MC VBF+MET QCD Samples Status

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Today's presentation

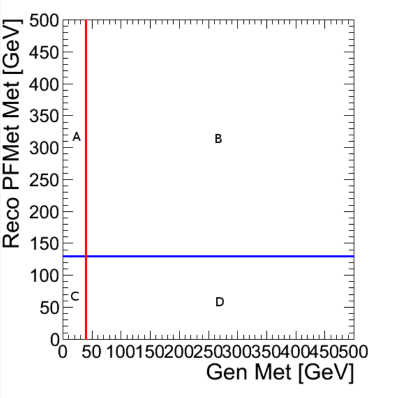
Topics

- GenMET vs RecoMET study
  - Fake MET contribution to QCD VBF samples
  - GenMET filter optimization
- First look at $\Delta\phi$ versus data

Fake met contribution study

To evaluate how much events pass out analysis cut of $MET > 130\ GeV$ that have a significant contribution of fake MET which the new QCD VBF-like samples will not be able to simulate we need to look at the inclusive samples.

Area Definition



We can define 4 areas:

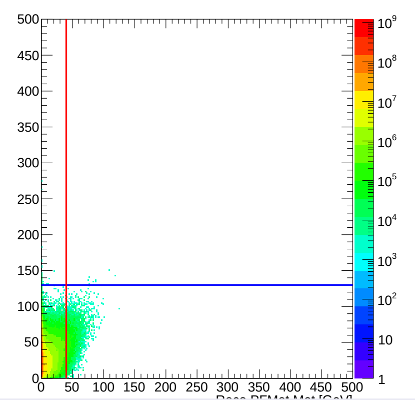
- A: Accepted by Analysis MET cut but rejected by GenMET Filter
- B: Accepted by Analysis MET cut and accepted by GenMET Filter
- C: Rejected by Analysis MET cut and rejected by GenMET Filter
- D: Rejected by Analysis MET cut but accepted by GenMET Filter

From this we can define the B area normalization factor as $\frac{A+B}{B}$

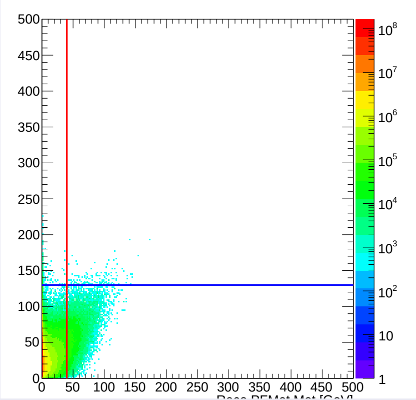
Gen Met Vs Reco MET I

Plots here do now have any weighting but cross section since filters will operate over genEvents with no weigting this (so this is just a scaling).

80to120



120to170

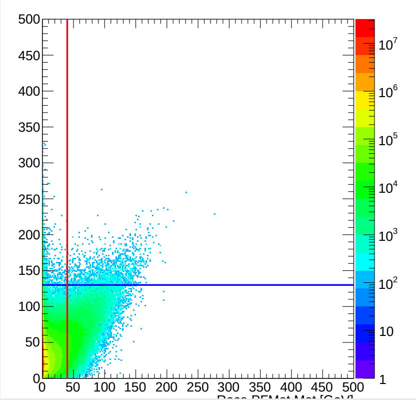


For both this p_T hats most event fall on zone C or D and are rejected analysis cut.

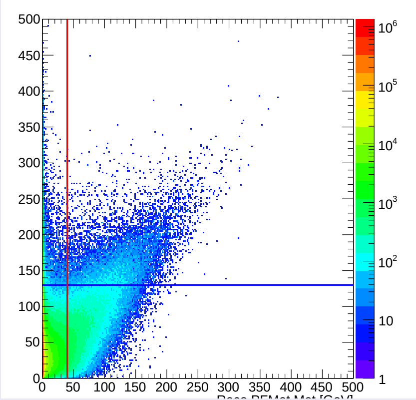
Gen Met Vs Reco MET II

Plots here do now have any weighting but cross section since filters will operate over genEvents with no weigting this (so this is just a scaling).

170to300



300to470

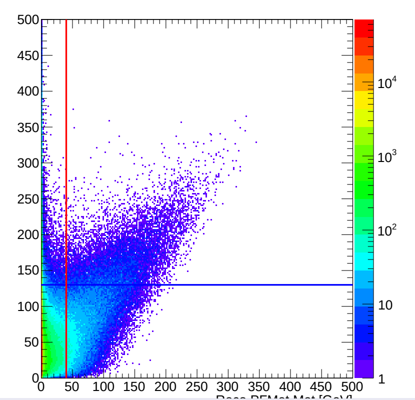


We can se for this p_T hats a significant population of events now in areas A and B.

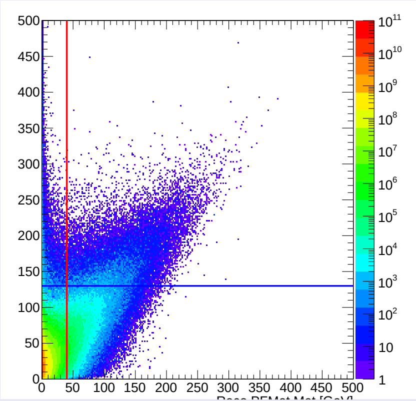
Gen Met Vs Reco MET III

Plots here do now have any weighting but cross section since filters will operate over genEvents with no weigting this (so this is just a scaling). Plot on the right Adds all the QCD inclusive p_T hats taking into account the relative cross section.

470to600



Total



We can see in both plots that there is a significant population in both areas A and B.

Gen Met Vs Reco MET - Into Numbers

Now we can calculate what is the percentage of events in each area and the normalization factor for B are.

Areas and normalization factor

Sample	A	B	C	D	Factor
MC_QCD-Pt-30to50-pythia6	0.000000	0.000000	0.999997	0.000003	inf
MC_QCD-Pt-50to80-pythia6	0.000000	0.000000	0.999884	0.000116	nan
MC_QCD-Pt-80to120-pythia6	0.000006	0.000001	0.998800	0.001193	5.625
MC_QCD-Pt-120to170-pythia6	0.000065	0.000024	0.995715	0.004195	3.676
MC_QCD-Pt-170to300-pythia6	0.000684	0.000281	0.989966	0.009069	3.432
MC_QCD-Pt-300to470-pythia6	0.005185	0.002331	0.976764	0.015721	3.224
MC_QCD-Pt-470to600-pythia6	0.016652	0.005900	0.959474	0.017973	3.823
MC_QCD-Pt-600to800-pythia6	0.034093	0.008591	0.939409	0.017906	4.969
MC_QCD-Pt-800to1000-pythia6	0.068863	0.011177	0.903115	0.016845	7.161
MC_QCD-Pt-1000to1400-pythia6	0.117719	0.012717	0.854500	0.015063	10.257
MC_QCD-Pt-1400to1800-pythia6	0.202556	0.014259	0.770444	0.012741	15.206
MC_QCD-Pt-1800-pythia6	0.285060	0.015070	0.688829	0.011041	19.916
Total	0.000001	0.000000	0.999954	0.000044	4.761343

Table : Relative are for A, B, C and D areas and factor to normalize B area to A+B (normalize QCD VBF samples to inclusive at $MET > 130\ GeV$ cut.

The normalization factors seem to be approximatly of the order of the discrepancy in yields seen last week

Considerations

- Factors are calculated for uncorrected (PU, Trigger and ID) events and applied to tables from last week which is to some level wrong but at first approximation gives an idea of the effect of this normalization factors.
- Factors only acount for events lost due to fake MET which is just one of the 2 filters applied, the VBF QCD jets filters while have its own losses which need to be accounted in parallel.

Correcting a MET cut level

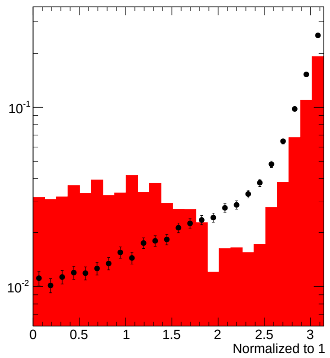
Cut	80-120 Inc	80-120 VBF	120-170 Inc	120-170 VBF	170-300 Inc	170-300 VBF	300-470 Inc	300-470 VBF	470-600 Inc	470-600 VBF
MET (Last Week)	1.50	300.35	4672.18	682.16	3577.84	661.70	232.67	43.28	4.06	0.82
MET (Apply factor)	1.50	1689.46	4672.18	2507.62	3577.84	2270.95	232.67	139.53	4.06	3.13

Number are now much closer to match, execept on the 80-120 *GeV* bin where QCD inclusive only has one event highly suppressed but non xsec weights. Note bin 470-600 *GeV* where both QCD Inc and QCD VBF have enough statistics to simulate 20 fb^{-1} now are much closer.

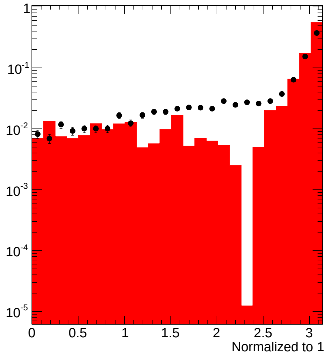
DPhi compared with Data

Both plots are normalized to 1 to observe shapes.

At Tight M_{jj} level



CJV level



It is interesting to notice that while shapes do not match very well are Tight m_{jj} they match "well" at CJV level including at low values except for dphi around 2.3.