Hadronic Decays of Boosted W/Z

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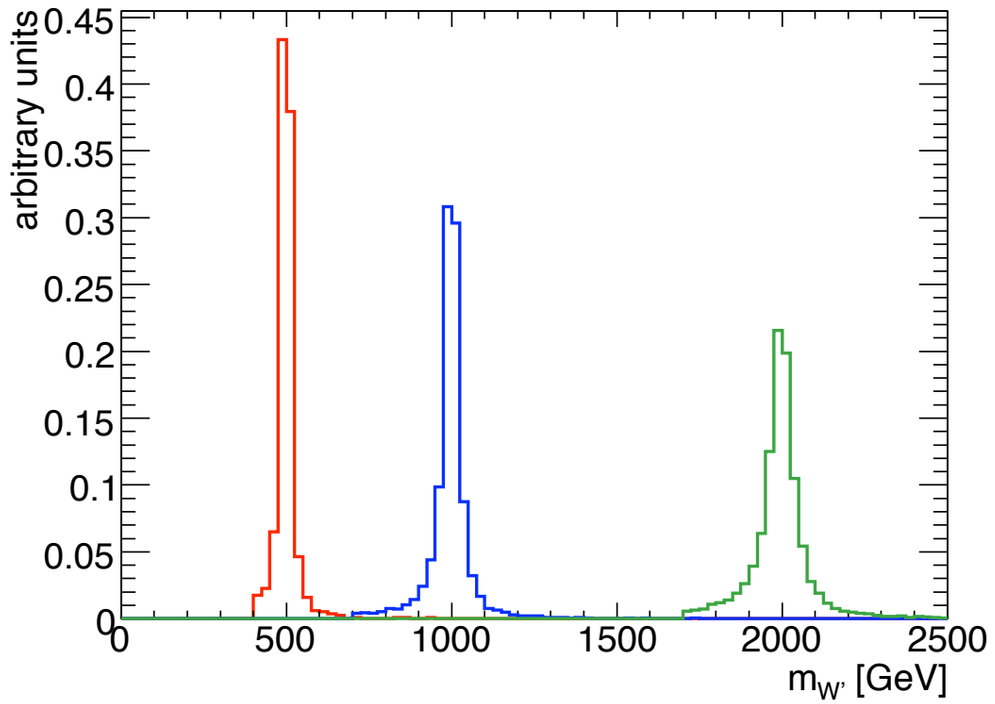
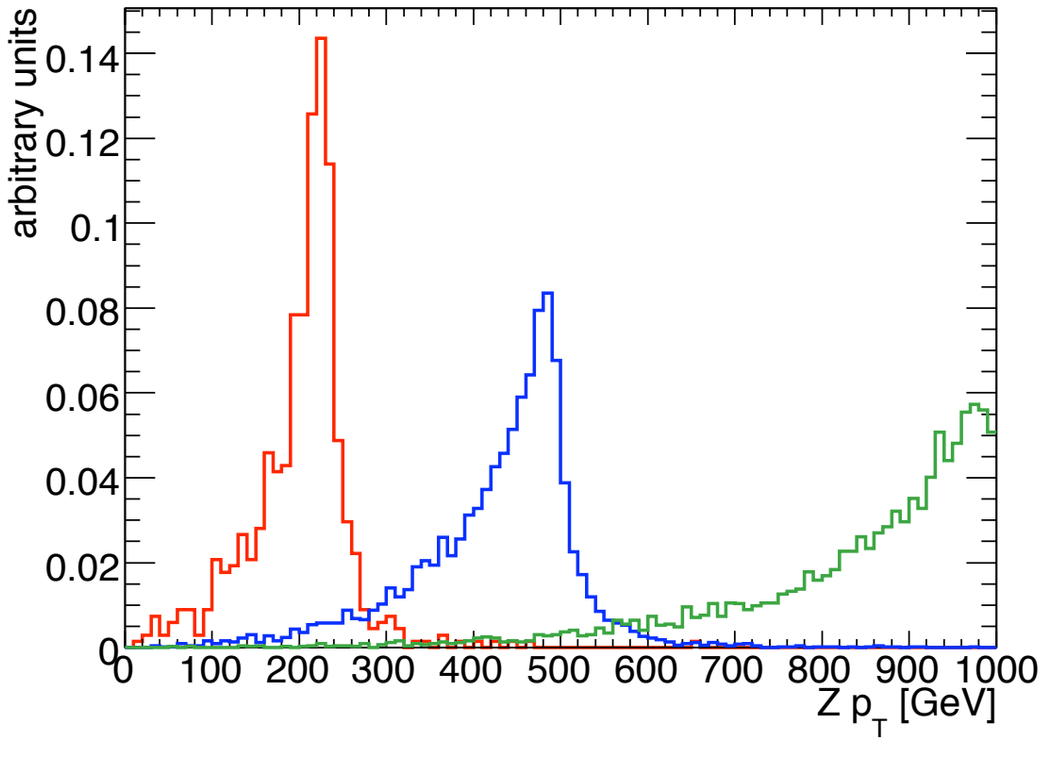
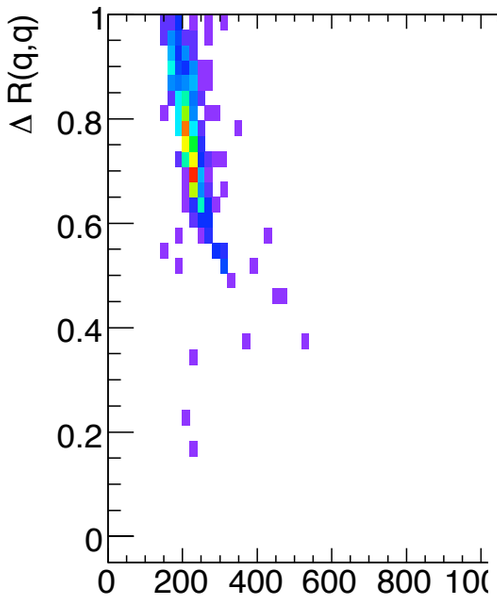
Introduction

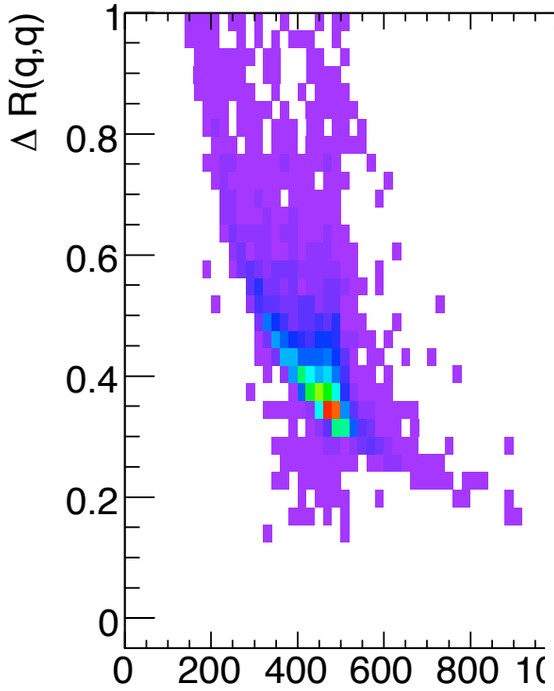
- Interested in how well hadronic W/Z can be reconstructed
- Use W’ production to produce samples of boosted W and Z
  - W’->WZ
  - Either W->qq; Z->ll or W->lv; Z->qq
- Prototyping using PGS and Pythia (10k events for each resonance mass)
- No backgrounds considered yet
- ATLFAST II samples are on their way
- Eventually we’ll need to use full simulation to understand this fully



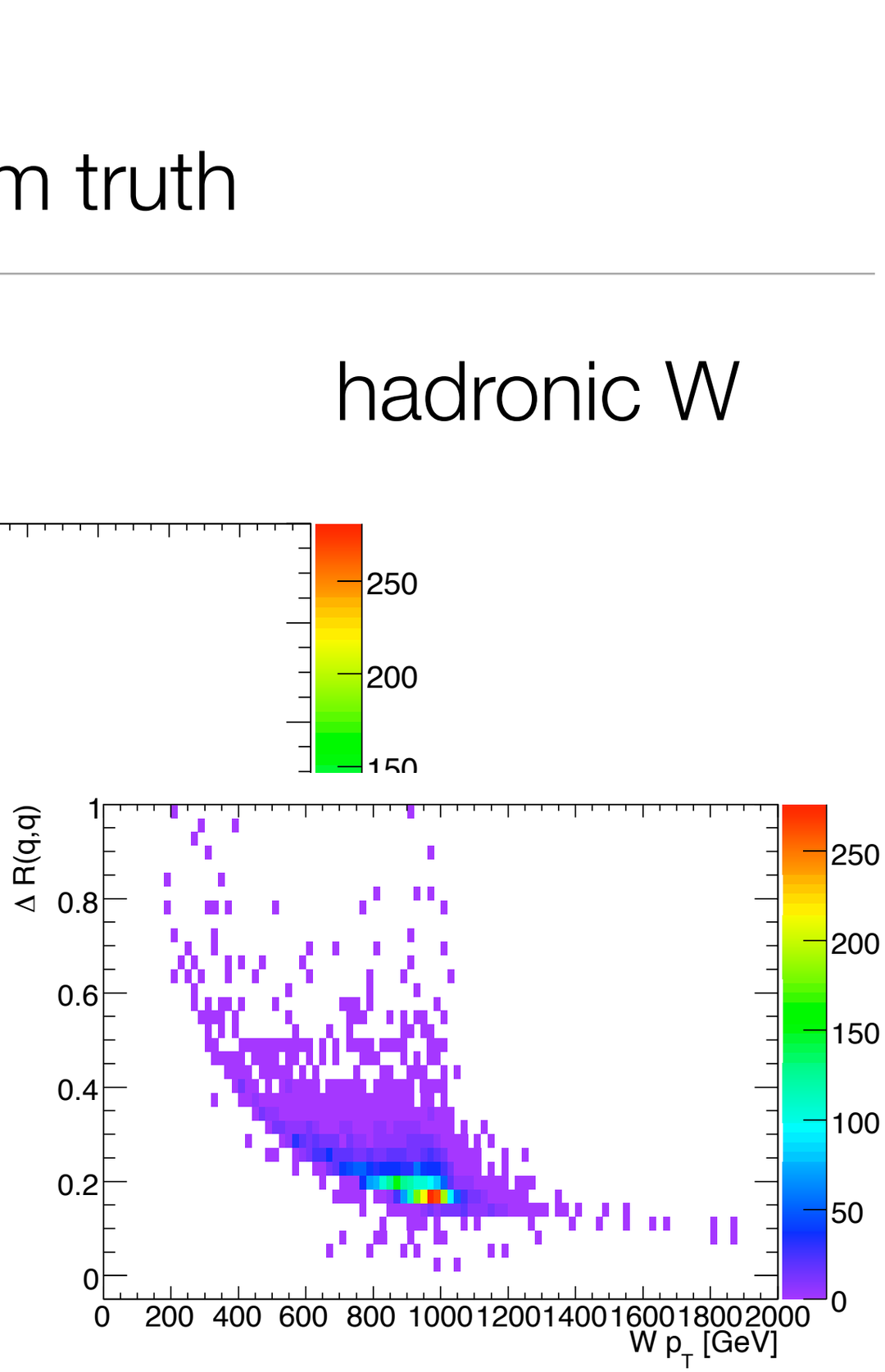


Distance between quarks from truth





hadronic W

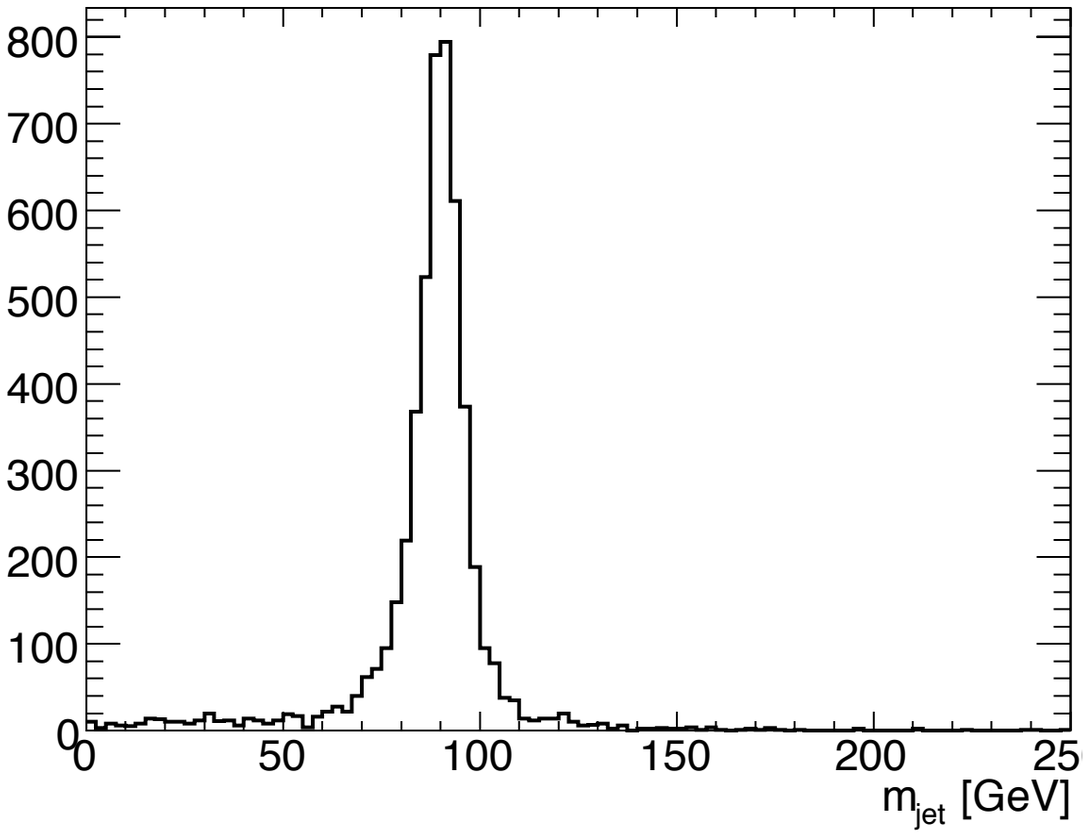


expect all jets to be merged in 2 TeV sample

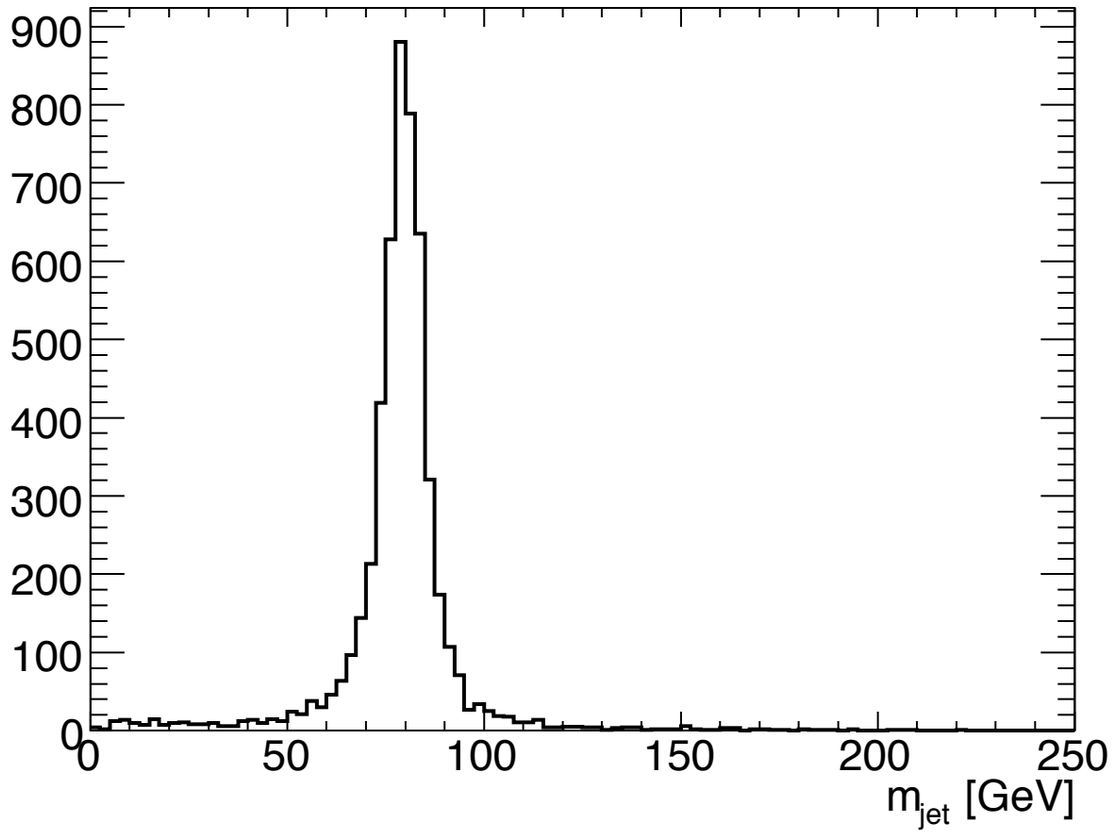
Jet Mass

$m_{W'}$=2 TeV

Z

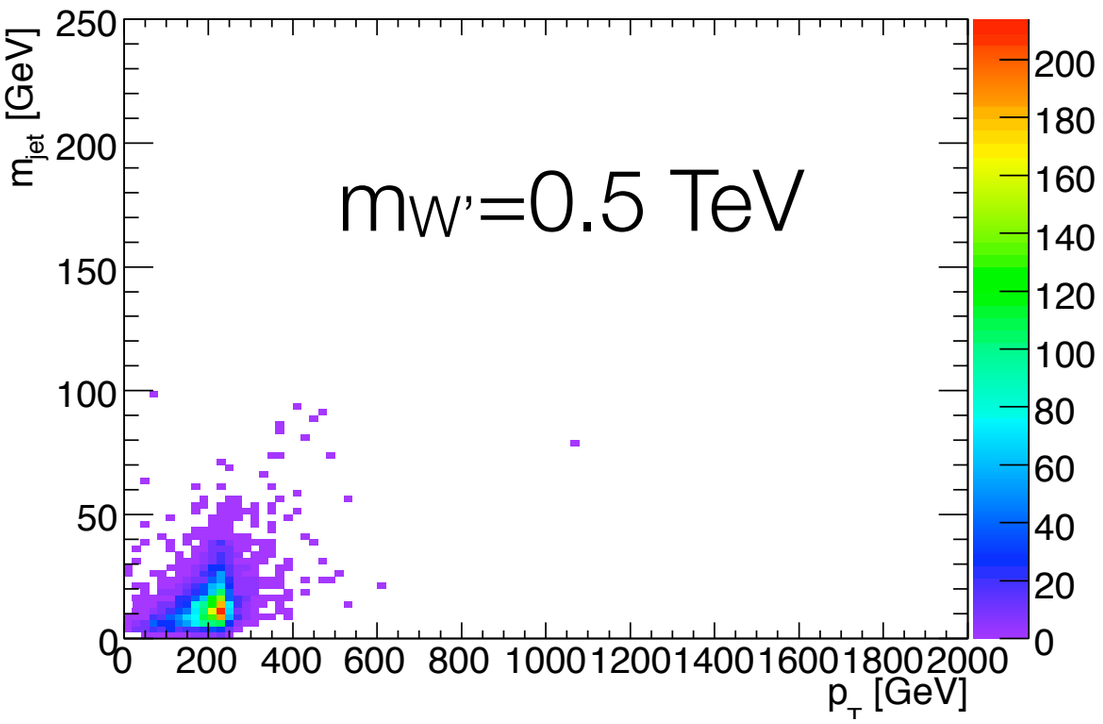


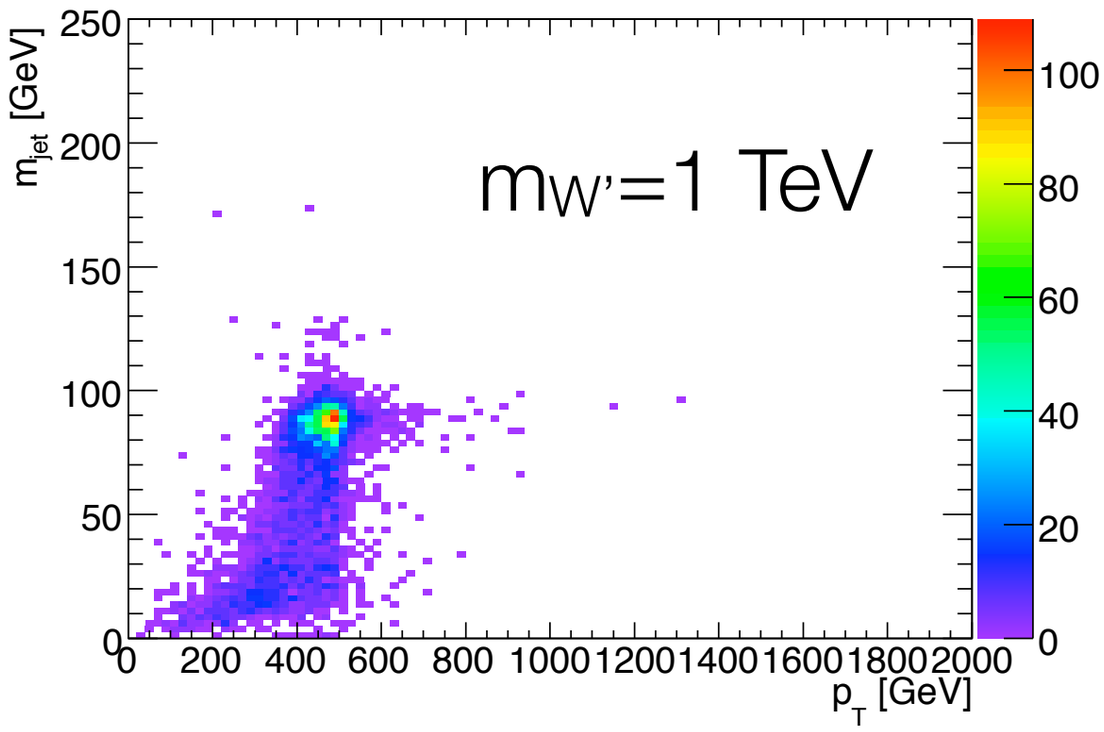
W



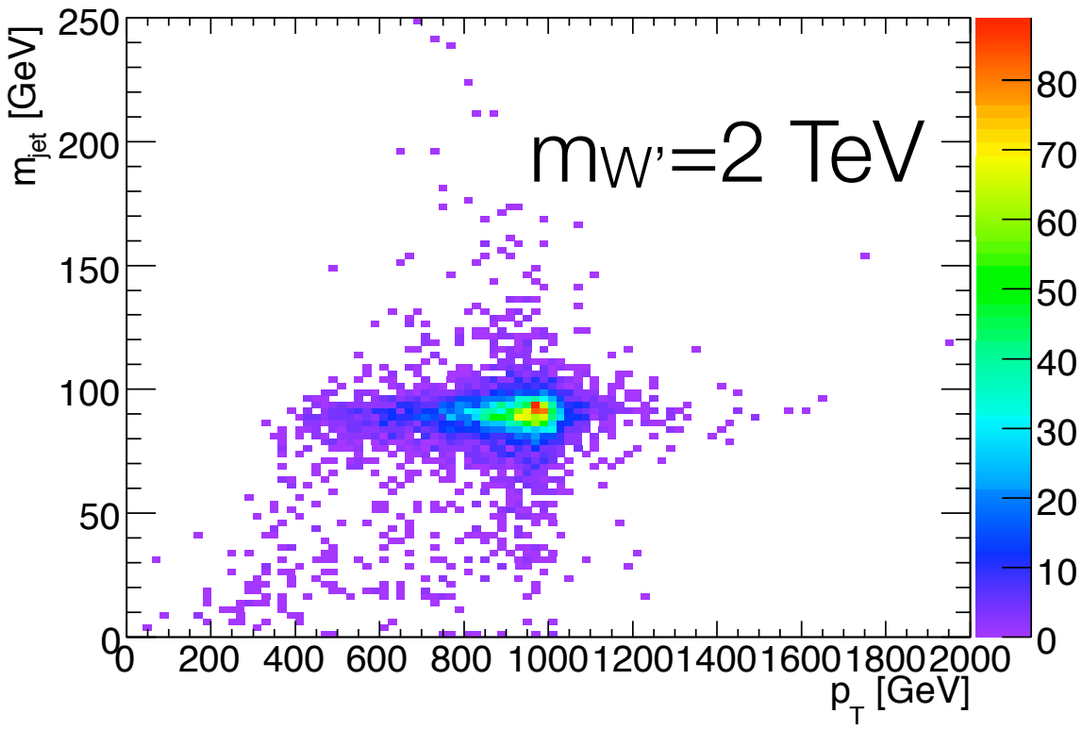
mass resolution to be determined from full simulation

Hadronic Z

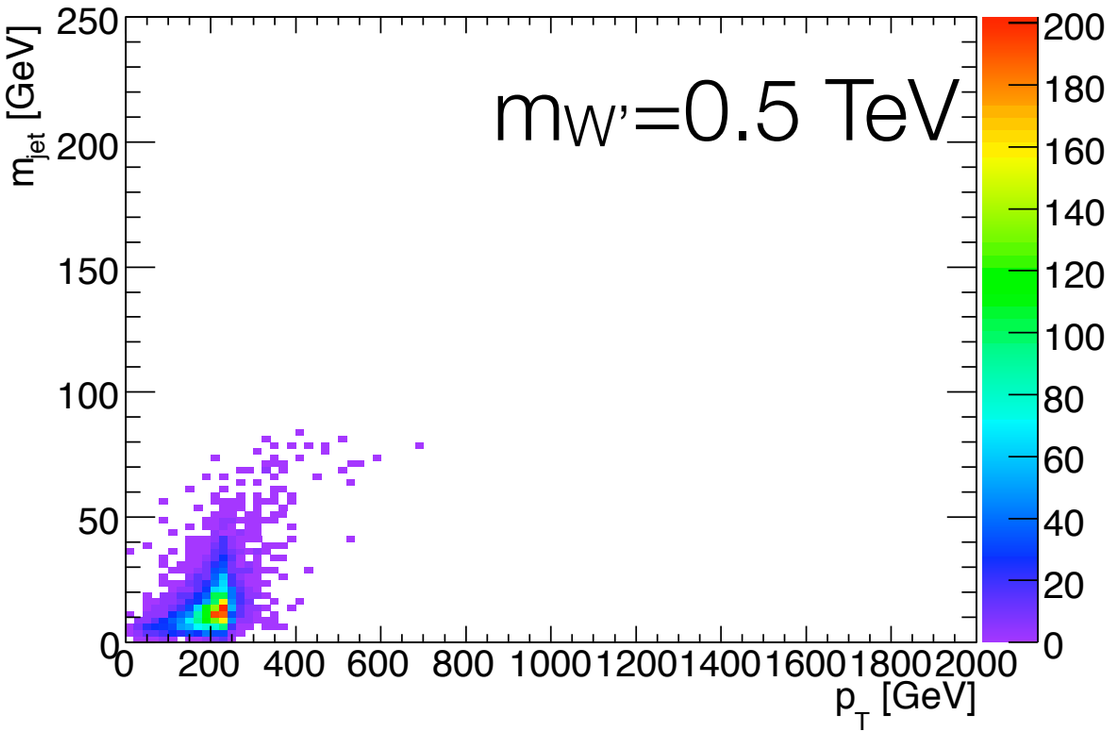


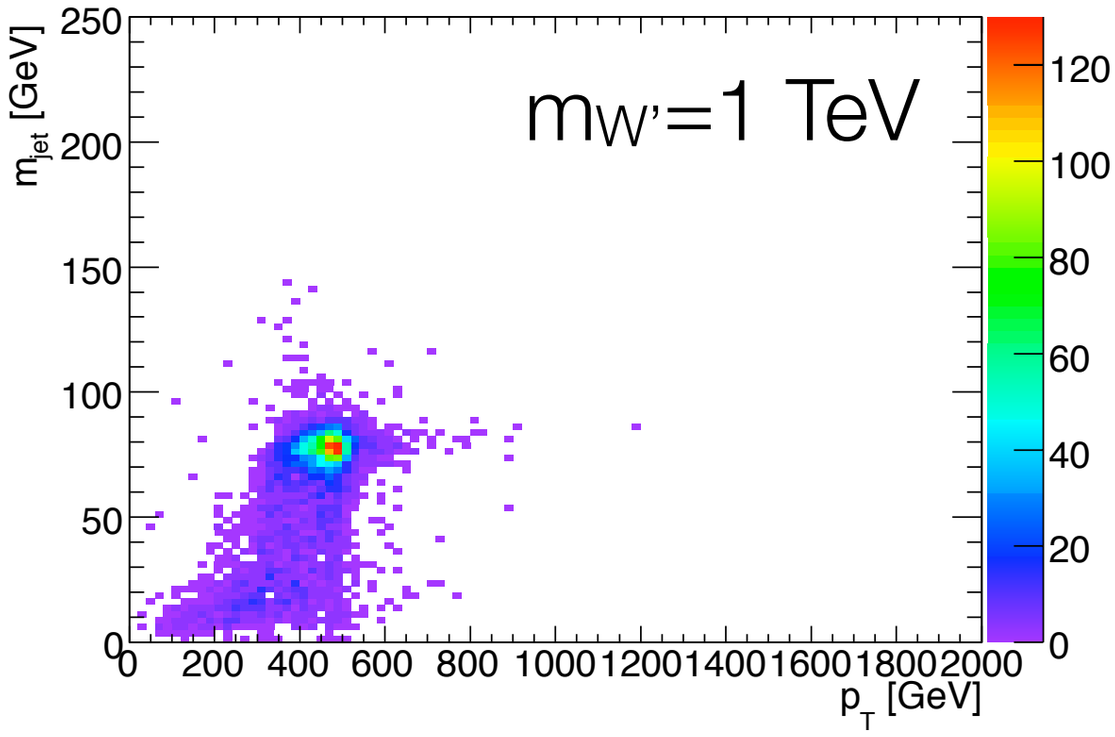


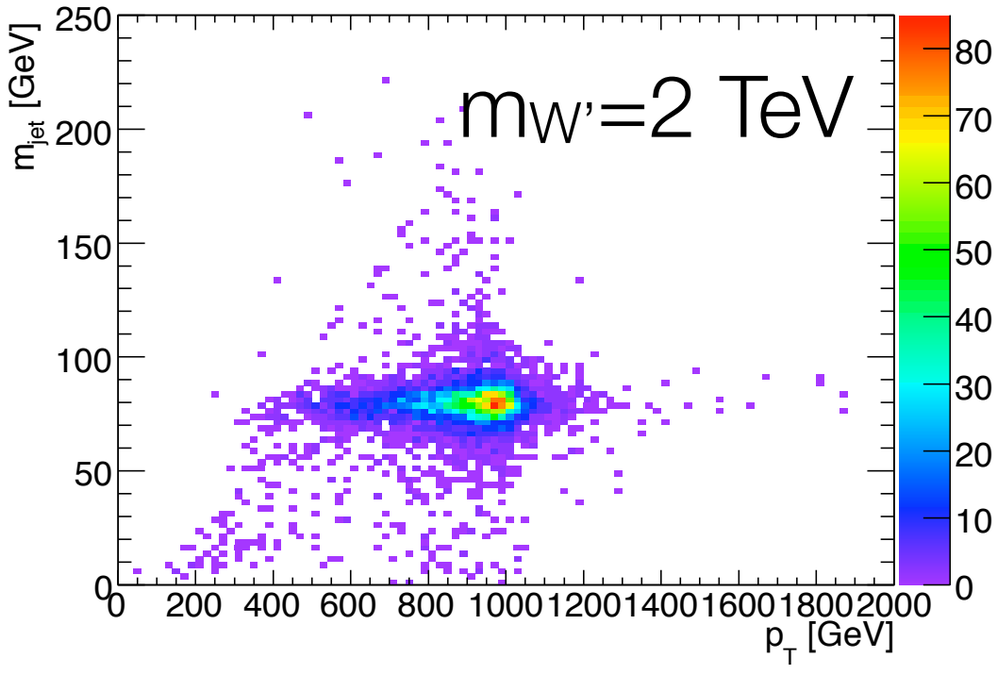
Jet mass vs Vector boson p_T



Hadronic W


$m_{W'}$=0.5 TeV
m_{jet} [GeV]
p_T [GeV]


$m_{W'}$=1 TeV
m_{jet} [GeV]
p_T [GeV]


$m_{W'}$=2 TeV
m_{jet} [GeV]
p_T [GeV]

Conclusion

- Quick study to explore the hadronic reconstruction of boosted W/Z
- For p_T >~ 400 GeV, expect these to be reconstructed as a single jet
- Need to use full simulation to model hadronic effects better
- Could perhaps use a cut on jet mass to identify them
  - I'd like to try out some of the algorithms developed to study jet structure to see how well they perform