Muon Collider Full Simulation Studies

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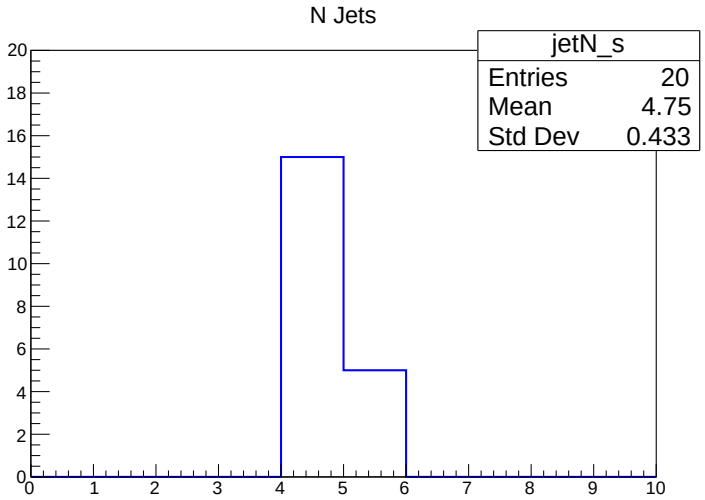
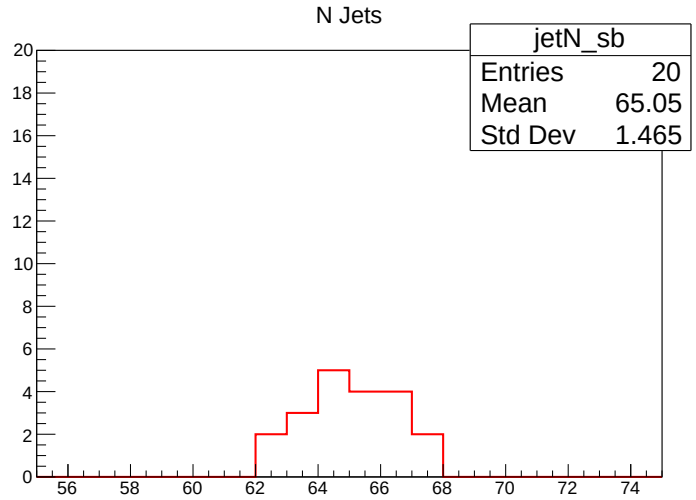
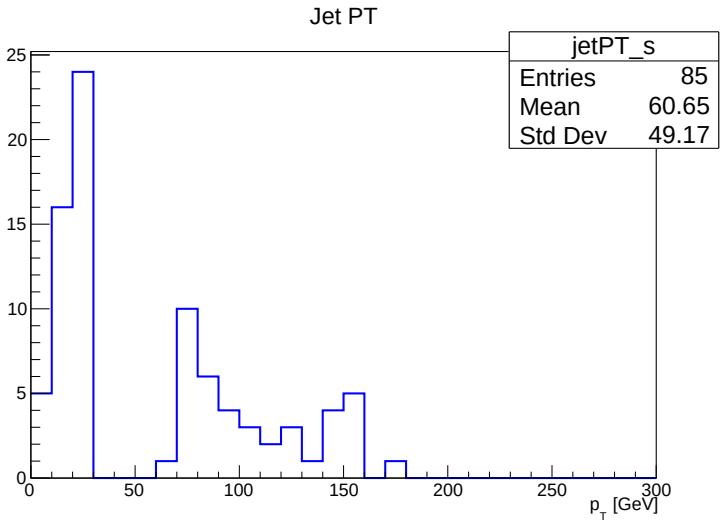
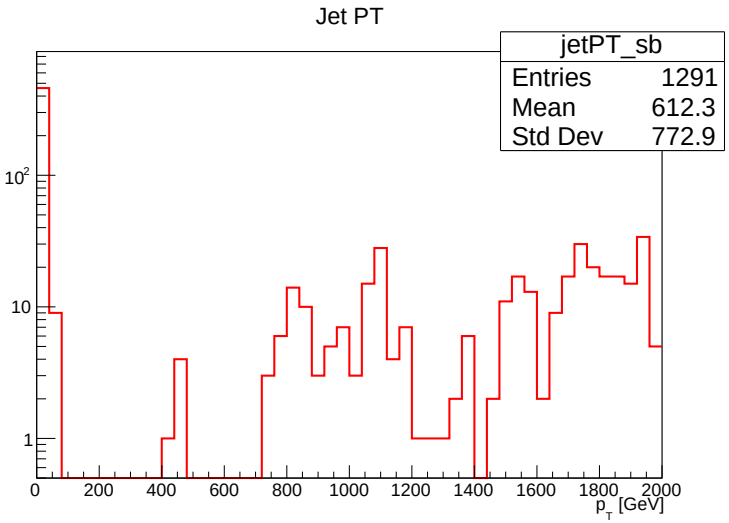
Jet reconstruction

20 events HH(bbbb) with no BIB and with full BIB









- Huge number of jets and very high p_T with BIB overlay.

HH(bbbb) with **no BIB**

Invariant Mass of di-jet pairs with minimum $\Delta M = \Delta m_1^2 + \Delta m_2^2$.
where $\Delta m_1 = 125 - m_{ij}$ and $\Delta m_2 = 125 - m_{kl}$

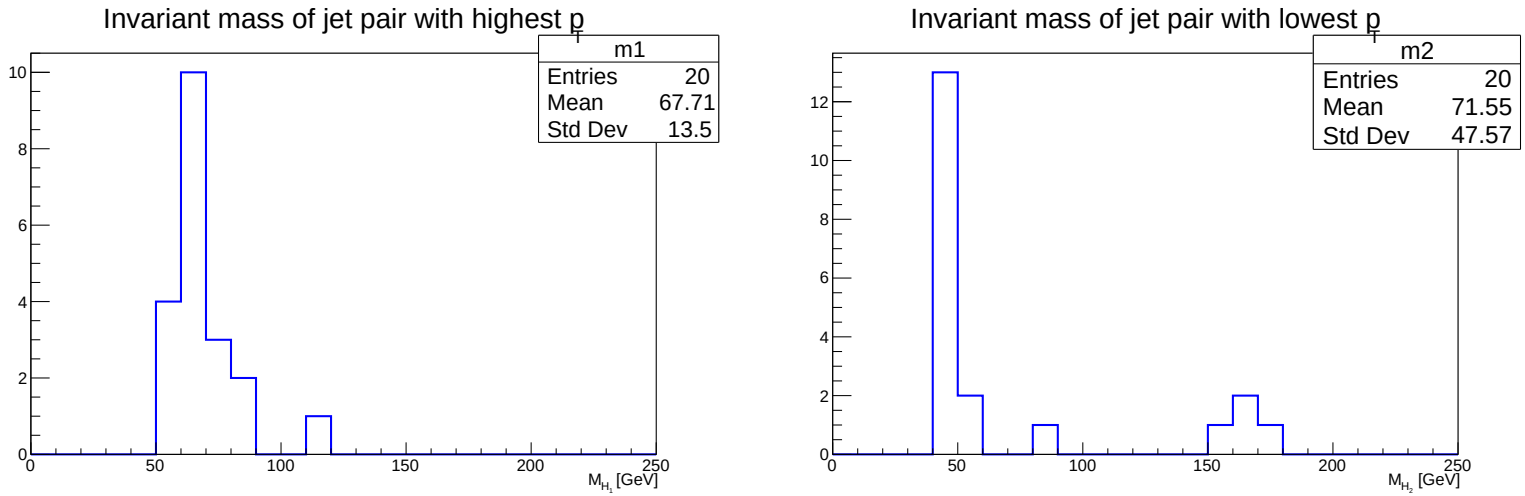


Figure: Left: leading in p_T. Right: subleading in p_T

- Need to check jet reconstruction.

HH(bbbb) with **full BIB**

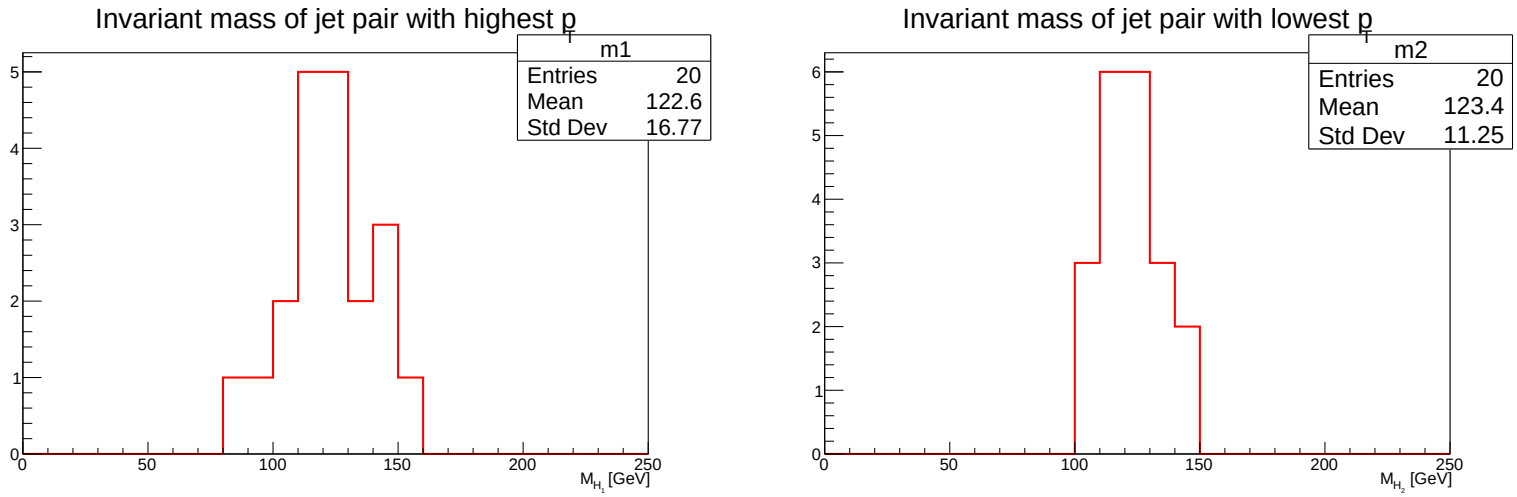


Figure: Left: leading in p_T. Right: subleading in p_T

- Multiple jets present, so some combination can give di-jet close to Higgs.

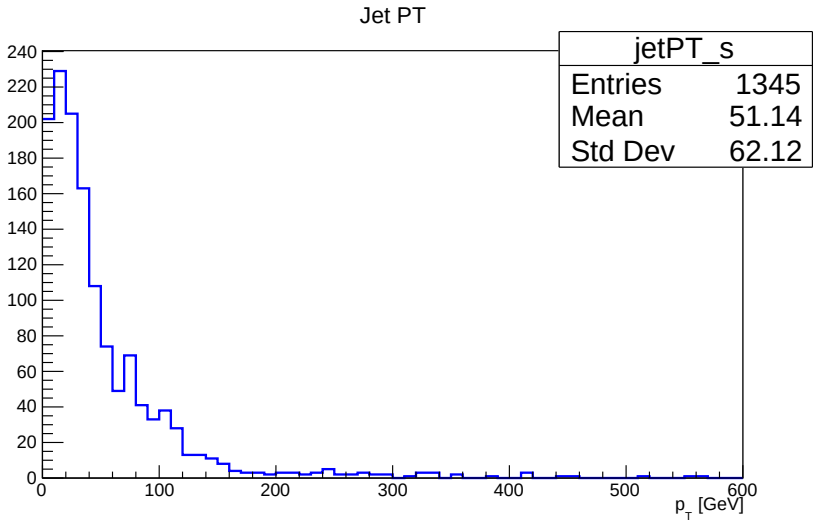
Next steps

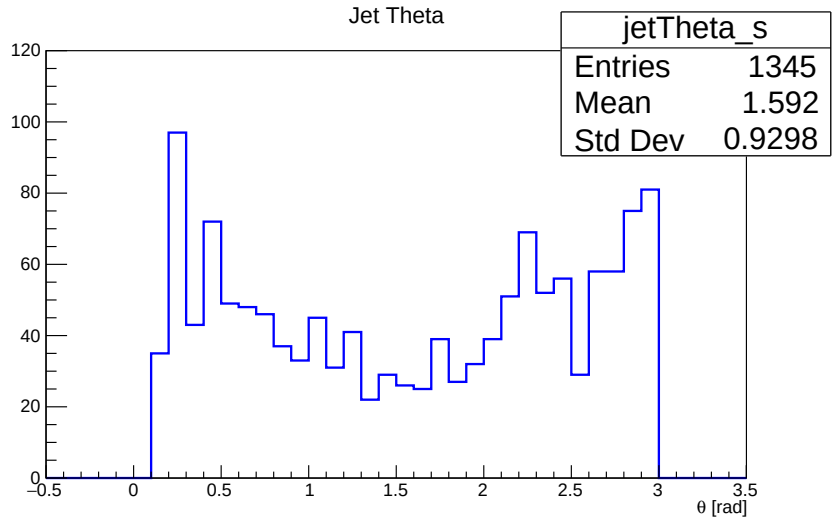
- Check ΔR between leading (subleading) jets in no BIB and full BIB events if properly matched.
- Generate more statistics.

Events with full BIB in progress.

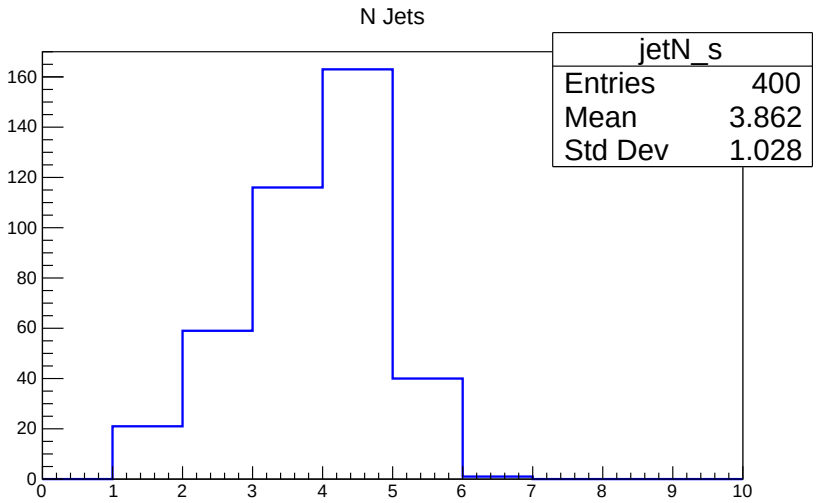
Following plots for 400 events with no BIB.

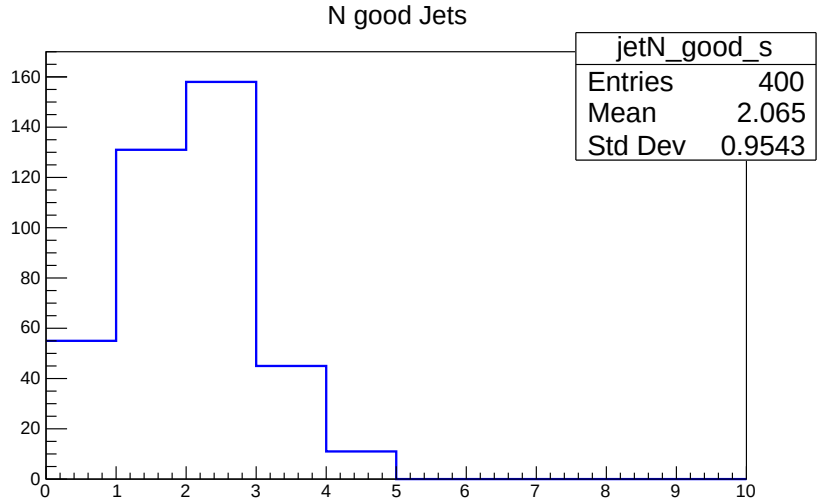
HH(bbbb) with **no BIB**: AK5 Jet reconstruction





Good jets: $p_T > 30$ GeV and $15 < \theta < 165$





HH(bbbb) with **no BIB**: Higgs-jet reconstruction

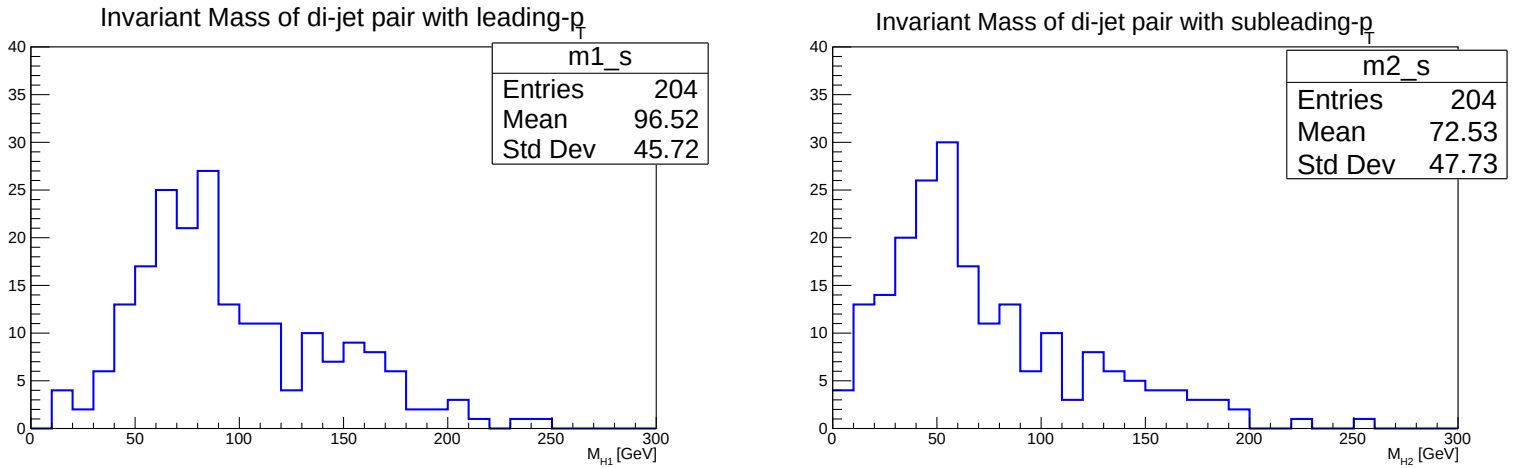


Figure: Left: leading in p_T. Right: subleading in p_T

Need jet energy corrections?

HH(bbbb) with **no BIB**: Higgs-jet reconstruction

Changed jet clustering algorithm from anti-k_T to k_T.
No significant difference.

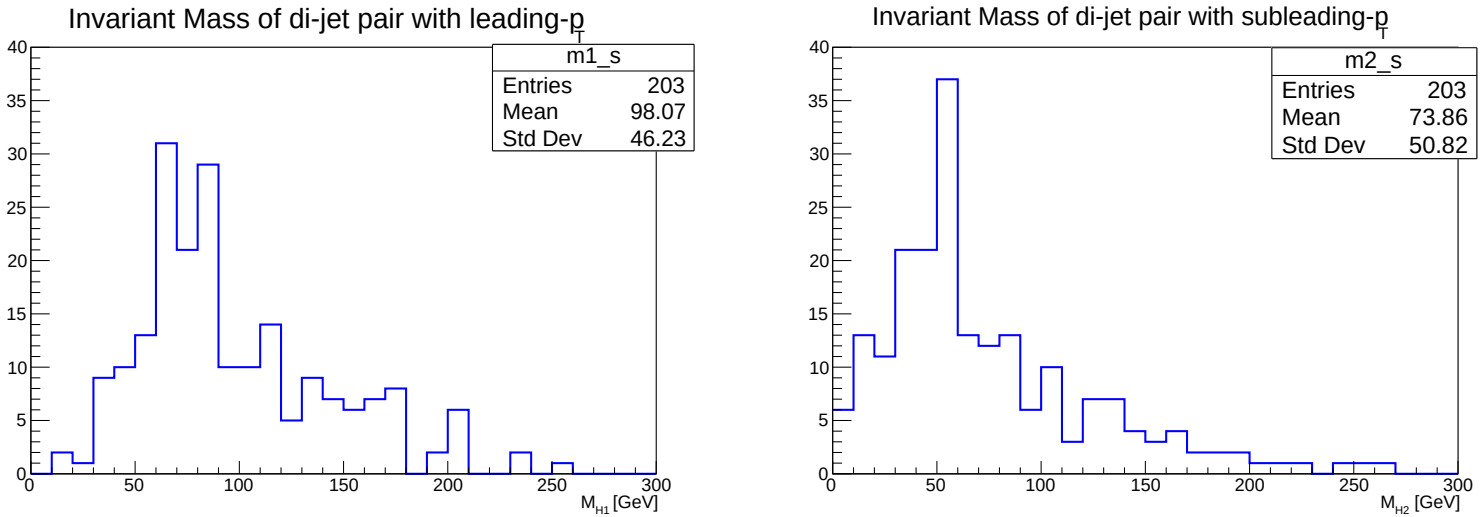


Figure: Left: leading in p_T. Right: subleading in p_T

HH(bbbb) with **no BIB**: Higgs-jet reconstruction

Invariant mass of leading di-jet (using "good" jets: $p_T > 30$ GeV, $15 < \theta < 165$)
Slight difference in clustering algorithm

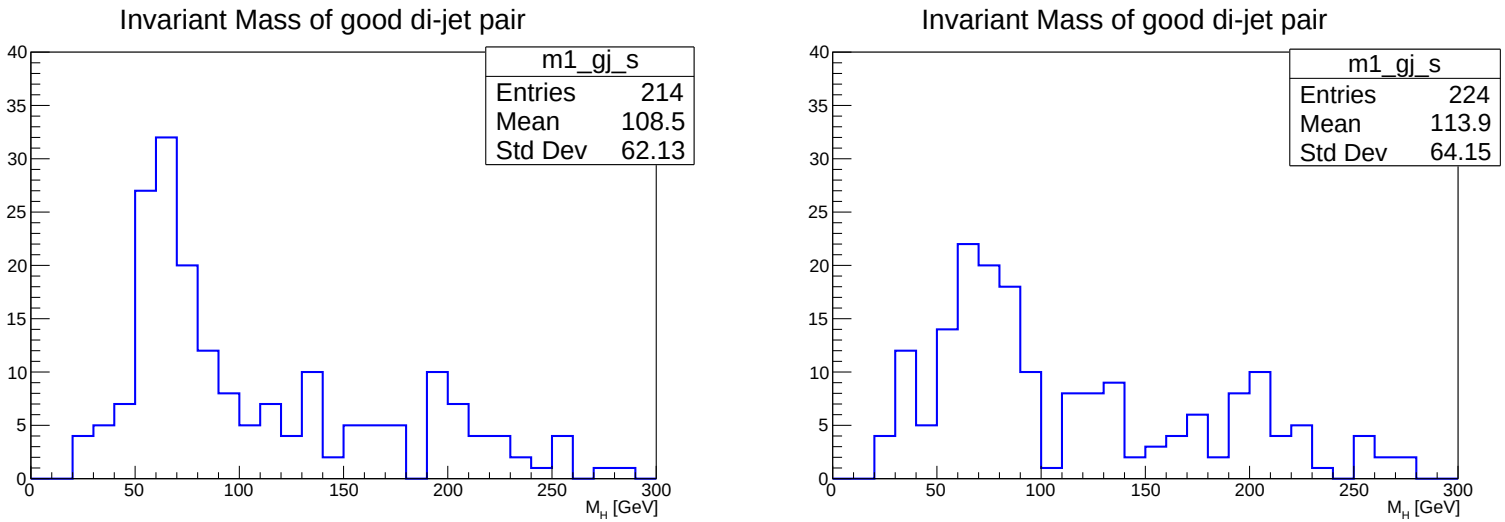


Figure: Left: Anti-k_T algorithm, Right: k_T algorithm

Next steps

- Jet energy corrections? Use VLC jets?
- Currently, generating events with full BIB.

Condor running successfully with large memory requirement.

- Apply matching strategy