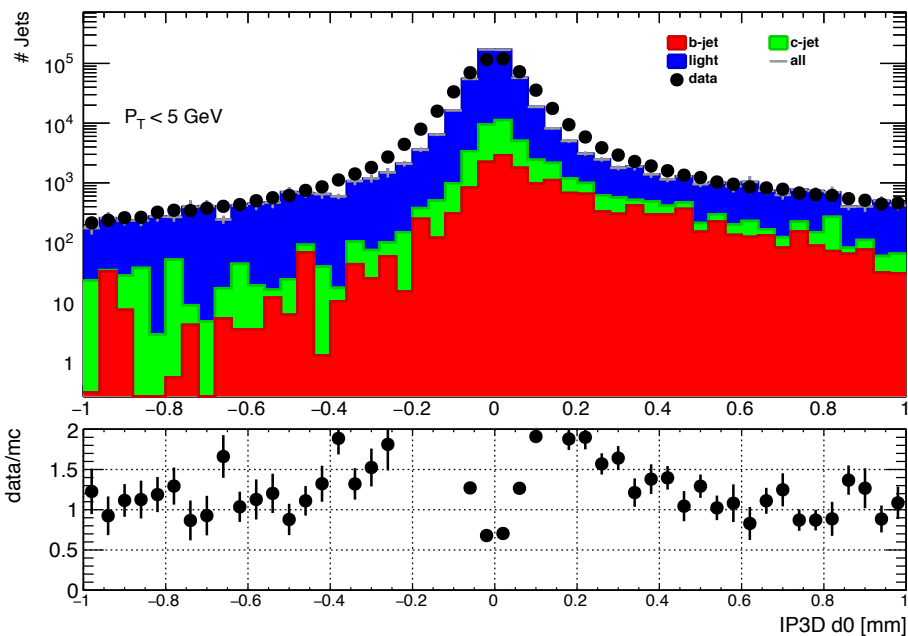
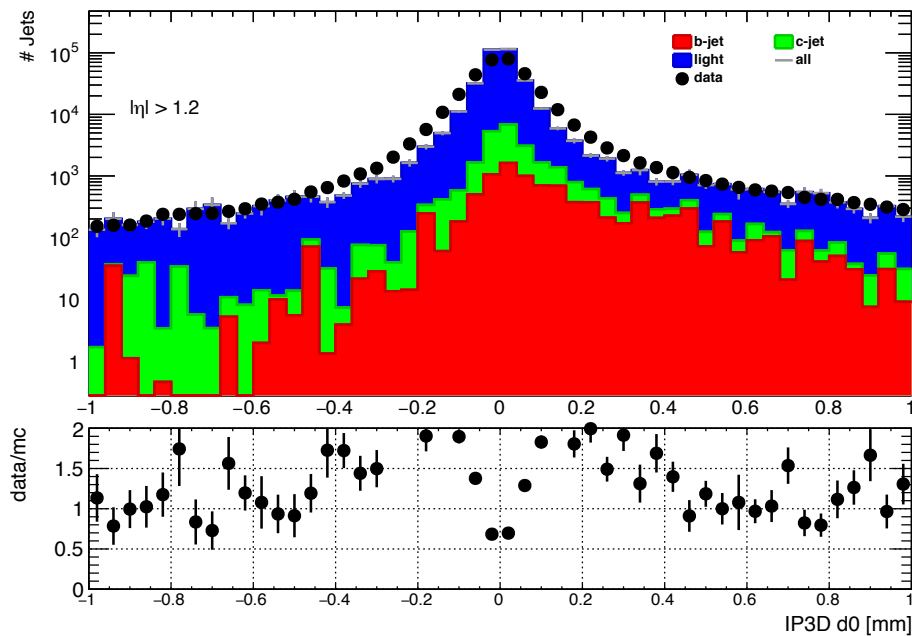
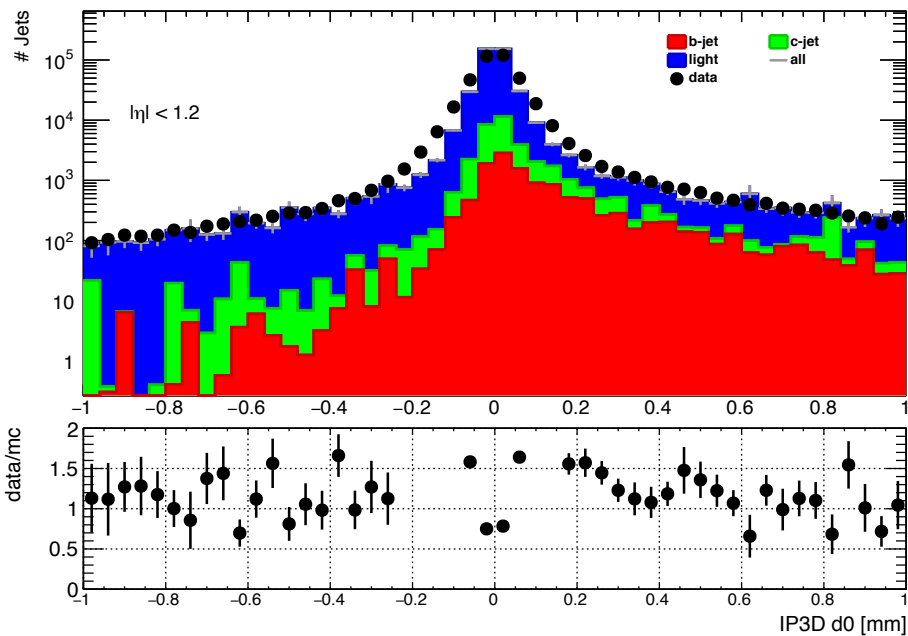


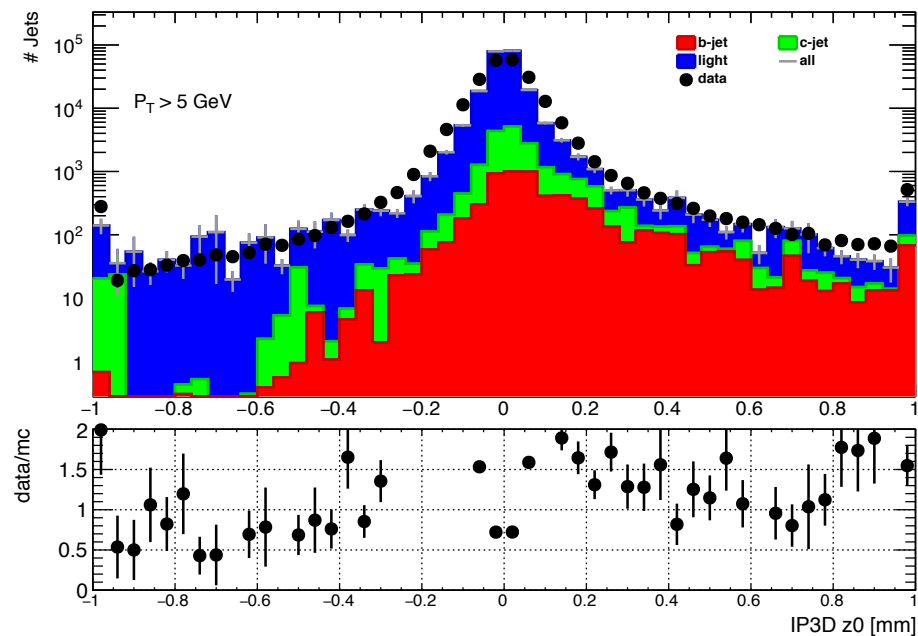
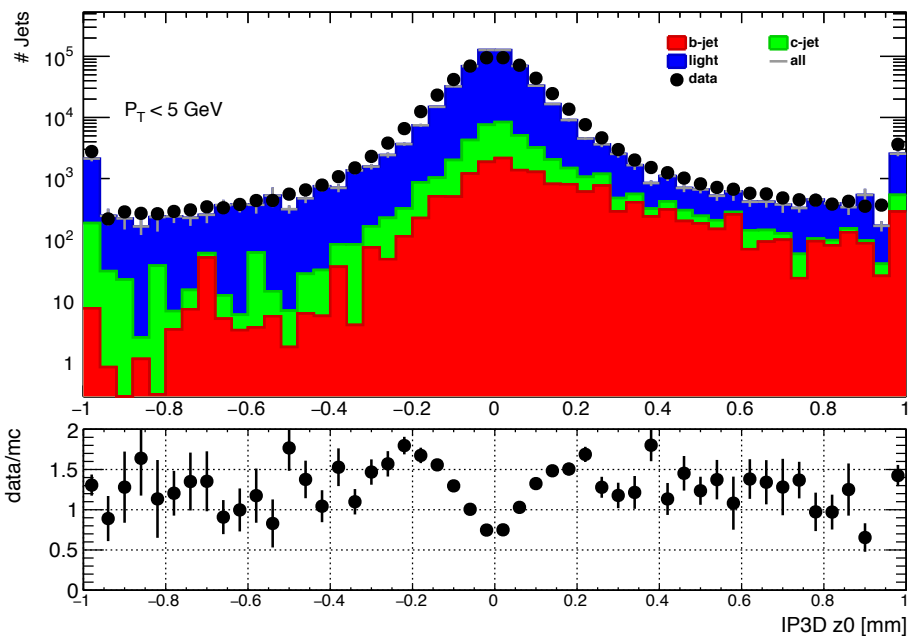
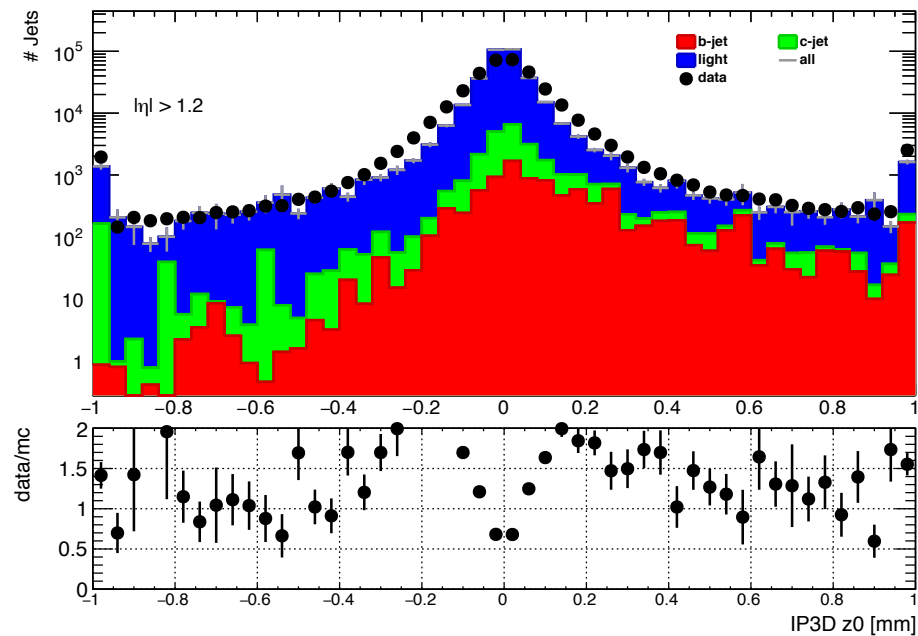
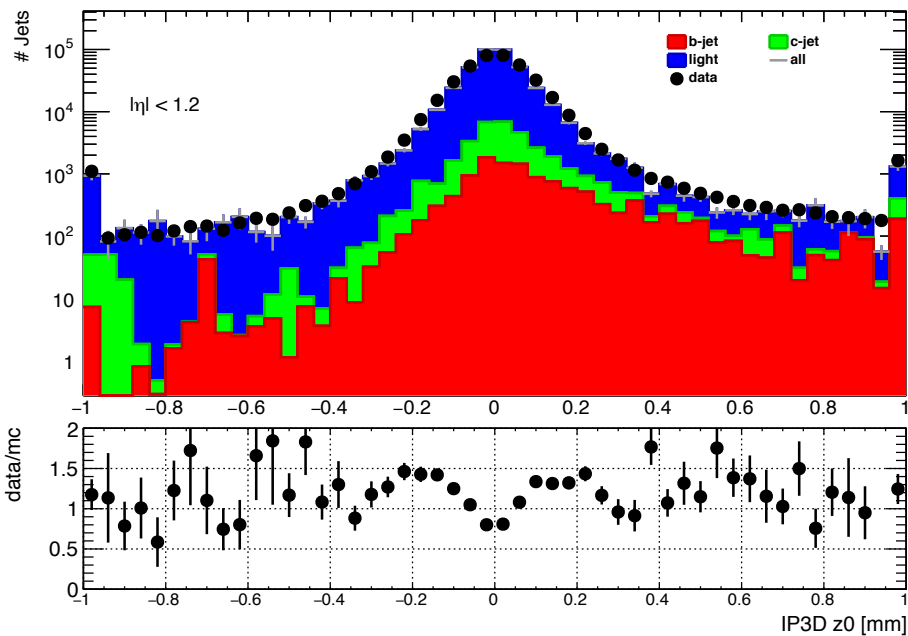
7 Discriminants

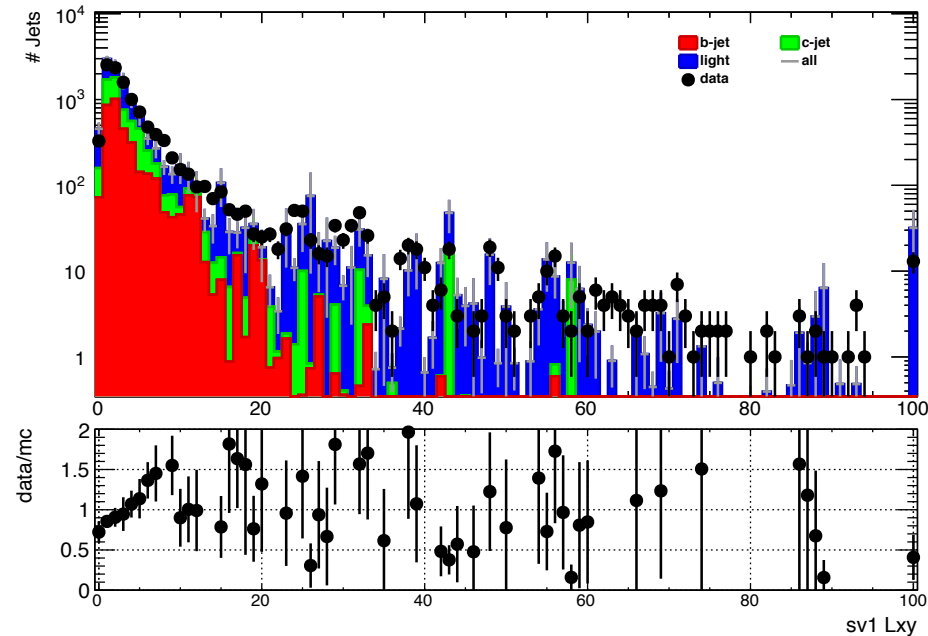
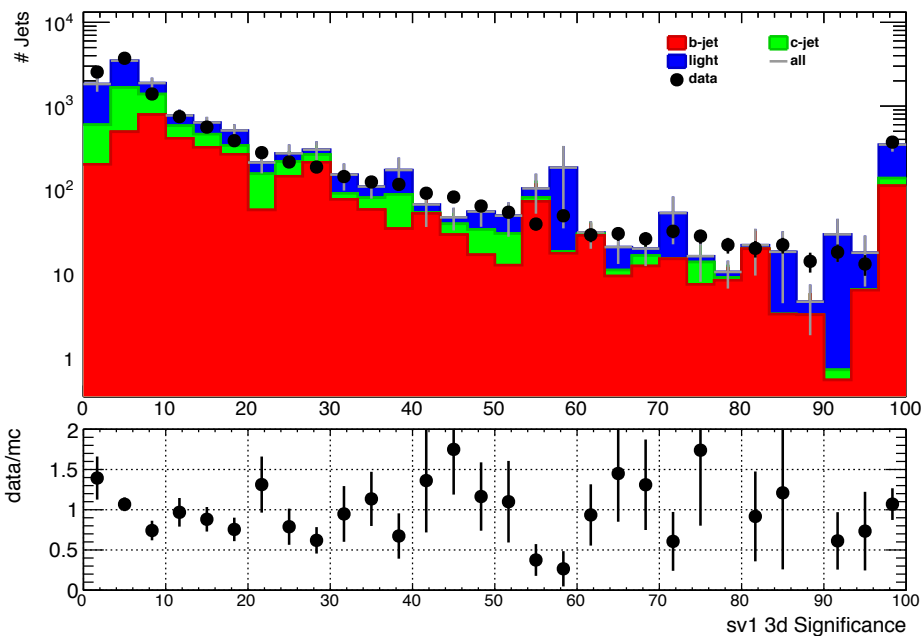
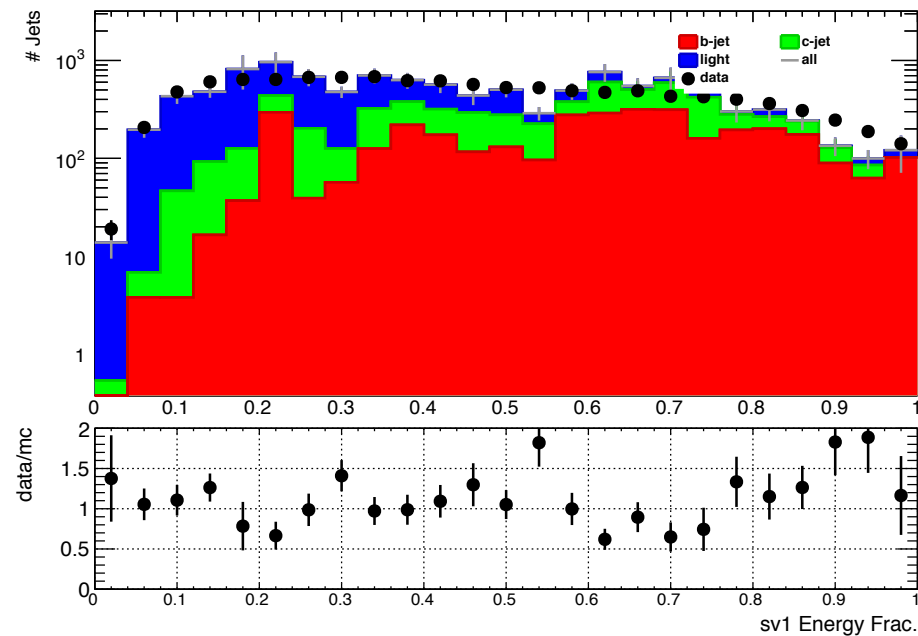
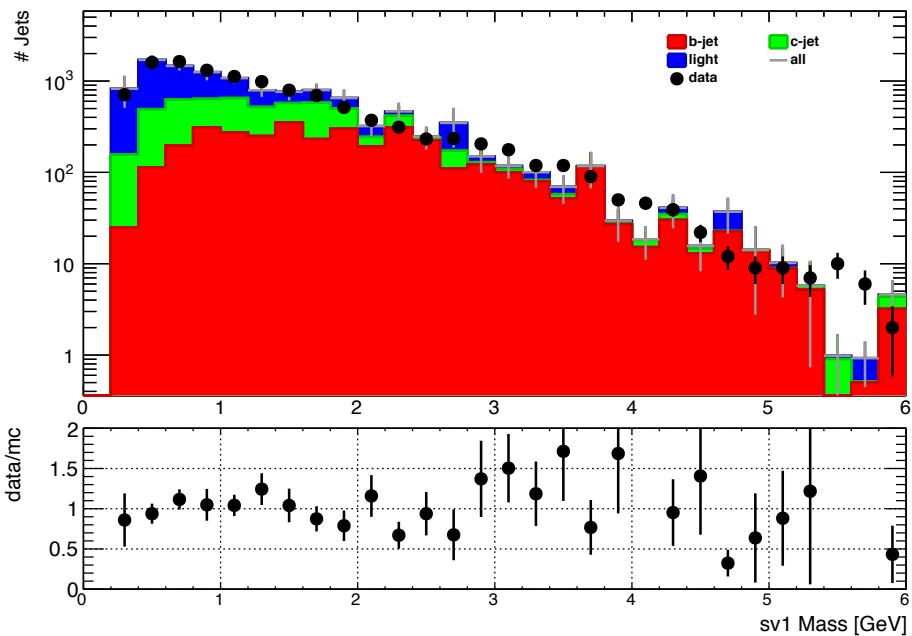
L1_RD0_Filled

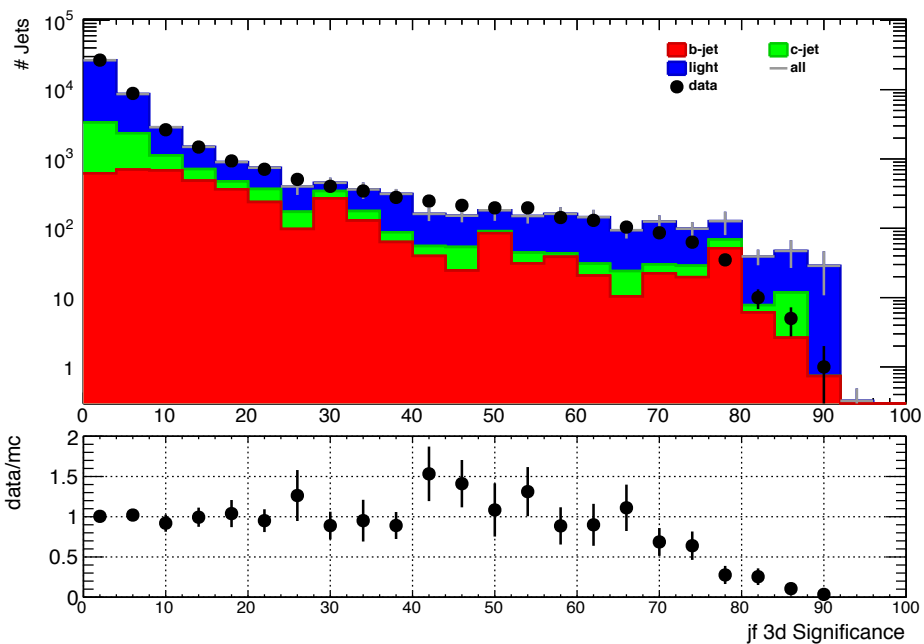
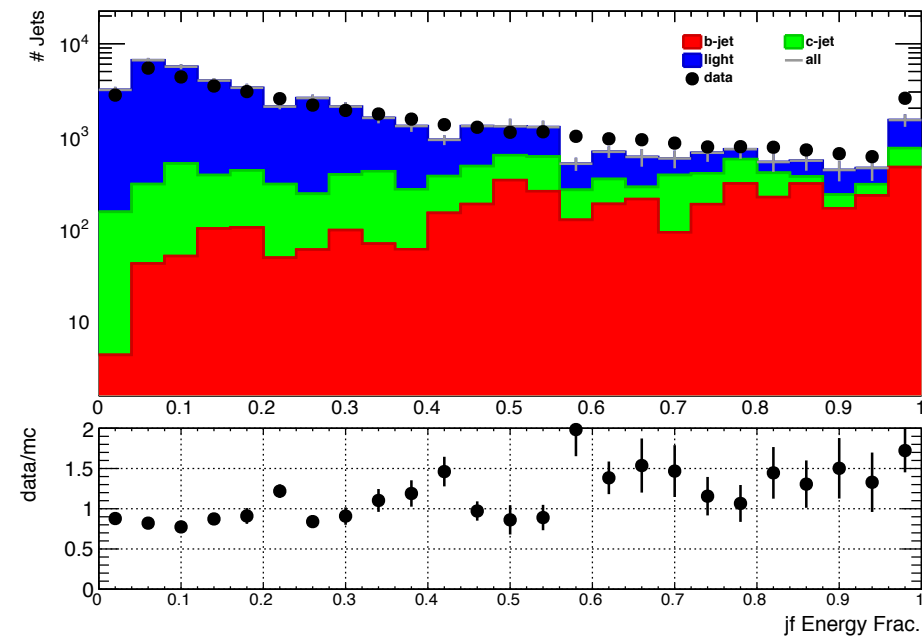
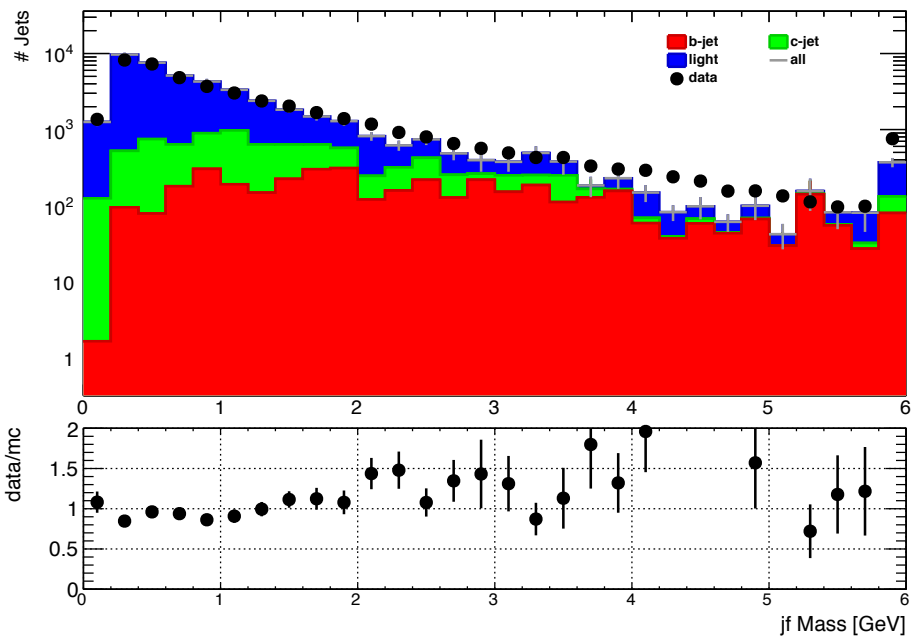


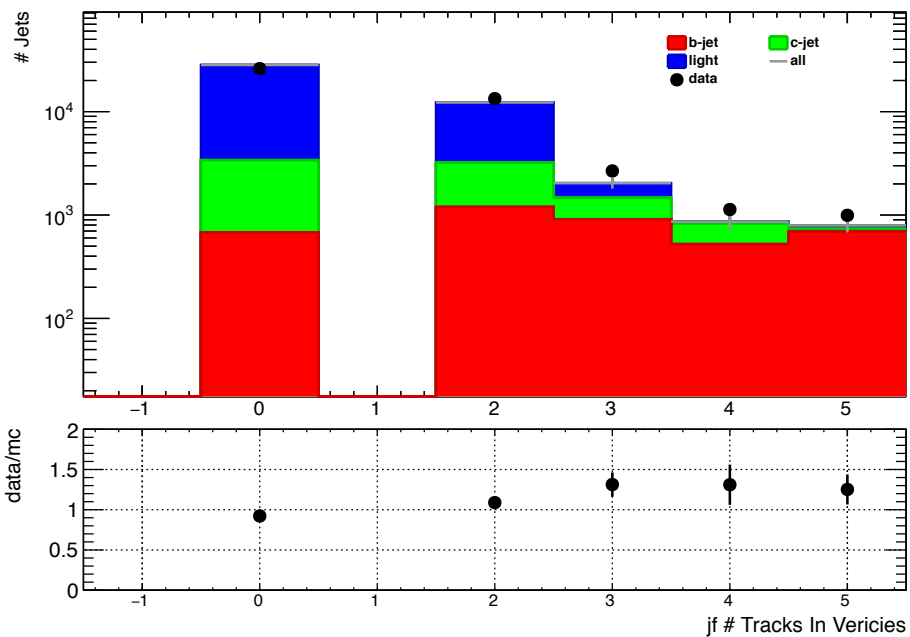
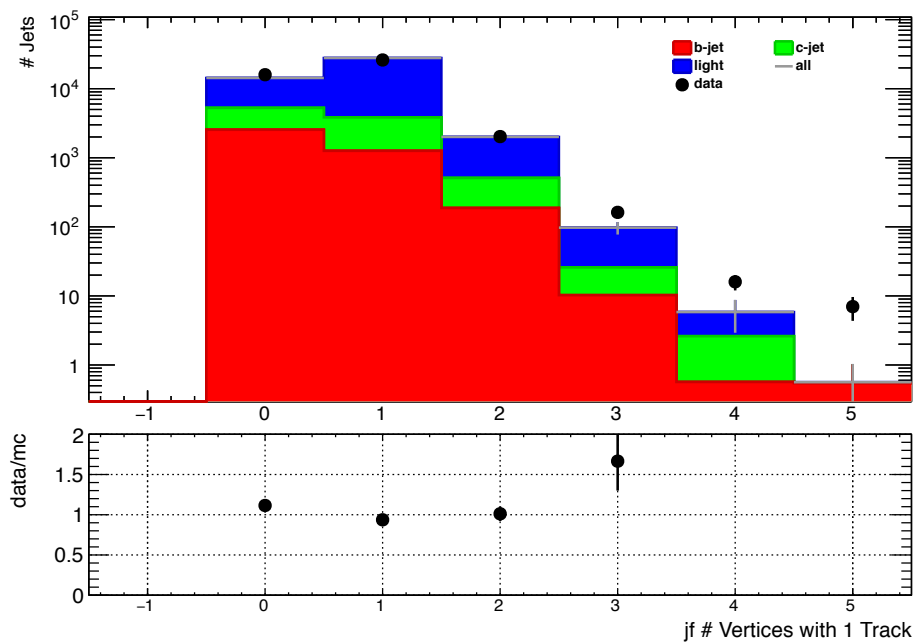
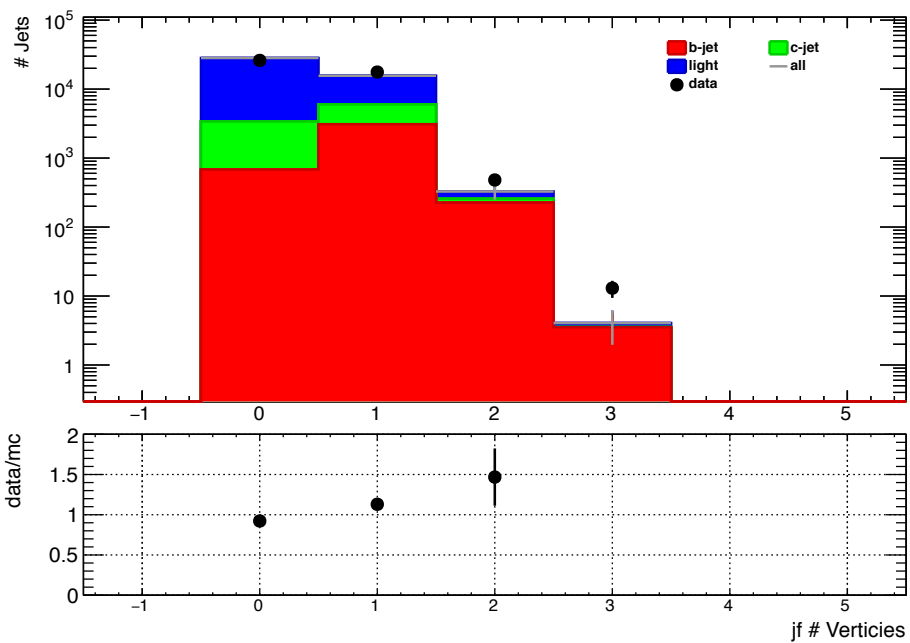














Conclusions

- There is beginning to be some agreement here.
- Algorithms are performing reasonably well given some of the caveats (d0 alignment ect.)

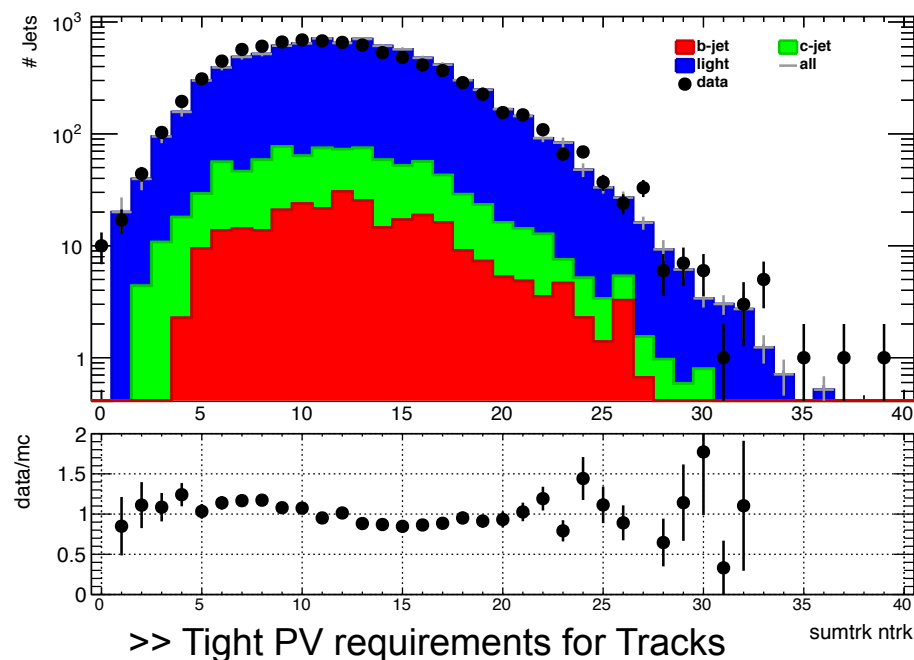
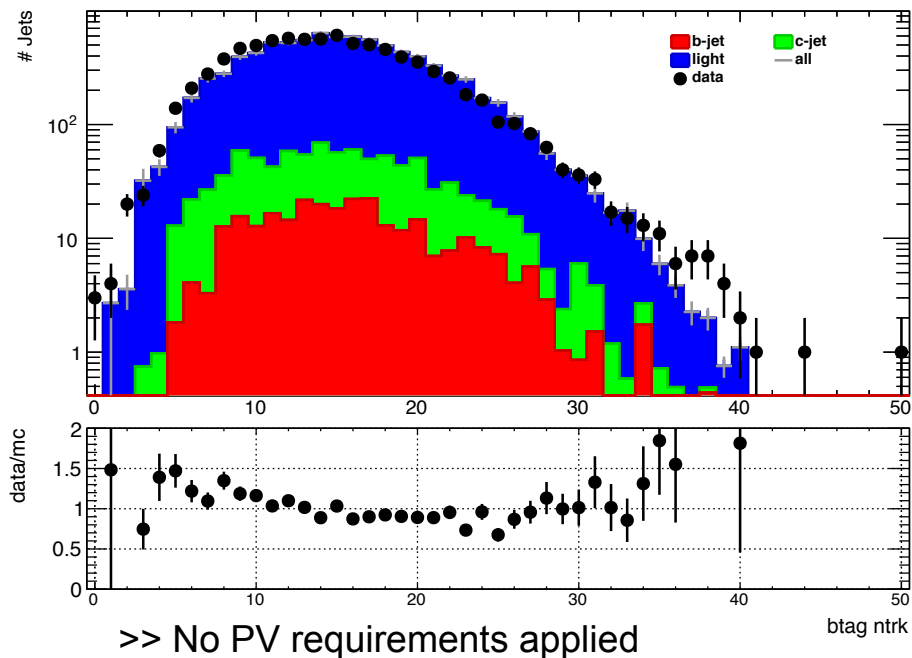
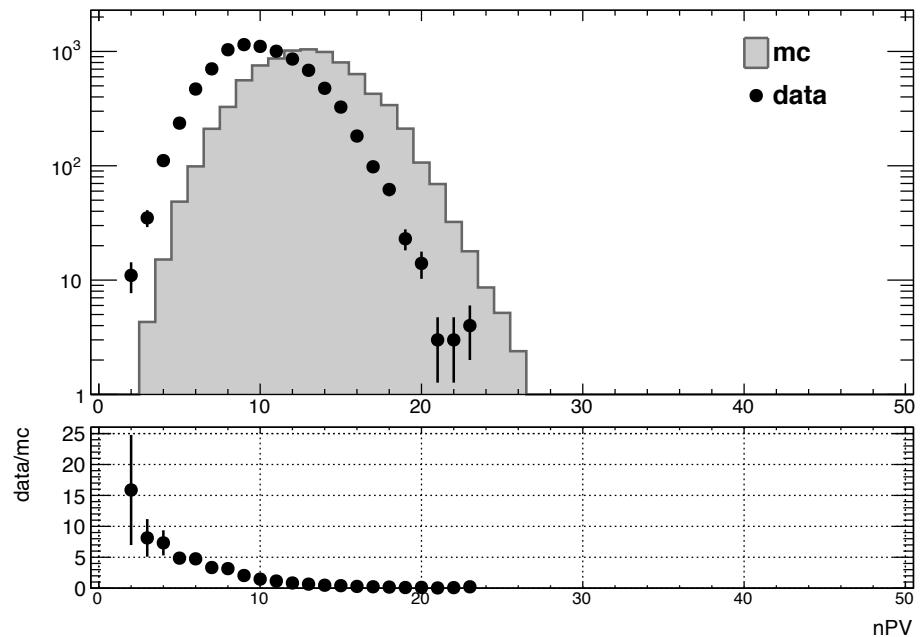
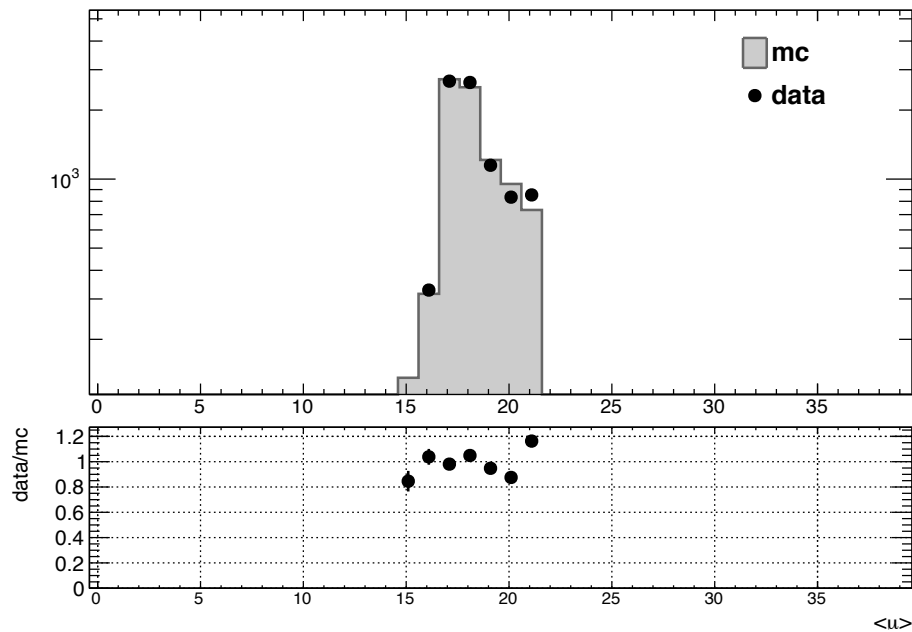
To Do

- Other runs, hopefully some with higher luminosity and new d0 alignments
- Add more variables to our studies
 - Study subleading jet performance.
 - Further PV plots.
- Couple of tests
 - Better understand re-weighting (Look at sum of weights).
 - Look and drop the truth PV check.



Backup

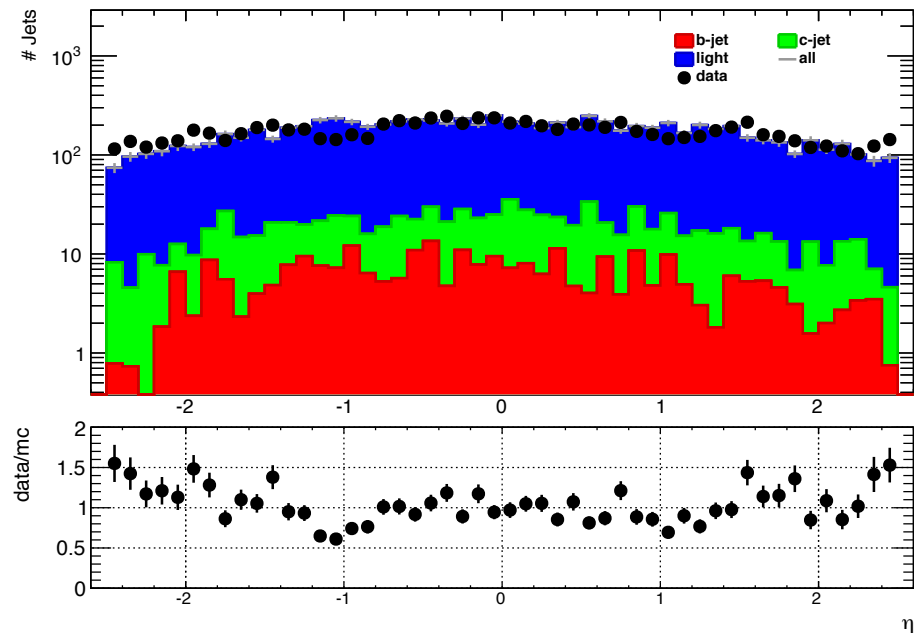
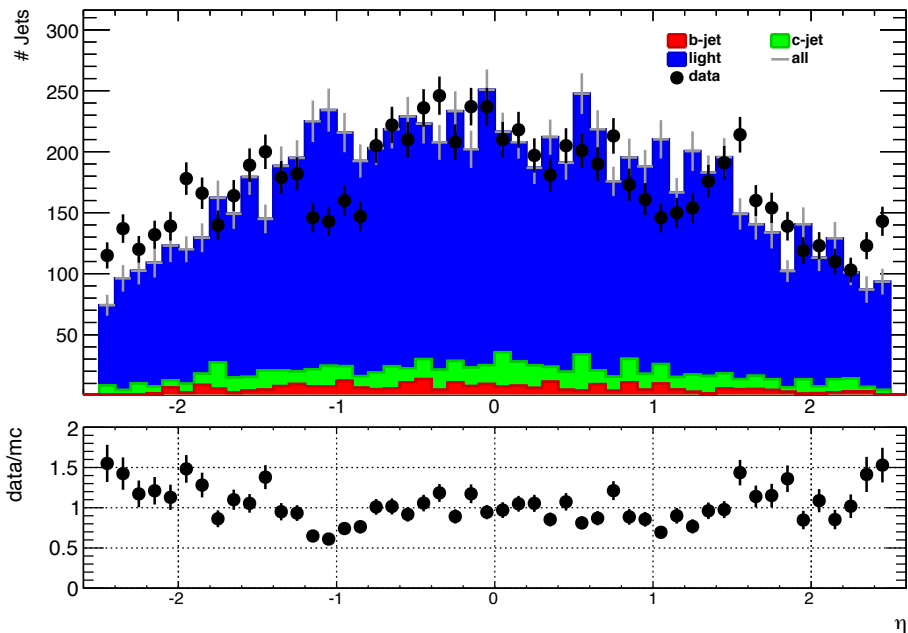
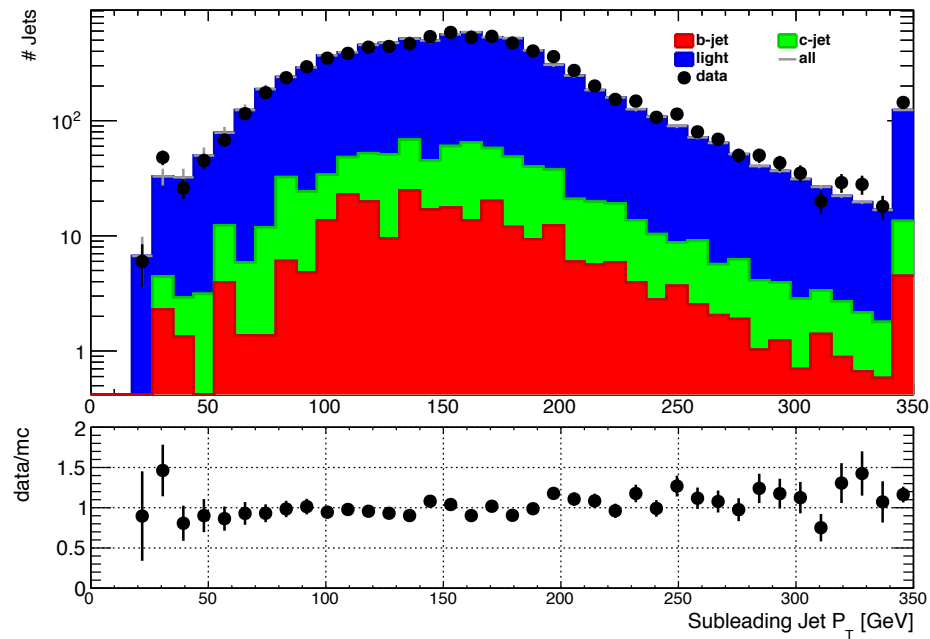
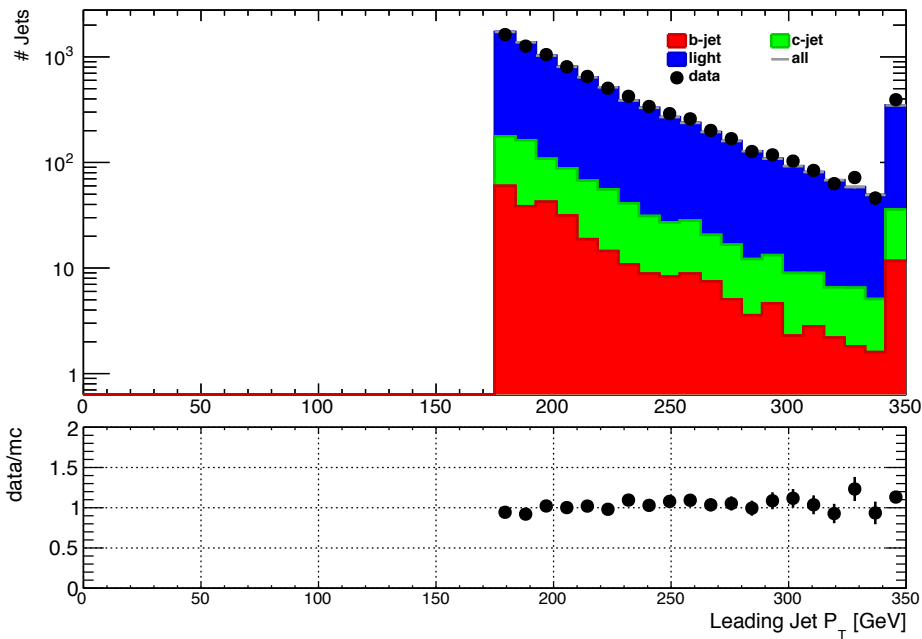
L1_J50, $P_T > 175 \text{ GeV}$





17 Jet Kinematic Distributions

L1_J50, $P_T > 175$





18 Discriminants

L1_J50, $P_T > 175$

