Commissioning with Data

Laurie McClymont

Antonello Miucci, Valerio Dao,
Andrea Coccaro, Andreas Korn

Flavour Tagging Weekly
01/07/15

Aims

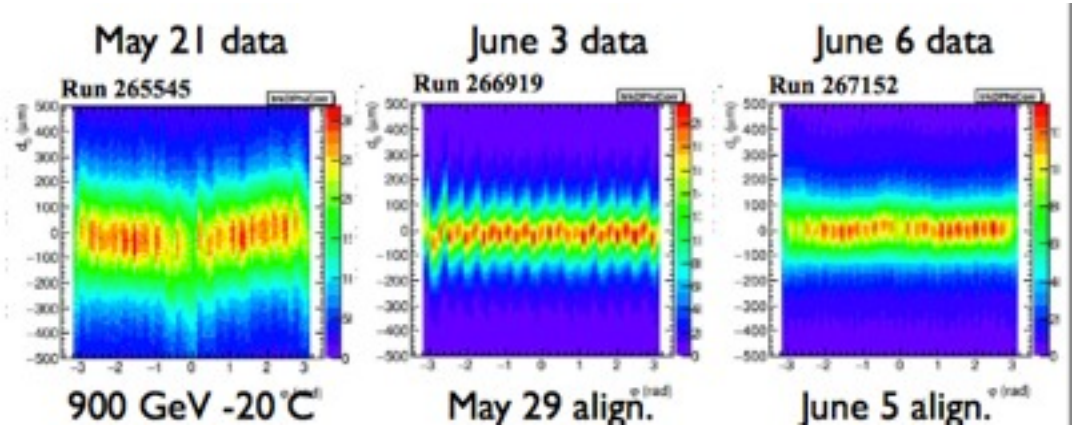
- Use dijets to compare data to MC.
- Get an early indication performance of the b-tagging algorithms in Run2 Collisions

Samples

- *group.perf-flavtag.mc15_13TeV.*
361025.Pythia8EvtGen_JZ5W.merge.AOD.e3668_s2576_s2132_r6630_r6264.BTAGNTUP_V12slim/
- JZ1W-JZ5W - No JZ0W
- ~ 10M Events, an increase by a factor of 10 on previous study.

- *group.perf-flavtag.data15_13TeV.*
00267639.physics_Main.merge.DAOD_FTAG1.r6848_p2358_p2366.BTAGNTUP_V14slim/
- Stable beam collisions
- ~6M Events from Run 267639
- Contains Full Alignment
- Problems with trigger: FTAG contains only events passing L1 triggers, very difficult to control trigger bias since current version of the ntuples does not contain HLT info.

Beam Spot Quality
- 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.

Next Plan:
- *L1_J25 Trigger with P_T > 70 GeV for MC*
- *HT_J60 Trigger with P_T > 70 GeV for Data*

Details/Cuts

- njets ≥ 1
- Run1LooseBadCuts and "ugly" jet removal
- |η| < 2.5
- To do:

- JVT > 0.641 if (P_T < 50 GeV and |η| < 2.4)

- Truth Dijet Test for MC

- (pt_1+pt_2)/2 < 1.4* truth_pt_1, for njet > 1
- (pt_1 < 1.4 * truth_pt_1), for njet =1

- Truth PV Check No Longer Applied

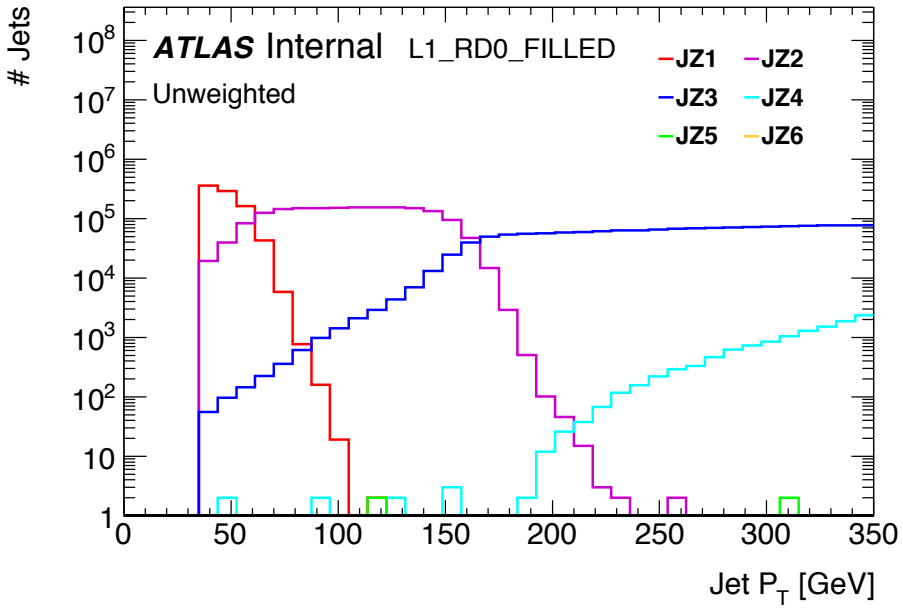
Then plot subleading if
- Subleading P_T > 25 GeV and |η| < 2.5

•LabDr_HadF truth matching.

- AntiKt4EMTopoJets.

Di-jet sample re-weighting

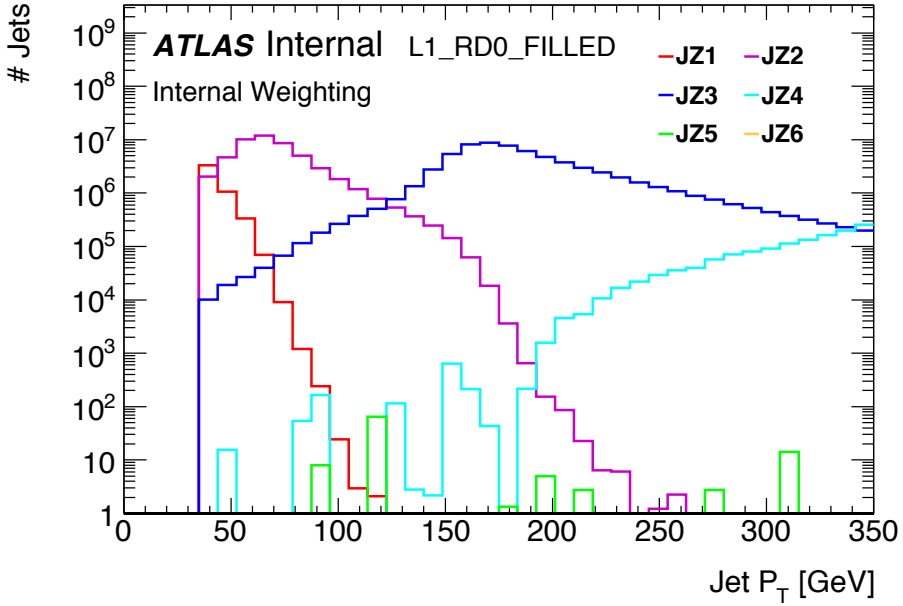
L1_RD0_Filled

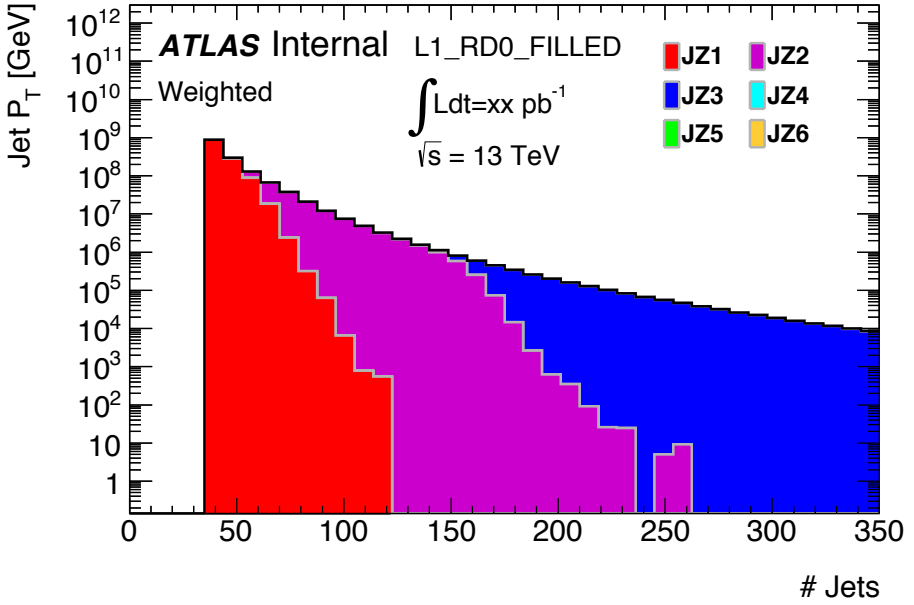


Total Weight	**=**	***mcwg*(Filter Eff.)*(CS[fb])*(Lumi[fb^{-1}])*** / ***(# Events)***

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

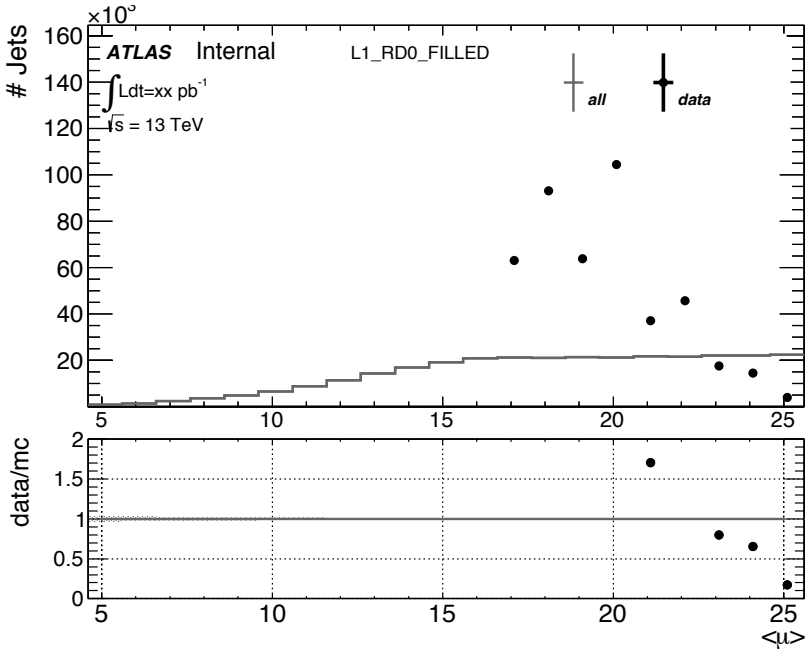
Xs(fb)	Eff.	Slice and Energy
7.8420E+13	6.7198E-04	#JZ1W 20-60 GeV
2.4334E+12	3.3264E-04	#JZ2W 60-160 GeV
2.6454E+10	3.1953E-04	#JZ3W 160-400 GeV
2.5464E+08	5.3009E-04	#JZ4W 400-800 GeV
4.5536E+06	9.2325E-04	#JZ5W 800-1300 GeV
2.5752E+05	9.4016E-04	#JZ6W 1300-1800 GeV

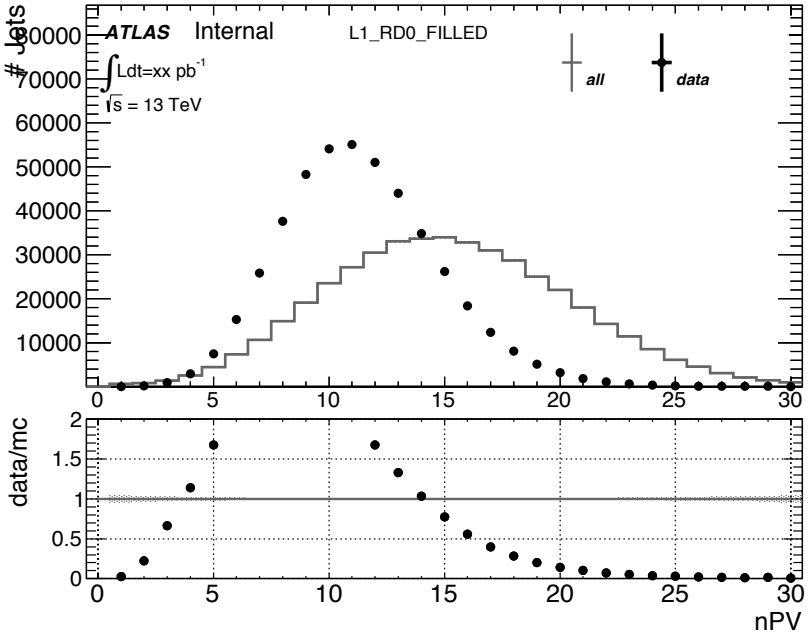


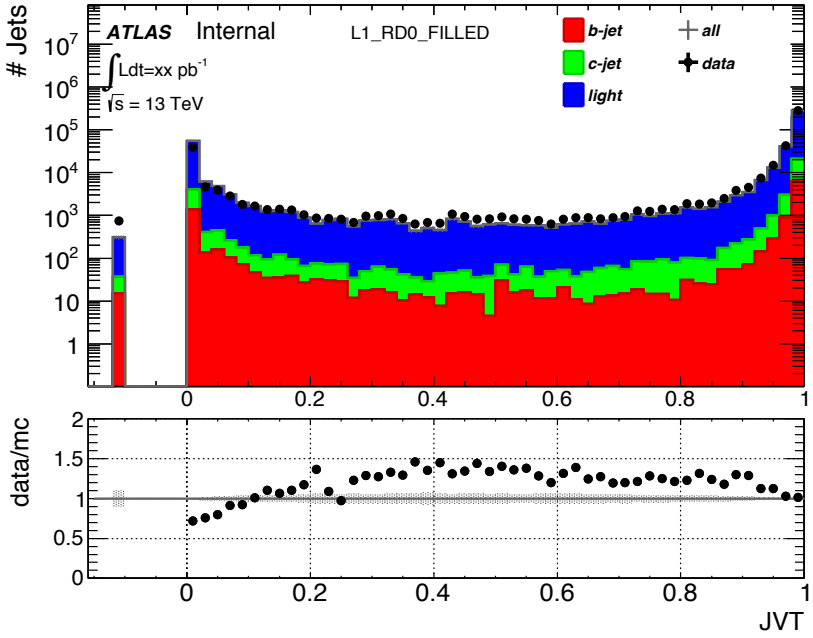


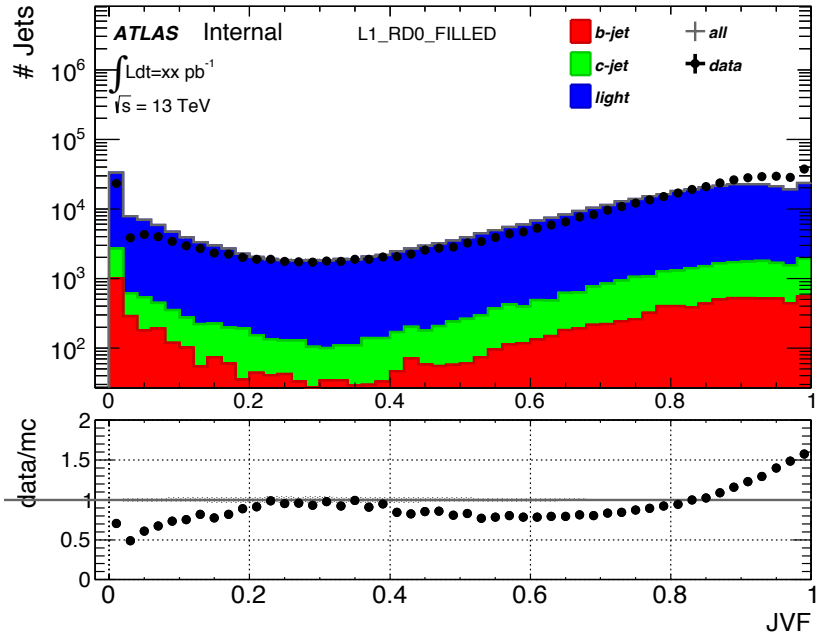
Event/Jet Properties

L1_RD0_Filled



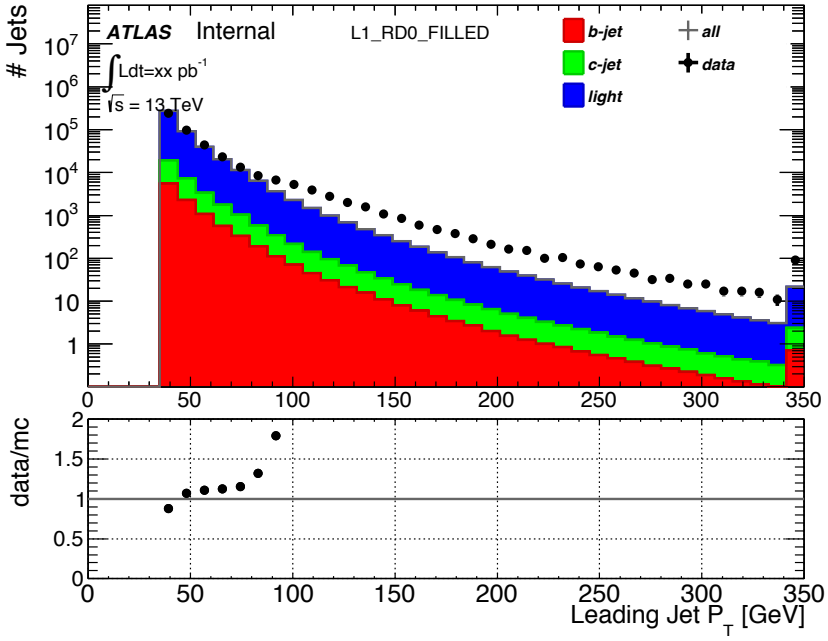


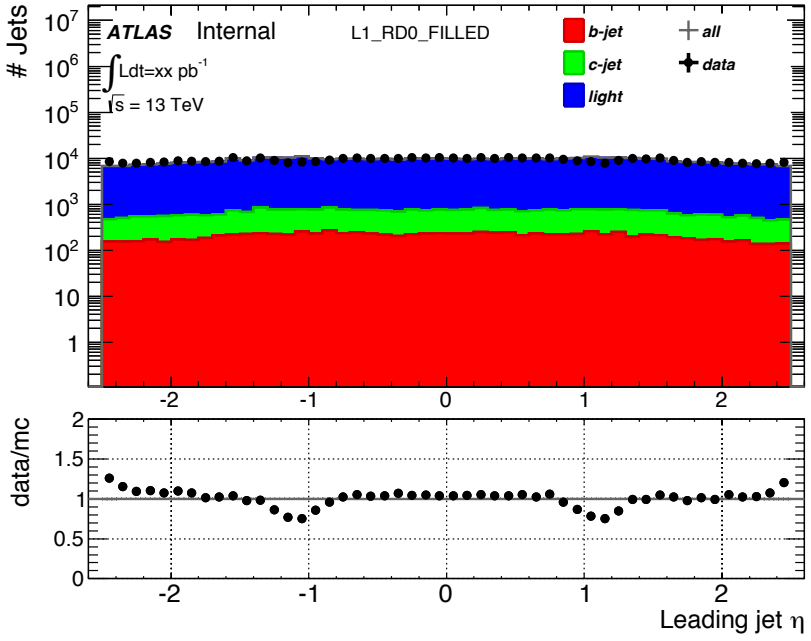


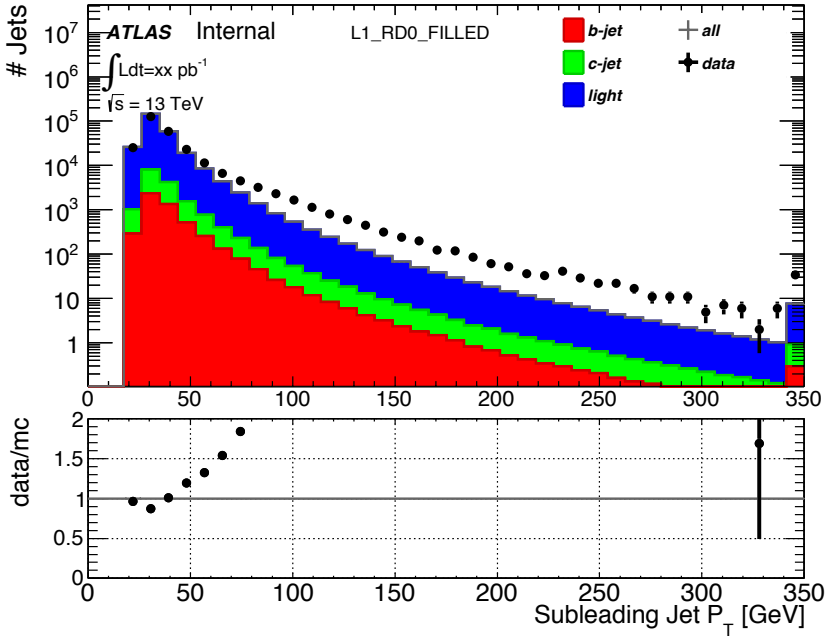


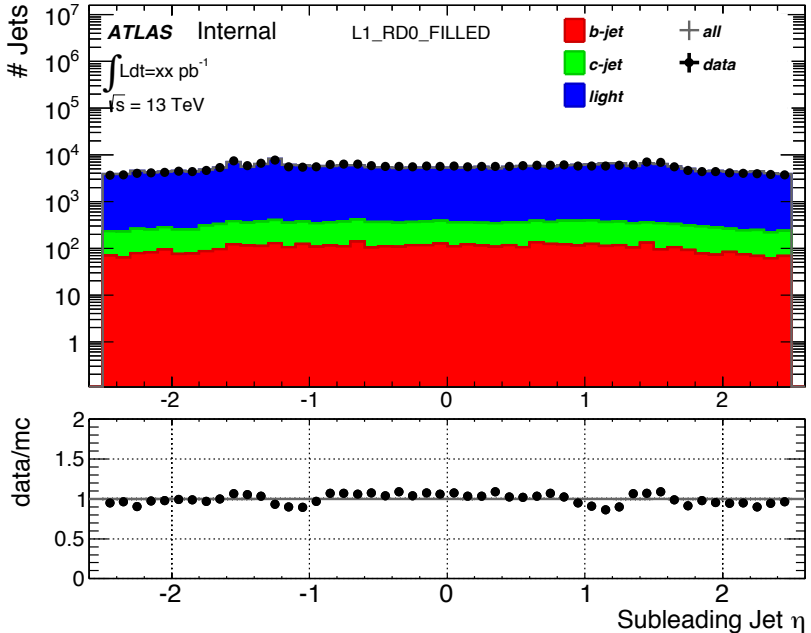
Jet Kinematic Distributions

L1_RD0_Filled



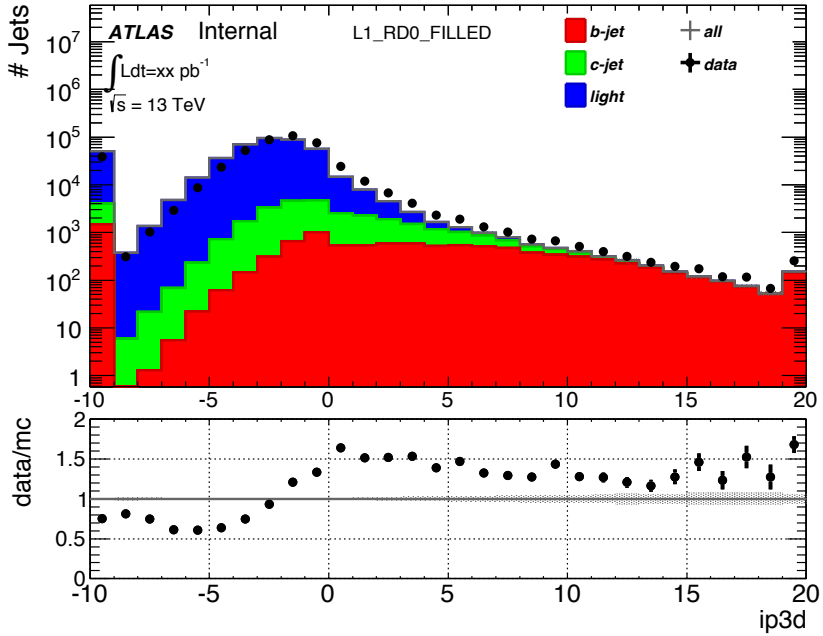


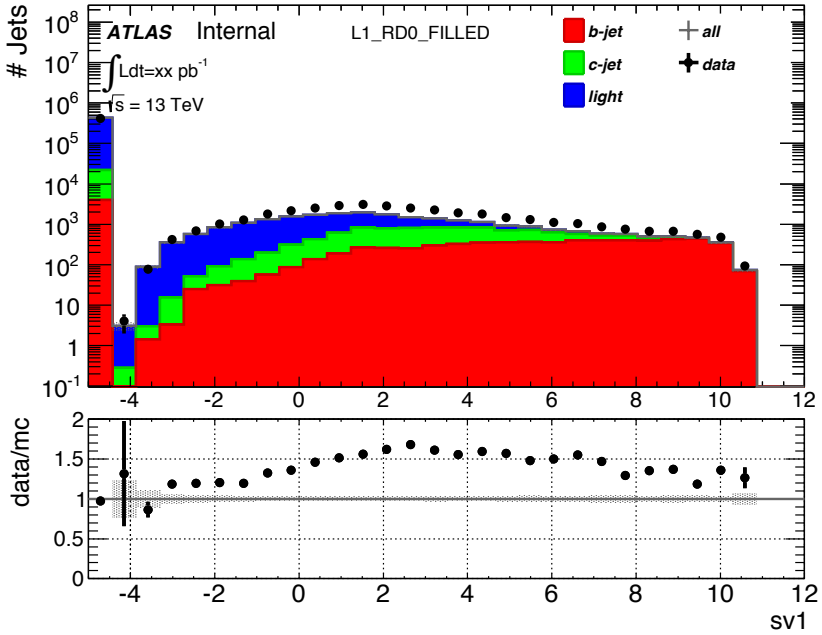


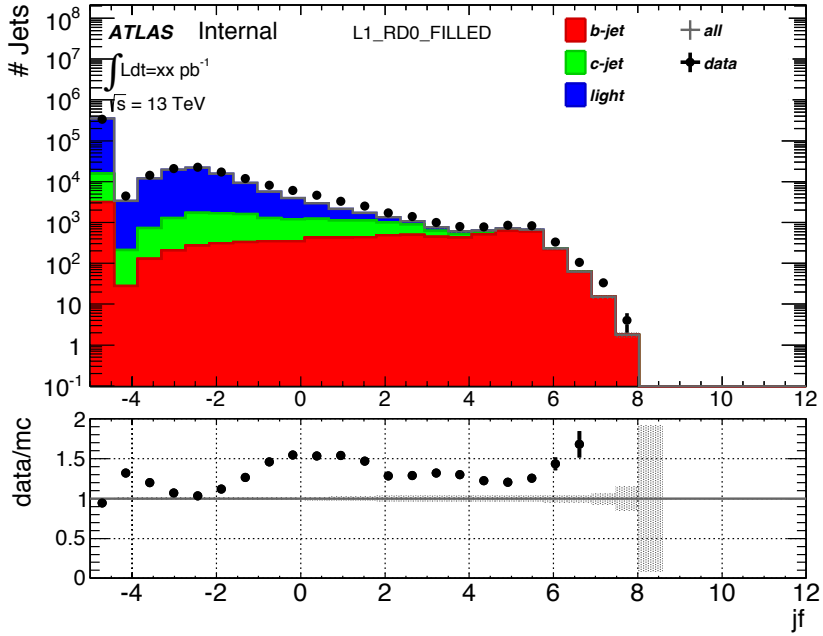


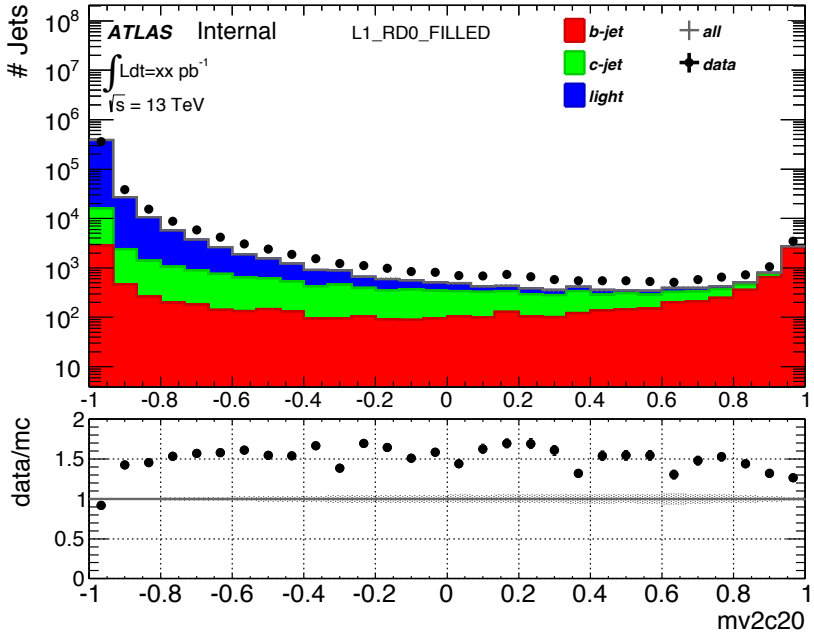
Discriminants

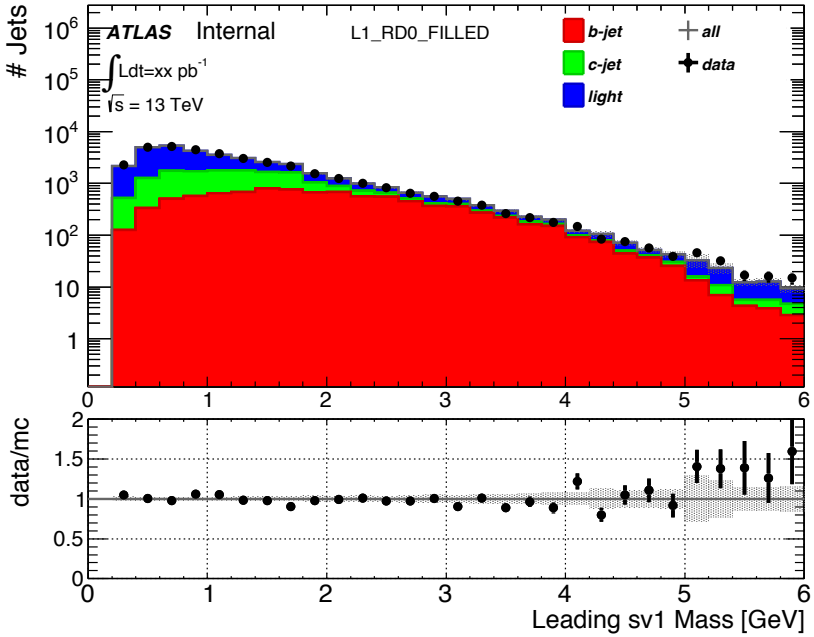
L1_RD0_Filled

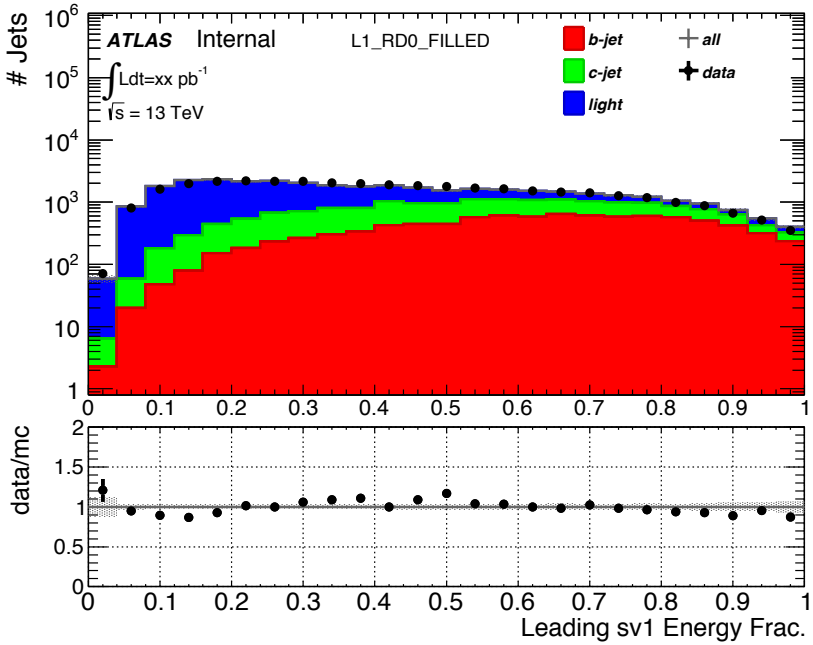


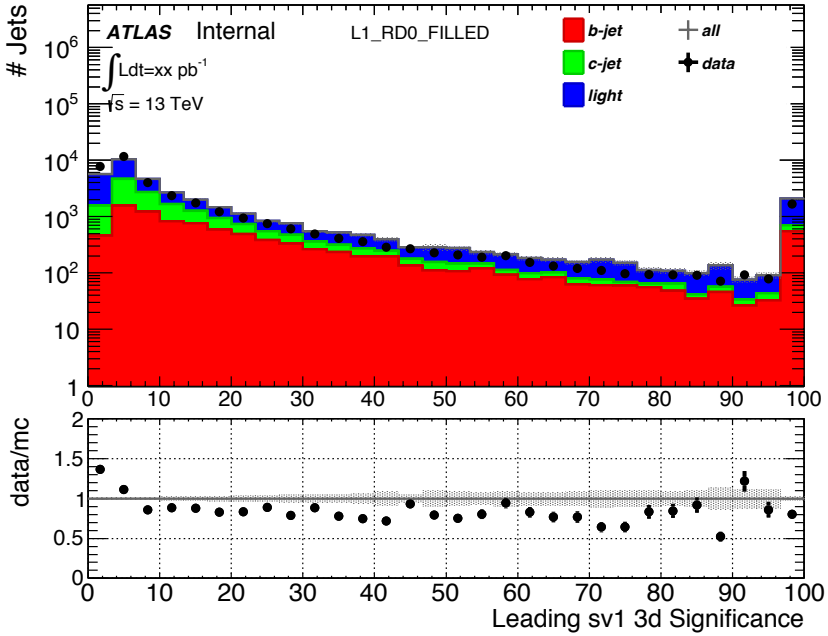


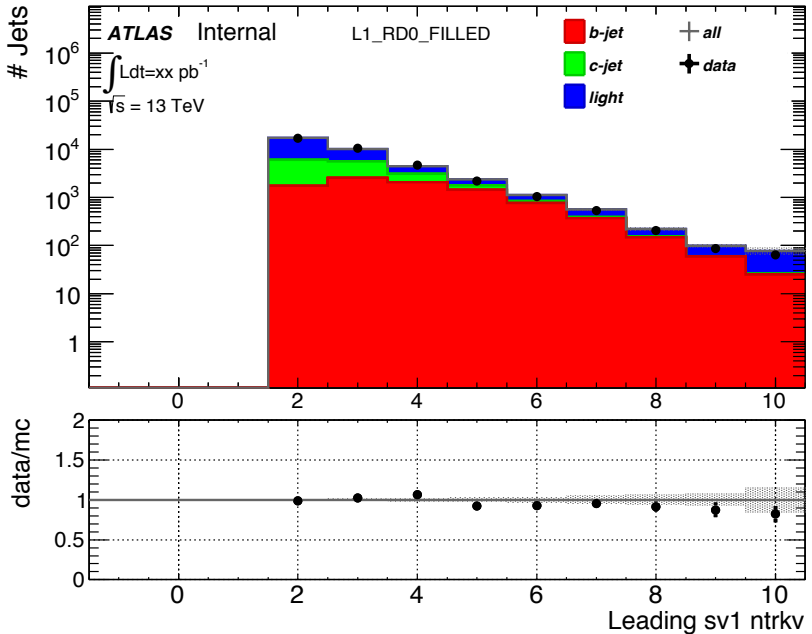




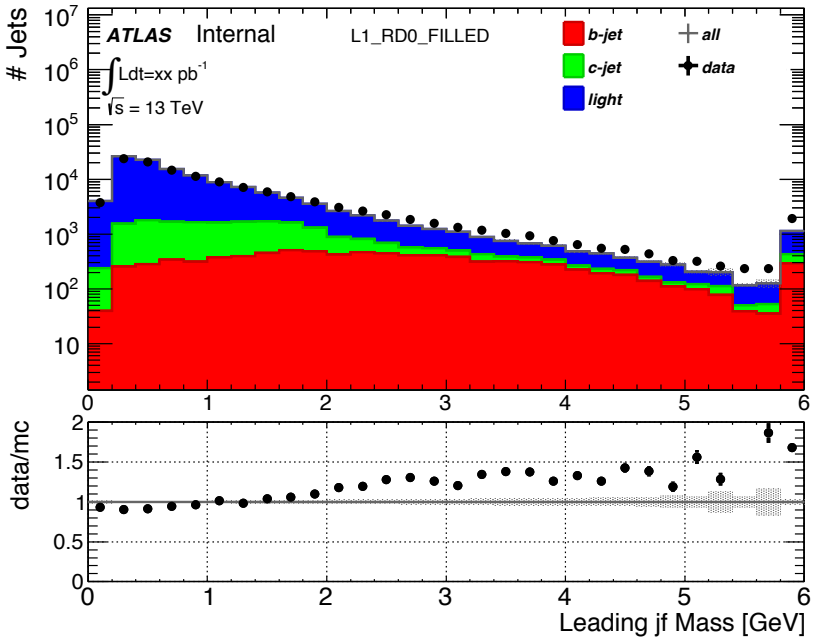

ATLAS Internal
L1_RD0_FILLED
∫Ldt=xx pb-1
√s = 13 TeV
b-jet
c-jet
light
all
data
Jets
data/mc
Leading sv1 Mass [GeV]

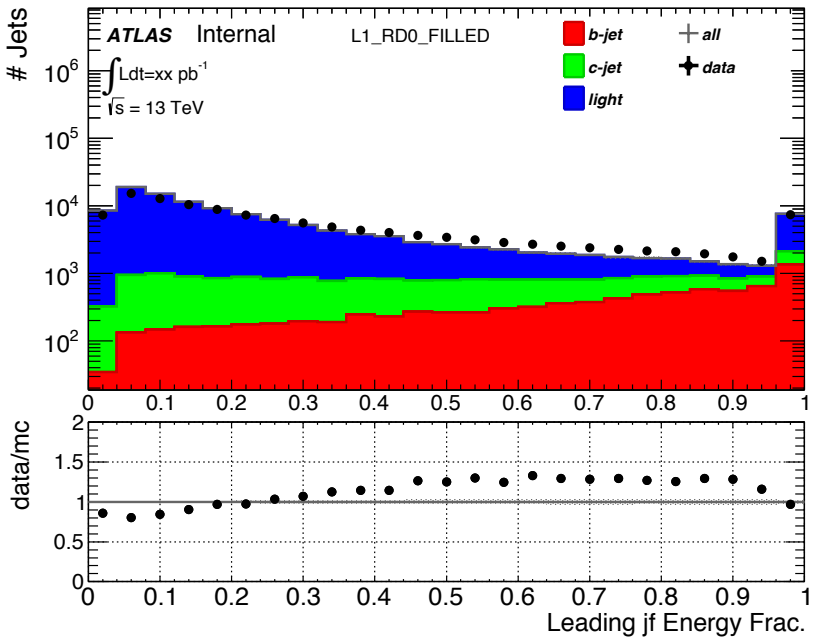

ATLAS Internal
L1_RD0_FILLED
∫Ldt=xx pb-1
√s = 13 TeV
b-jet
c-jet
light
all
data
Jets
data/mc
Leading sv1 Energy Frac.

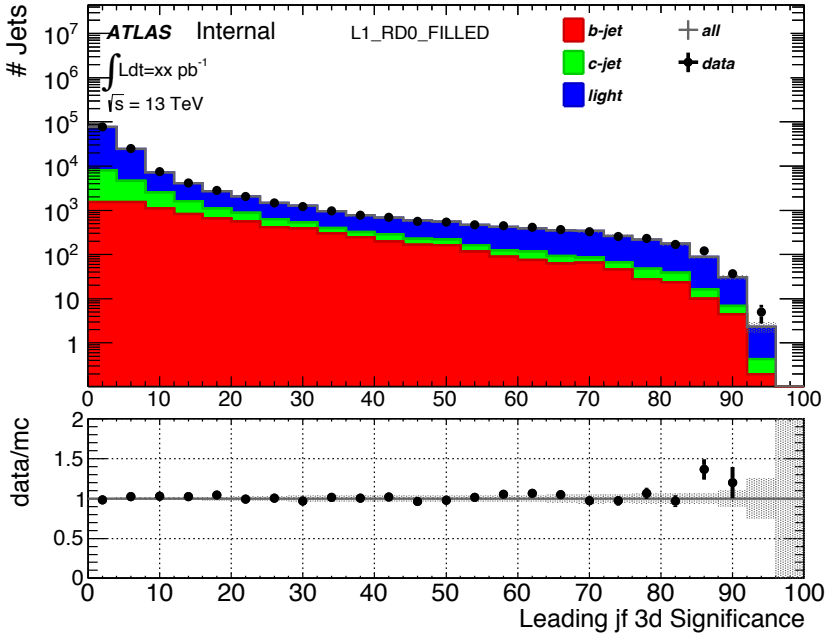

ATLAS Internal
L1_RD0_FILLED
∫Ldt=xx pb-1
√s = 13 TeV
b-jet
c-jet
light
all
data
Jets
data/mc
Leading sv1 3d Significance


ATLAS Internal
L1_RD0_FILLED
∫Ldt=xx pb-1
√s = 13 TeV
b-jet
c-jet
light
all
data
Jets
data/mc
Leading sv1 ntrkv

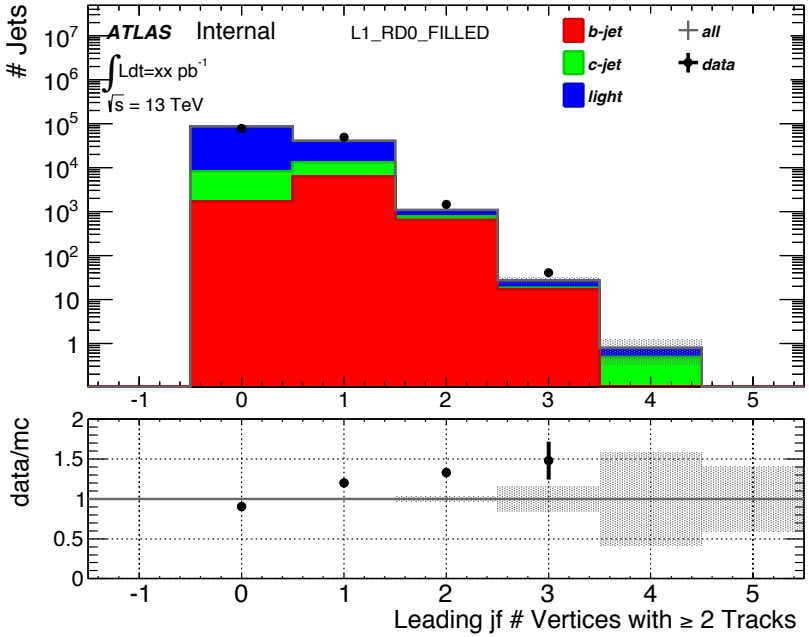
L1_RD0_Filled

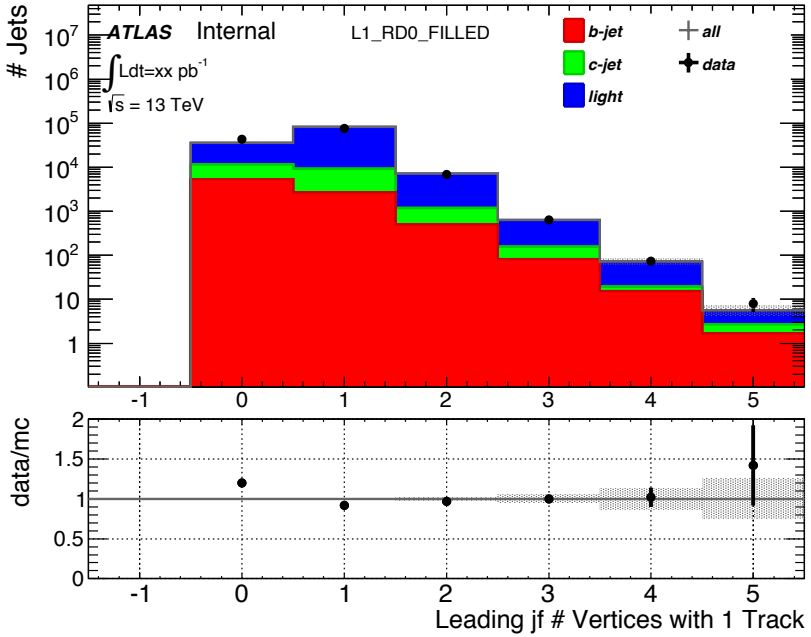


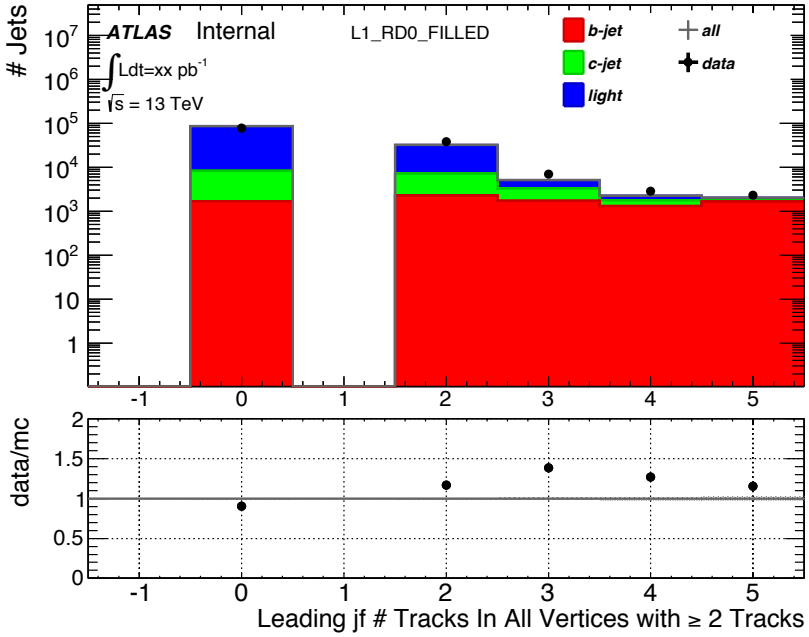




L1_RD0_Filled







Conclusions

- There is some good agreement, SV1 properties.
- Problems: FTAG Triggers, Jet P_T, <μ> re-weighting

To Do

Next Plan:
- L1_J25 Trigger with $P_T > 70$ GeV for MC
- HLT_J60 Trigger with $P_T > 70$ GeV for Data

- This trigger is used with a large P_T cut such that the trigger is at optimal efficiency

- Full data set: include tracking info (d0/z0 info.)
- JVT > 0.641 if ($P_T < 50$ GeV and $|\eta| < 2.4$)
- Reweight <μ>