Run 2 Trigger Study

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Today's presentation

Topics

- L1 and HLT efficiencies for 13 *TeV* for the 3 TSG proposed scenarios
- Comparison between 8 *TeV* and 13 *TeV* samples.
- Signal efficiency as a function of L1T seed threshould.

Samples

For comparison we use numbers obtained by rerunning a L1+HLT menu from Run D over a 8 *TeV* signal sample (to have all parked data trigger available):

8 *TeV* Dataset

Sample
/VBF_HToZZTo4Nu_M-120_8TeV-pythia6/Summer12-PU_S9_START52_V9-v1/GEN-SIM-RECO

For the 13 *TeV* study we will use the TSG provided samples. Note that this samples where produced using POWHEG with Higgs mass 125 *GeV* while the 8 *TeV* samples were produced using Pythia for Higgs mass of 120 *GeV* and using a different PU scenario.

13 *TeV* Dataset

Sample	Events
/VBF_HToInv_M-125_13TeV_powheg-pythia6/Fall13dr-tsg_PU20bx25_POSTLS162_V2-v1/AODSIM	484096
/VBF_HToInv_M-125_13TeV_powheg-pythia6/Fall13dr-tsg_PU40bx50_POSTLS162_V2-v1/AODSIM	482996
/VBF_HToInv_M-125_13TeV_powheg-pythia6/Fall13dr-tsg_PU40bx25_POSTLS162_V2-v1/AODSIM	483696

Seeds

Lets review our HLT paths and their corresponding seeds:

HLT Paths vs. Seeds

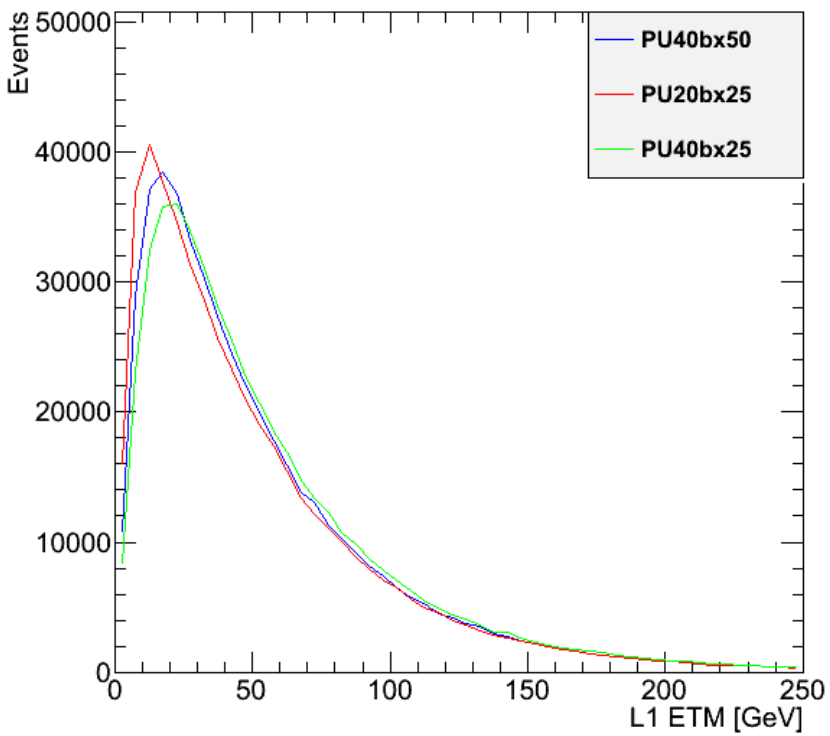
HLT Path	Seeds
HLT_DiPFJet40PFMETnoMu65MJJ600VBFLeadingJets	L1_ETM40
HLT_DiPFJet40PFMETnoMu65MJJ800VBFAllJets	L1_ETM40
HLT_DiJet20_MJJ650_AllJets_DEta3p5_HT120_VBF	L1_HTT200 OR L1_HTT175 OR L1_ETM40 OR L1_ETM50
HLT_DiJet30_MJJ700_AllJets_DEta3p5_VBF	L1_HTT200 OR L1_HTT175 OR L1_ETM40 OR L1_ETM50
HLT_DiJet35_MJJ650_AllJets_DEta3p5_VBF	L1_HTT200 OR L1_HTT175 OR L1_HTT150 OR L1_ETM40
HLT_DiJet35_MJJ700_AllJets_DEta3p5_VBF	L1_HTT200 OR L1_HTT175 OR L1_ETM40
HLT_DiJet35_MJJ750_AllJets_DEta3p5_VBF	L1_HTT200 OR L1_HTT175 OR L1_ETM40

Even though we only use L1_ETM seeded events parked data paths have L1_HTT seeds too.

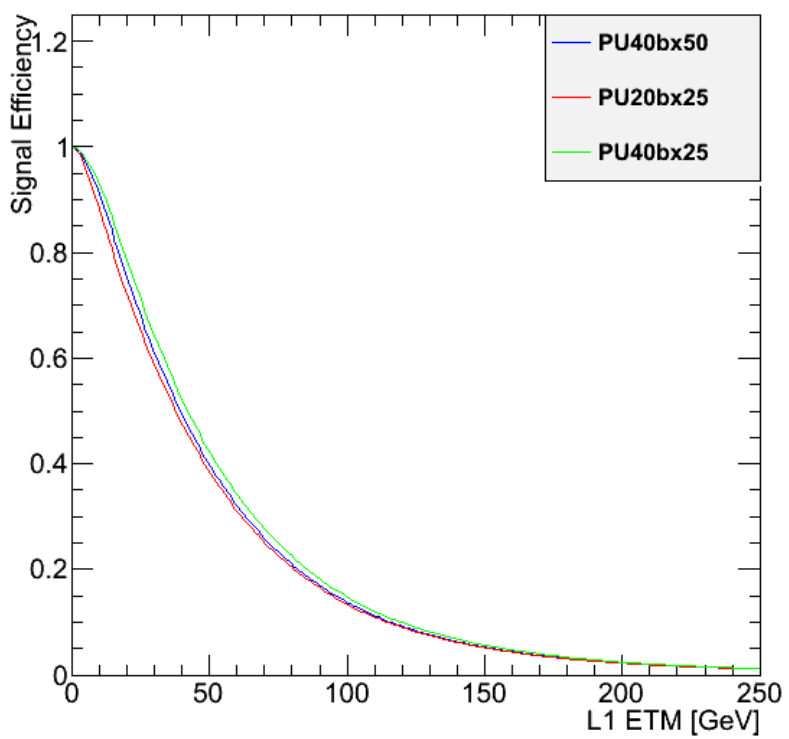
Efficiencies

Trigger	8 *TeV*	PU40bx50	PU20bx25	PU40bx25
L1_ETM40	-	0.526785	0.48077	0.498313
HLT_DiPFJet40PFMETnoMu65MJJ600VBFLeadingJets	0.104736	0.11675	0.107917	0.10923
HLT_DiPFJet40PFMETnoMu65MJJ800VBFAllJets	0.0766837	0.0919718	0.0849935	0.0878568
HLT_DiJet35MJJ650VBFAllJets	0.12091	0.0792947	0.12493	0.119854
HLT_DiJet35MJJ700VBFAllJets	0.109952	0.0691848	0.114779	0.10998
HLT_DiJet35MJJ750VBFAllJets	0.100287	0.0620005	0.106152	0.102006
HLT_DiJet20MJJ650VBFAllJetsHT120	0.129063	0.105392	0.149766	0.13758
HLT_DiJet30MJJ700VBFAllJets	0.120932	0.0775783	0.127966	0.125002

L1T ETM



Sig. Eff. vs L1T ETM



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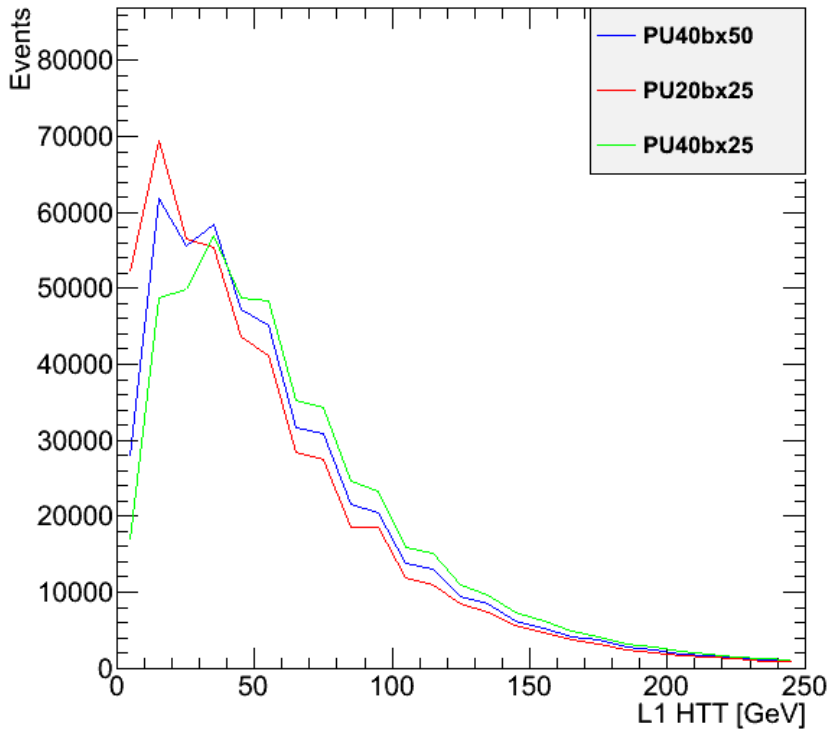
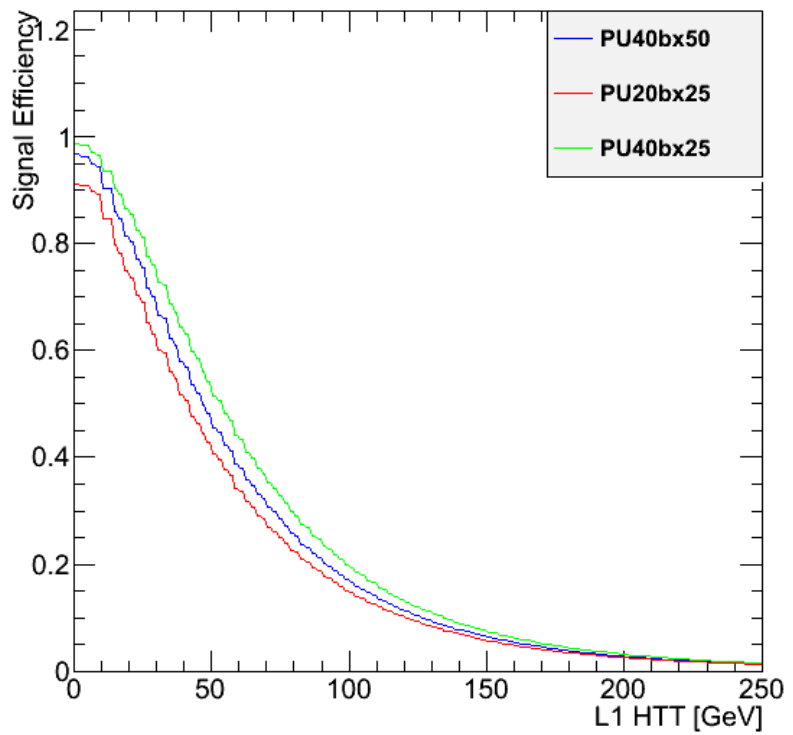
L1T HTT

L1T HTT



Sig. Eff. vs L1T HTT



L1 HTT is the sum of all L1 Jets and the kinks on the plots are most likely due to two effects:

- A L1 Jet seed need to have at least 5 *GeV*
- A L1 Jet to be included in HTT needs to have at least least 10 *GeV*.

Summary and next steps

Summary:

- Our trigger when applied to 13 *TeV* samples and various spacing and PU scenarios show some small variations on signal efficiency depending of the algorithm while compared with 8 TeV samples.

Next Steps:

- HLT study
- Rerun run D HLT on 8 *TeV* samples so we can compare samples with same generator and Higgs mass