Compare Pythia8 and MadGraph5 with high masses of heavy Higgs in 2HDM Update

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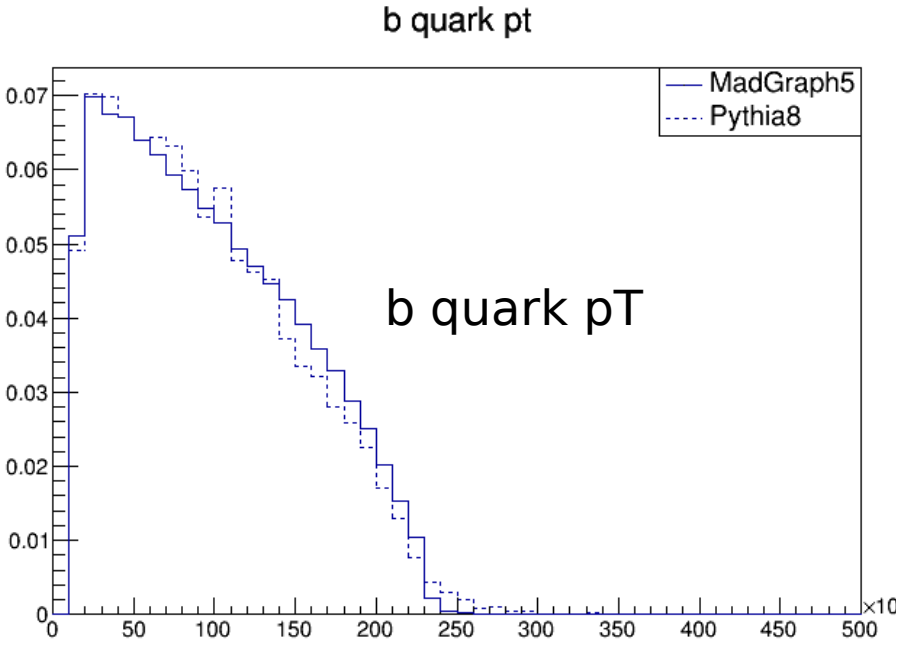
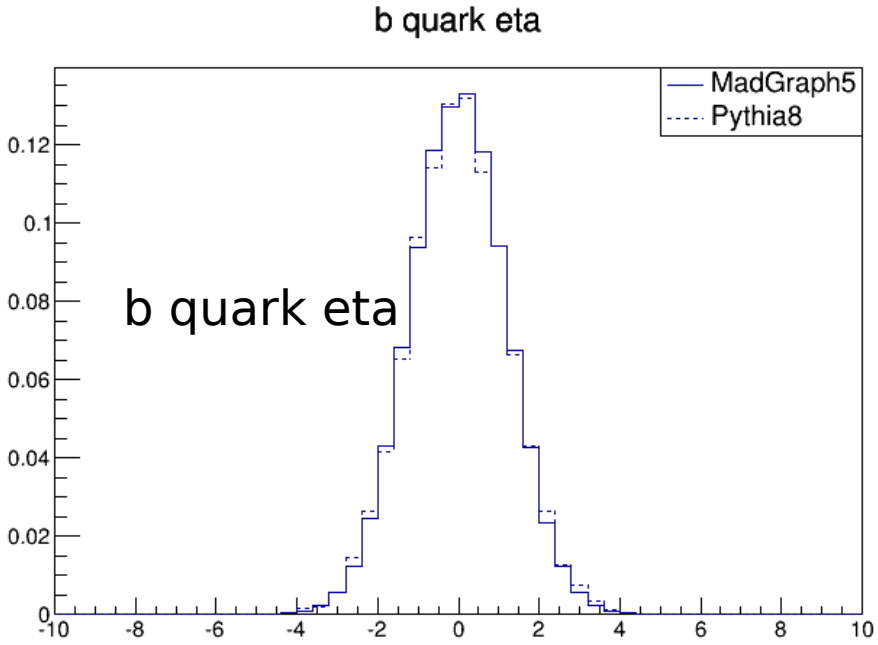
Introduction

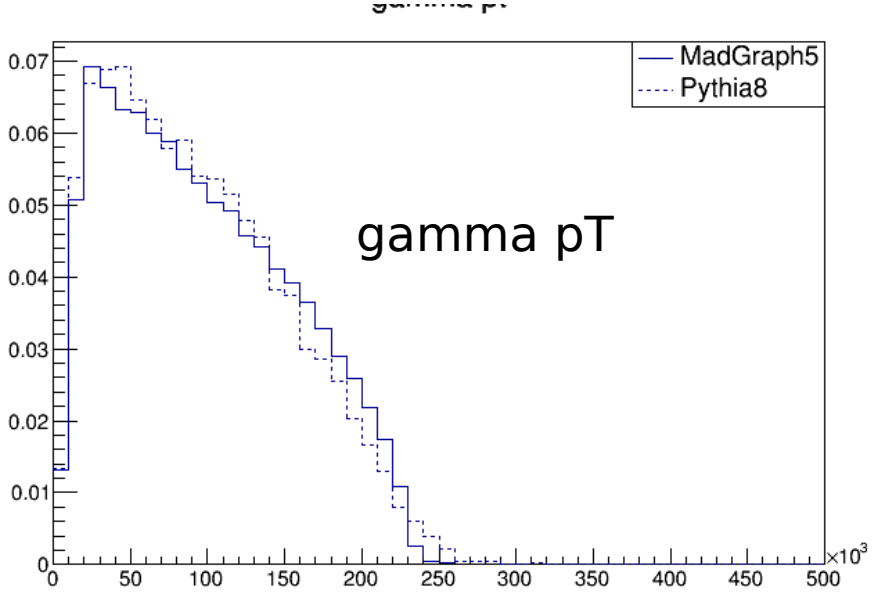
- heft in MadGraph5 (MG5) is not working, when the mass of heavy higgs goes beyond 2*m(top)
- One needs to check MG5 heft can work till which mass
- Generate events with MG5 and compare them with ones from Pythia8
- Setting all the time the same mass for H, A and H+/-
  - 300GeV, 350GeV, 400GeV, 800GeV
- Generate processes
  - gg->H->hh->bbgammagamma
- In this talk, comparisons are all implemented in parton level
  - Only gg-fusion production mode is considered
  - MG5 and Pythia8 both implemented standalone
  - Read their output lhe files directly
  - New mass points 500GeV, 600GeV, 700GeV

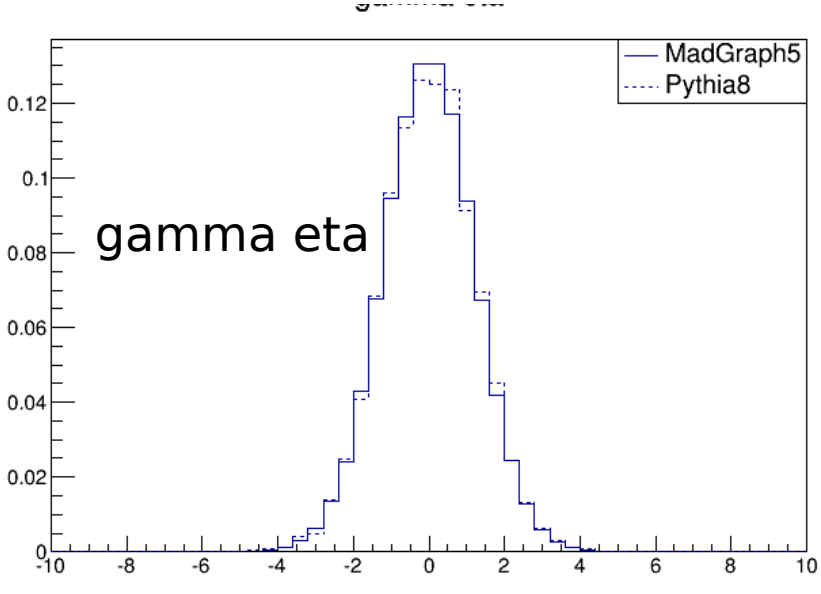
- Next slides show the kinematics for different heavy Higgs masses (mH)

H->hh->bbgammagamma (mH=500)

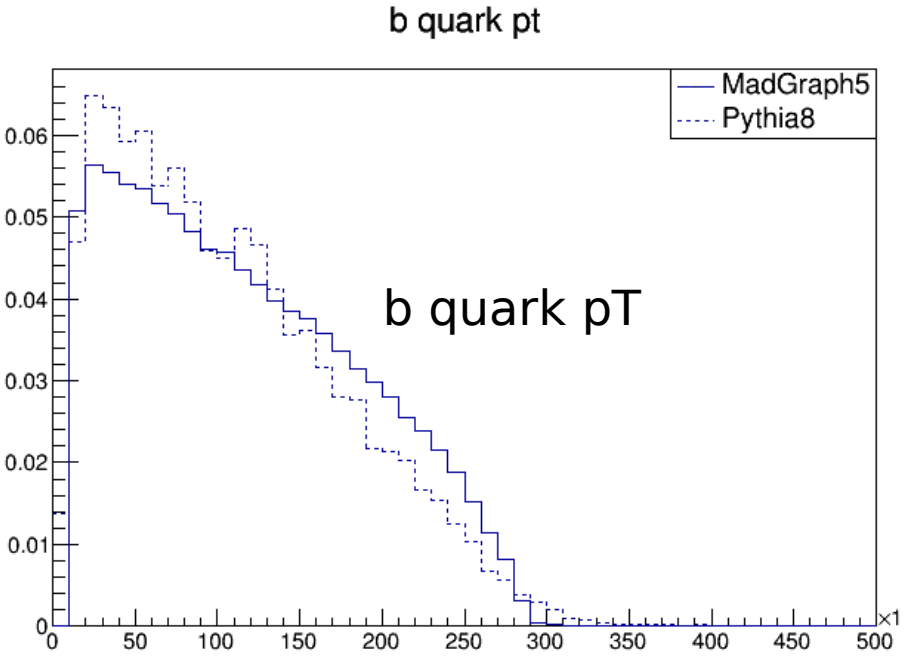


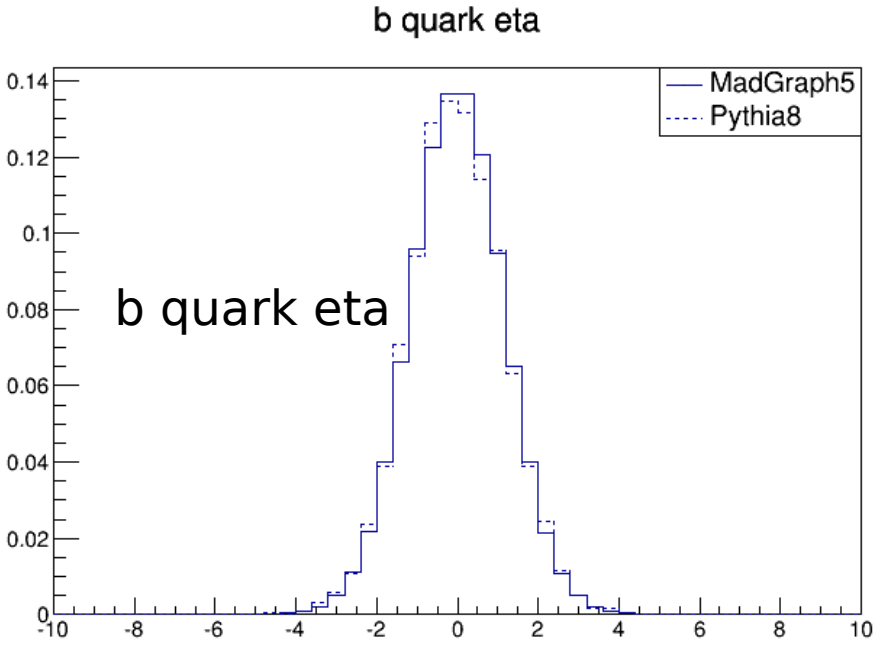


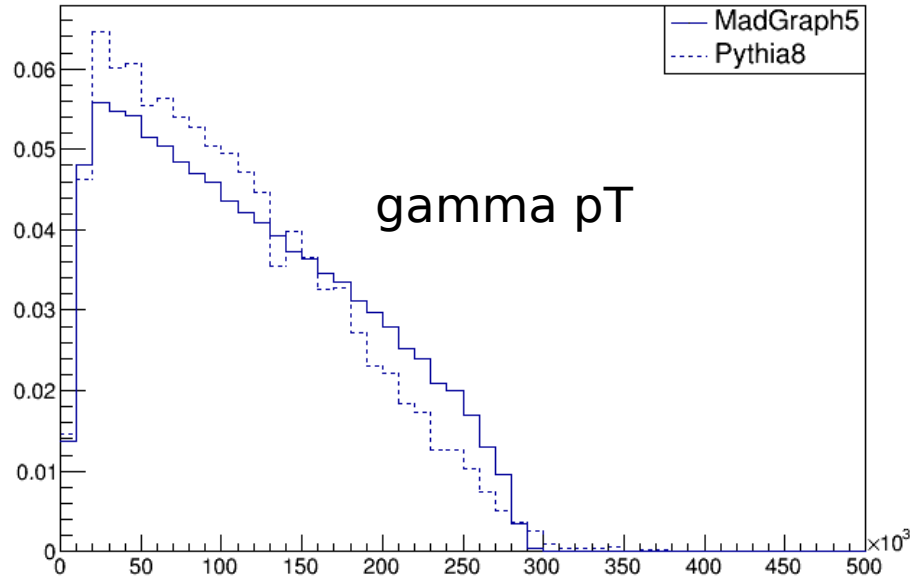


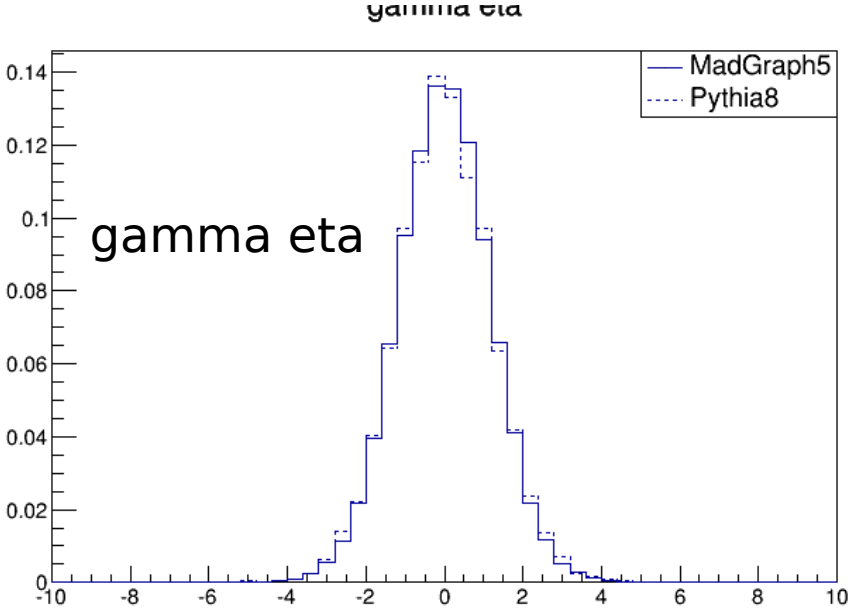


H->hh->bbgammagamma (mH=600)

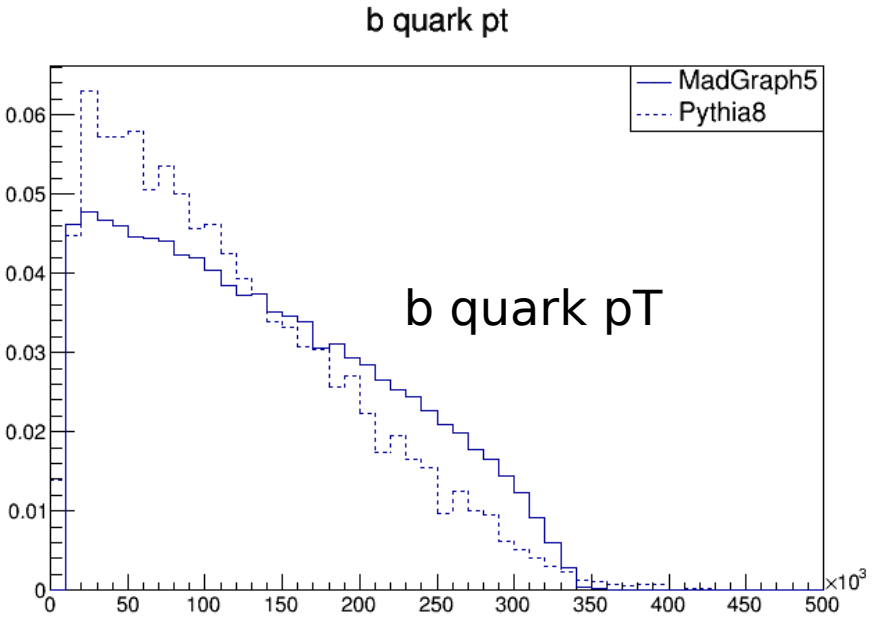


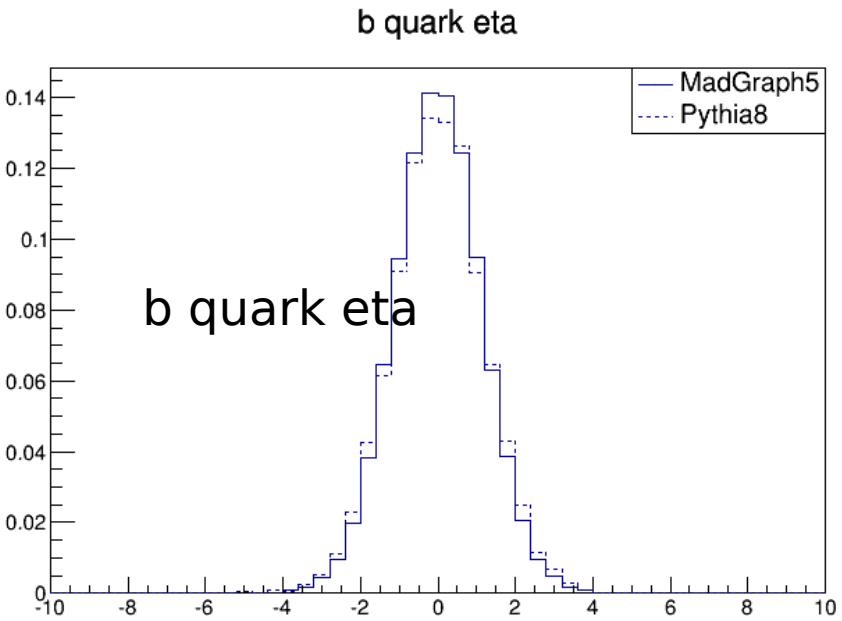


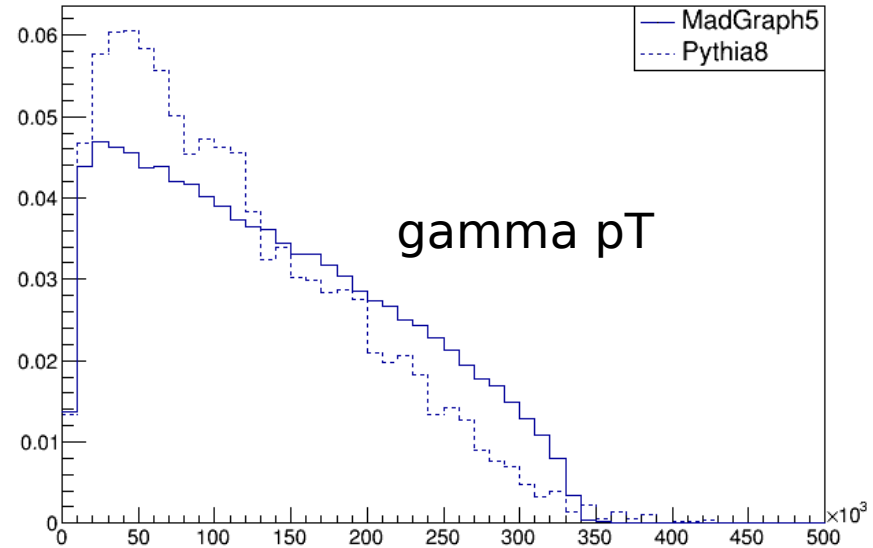


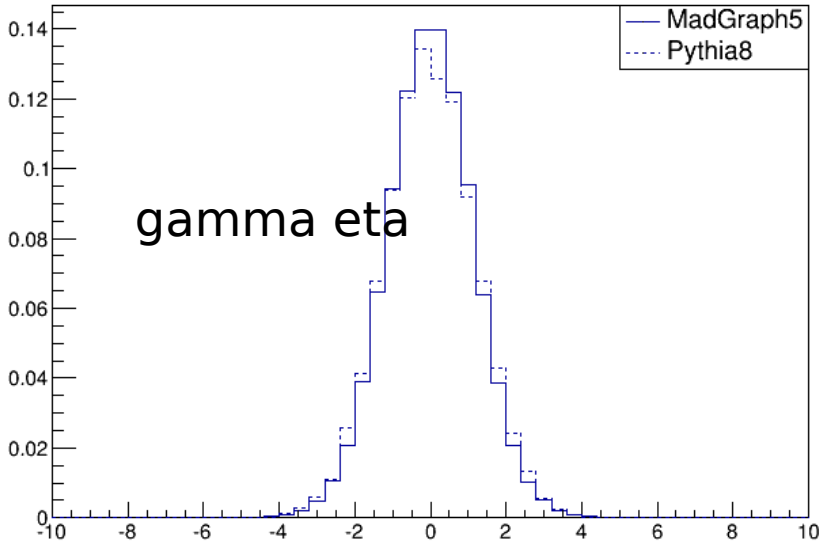


H->hh->bbgammagamma (mH=700)

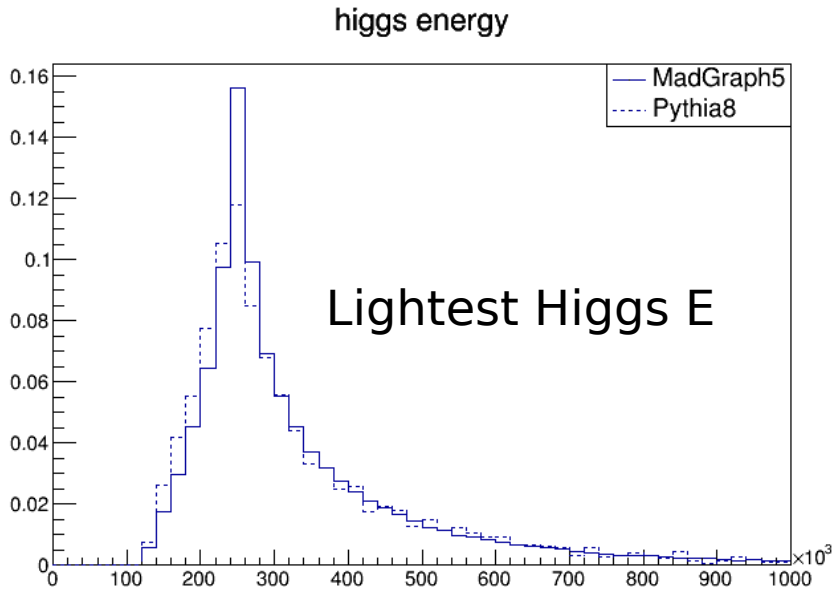


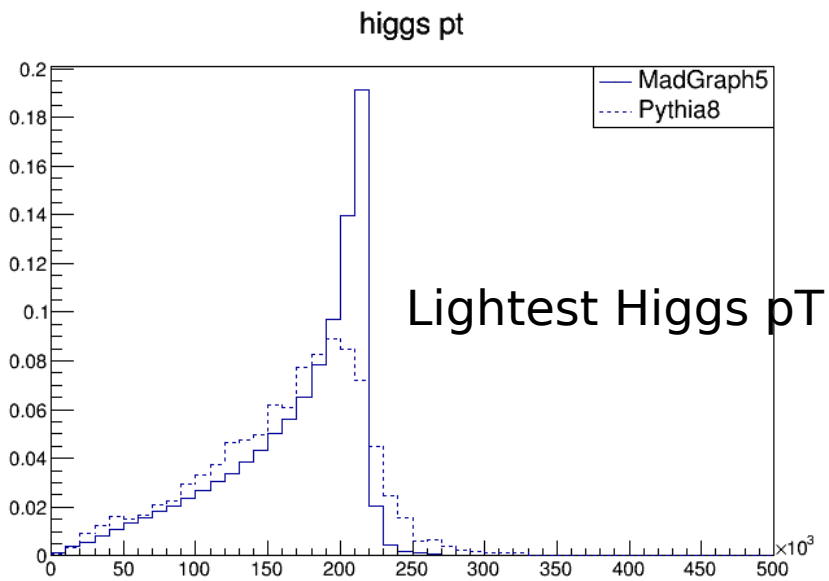


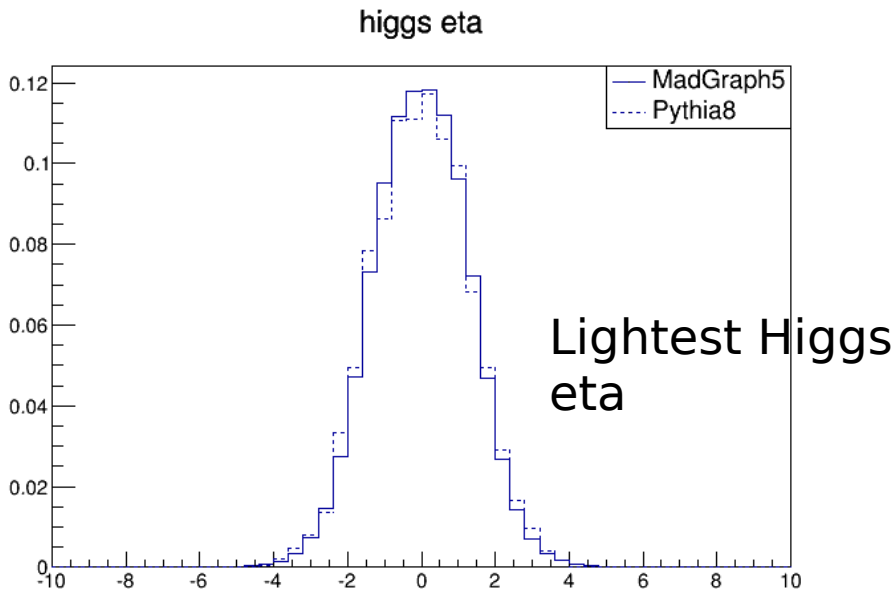


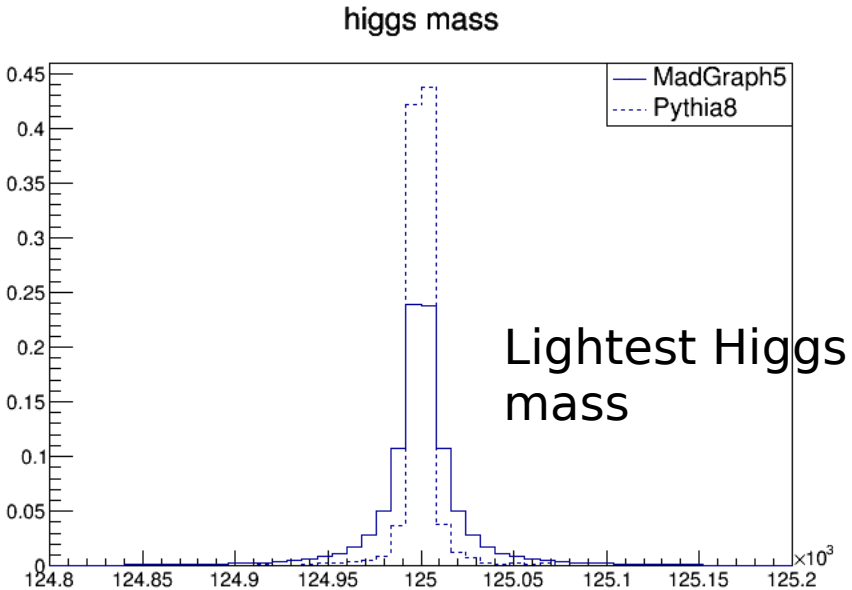


H->hh->bbgammagamma (mH=500)

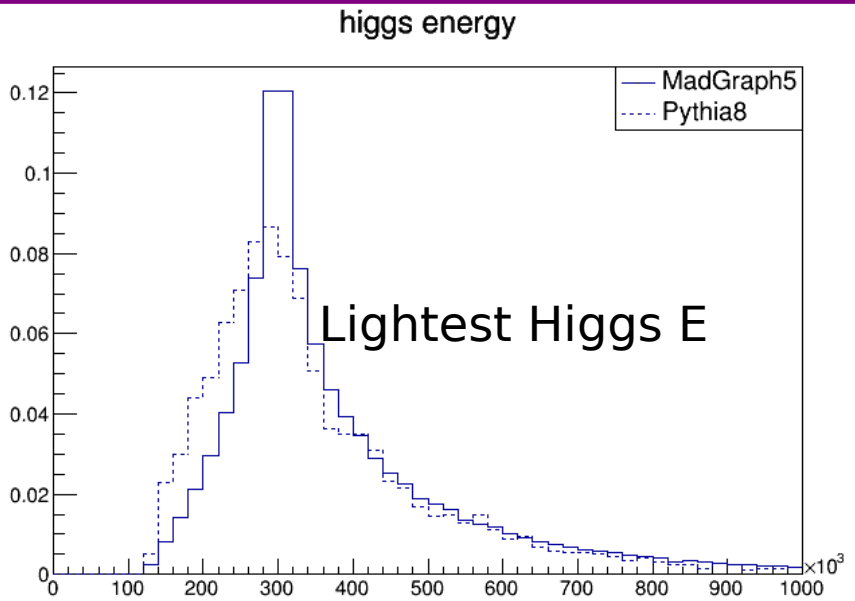


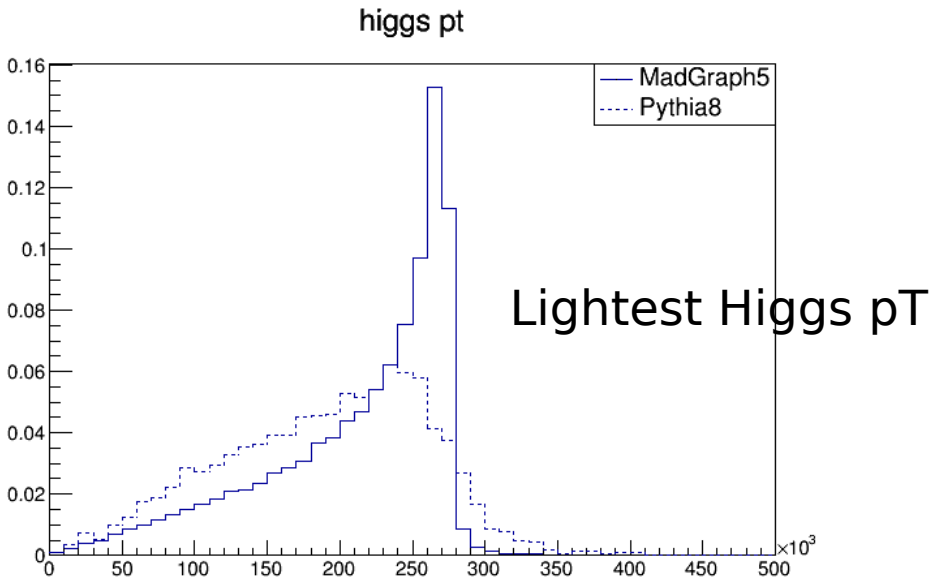


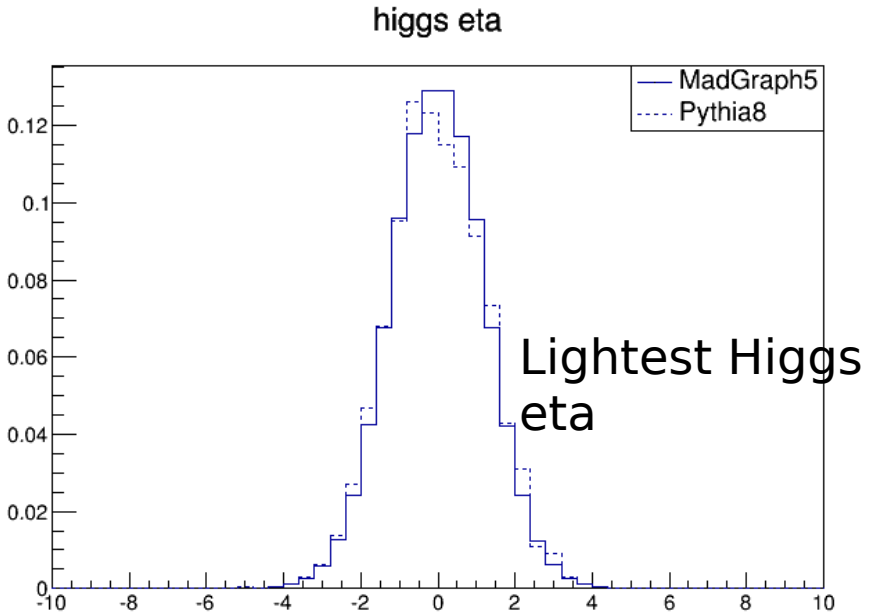


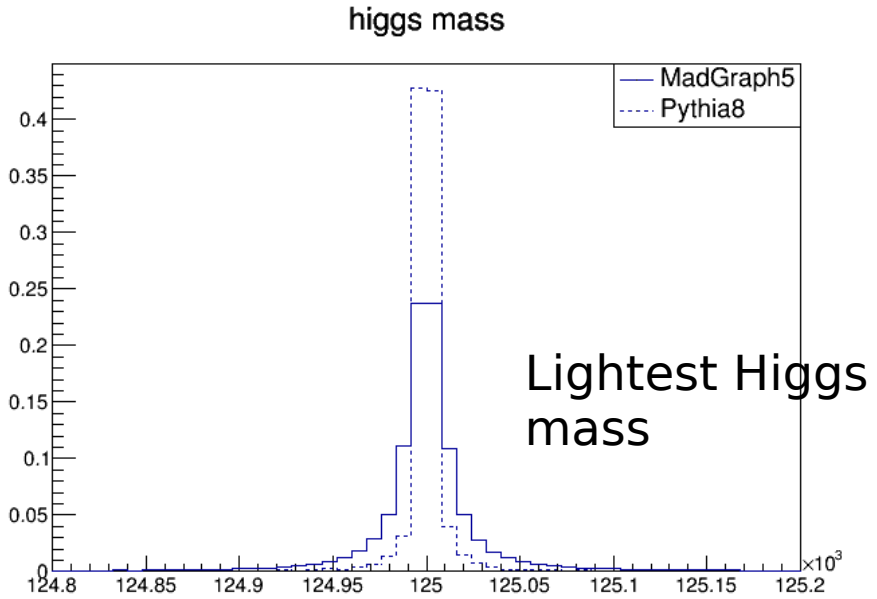


H->hh->bbgammagamma (mH=600)









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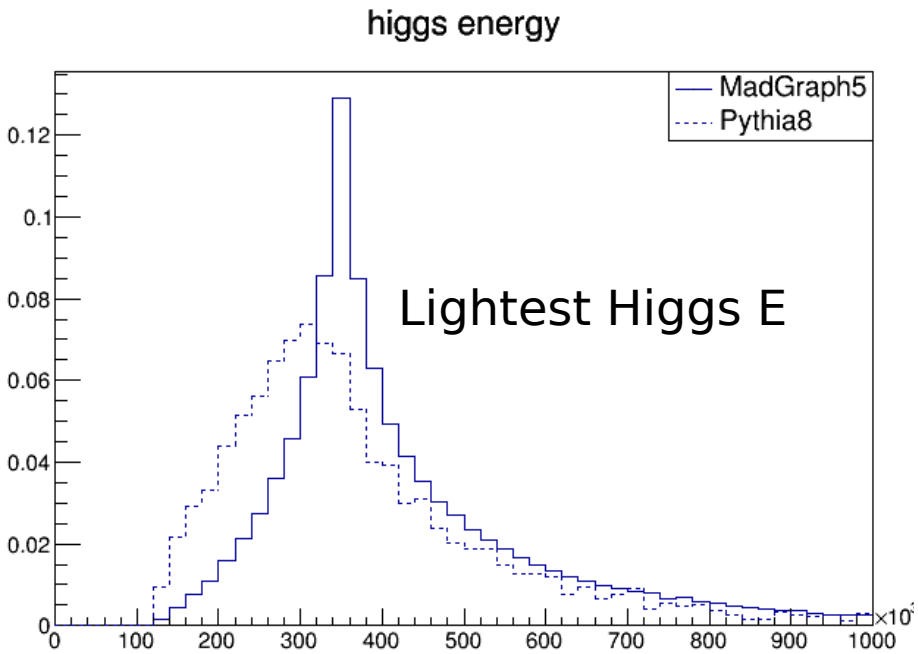

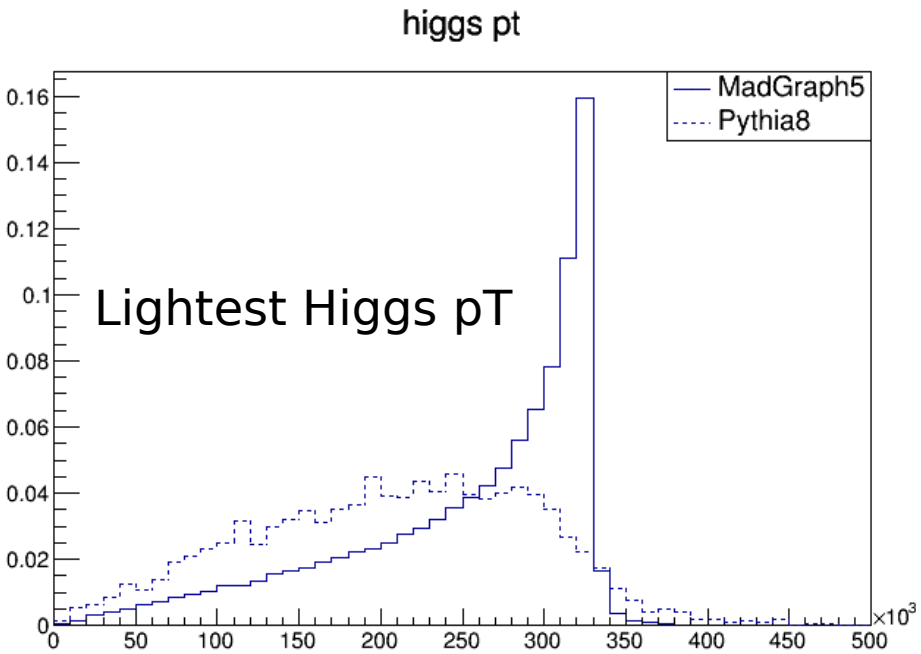

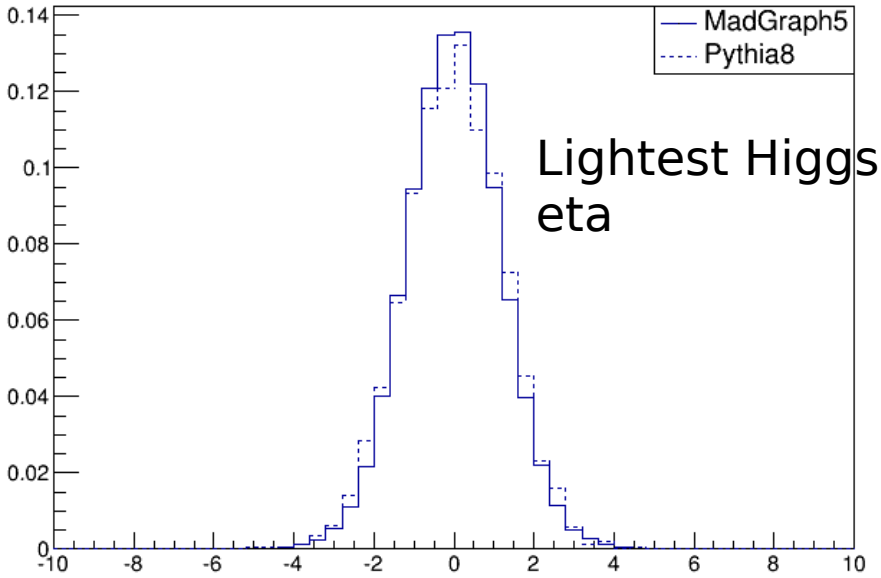

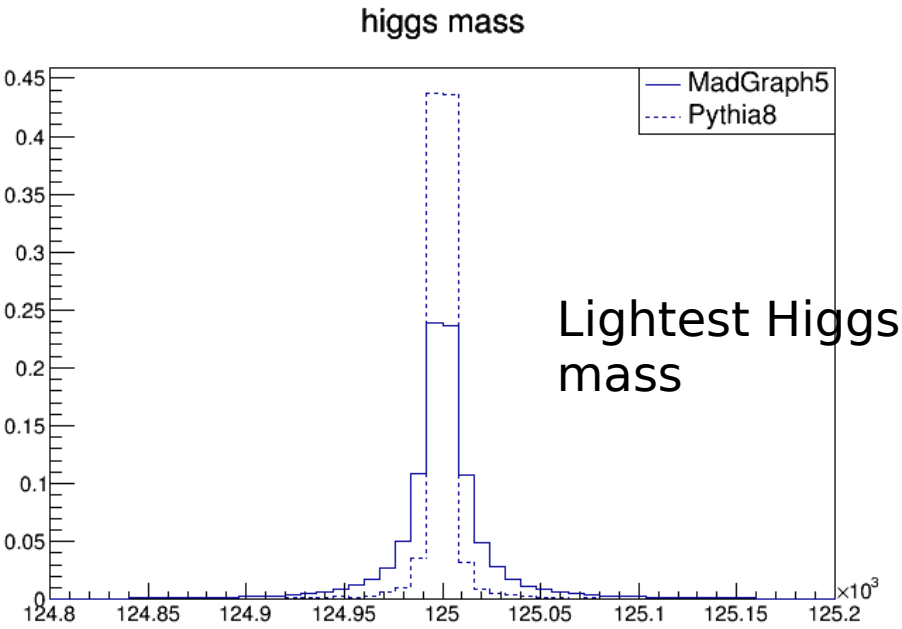

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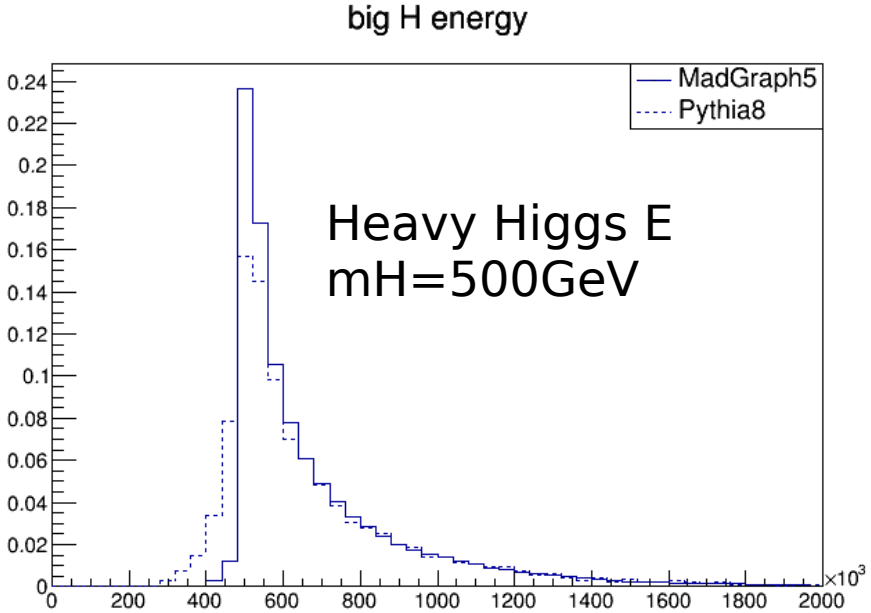

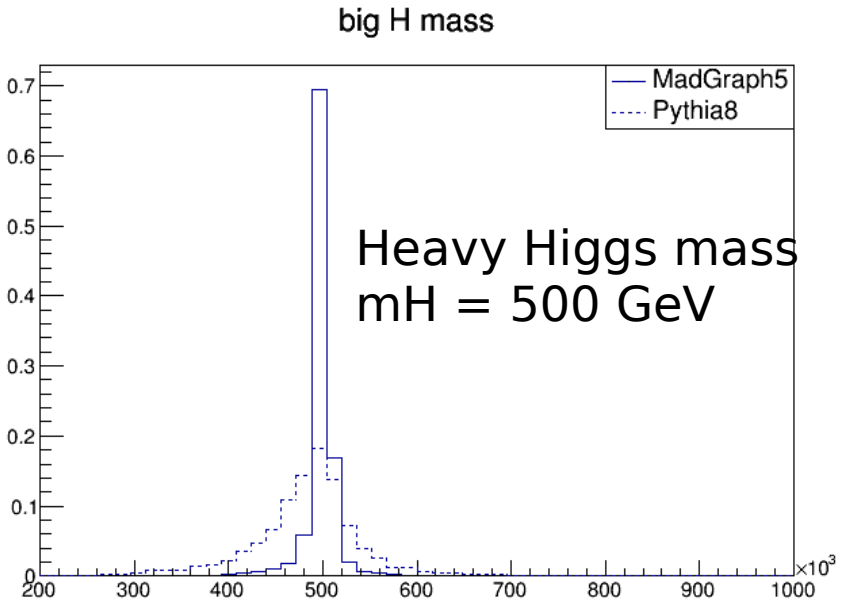

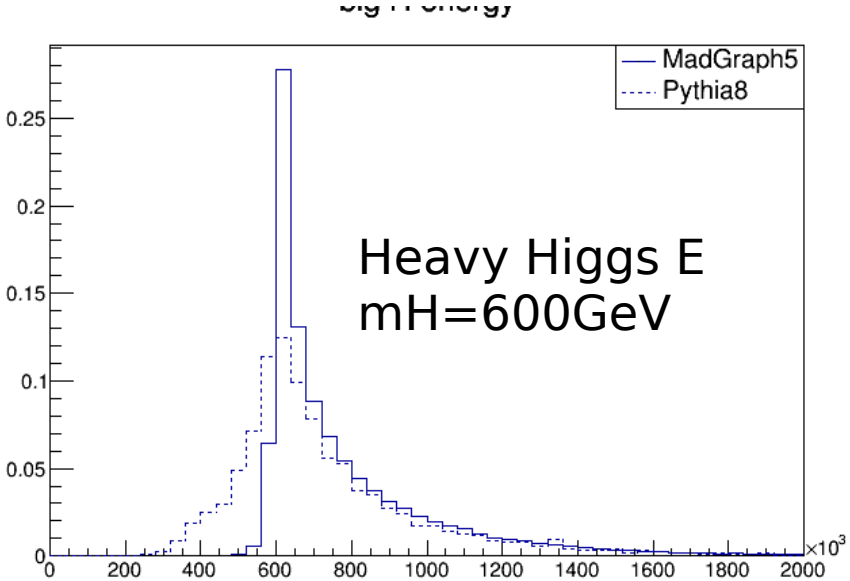

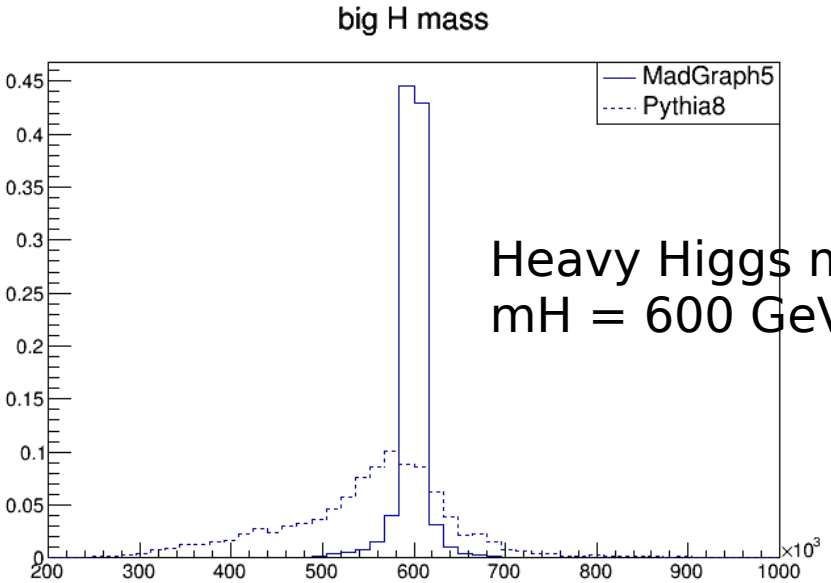

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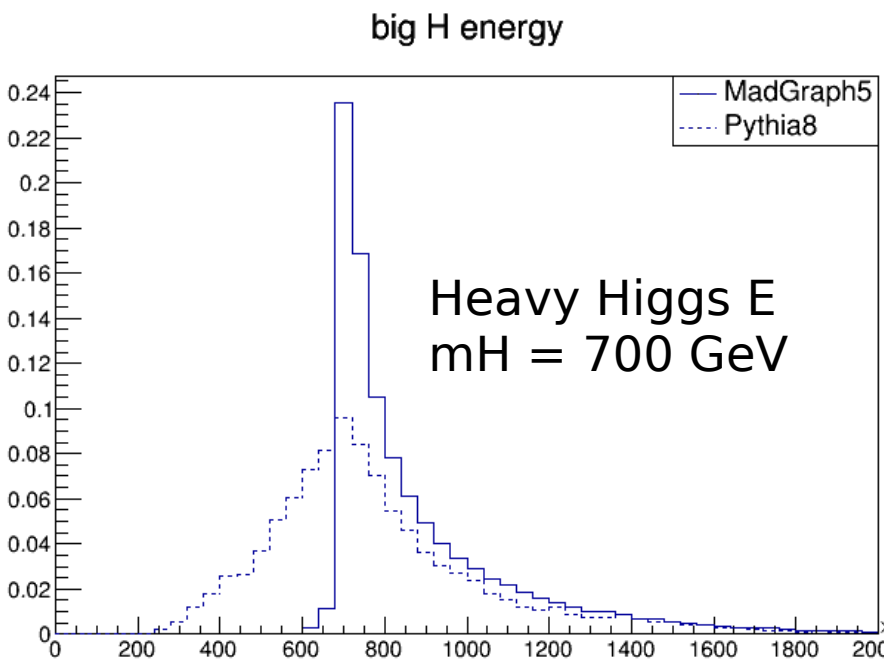

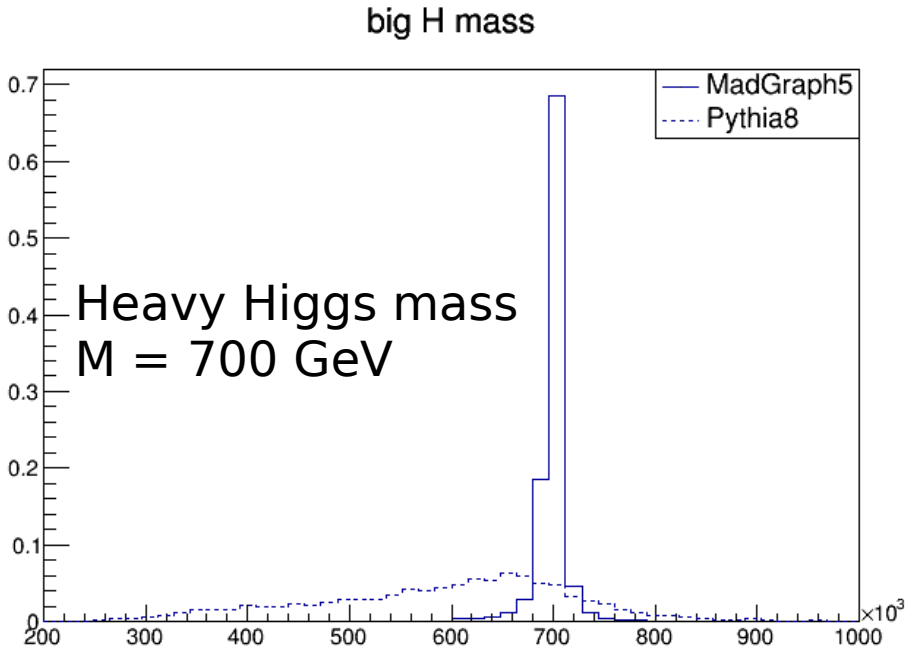

Conclusion

- I failed to implement narrow width in Pythia8 due to the vanishing cross section when only gg-fusion mode is switched on
- Regardless the corrections from narrow width, one can see that up to mH = 500 GeV, MG5 match well Pythia8

Many thanks to Nikolaos and Liron for their tremendous help on the instructions of the generator configurations

Backup

No pT for heavy Higgs

- Since ISR is swicthed off, there is almost no transverse momentum for heavy Higgs produced by two gluons in both MG5 & PY8

An evt in lhe file produced by MG5, [35] is heavy Higgs
px py in circles are small or zero most of the case

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