Software Review: Update
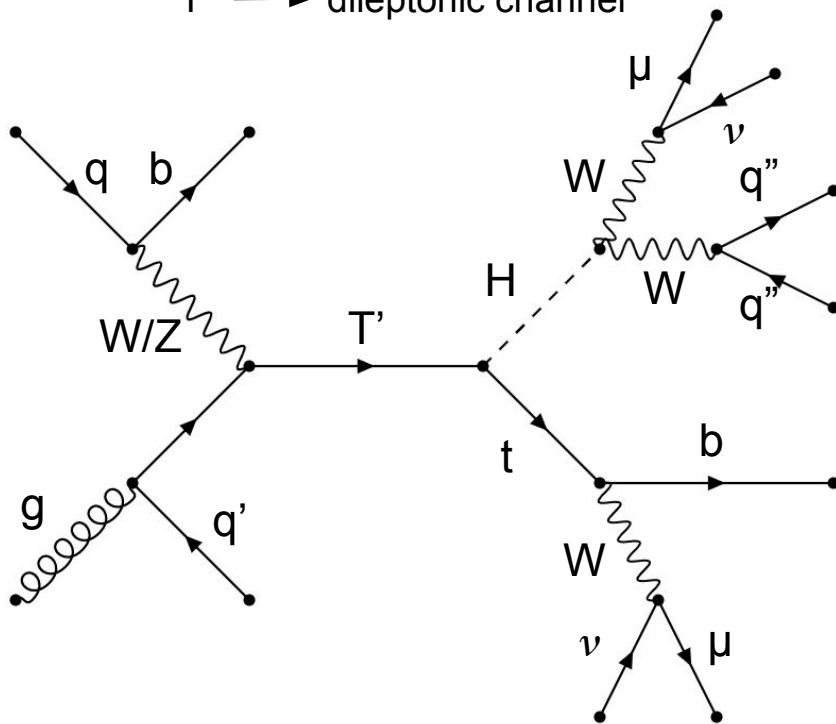
2 November 2022
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T' → dileptonic channel

Current analysis:

Identification of the muons: tight ID, Pt > 20 GeV, |eta| < 2.4, Sip3d < 3, TightCharge== 2 and Isolation < 0.05.

Identification of the electrons: tight ID, Pt > 25 GeV, |eta| < 2.5, Sip3d < 2, TightCharge==2 and Isolation < 0.05.

Cut 0: 2 Leptons SS with Sum of Pt of the two leptons > 160 GeV.

Cut 1: at least 3 jets with at least one b-jet (b-tag medium) of Pt > 50 GeV.

Cut 2: minimum of the invariant mass of the three jets with a least one b-jet > 34 GeV (Mass of the top +/- 2σ).

Cut 3: ΔR between the two leptons > 1.8.
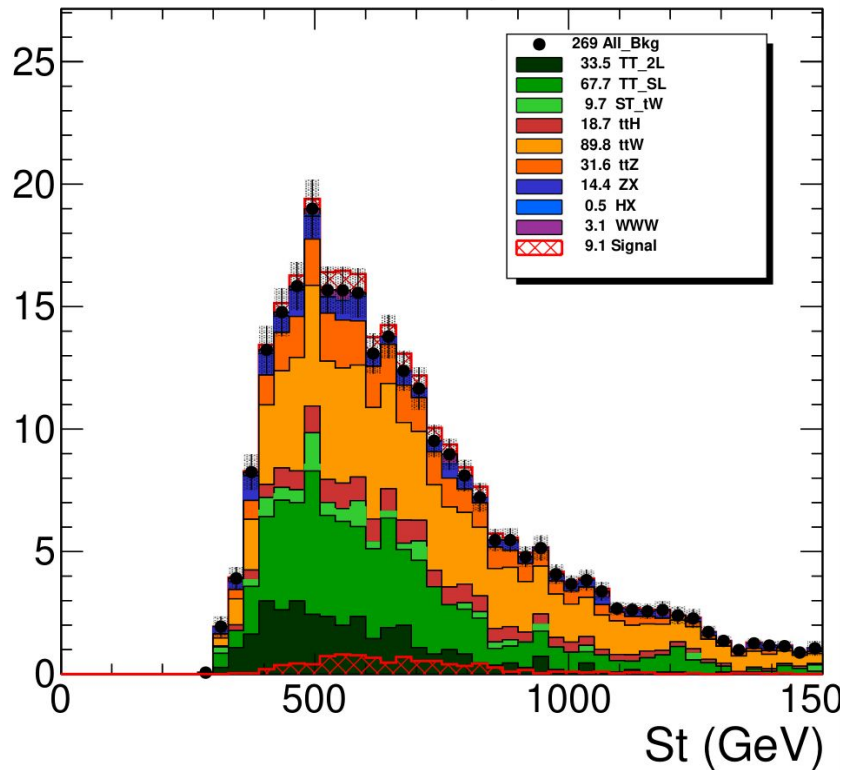
Implementing the HLT paths:
- Single muon: HLT_IsoMu24.
- Single electron: HLT_Ele32_WPTight_Gsf.
- Double muon: HLT_Mu17_TrkIsoVVL_Mu8_TrkIsoVVL_DZ_Mass3p8.
- One muon + One electron:
  HLT_Mu8_TrkIsoVVL_Ele23_CaloIdL_TrackIdL_IsoVL_DZ and
  HLT_Mu23_TrkIsoVVL_Ele12_CaloIdL_TrackIdL_IsoVL.
- Double electron: HLT_Ele23_Ele12_CaloIdL_TrackIdL_IsoVL.
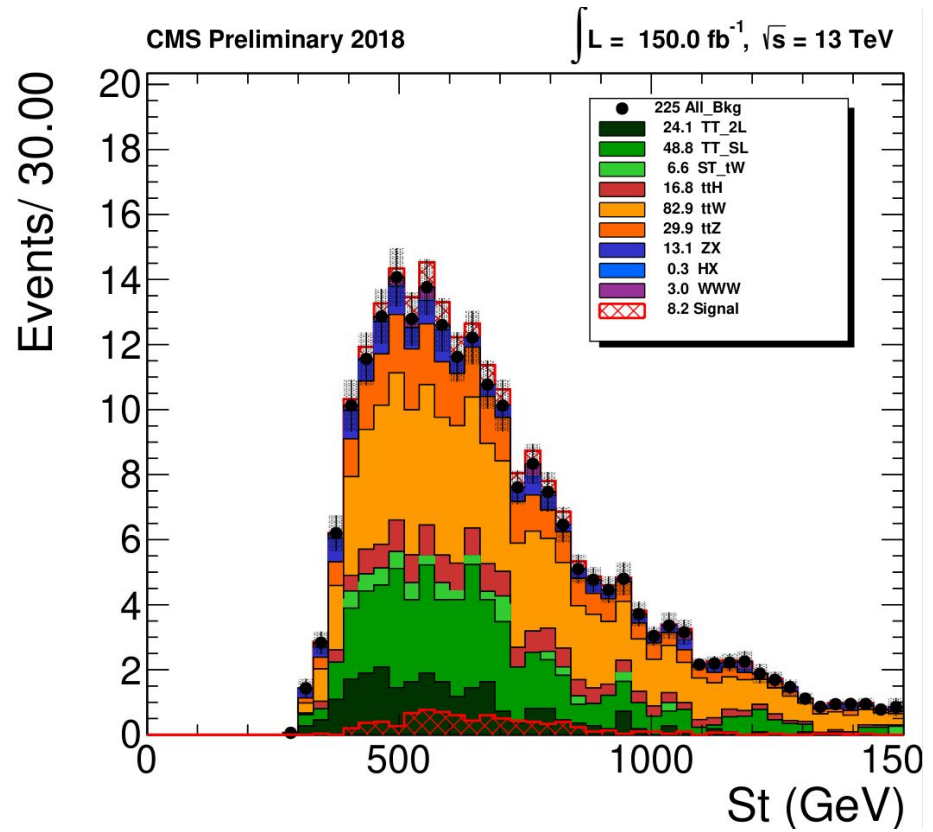
St after Cut 3

Without HLT Paths
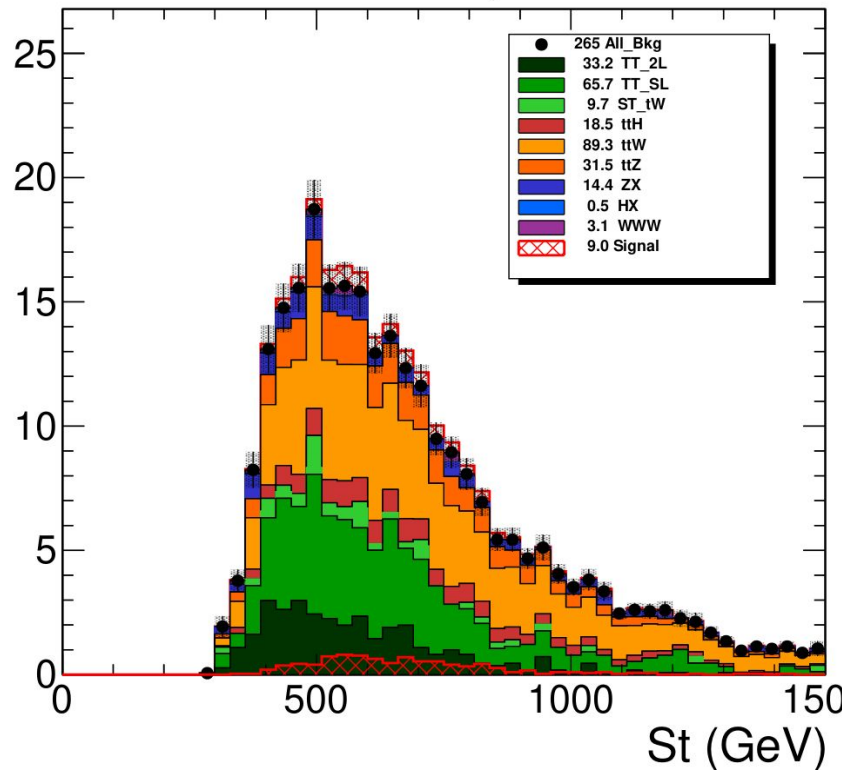
With HLT Paths

OK!

Implementing the Overlaps function:
- Di's analysis: asking for >= 3 clean jets and >= 1 clean bjet where clean jets pass the jet identification and the Overlaps selection (ΔR(lepton, jet) > 0.4).

Signal: 9.3 ⟶ 8.4.
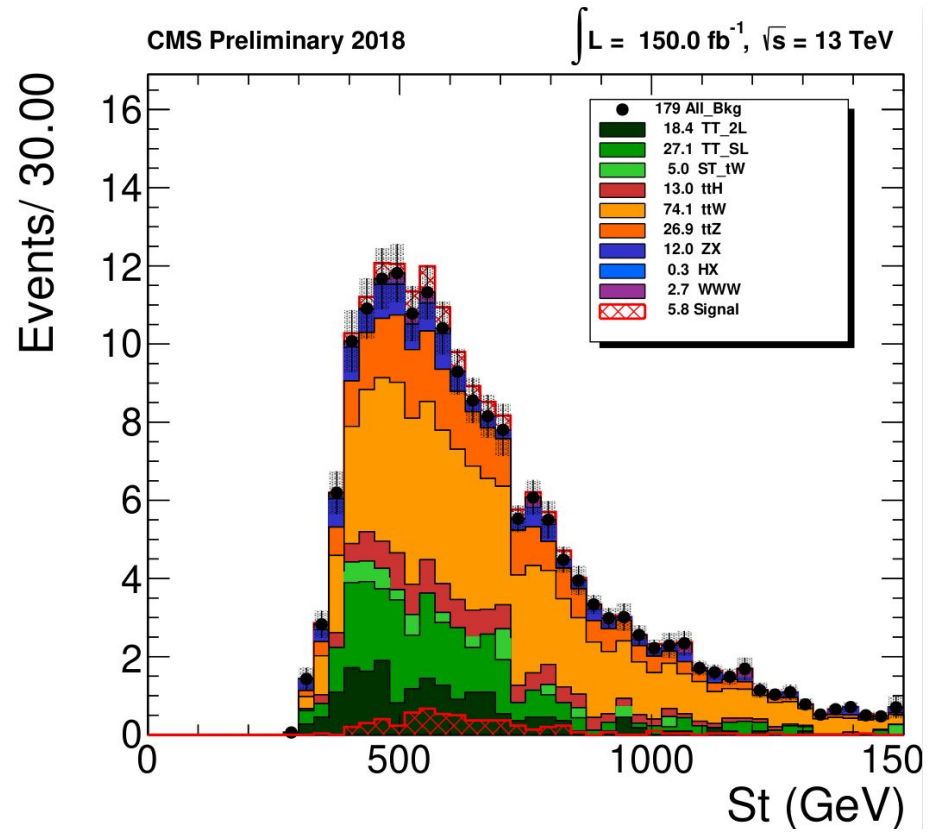Background: 276.6 ⟶ 234.0 (-25% of ttbar SL).
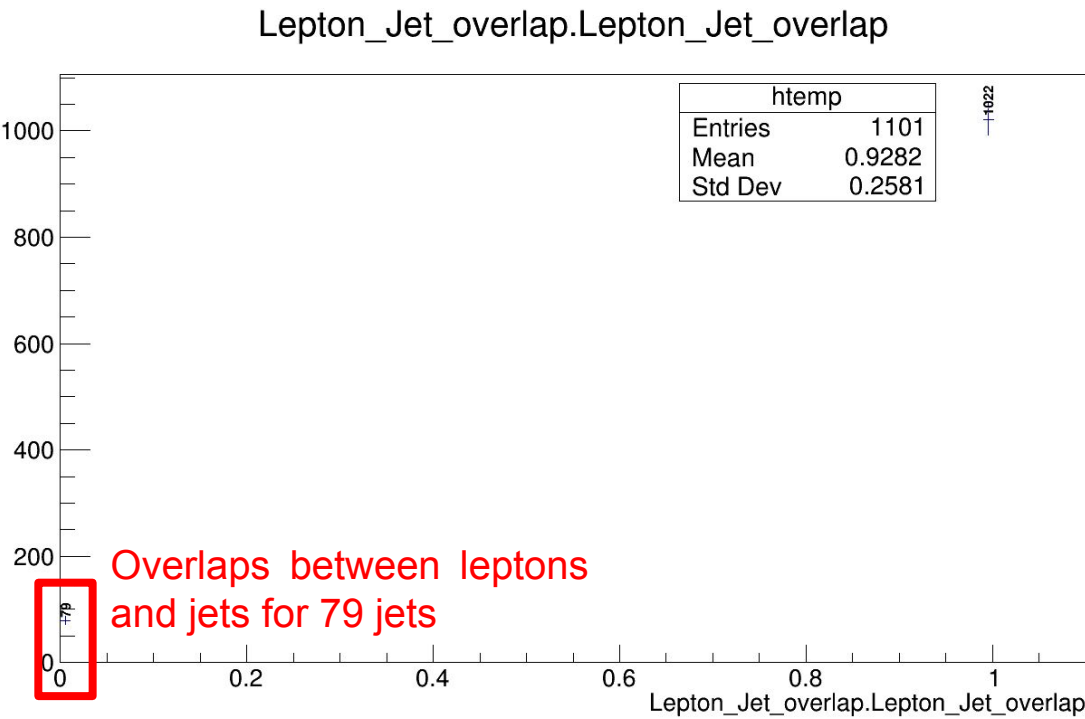S/B: 3.36% ⟶ 3.59%.

Implementing the Overlaps function:

- My analysis: asking for >= 3 selected jets >= 1 selected bjet and asking for the same number of jets before and after the Overlaps selection (ΔR(lepton, jet) > 0.4).

Signal: 9.3 ⟶ 5.8.
Background: 276.6 ⟶ 183.8 (-60% of ttbar SL).
S/B: 3.36% ⟶ 3.16%.

Implementing the Overlaps function:

- Issue with Di's analysis: Among 1100 jets, 80 jets don't pass the Overlaps selection which means that I let 80 events pass the selection while there could have fake leptons. ⟶ Normal?

Lepton_Jet_overlap.Lepton_Jet_overlap

htemp	
Entries	1101
Mean	0.9282
Std Dev	0.2581

Overlaps between leptons and jets for 79 jets

Need to check with Gen information anyway (fake leptons or isolated leptons close to the jets?)!