Mono-V QCD estimation

13.03.2017

Update

Problem: Tension in fit due to MJ estimation for 0 tag region, also some normalisations (ttbar, W/Z) pulled in template normalisation procedure

- Template Shape: ✔ (extrapolate from QCD region to signal region)
- Template Normalisation: ✔ (fit template + backgrounds to data in sidebands) challenge: find well-modelled variable, which is also sensitive to QCD

Changes to procedure used until now:

- New fit variable: back to MET again, but with way coarser binning
- Split W/Z + jets backgrounds in light and heavy flavour
- Use background modeling uncertainties of global statistical analysis
- Perform fitting in side-bands with other anti-QCD cuts except dPhi(jets, MET): dPhi(MET,J/jj) > 2.1; dPhi(MET,MPT) < π/2; dR(MET, jj) < 1.4 (2-tag: 1.25)
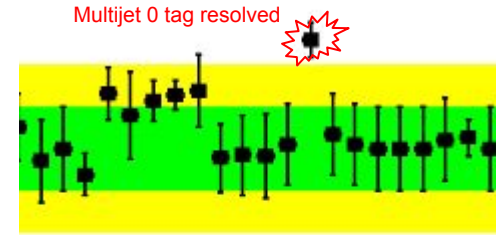
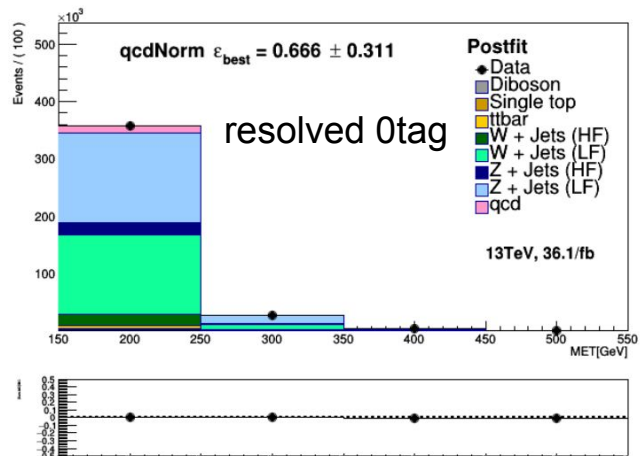Multijet 0 tag resolved

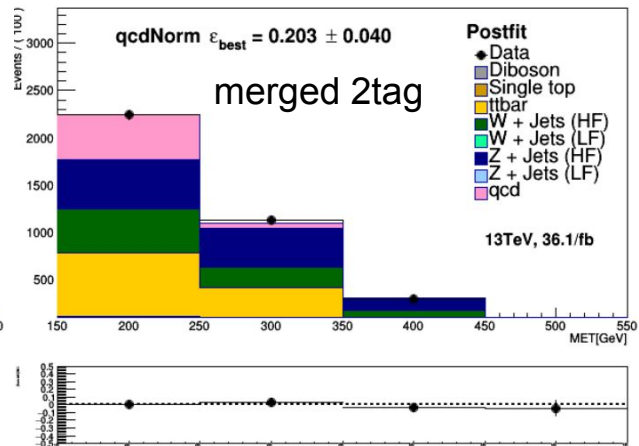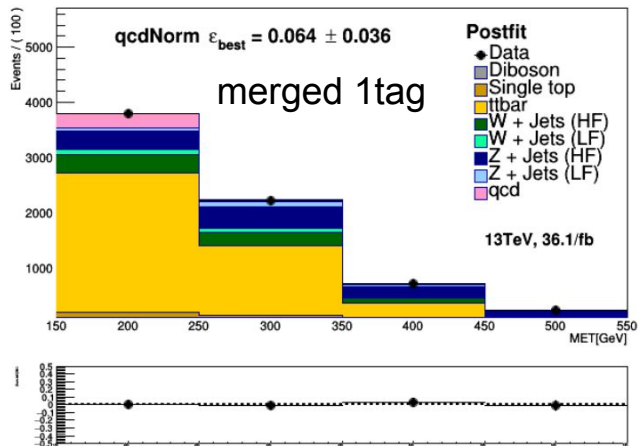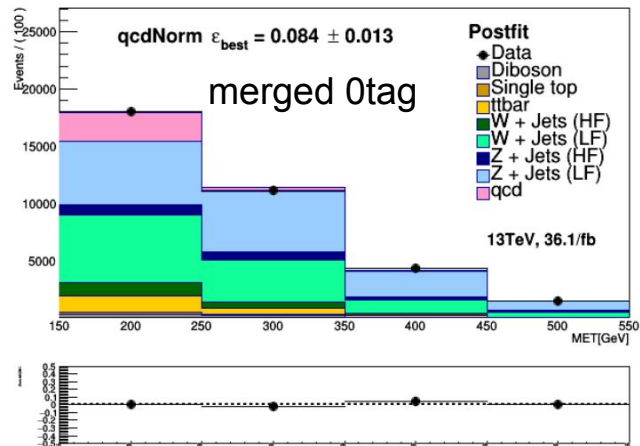# MJ normalisation estimation

Determine normalisation by fitting in 0 lepton W/Z sidebands with only four MET bins (bin width: 100 GeV) → MET is sensitive to QCD with this coarse binning
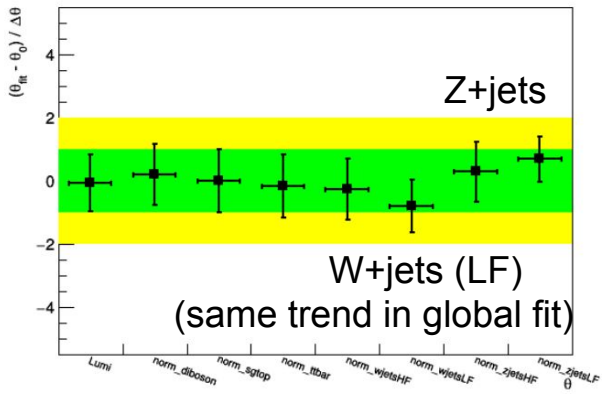
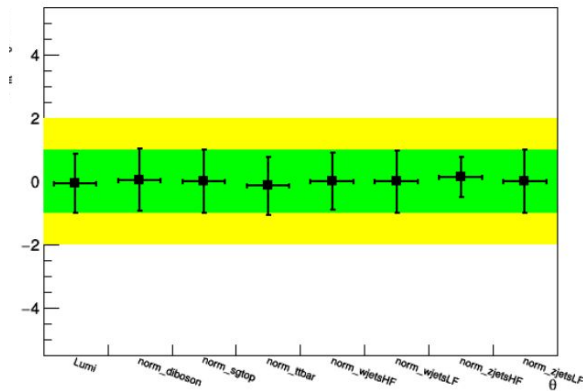Fit Inputs: template <u>without correct normalisation</u> + other backgrounds
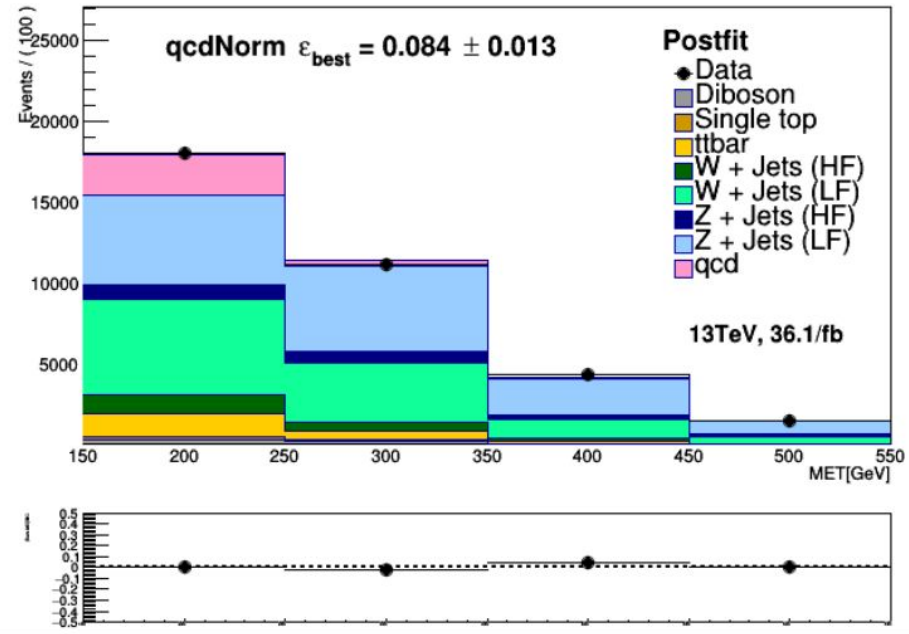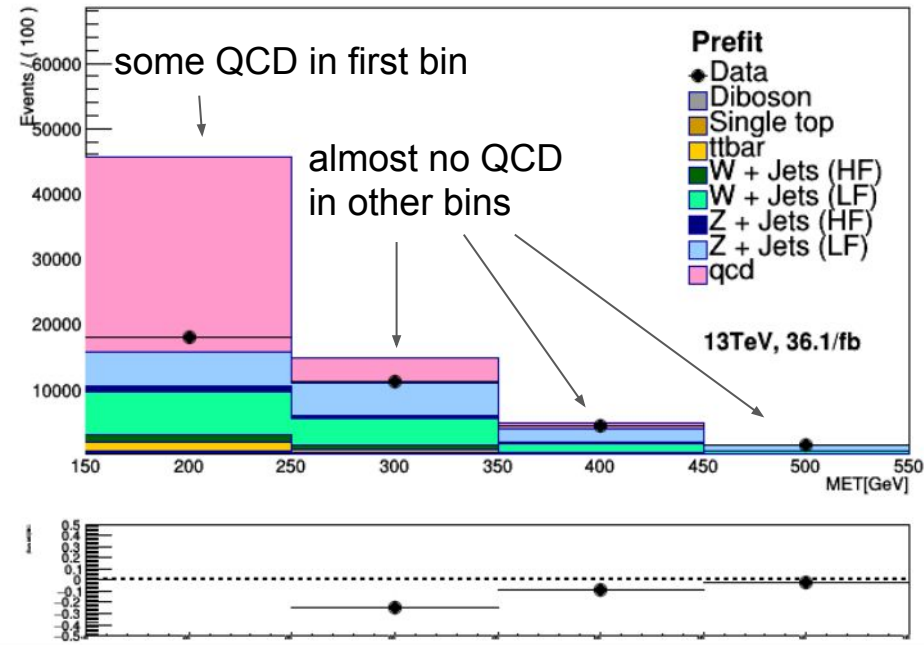
Post-Fit Plots
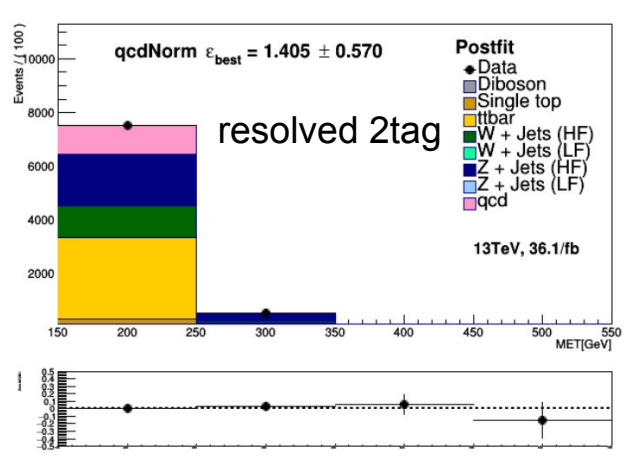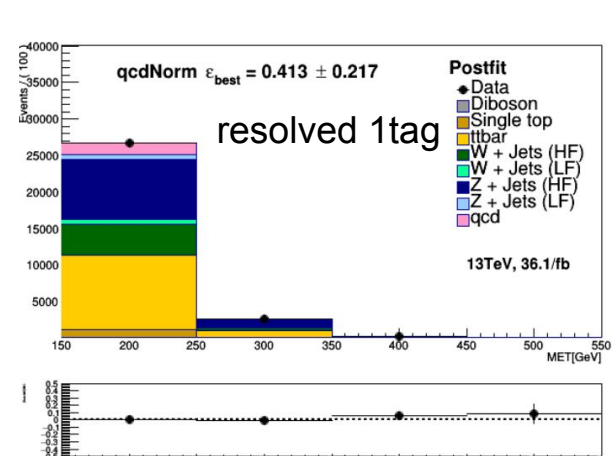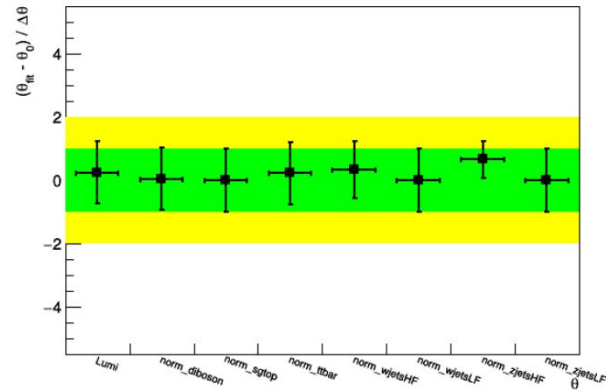
Pull Plots
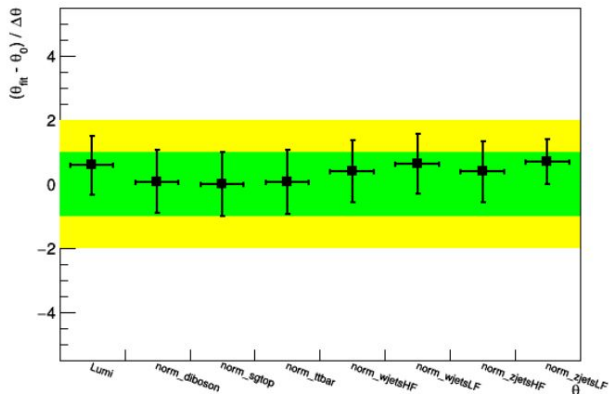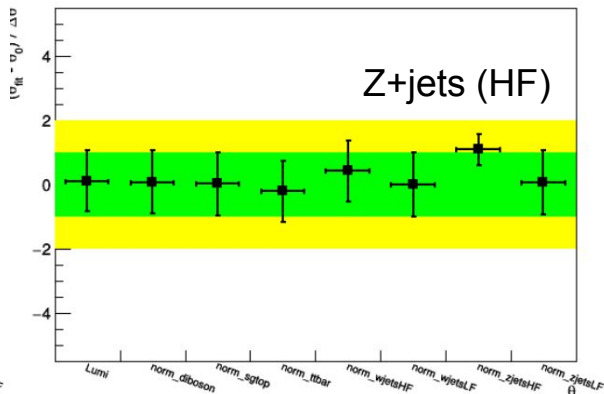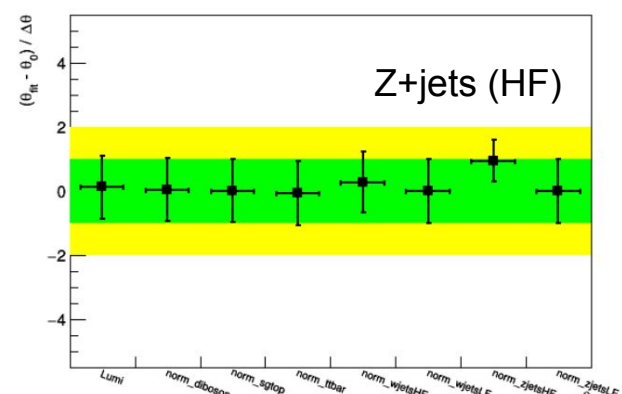
Pre-fit inputs with multijet templates
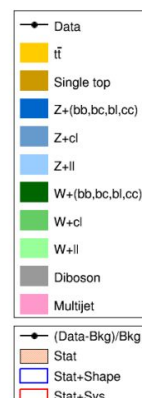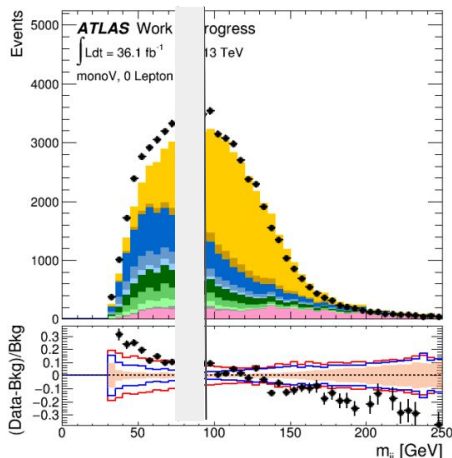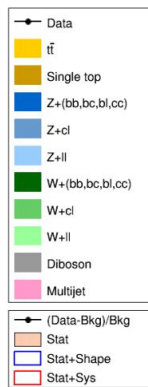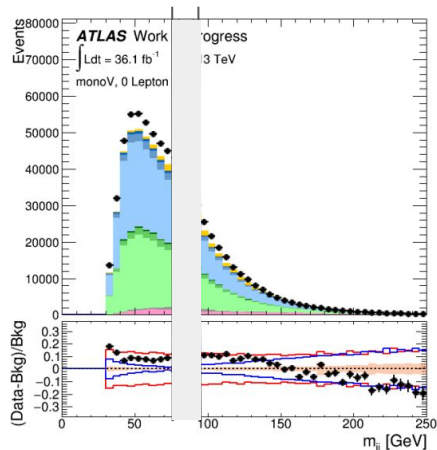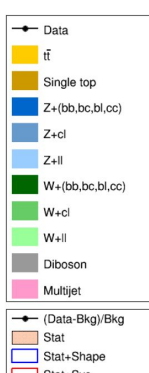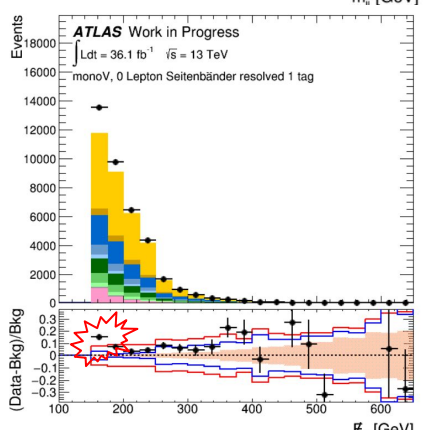

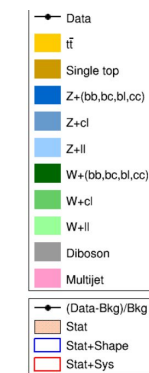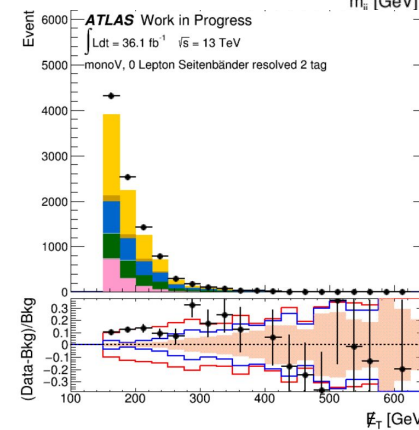side-bands: resolved 0tag

resolved 1tag
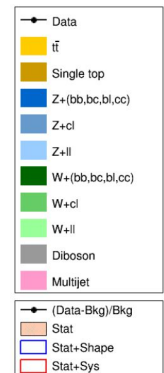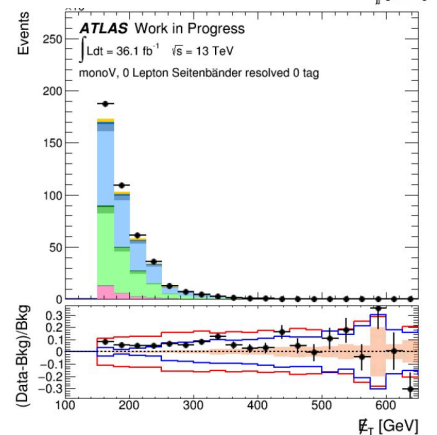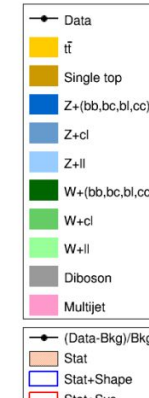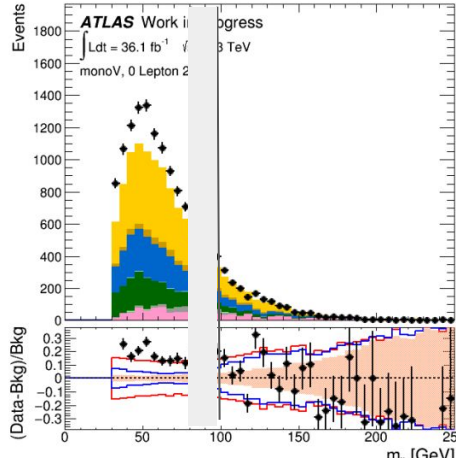
resolved 2tag

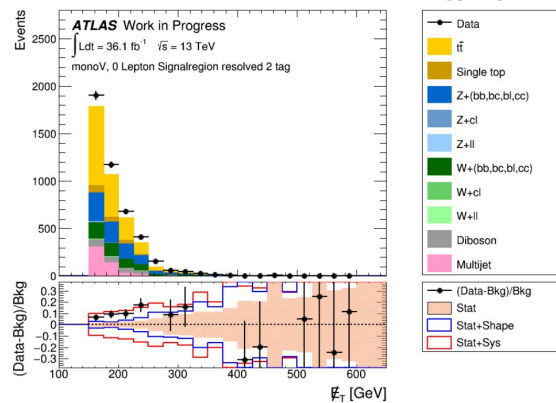covered by uncertainty band
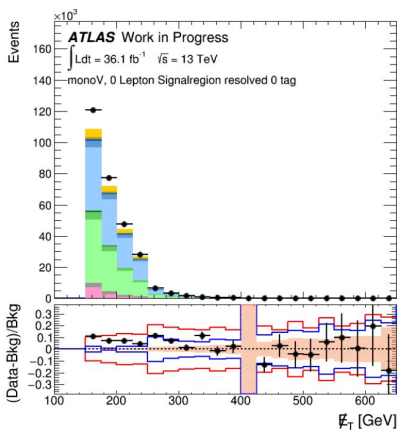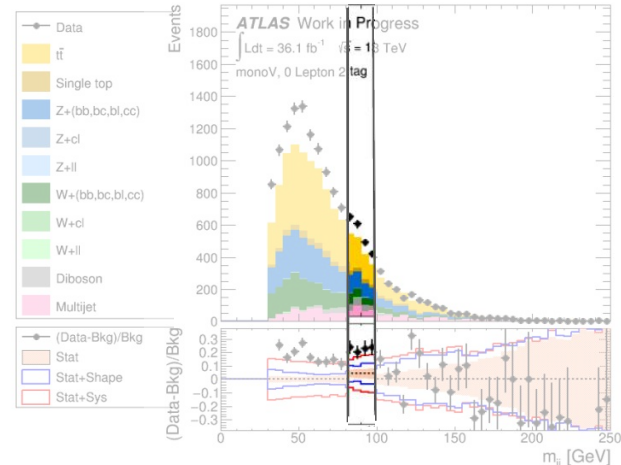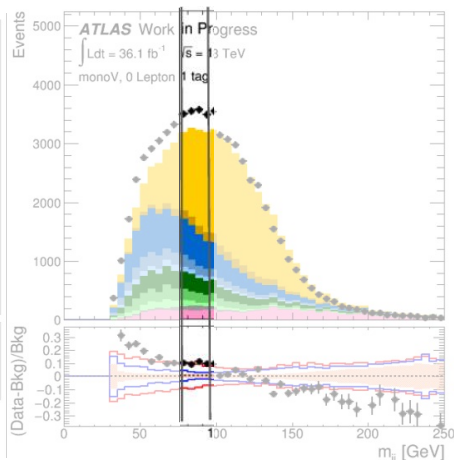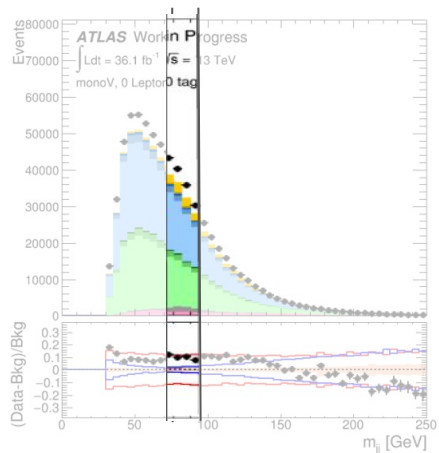
not fully covered by uncertainty band

mostly covered by uncertainty band
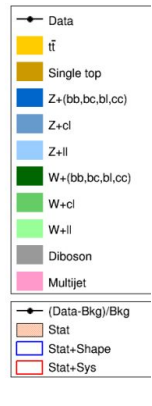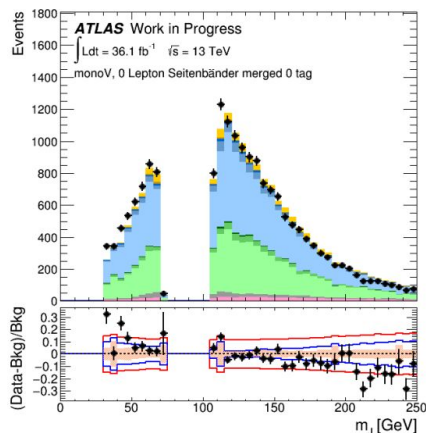
Pre-fit inputs with multijet templates

signal region: resolved 0tag

resolved 1tag

resolved 2tag
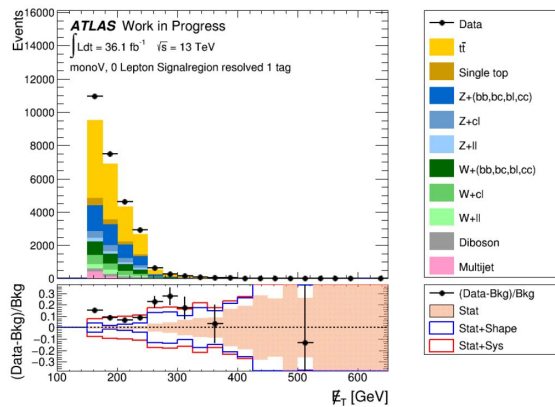
Pre-fit inputs with templates

side-bands: merged 0tag   merged 1tag   merged 2tag
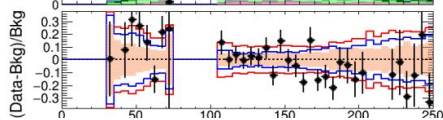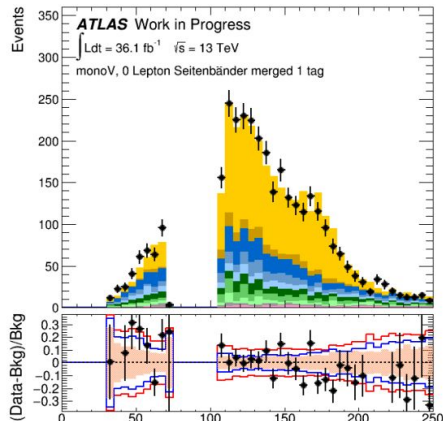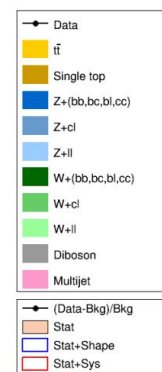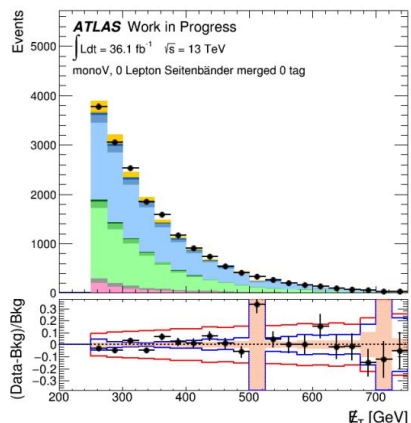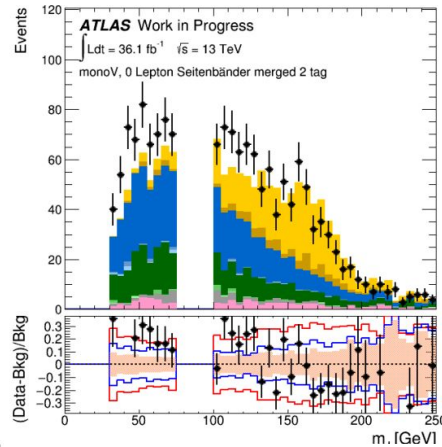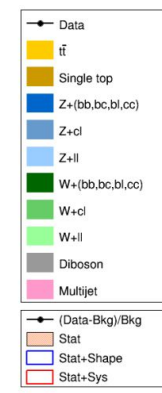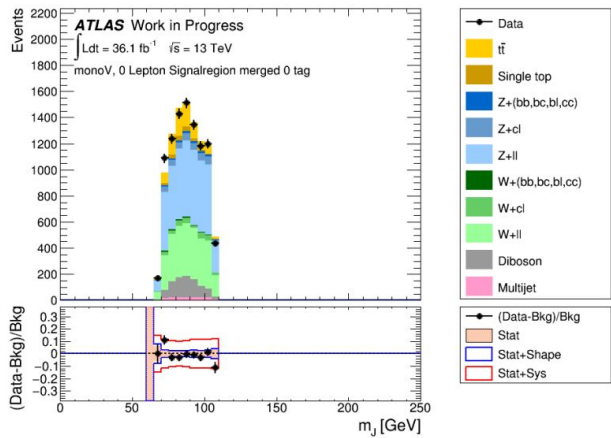
Pre-fit inputs with templates

signal region: merged 0tag

merged 1tag
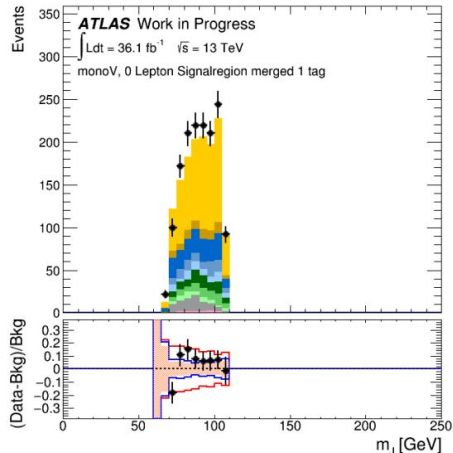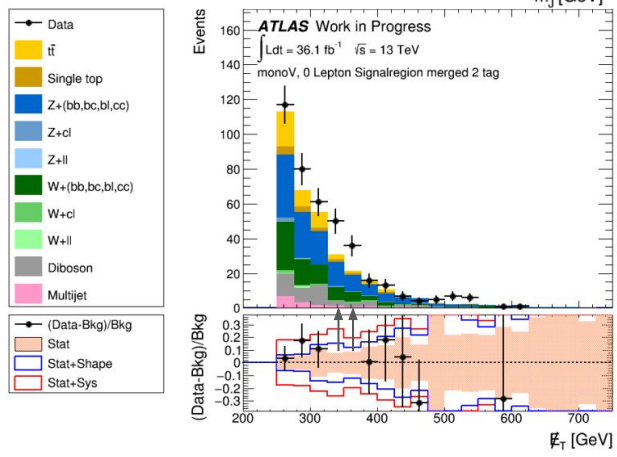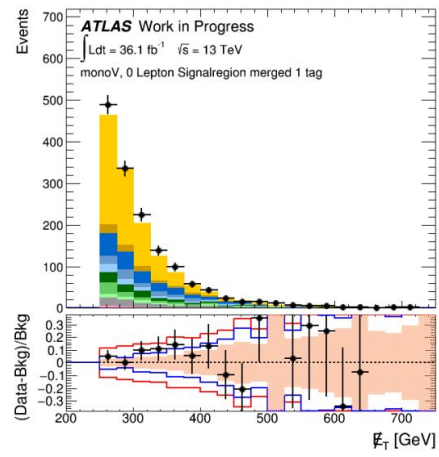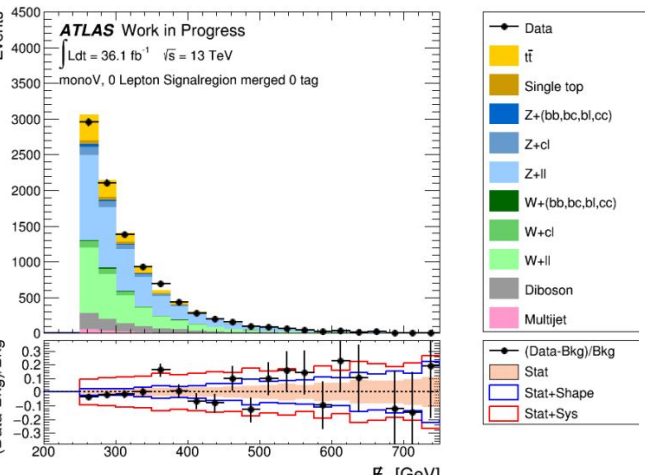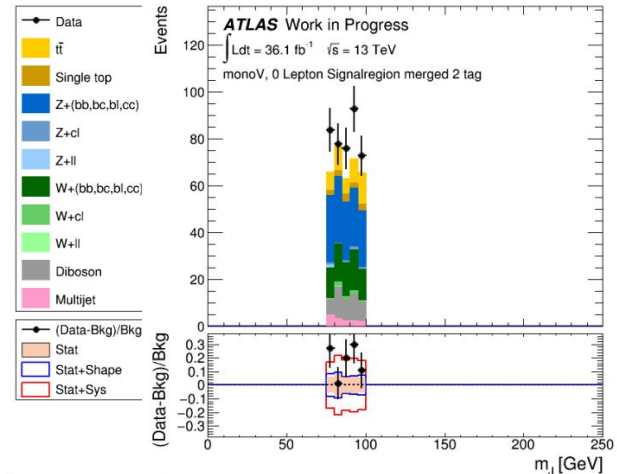
merged 2tag

Multijet Yields compared to other backgrounds (pre-fit)

	multijet	other background	fraction
merged 0 tag	160 +/- 4	9515	1.65 %
merged 1 tag	15 +/- 1.4	1383	1.07 %
merged 2 tag	16 +/- 2	328	4.88 % (no D2)
resolved 0 tag	10 762 +/- 88	254 276	4.06 %
resolved 1 tag	646 +/- 20	23 811	2.64 %
resolved 2 tag	520 +/- 31	3 574	12.7 %

Summary

- Revisited QCD estimation, now with physically better motivated way of obtaining the template normalisation.
- Use MET instead of nJetsWithMuon for fitting procedure (better discrimination of QCD for all b-tag categories)
- Good agreement already in pre-fit plots
- Templates available here:

  http://pgadow.web.cern.ch/pgadow/share/?dir=monoV/templates