Unbinned fit
in Zy boosted analysis

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IHEP
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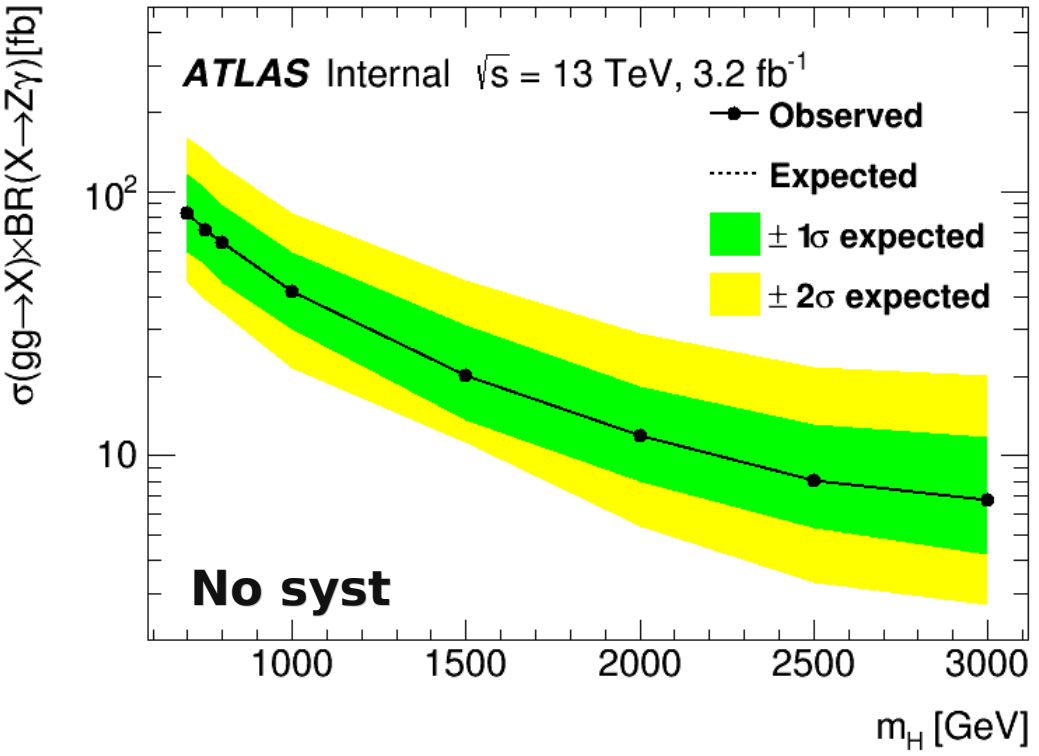
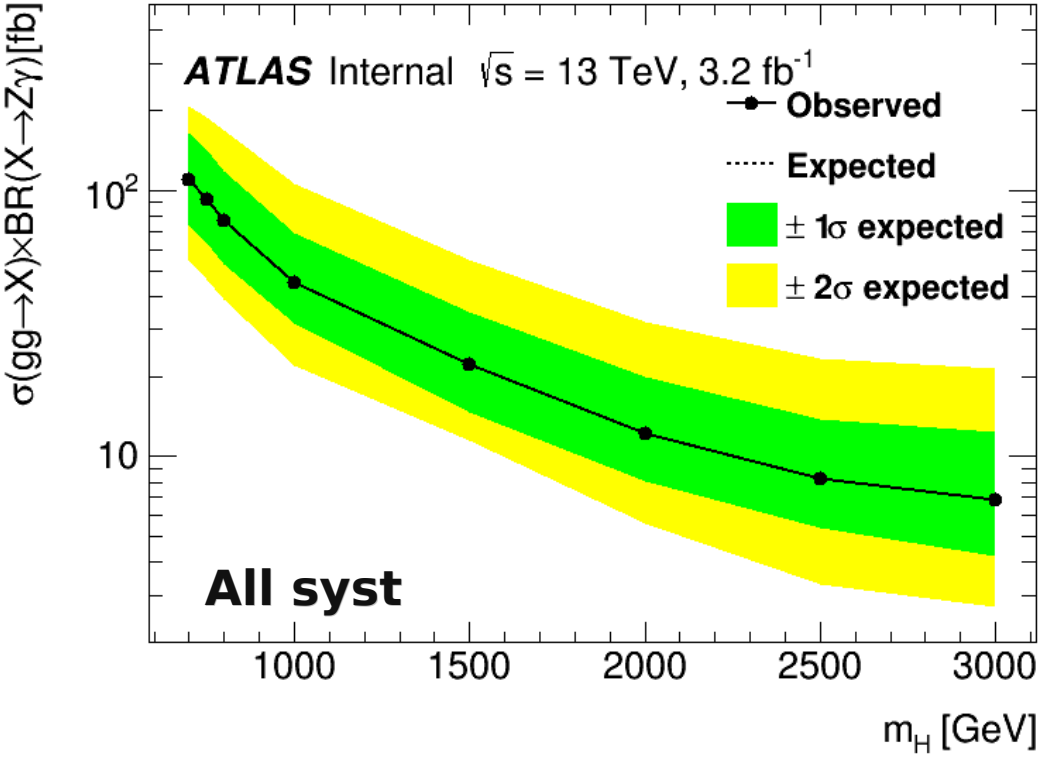
Upper limits (expectation only)

- Expected limits only from unbinned fit





Observed in these plots are set to expected

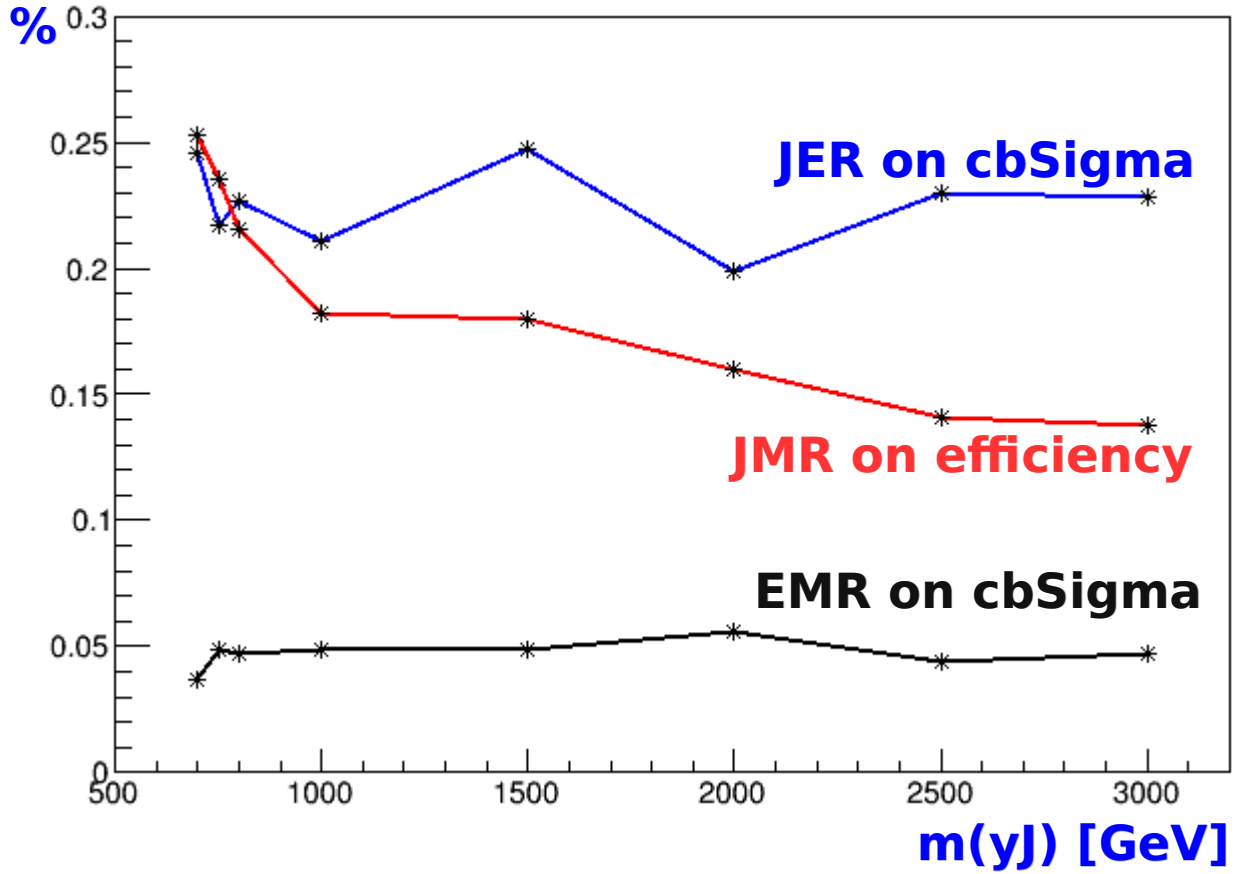
Add systematic uncertainties

- Based on signal template generation script from Zhijun, I added to signal modeling several systematic uncertainties
  - JER, affects cbSigma
  - EMR, affects cbSigma
  - EM, affects cbMu
  - JES, affects cbMu
  - JMR, affects signal efficiency

$$f(m(\gamma J)) = f_{CB}CB(m(\gamma J); \mu, \sigma_{CB}, \alpha_{CB}, N_{CB}) + (1 - f_{CB})Gauss(m(\gamma J); \mu, k\sigma_{CB})$$

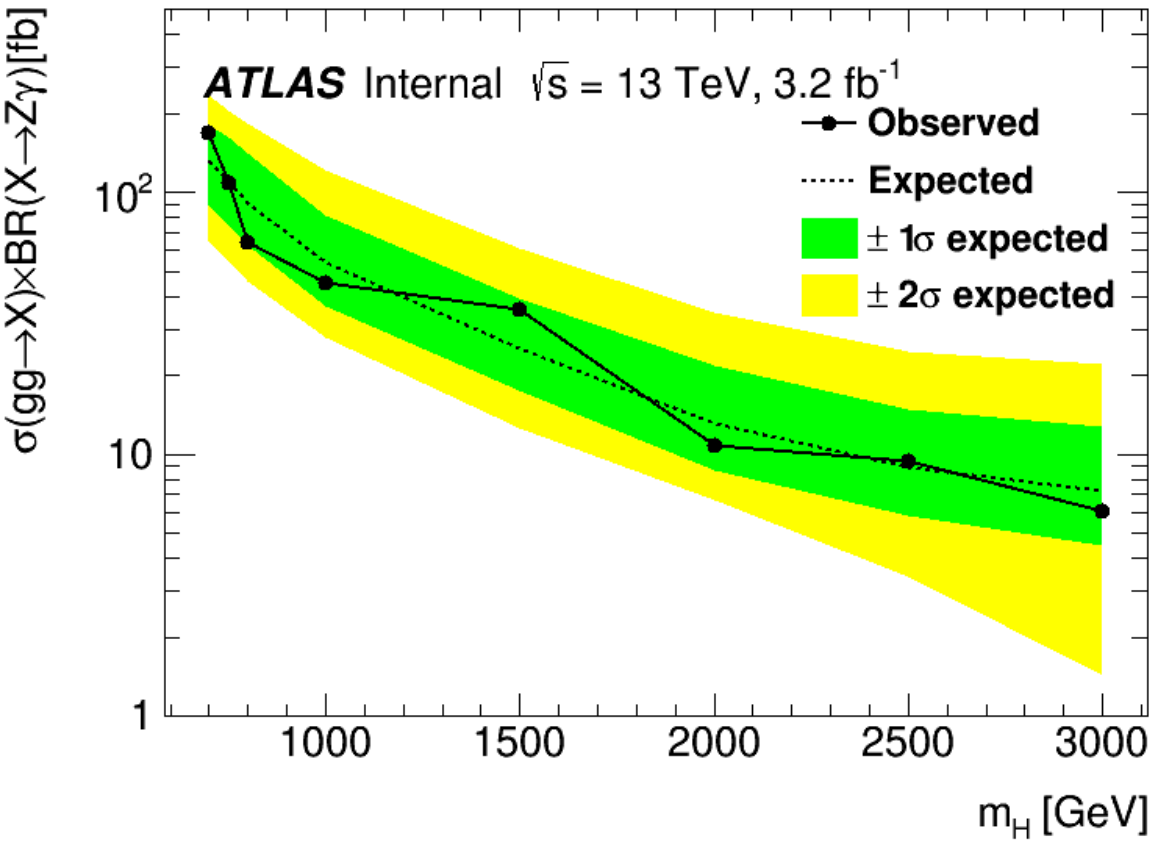
Uncertainty inputs

- The rate/resolution uncertainties due to major sources of systematics

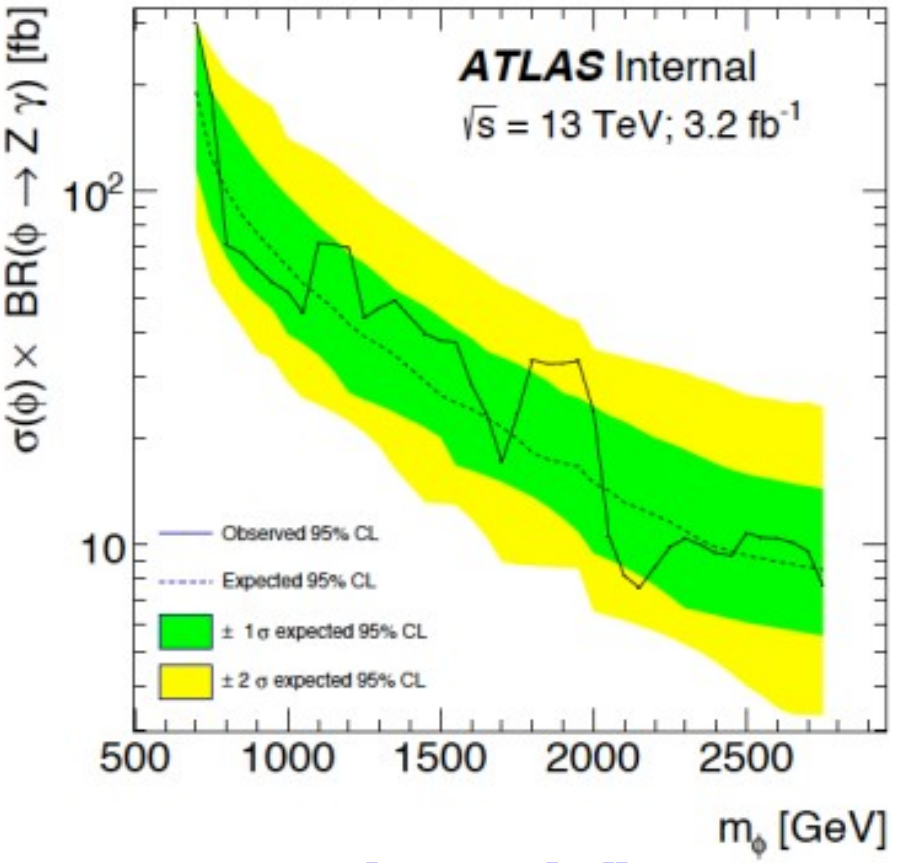


Upper limits (obs)

- Compared to binned fit



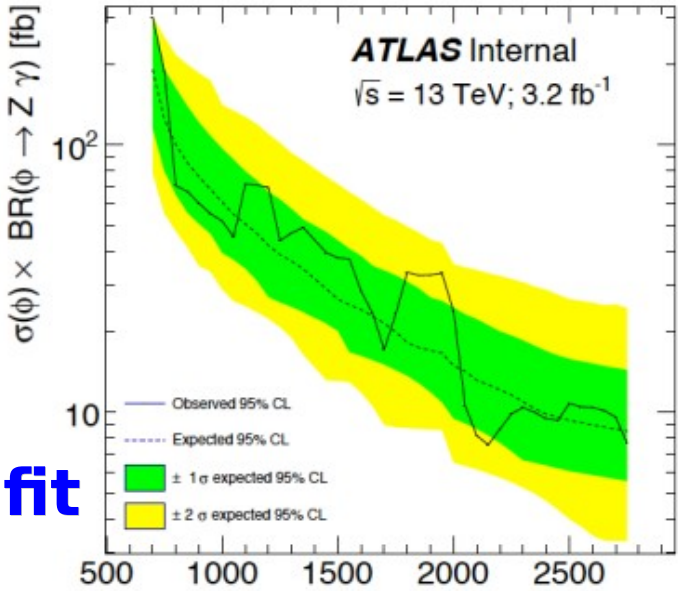
Unbinned fit



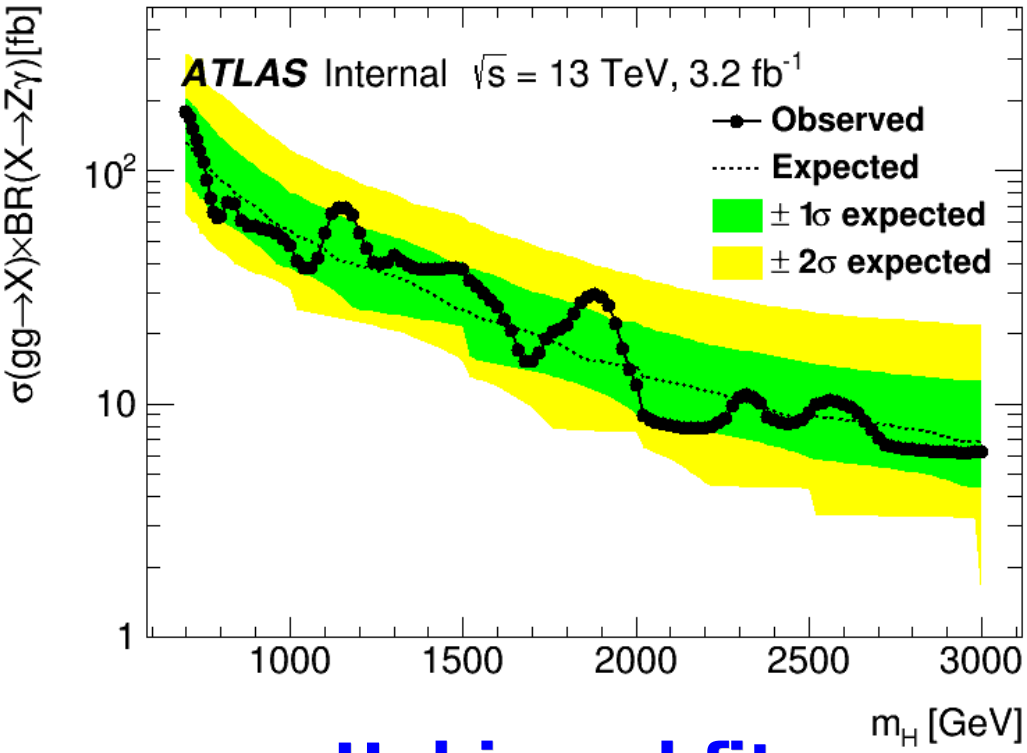
Binned fit

Finer steps

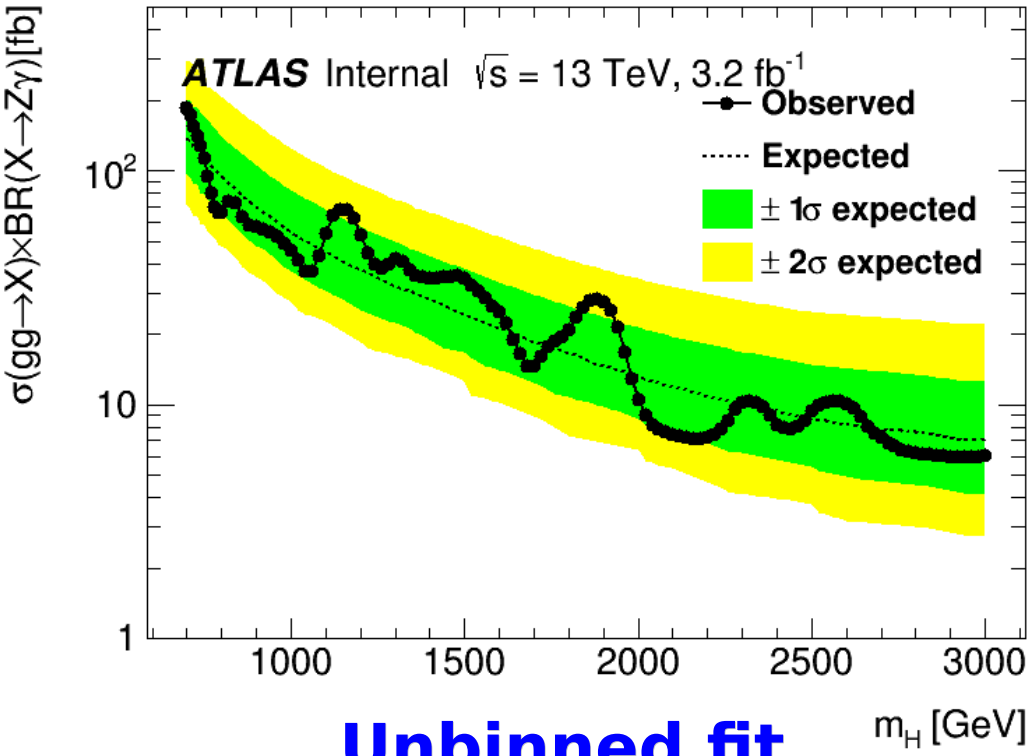
- 10-GeV step from 700 to 800
- 20-GeV step from 800 to 3000
- With an update in systematics



Binned fit



Unbinned fit



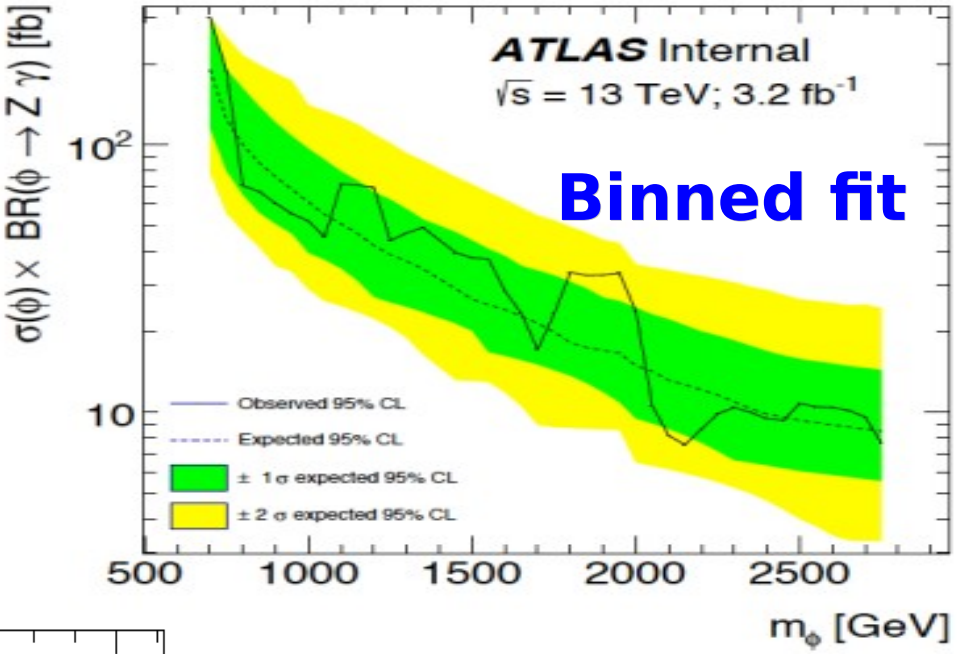
Unbinned fit

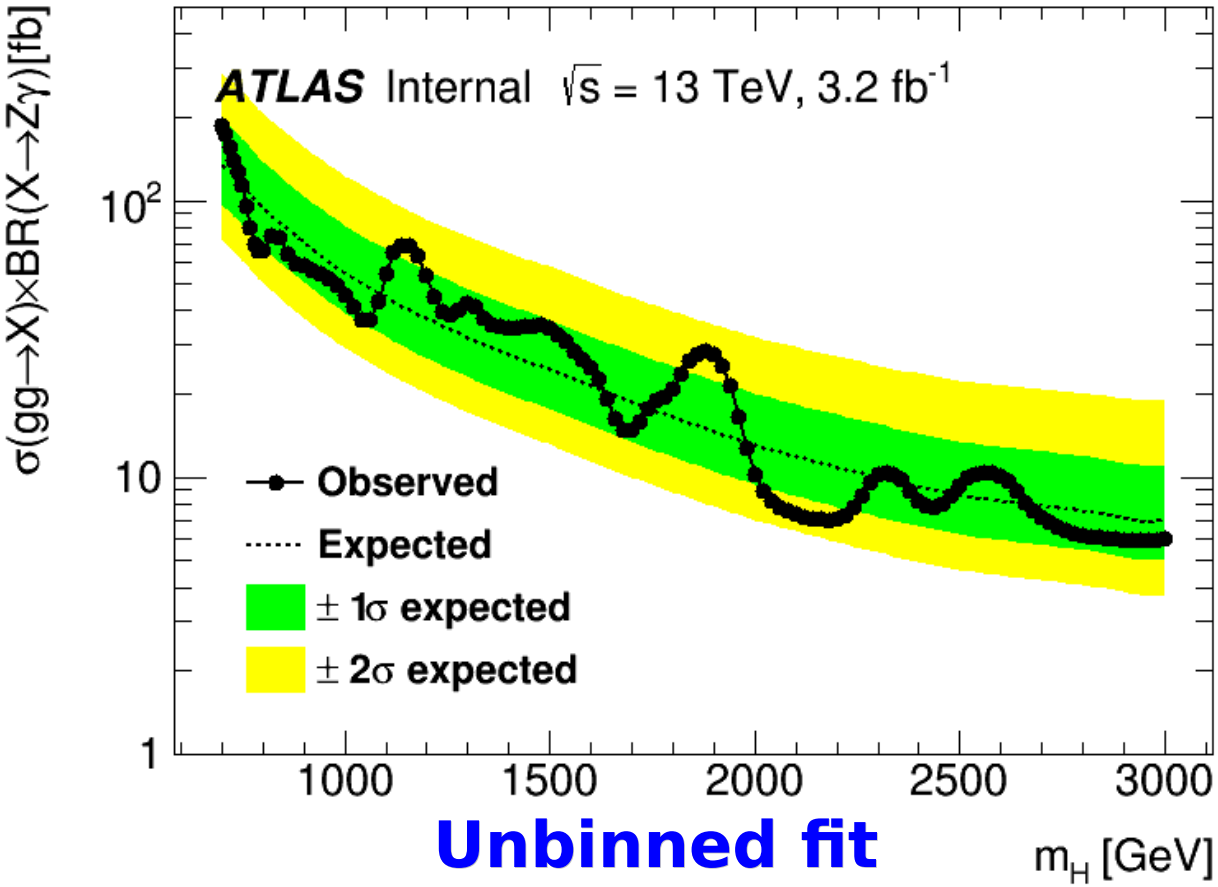
Updated with more syst

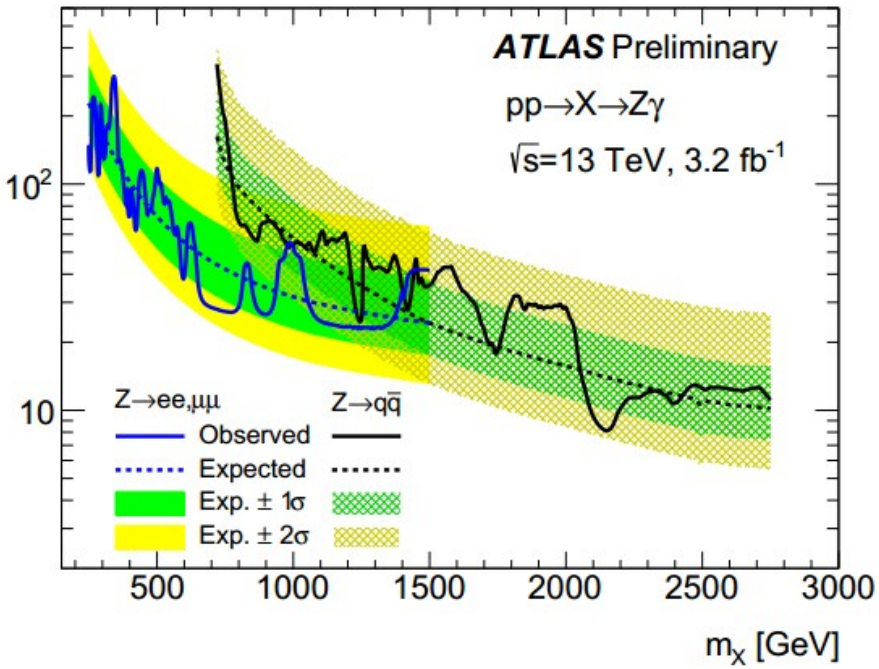
Finer scanning grid along mu

Updated limits

- Independent on scanning density or range, using Aaron's iterative algorithm to get upper limits







Leptonic: unbinined
Boosted: binned fit

Updated systematic uncertainties

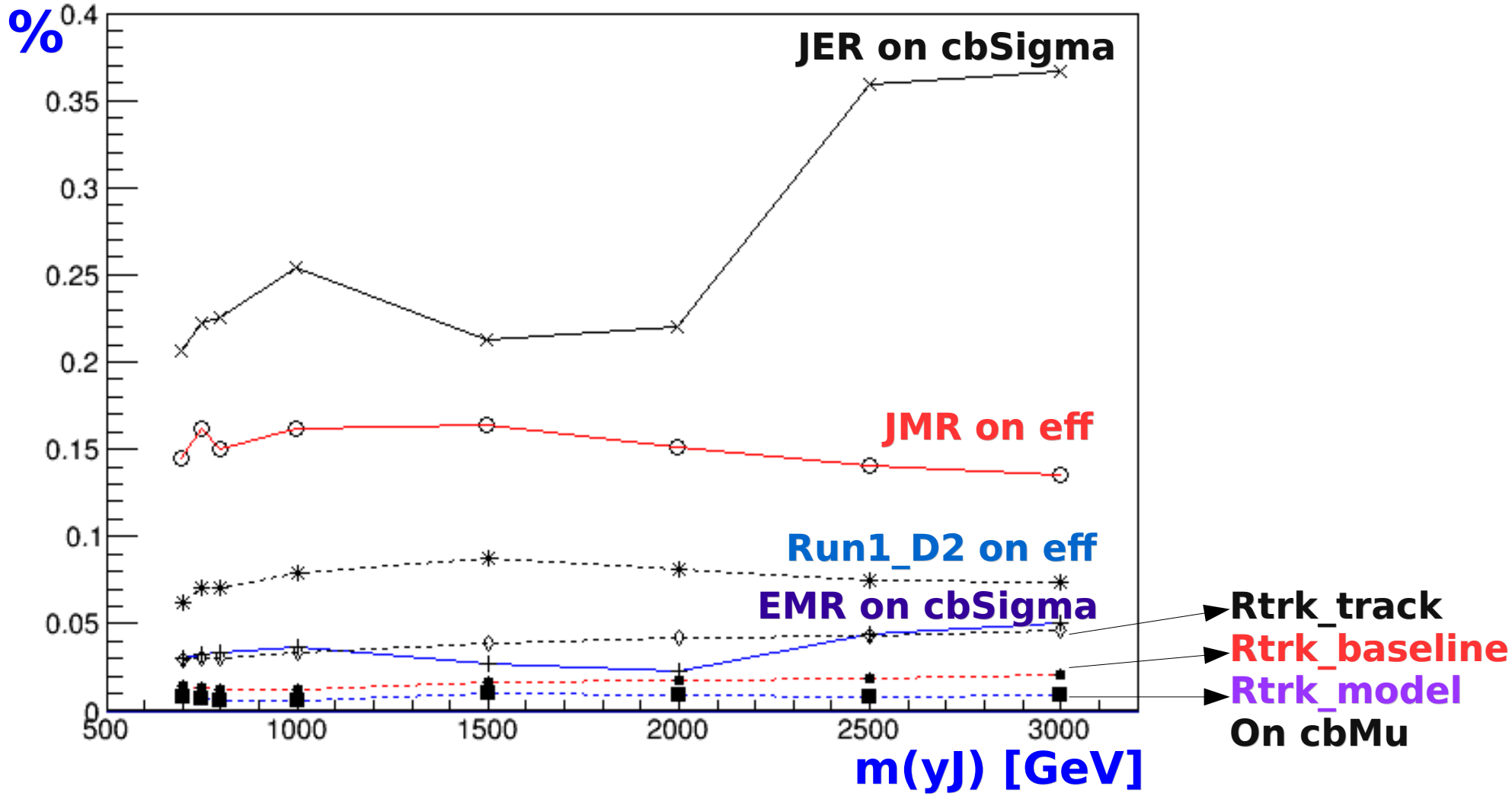
- Based on a new signal template generation script from Zhijun, I updated to signal modeling several systematic uncertainties
  - // dJER affects: cbSigma
  - // dEMR affects: cbSigma
  - // dEM affects cbMu
  - // dJES affects cbMu [deleted]
  - // dRtrk_baseline affects cbMu // newly added
  - // dRtrk_model affects cbMu // newly added
  - // dRtrk_track affects cbMu // newly added
  - // dJMR affects Acc
  - // dRun1_D2 affects Acc // newly added

Signal model

$$f(m(\gamma J)) = f_{CB}CB(m(\gamma J);\mu,\sigma_{CB},\alpha_{CB},N_{CB}) + (1-f_{CB})Gauss(m(\gamma J);\mu,k\sigma_{CB})$$

Updated uncertainty inputs

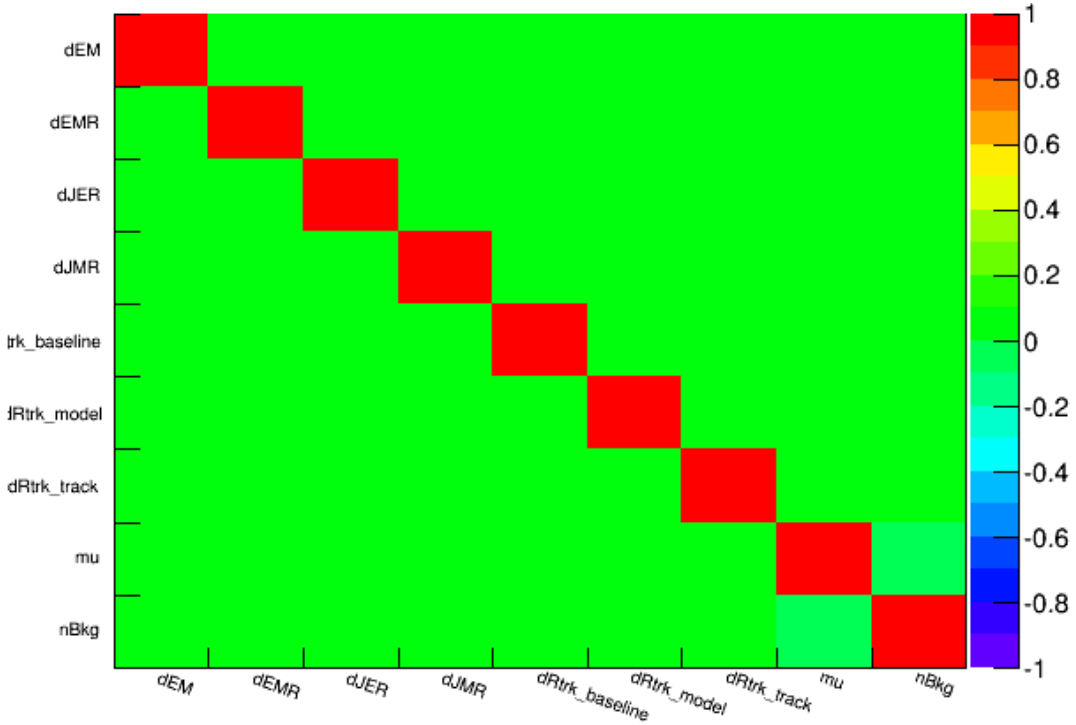
- The updated rate/resolution uncertainties due to major sources of systematics



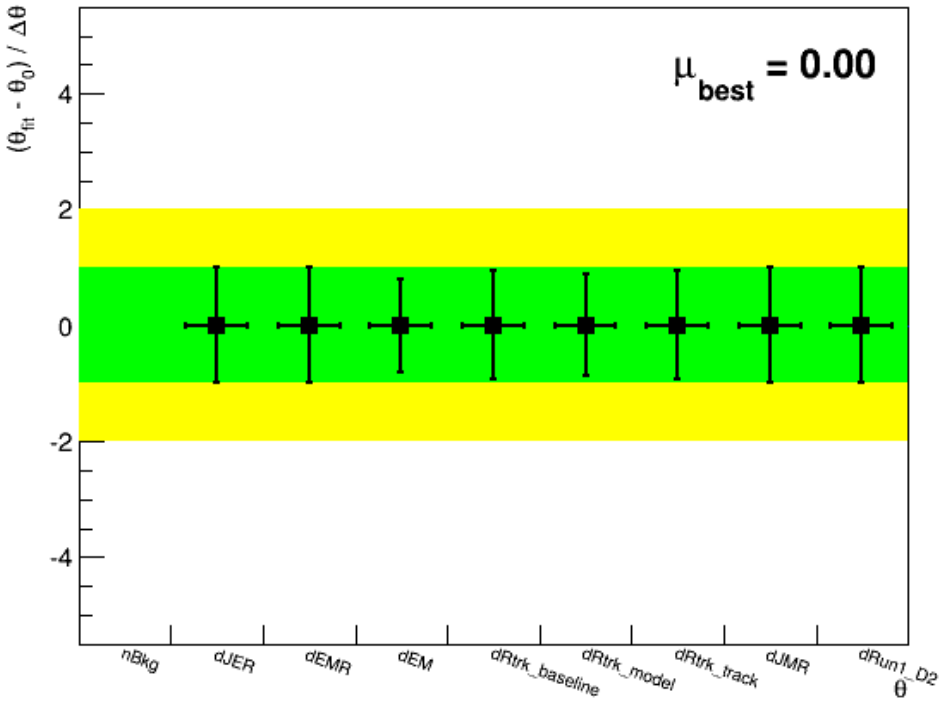
Checks on nuis [pseudodata]

- Check correlation & pull
- Plots are made with 750GeV and pseudodata

Floating Parameter	InitialValue	FinalValue +/- Error
dEM	0.0000e+00	2.3733e-04 +/- 7.99e-01
dEMR	0.0000e+00	6.9817e-09 +/- 9.93e-01
dJER	0.0000e+00	4.8449e-08 +/- 9.93e-01
dJMR	0.0000e+00	-6.4316e-08 +/- 9.93e-01
dRtrk_baseline	0.0000e+00	8.6017e-05 +/- 9.38e-01
dRtrk_model	0.0000e+00	1.6300e-04 +/- 8.77e-01
dRtrk_track	0.0000e+00	8.8806e-05 +/- 9.36e-01
mu	0.0000e+00	7.2873e-06 +/- 4.33e+02
nBkg	4.2570e+02	4.2570e+02 +/- 2.06e+01



No large correlations

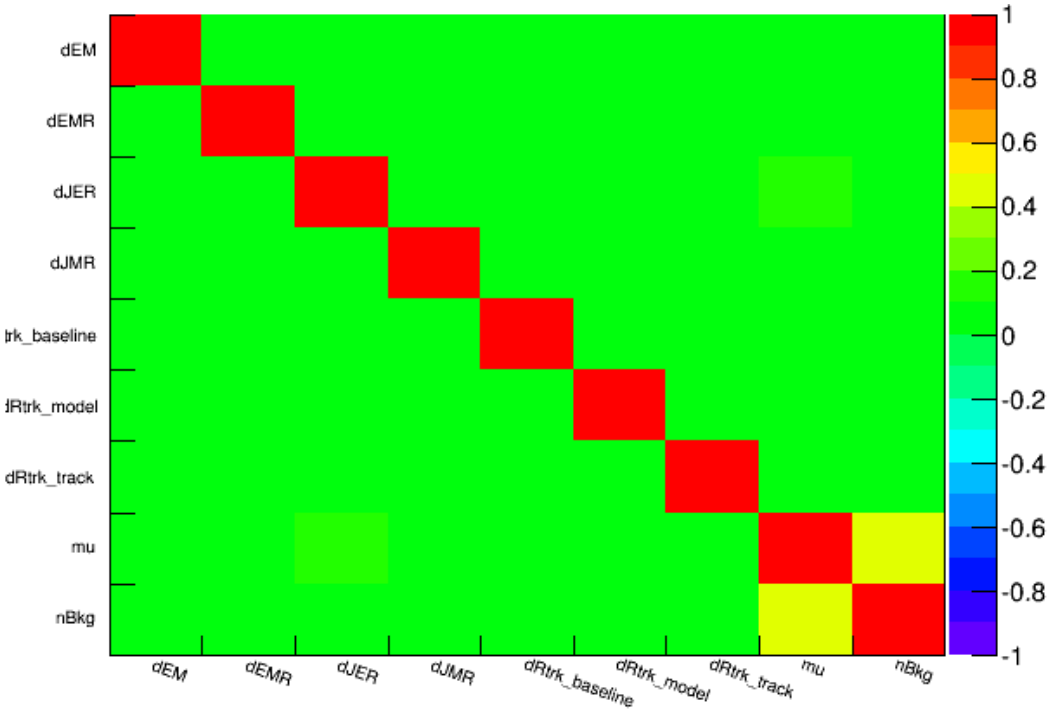


No pull seems strange

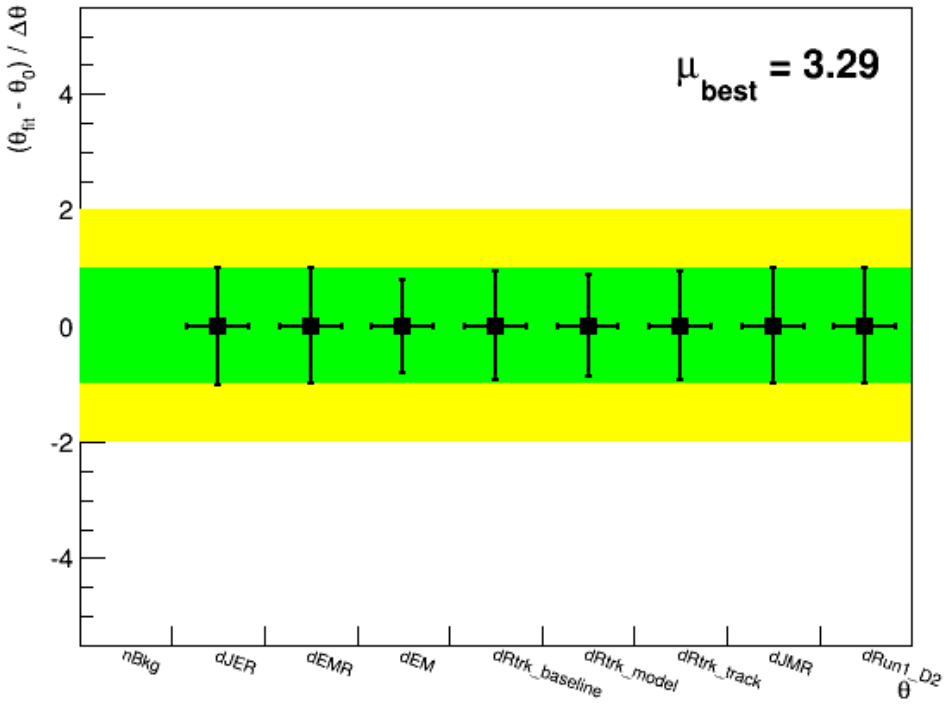
Checks on nuis [obsdata]

- Check correlation & pull
- Plots are made with 750GeV and obsdata

Floating Parameter	InitialValue	FinalValue +/- Error
dEM	0.0000e+00	6.0090e-04 +/- 7.99e-01
dEMR	0.0000e+00	-1.6193e-03 +/- 9.94e-01
dJER	0.0000e+00	-1.1247e-02 +/- 1.01e+00
dJMR	0.0000e+00	-2.5393e-04 +/- 9.93e-01
dRtrk_baseline	0.0000e+00	1.8012e-04 +/- 9.38e-01
dRtrk_model	0.0000e+00	3.8175e-04 +/- 8.77e-01
dRtrk_track	0.0000e+00	1.6012e-04 +/- 9.36e-01
mu	0.0000e+00	3.2914e+00 +/- 3.54e+02
nBkg	4.2570e+02	6.1512e+02 +/- 2.83e+01



No large correlations



No pull seems strange