Dibjet Roundtable

Flavour Comp. Studies

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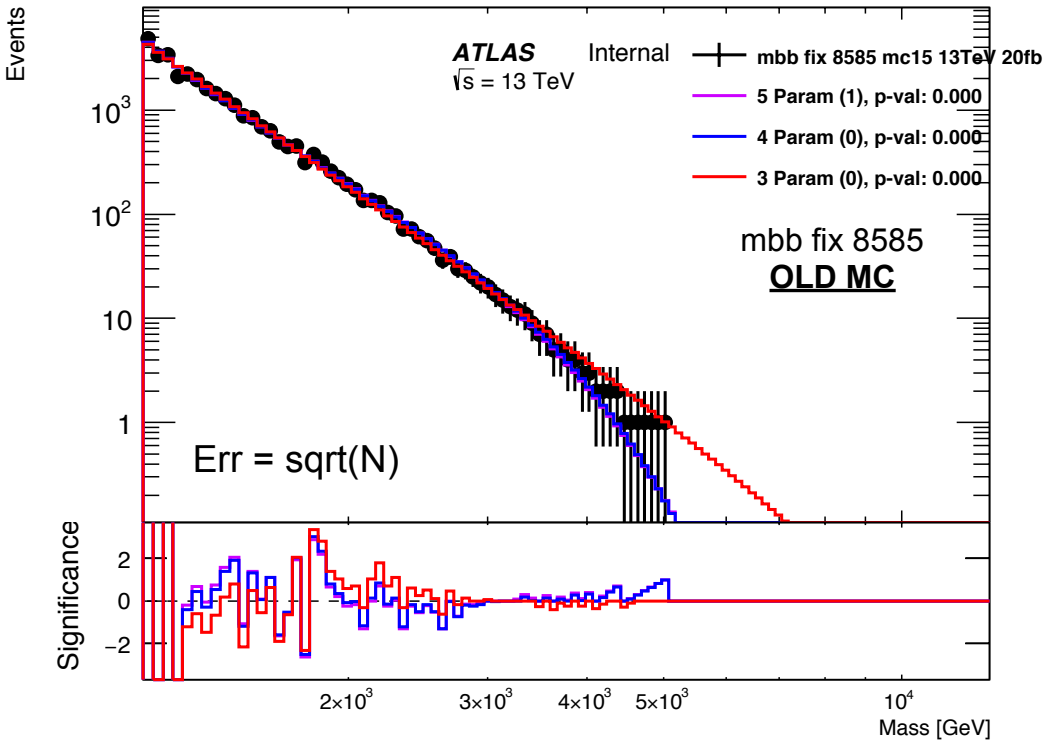
2 Dec 2015

Last time...

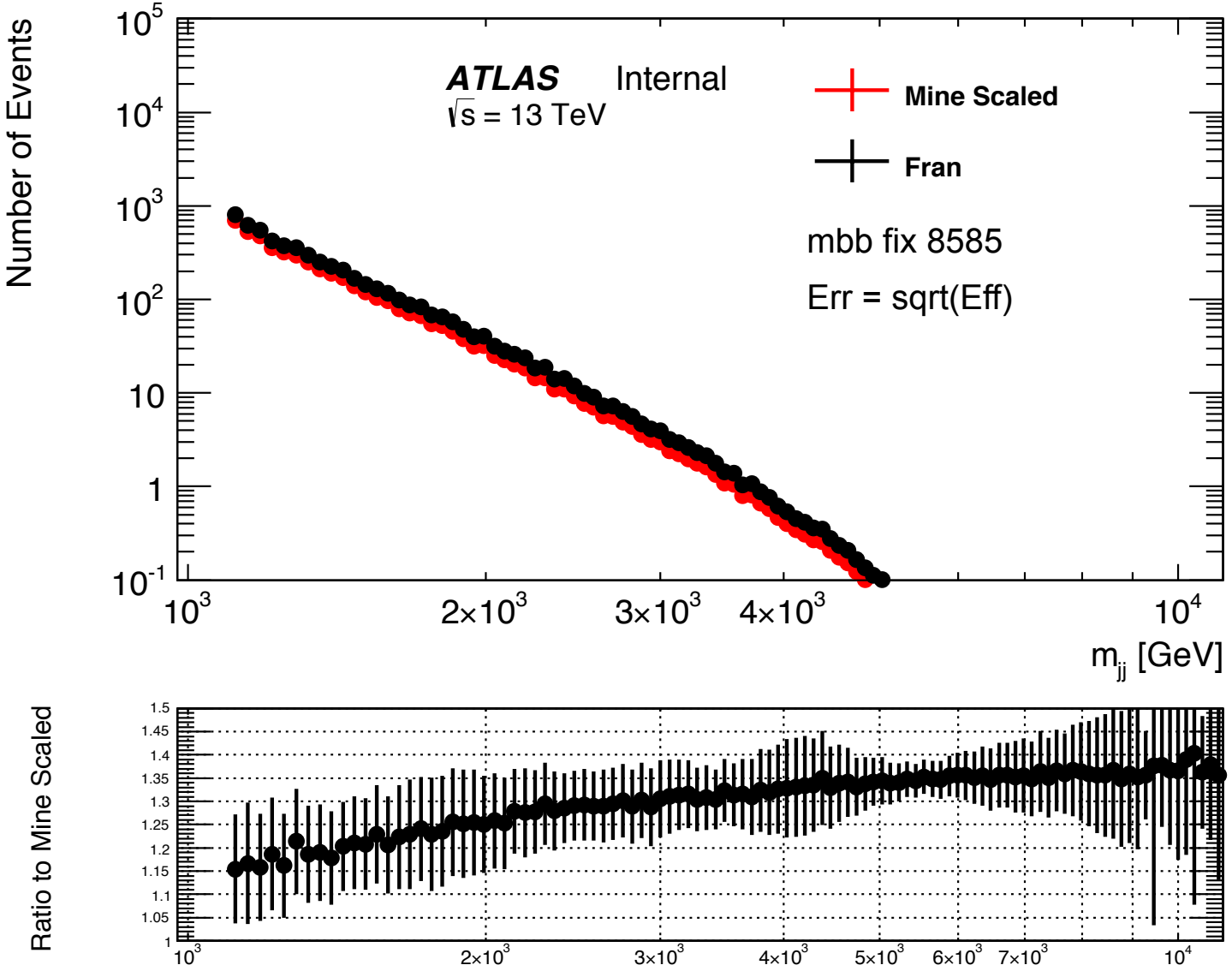
Observed features in mbb spectrum



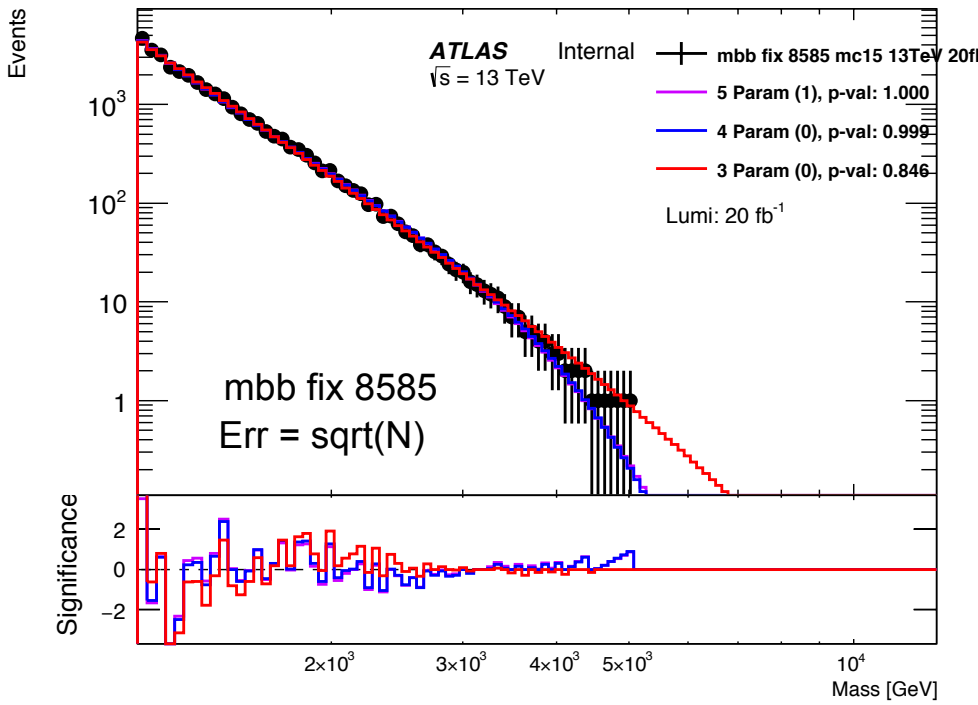
What I've done

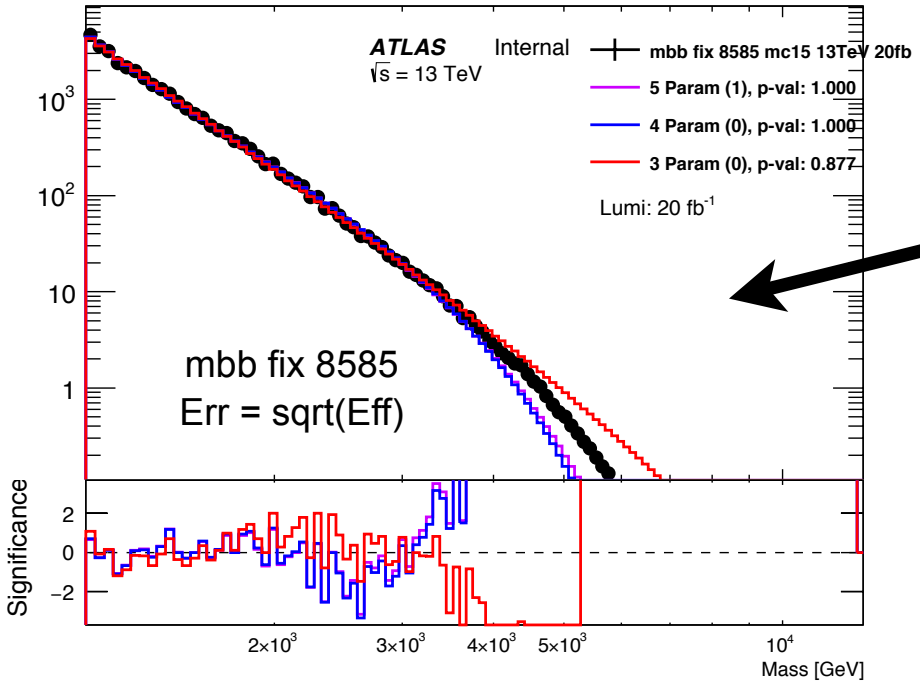
- Updated to MC15_20151104
- Cross checked with machinery to see if obvious bug, there wasn't
- Cross checked with francesco
- Changed errors to sqrt(eff entries)
- compared to Patched distributions

Comparison to Francesco mbb fix 8585



Within statistical fluctations?





This is our replacement to original plot on slide 2

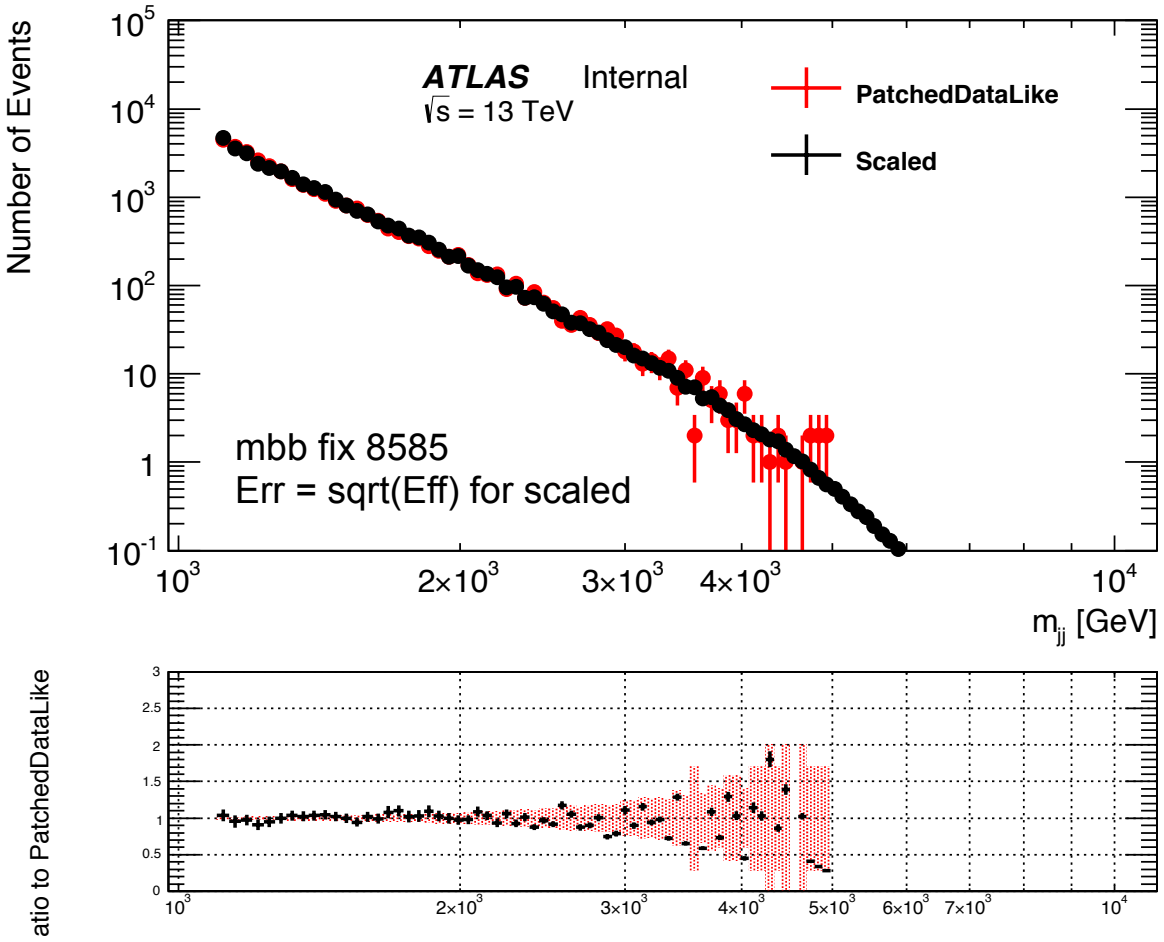
Compared to slide 3 it has:
=> Better errors
=> Updated MC

It is not “smooth” like slide 3 is, which means it is not rounded to integer values
- but this doesn’t matter in low mass region where we saw discrepancy.

Within statistical fluctations? - 2

Compare scaled to patched-data like, which is based on fit to 20ifb

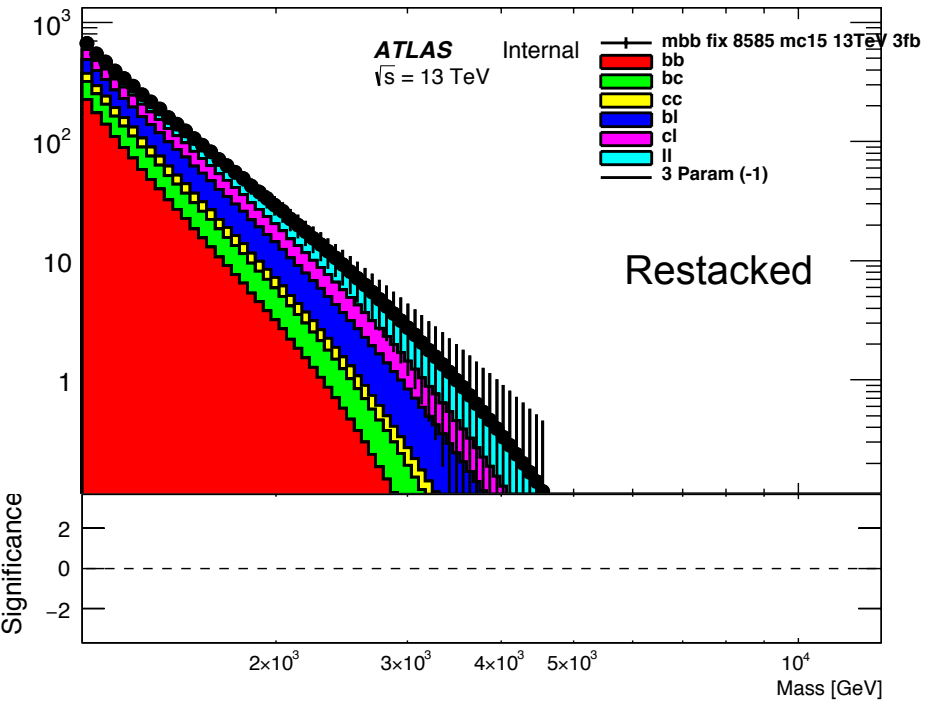
- Ratio plot at bottom shows scaled divided by patched data like
- Errors of the two are close to accounting for fluctuations
- To be clear these are not poisson like errors for scaled, instead sqrt(eff. entries)

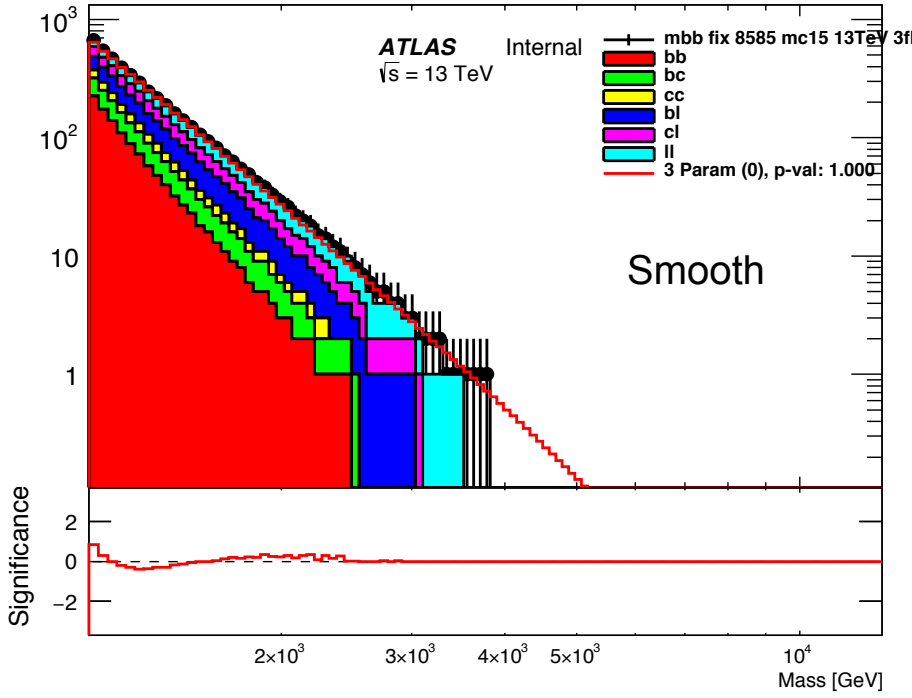


Stacking flavour fraction

Take fits to 20ifb data contributions (bb, bc, bl, cc, cl, ll)

- Use these as templates to contributions
- Restack them to create a mbb spectrum at desired lumi (3ifb)
- Then smooth histogram => Round to nearest integer.
- Then fit to smooth histogram

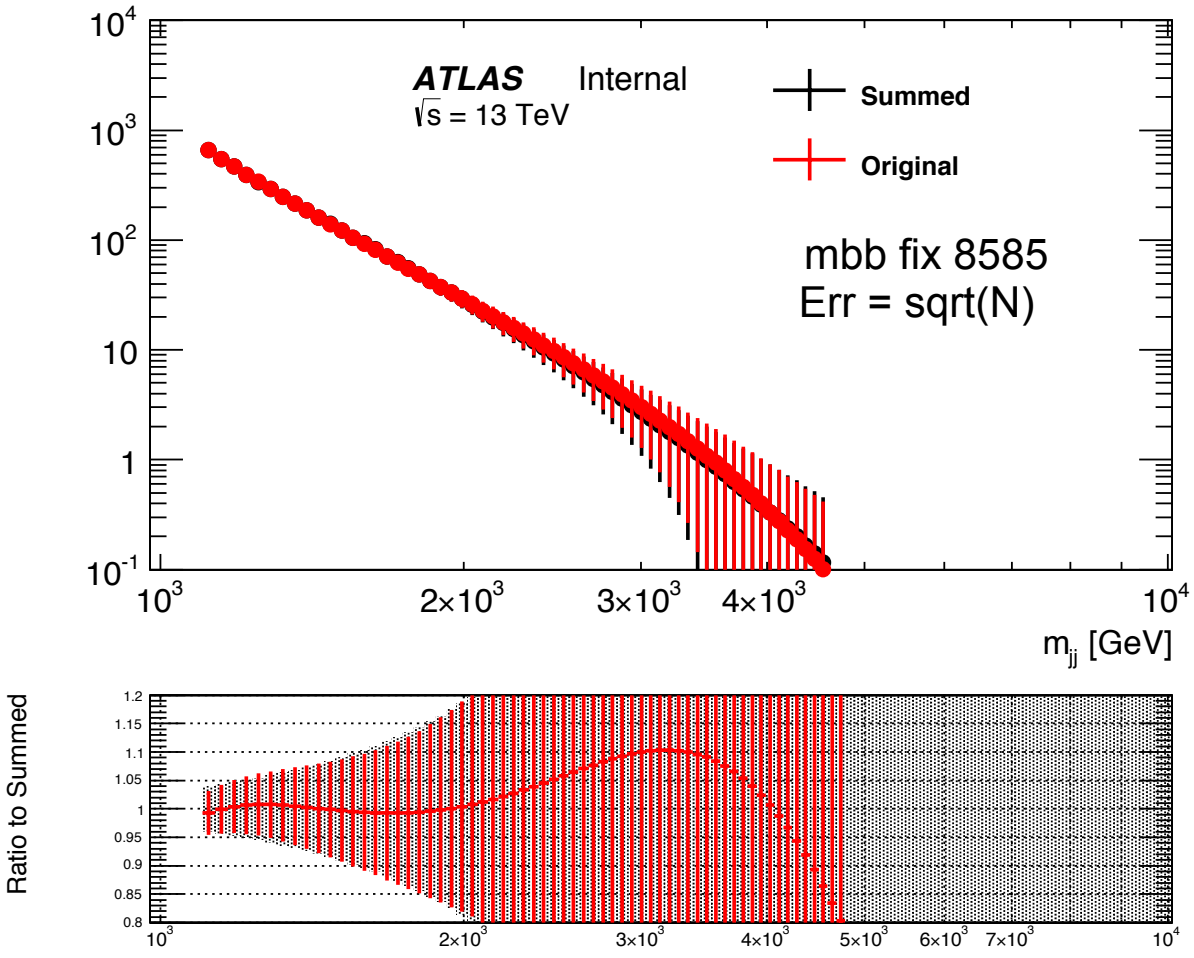




New plots, really need to do more work to understand them.
- Subtle differences between “original” histogram from fit to all and “restacked”

Stacking flavour fraction

New plots, really need to do more work to understand them.
Subtle differences between:
- “original” - histogram from fit to mbb spectrum
- “summed” - histogram from summing fits from each component of mbb spectum



Backup

Details

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

Standard Dijet Resonance Cuts
- Leading Jet p_T > 410 GeV
- Sublead Jet p_T > 50 GeV
- |y*| < 0.6
- m_{jj} > 1100 GeV

Using fixed cut 85% for both jets.
- mbb_fix_8585

Cone matching truth flavour
- jetHadronConeExclTruthLabelID

Work Flow

Samples from Andrea:
- `phys-exotics/jdm/dijet/inputs/Btag/`
`MC15_20151104 and MC15a_DiJet_20151005`

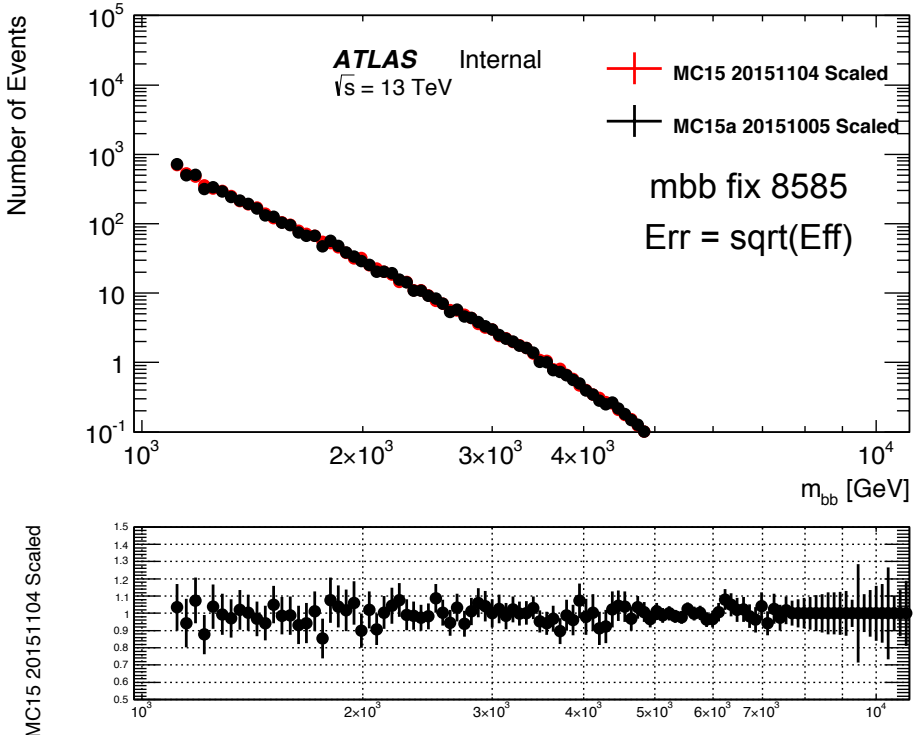
Use DijetHelpersPackage:

Create Histograms and merge slices
- *makeStandardHistograms.py*
- *plotStandardPlots.py*

Patch Process:
- Fit 20ifb smooth histos using *singleFit.py*
- Create data-like using *makeDataLikeHistograms.py*
- Apply patch from Francesco to truncated part of spectrum using 20ifb fit. **(I used 4 Parameter)**
(Done this by hacking *makeDataLikeHistograms.py)*

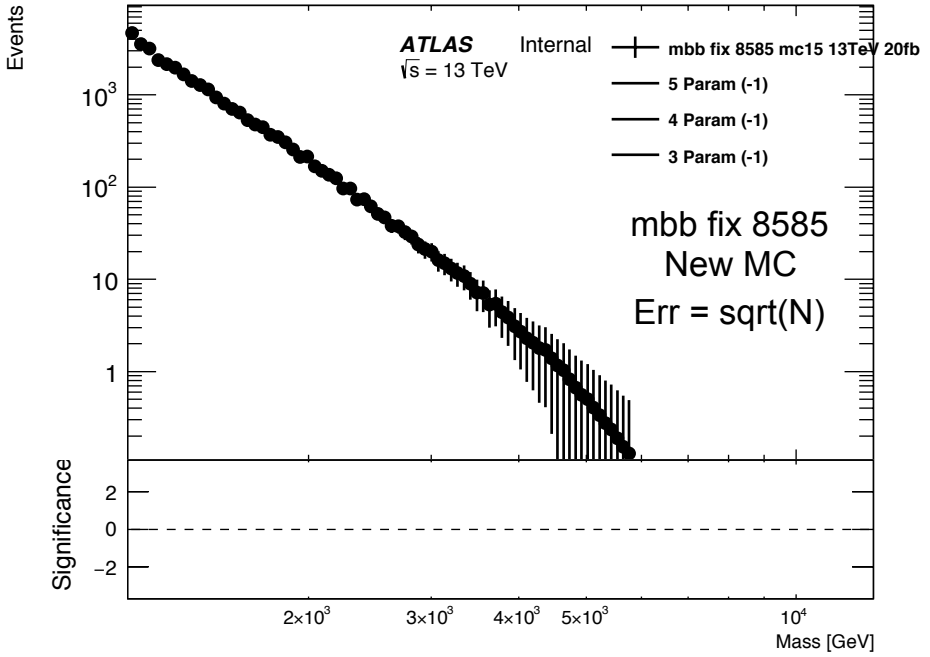
Fit spectrums and make some plots
- *singleFit.py*
- *plotSingleFit.py*

Moving to New MC?



Old MC = MC15a_20151005

New MC = MC15_20151104



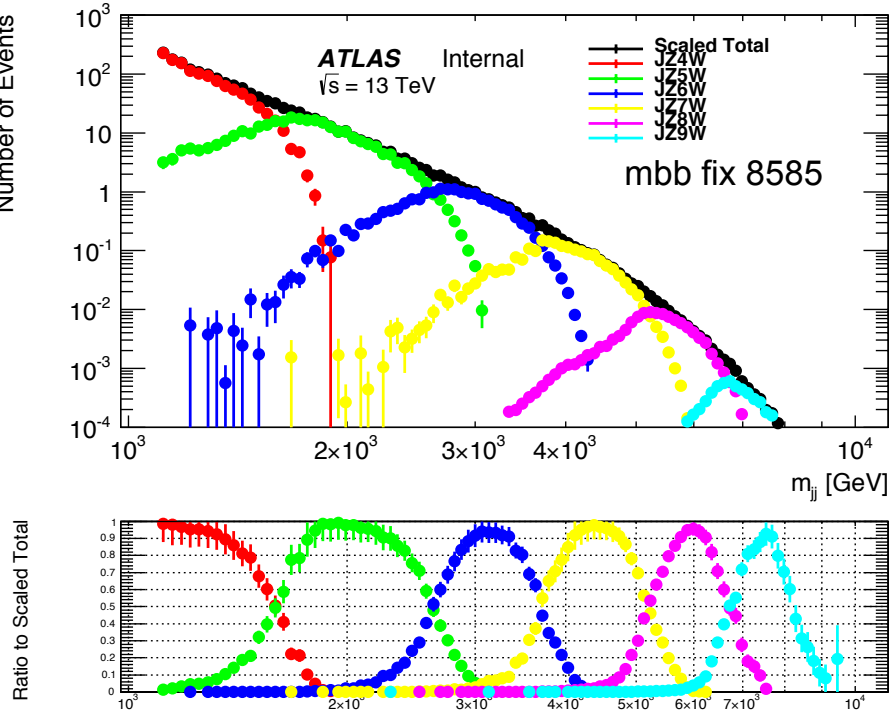
Moving to new MC does help
- (See above)

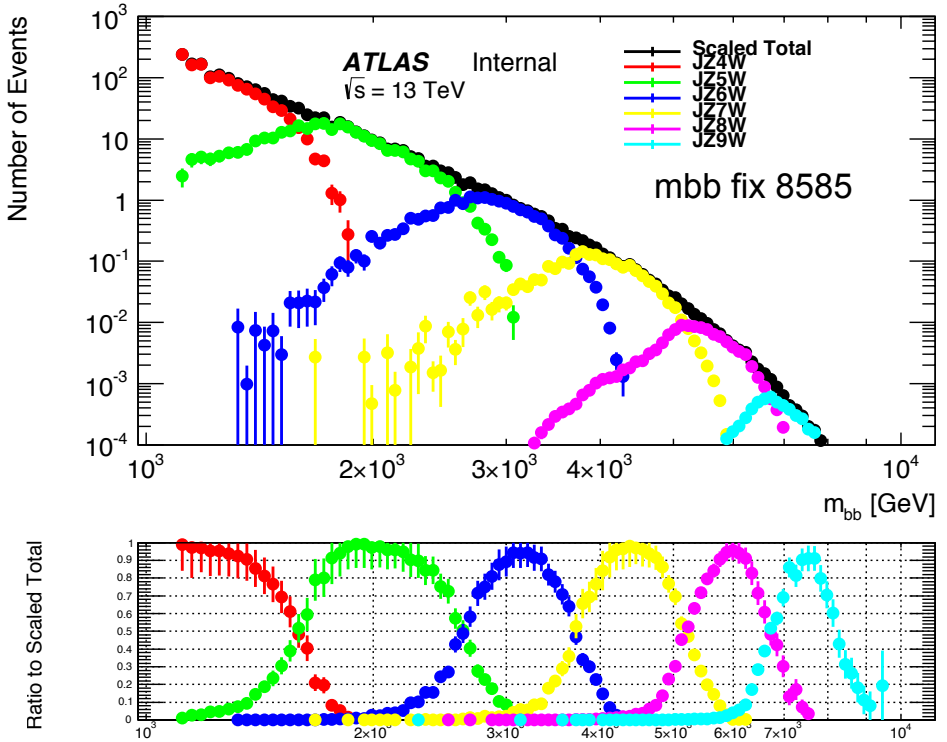
But still not quite perfect
- (See right)

11 Check JZ Slices to merged

Appears Features are in JZ Slices
- Problem not in merging

New MC
MC15a_20151104





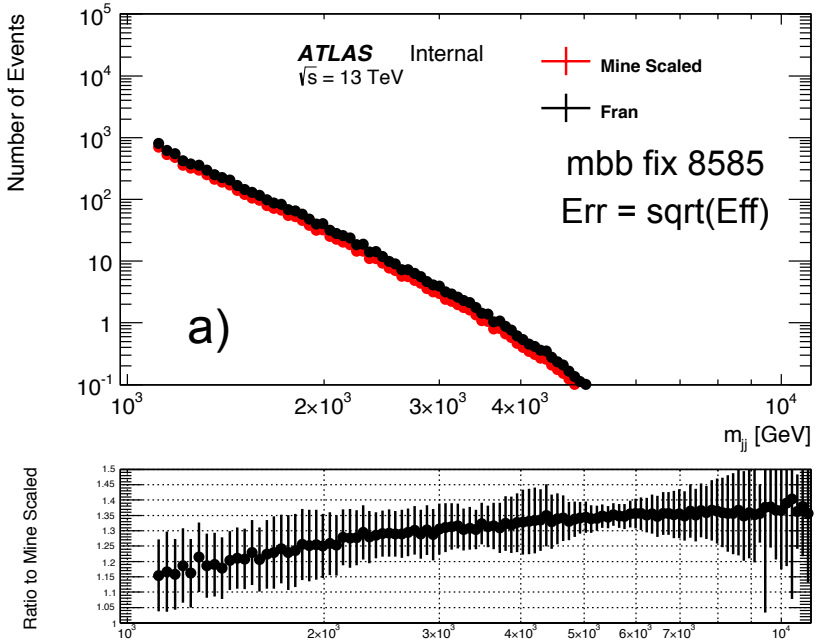
Old MC
MC15a_20151005

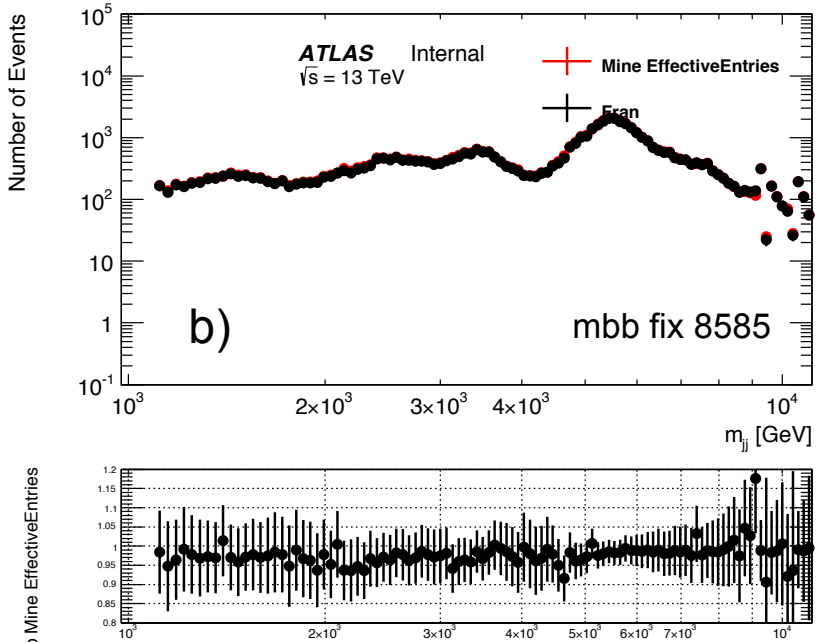
Comparison to Francesco mbb fix 8585

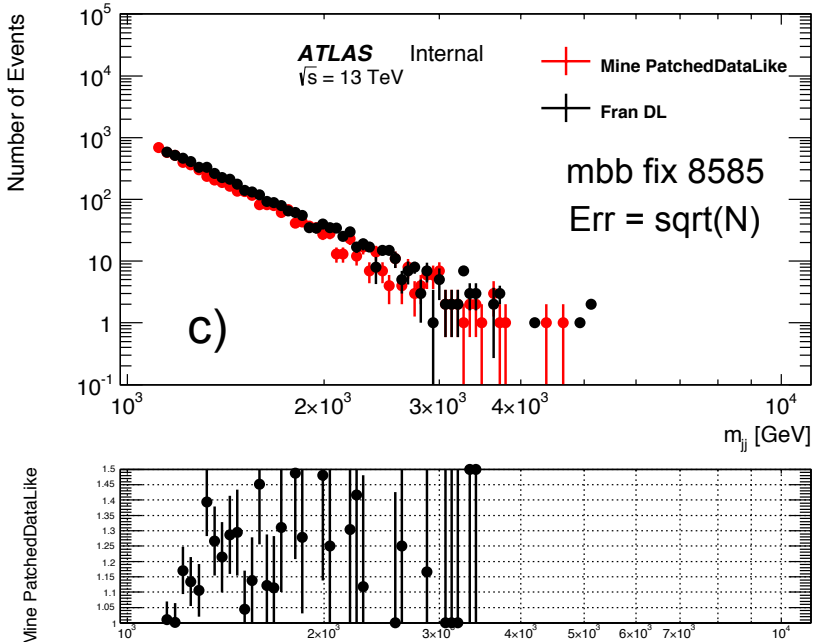
a) Scaled distributions
b) Effective entries
c) Patched Data Like

See similar structure as Francesco
- Also see some structure in eff entries

Patched don't match to well
- Different slope (3 para to 4 para fit?)
- One extra bin in mine (easy to check)





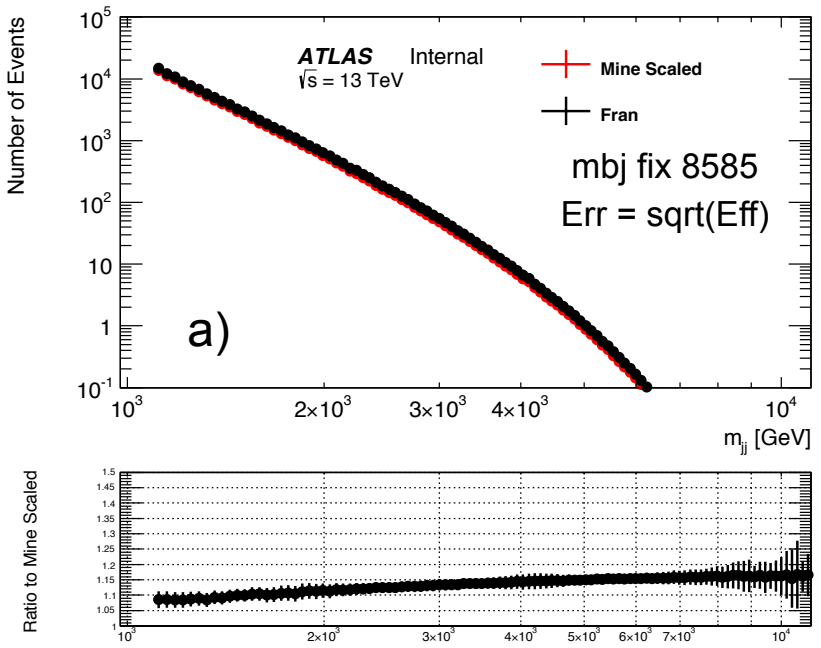


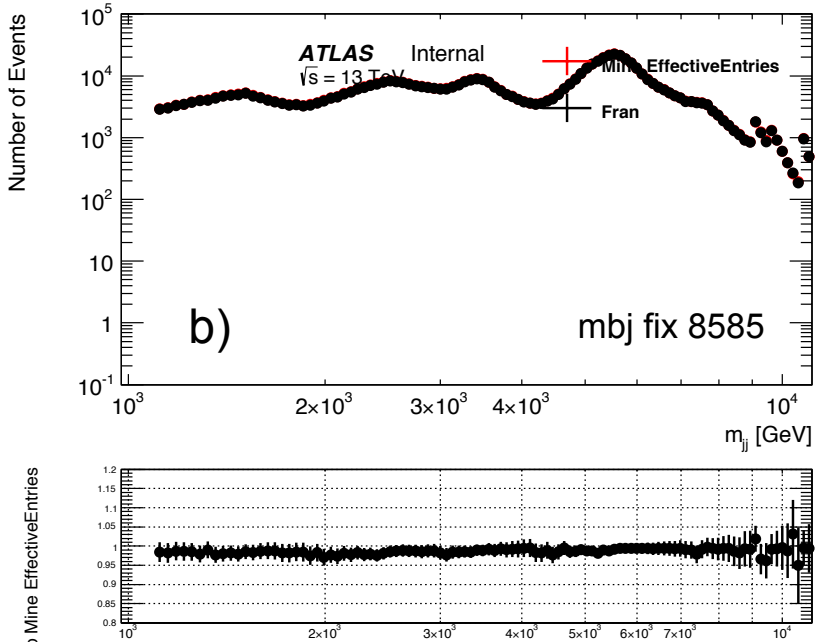
Comparison to Francesco mbj fix 8585

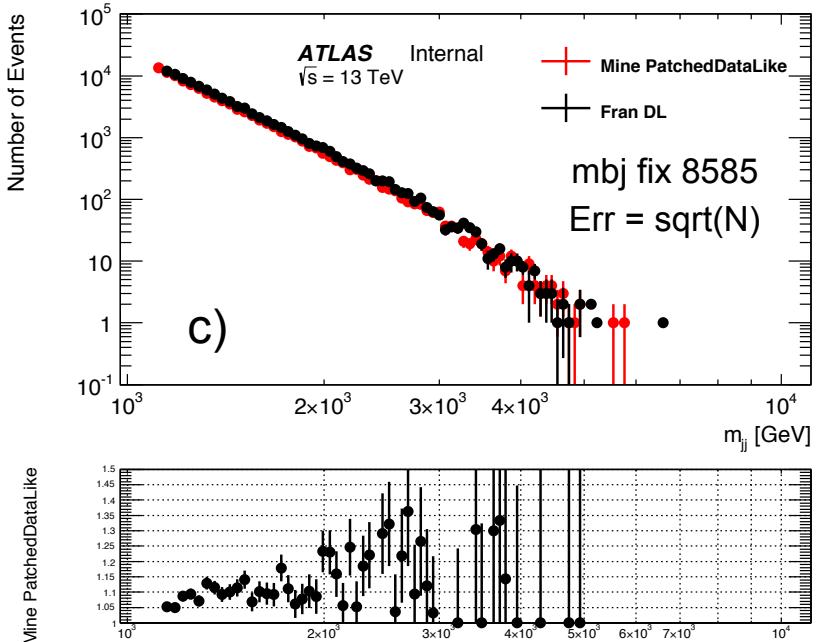
a) Scaled distributions
b) Effective entries
c) Patched Data Like

Both are smooth

Slight difference in two scaled distribution.
- Francesco has ~10% extra events.





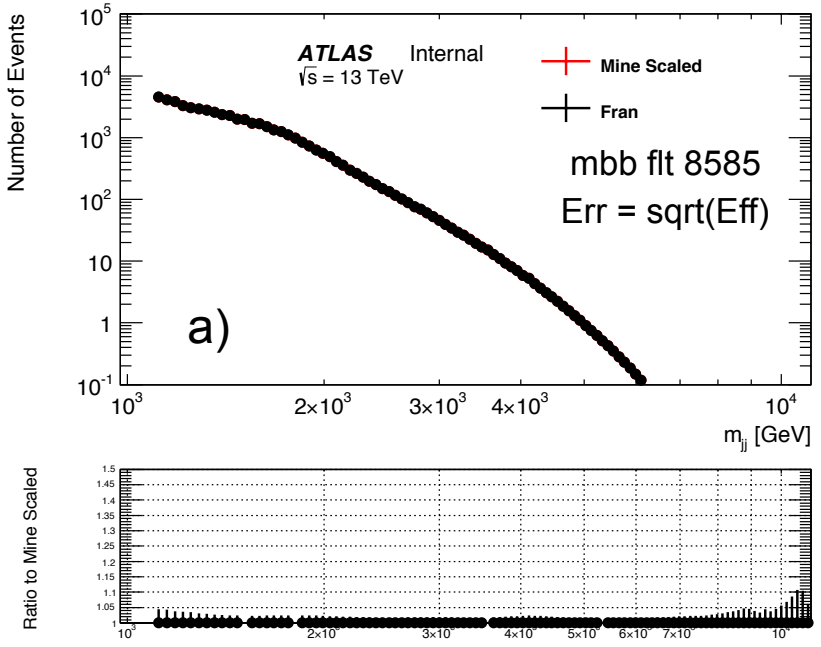


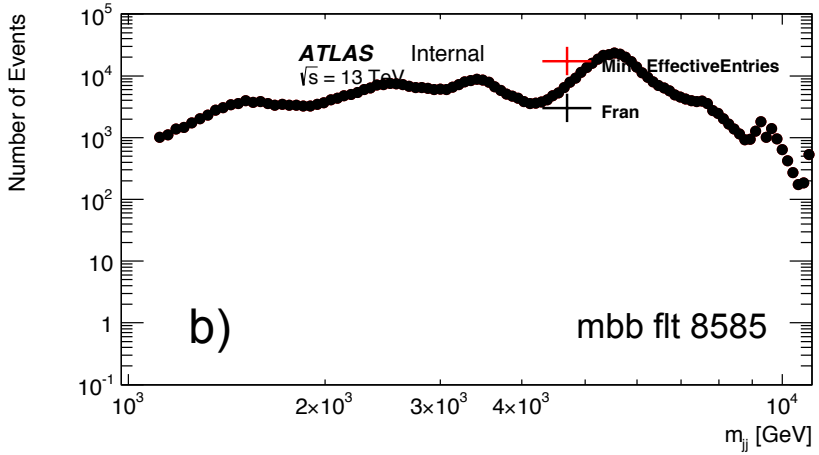
Comparison to Francesco mbb flt 8585

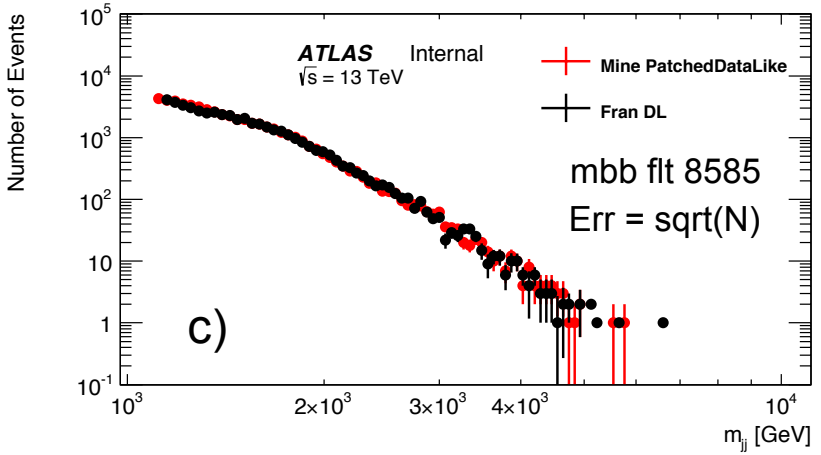
a) Scaled distributions
b) Effective entries
c) Patched Data Like

Identical plots!

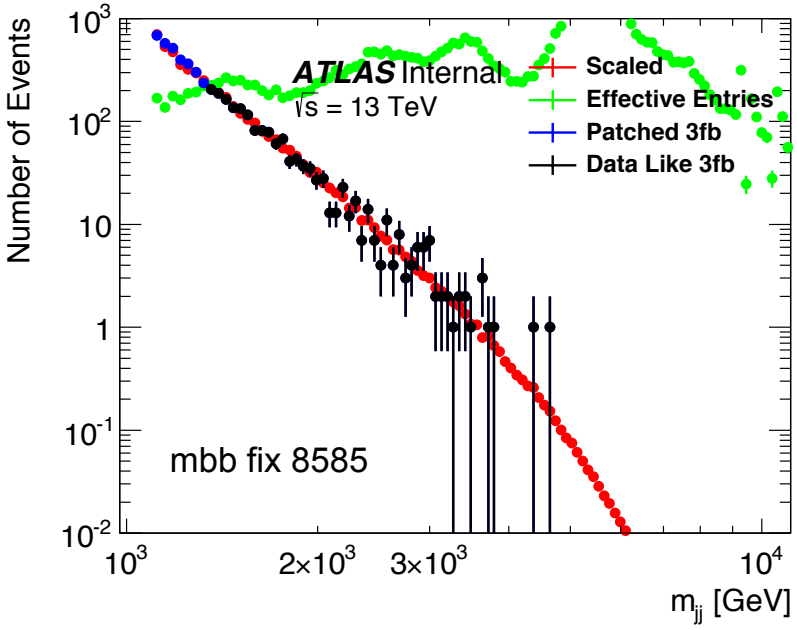
Broad peak @ 1.2-2.2 TeV
- seen by both of us

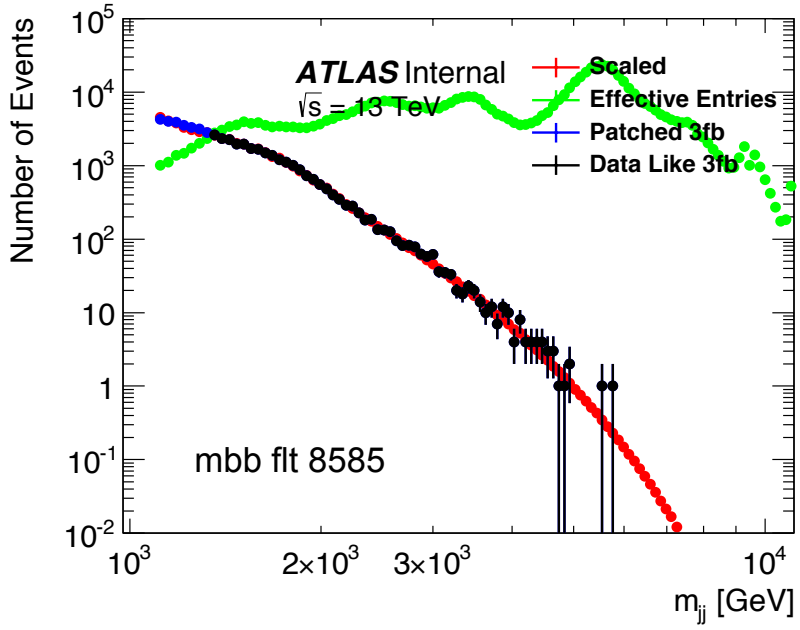


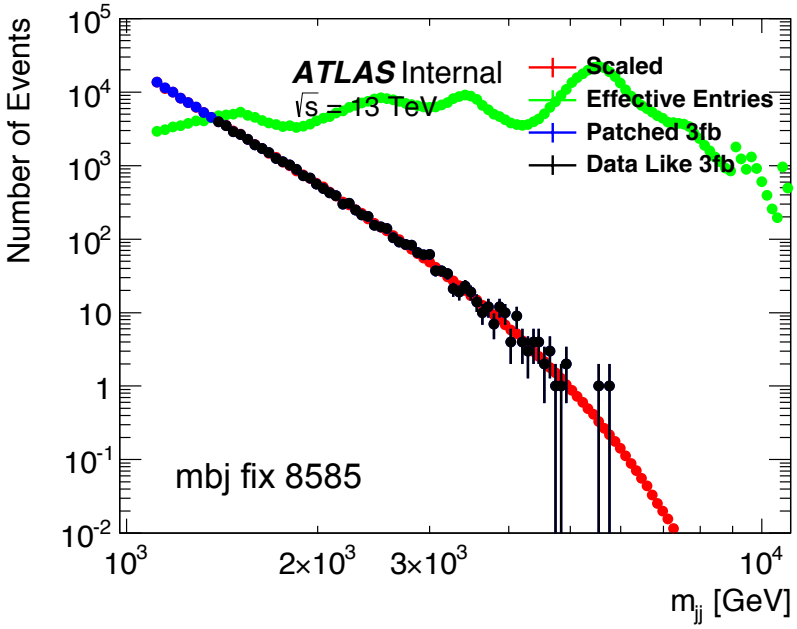


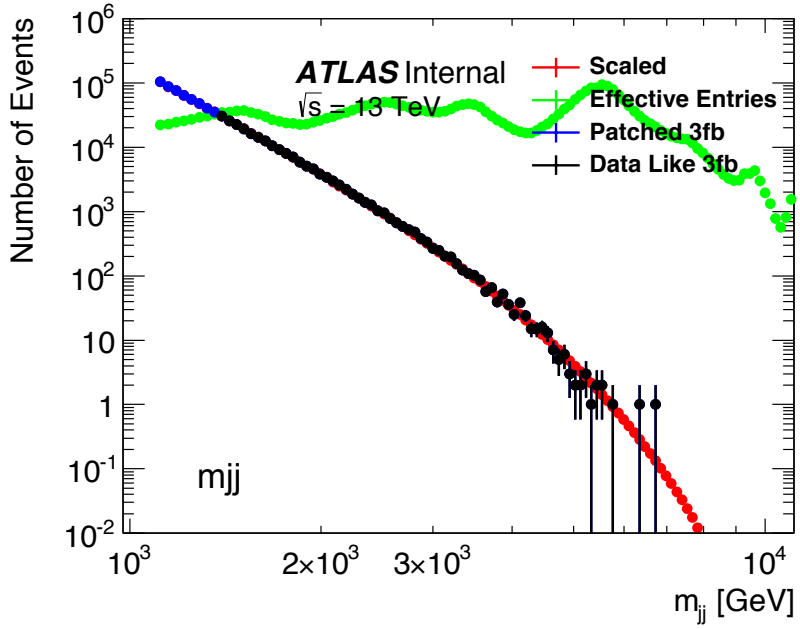


Look at mjj spectra



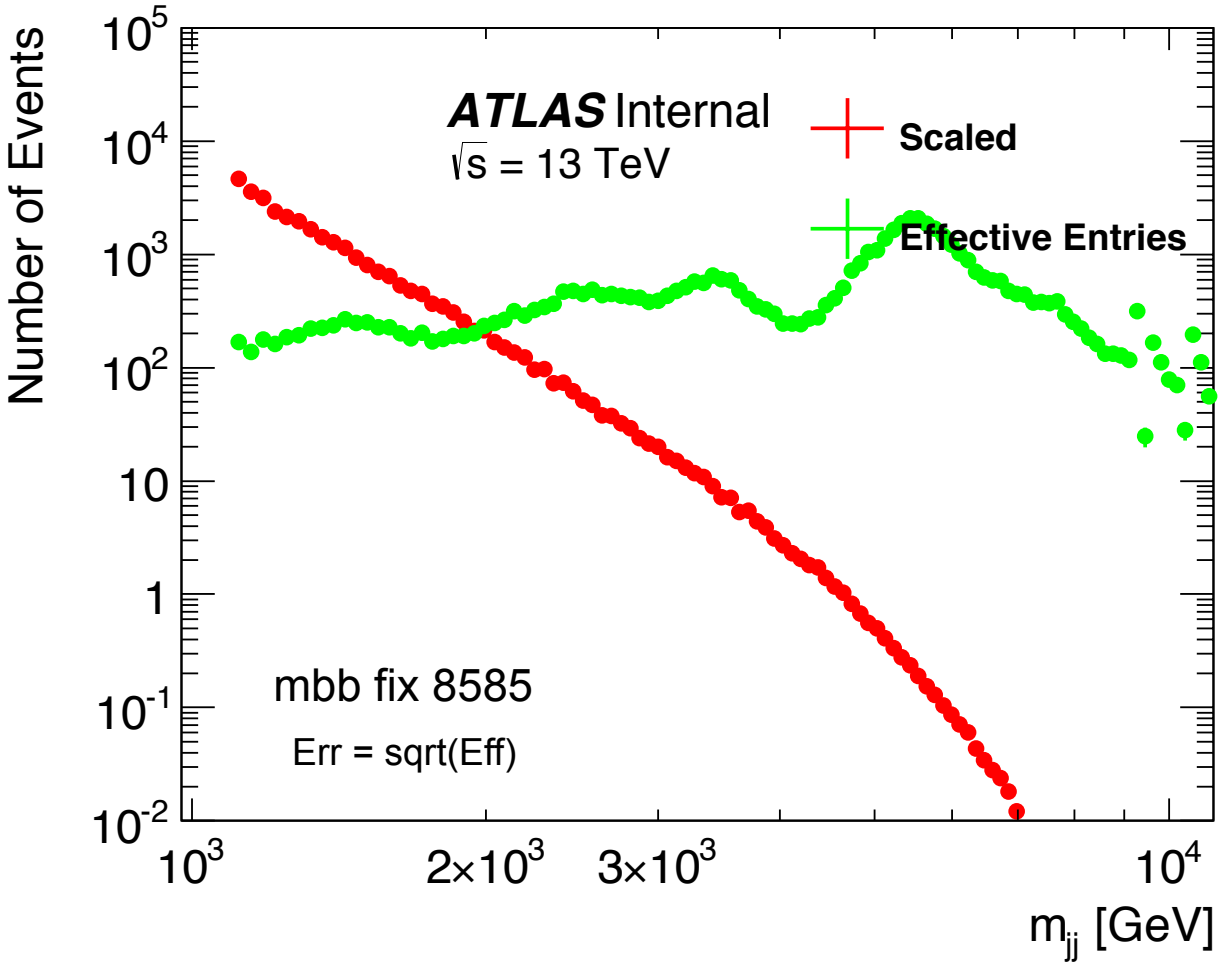






Within statistical fluctations - 1

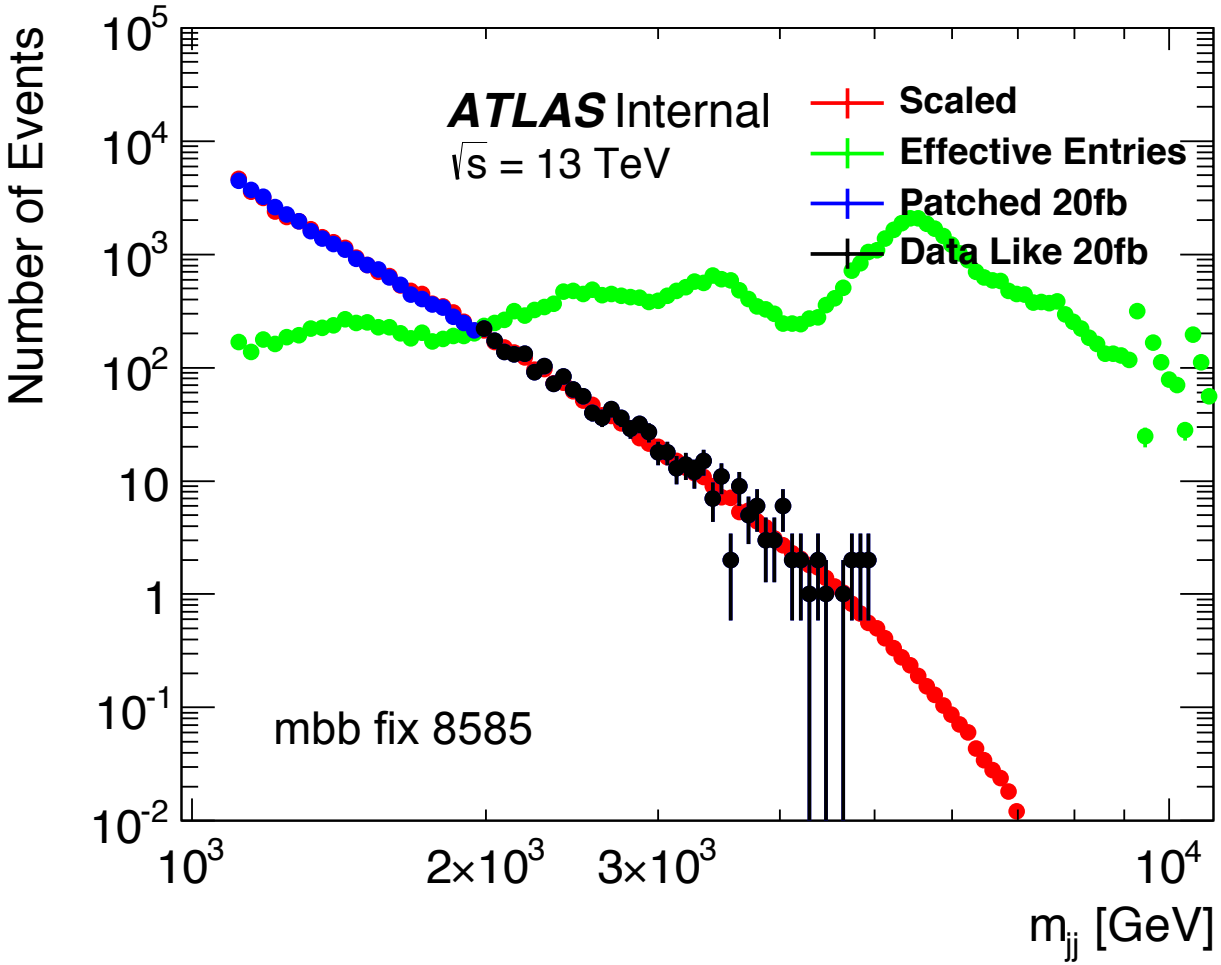
Are the fluctuations in the mbb spectrum within errors?



Within statistical fluctations - 2

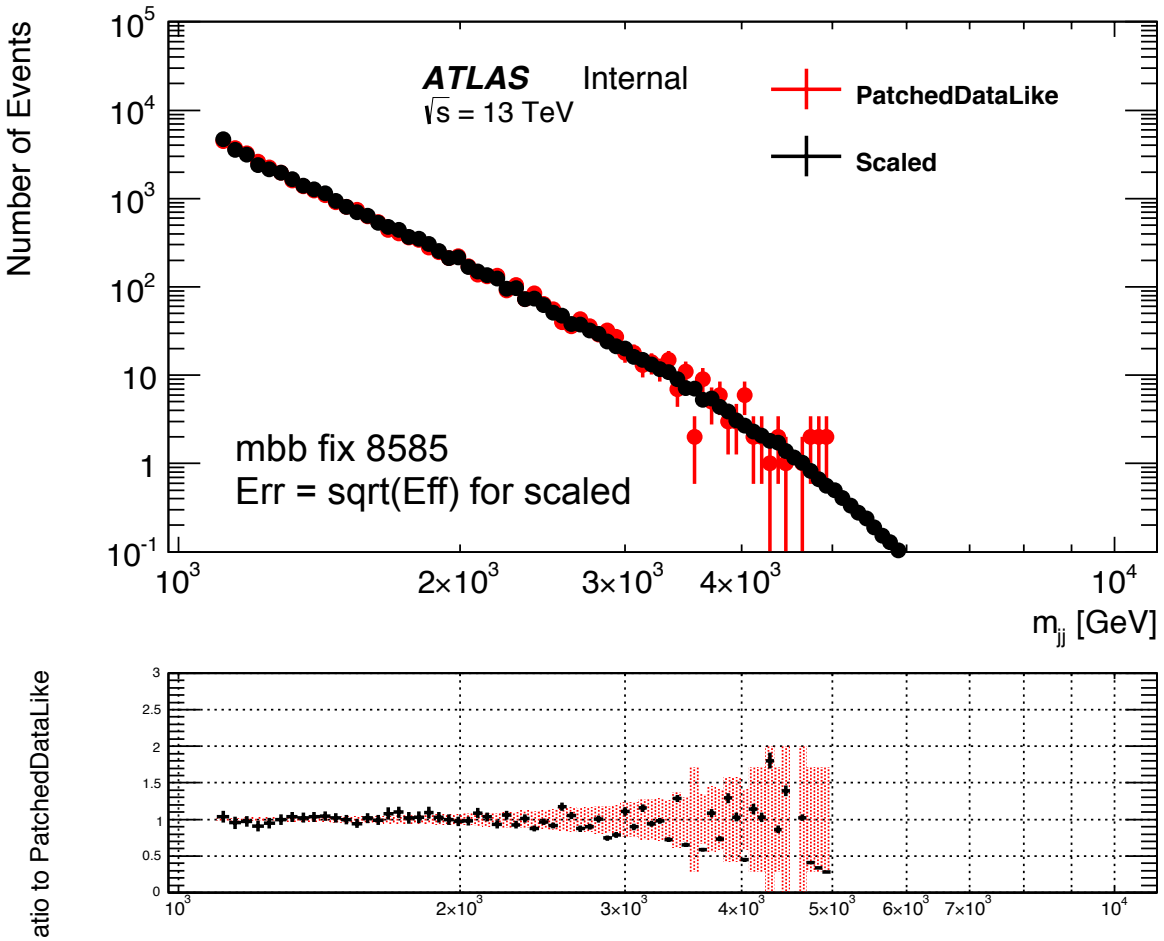
Are the fluctuations in the mbb spectrum within errors?

Try and use patched as a proxy to true position.



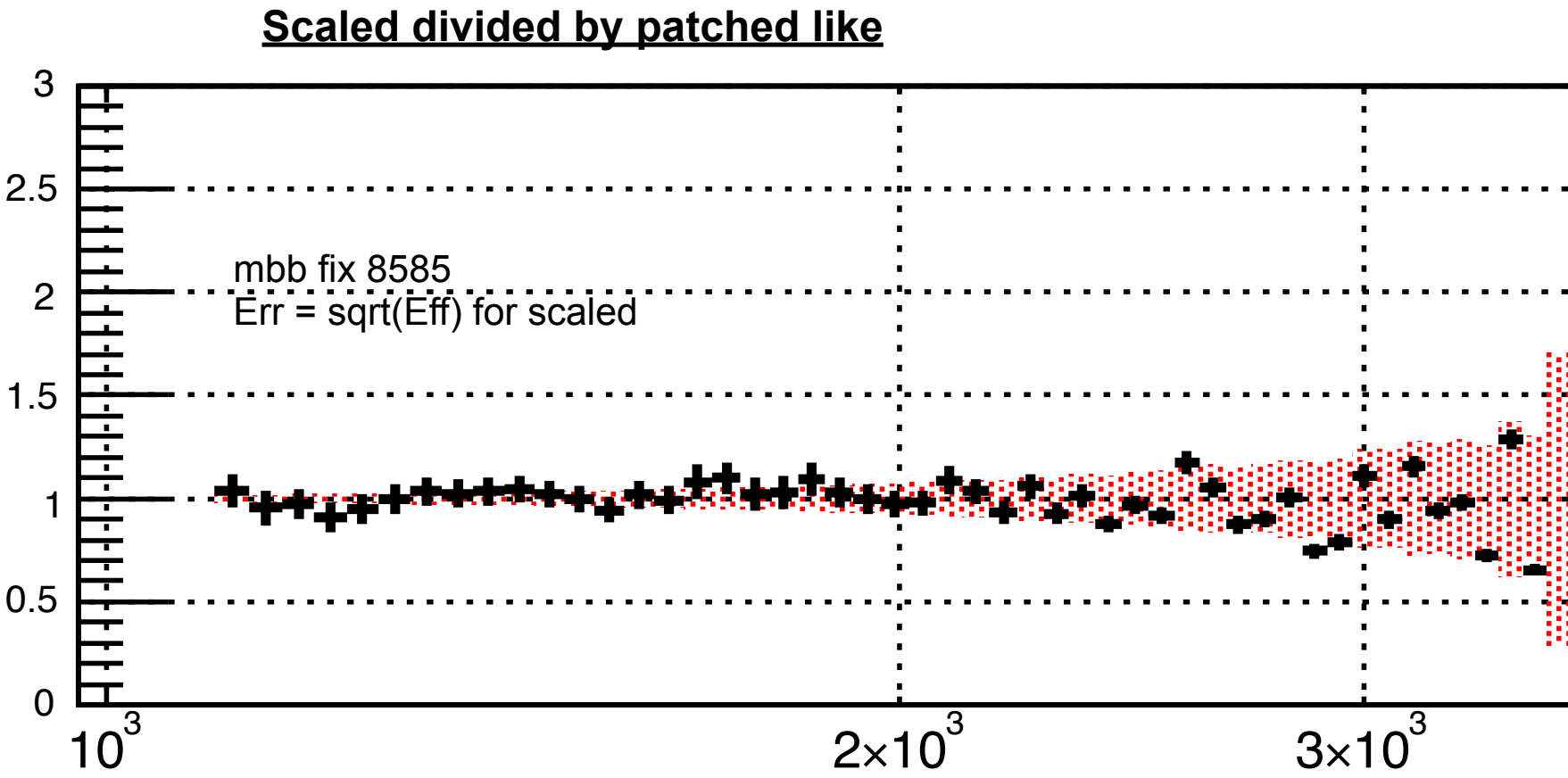
Within statistical fluctations - 3

Let's try!!
- Ratio plot at bottom shows scaled divided by patched data like
- Errors of the two are close to accounting for fluctuations
- To be clear these are not poisson like errors for scaled, instead sqrt(eff. entries)



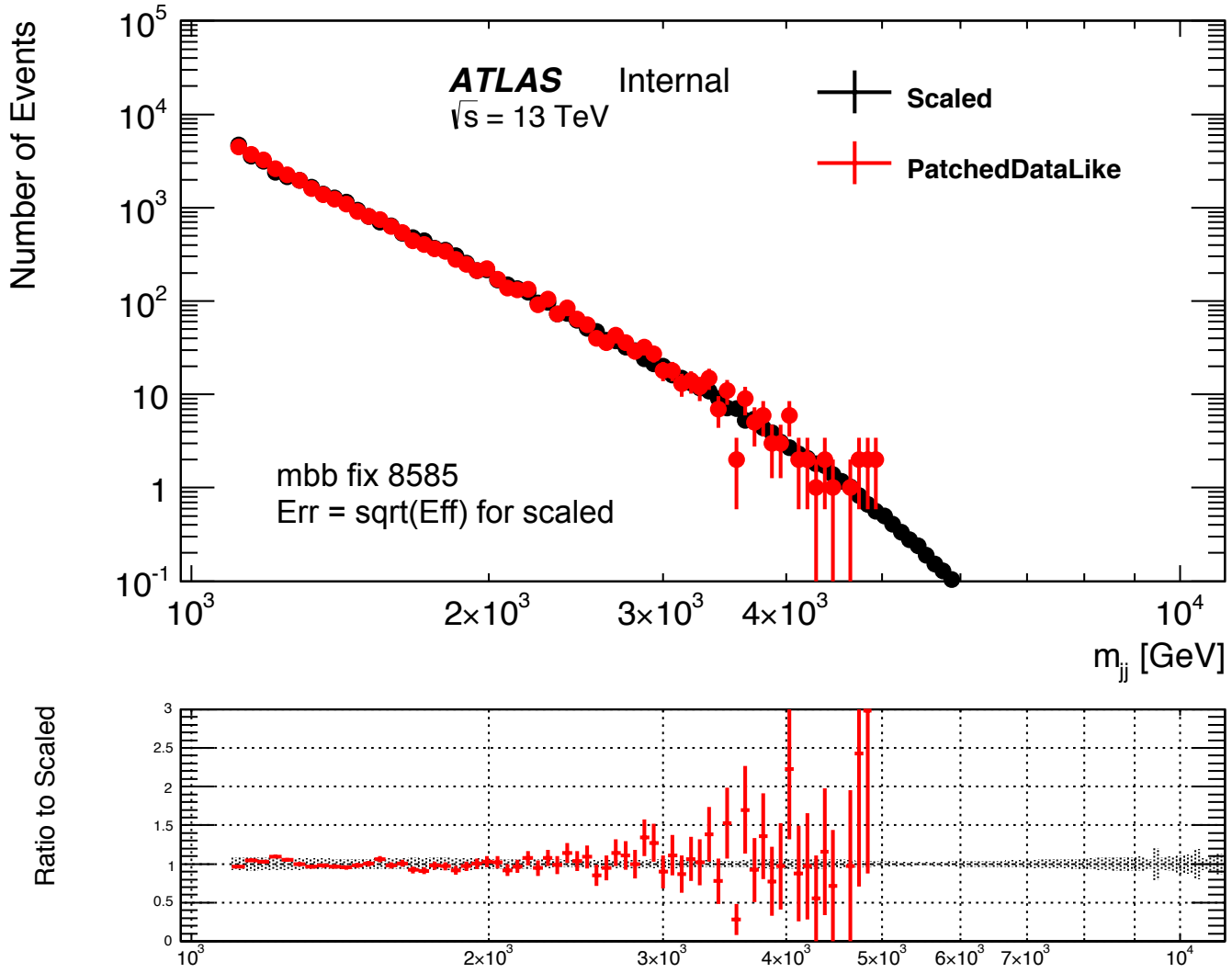
Within statistical fluctations - 4

Zoom in on ratio plot, errors are approximately size of fluctuations.
=> Here errors are relatively large as effective entries are less than scaled distribution



Within statistical fluctations - 5

Other way around, patched divided by scaled in ratio!



- I want to see errors on this, is it possible that these are just statistical fluctuations?
  - This is in the area where scaled > eff entries

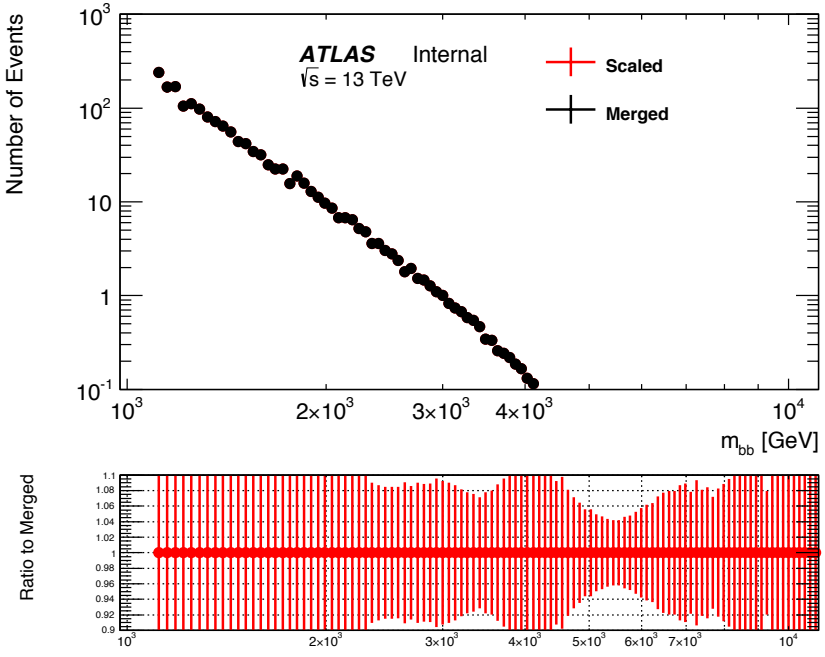
- Want to understand that bin in the scaled.
  - Check no events < 1100 GeV is the way of doing this.

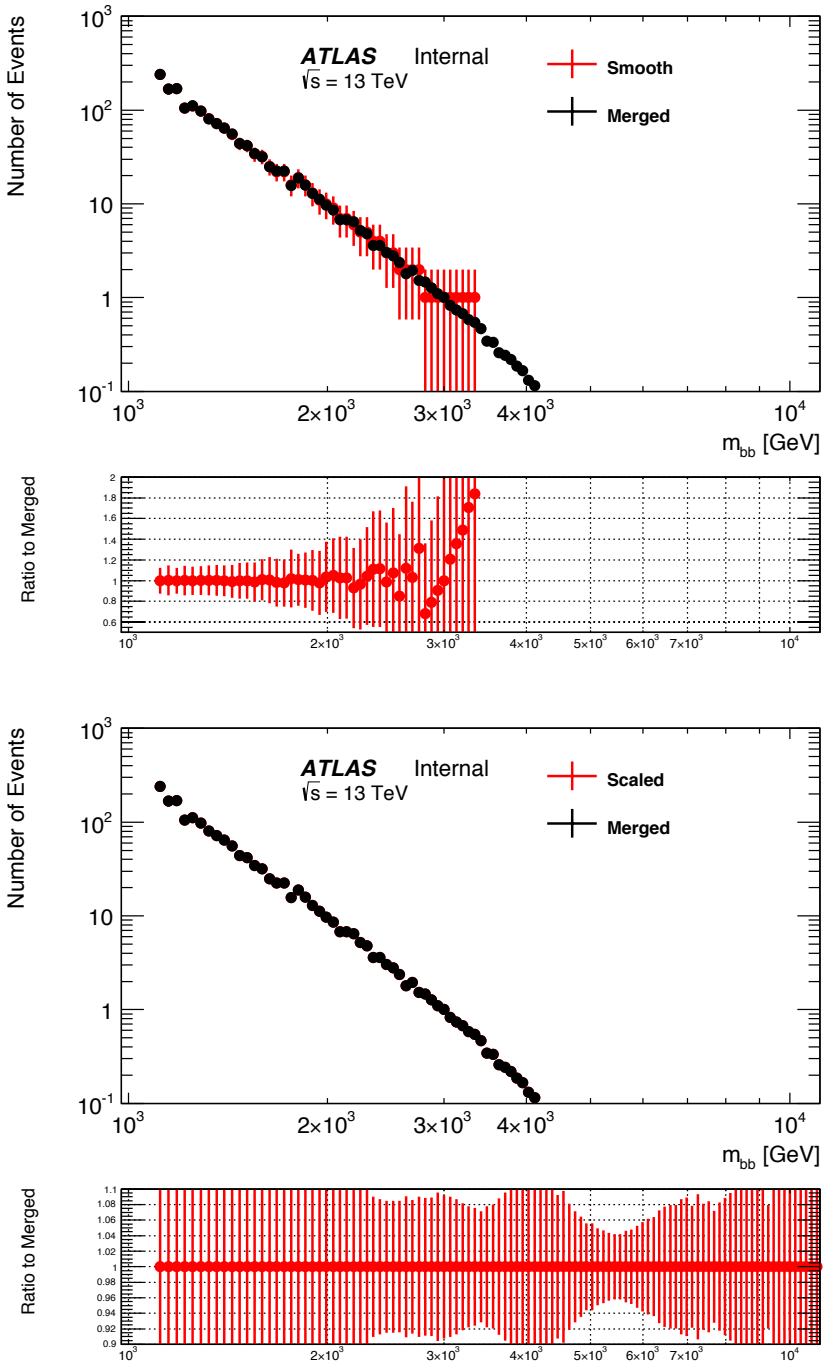
- Other suggestions welcome!

Data-Like Making Procedure?

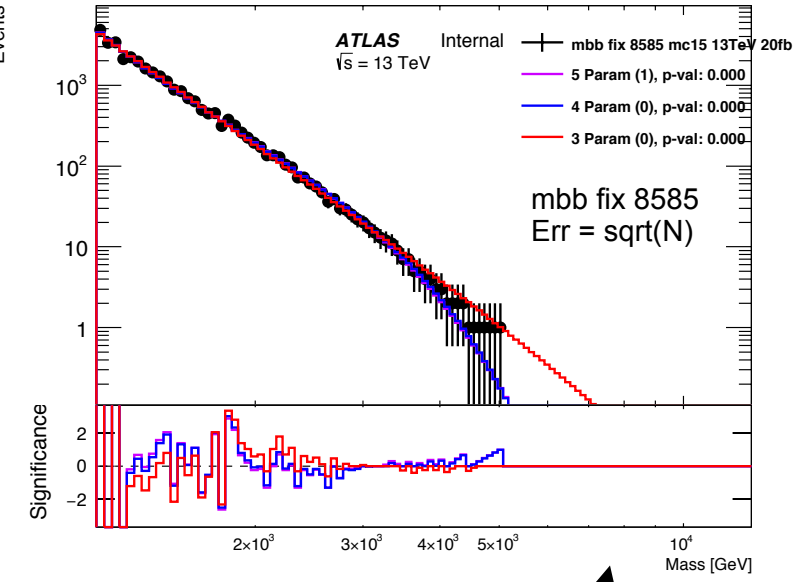
All different types of plots show same type of structure...

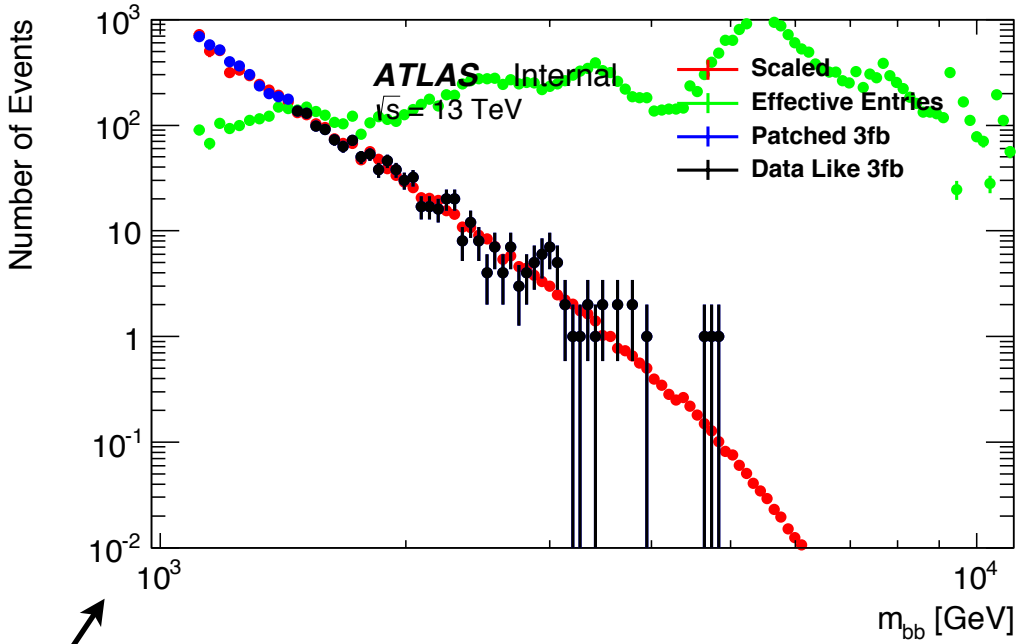
Not in dataLikeMaking process!



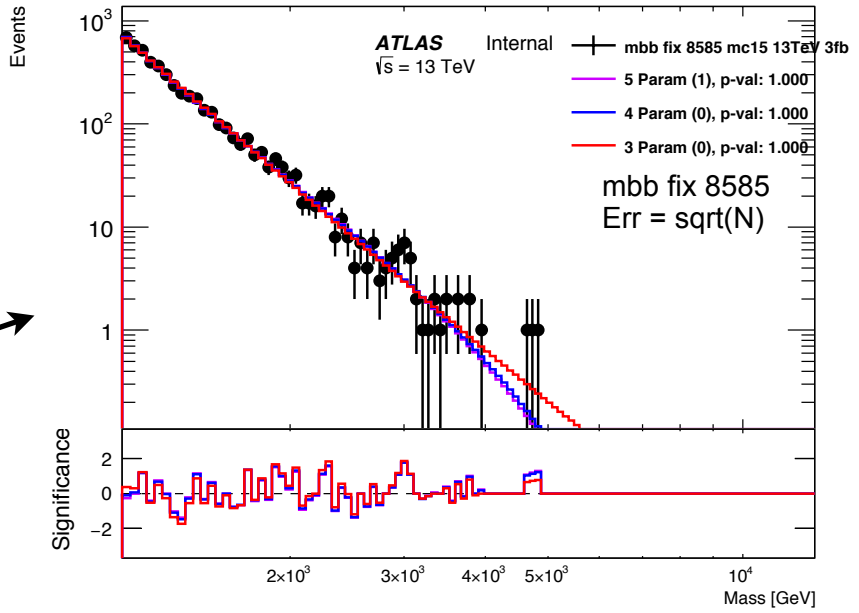


Patch Making





1) Fit to 20ifb Smooth

2) Create Patched Data-Like Plot

3) Fit to Patched Data-Like Spectrum