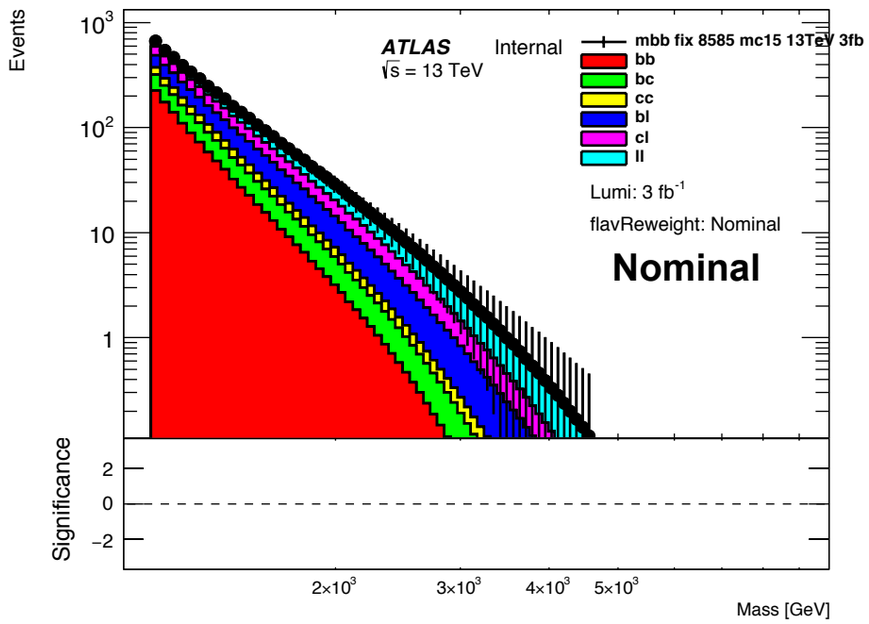
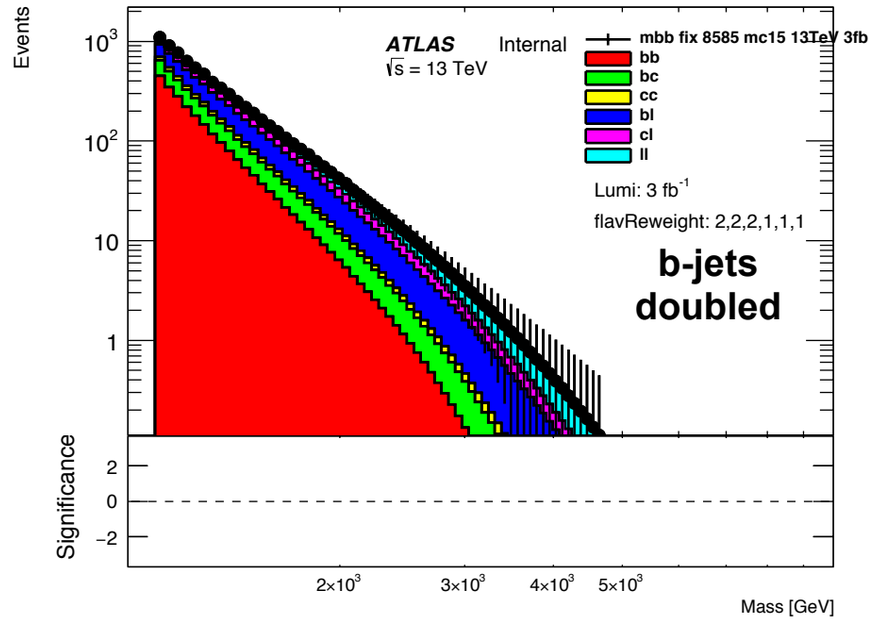
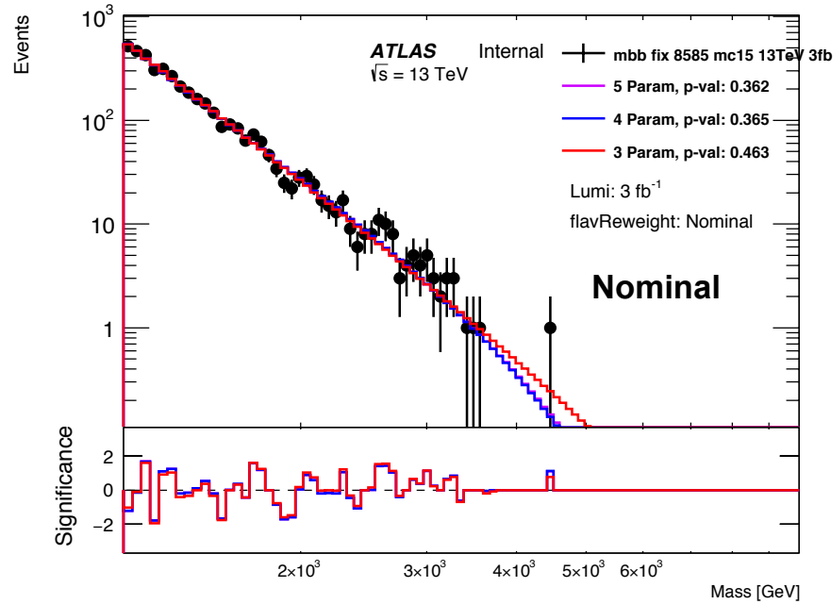
# Test of Robustness of Fit Against Changes in Flavour Composition

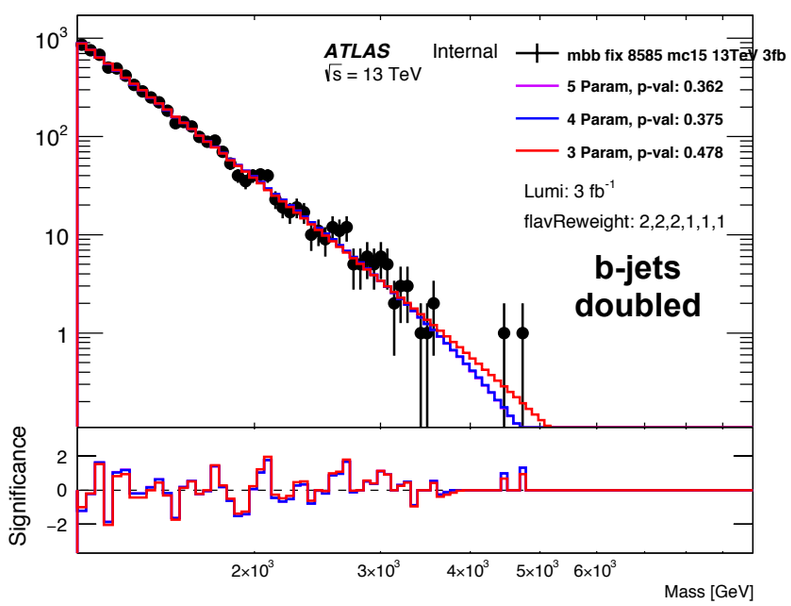
- Test that fitting procedure is robust to changes in the flavour composition
  => Create templates for each of the flavour combinations by fitting to individual spectra.
  => Adding the fractions with different weights to produce spectra with different flavour combinations




- Apply Poisson fluctuations to create ‘data-like’ distributions.
- These are fitted to and then p-values of fits are compared for the two different flavour compositions
- This is repeated for 100 different ‘data-like’ distributions.



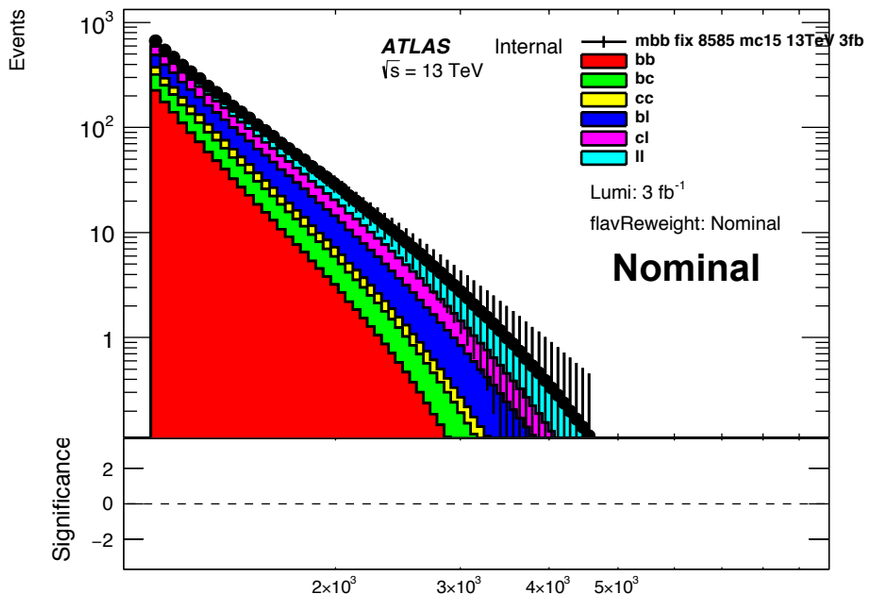



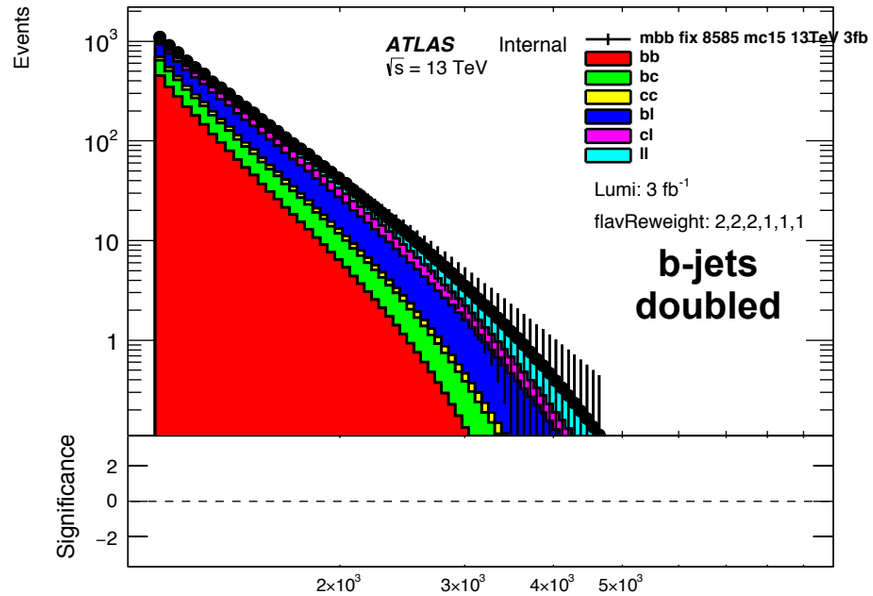

## Mean p-values

| | Nominal | b-jets doubled |
|---|---|---|
| **3 Par. Fit** | 0.325 +/- 0.024 | 0.308 +/- 0.024 |
| **4 Par. Fit** | 0.280 +/- 0.023 | 0.267 +/- 0.022 |
| **5. Par Fit** | 0.283 +/- 0.022 | 0.276 +/- 0.022 |

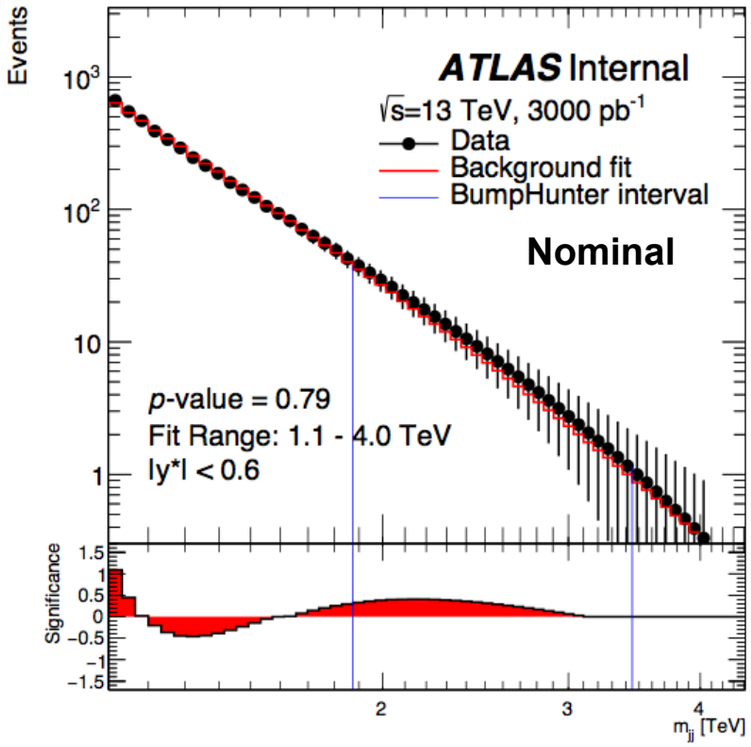
# Spurious Signal Tests for Varying Flavour Compositions

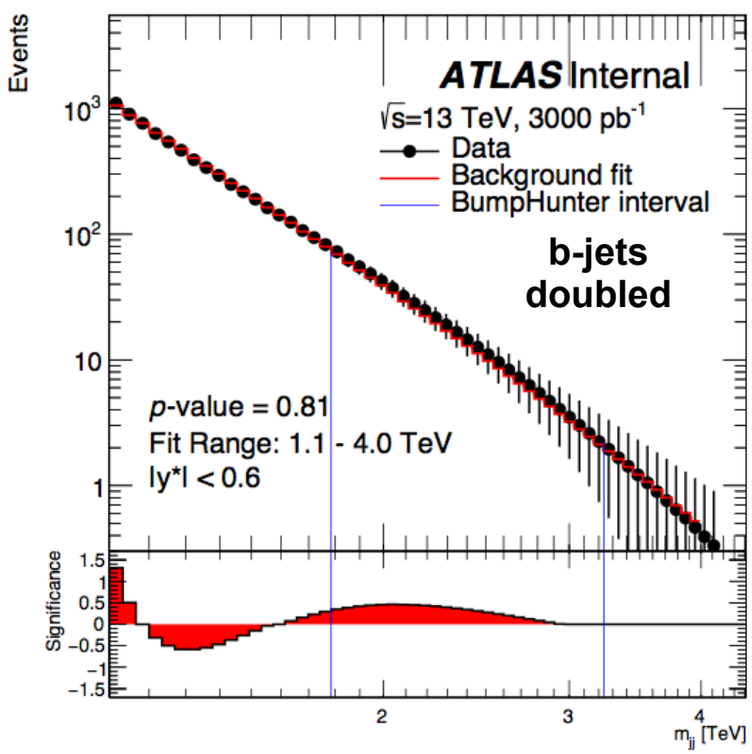
- Test a spurious signal due to discrepancies between fit and background for different flavour compositions
  => Use spectra created templates for each of the flavour combinations by fitting to individual spectra.
  => Adding the fractions with different weights to produce spectra with different flavour combinations




- Fit to the above spectra using 3-parameter fit function.
- Use search phase of BumpHunter to search for discrepant regions




- No significant spurious signal found
  - Large p-values
  - Wide signal unlike benchmark models.

- This study not currently in supporting note in CDS.
  - Documented and ready to go.
  - Can go in next version.