FastSim vs FullSim

and

PileUp Studies

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FastSim vs FullSim

Comparison of FullSim (CMSSW 1.5.2) and FastSim (CMSSW 1.6.8)

FullSim read data files and run analysis code

FastSim generate events and run analysis code

Same analysis code used in both cases

Looked at two QCD samples

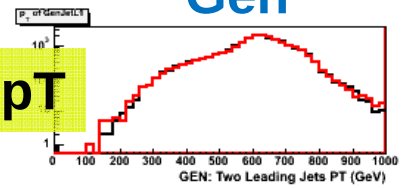
pT = (600 – 800)
pT = (3500 – inf)

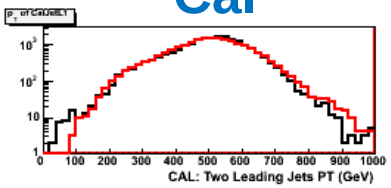
FastSim vs FullSim

pT = 600 - 800

Gen **Cal**

pT





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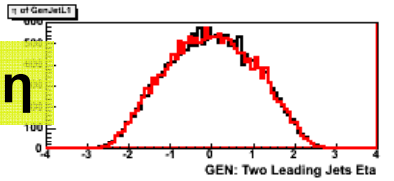

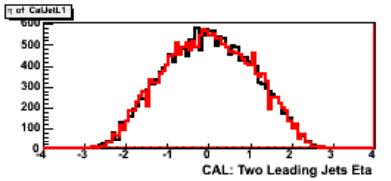

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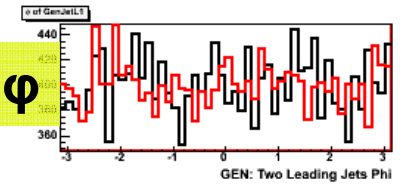
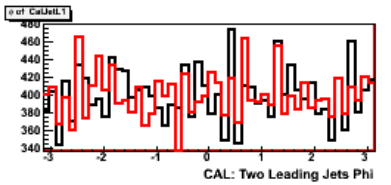




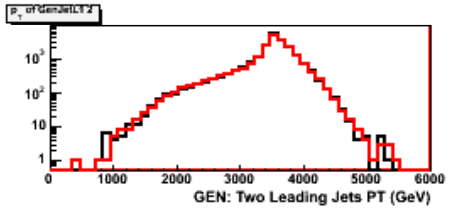
See better agreement for Cal quantities in the low pT sample

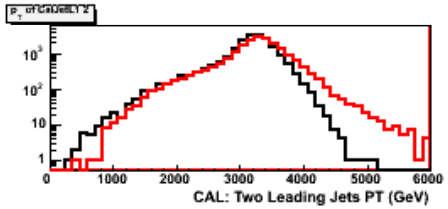
Comparison of Gen and Cal quantities

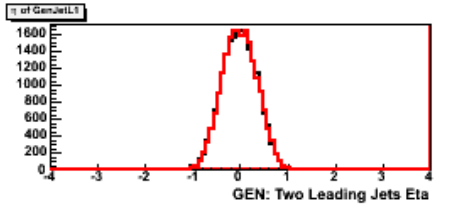
Gen quantities agree in both samples

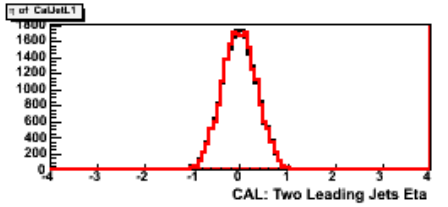
Black: fullsim
Red: fastsim

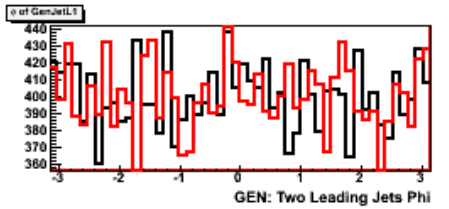
pT = 3500 - inf

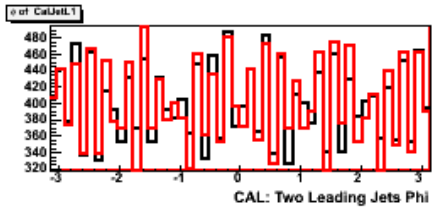




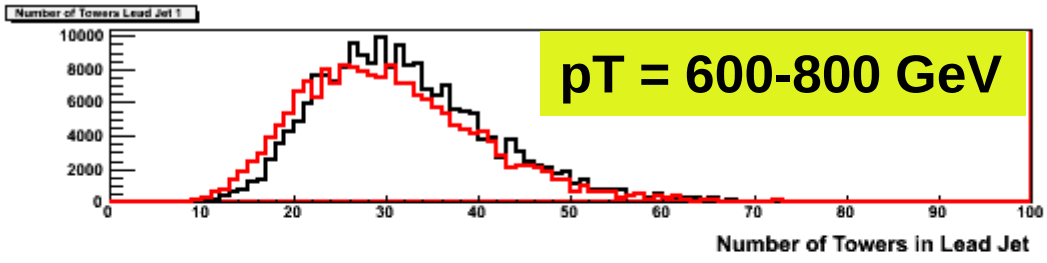




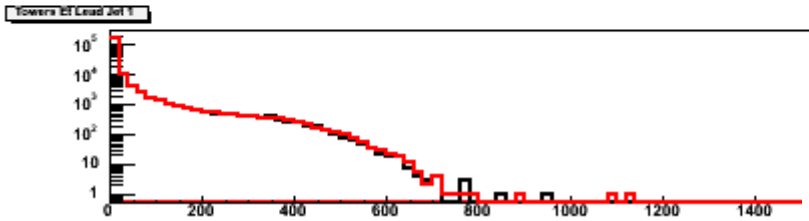


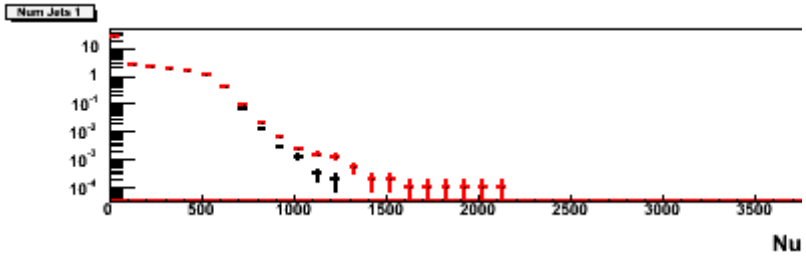


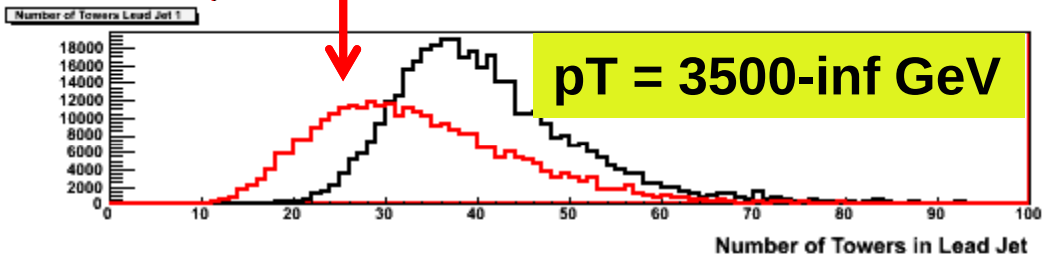
FastSim vs FullSim

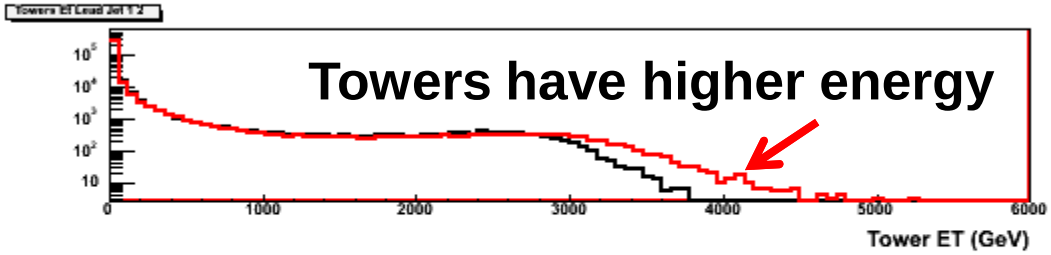


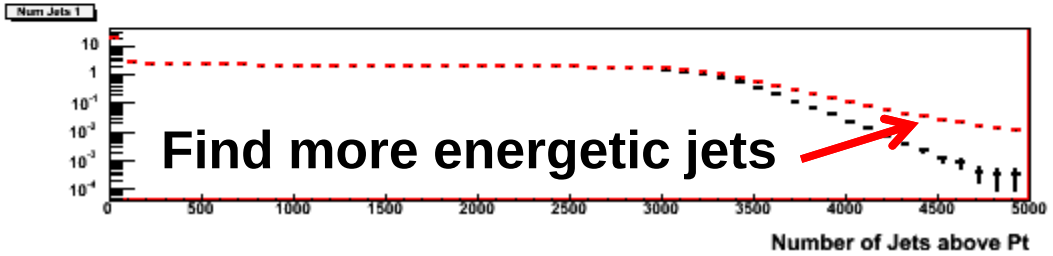
At higher pT we see fewer towers



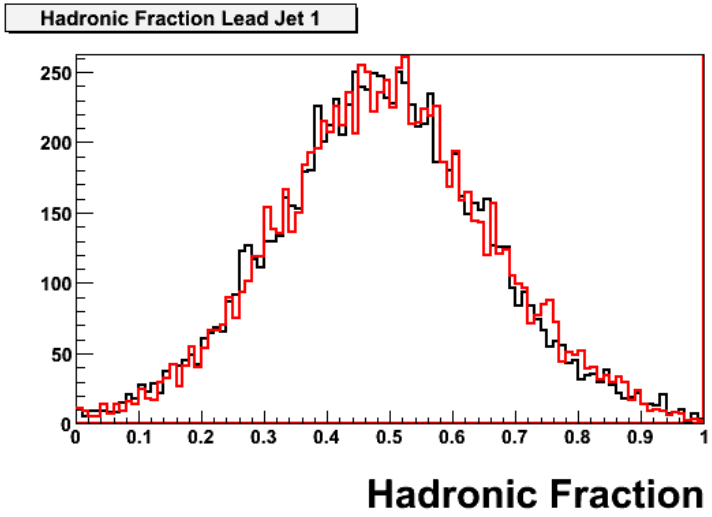






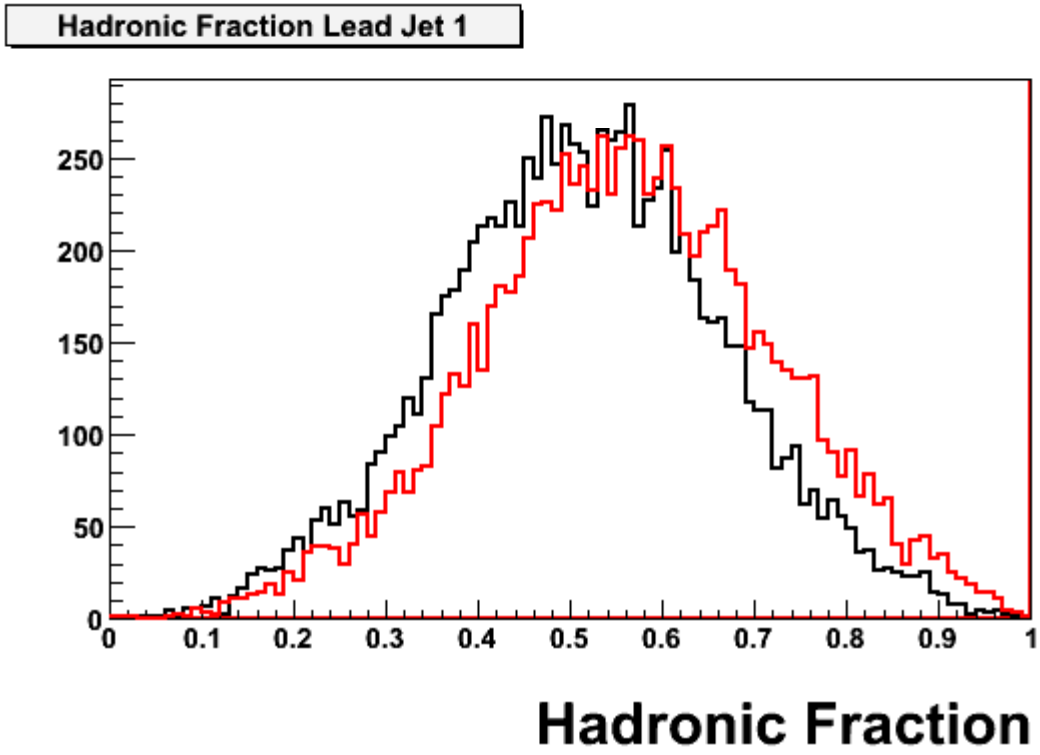


FastSim vs FullSim

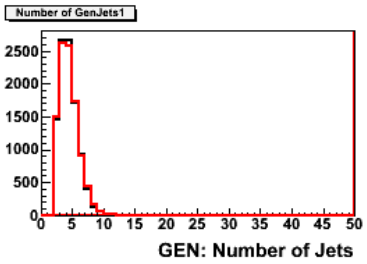


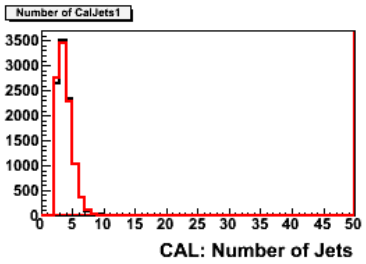
Hadronic fraction of the Jet is larger in the high pT sample

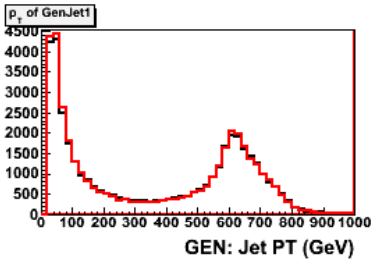
Shower developing deeper

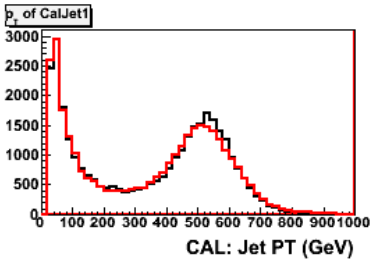


FastSim vs FullSim

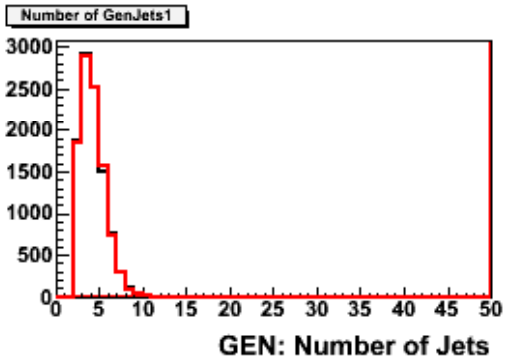


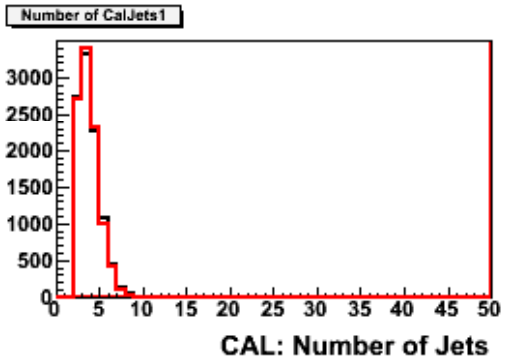




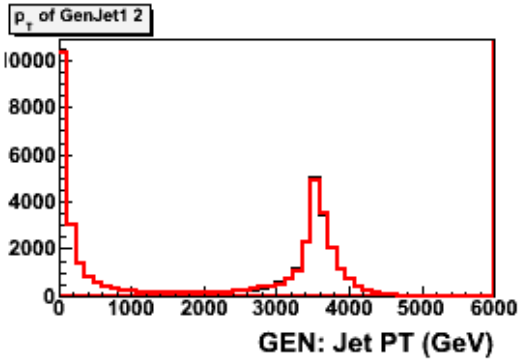


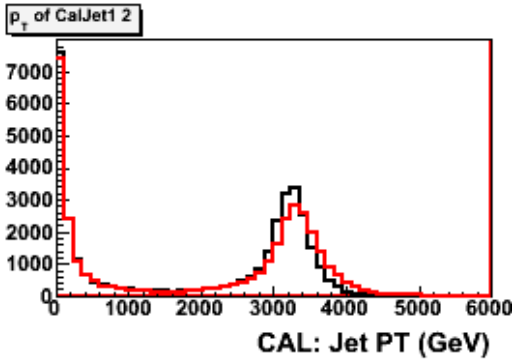
Generated quantities agree…





Jet are constructed with higher pT in the high pT sample





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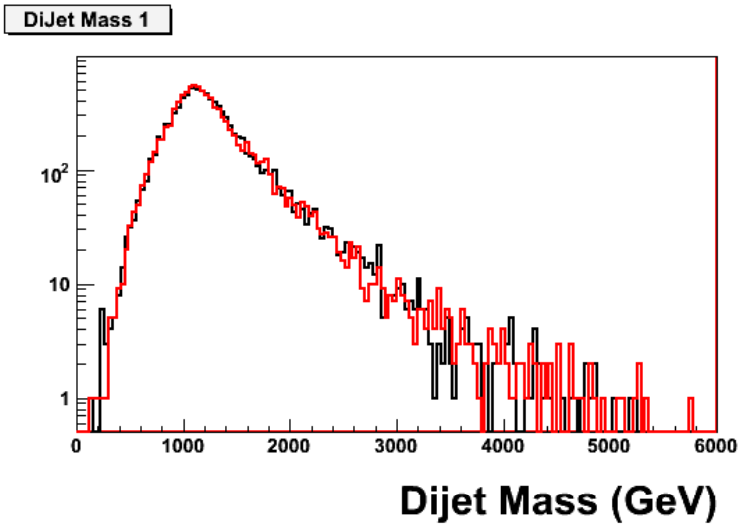
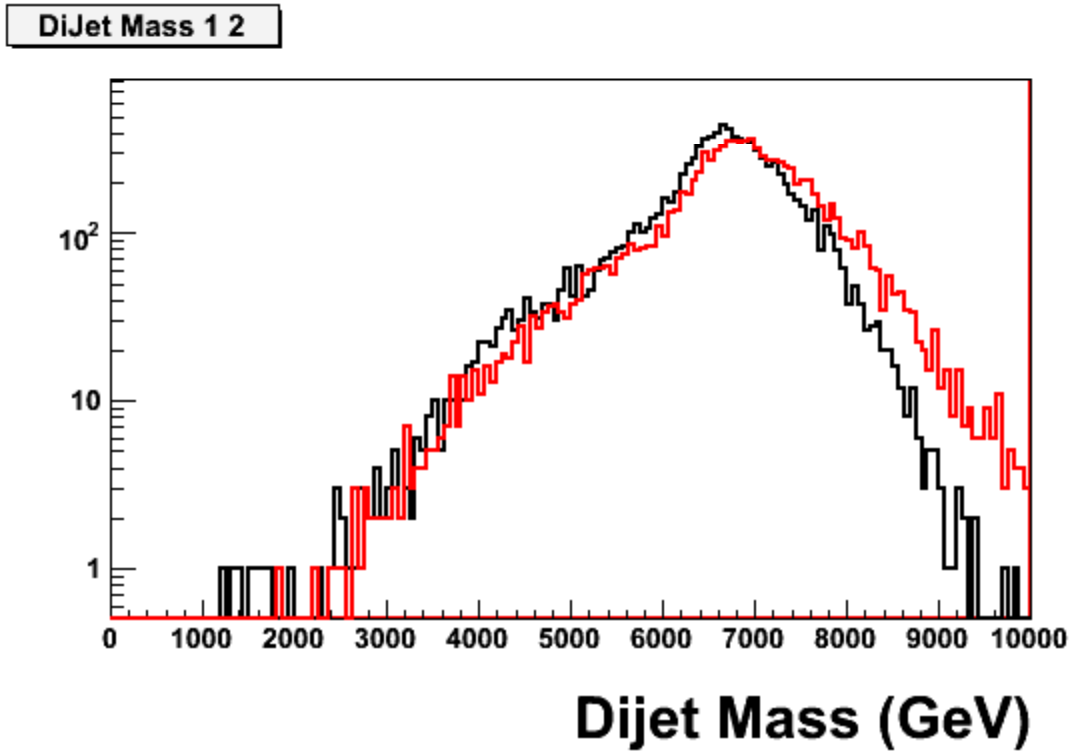


Dijet Mass from the two leading jets



FastSim vs FullSim

We see a larger discrepancy for the high pT sample

See fewer towers *and* towers *have more energy*
- ***Lateral shower spread***

FastSim jets are *more energetic*
- ***Energy scale/linearity***

FastSim jets have a *larger hadronic component*
- ***Longitudinal shower***

PileUp Studies

Study pileup effects using FastSim

Saw differences in response for FastSim vs FullSim but should be ok for pileup studies

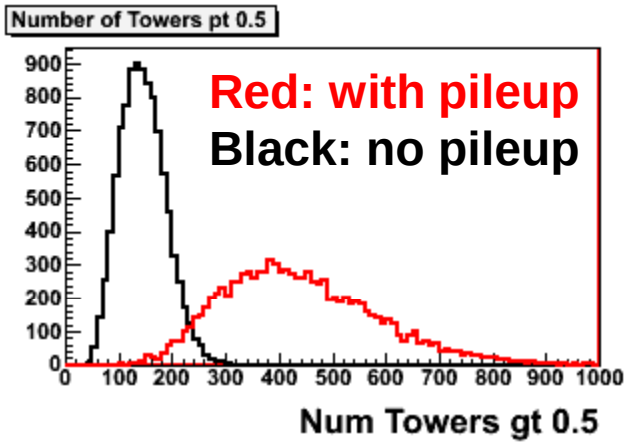
FastSim pileup simulation only for in-time pileup

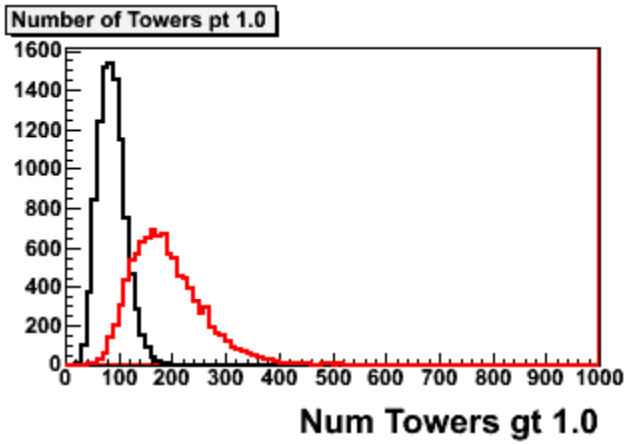
Compared evts=0 with evts=20

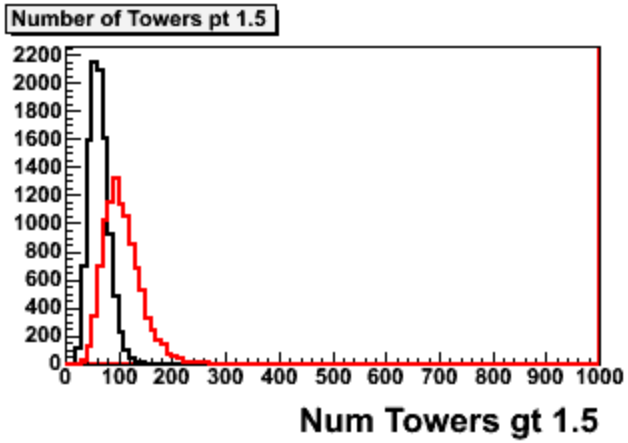
Is pileup properly simulated?

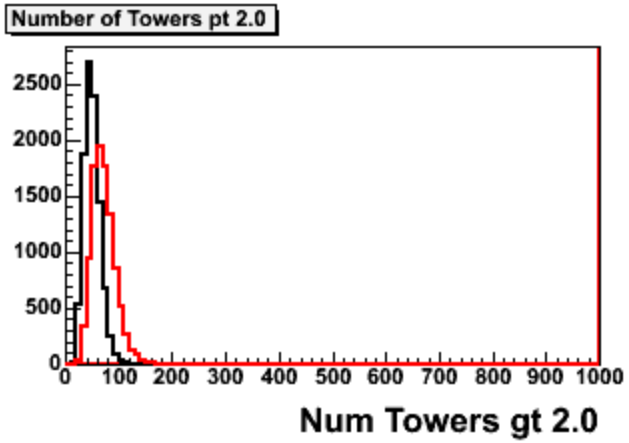
PileUp Studies

QCD pT = (600-800) GeV

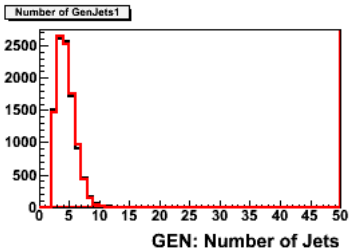


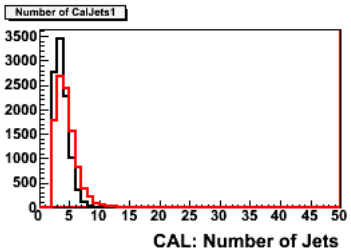


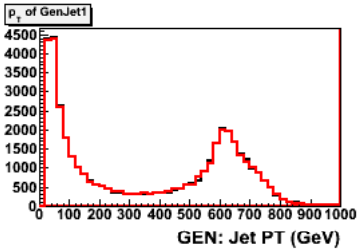


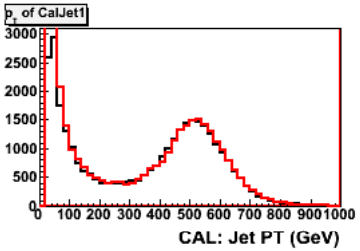


PileUp Studies



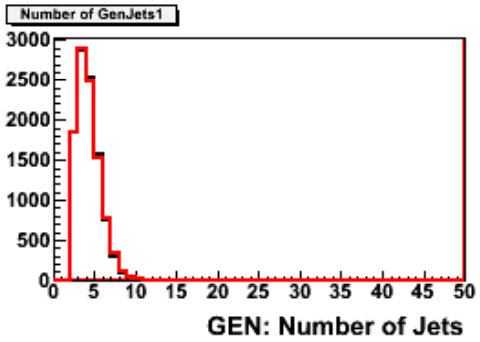


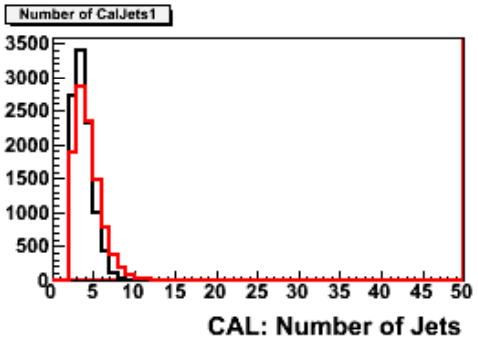


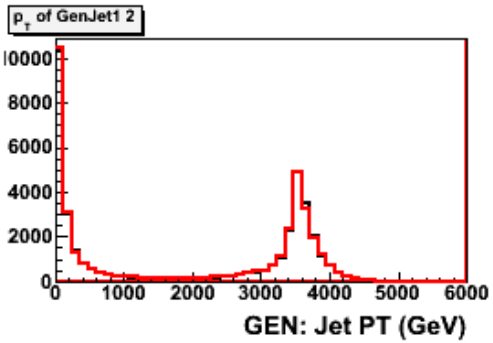


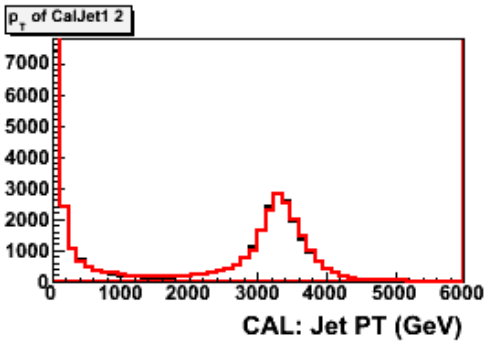
Distributions look reasonable

More lower pT jets (as expected)

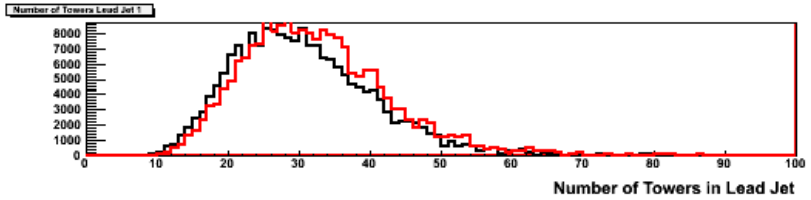


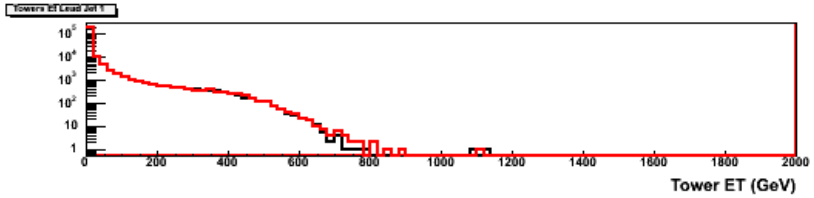


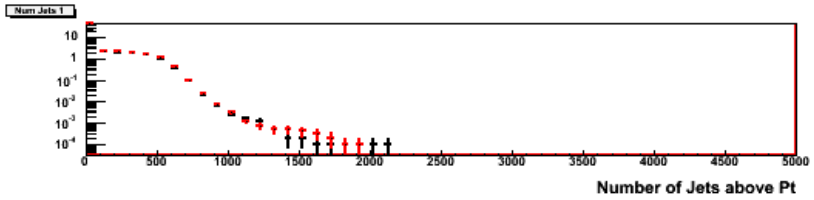




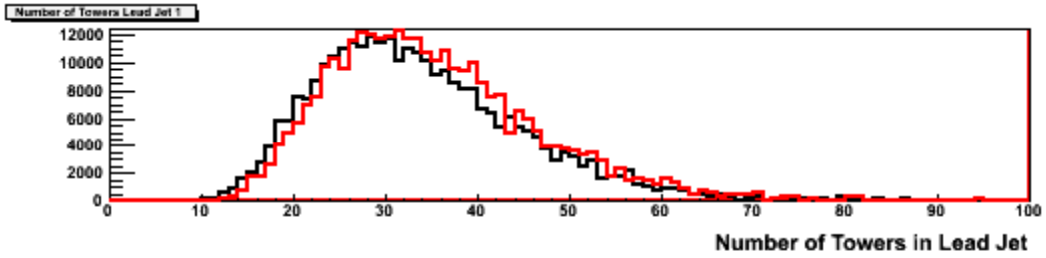
PileUp Studies

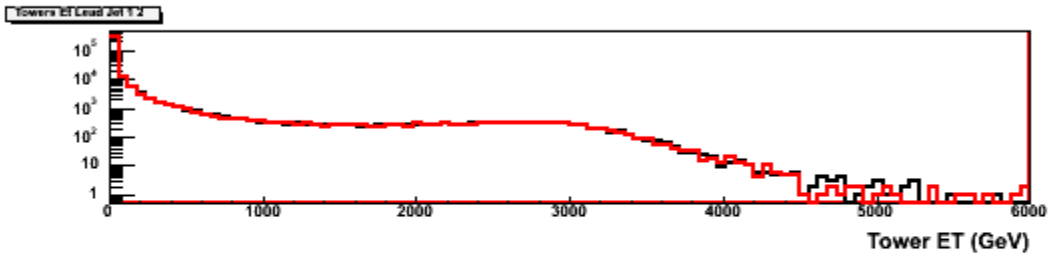


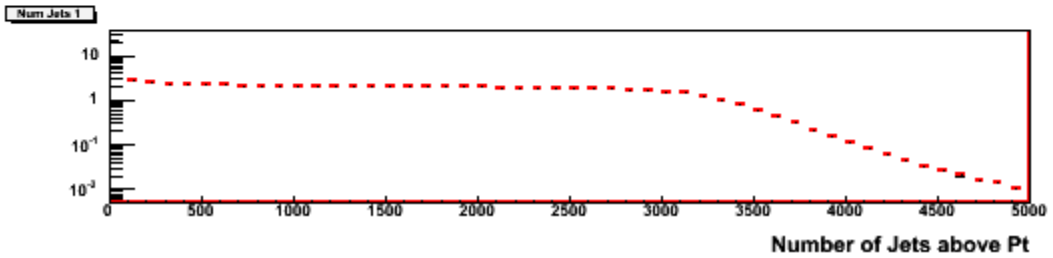




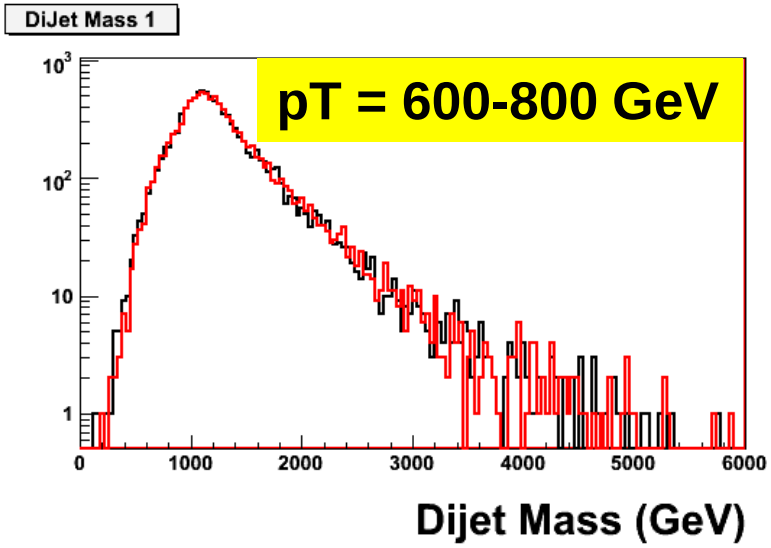
Jets have slightly more towers



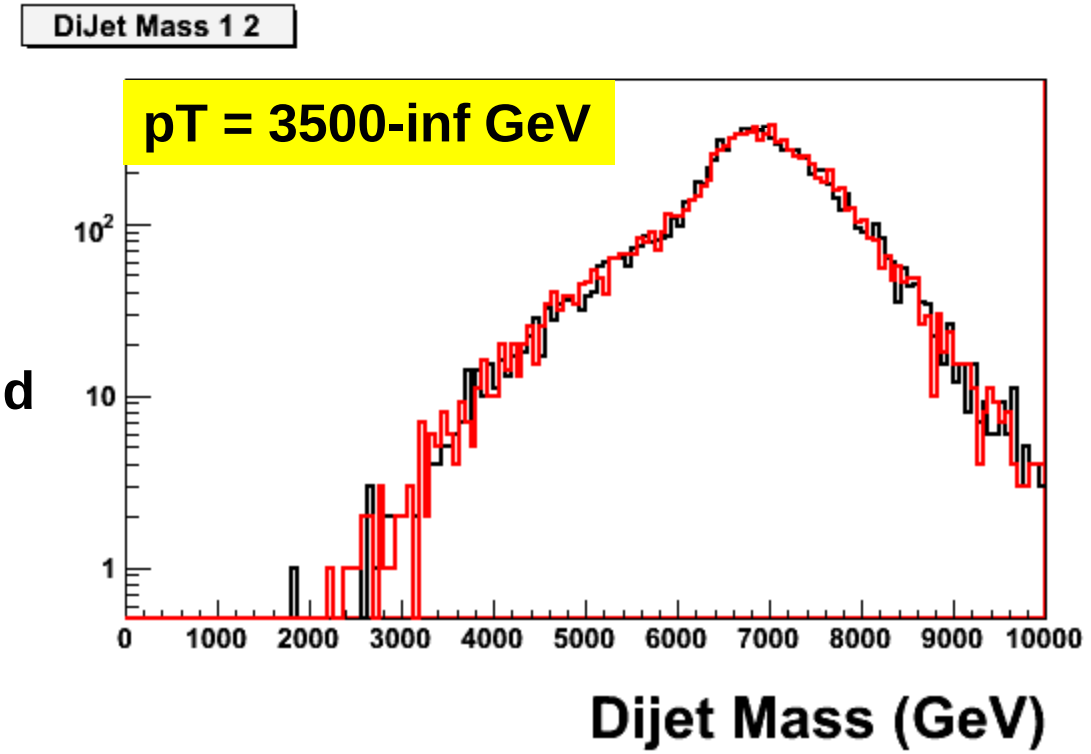




PileUp Studies



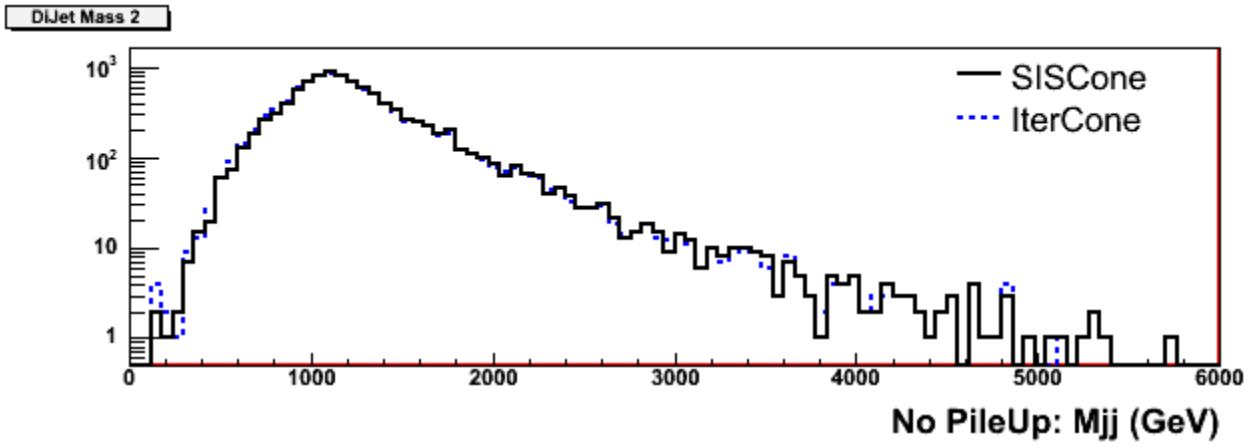
Dijet mass determined from the two leading jets

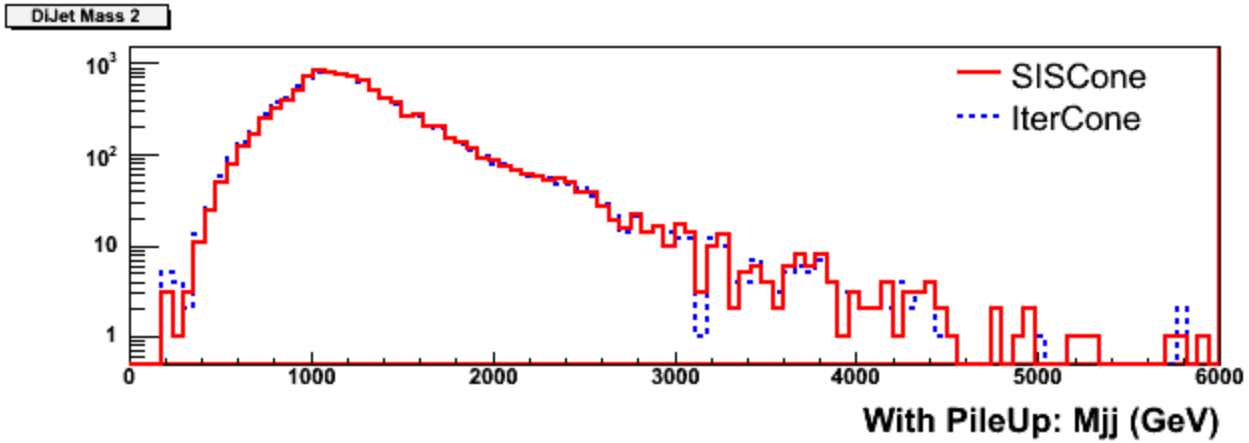


Similar distributions with and without pileup…

PileUp Studies

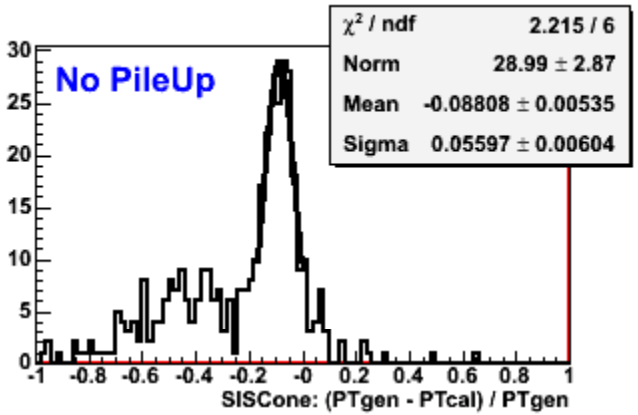
SISCone and IterCone

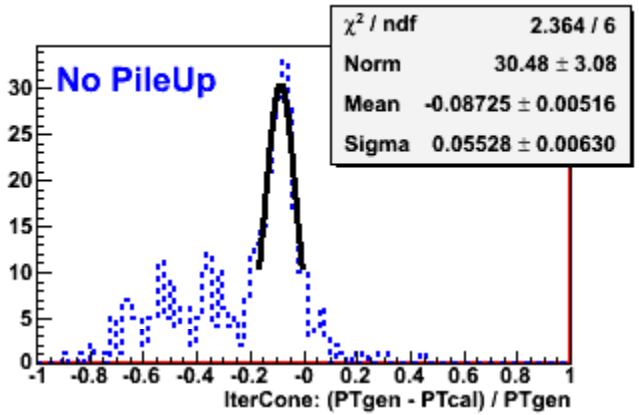


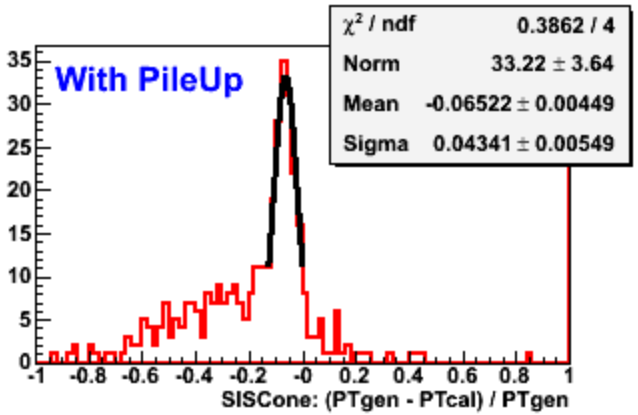


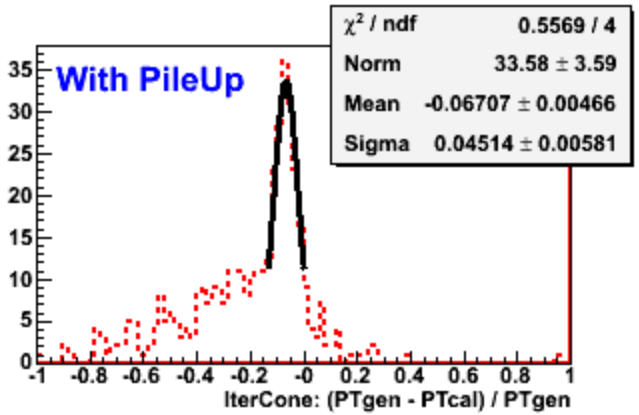
PileUp Studies

pT Resolution









PileUp Studies

Some concerns about how SISCone behaves at the detector level

Need to demonstrate that SISCone behaves well in the presence of pileup