Study of HH events

Muon Collider meeting - Detector and Physics simulation
17 – 03 – 2020
Laura Buonincontri

Study of the invariant masses

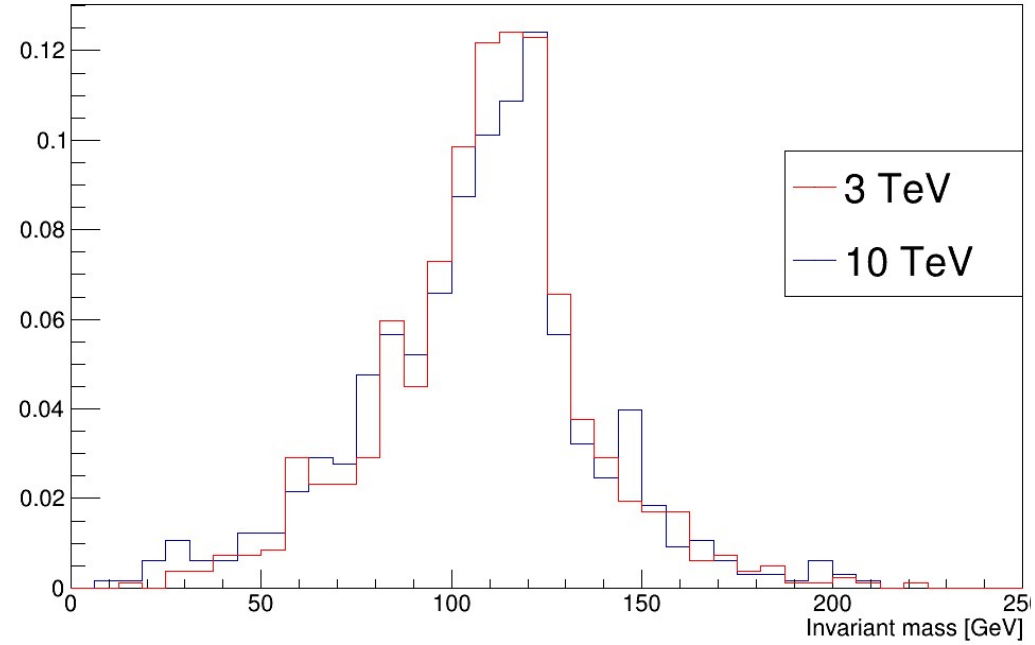
- Selection of events with $N_{jets}>3$
- Jets are combined in pairs and for each combination the invariant mass is calculated

  (m_{ij},m_{kl})
- The following relation is calculated for each pair:

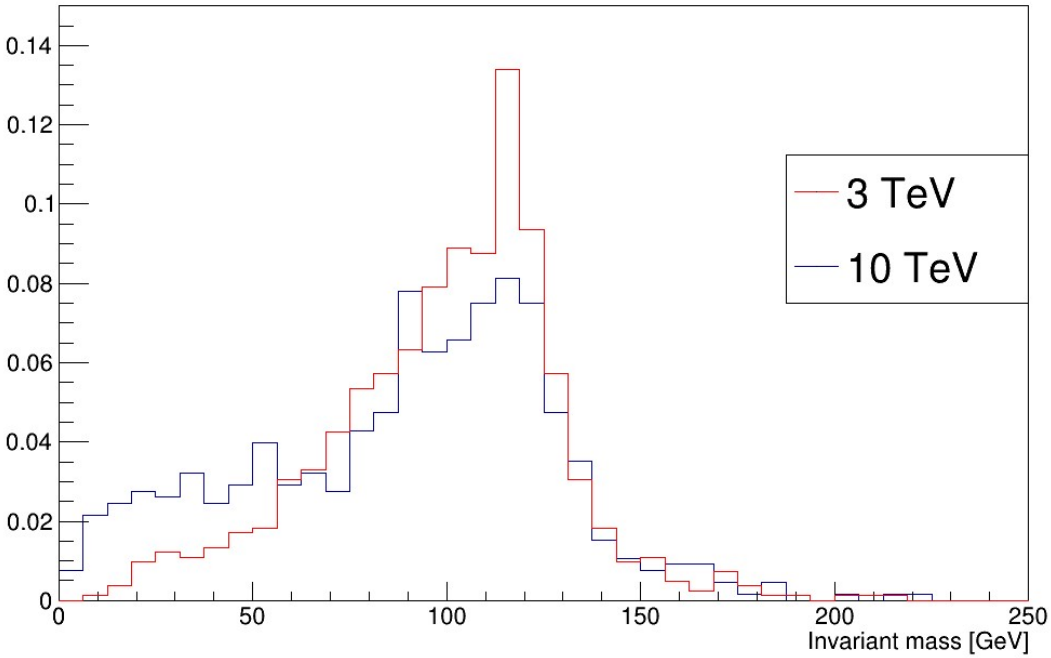
  $(m_h-m_{ij})^2+(m_h-m_{kl})^2$
- The pair of jets which minimize the above relation, is used to fill the invariant mass plots

Study of the invariant masses

Filled with m_{ij}



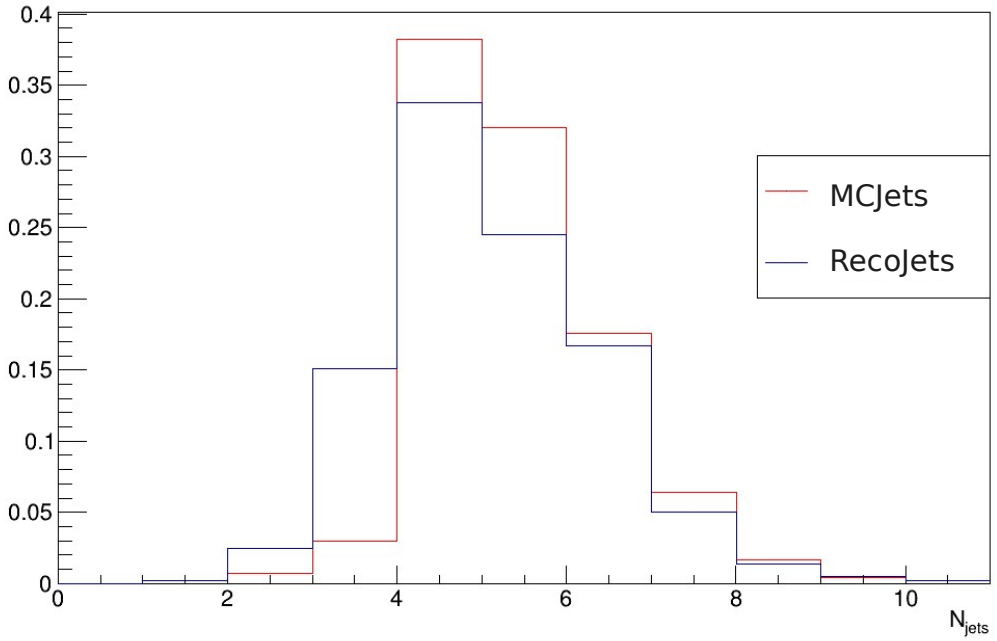
Filled with m_{kl}

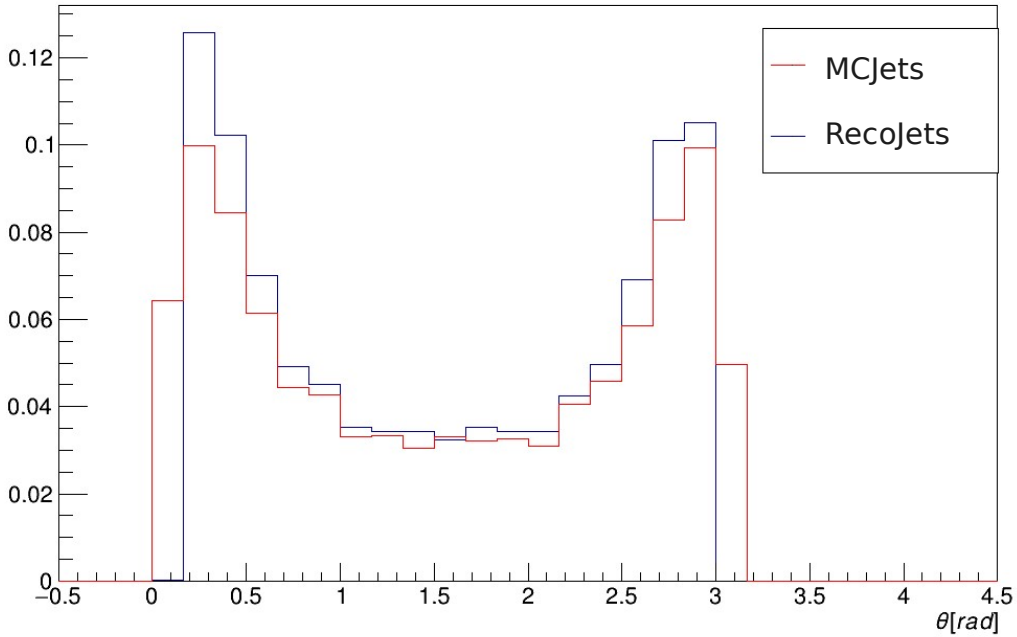


-Sometimes the wrong jet is taken
-We need to better understand the properties of the True Jets and that of the two Higgs and four b quarks

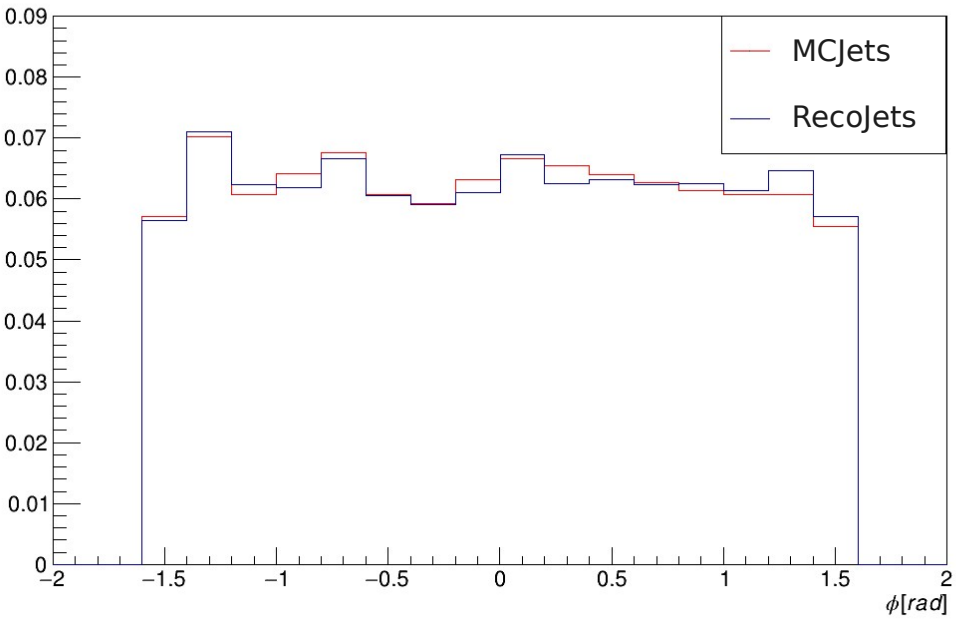
Jets reconstruction with MCParticles (3 TeV)

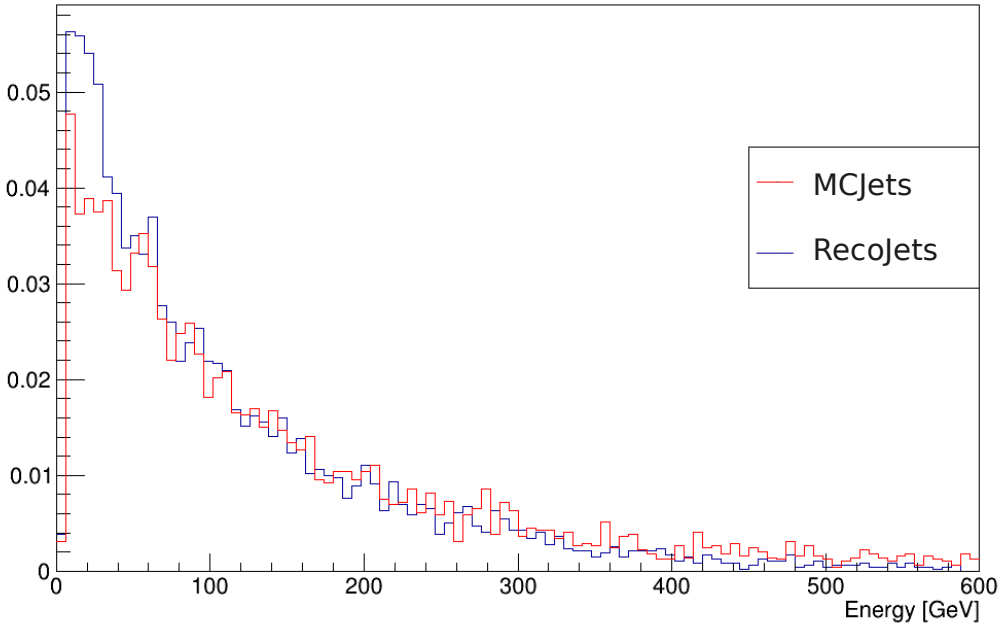
- TrueMCintoRecoForJets: processor which saves MCParticles collections as ReconstructedParticle
- Then FastJet processor can then be used on MCParticles (MCJets)
- MCJets can be compared with RecoJets



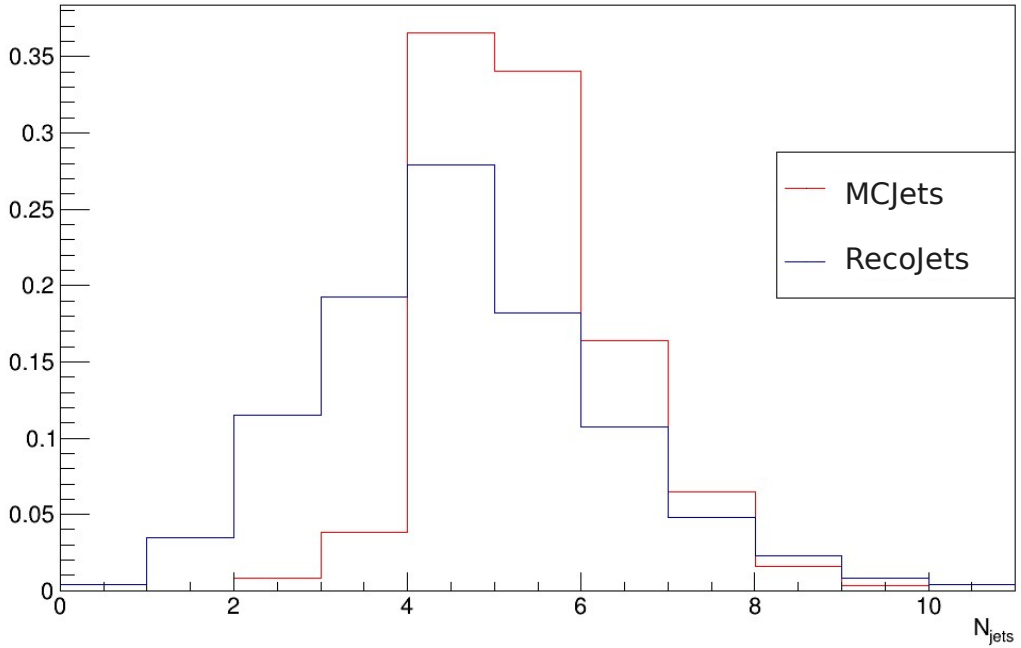


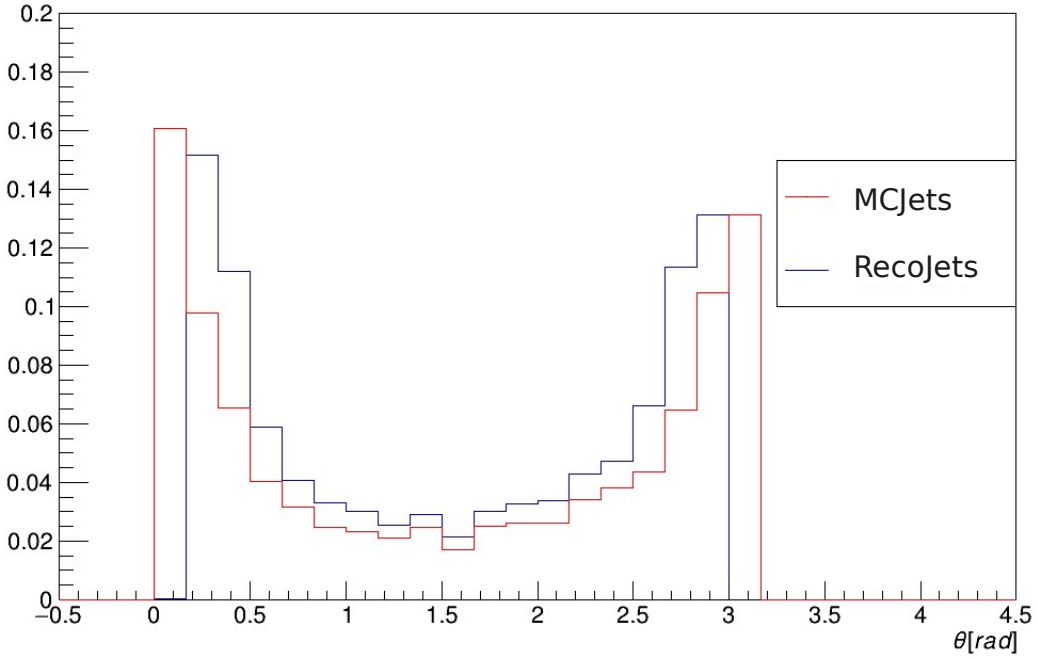
Jets reconstruction with MCParticles (3 TeV)





Jets reconstruction with MCParticles (10 TeV)





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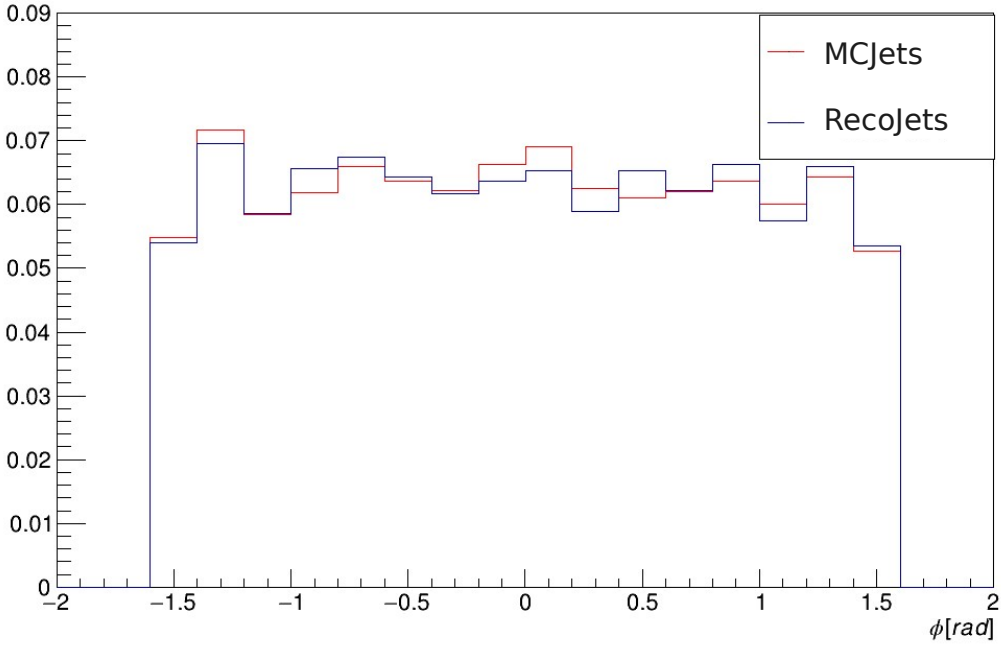
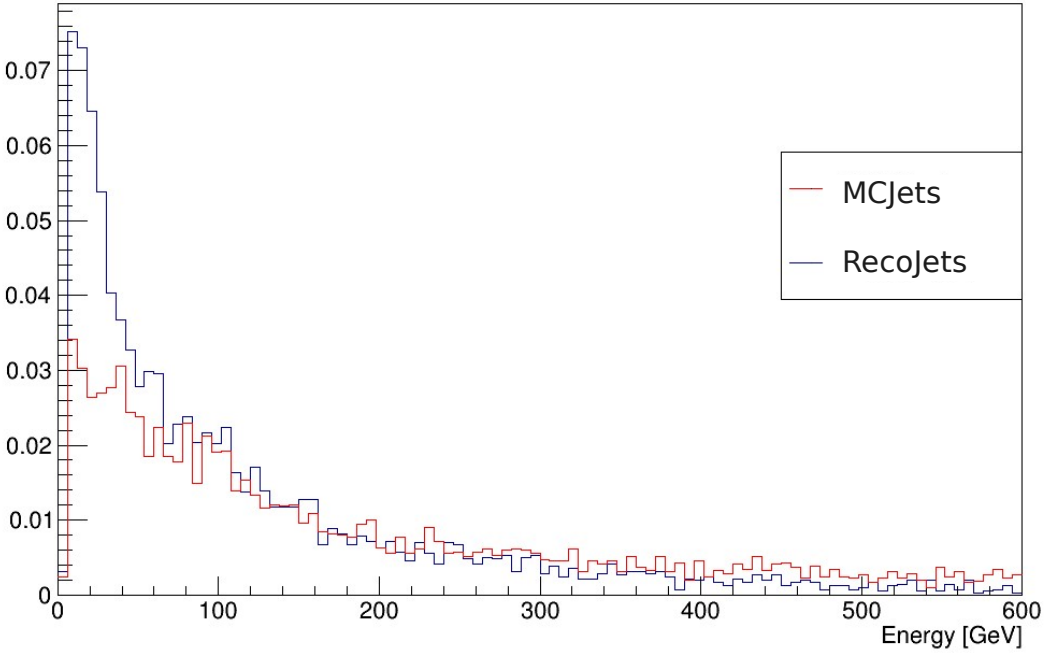
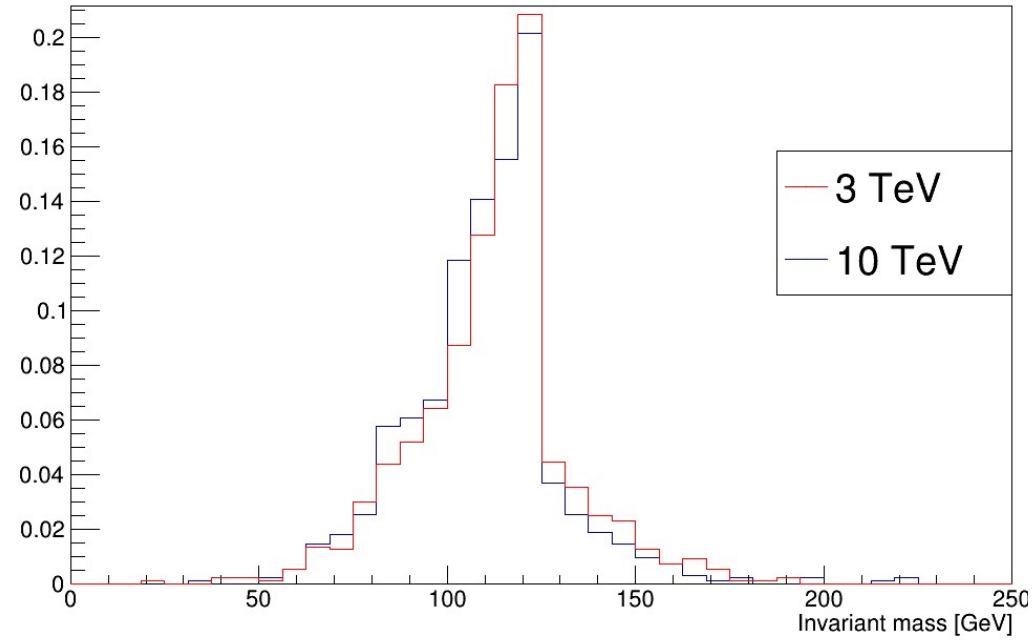
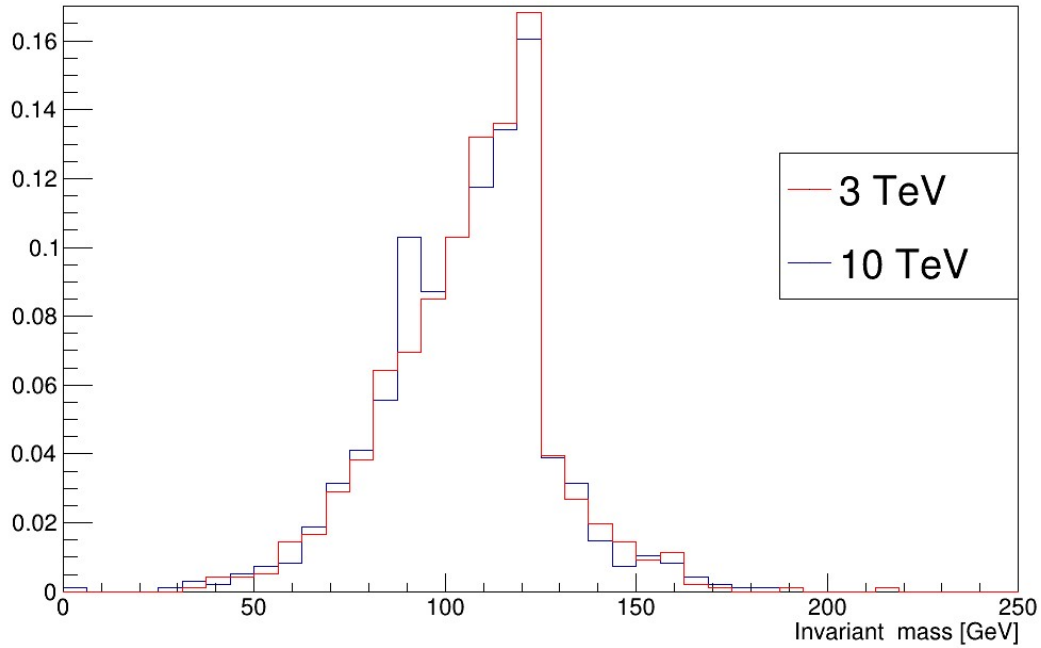


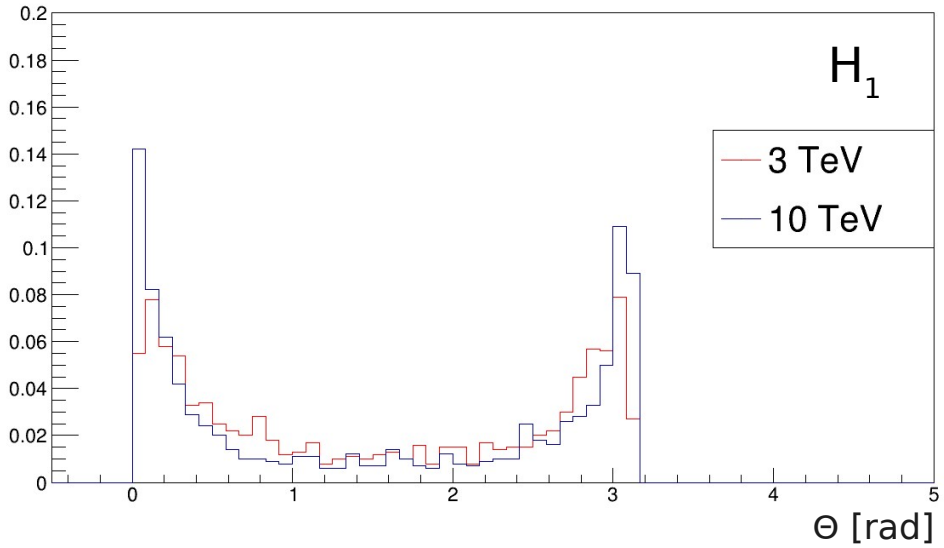


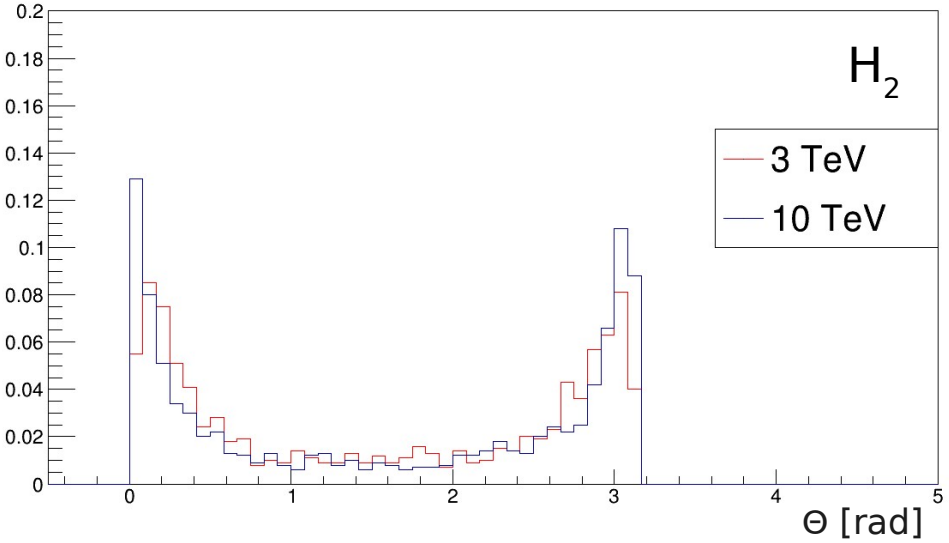
Invariant mass study with MC Jets

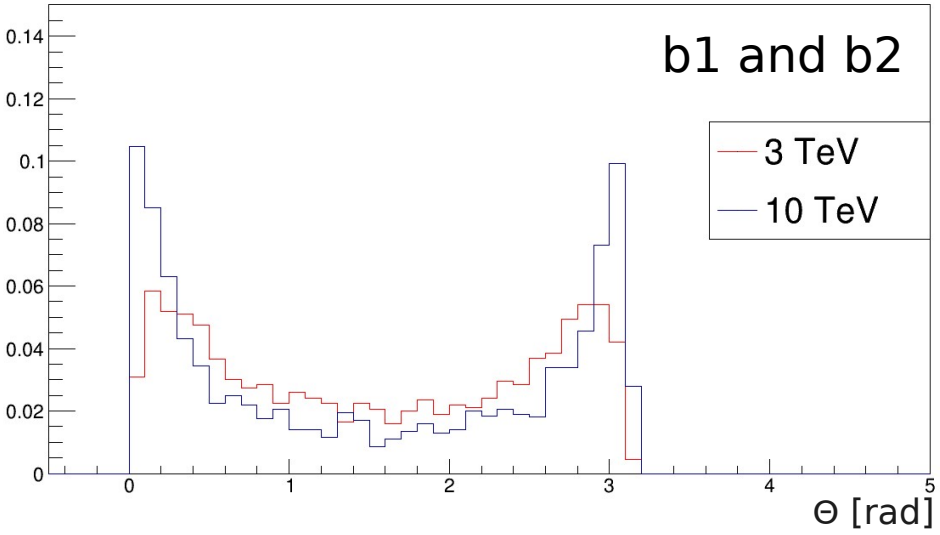


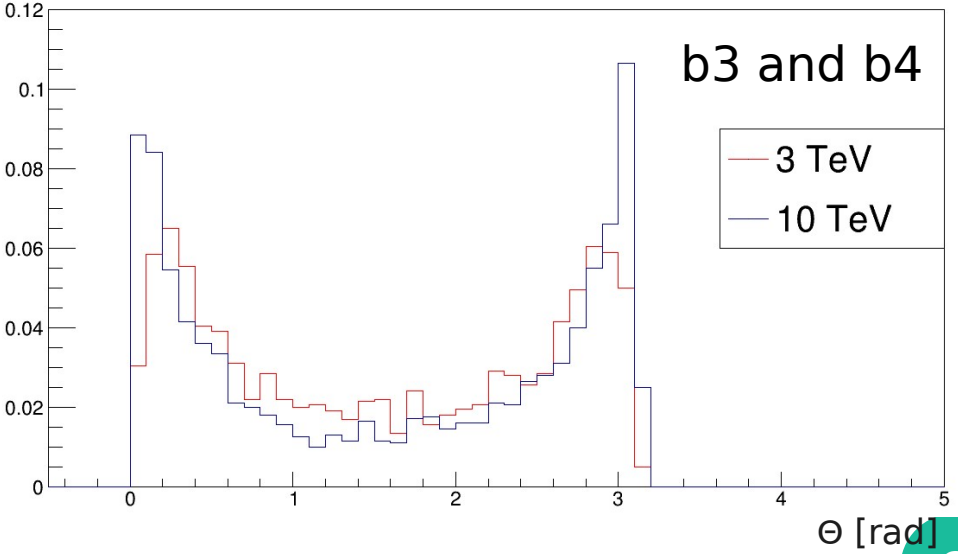


From MCParticle: Study of H_1 H_2 and 4b

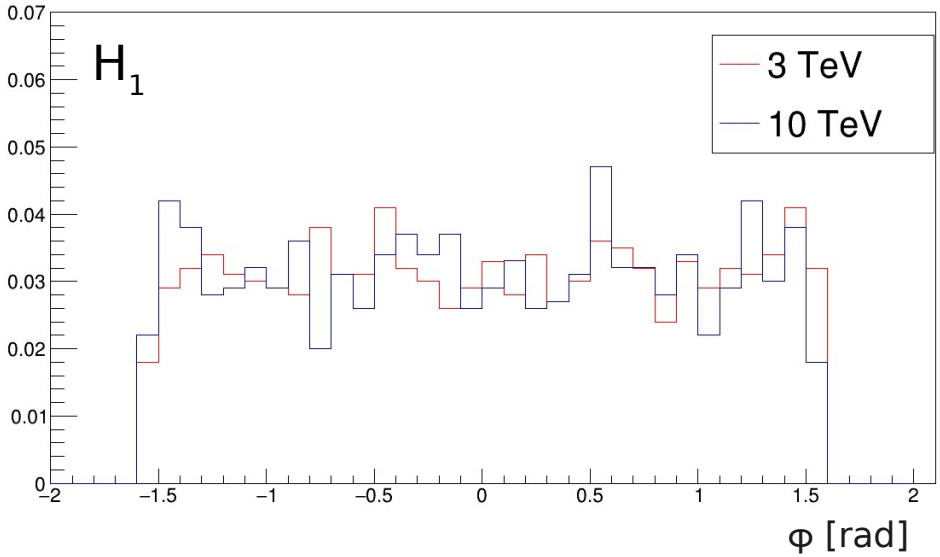


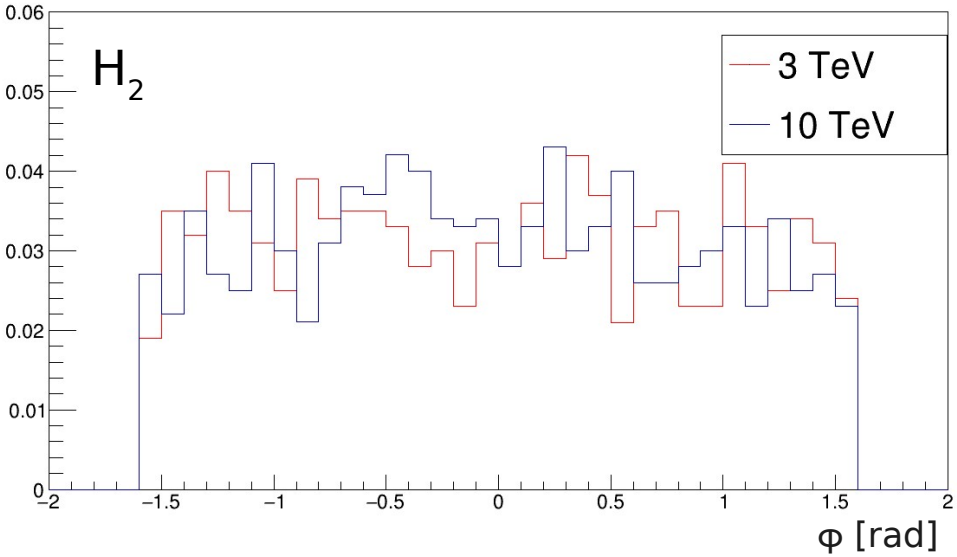


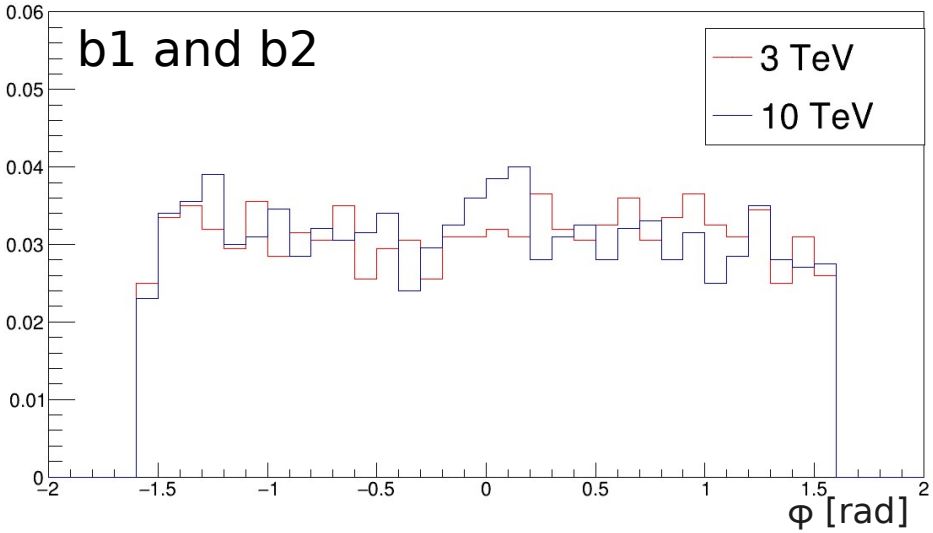


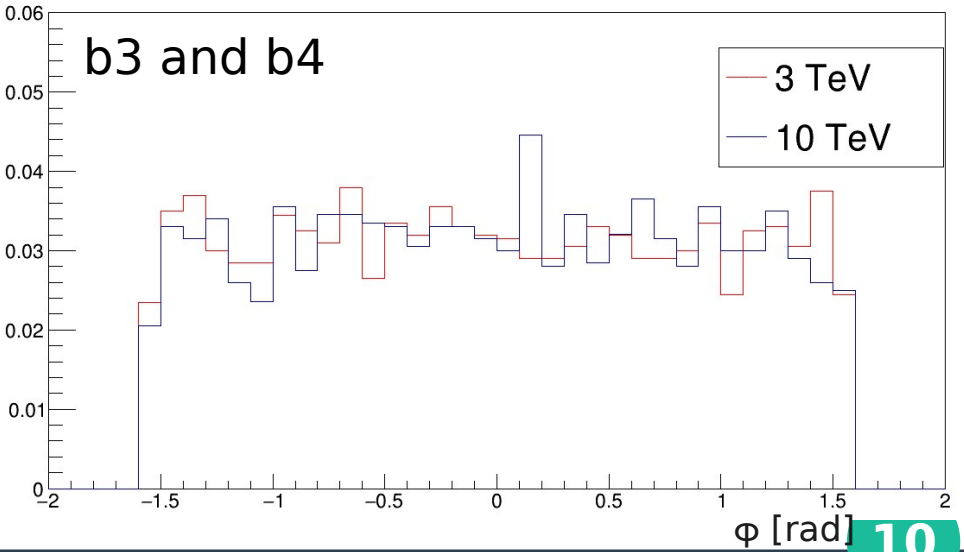


Study of H_1 H_2 and 4b

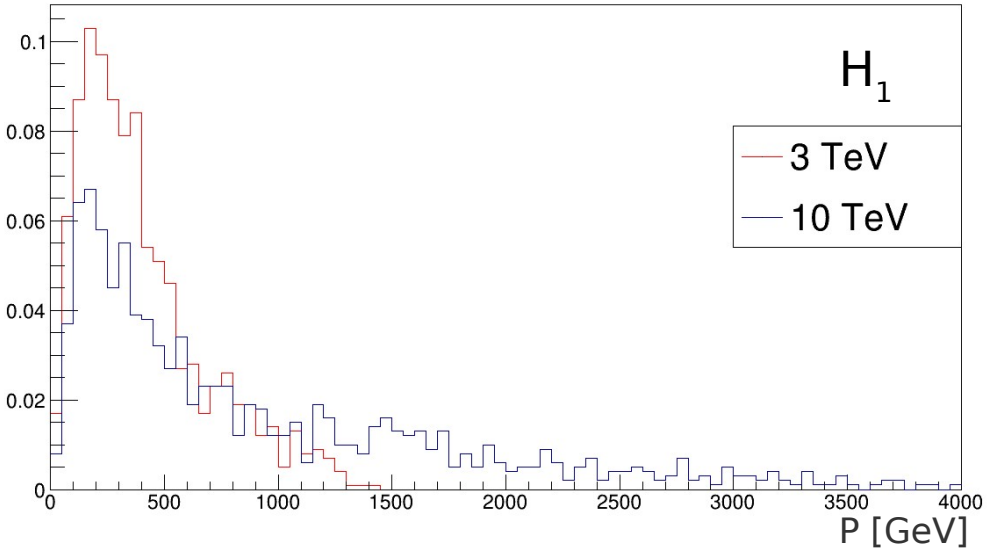


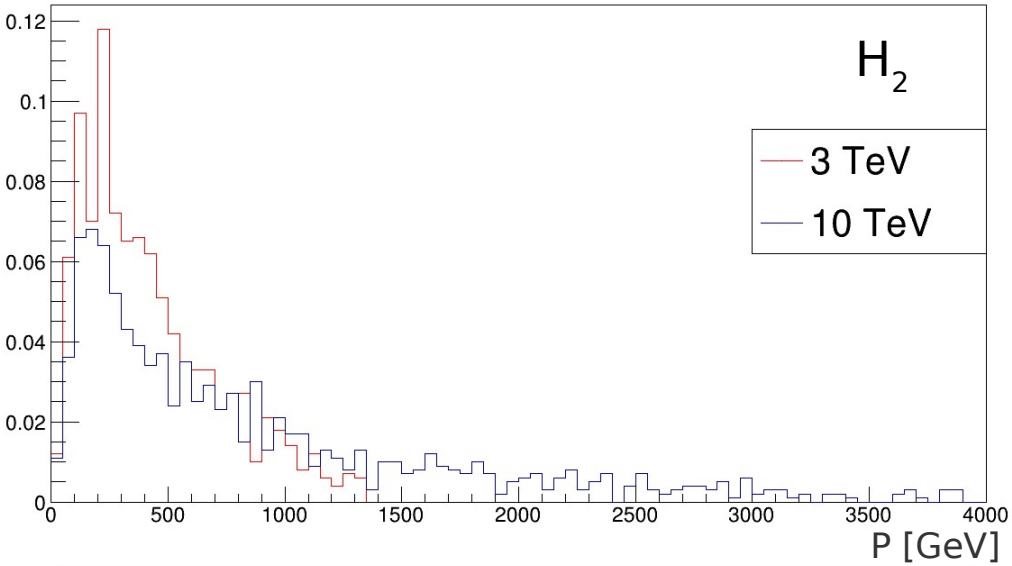


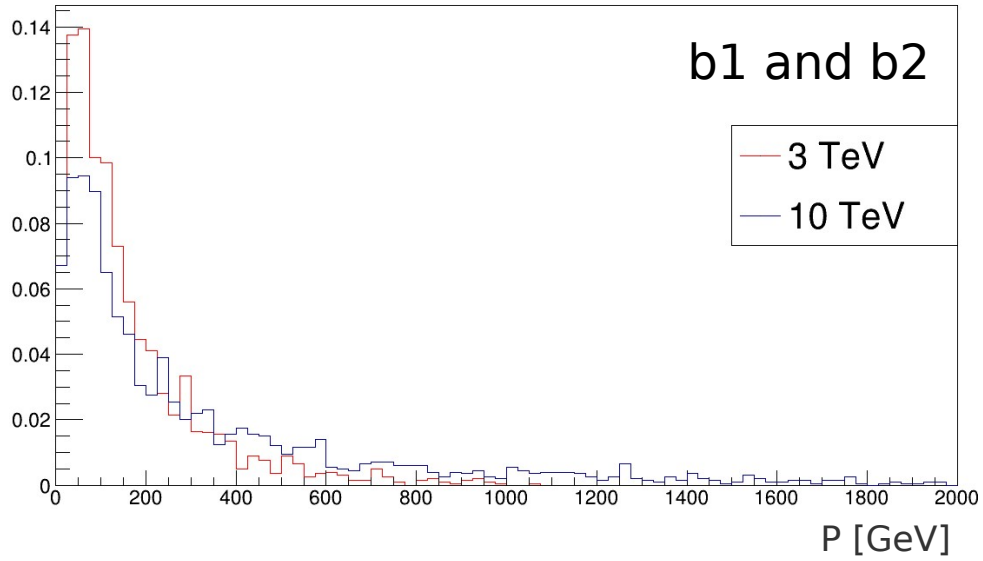


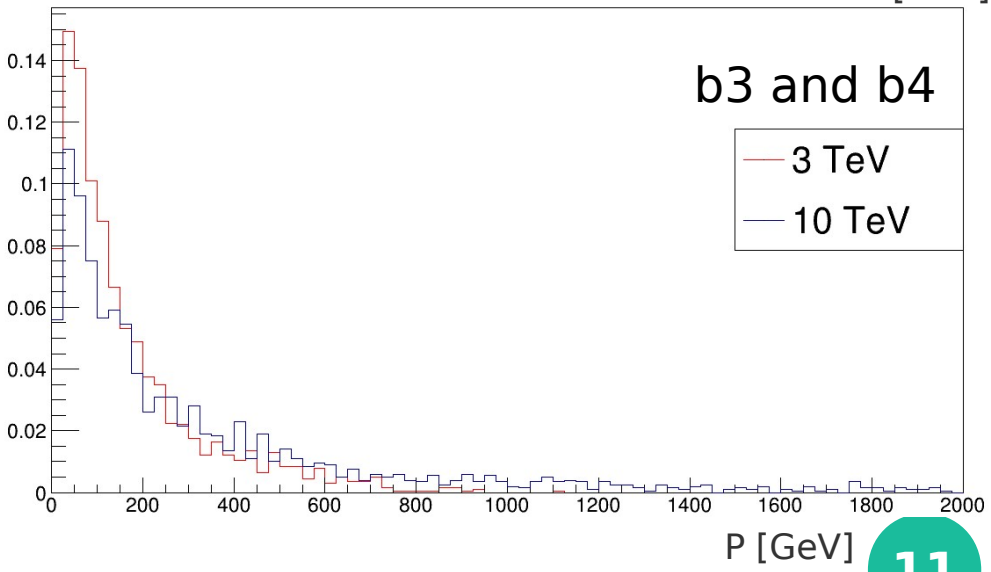


Study of H_1 H_2 and 4b: P

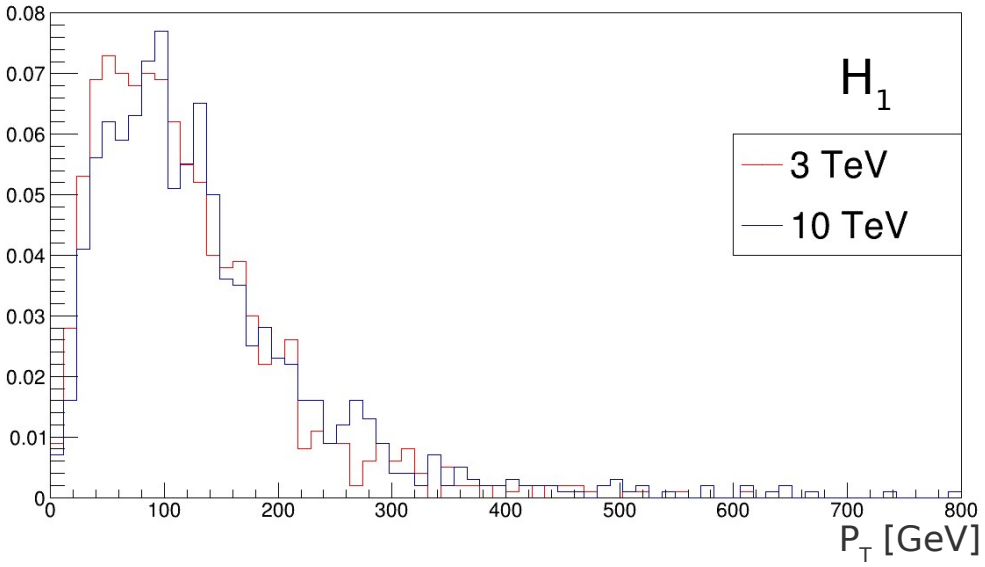


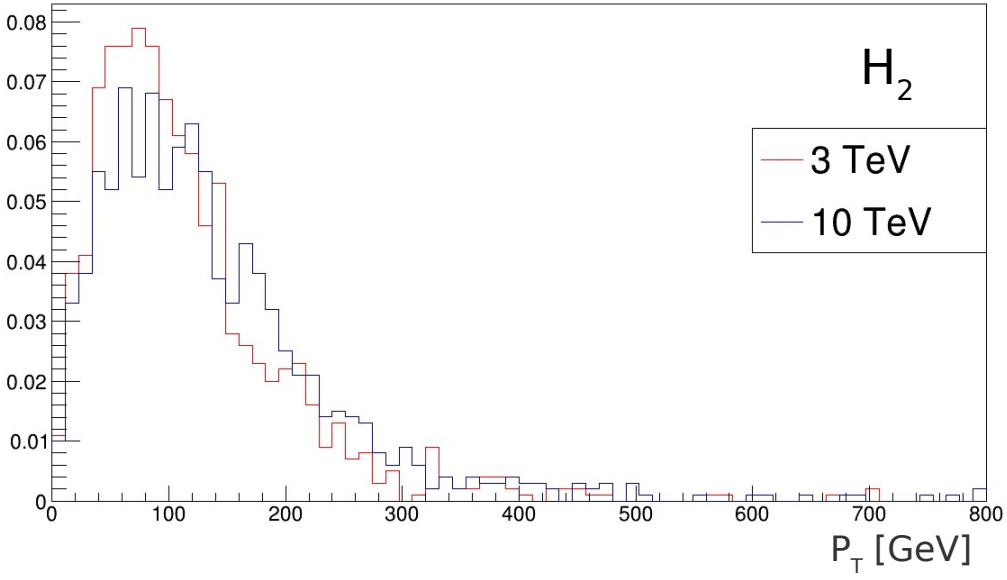


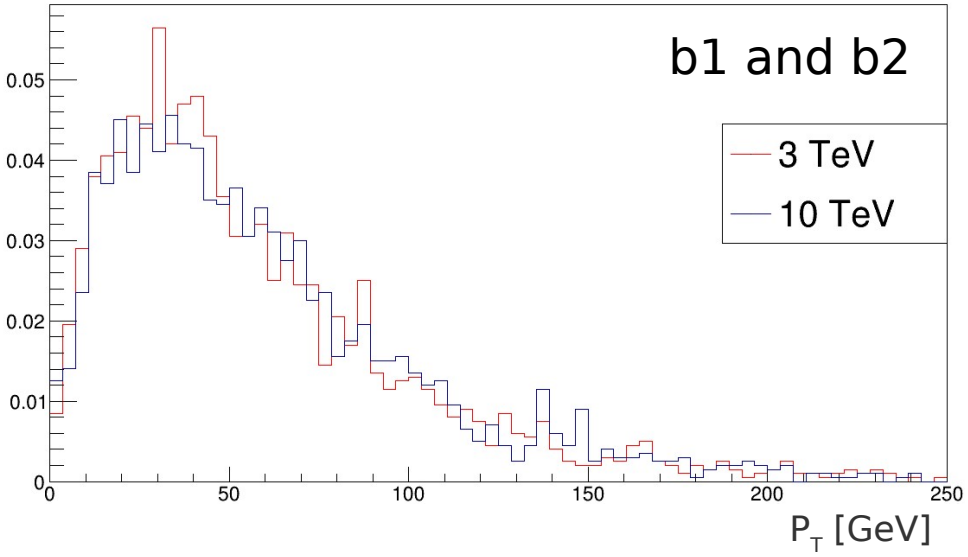


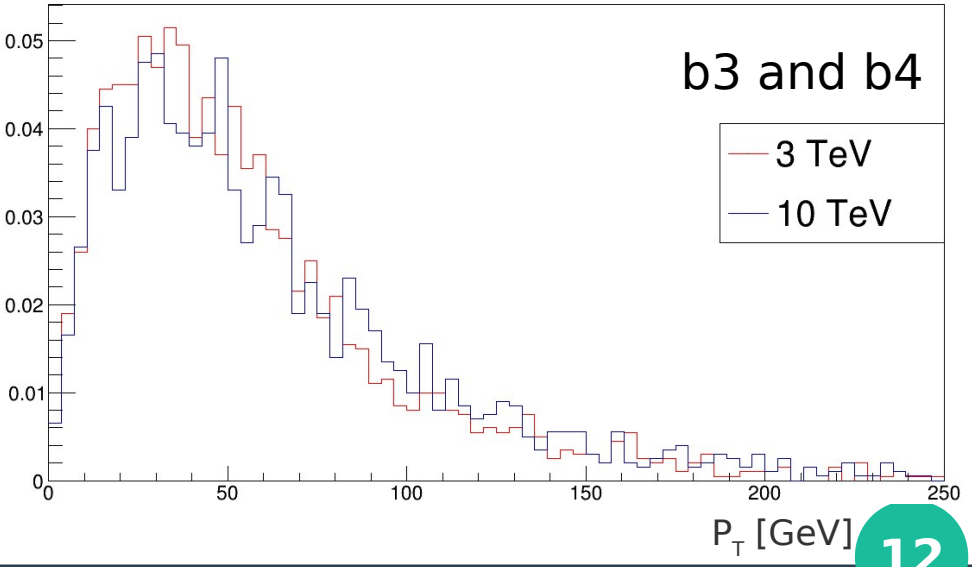


Study of H_1 H_2 and 4b: P_T







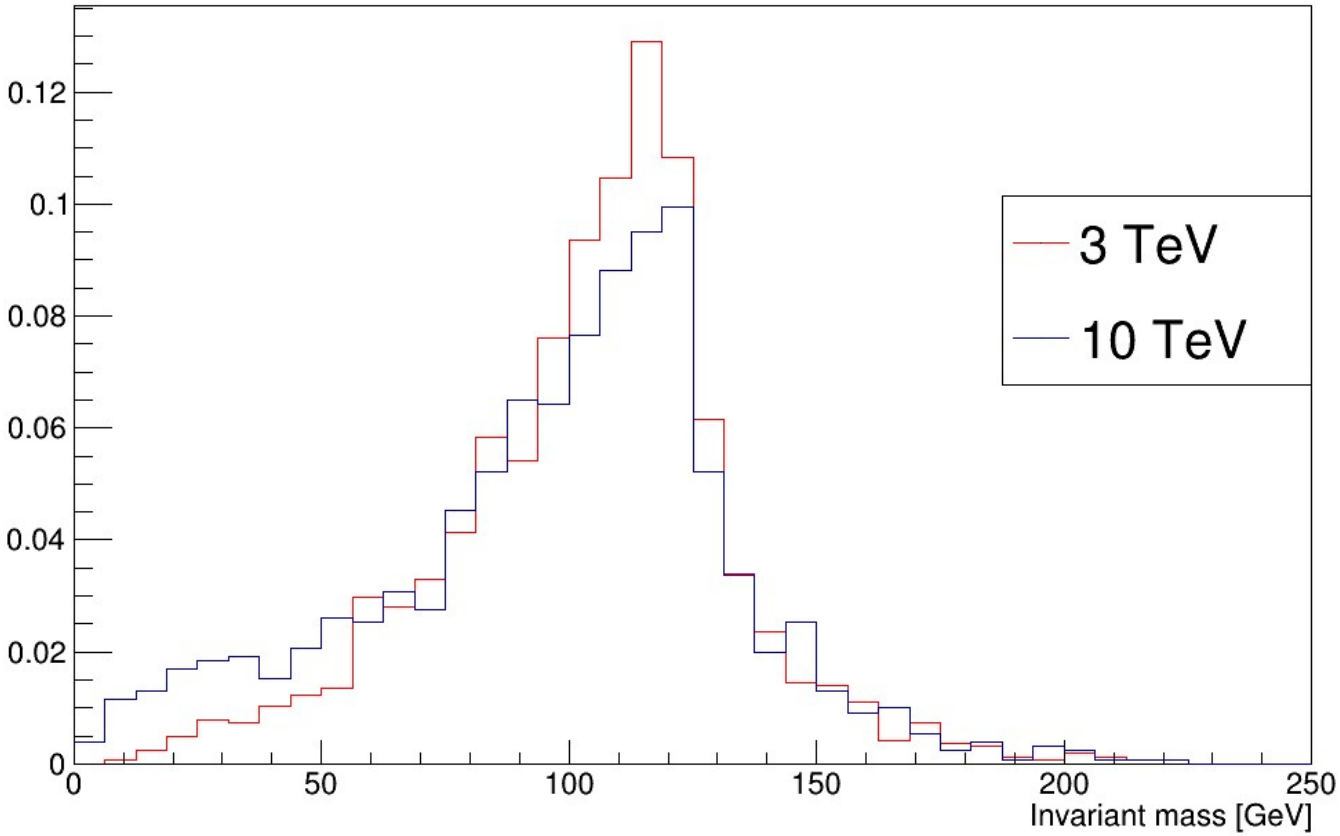


Next steps..

- Study of the angles between the directions of b_1 and b_2
- Matching of MCJets with b direction to study properties of jets produced by b quarks
- Matching of RecoJets with MCJets
- Introduction of a flavor tagging processor (LCFIVertex or LCFIPlus)

Backup

Total invariant mass (m_{ij} and m_{kl})



Invariant mass study with MC Jets

Total invariant mass (m_{ij} and m_{kl})