Spurious Signal Tests

Laurie McClymont, Andreas Korn

Di-bjet Meet

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Introduction

- **Confirm that fits discrepancies are not significantly occurring**
  - Fit discrepancy = A difference in shape between fitting function and background shape
  - Fit discrepancy may hide true signal or create fake signal

- **Test fit function by performing fits to background only data-set**
  - Use MC for representative background only data-set
  - Create data-like distributions by applying poisson fluctuations
  - Study fit quality - BH p-value, Chi2 p-value, Deficit Hunter p-value
  - Search for evidence of spurious signal

Event Selection

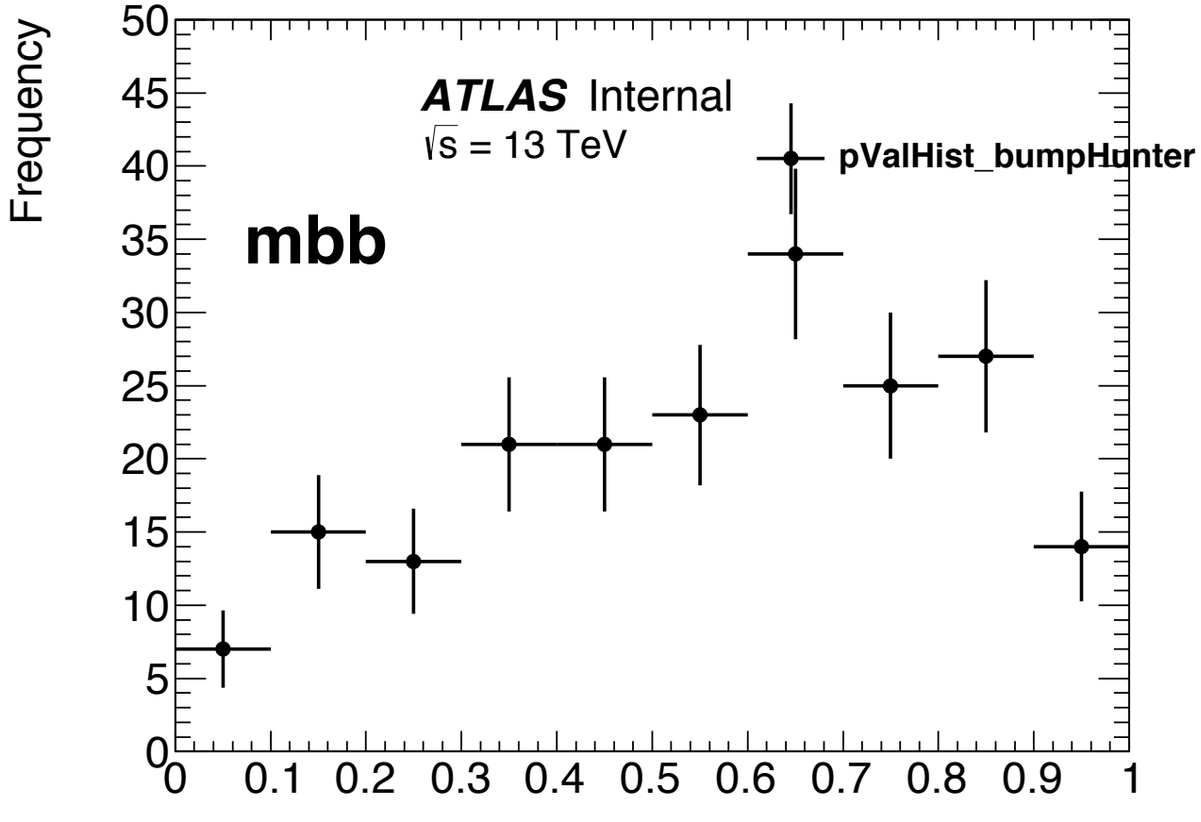
Pythia8EvtGen MC Di-Jet Sample
- 2016 MC
- di-b-jet Ntuple production

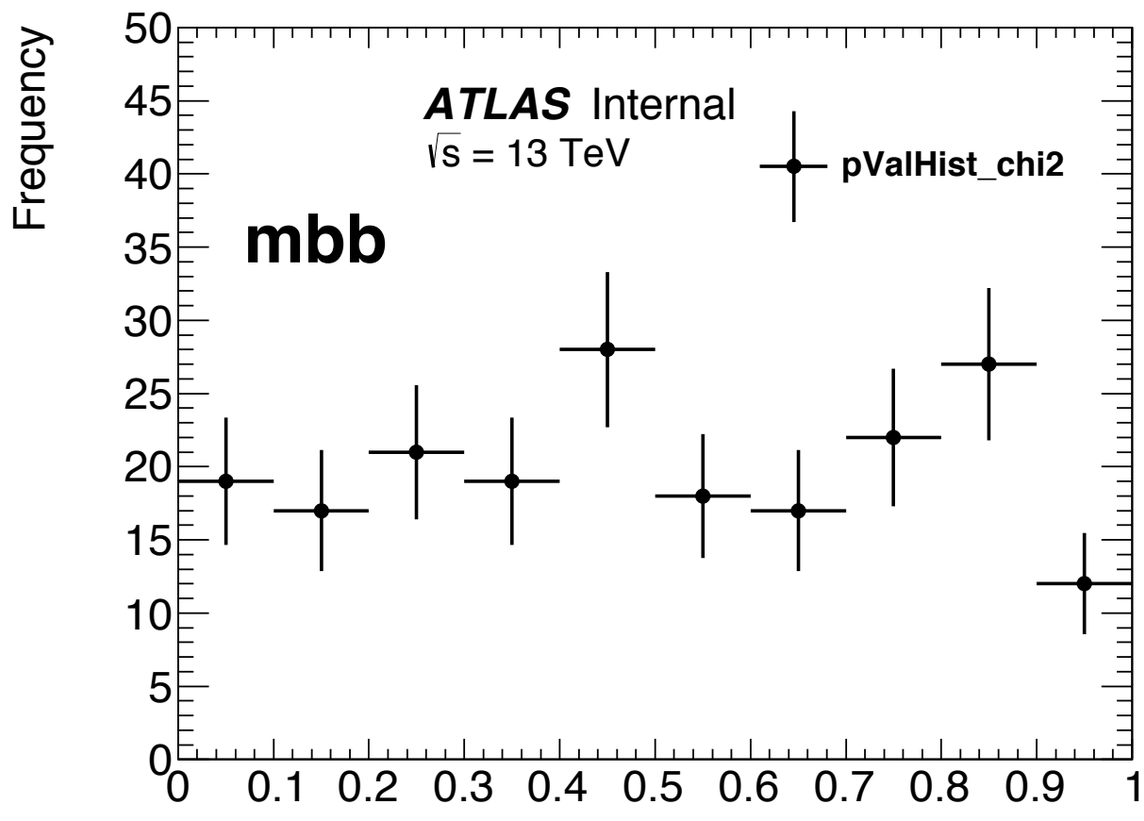
Scale to 10ifb
- Will update for final lumi

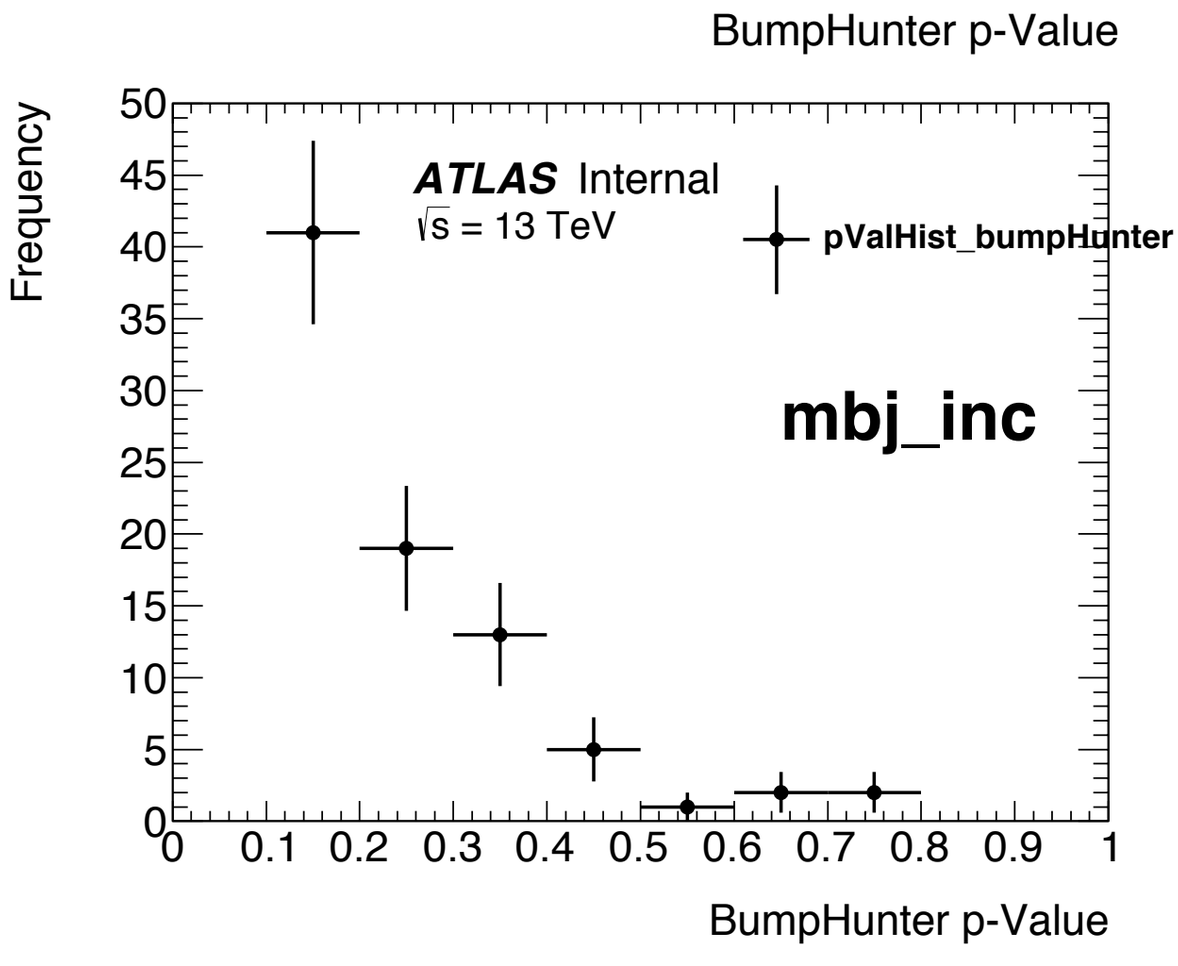
- **Standard Dijet Resonance Cuts**
  - Leading Jet pT > 410 GeV
  - Sublead Jet pT > 50 GeV
  - $|y^*| < 0.6$
  - mjj > 1100 GeV

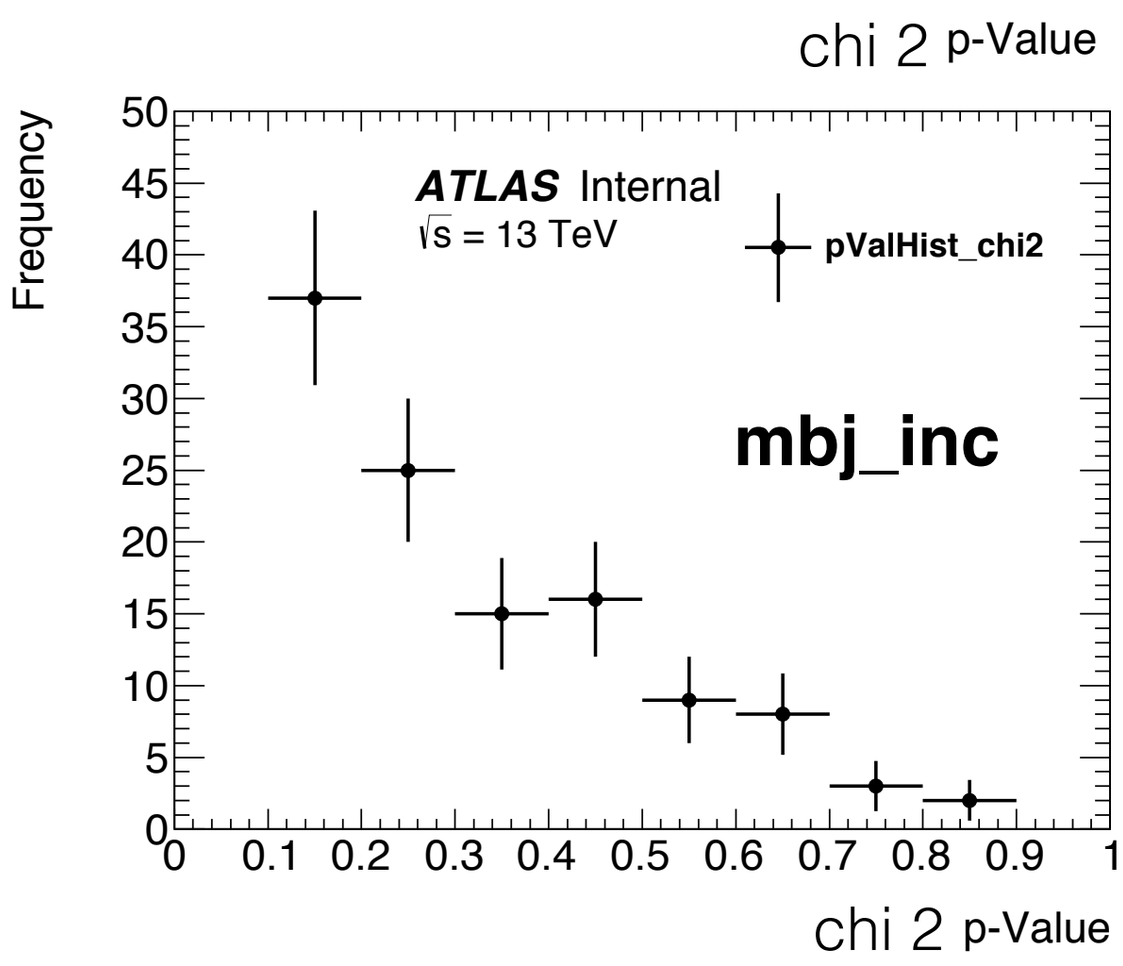
- **MV2c10**
  - Using fixed cut 85%
    mbb_fix_8585
  - mbj_incl_fix_8585 (>= 1 b-tag)

Distributions of p-values for fit to background

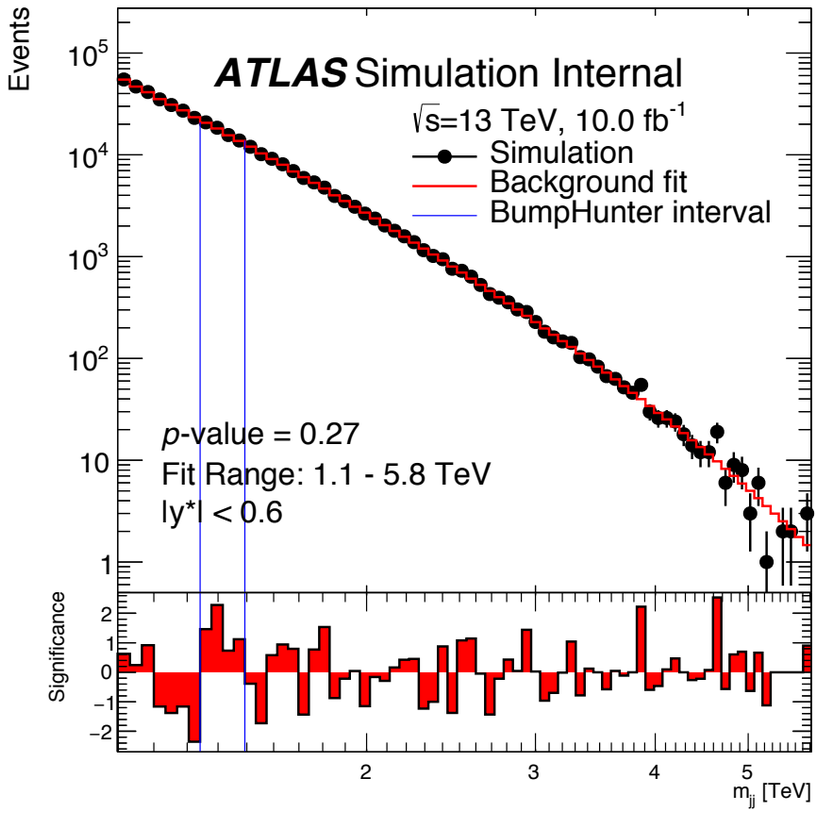


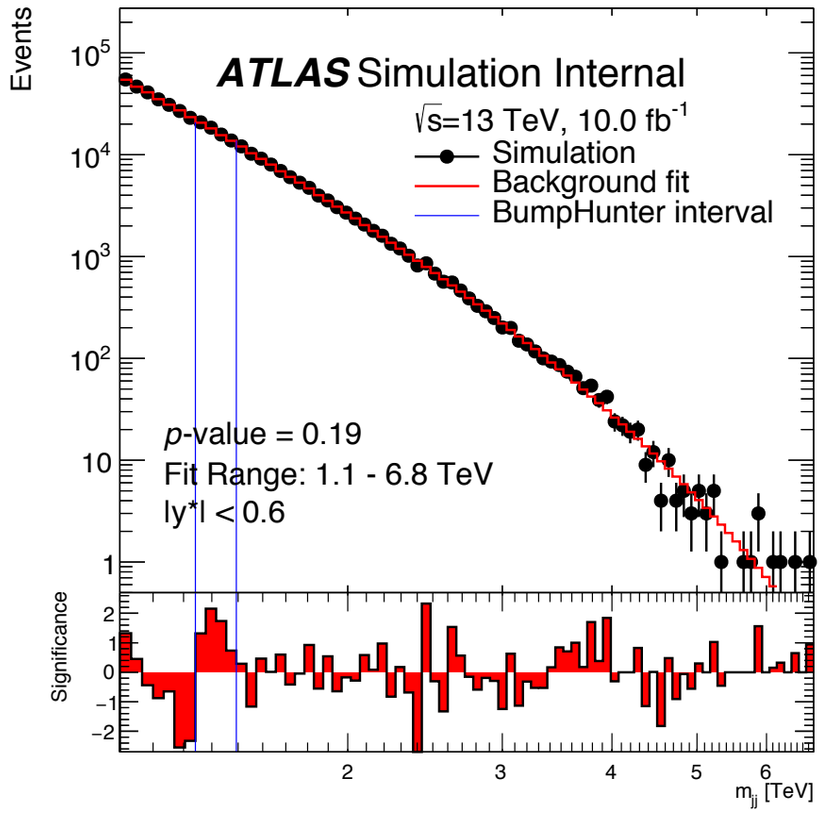


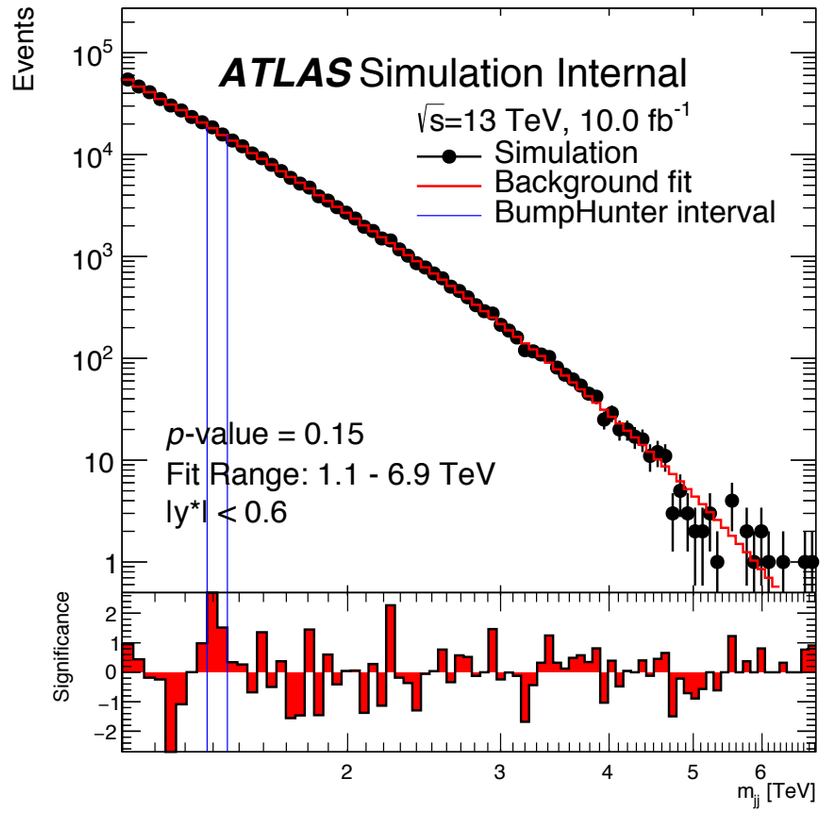


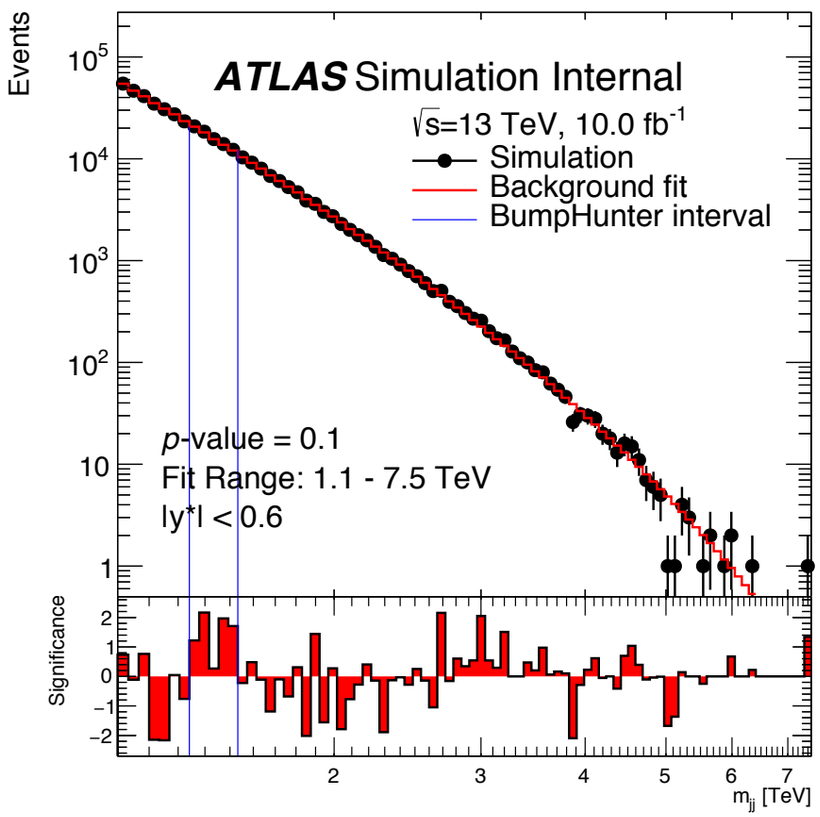


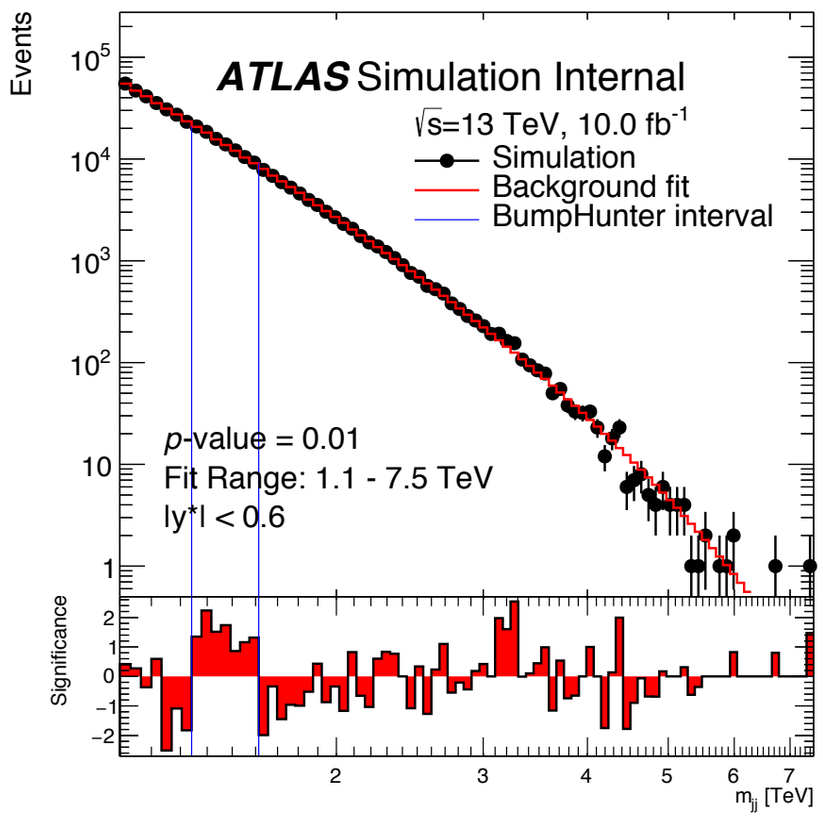
A couple of examples…

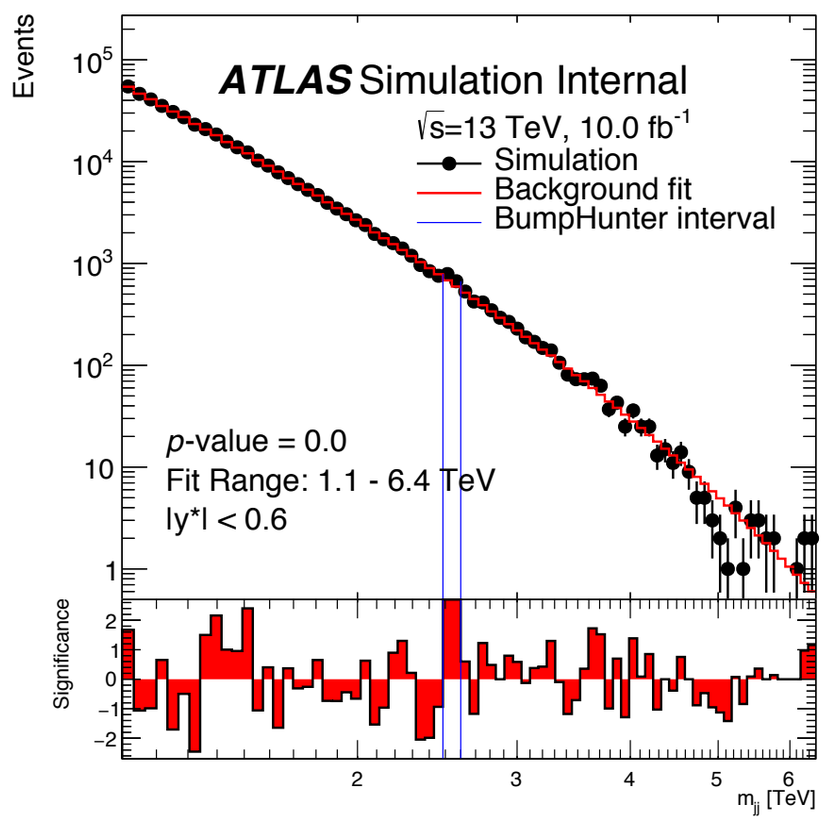






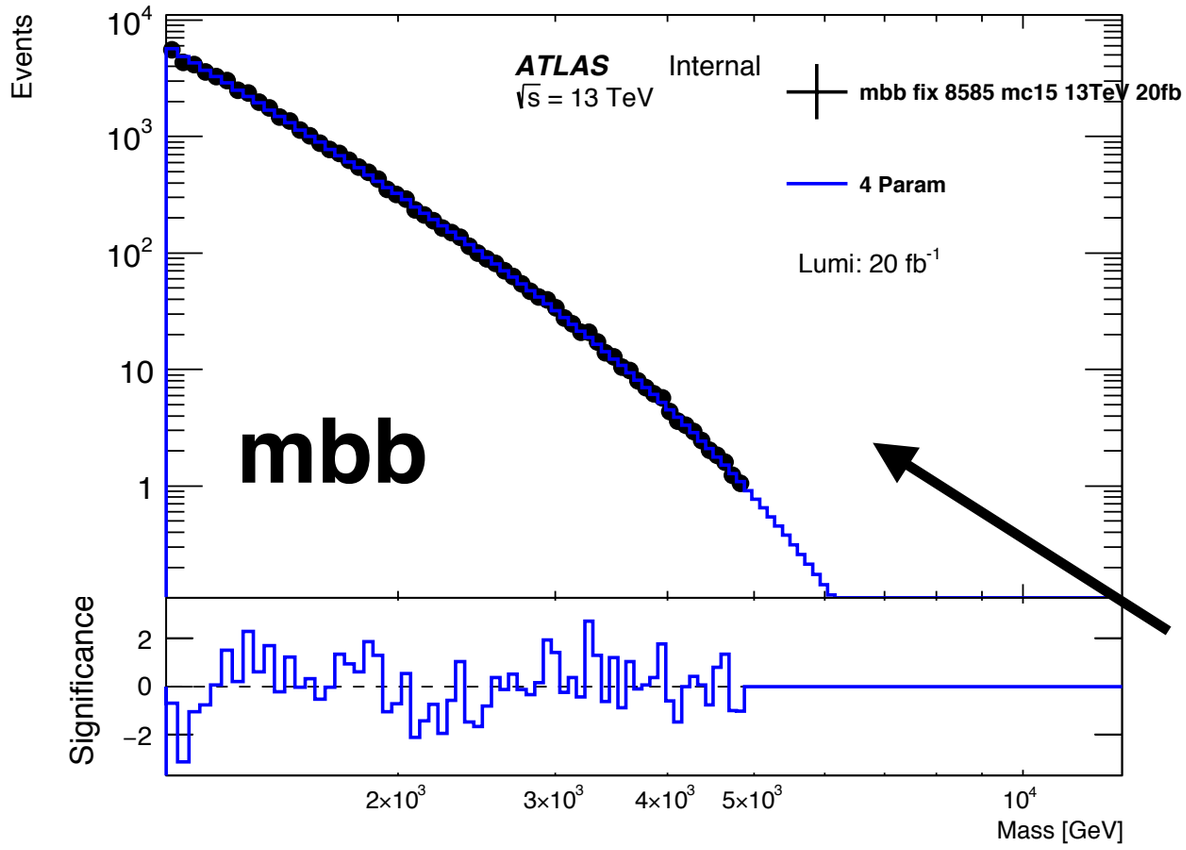






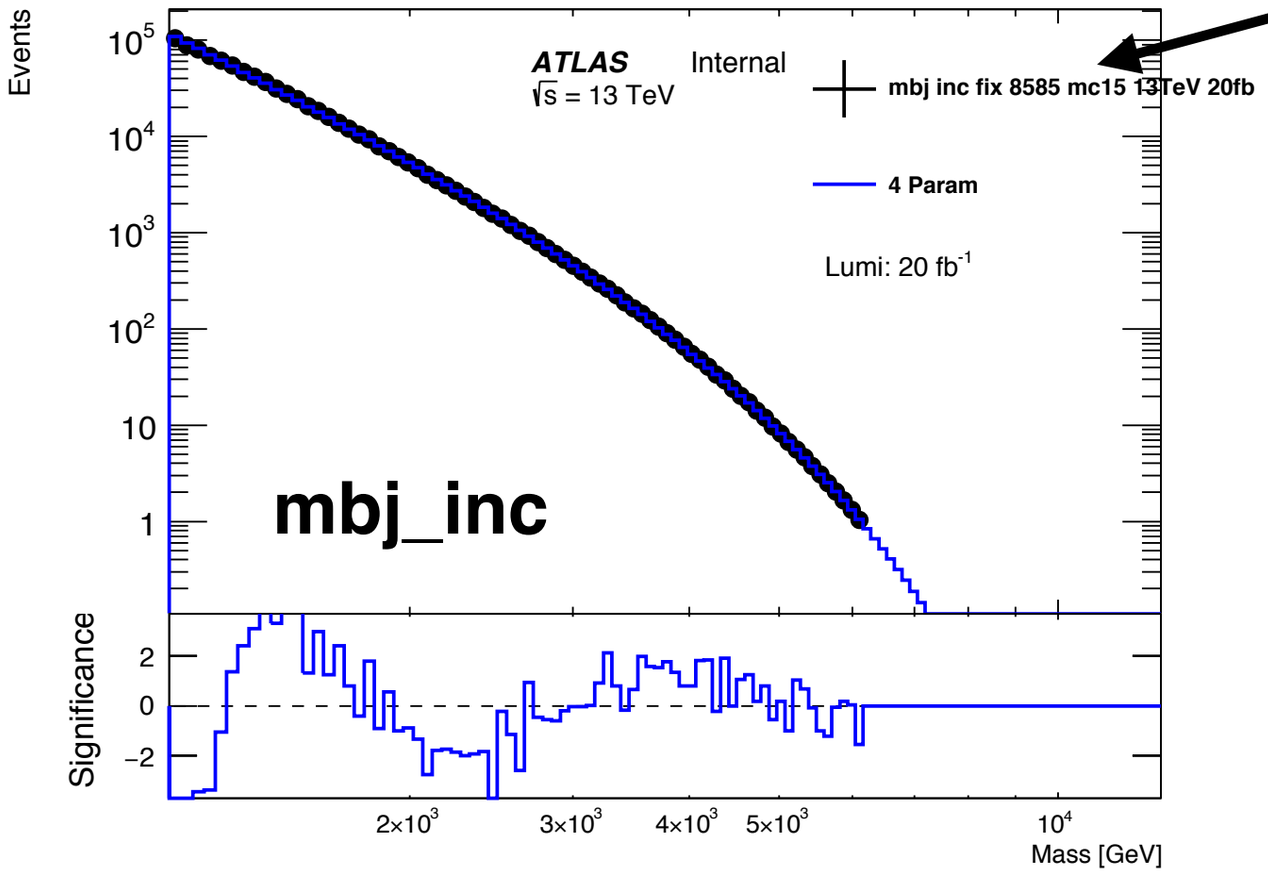
Patch Fit

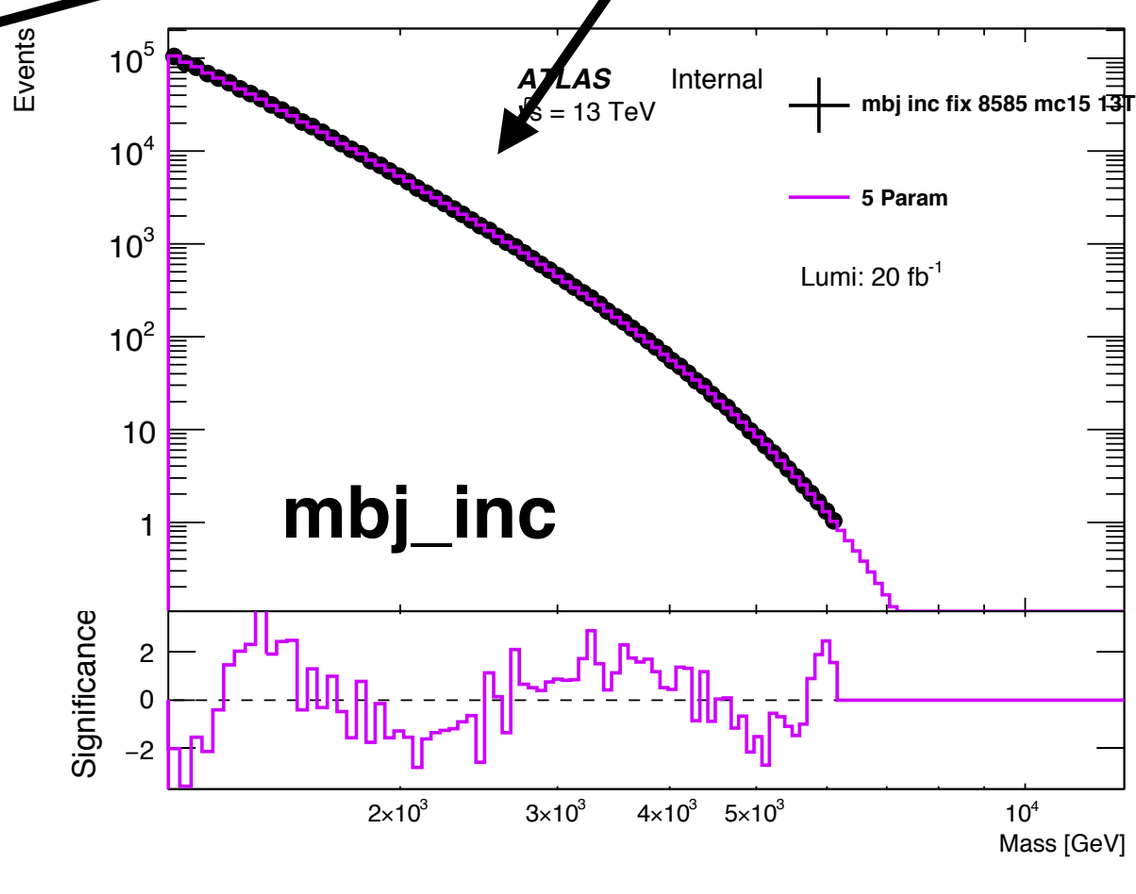
Fit to 20ifb curve cut off at 1 event
Errors are MC errors
Use fit to patch.



Works

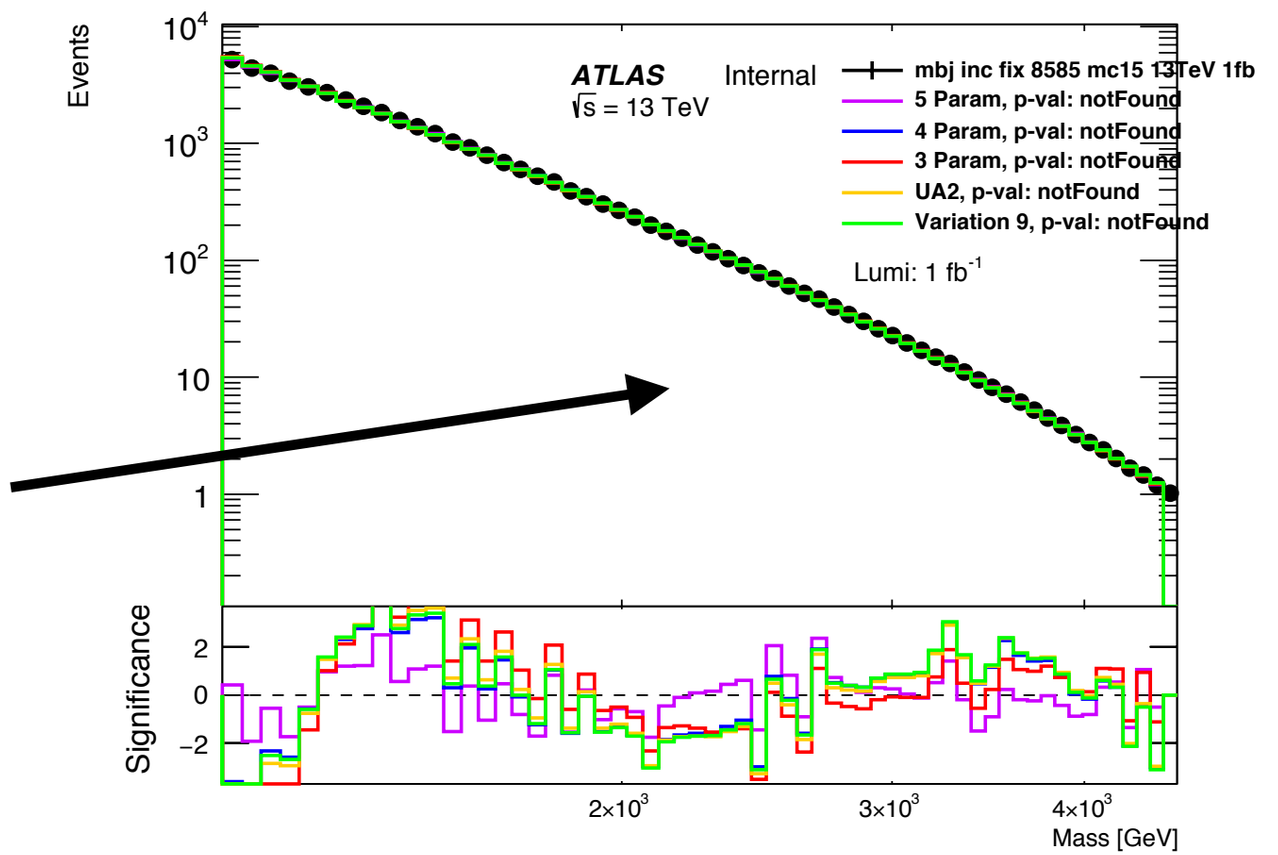
Not Working



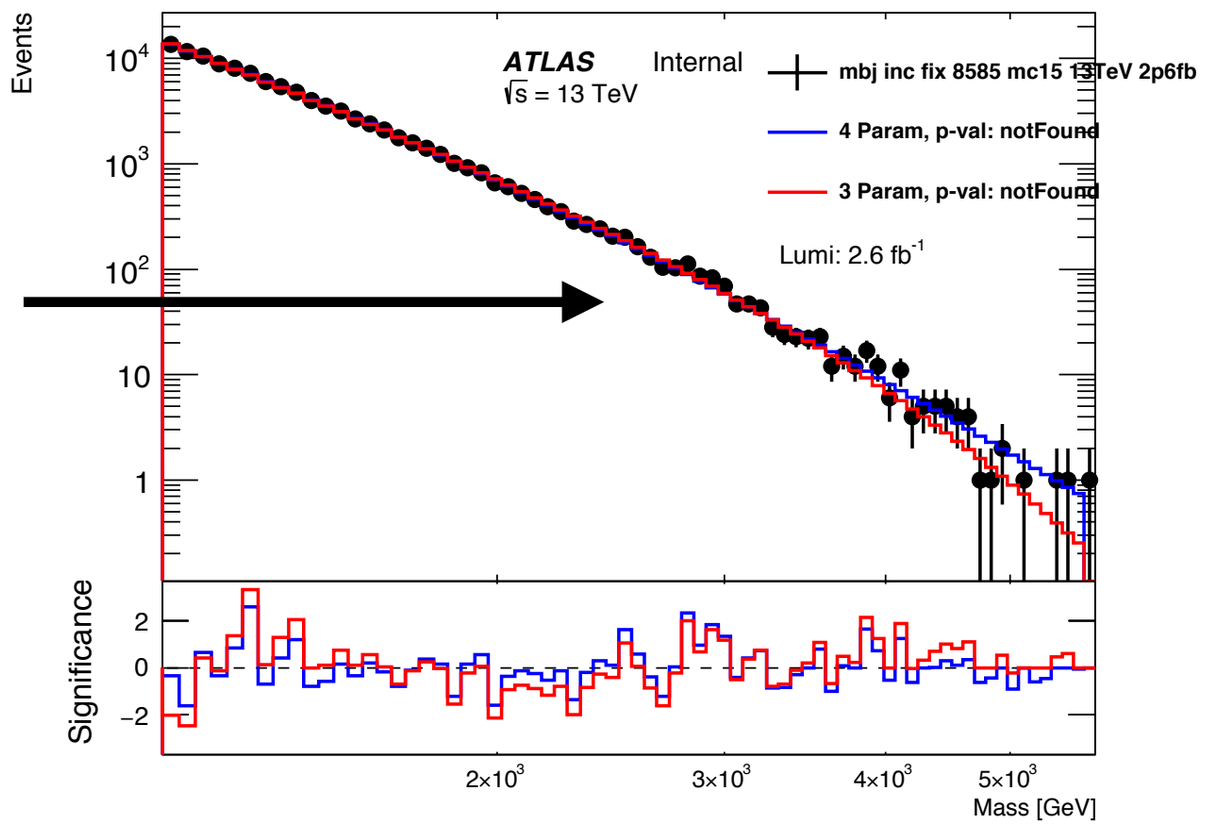


Possible solutions

1) Fix the patch
- Possible that changing to 5 para and fitting to a different mass range might fix the problem



2) Fit to data-like only.
- Perform tests to region where we have precision (no patch)
- Done for 2.6 fb^{-1}, right.



3) TLA sample with truth tagging
- TLA used large truth MC sample to perform tests
- Can we use this with emulation of b-tagging
- Does such a tool exist?