Study of Track MET in HWW Low Mll 8.2 fb^{-1}

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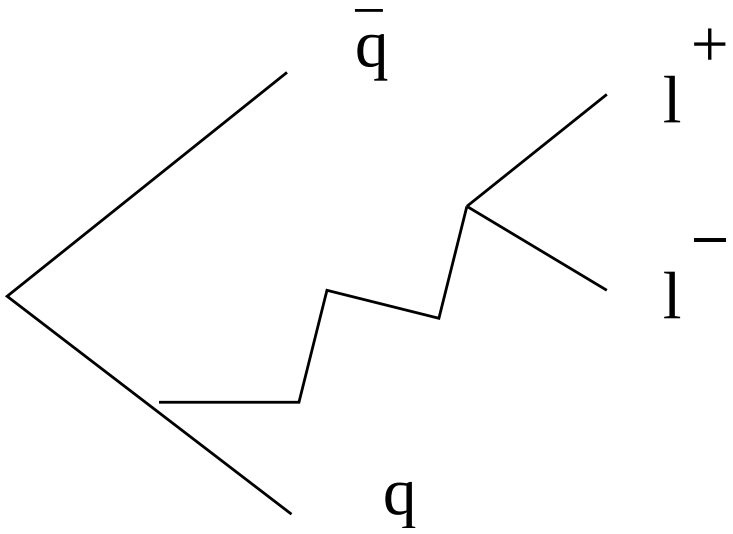


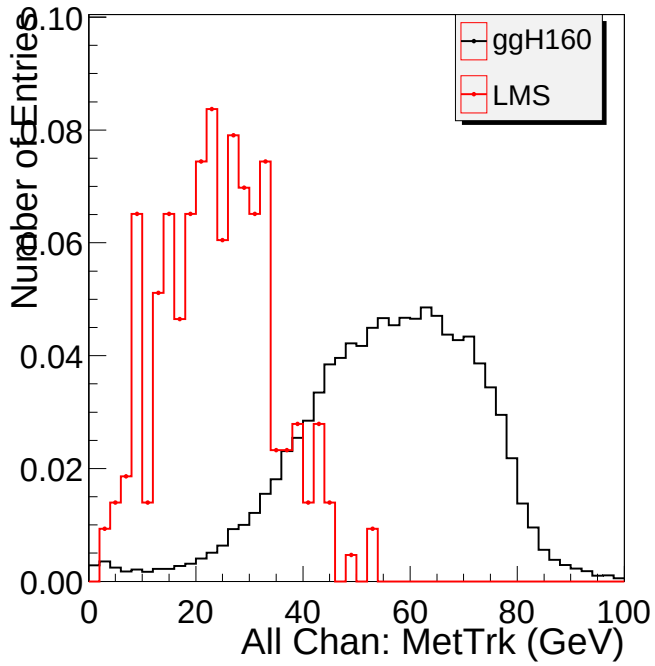
Method

- Drell Yan background with jets missed results in MET.
- Look at Low $\not\!\!E_{Tspec}$ region: $15 \leq \not\!\!E_{Tspec} \leq 25$ GeV/c^2 for events: only same flavor found, confirming it is DY.
- Look at the ggH 160 signal as reference for thinking of cuts or discrimination

- Perhaps mismeasurement can be recovered by looking at Met in Tracks.
- Look at High, Low S/B and 0 and 1 jet.
- Look for very low Tracking Met:
  - MetTrk
  - MetTrk vs MetSpec
- For zero jets, MET comes from recoil against leptons, so look at Vector sum of the Pt of the leptons:
  - VSum 2Lepton Pt
  - VSum 2Lepton Pt vs MetTrk
- Look at Met itself to check it does what we expect relative to MetSpec
  - Met, MEt Vs MetSpec

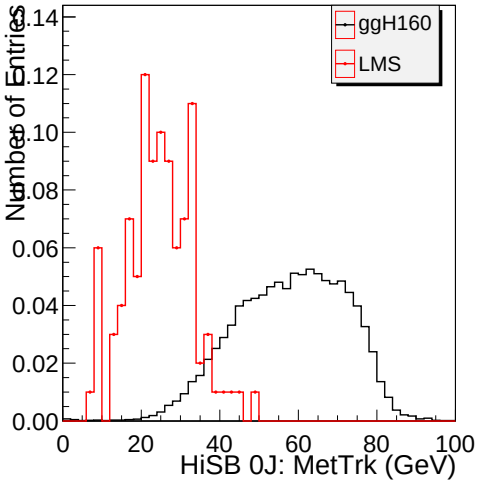
- The events are dominated by the two leptons. How does the sum of all trk pt compare to Met, MetTrk and MetSpec?
  - SumPtTrk vs Met, MetTrk, MetSpec

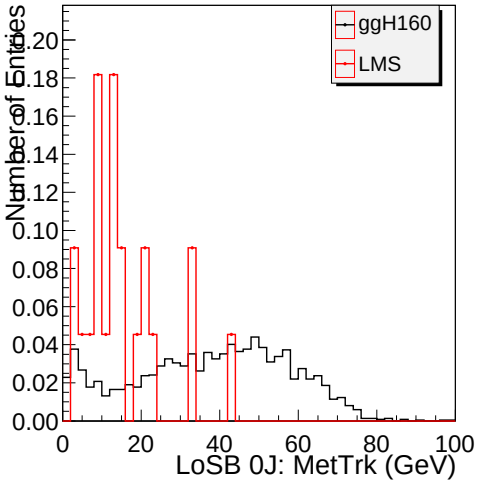
MetTrk Distribution

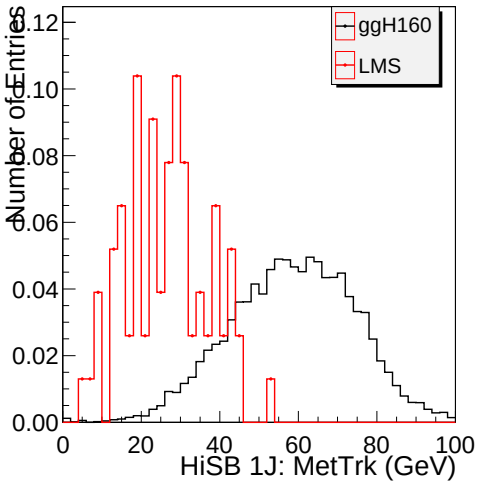


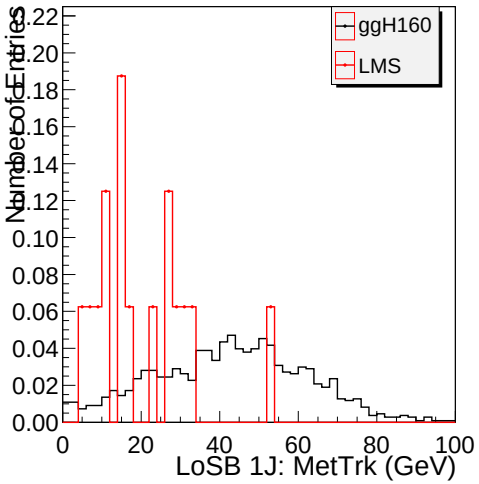
Not a spike at zero! Is there a Jet or HI/Low SB dependence?

MetTrk Distribution



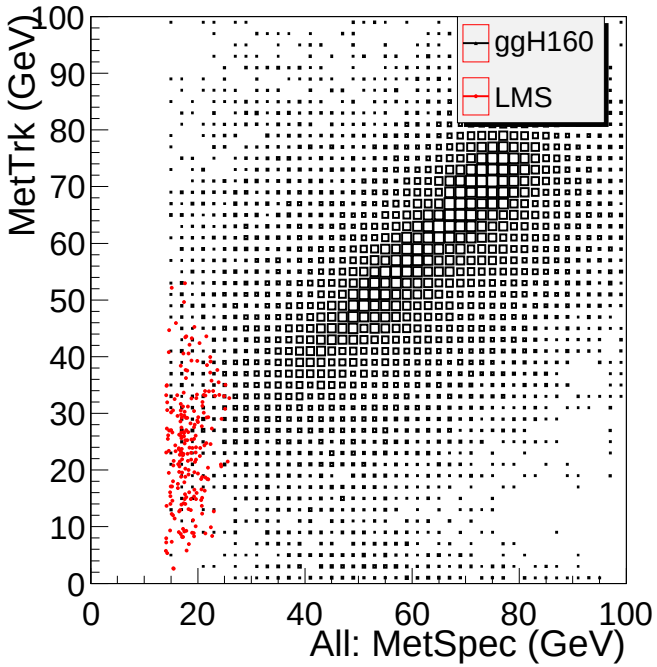






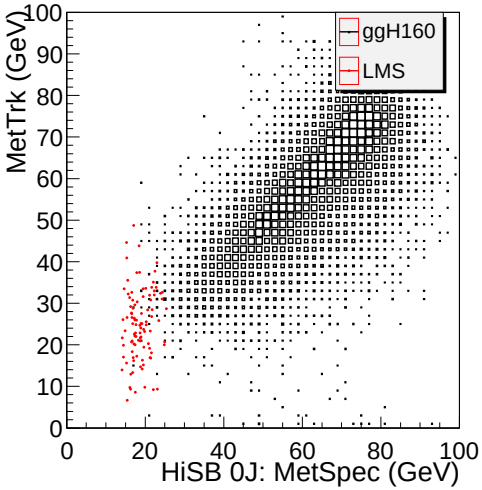
LowSB lower – but so is signal. No Jet Dependence.

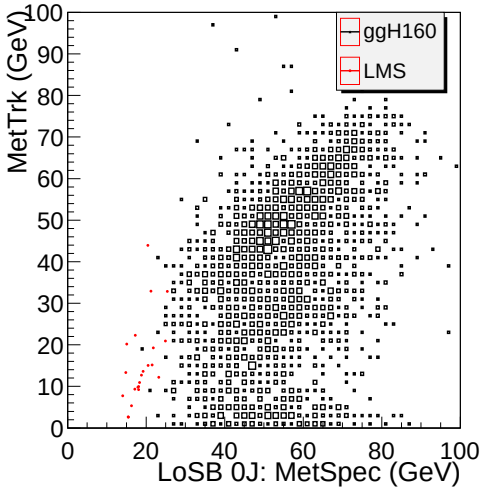
MetTrk vs Met Spec

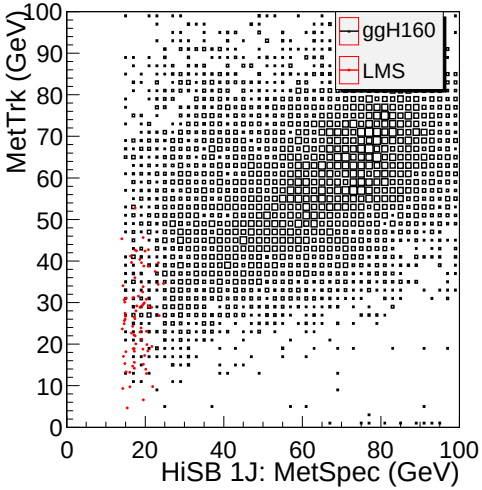


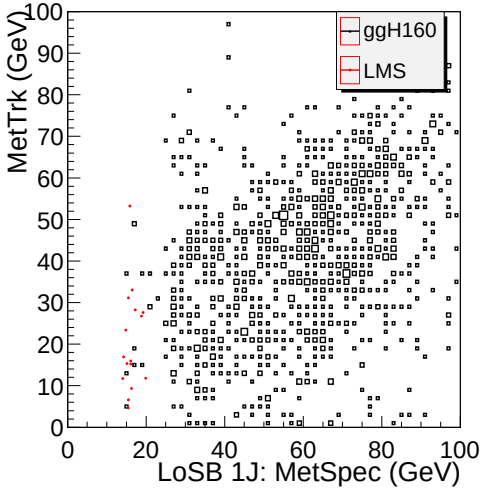
Signal discrimination looks intersting. Perhaps use as an input? But not until we can train with MC.

MetTrk vs Met Spec by Hi/Low S/B and Jet



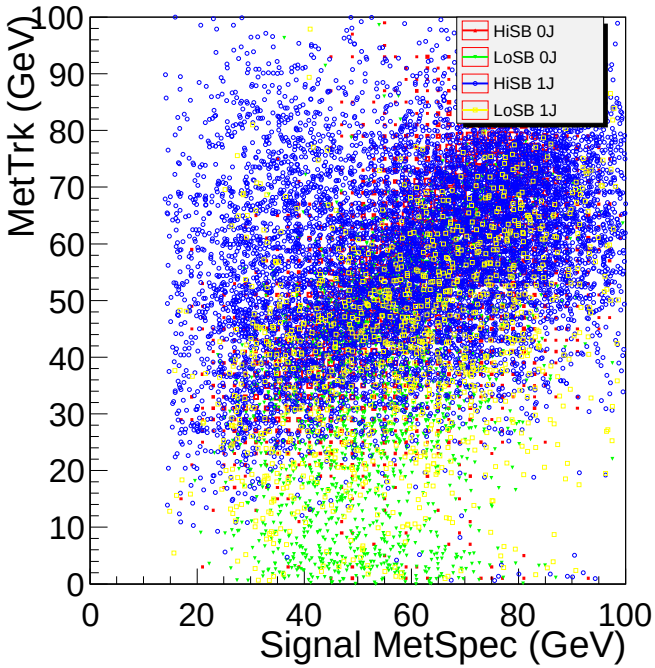


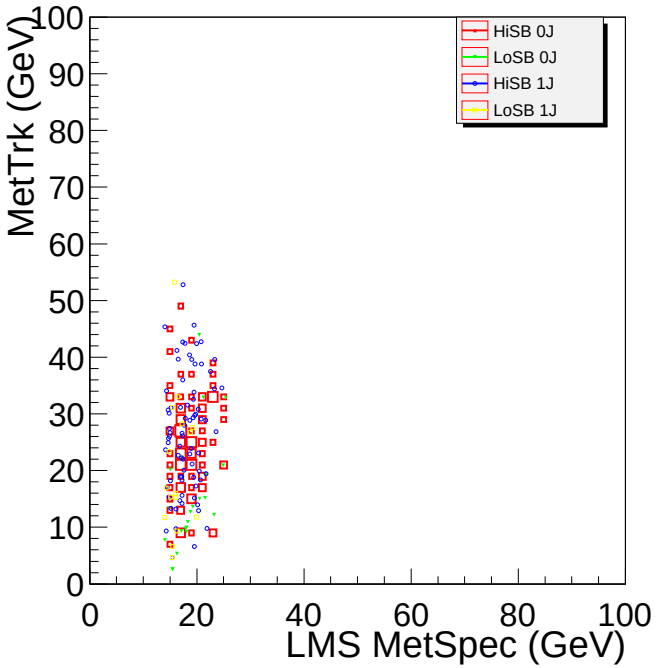




What is going on in Low SB 0 jet in signal

MetTrk vs Met Spec by Signal, Bkg

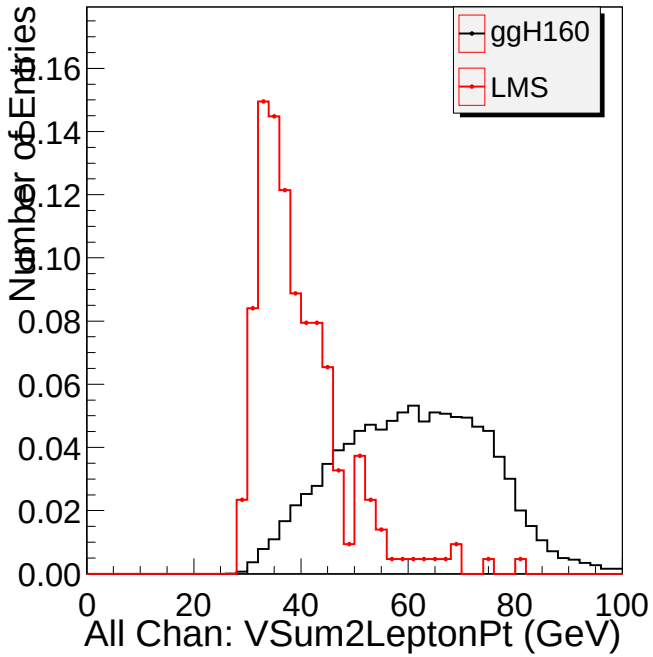




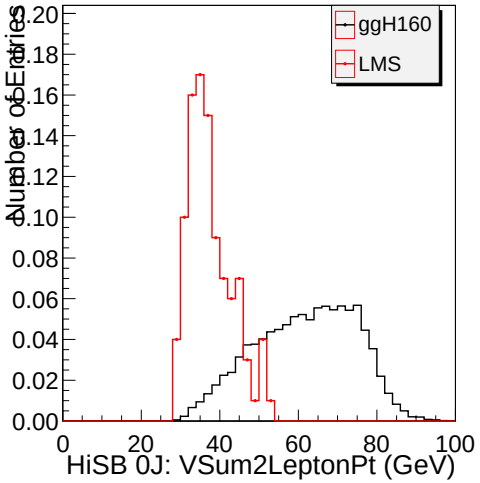
LowSB has less MetTrk in Signal. Not so much so in Bkg, but some trend.

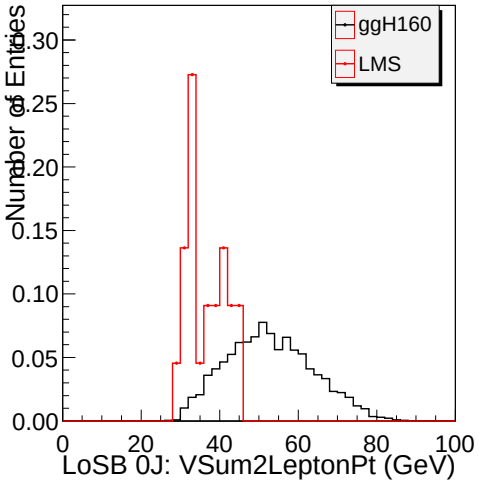
VSum 2Lepton Pt

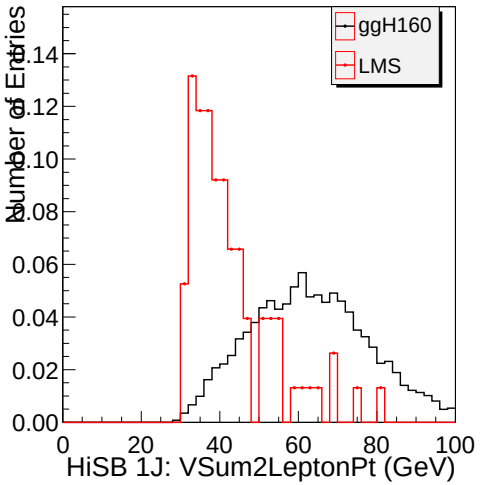
For zero jets, MET comes from recoil against leptons, so look at Vector sum of the Pt of the leptons:

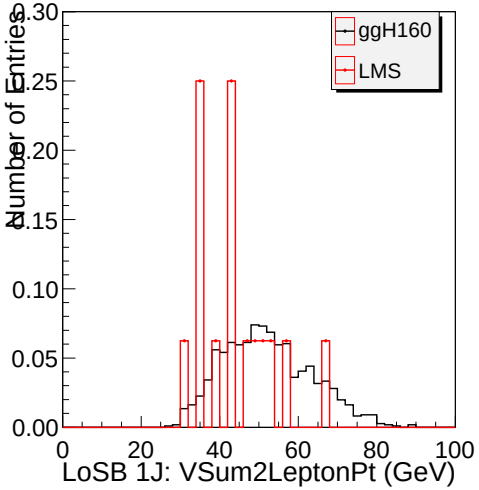


VSum 2Lepton Pt by Hi/Low S/B and Jet

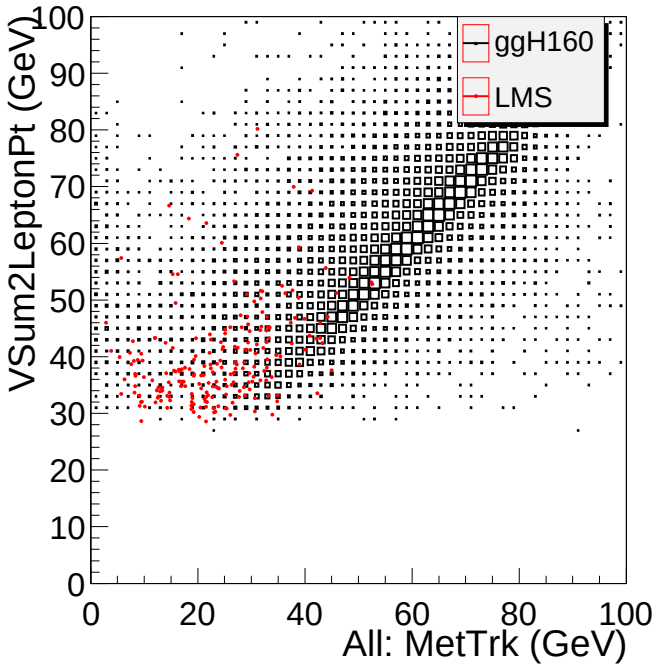






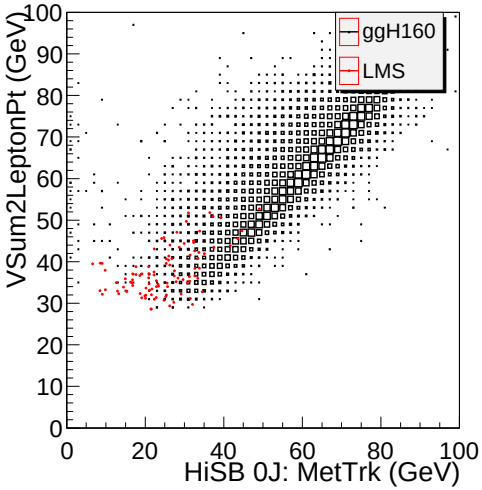


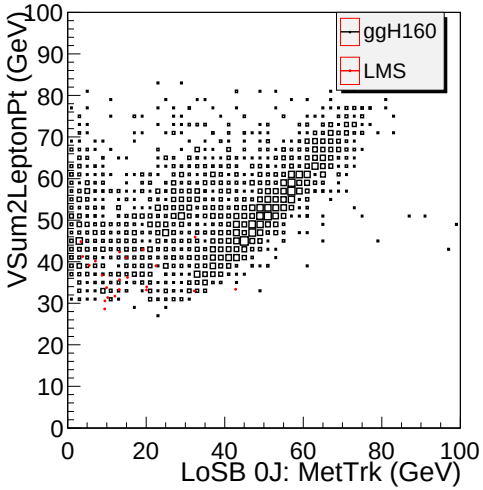
VSum 2Lepton Pt vs Met Trk

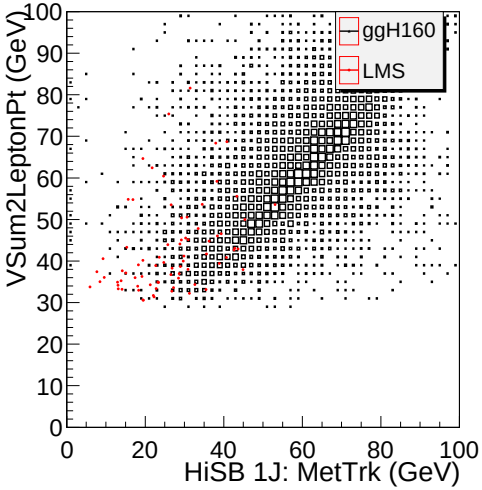


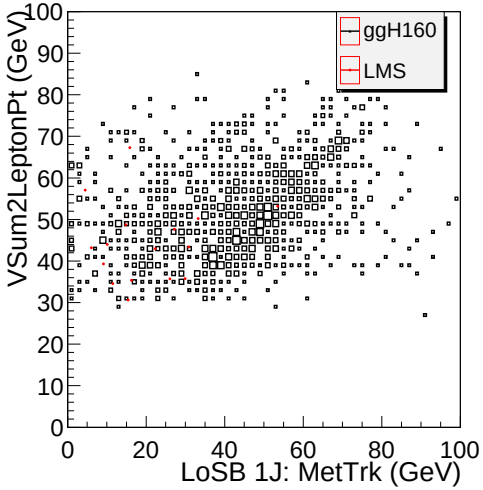
Something should recoil in bkg, so the metis lower than in signal.

VSum 2Lepton Pt vs MetTrk H/L SB/Jet



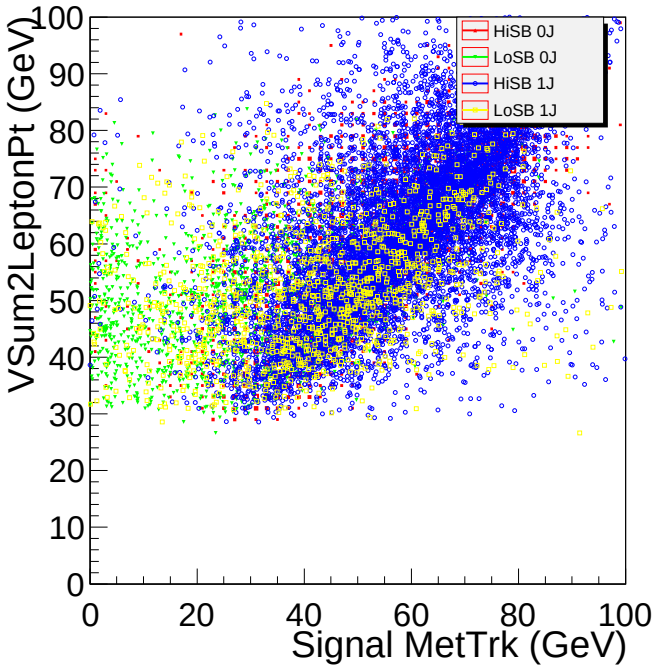


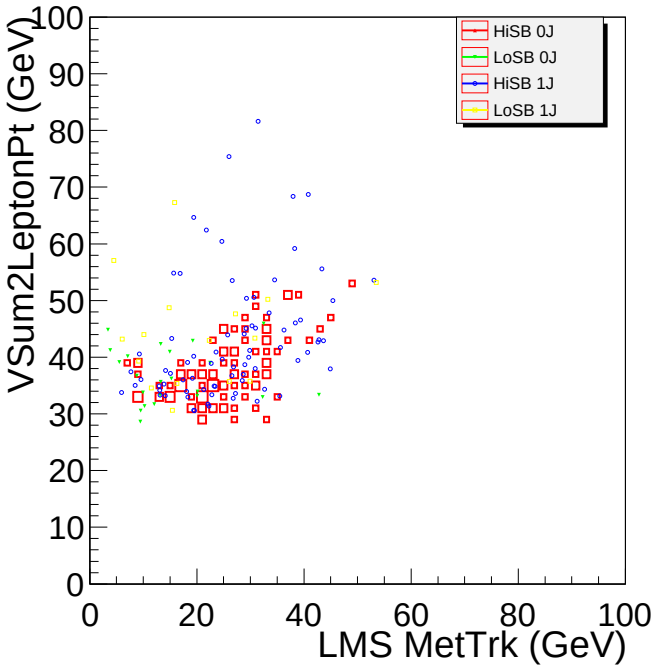




Odd signal behaviour most noticible in low s/b 0Jet

VSum 2Lepton Pt vs Met Trk, Sig, Bkg

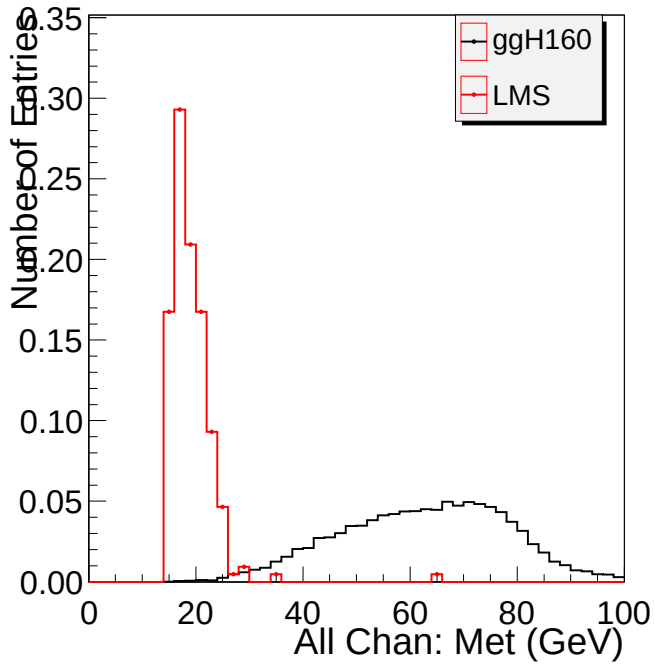




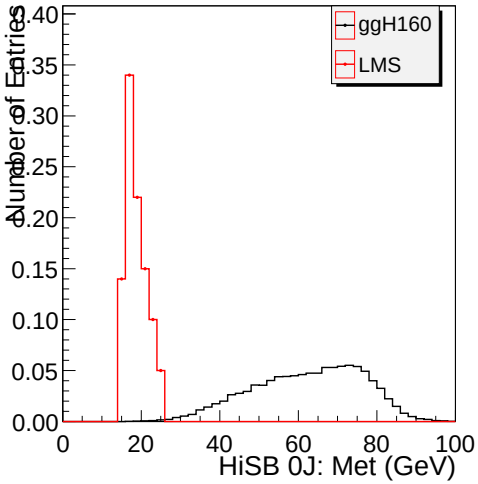
LowS/B shows low values of TrkMet

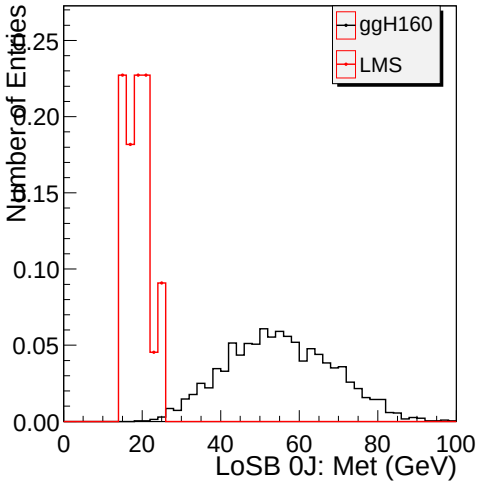
Met

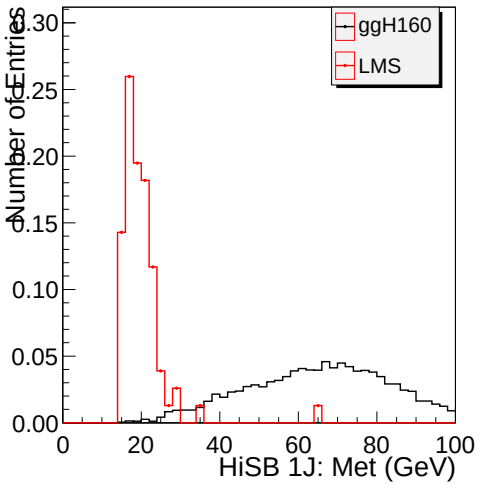
Look at Met itself to check it does what we expect relative to MetSpec

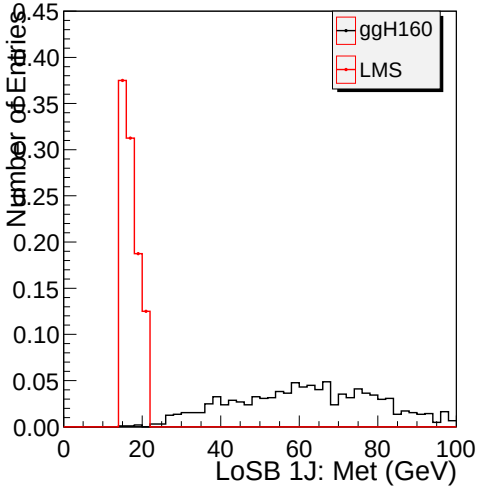


Met SB,Jet

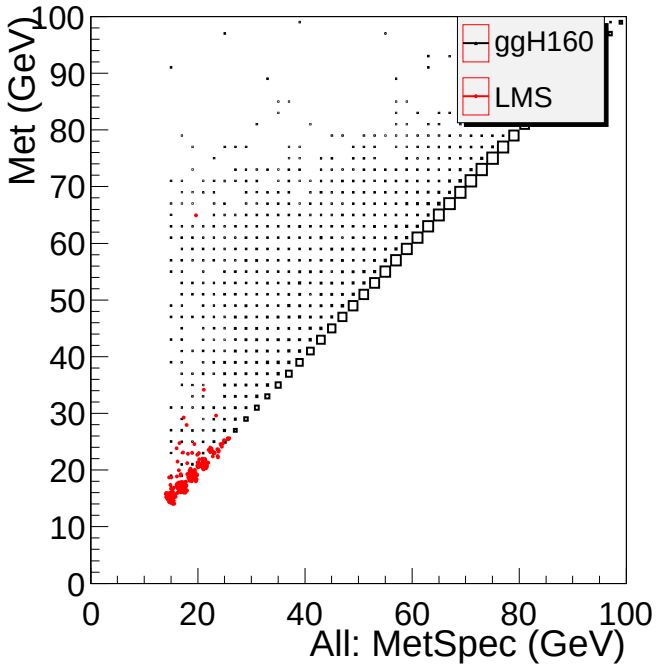

ggH160
LMS
Number of Entries
HiSB 0J: Met (GeV)


ggH160
LMS
Number of Entries
LoSB 0J: Met (GeV)

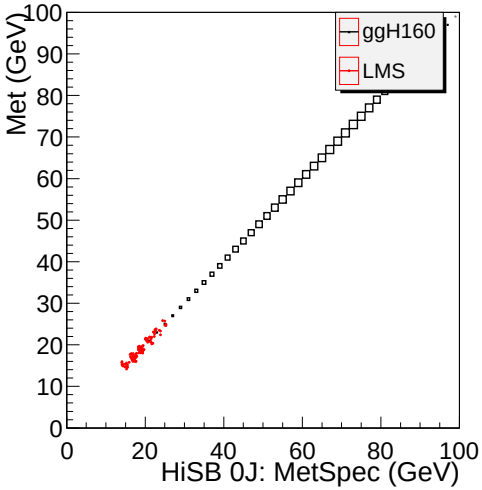

ggH160
LMS
Number of Entries
HiSB 1J: Met (GeV)

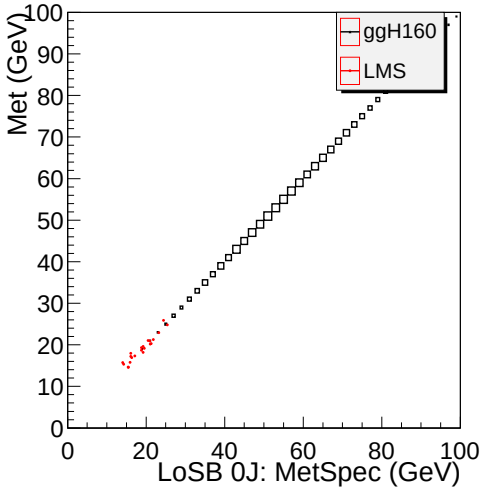

ggH160
LMS
Number of Entries
LoSB 1J: Met (GeV)

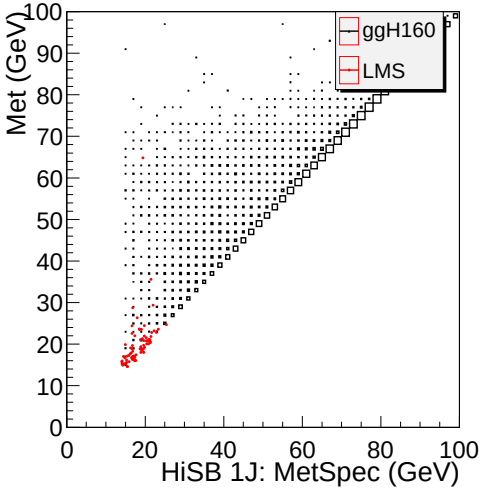
Met vs MetSpec

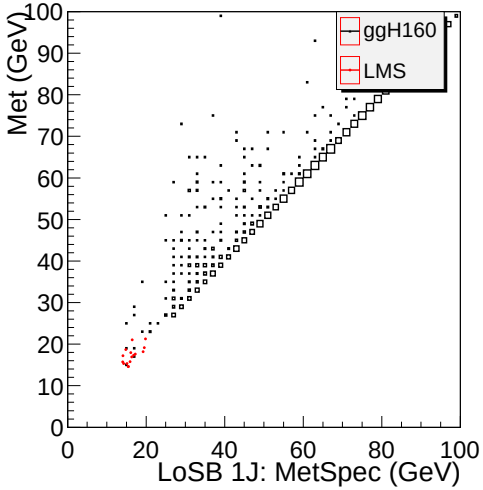


Met vs MetSpec SB, Jet



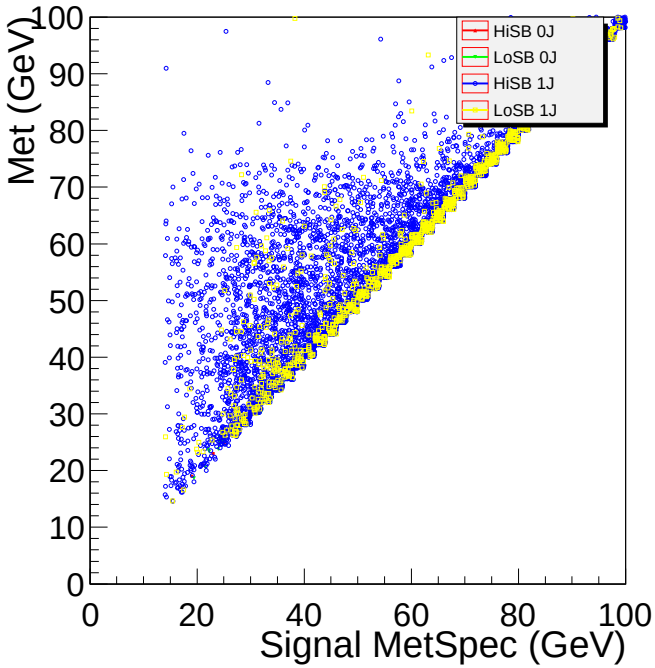


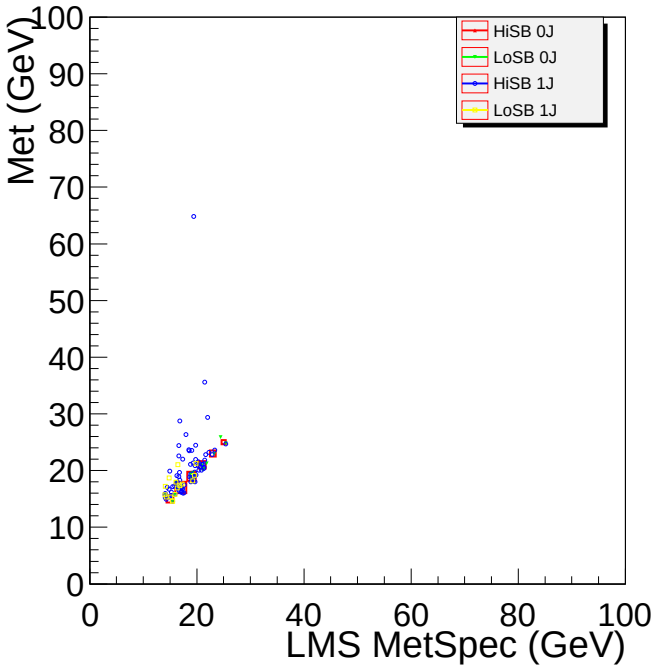




Met differs from MetSpec in 1J

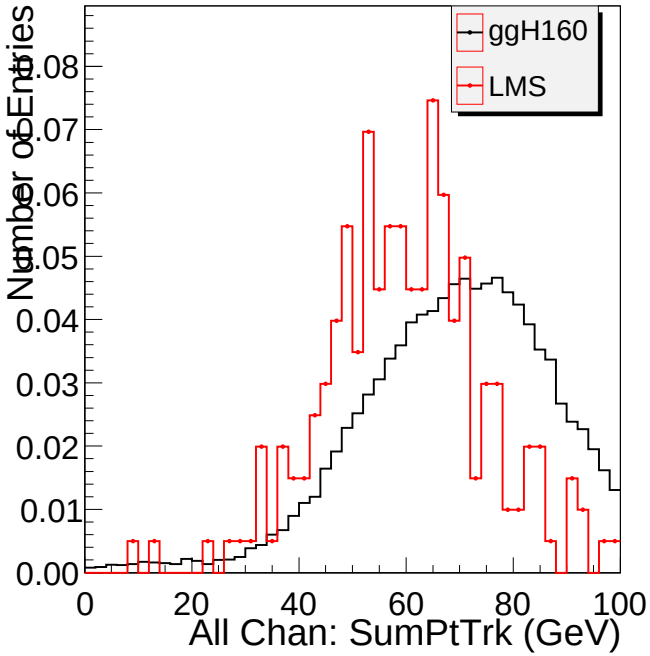
Met vs MetSpec Sig,bkg





SumPtTrk

Leptons should dominate Pt of tracks



Background not much different from Signal and that is no suprise.

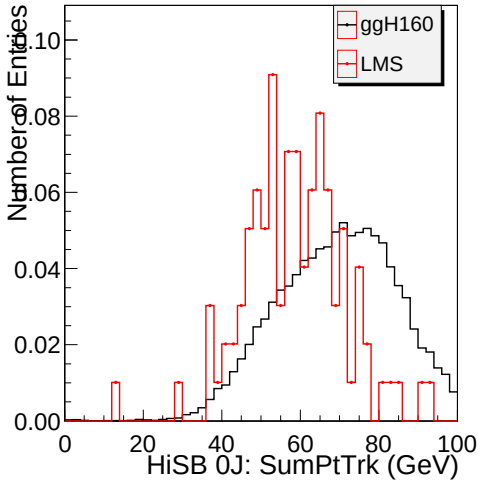
Conclusions

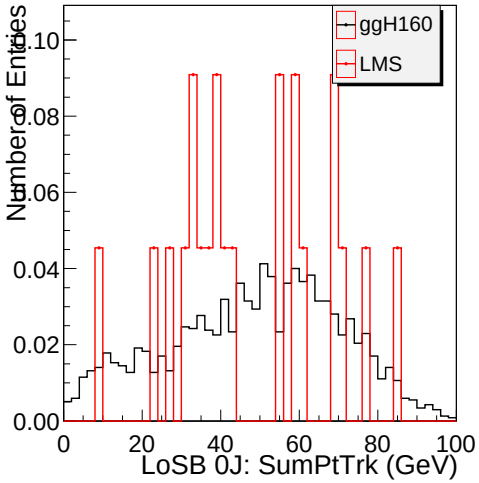
- Surprisingly there is a lot of Met in Tracks.
- Disappointingly this does not just go to zero.
- Scarily this means we have jets that are going out of acceptance and creating MET
- It may be useful as a new NN variable if we can train against the BosRad
- Checked we generate BosRad jets out to $|\eta| < 5$ and they actually only go to about $|\eta| < 4$.
- Studying madgraph level to see what is there. Find a few percent of jets and photons that go out to $|\eta| > 2.5$. Would need to understand the jet and photon response vs eta to get rapidity.

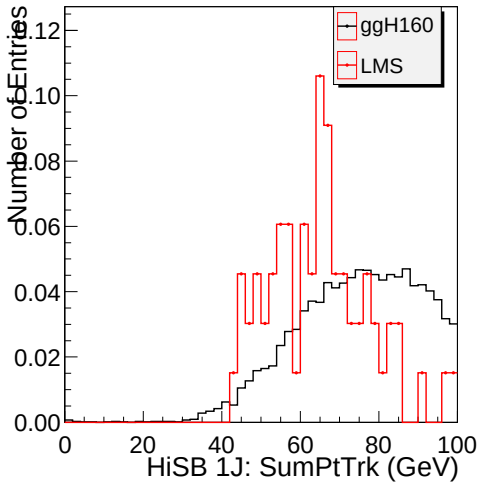
- No difference in muon and electron on photon multiplicity so this is from quarks. Pythia would not have that either.

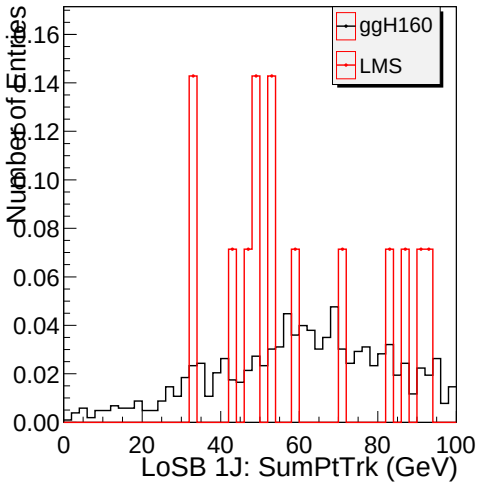
Extras

SumPtTrk by S/B Met

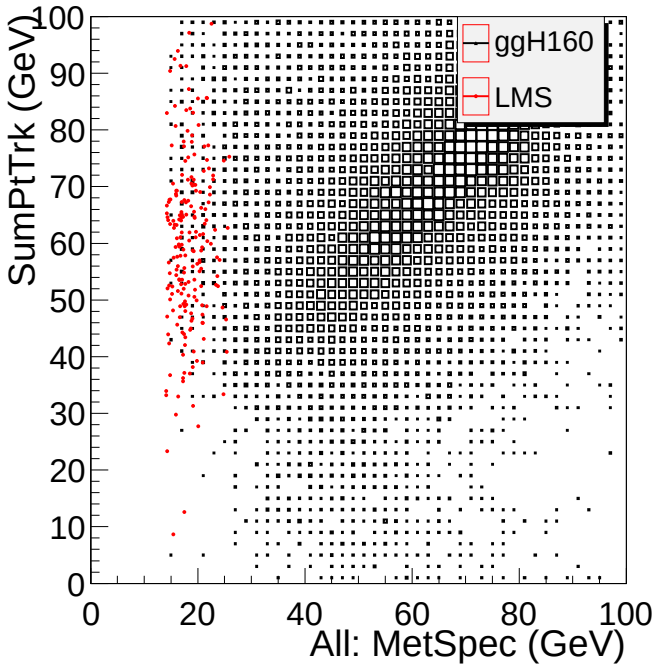




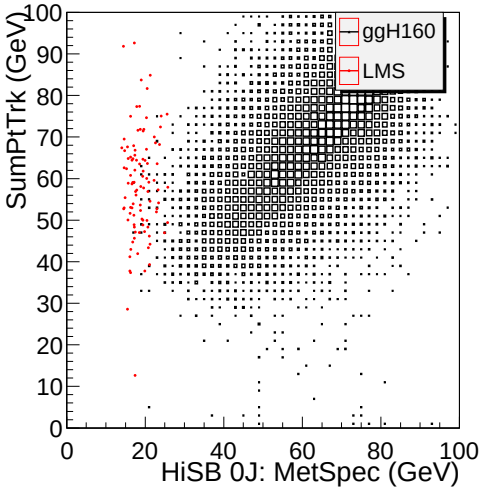


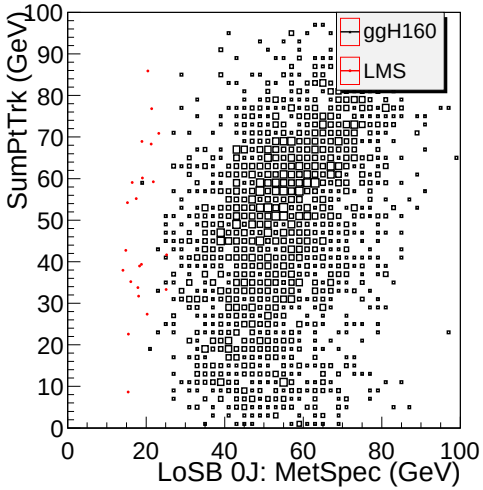


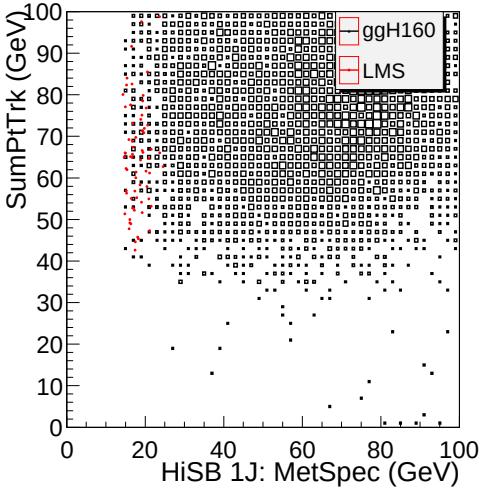
SumPtTrk vs MetSpec

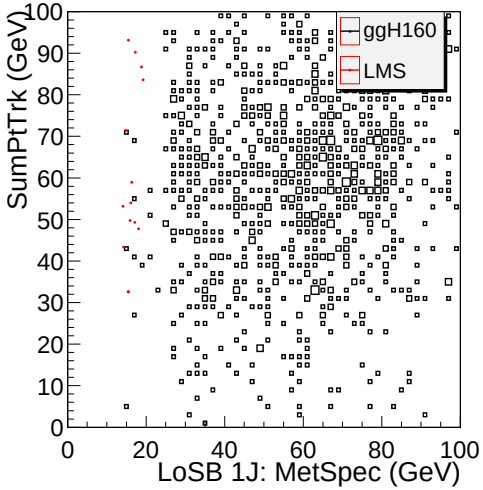


SumPtTrk vs MetSpec S/B, Jet

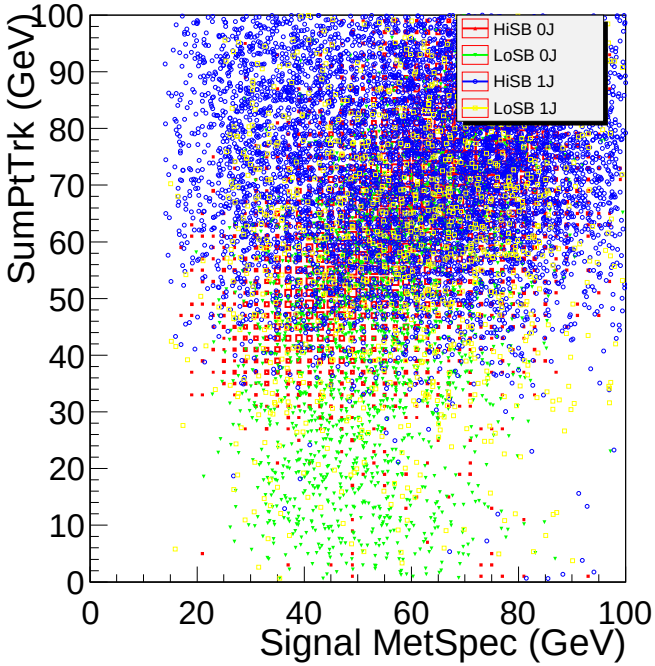


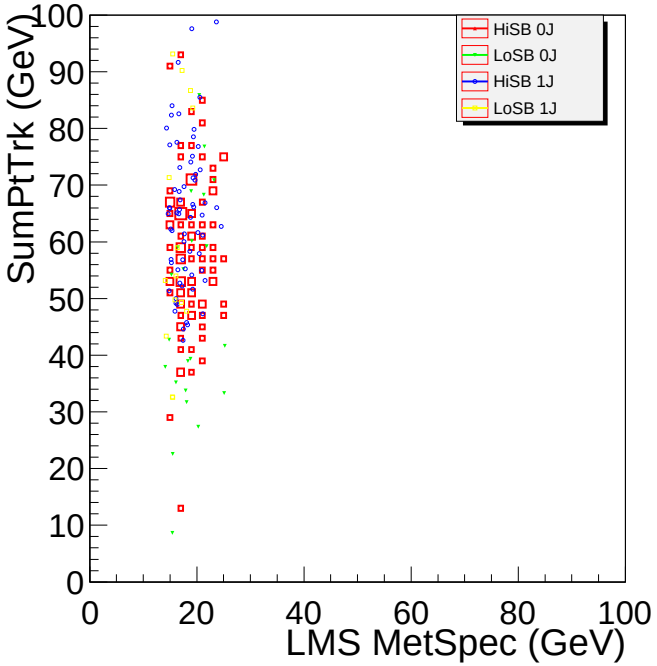




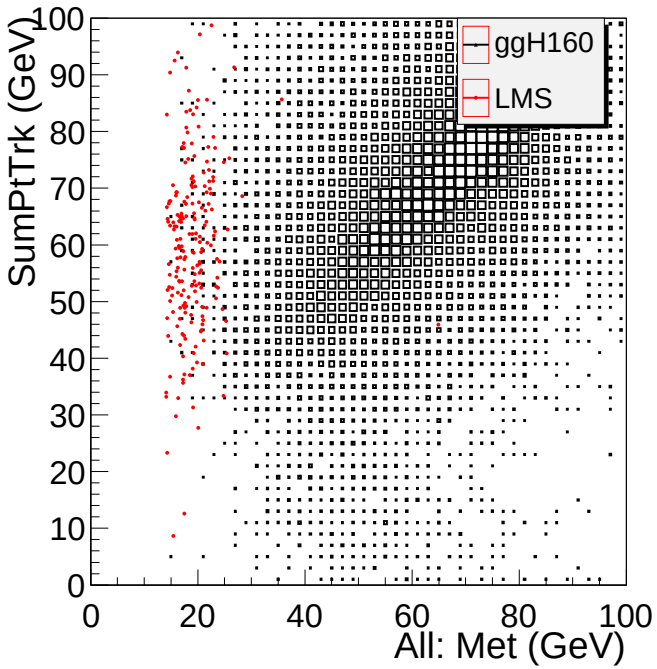


SumPtTrk vs MetSepc Sig,Bkg

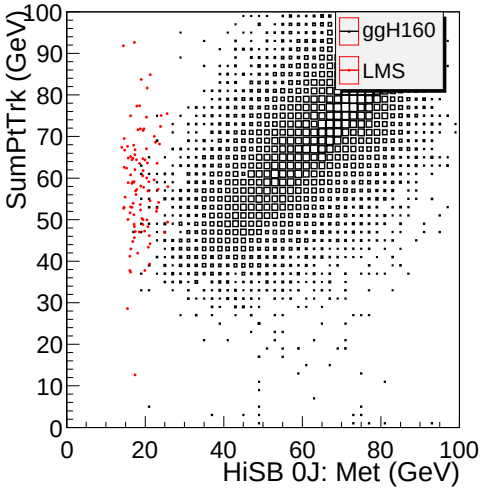


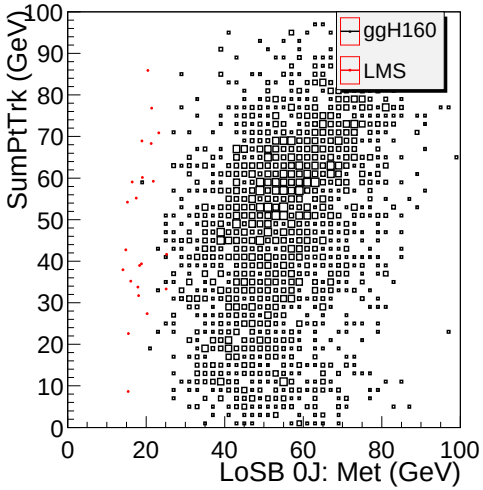


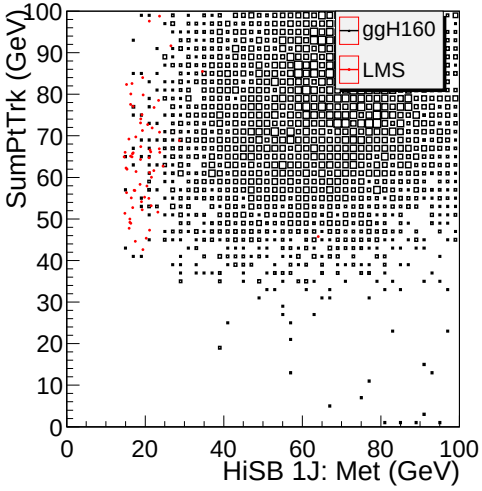
SumPtTrk vs Met

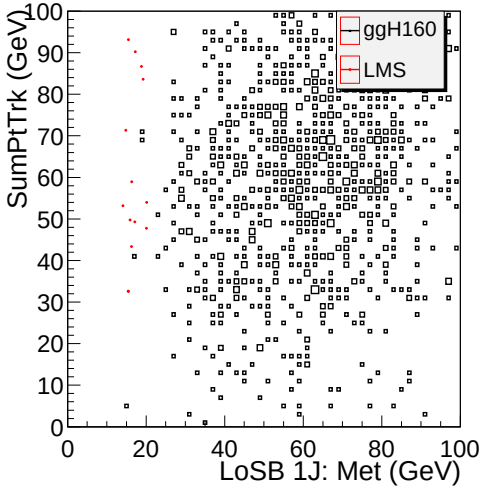


SumPtTrk vs Met, S/B, Jet

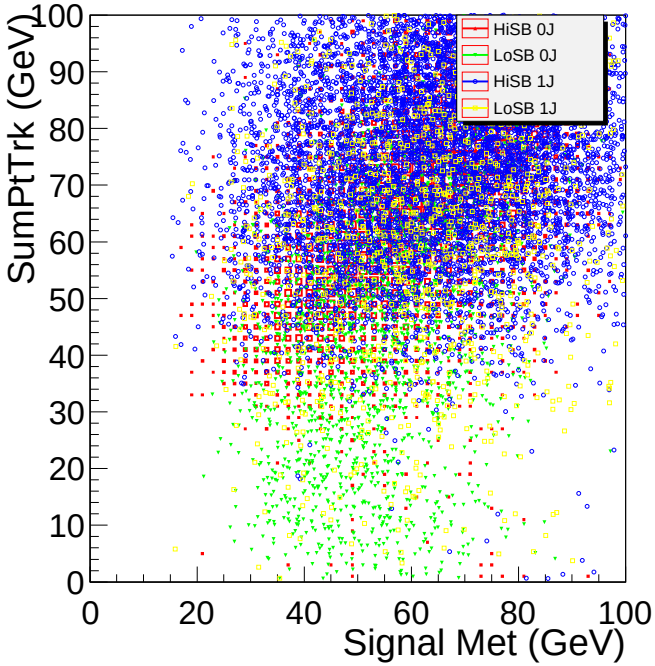


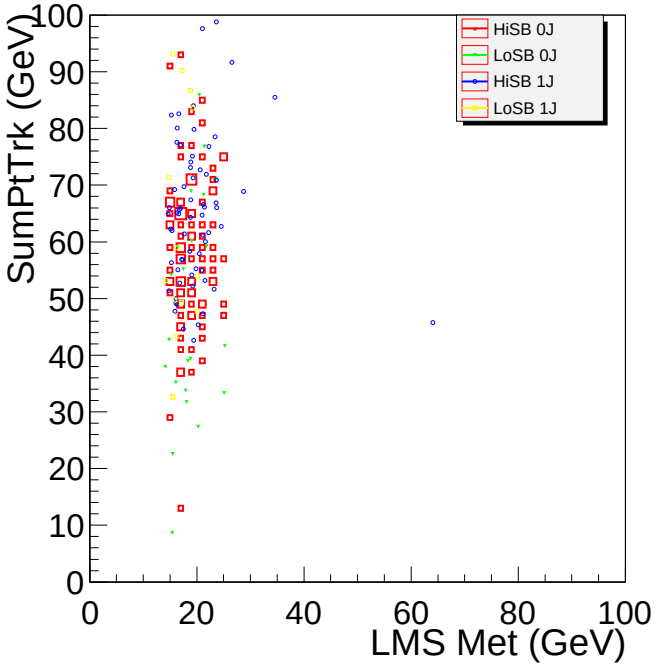




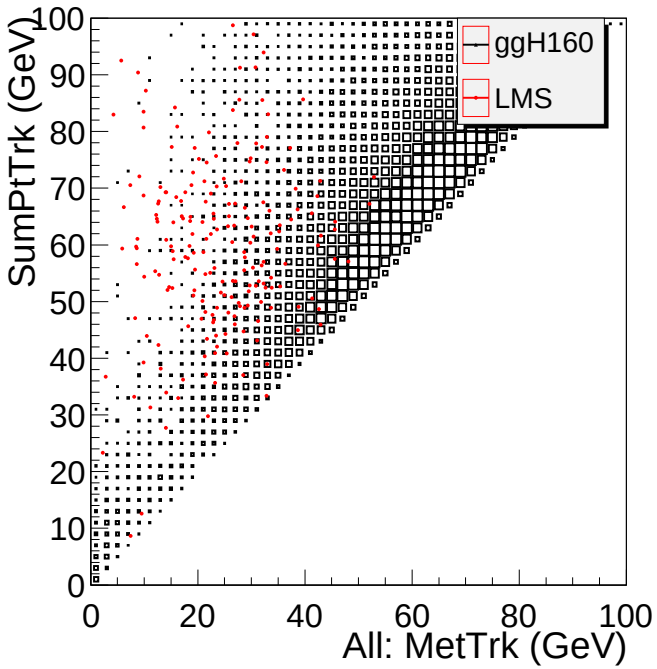


SumPtTrk vs Met, Sig, Bkg

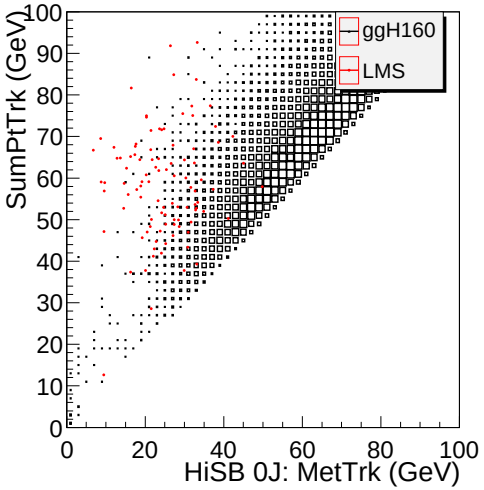


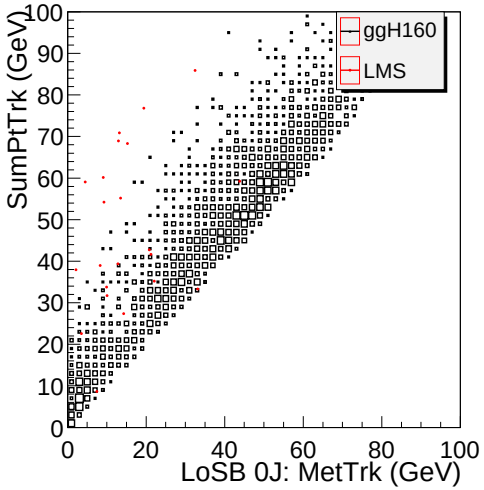


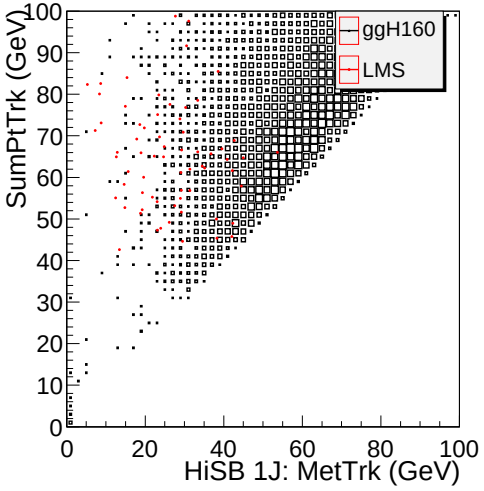
SumPtTrk vs MetTrk

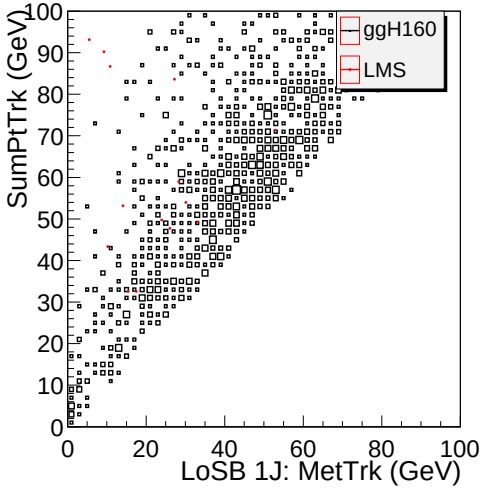


SumPtTrk vs MetTrk, S/B, Jet









SumPtTrk vs MetTrk, Sig, Bkg