

HEP Weekly Report

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Weekly Report

- Background shape extraction
- Fit in SR_A region and CR_A
 - Signal Region (SR): Baseline selection + topTagger + b-tagging (2 b-tag) + Mass Cut [120,220]GeV
 - Control Region (CR): Baseline selection + topTagger + revert b-tagging + Mass Cut [120,220]GeV
 - Signal Region A (SR_A): Extended SR \rightarrow SR – Mass Cut
 - Control Region A (CR_A): Extended CR \rightarrow CR – Mass Cut
 - In SR_A we fit signal from MC, Subdominant Bkg from MC and Data
- Initial thought was Simultaneous fit in 2 regions
- Idea for fit in the 3 regions
 - Include 1-btag region, where CR and SR are exactly the same but the b-tagging requirement changes so that only 1 subjet is b-tagged

$$D(x)^{(0)} = N_{tt}^{(0)} T(x, kMassScale, kMassResolution) + N_{bkg}^{(0)} B(x, \vec{p})$$

$$D(x)^{(2)} = N_{tt}^{(2)} T(x, kMassScale, kMassResolution) + N_{bkg}^{(2)} B(x, \vec{p})(1 + kx) + N_{sub}^{(2)} O(x)$$

$$D(x)^{(1)} = N_{tt}^{(1)} T(x, kMassScale, kMassResolution) + N_{bkg}^{(1)} B(x, \vec{p})(1 + kx) + N_{sub}^{(1)} O(x)$$

We assume that $N_{tt}^{(0)} = (1 - e_b)^2 N_{tt}$, $N_{tt}^{(2)} = e_b^2 N_{tt}$ and $N_{tt}^{(1)} = 2(1 - e_b)e_b N_{tt}$ where e_b is the b tagging efficiency and N_{tt} is the total ttbar yield.

We can either have e_b and N_{tt} as free parameters in the fit or $N_{tt}^{(0)}$, $N_{tt}^{(1)}$, $N_{tt}^{(2)}$



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- Using the b-tagging efficiency e_b and the total ttbar yield N_{tt} → High correlation between these two variables
 - Expectation is a btagging efficiency ~69%, and the output from the fit is ~58%.
 - Decision is to add the b-tagging efficiency as a fixed parameter
 - For this reason, we need to estimate the b-tagging efficiency correctly

- Calculation of 'r':

$$r = \frac{N_{tt,obs}}{N_{tt,exp}}$$

Where $N_{tt,expected} = N_{tt}^{(0)} + N_{tt}^{(1)} + N_{tt}^{(2)}$ taken from MC ttbar samples and $N_{tt,observed}$ is taken directly from the fit result

- ttX round table status report for NTUA
 - TOP-EFT subgroup
 - Suggestion for high P_T samples for 2017 (already in production)

