



VBF H(inv) - 2015 Trigger Status Update

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Legacy system (baseline)

- ▶ We can define a baseline by just updating the seed of our HLT paths to the lowest unprescaled L1 ETM available trigger.
 - ▶ In the current draft menu this is L1_ETM70
- ▶ With the help of neutrino gun samples we can calculate VBF H(inv) signal efficiency:

L1+HLT	PU20bx25	PU40bx50	PU40bx25
L1_ETM40 + HLT_DiPFJet40_PFMETnoMu65_MJJ600VBF_LeadingJets_v	0.1079	0.1092	0.1168
L1_ETM70 + HLT_DiPFJet40_PFMETnoMu65_MJJ600VBF_LeadingJets_v	0.0761	0.0774	0.0841
L1_ETM40 + HLT_DiPFJet40_PFMETnoMu65_MJJ800VBF_AllJets_v	0.0850	0.0879	0.0920
L1_ETM70 + HLT_DiPFJet40_PFMETnoMu65_MJJ800VBF_AllJets_v	0.0615	0.0634	0.0677

- ▶ By raising the seed from L1_ETM40 to L1_ETM70 we lose ~30% signal efficiency.
 - ▶ This is a tolerable efficiency loss but we aim at improving algorithms both on the L1T and HLT sides
- ▶ We can now calculate the expected pure HLT rates for this paths.

L1+HLT	PU20bx25	PU40bx50	PU40bx25
L1_ETM40 + HLT_DiPFJet40_PFMETnoMu65_MJJ600VBF_LeadingJets_v	113.48	179.95	1903.08
L1_ETM70 + HLT_DiPFJet40_PFMETnoMu65_MJJ600VBF_LeadingJets_v	21.62	57.78	308.35
L1_ETM40 + HLT_DiPFJet40_PFMETnoMu65_MJJ800VBF_AllJets_v	78.36	127.12	1087.03
L1_ETM70 + HLT_DiPFJet40_PFMETnoMu65_MJJ800VBF_AllJets_v	18.91	42.92	263.97

- ▶ HLT pure rates drop significantly to ~20Hz on first scenario
 - ▶ HLT PU subtraction should further lower this rates.
- ▶ At the last PU scenario rates become too high. We can again do the exercise of raising the seed, but at this point we should have in place a better trigger with more options.

First look over SUSY algos

For convinience on the code building I implemented first:

- L1_DoubleJetC60_ETM60 (SUSY algo)
- L1_DoubleJet60_ETM60 (extension to all calorimeter

We can calculate signal efficiency:

- L1_DoubleJetC60_ETM60 : 0.0750326
- L1_DoubleJet60_ETM60 : 0.104578

In both cases the additional double jet condition kills more signal than the reduction of threshold in ETM. Unless we drop both and add additional conditions this does not seem to work.