HSG5 Input to Trigger Workshop

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Introduction

- We were asked for input for the Trigger Workshop next week
- One of the issues are the lepton triggers for high lumi (1-2 x $10^{34}cm^{-2}s^{-1}$):
  - Single lepton triggers will likely be ≈30 GeV for electrons and ≈25 GeV for muons.
  - Di-lepton triggers @ $2x10^{34}$:
    - 2e trigger ≈20 GeV + 20 GeV
    - 2μ trigger ≈13 GeV + 13 GeV

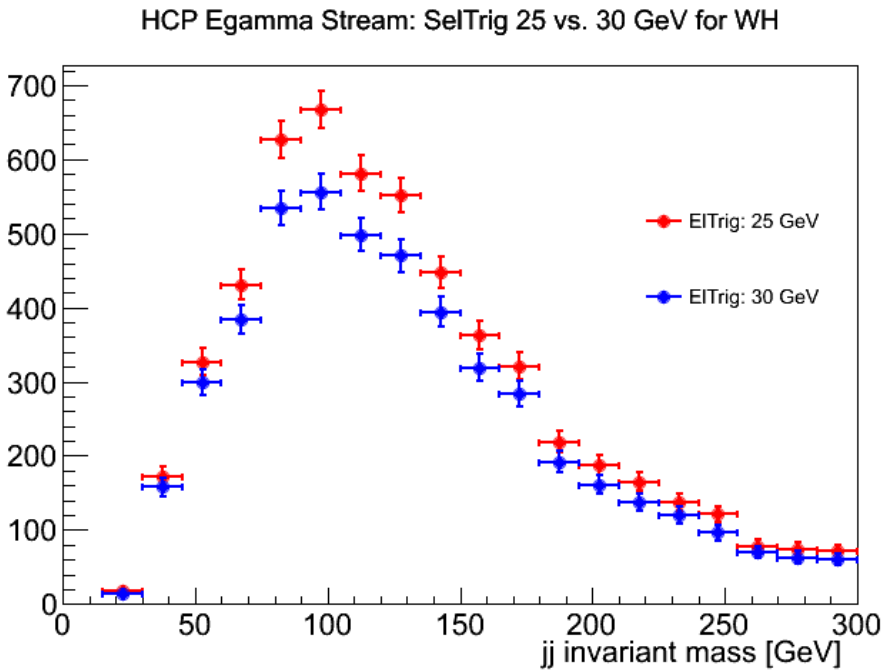
- The first question is how much we would loose from the tighter thresholds.
  - This probably affects WH and ttH semileptonic harder than other channels
  - Muon p_T cut can stay almost the same, but the offline electron p_T cut will need to go to ≥30GeV (on at least one lepton)

- Alternatives to single lepton trigger (if we see a large impact):
  - WH->lvbb: combined lepton+jets trigger (possibly with b-tagging).
    - Downside: the trigger jet thresholds would impact on the offline jet cuts
  - ZH->llbb: impact should be smaller
  - ttH (single-lepton channel): lepton+jets (incl. b-tagging?), lepton+HT

Impact on HSG5 analyses

- Following slides: HCP/Top2012 analyses with offline electron p_T cut at 30GeV

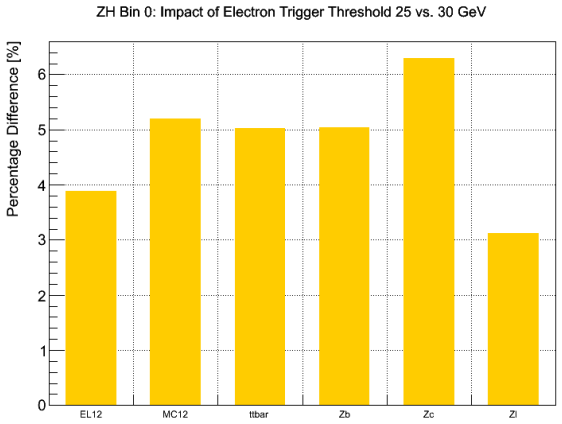
- Study by Manuel Proissl below:
  - WH: e/gamma rate ≈10% lower

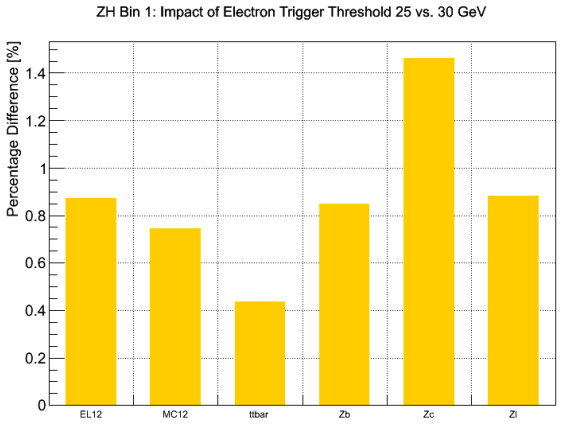


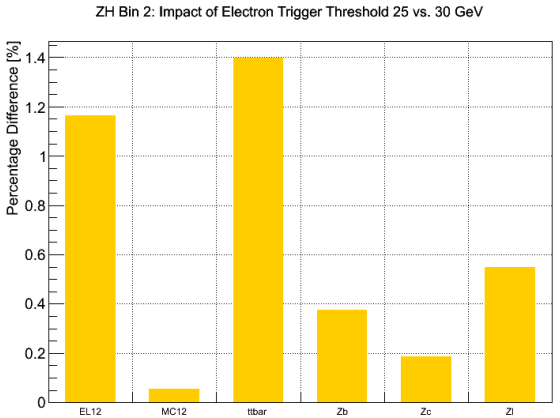
ZH->llbb

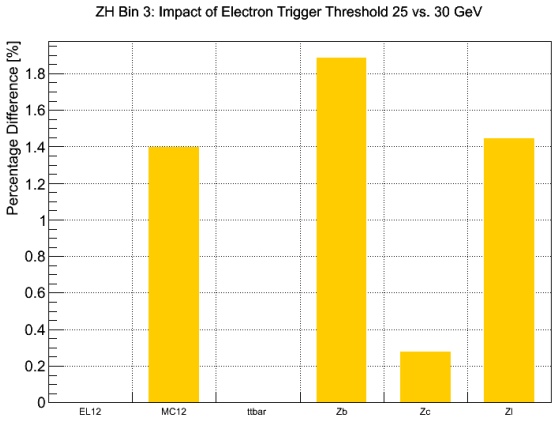
- Small drop in acceptance

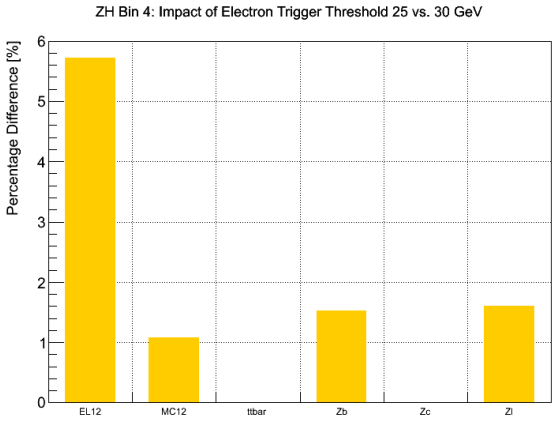
Eff.drop (%)	Bin 0	Bin 1	Bin 2	Bin 3	Bin 4	Inclusive
Top + V+jets	5.2	0.75	0.05	1.4	1.1	2.15

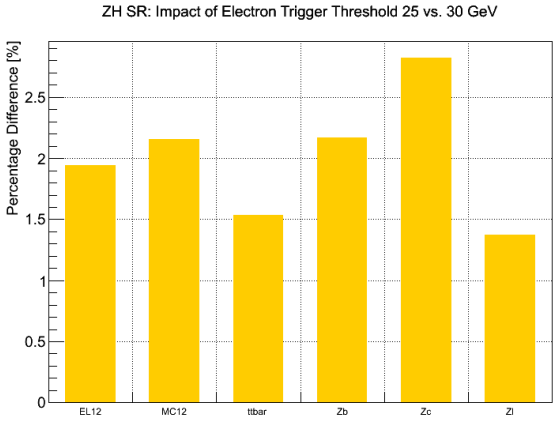








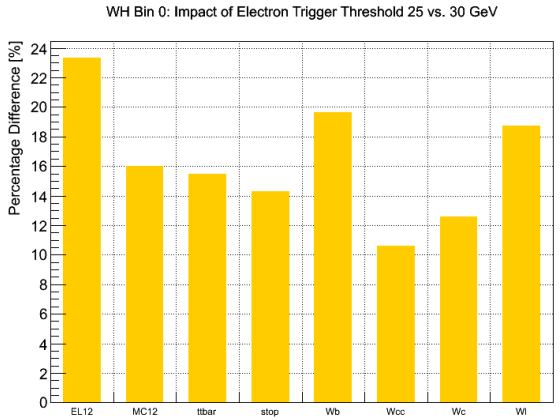


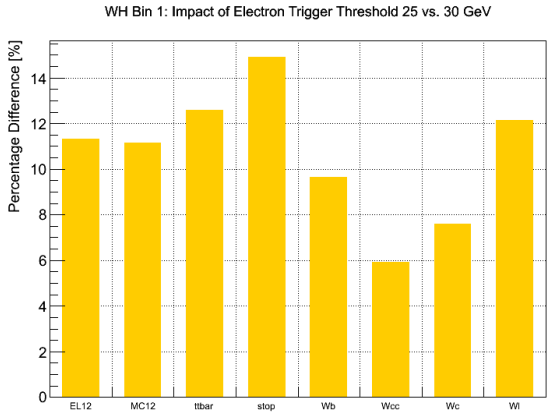


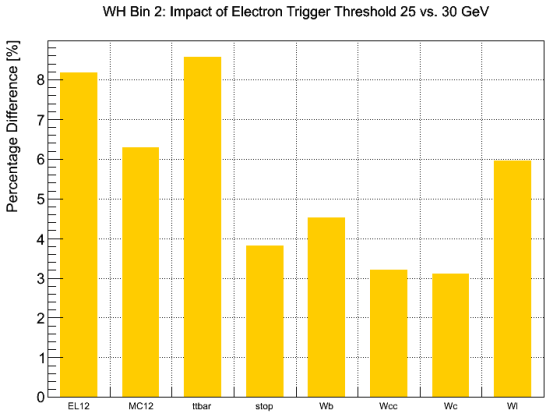
WH->lvbb

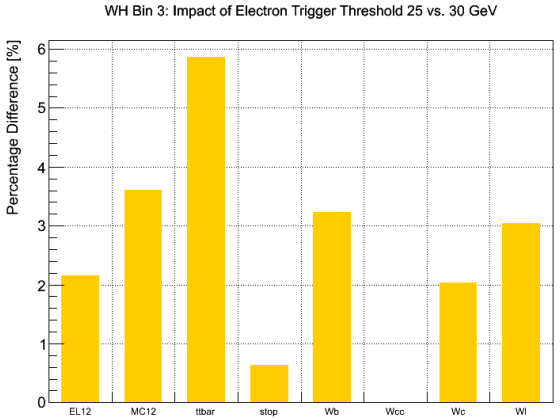
- Small drop in acceptance similar for all backgr

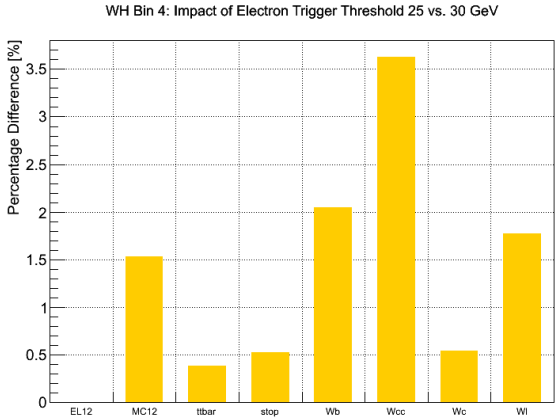
Eff.drop (%)	Bin 0	Bin 1	Bin 2	Bin 3	Bin 4	Inclusive
Top + V+jets	16	11	6.5	3.6	1.5	11

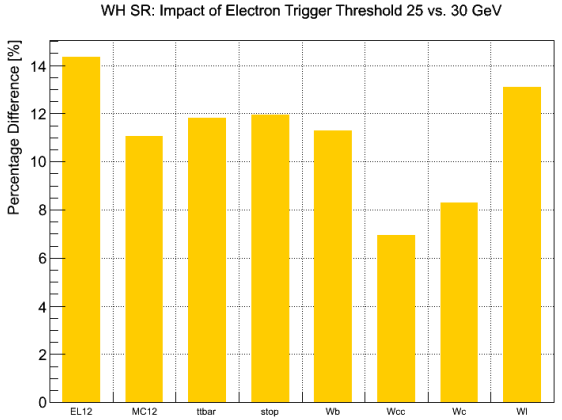












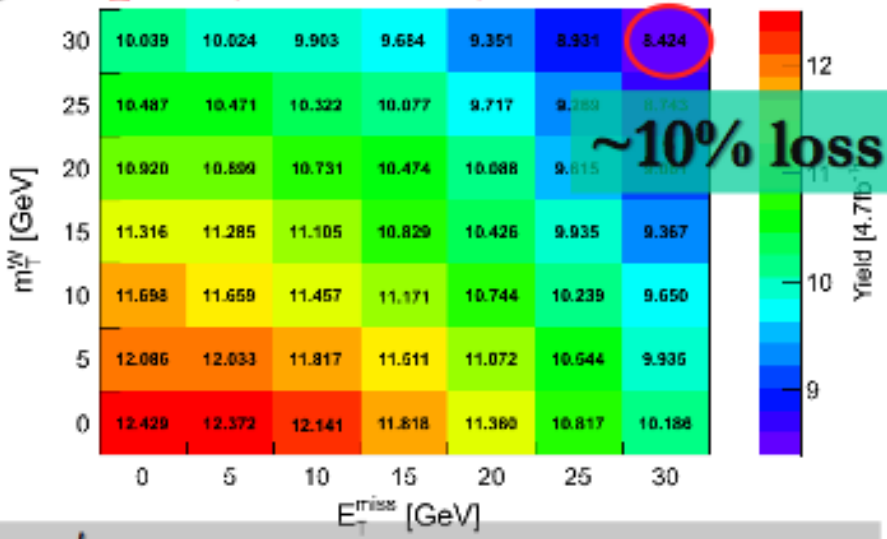
ttH epton+jets and di-lepton

- Study by Leonid Serkin
  - pTjet > 25GeV cut (may change for analysis)
- Increased offline pT(e) cut to 30GeV
  - ≈10% loss in lepton+jets acceptance
  - ≈8% loss in di-lepton acceptence
- Drop in S/√B of 4% from 0.0419 to 0.0403
  - In ≥ 4 jet bin (and E_T^{miss} > 30GeV, M_T^W > 30GeV analysis cuts)

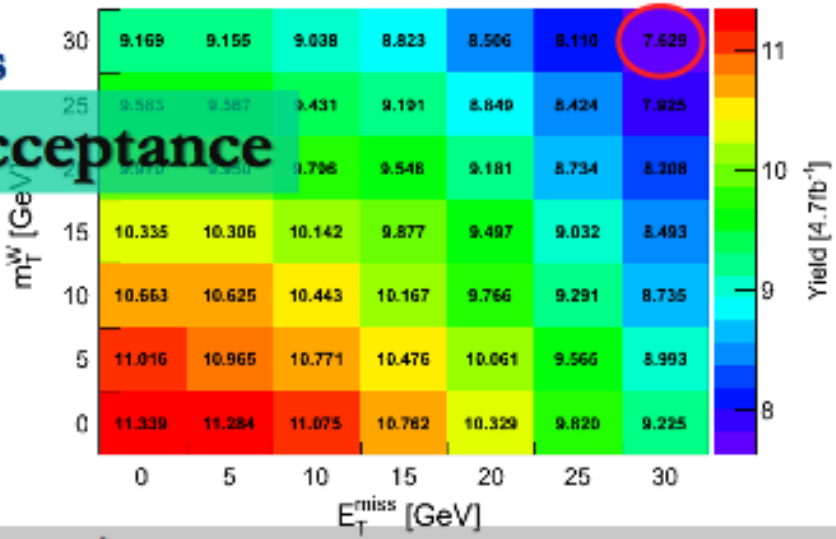
1). Selection optimization for e+jets ttH(125) 7 TeV

pT (jets) > 25 GeV

pT (electron) > 25 GeV



pT (electron) > 30 GeV

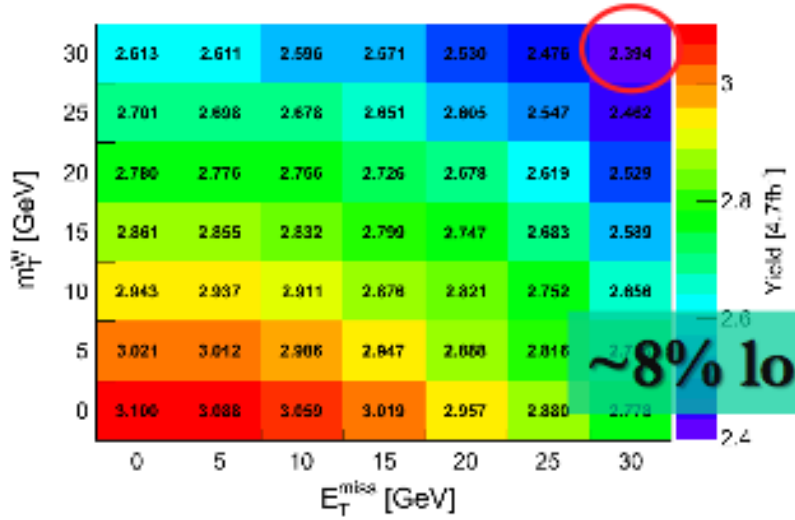


l+jets

~10% loss in acceptance

S/√B (4jincl, MET>30, MTW>30) = 0.0419

S/√B (4jincl, MET>30, MTW>30) = 0.0403



dilepton

~8% loss in acceptance