

Department of Physics, Shandong University

Compressed EWK study(ISRC1N2)

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Tasklist

- Bkg estimation for C1N2ISR
- BSc thesis: <https://www.overleaf.com/project/674e7119837a2580151a0868>

SR definition

Pre-Selection

- lep-had
channel: $nTaus \geq 1; nLeps \geq 1$
- had-had
channel: $nTaus \geq 2; nLeps = 0$
- $MET \geq 200$; pass MET trigger
- $1 \leq nBaseJet \longrightarrow Nbjets > 0$
For Top estimation
- b-veto
- OS

SR for HH channel

hyper parameter: NTrees=500, learning rate=0.05, max depth=12, MinNodeSize=1%(default)

Pre-Selection + BDT score ≥ 0.91

SR for LH channel

hyper parameter: NTrees=400, learning rate=0.01, max depth=10, MinNodeSize=1%(default)

Pre-Selection + BDT score ≥ 0.87

Top(LH)

≥ 1 medium tau

≥ 1 lepton

METtrig && MET ≥ 200

OS

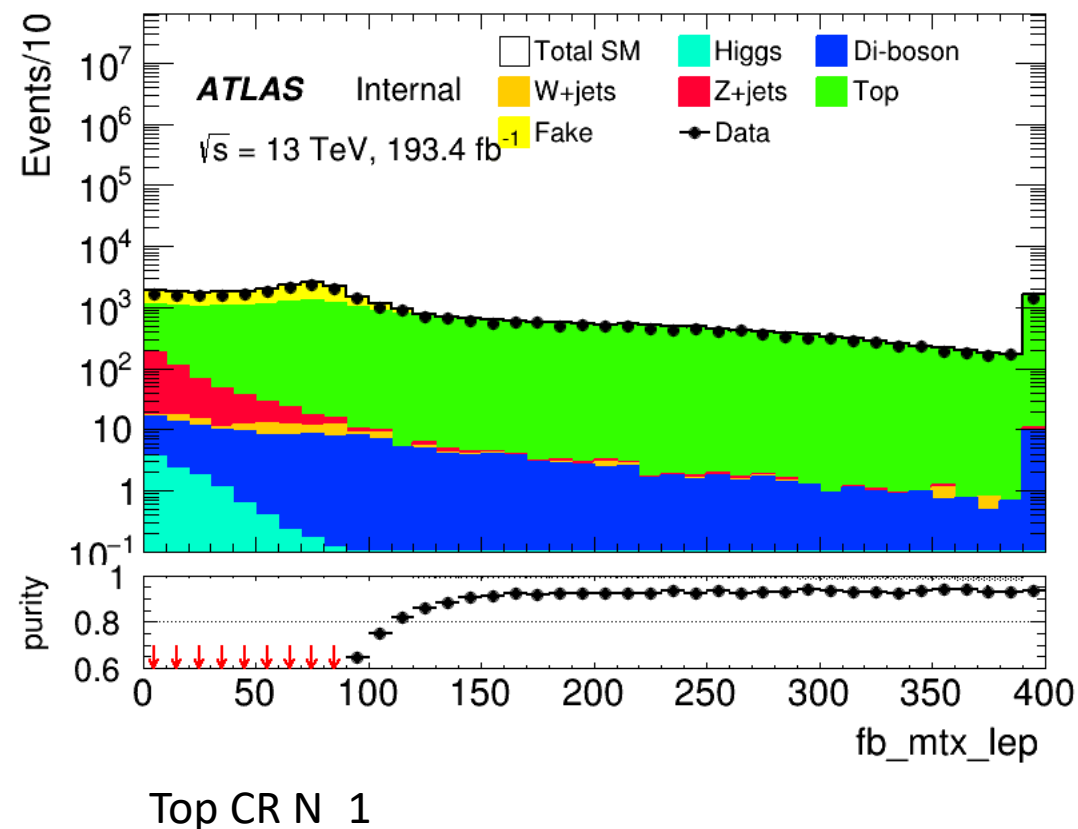
≥ 1 bTag

CR: $M_T(l, MET) > 250$

VR: $200 < M_T(l, MET) < 250$

CR: TOP 5480.93, MC: 5884.94, purity: 0.931349

VR: TOP 5044.15, MC: 5471.2, purity: 0.921946



Zjets(LH)

≥ 1 medium tau

≥ 1 lepton

METtrig && MET ≥ 200

OS

b Veto

$M_T(MET, \tau) + M_T(MET, l) < 80$ or dRtt < 1.2

CR: $70 < M_{tt}reco < 110$

VR: $40 < M_{tt}reco < 70$

In order to make region orthogonality, apply M_Treco cut at signal region

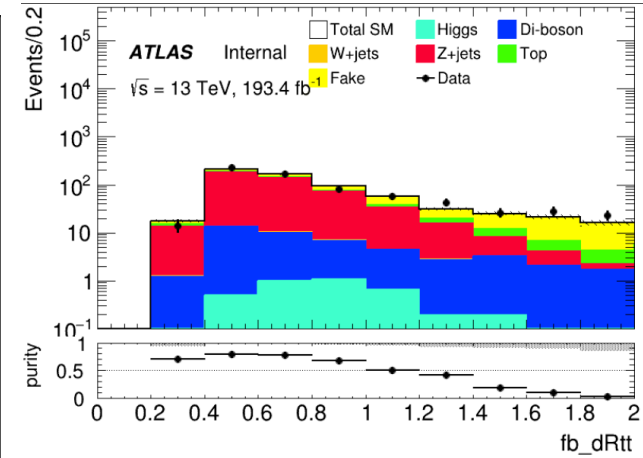
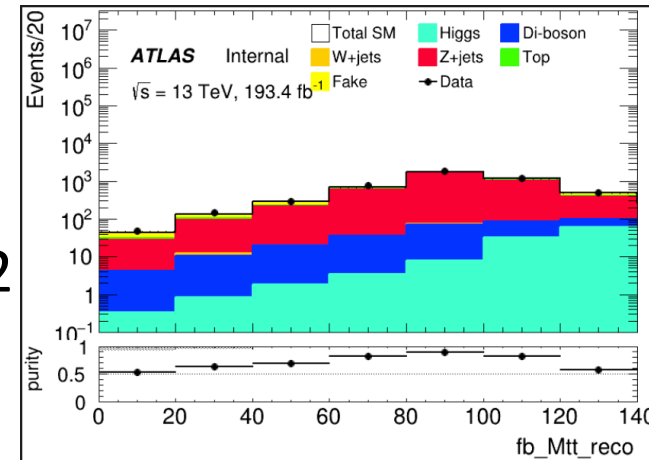
CR: Zjets: 3780.25, MC: 5458.11, purity: 0.887756

VR: Zjets: 379.093, MC: 486.911, purity: 0.778568

CR: Zjets: 2555.77, MC: 2905.17, purity: 0.879732

VR: Zjets: 402.205, MC: 548.51, purity: 0.73327

I'm not sure after apply MT sum cut
if CR&VR can othogonalize with SR



Yellow one correspond to MT sum cut

Green one correspond to dRtt cut

Backup



Bkg decay mode

Wjets: W→e/muon + nu
W→tau+nu(can contribute true tau_had)
jet misidentified to a fake tau

Zjets: Z→ll/tautau
jet misidentified to fake tau

Top: top→W+b, W can contribute a true tau_had
b-quark is a source of fake

VV: W/Z

LH channel: $\geq 1\tau$, $\geq 1lep$

Wjets: W contribute lep, jets misidentified to fake

Zjets:

SingleTop: W contribute lep, b-quark misidentified to fake

VV:

HH channel: $\geq 2\tau$, $== 0lep$

Wjets: W contribute tau_had, plus a fake tau

Zjets: Z→tautau(had) or 2 fake tau

SingleTop: W contribute a tau_had, plus a fake tau

VV: