

Weekly Meeting

Qi Li

Monday, July 25, 2016

Introduction

- Ran over $3.212 \text{ fb}^{-1} + 10.06 \text{ fb}^{-1}$ data.
- XS, Br and theoretical uncertainties are obtained from [CERN Report 4](#).

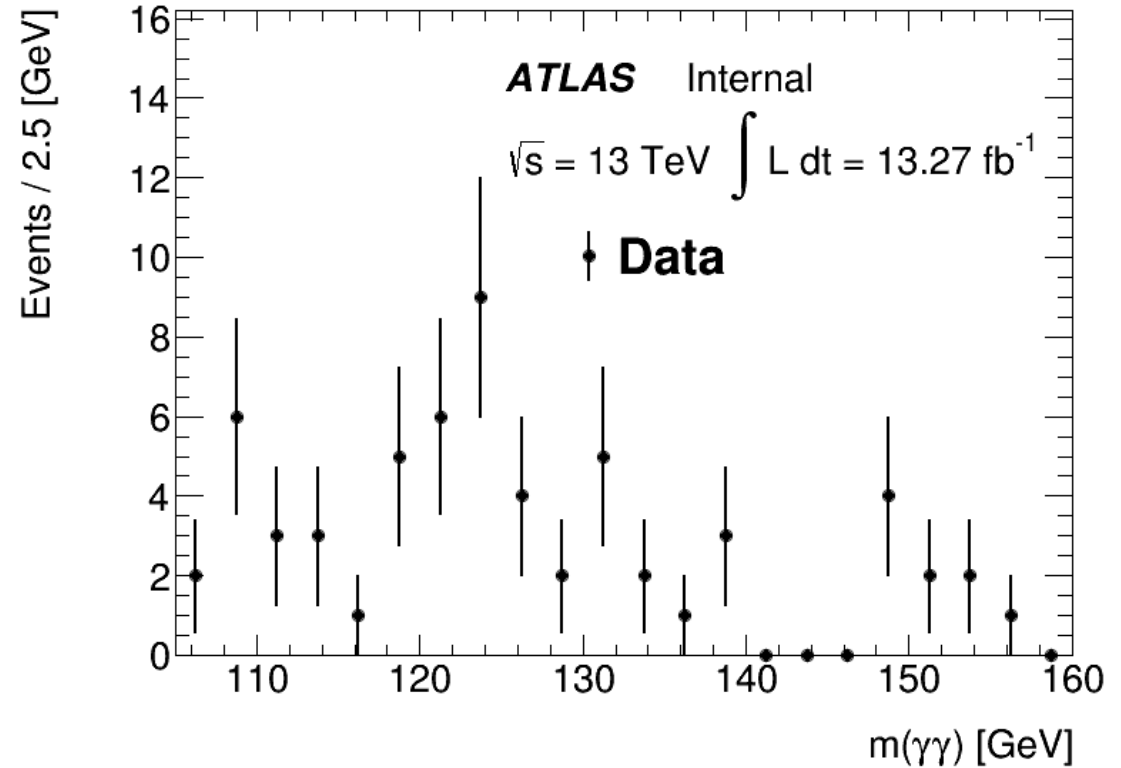
Yields

	ggF	VBF	Wh	Zh	tth
ϵ	0.00316466%	0.00843496%	0.493275%	0.320697%	1.77887%
XS	44.08 pb	3.779 pb	1.369 pb	0.8824 pb	0.5065 pb
Stat Error (percentage)	0.194095	0.164447	0.0456566	0.0508637	0.0480316
Yields	0.0418	0.00955	0.202	0.0848	0.270
Stat Error	0.00811	0.00157	0.00924	0.00431	0.0130

	m500	m400	m300	m260	non-res
ϵ	10.7028%	9.12489%	6.67516%	5.67558%	9.84315%
XS	1 pb	1 pb	1 pb	1 pb	33.41 fb/1 pb
Stat Error (percentage)	0.0182255	0.0199978	0.0246695	0.0256689	0.0196681
Yields	0.605	0.515	0.377	0.321	0.0188/0.556
Stat Error	0.0110	0.0103	0.00930	0.00824	0.000370/*

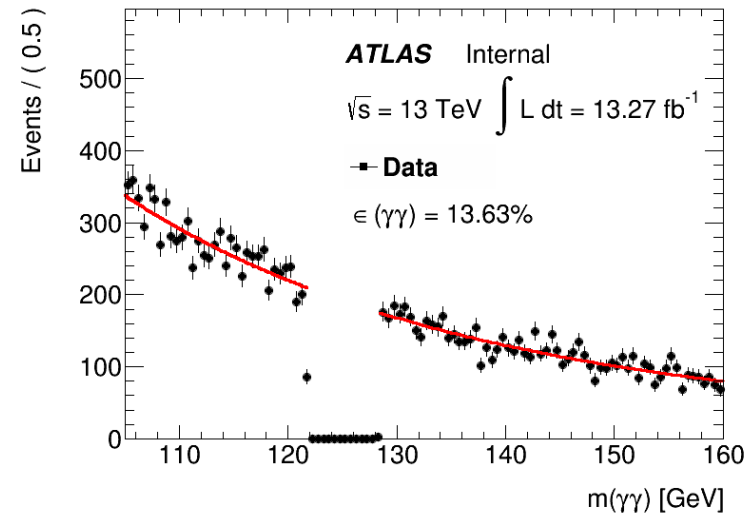
data

SR: 15
Sideband: 46
Data 15: 3.212 fb^{-1}
Data 16: 10.06 fb^{-1}



$$\epsilon_{\gamma\gamma}$$

- Exponential with 2nd term
- $\epsilon_{\gamma\gamma} = 13.64\%$
- $N_{SR}^{continuum} = 6.27$
– $N_{SR}^{continuum} = N_{sb} \times \frac{\epsilon_{\gamma\gamma}}{1 - \epsilon_{\gamma\gamma}}$
- Statistical error: 1.30%



Systematics

- Sys on luminosity for 2015 data, 2.1%
- Sys on luminosity for 2016 data, 3.7%
- Sys on Trigger, 0.4%
- Statistical uncertainty on data in sideband region, 14.7% (46 events in sideband)
- Uncertainty on $\epsilon_{\gamma\gamma}$
 - From lepton multiplicity,
 - From sideband definition, 1.2%
 - From fit model, 3.8%
 - From the statistical, 1.3%
- Theoretical uncertainty
 - On $Br(h \rightarrow WW)$, $\pm 1.5\%$
 - On $Br(h \rightarrow \gamma\gamma)$, $+2.1/-2.0\%$
 - On $\sigma(gg \rightarrow hh)$
 - On $\sigma(\text{SM Higgs})$
- Object systematics

\sqrt{s}	$\sigma_{gg \rightarrow hh}^{NNLO}$	Scale	$\pm PDF$ %	$\pm \alpha_s$ %	EFT
13 TeV	33.41 fb	+4.3% -6.0%	$\pm 2.1\%$	$\pm 2.3\%$	$\pm 5\%$

Processes	+QCD Scale %	-QCD Scale %	$\pm PDF$ %	$\pm \alpha_s$ %
ggh	+7.6	-8.1	± 1.8	± 2.5
VBF	+0.4	-0.3	± 2.1	± 0.5
Wh	+0.5	-0.7	± 1.7	± 0.9
Zh	+3.8	-3.0	± 1.3	± 0.9
tth	+5.8	-9.2	± 3.0	± 2.0

To-do list

- Get the object systematics tonight
- Get the uncertainty on $\epsilon_{\gamma\gamma}$ from the lepton multiplicity tomorrow.
- Get the limits tomorrow by asymptotic approximation
- Validate the asymptotics on Wednesday
- Thursday, update the Conf. note, ATLAS approval meeting
- Friday, update the INT note.