Spurious Signal for WWyy

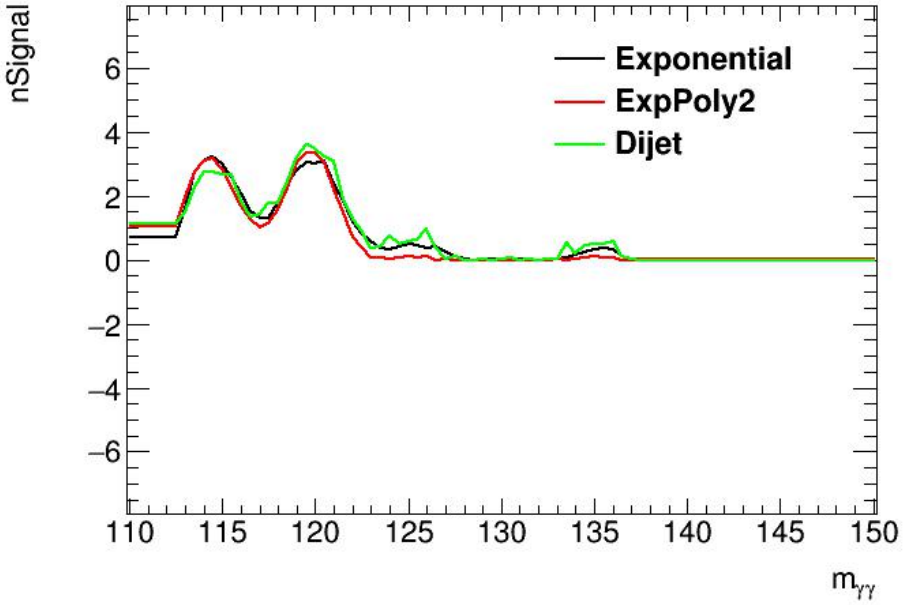
Principle

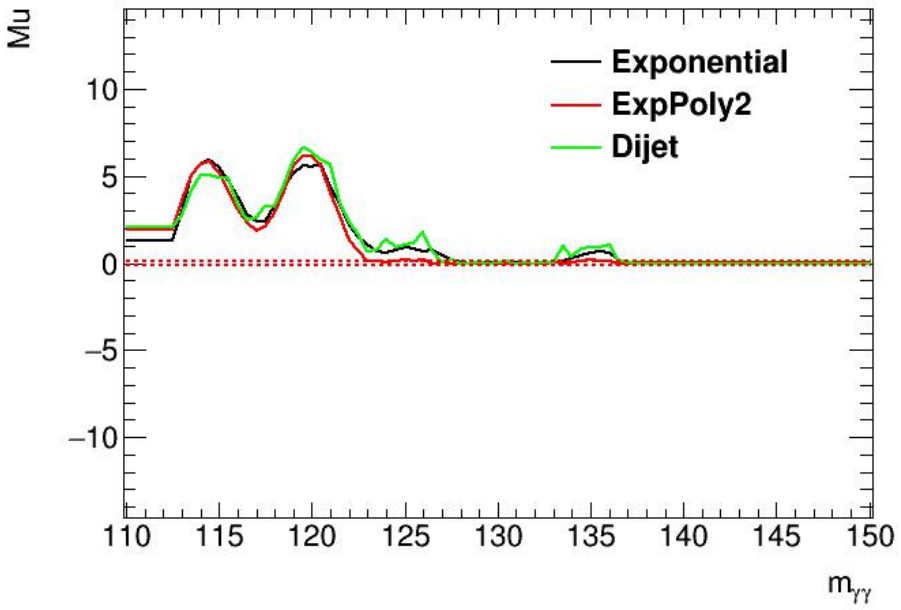
- Perform S+B fit on large statistic background sample
  - normalize the MC to data sideband
  - consider two factors : Mu=S/RefS, Z=S/DeltaS
  - RefS is the predicted yield, DeltaS is the fitted error of spurious signal.
  - require Mu<0.1, Z<0.2 @mh=125GeV
  - vary mh from 110 to 150, 0.5 GeV per step
- Candidate function
  - Exponential
  - Exponent-2nd
  - Dijet
- Sample
  - full hadonic : 100 M fast simulation of diphoton + 0,1,2,3 jets
  - one lepton : 2M fast simulation of lvqqyy. can not download due to the site in blacklist.....

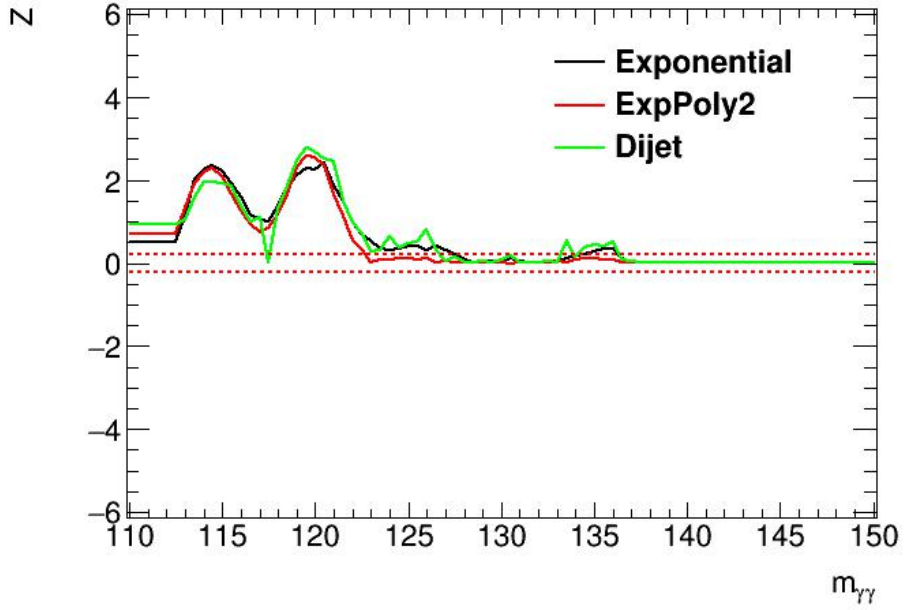
full hadronic

non-res 3jet

- a

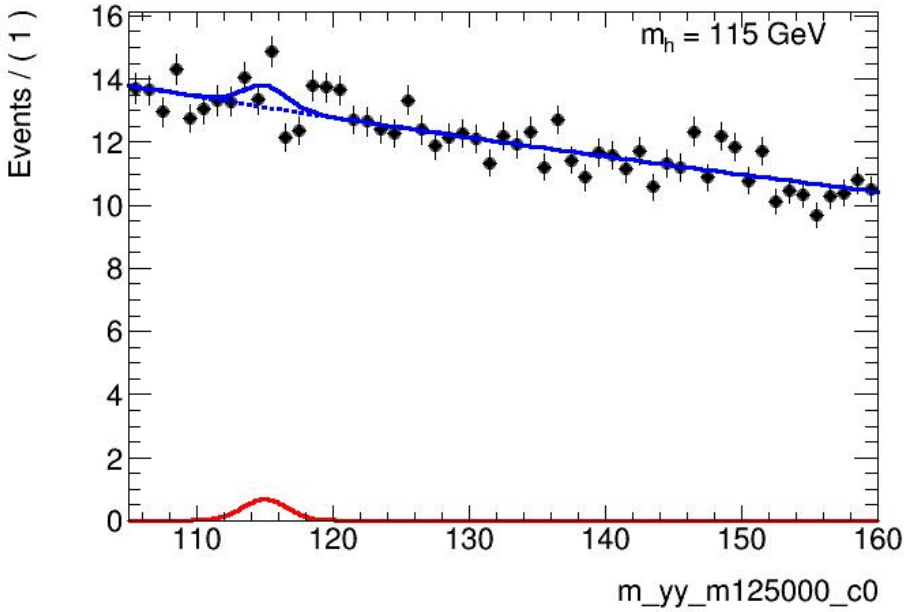


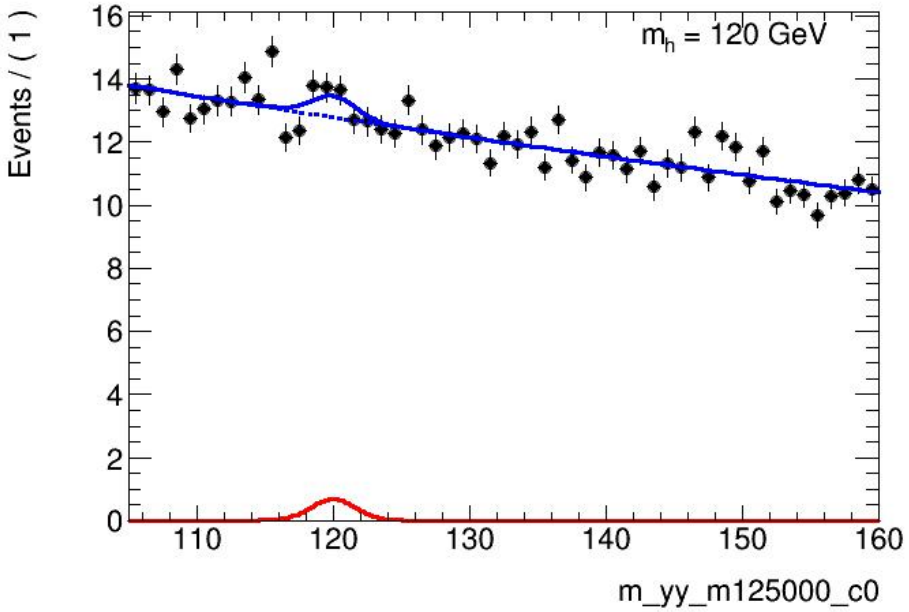




understand the structure

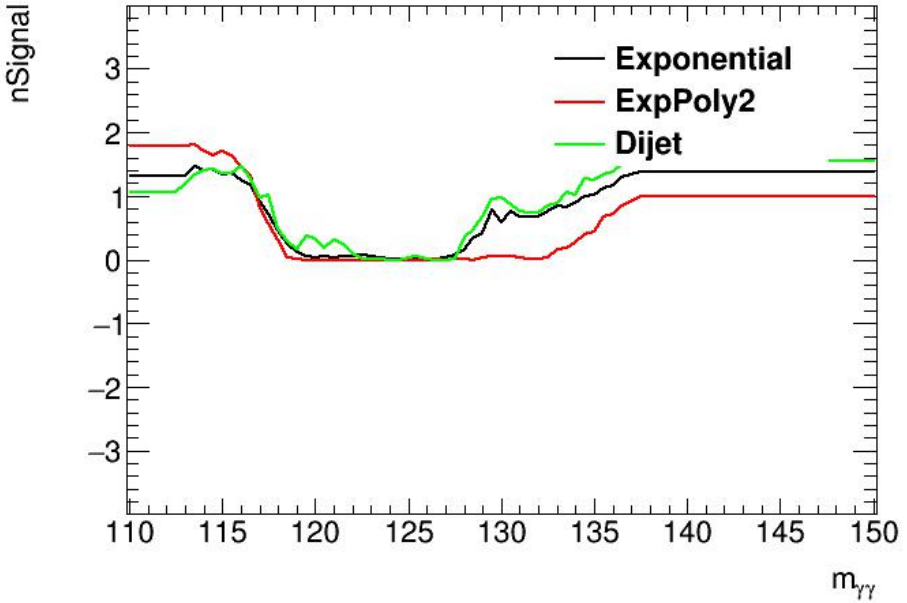
- Exponential fit

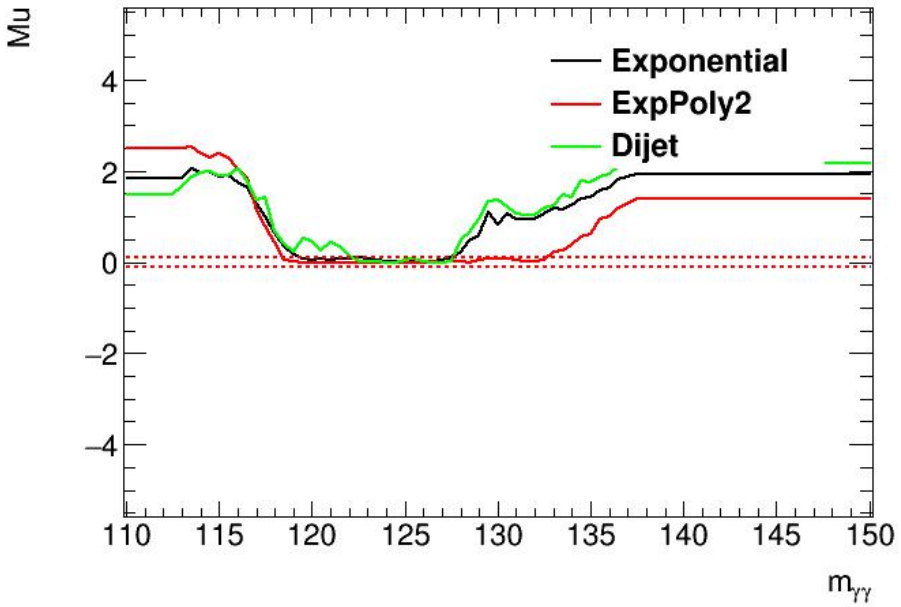


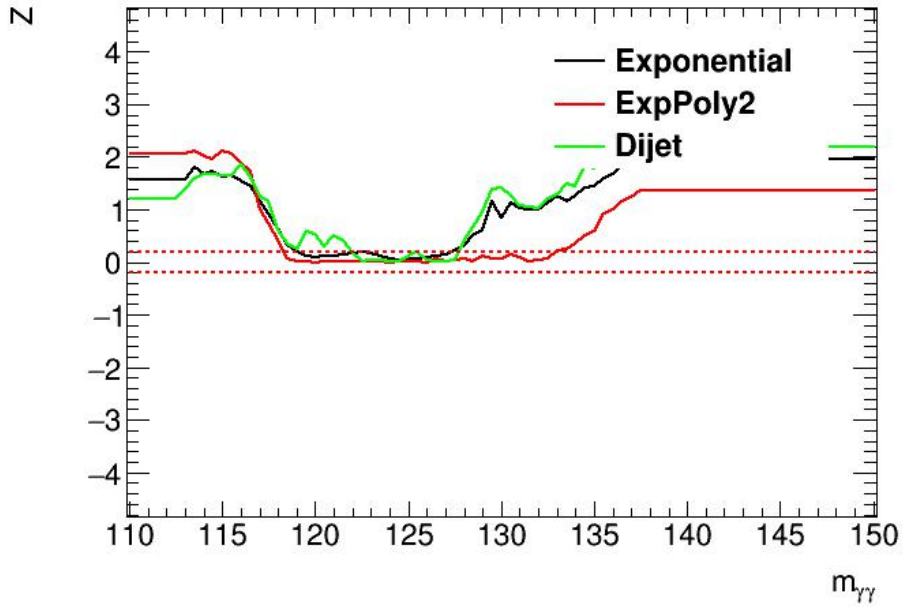


non-res 4jet

- a

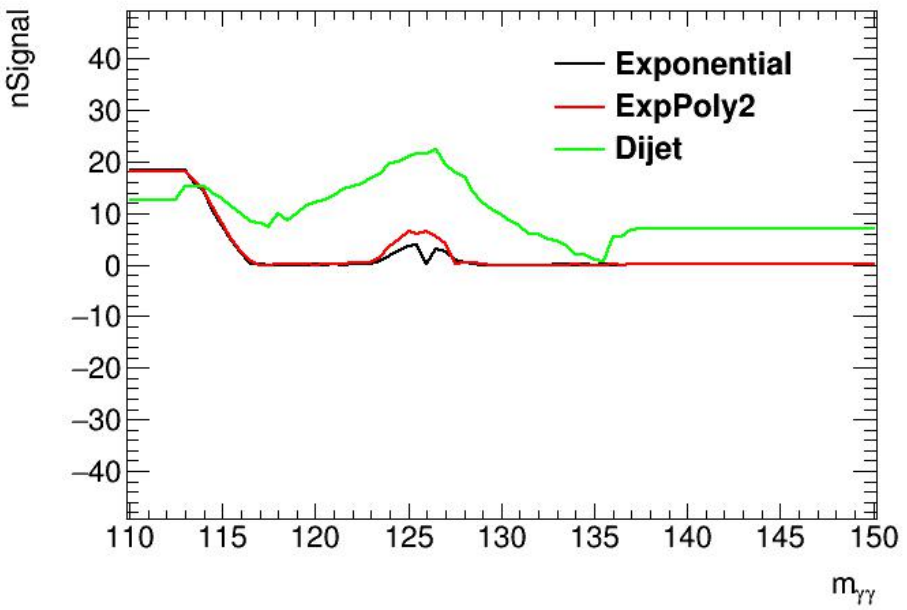






260 3jet

- a


nSignal
Exponential
ExpPoly2
Dijet
40
30
20
10
0
−10
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−30
−40
110
115
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125
130
135
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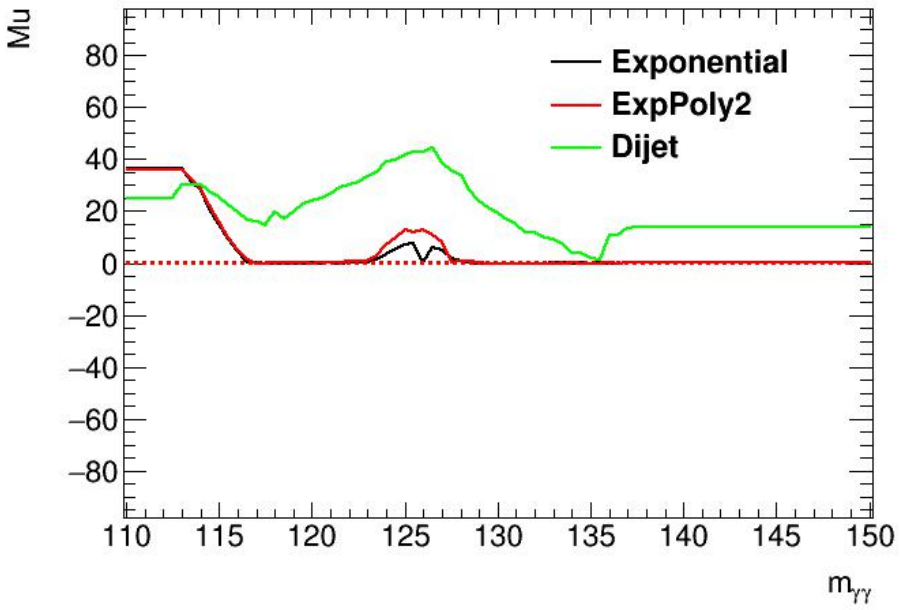
145
150
$m_{\gamma\gamma}$


Mu
Exponential
ExpPoly2
Dijet
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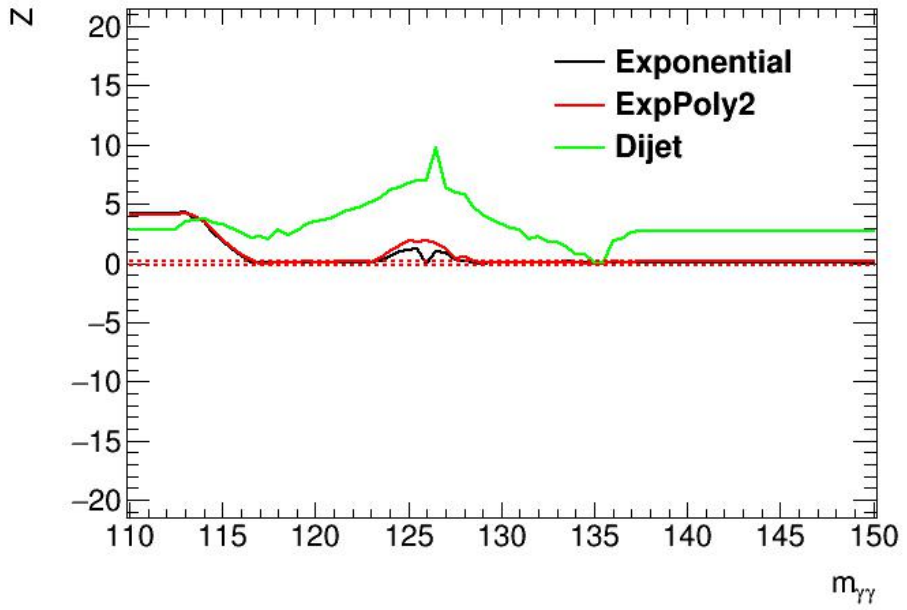
$m_{\gamma\gamma}$


N
Exponential
ExpPoly2
Dijet
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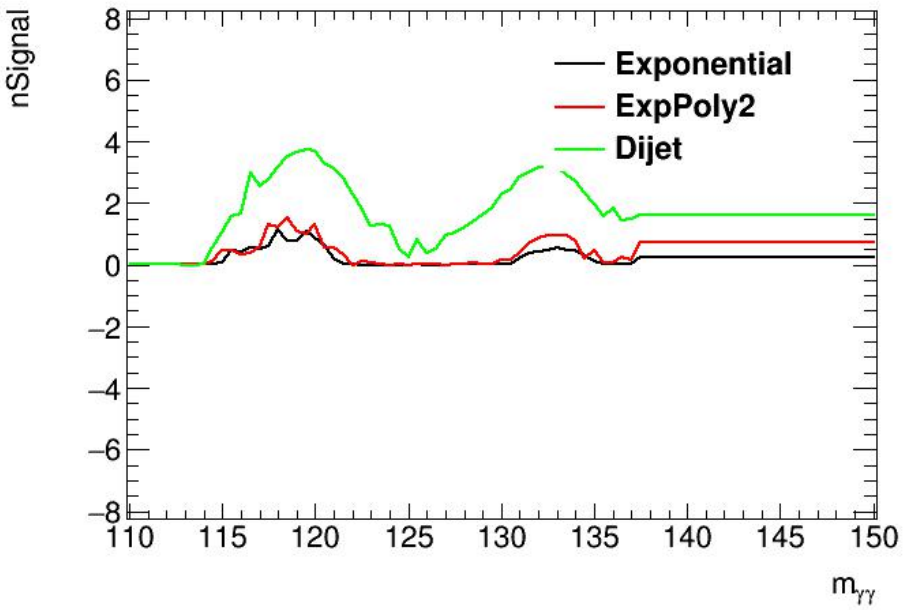
150
$m_{\gamma\gamma}$

260 4jet

- a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Exponential
ExpPoly2
Dijet
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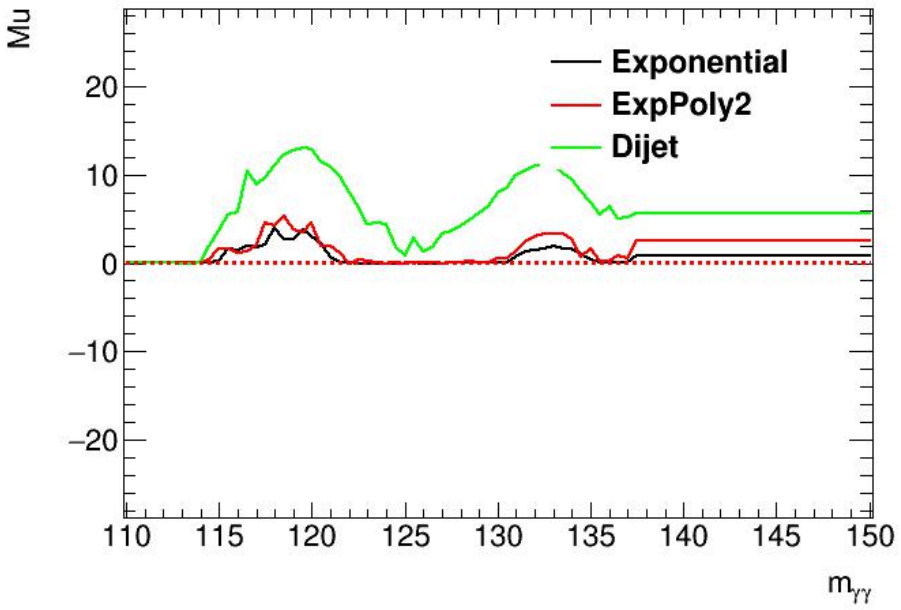
$m_{\gamma\gamma}$


Mu
Exponential
ExpPoly2
Dijet
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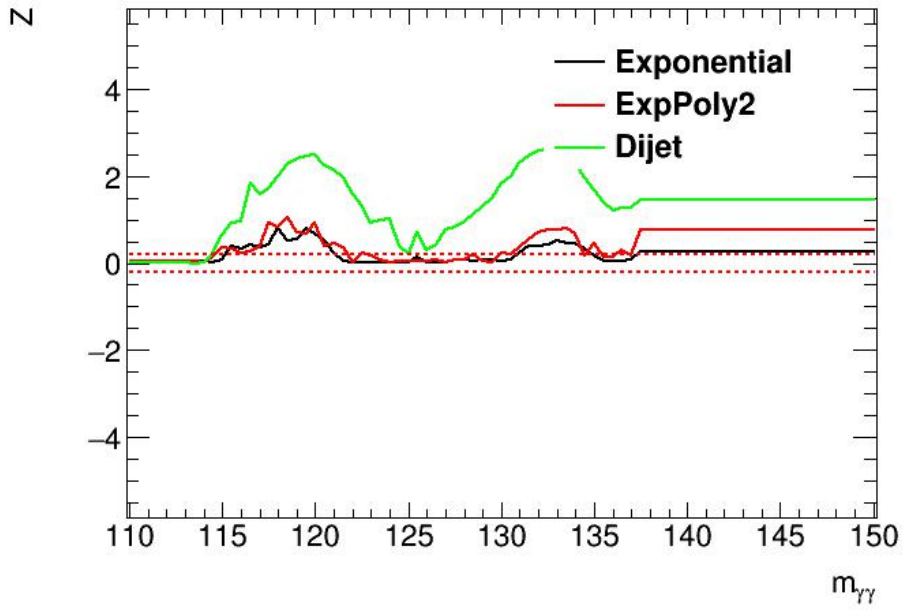
$m_{\gamma\gamma}$


Z
Exponential
ExpPoly2
Dijet
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110
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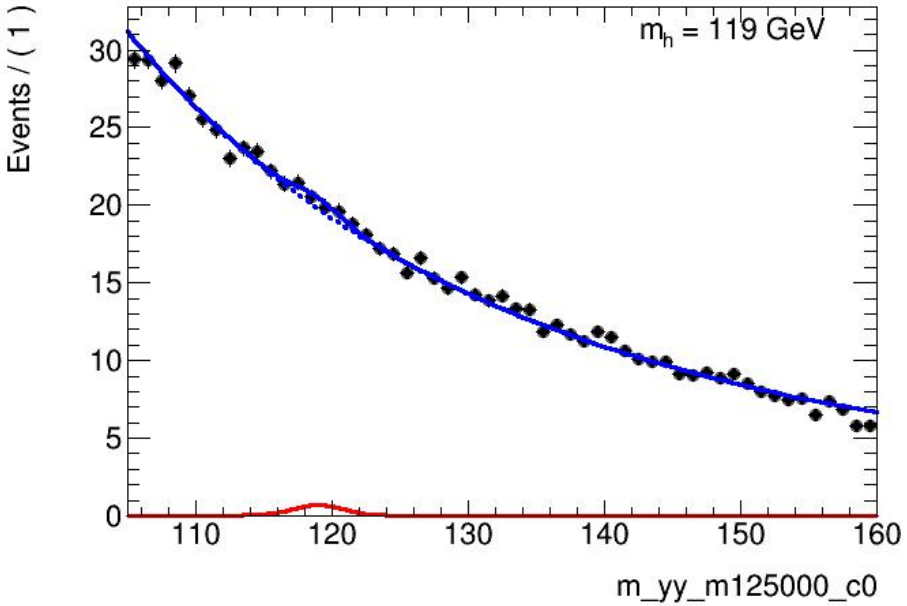
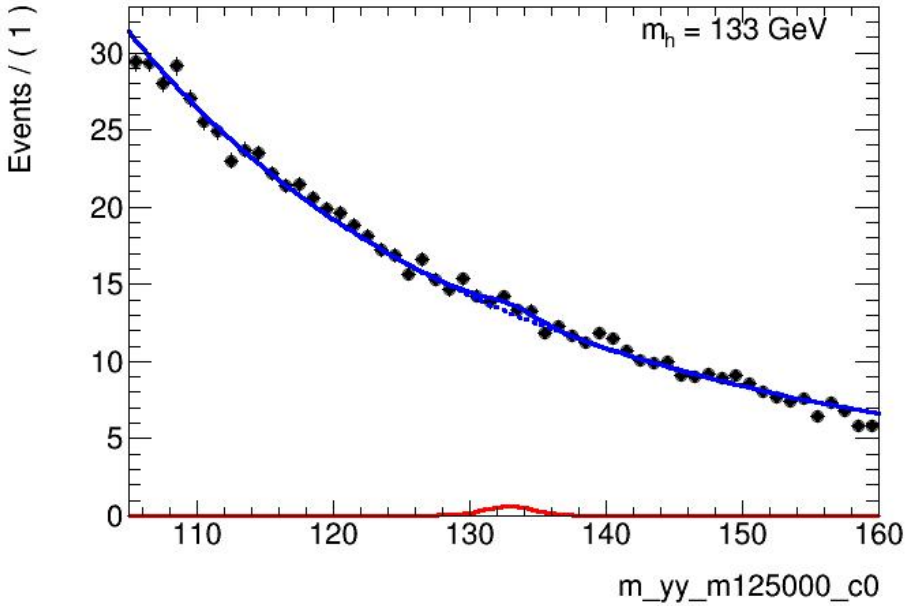
135
140
145
150
$m_{\gamma\gamma}$

understand the structure

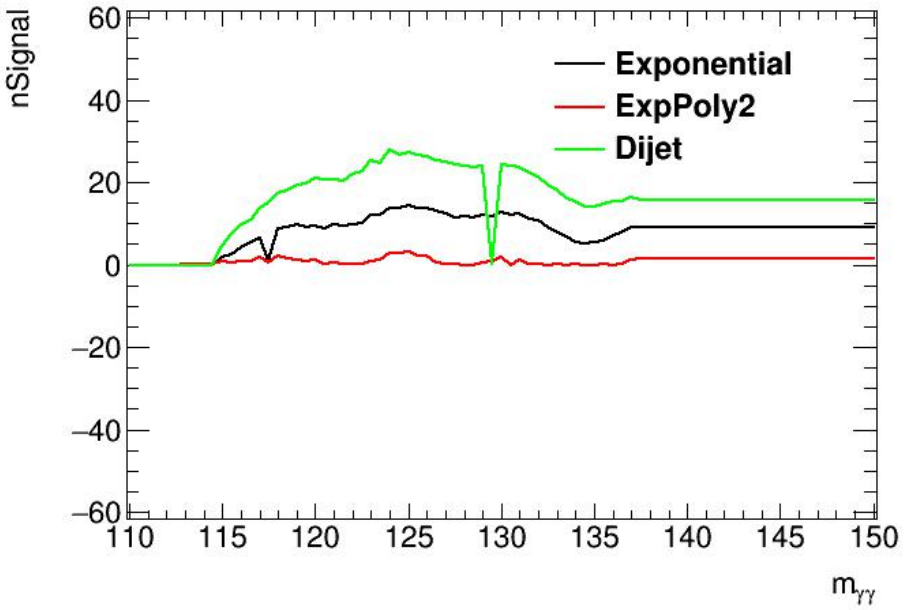
- “Dijet” fit

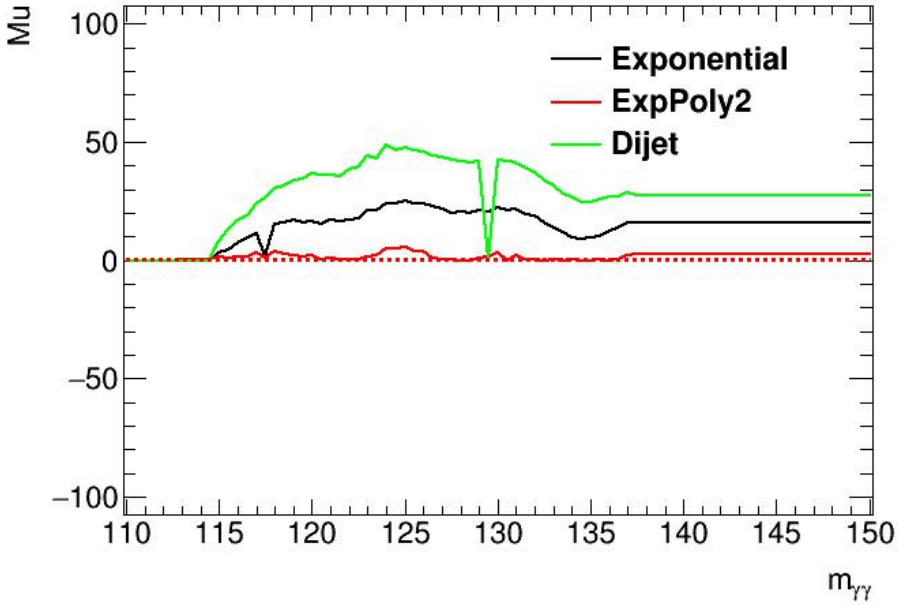




300 3jet

- a


nSignal
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$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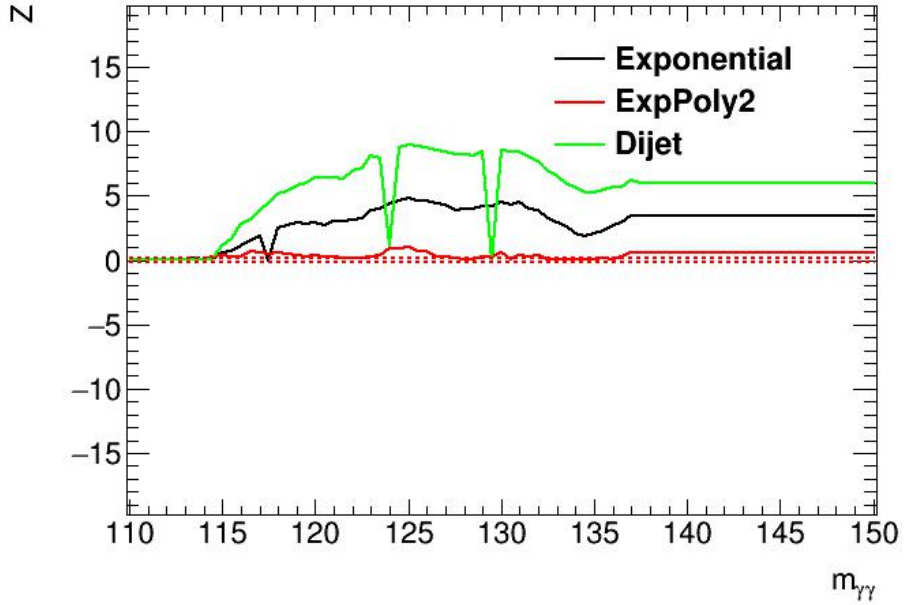
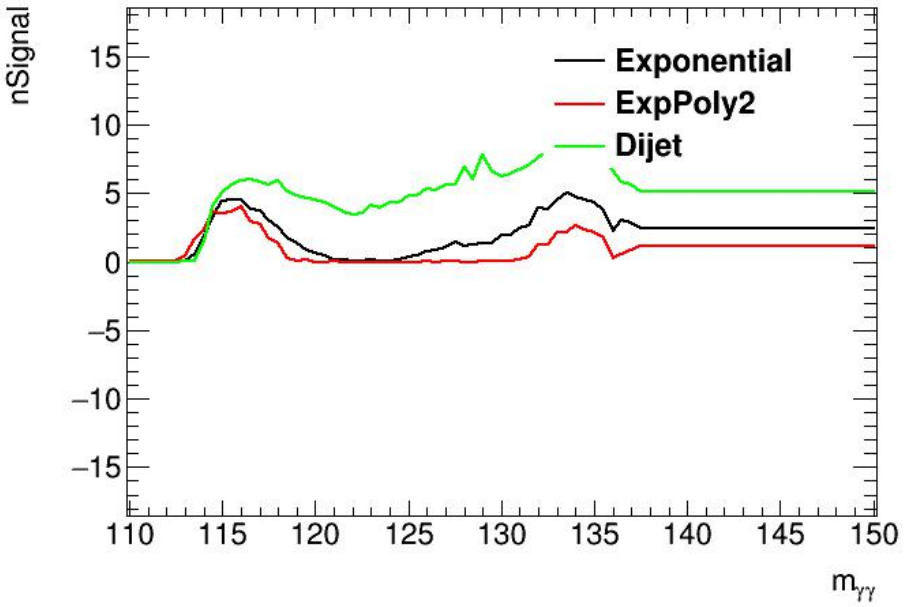
ExpPoly2
Dijet
$m_{\gamma\gamma}$


Z
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$

300 4jet

- a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Exponential
ExpPoly2
Dijet
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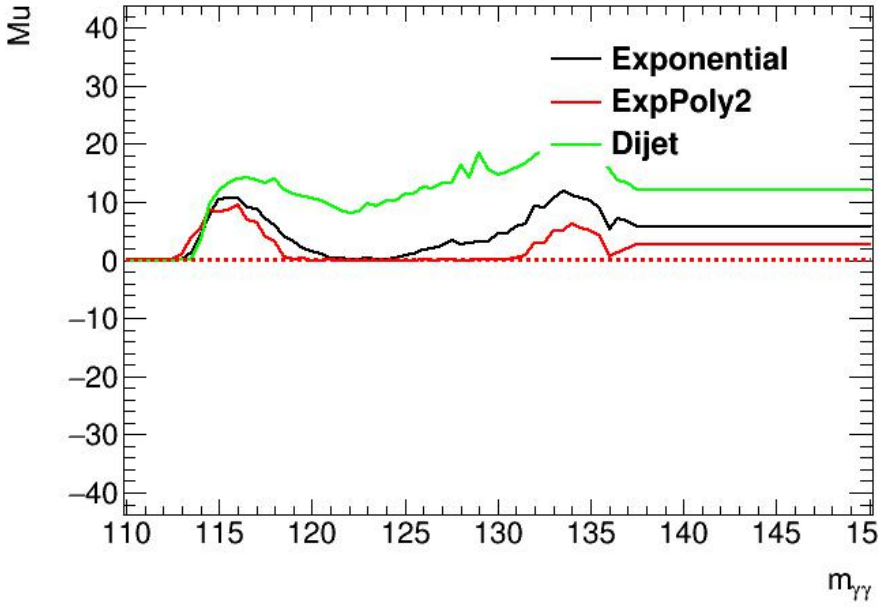
$m_{\gamma\gamma}$


Mu
Exponential
ExpPoly2
Dijet
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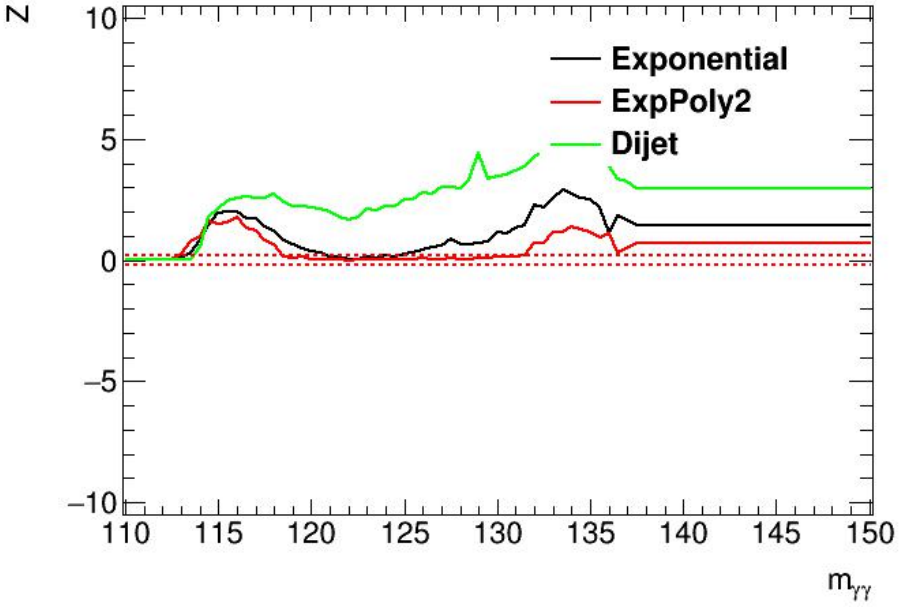
$m_{\gamma\gamma}$


Z
Exponential
ExpPoly2
Dijet
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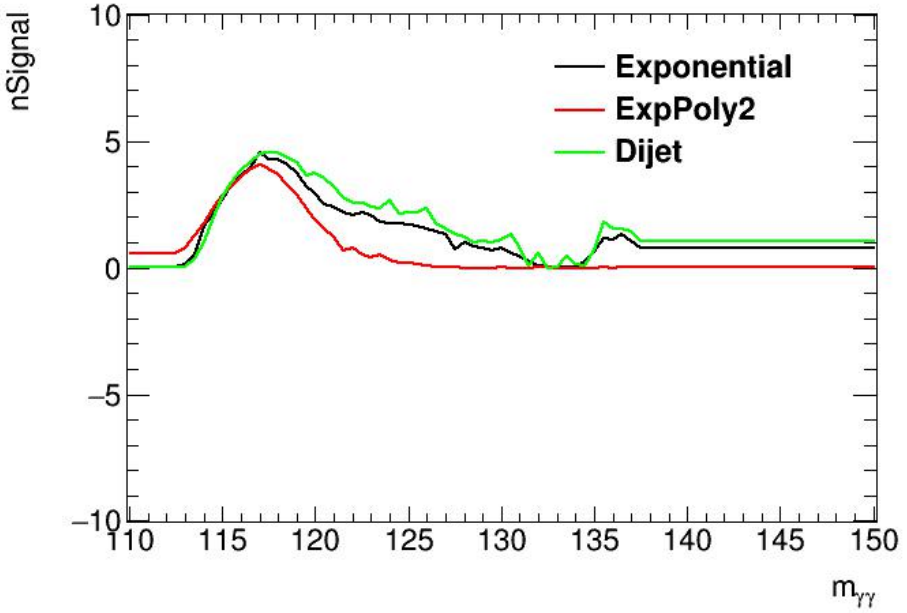
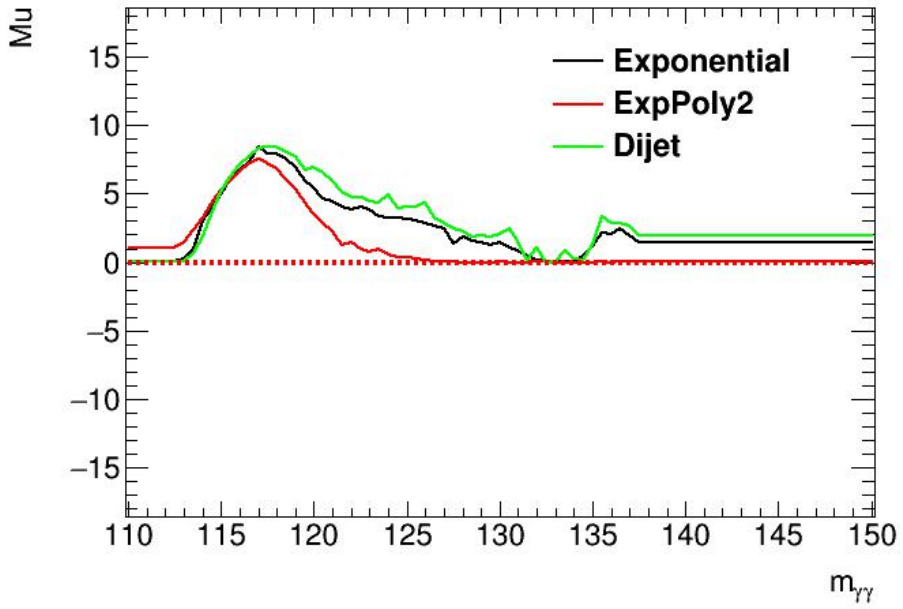
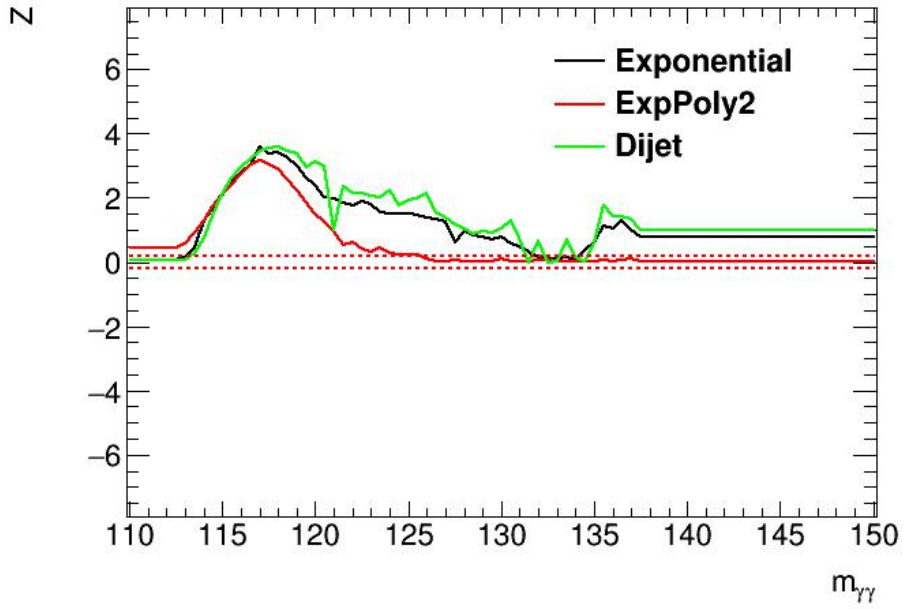
150
$m_{\gamma\gamma}$

400 3jet

- a

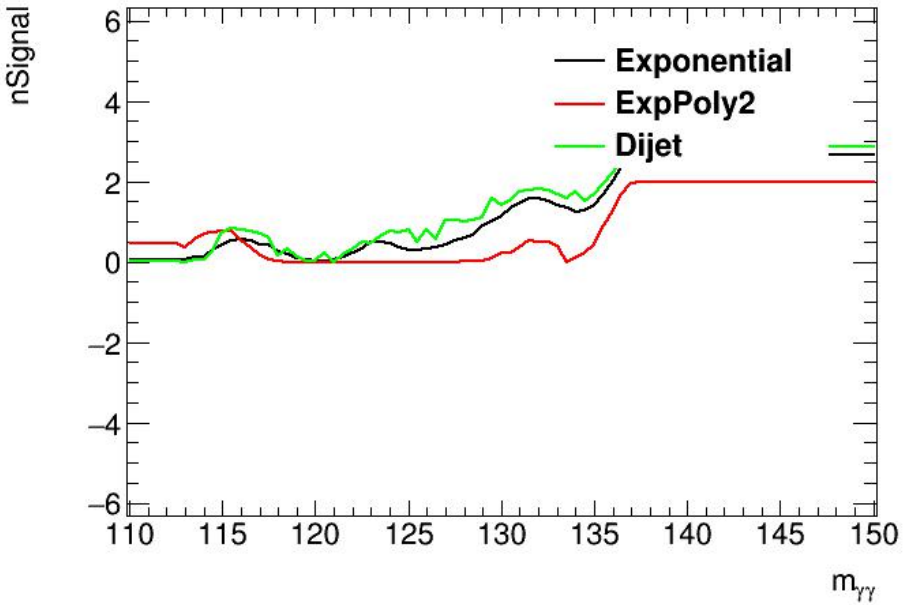

nSignal
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$

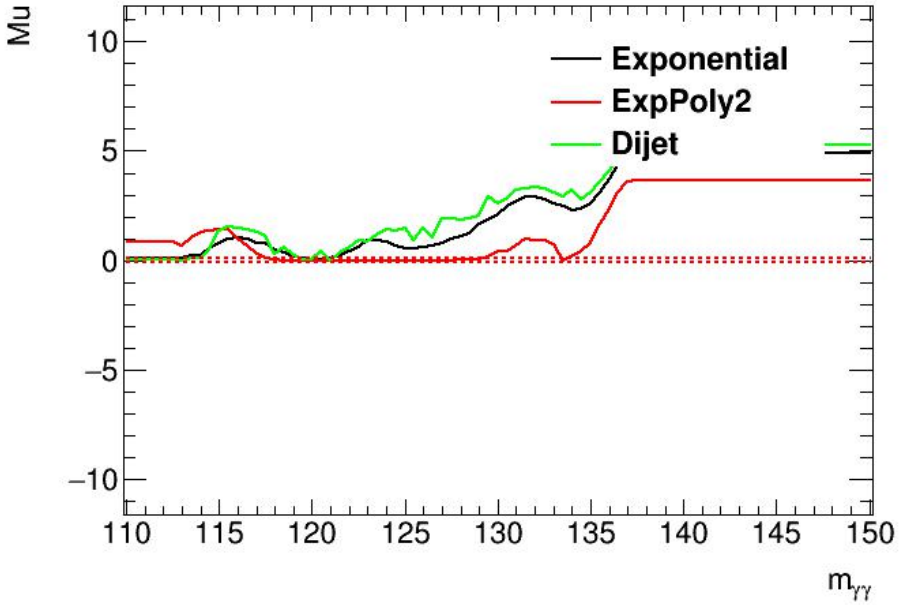

Mu
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$

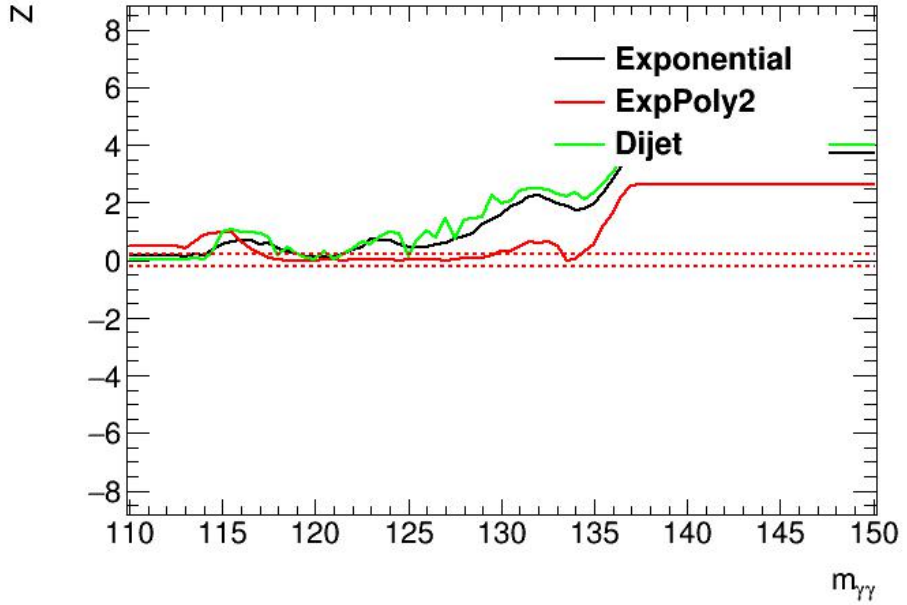

Z
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$

400 4jet

- a

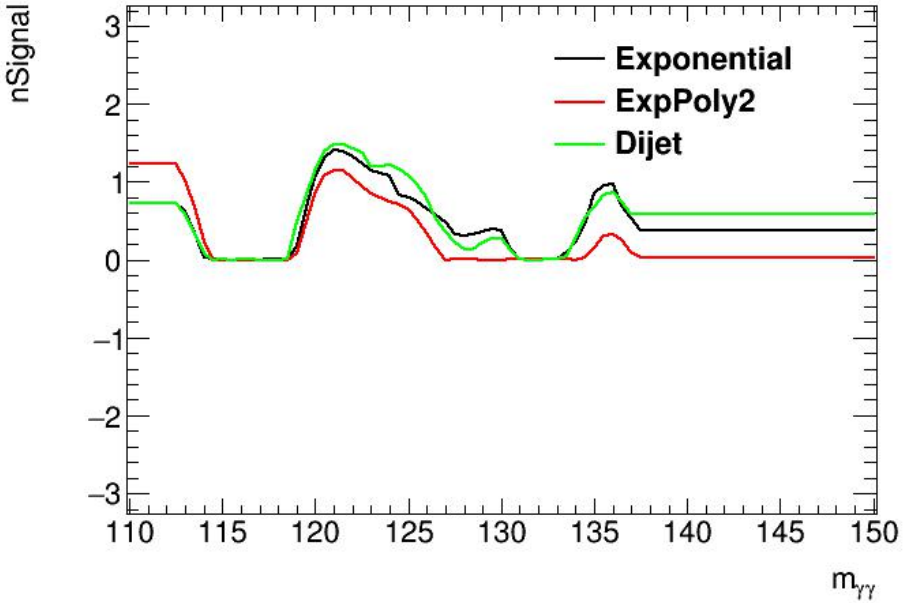

nSignal
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$

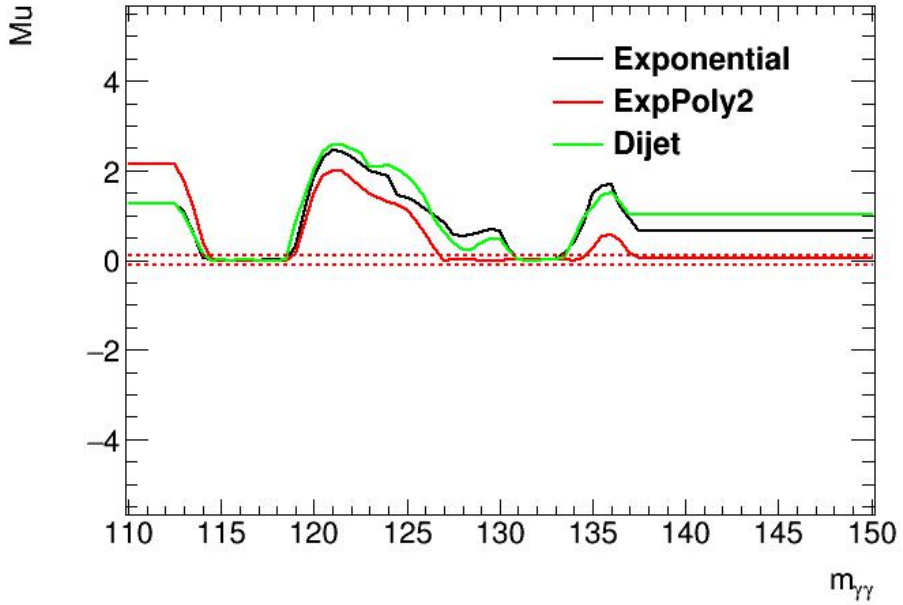

Mu
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$

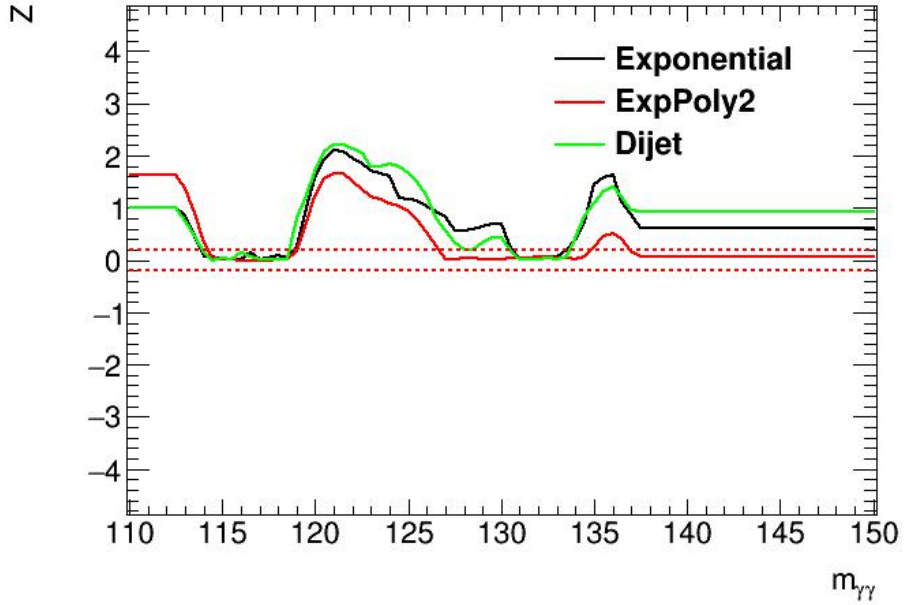

N
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$

500 3jet

- a

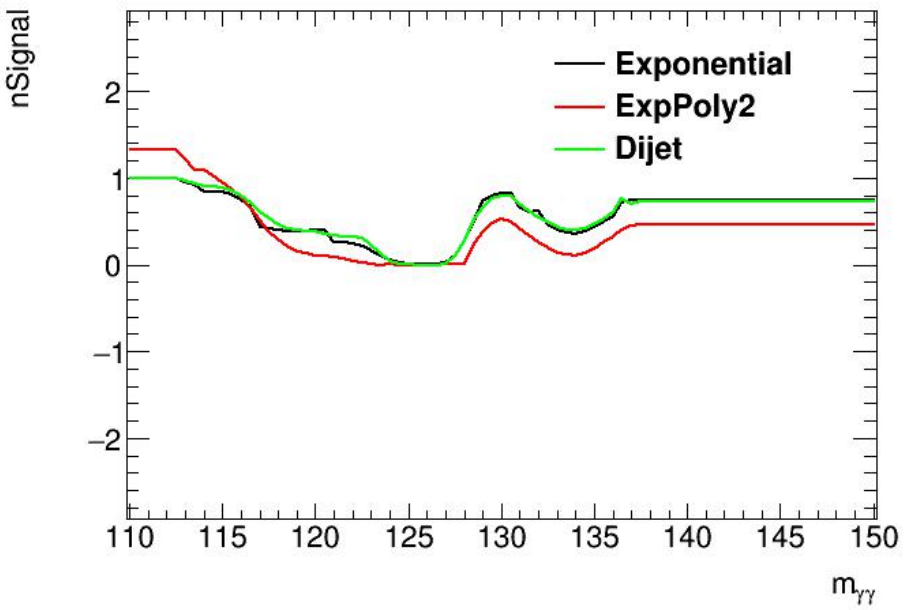

nSignal
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$


Mu
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$


Z
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$

500 4jet

- a


nSignal
Exponential
ExpPoly2
Dijet
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115
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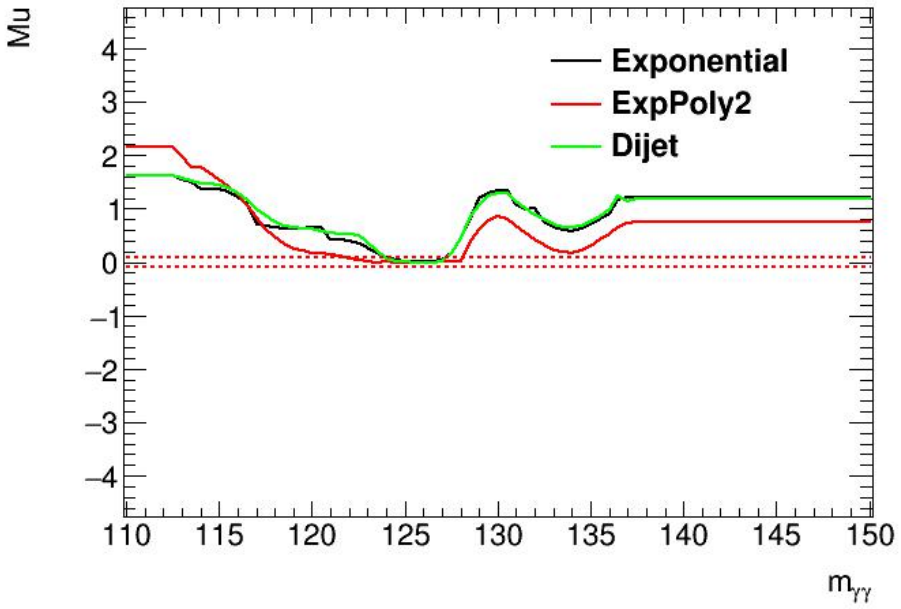
150
$m_{\gamma\gamma}$


Mu
Exponential
ExpPoly2
Dijet
4
3
2
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−1
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115
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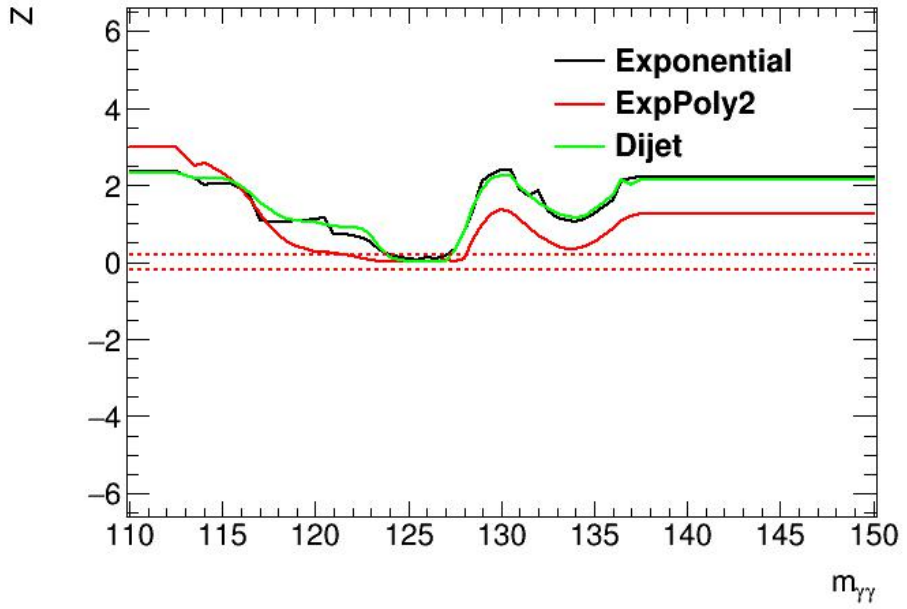
145
150
$m_{\gamma\gamma}$


Z
Exponential
ExpPoly2
Dijet
6
4
2
0
−2
−4
−6
110
115
120
125
130
135
140
145
150
$m_{\gamma\gamma}$

Summary @mh=125GeV

	function	S	S/DeltaS	S/RefS
non-res 3jet	ExpPoly2	0.11	0.12	0.20
non-res 4jet	Exp	0.005	0.07	0.008
260 3jet	Exp	3.45	1.11	6.86
260 4jet	Exp	0.0002	0.015	0.0008
300 3jet	ExpPoly2	3.16	0.98	5.52
300 4jet	ExpPoly2	0.002	0.03	0.005
400 3jet	ExpPoly2	0.18	0.21	0.34
400 4jet	ExpPoly2	0.0007	0.023	0.001
500 3jet	ExpPoly2	0.63	0.93	1.10
500 4jet	Exp	0.008	0.09	0.013

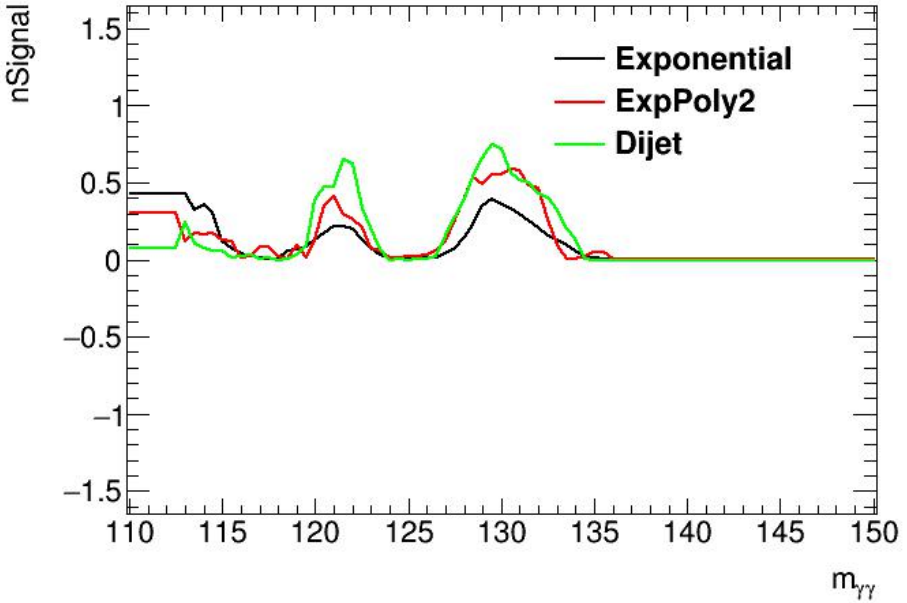
Comment

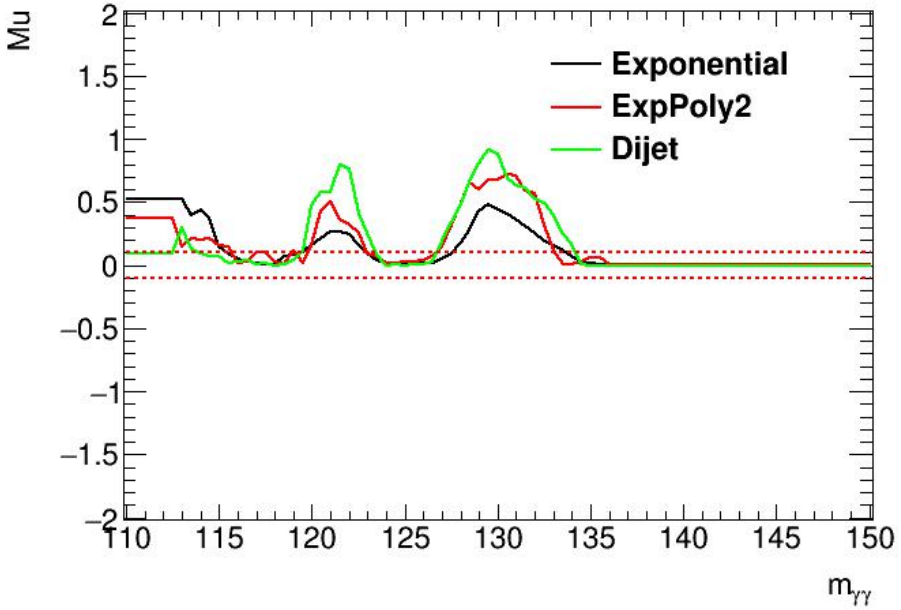
- The statistic is not large enough --- fluctuation is everywhere
- In 4jet category, there is always one function passing the criteria but not in 3jet category
- Fit plot in backup, the nSignal is forced to be positive ---- need to modify : negtive spurious signal is possible
- Only check the spurious signal @mh=125GeV
- Do not consider reducible backgrouond ---see backup about the data/MC comparision, not very consistent
- Do not undertand the very flat line at low or high mass region --- e.g. on page13 beyond 140 GeV

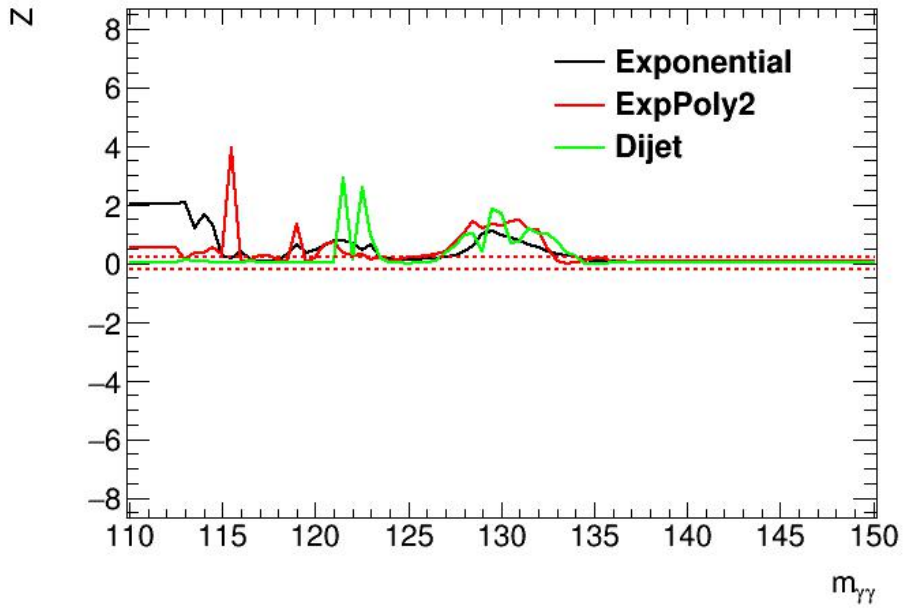
one lepton

non-res

- a

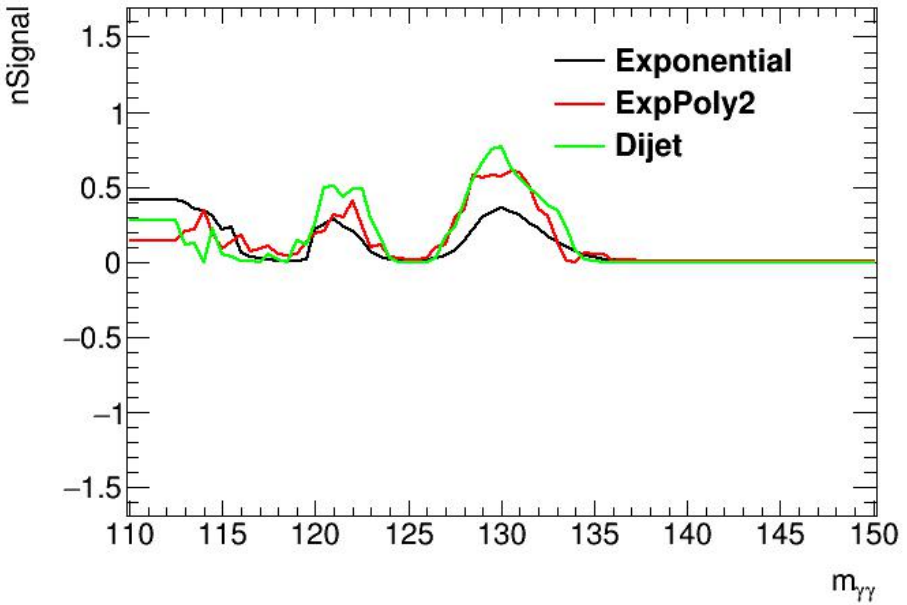

nSignal
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$


Mu
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$


Z
Exponential
ExpPoly2
Dijet
$m_{\gamma\gamma}$

260

- a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Exponential
ExpPoly2
Dijet
1.5
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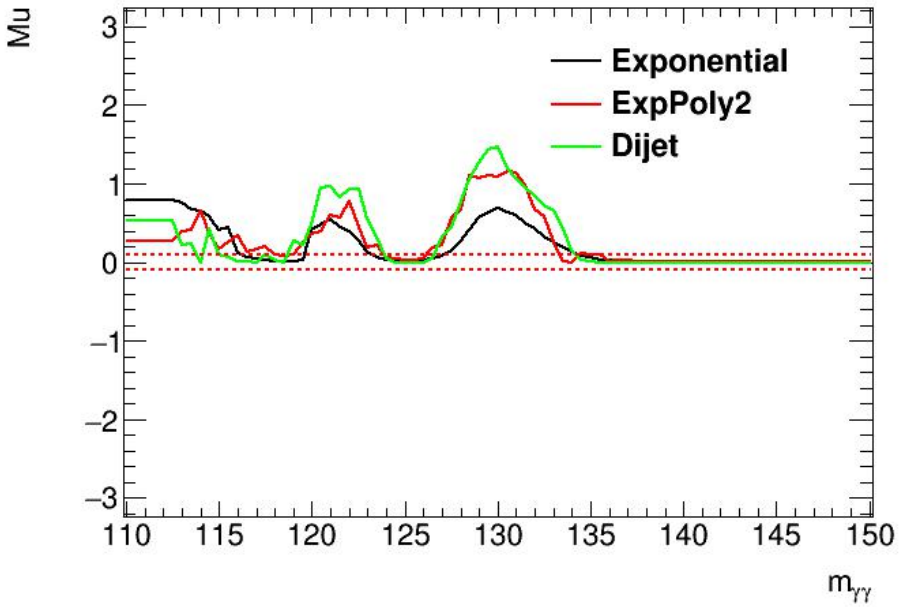
$m_{\gamma\gamma}$


Mu
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ExpPoly2
Dijet
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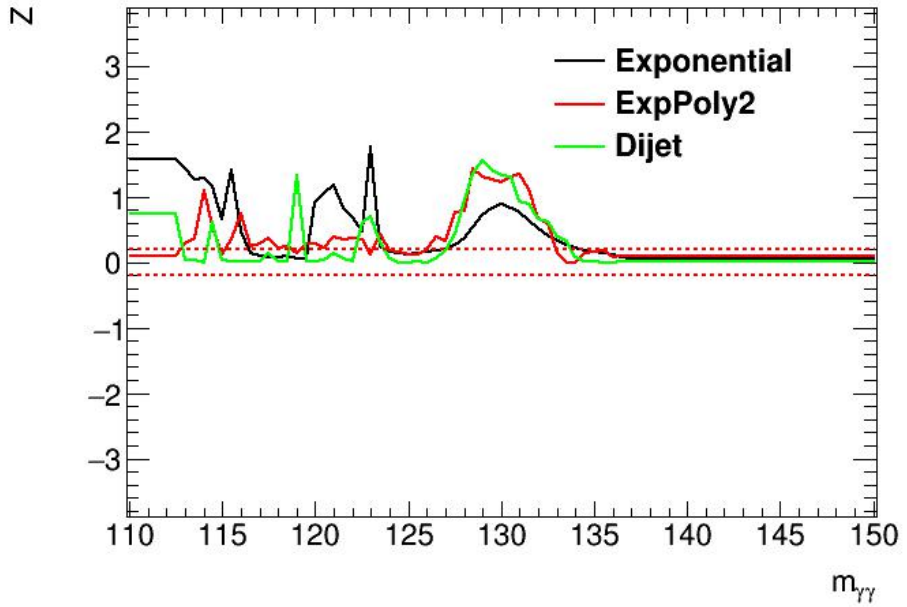
150
$m_{\gamma\gamma}$


Z
Exponential
ExpPoly2
Dijet
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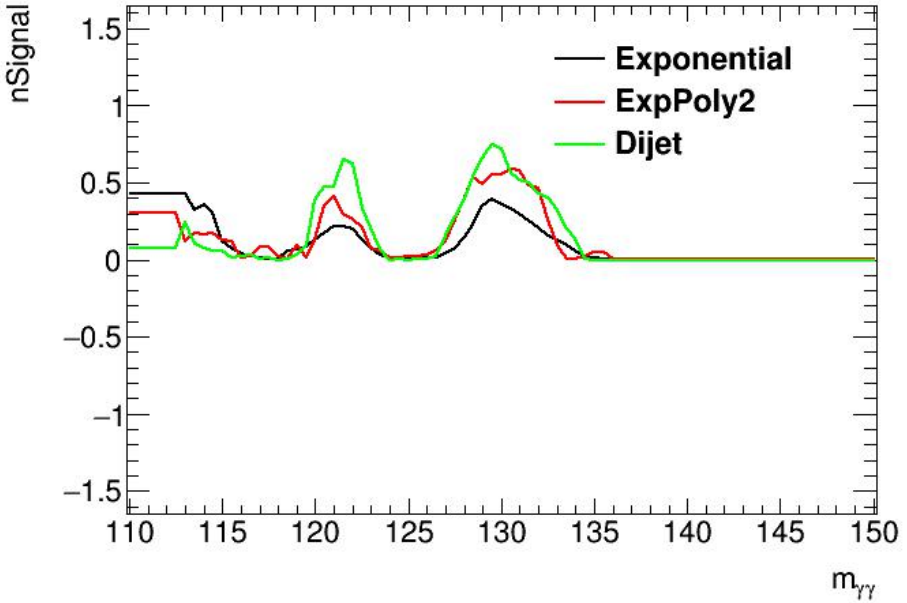
145
150
$m_{\gamma\gamma}$

300

- a


nSignal
Exponential
ExpPoly2
Dijet
1.5
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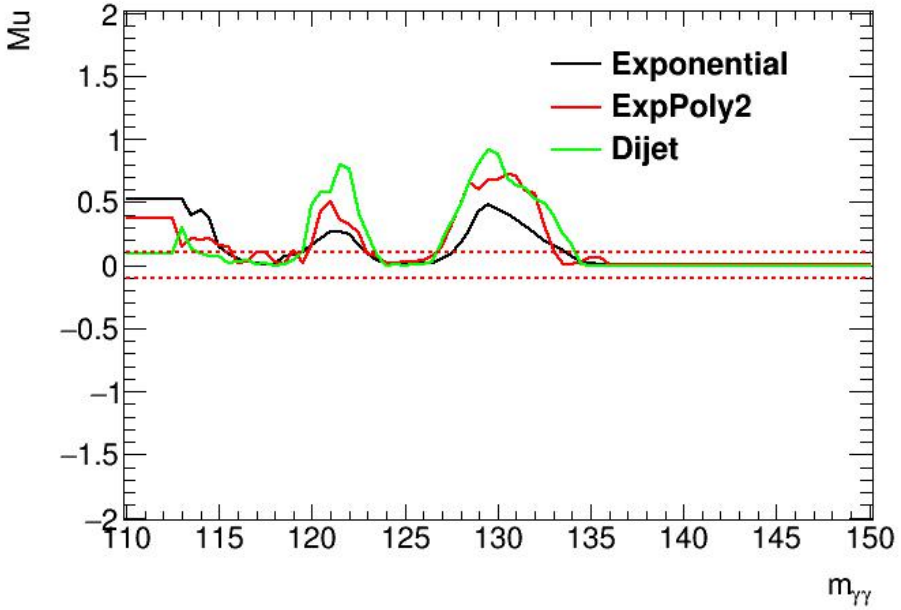
$m_{\gamma\gamma}$


Mu
Exponential
ExpPoly2
Dijet
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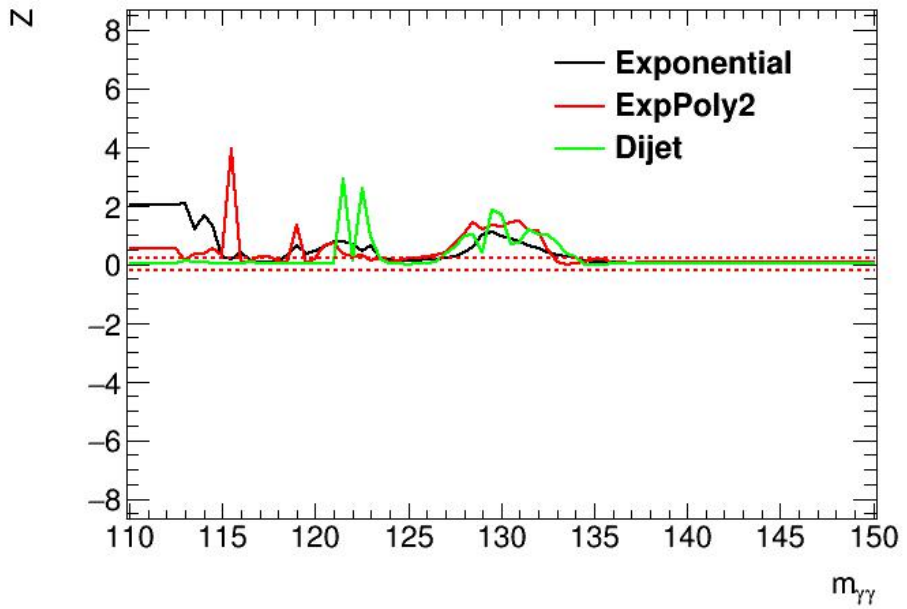
$m_{\gamma\gamma}$


N
Exponential
ExpPoly2
Dijet
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135
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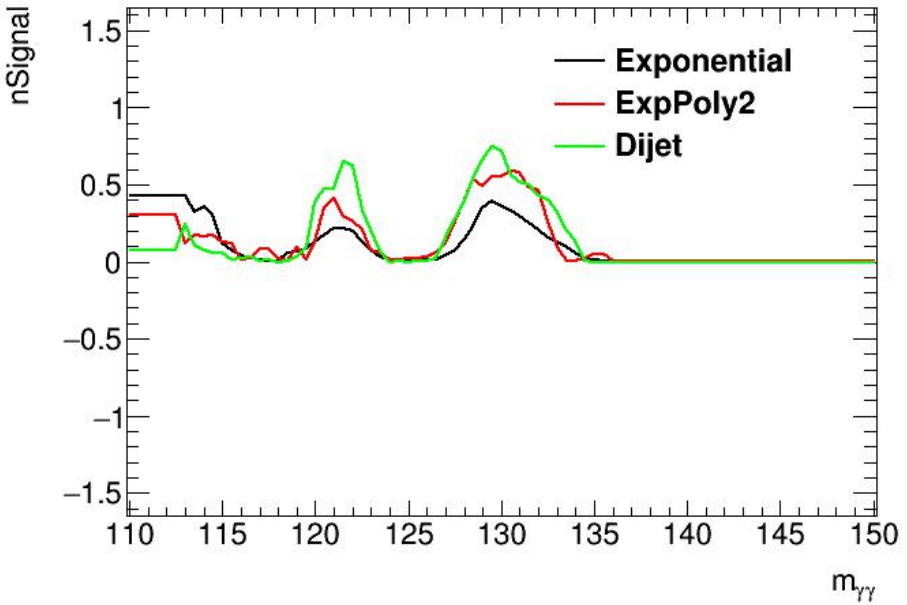
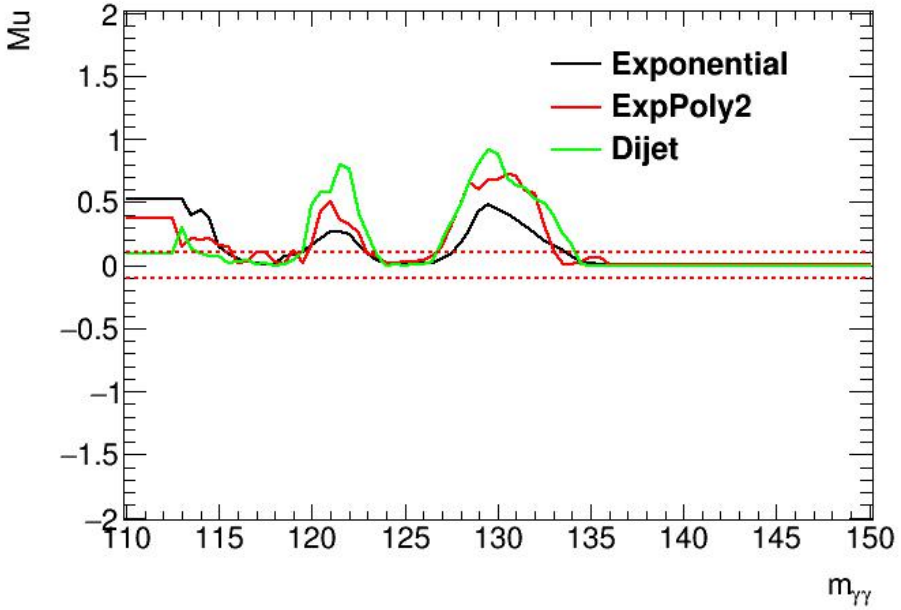
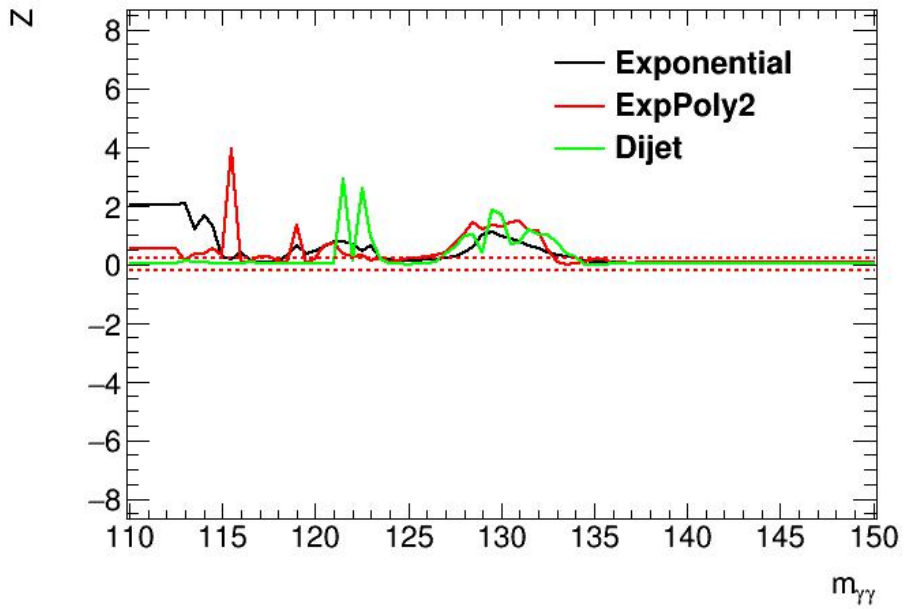
145
150
$m_{\gamma\gamma}$

400

- a

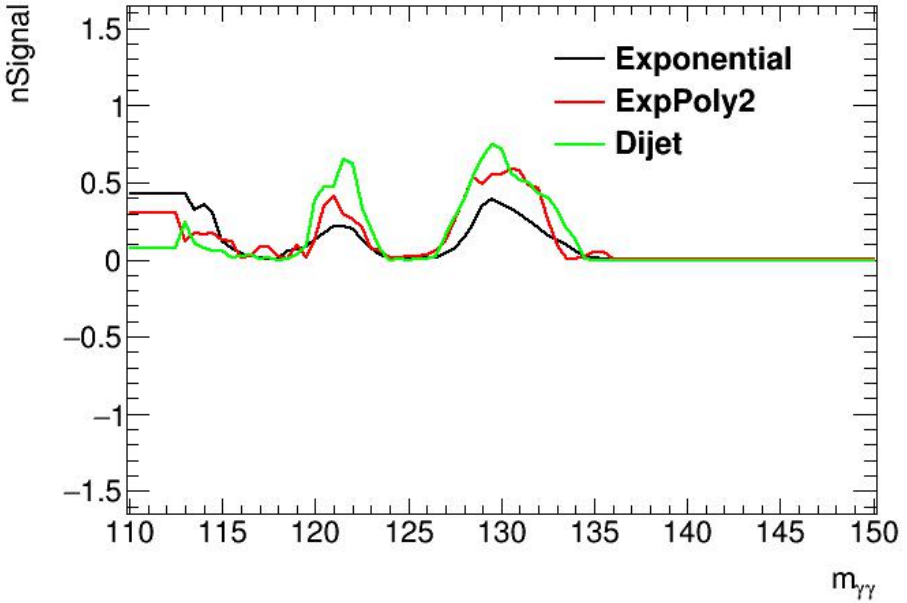

nSignal
Exponential
ExpPoly2
Dijet
1.5
1
0.5
0
−0.5
−1
−1.5
110
115
120
125
130
135
140
145
150
$m_{\gamma\gamma}$


Mu
Exponential
ExpPoly2
Dijet
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
110
115
120
125
130
135
140
145
150
$m_{\gamma\gamma}$


N
Exponential
ExpPoly2
Dijet
8
6
4
2
0
−2
−4
−6
−8
110
115
120
125
130
135
140
145
150
$m_{\gamma\gamma}$

500

- a


nSignal
Exponential
ExpPoly2
Dijet
1.5
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110
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130
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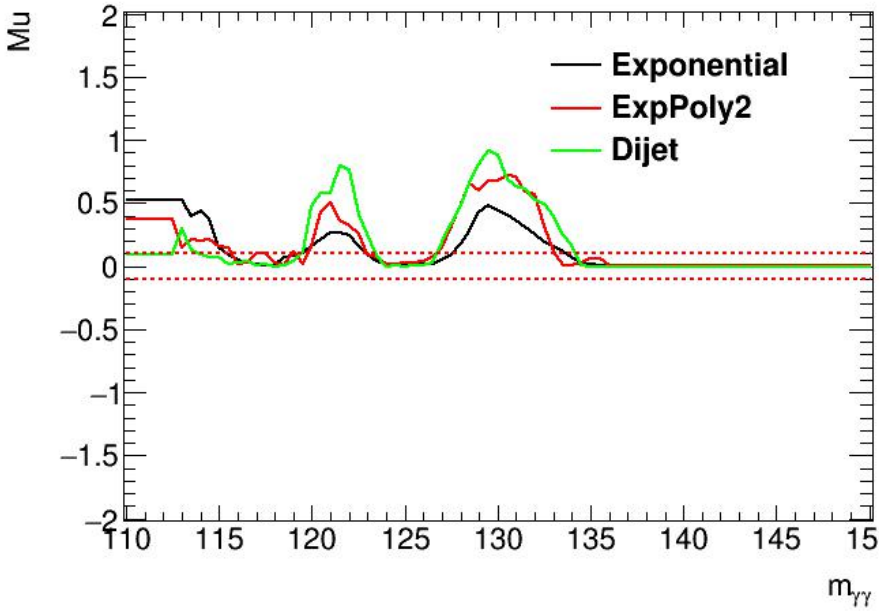
150
$m_{\gamma\gamma}$


Mu
Exponential
ExpPoly2
Dijet
2
1.5
1
0.5
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−2
110
115
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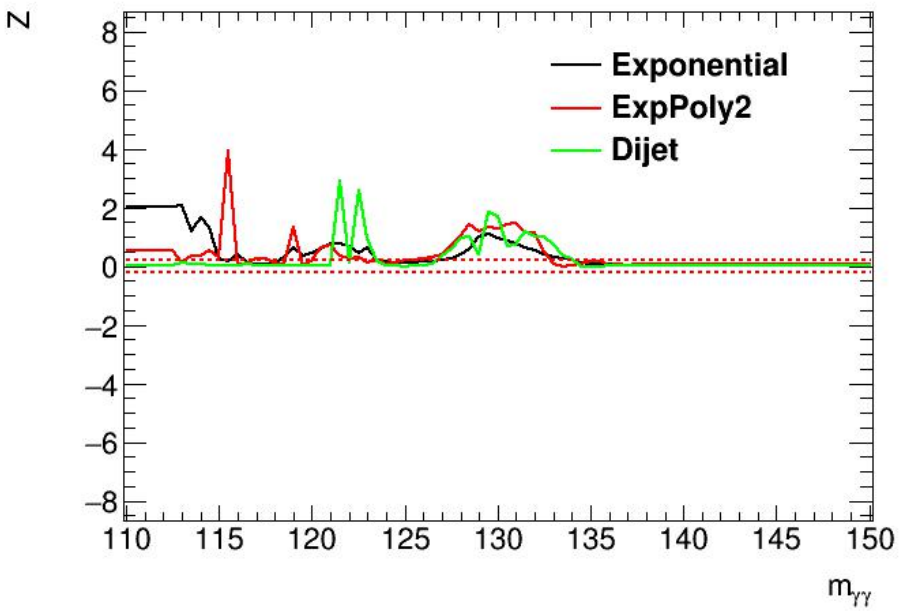
15
$m_{\gamma\gamma}$


Z
Exponential
ExpPoly2
Dijet
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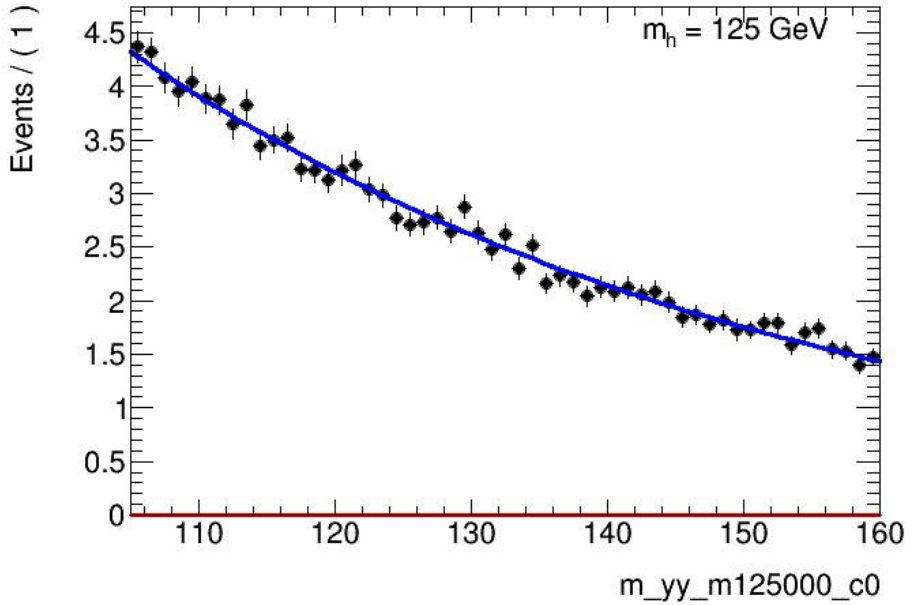
6
4
2
0
−2
−4
−6
−8
110
115
120
125
130
135
140
145
150
$m_{\gamma\gamma}$

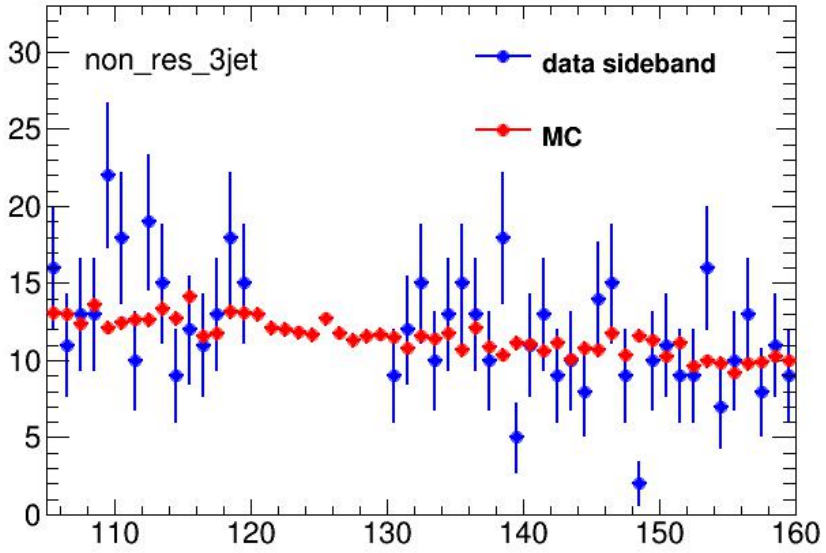
Summay

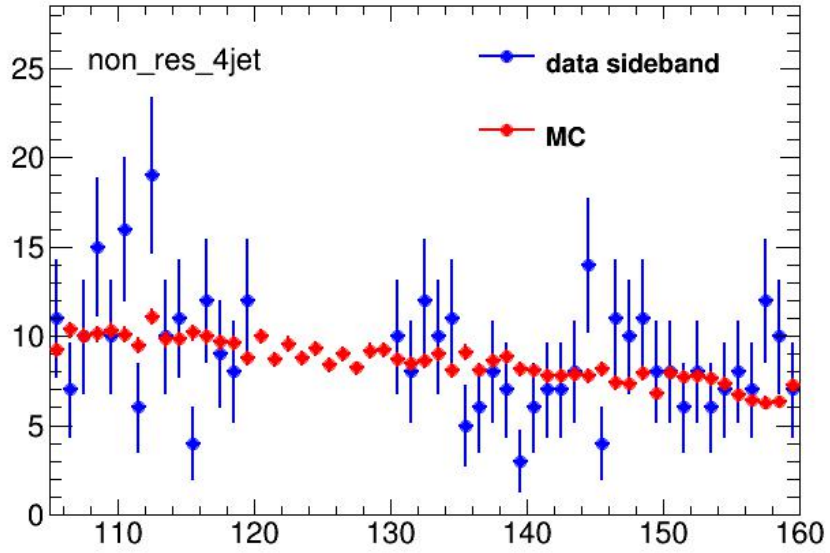
mass	func	S	S/DeltaS	S/RefS
non-res	Exp	0.00736787	0.125002	0.0090152
260	Exp	0.00805869	0.12522	0.0154148
300	Exp	0.00796571	0.124265	0.0138511
400	Exp	0.00737294	0.124387	0.00945729
500	Exp	0.00733877	0.126655	0.00845651



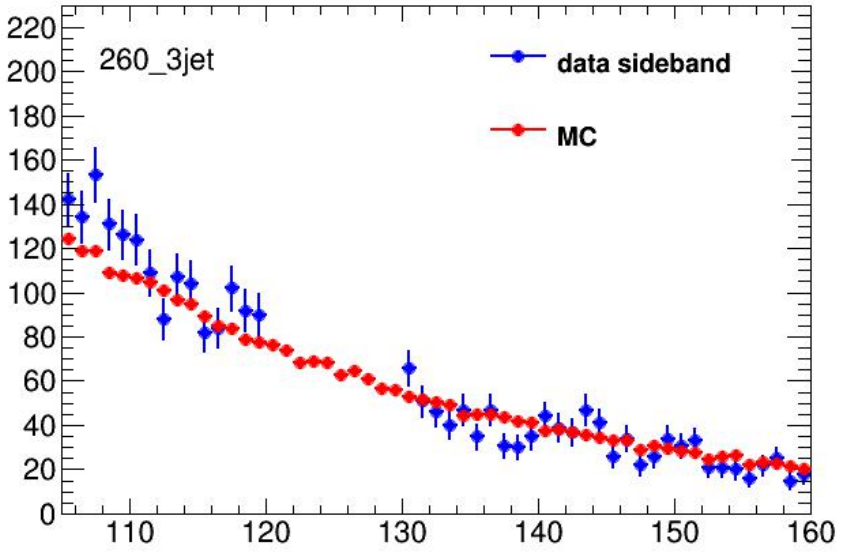
back up

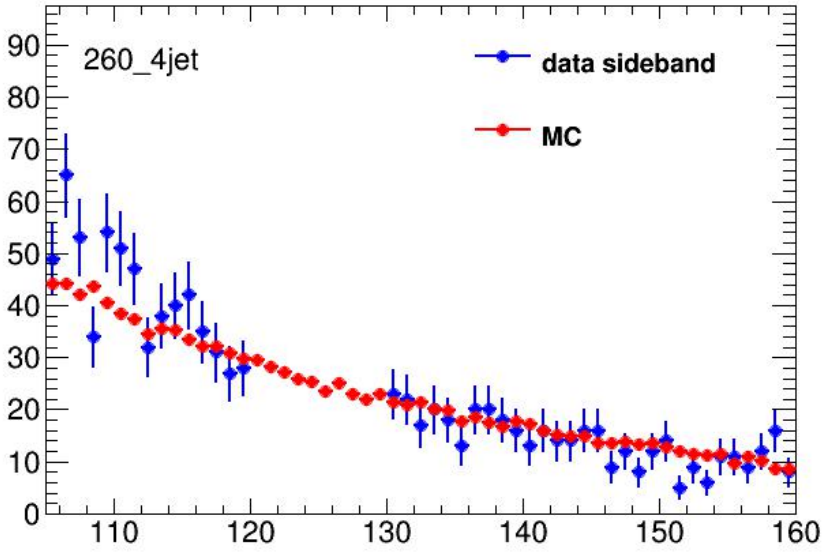
data/MC

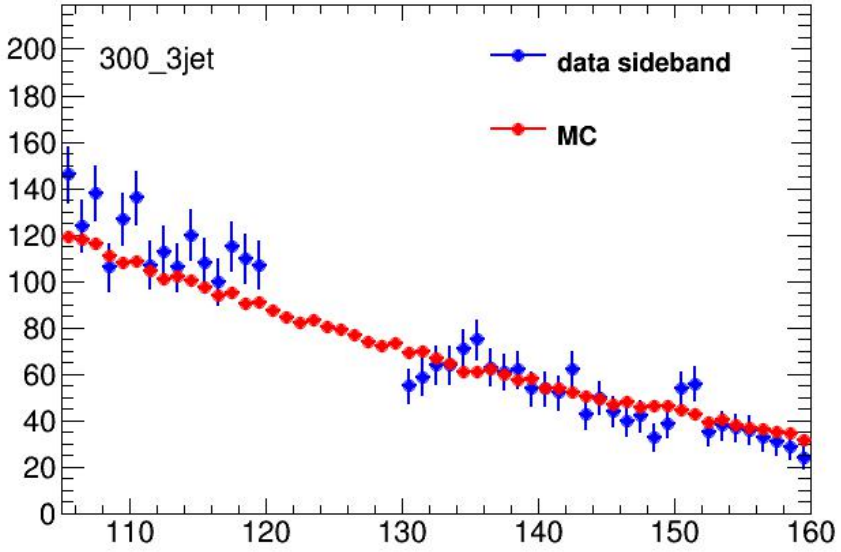

non_res_3jet
data sideband
MC
30
25
20
15
10
5
0
110
120
130
140
150
160

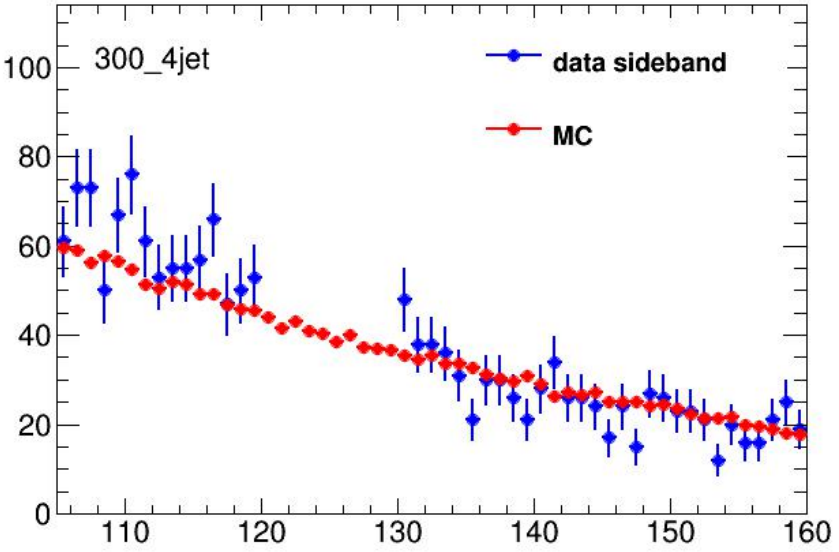

non_res_4jet
data sideband
MC
25
20
15
10
5
0
110
120
130
140
150
160

data/MC

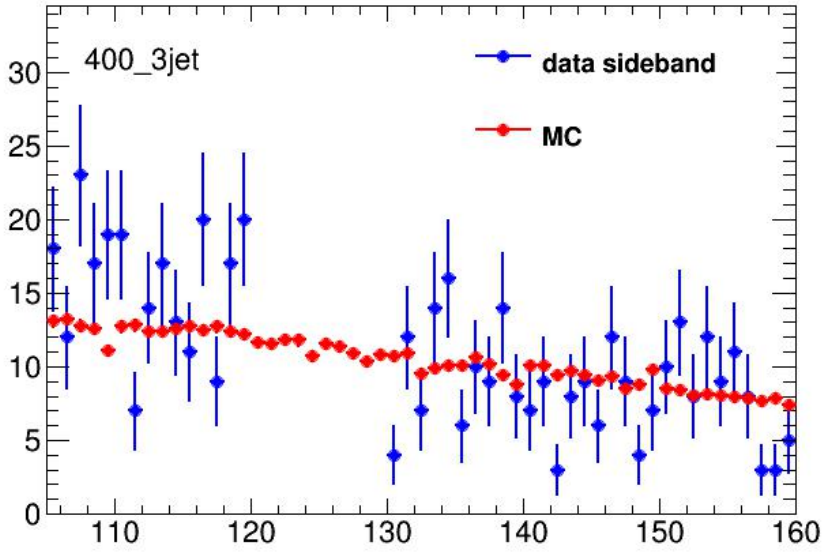

260_3jet
data sideband
MC

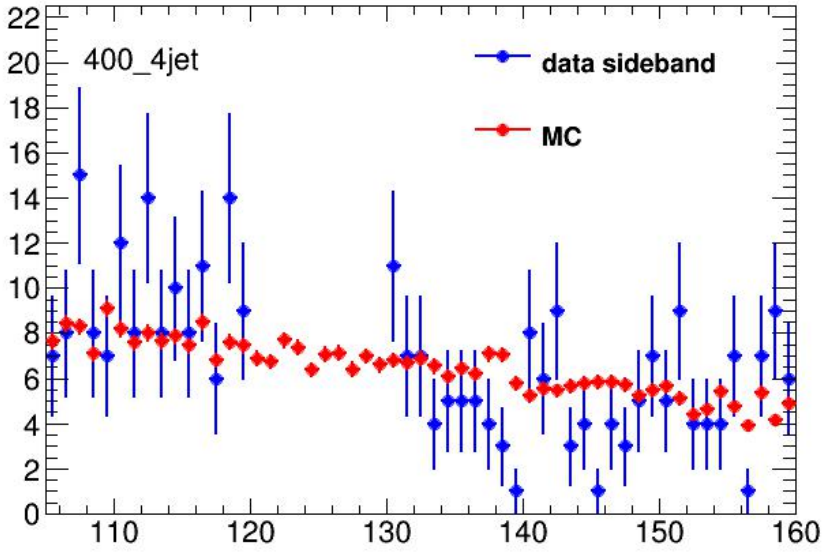

260_4jet
data sideband
MC


300_3jet
data sideband
MC


300_4jet
data sideband
MC

data/MC


400_3jet
data sideband
MC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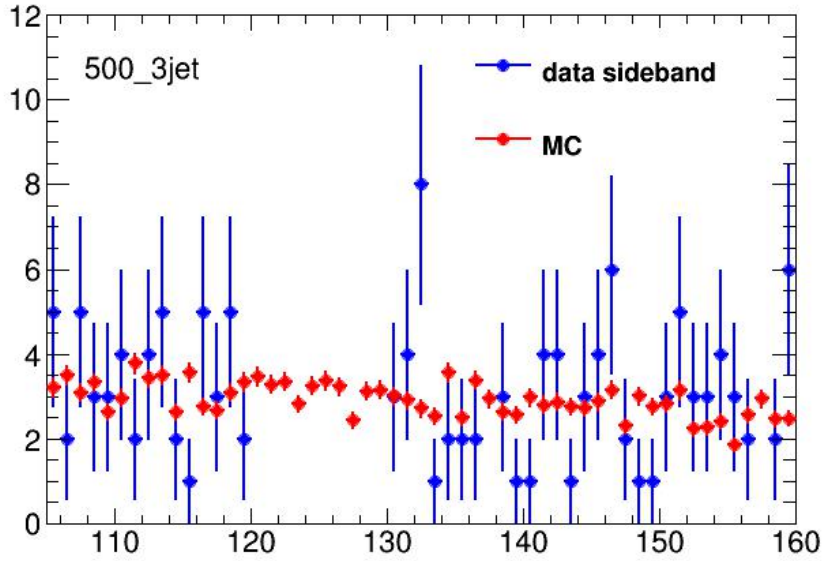
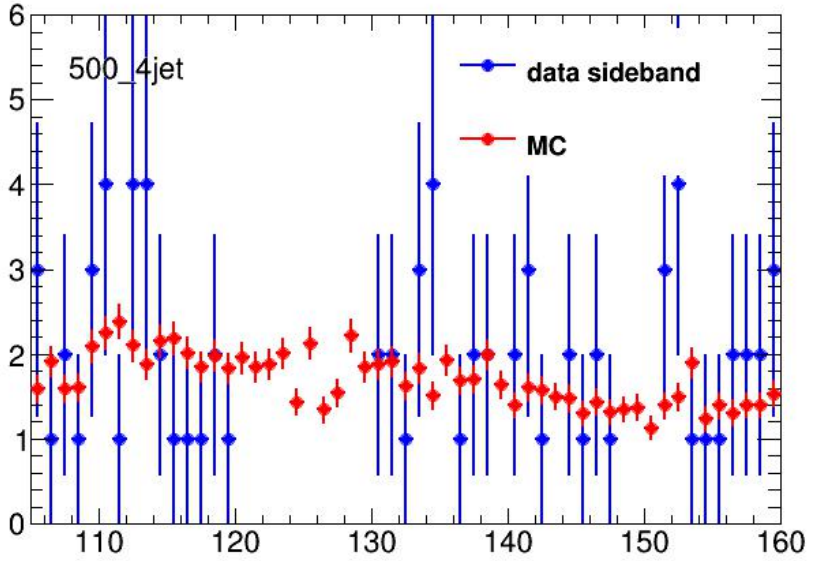
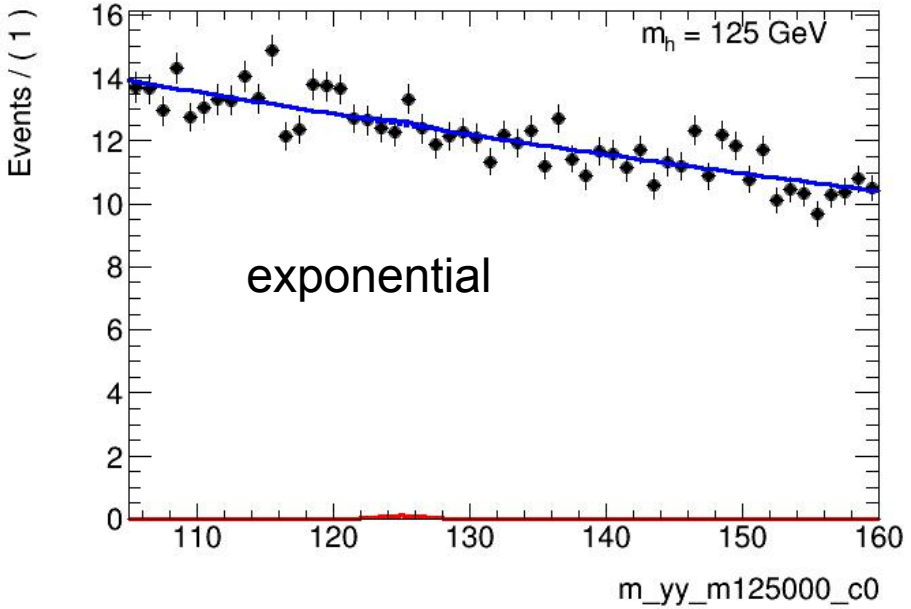
data sideband
MC

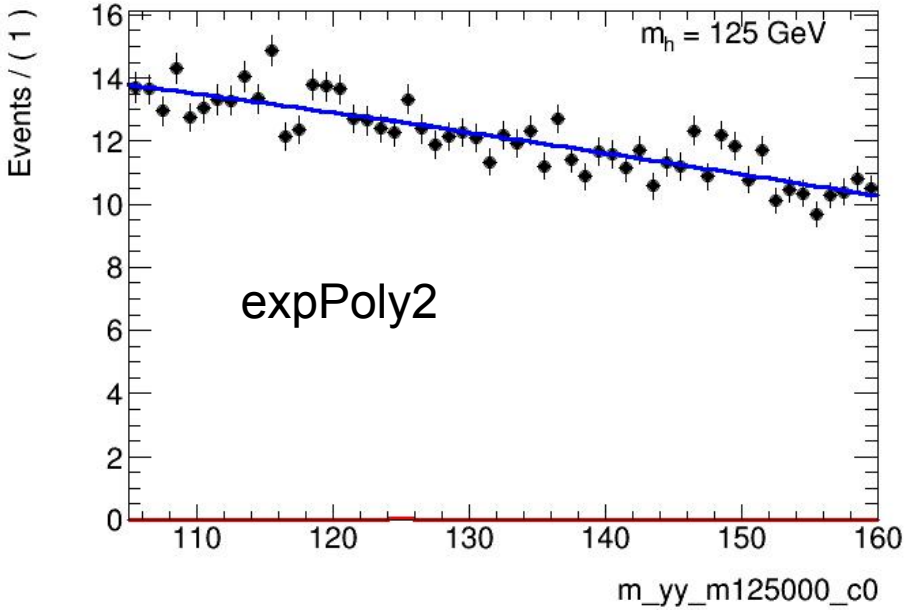

500_3jet
data sideband
MC

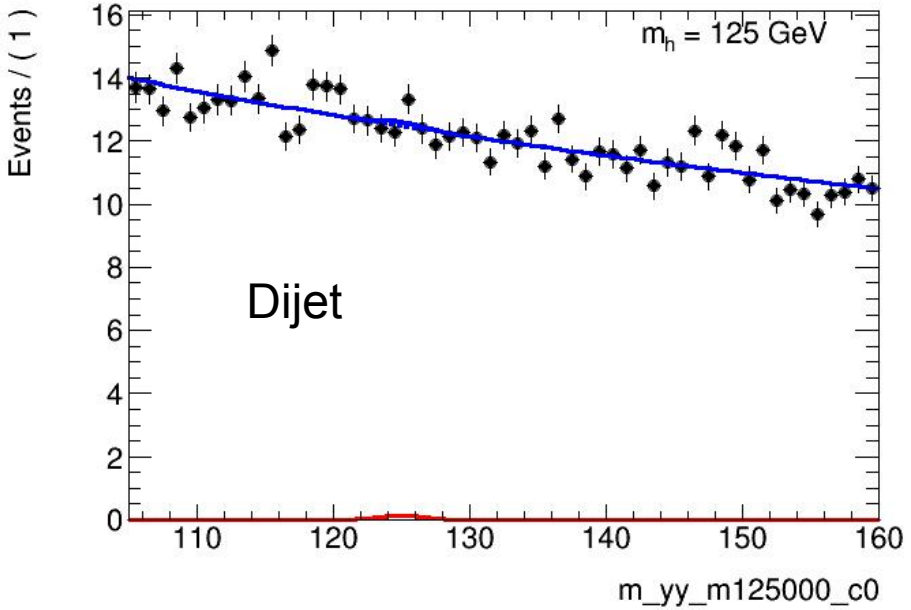

500_4jet
data sideband
MC

non-res 3jet @mh=125

- a







non-res 4jet @mh=125

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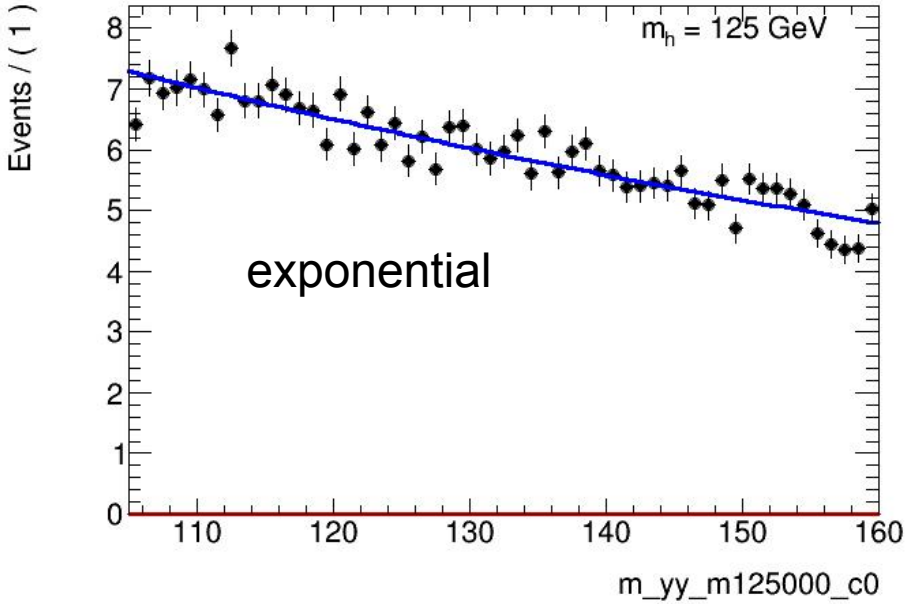

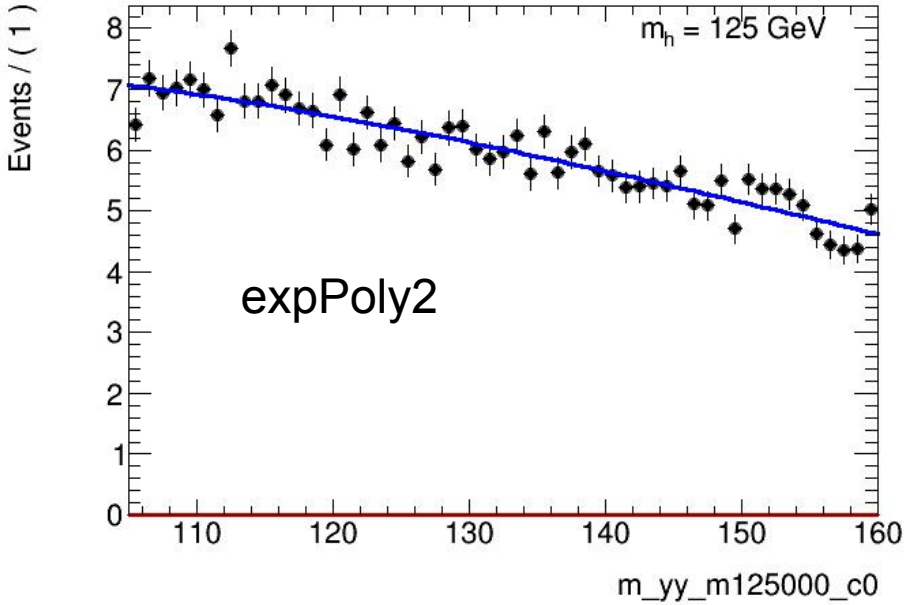

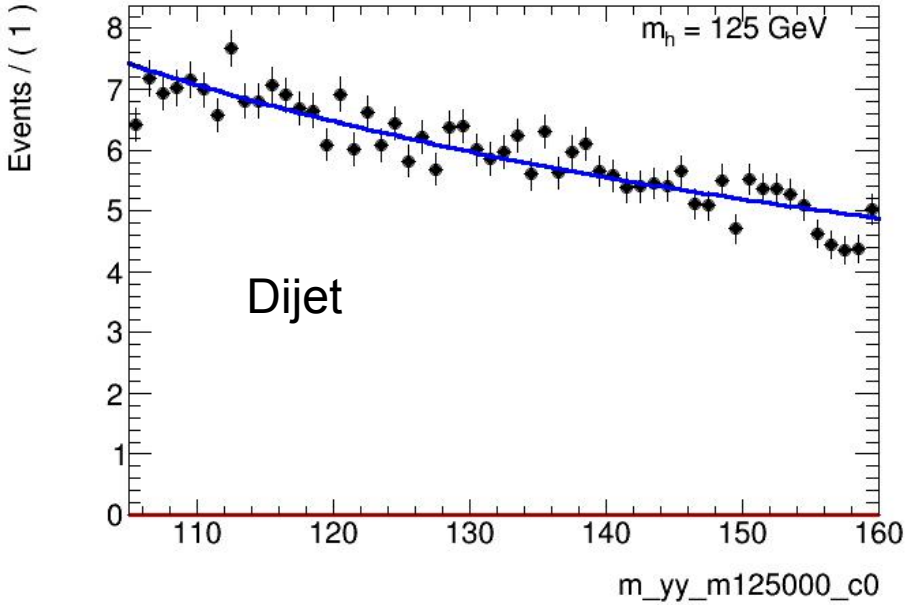

260 3jet @mh=125

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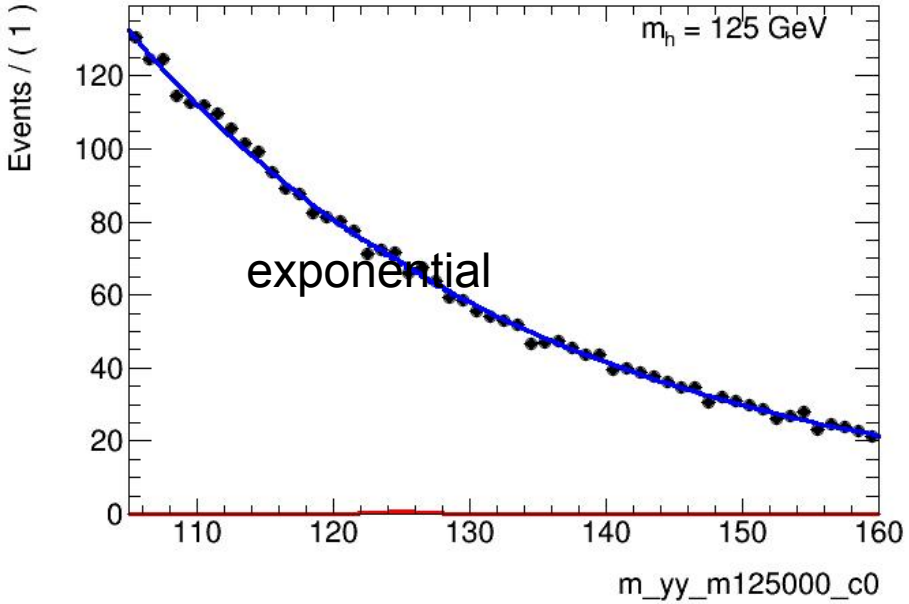

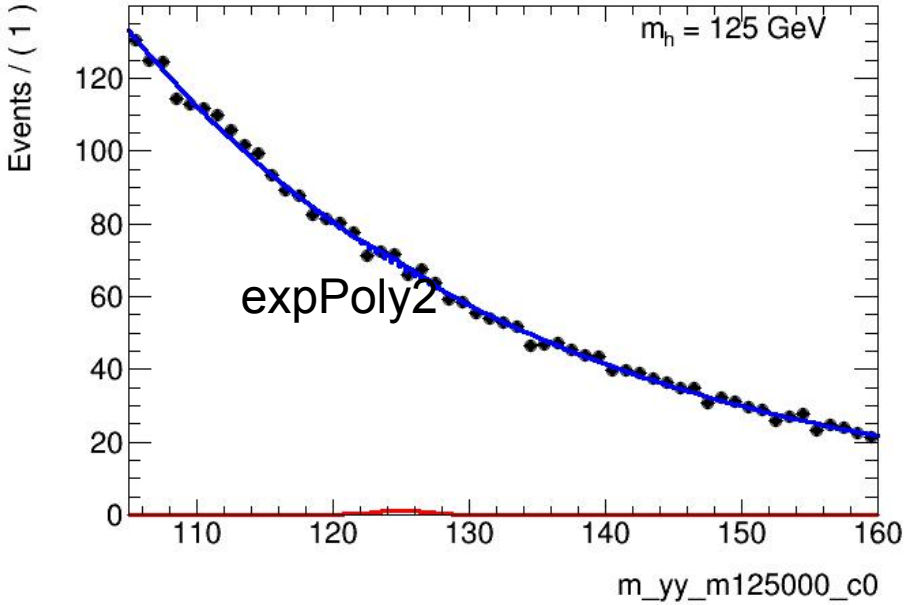

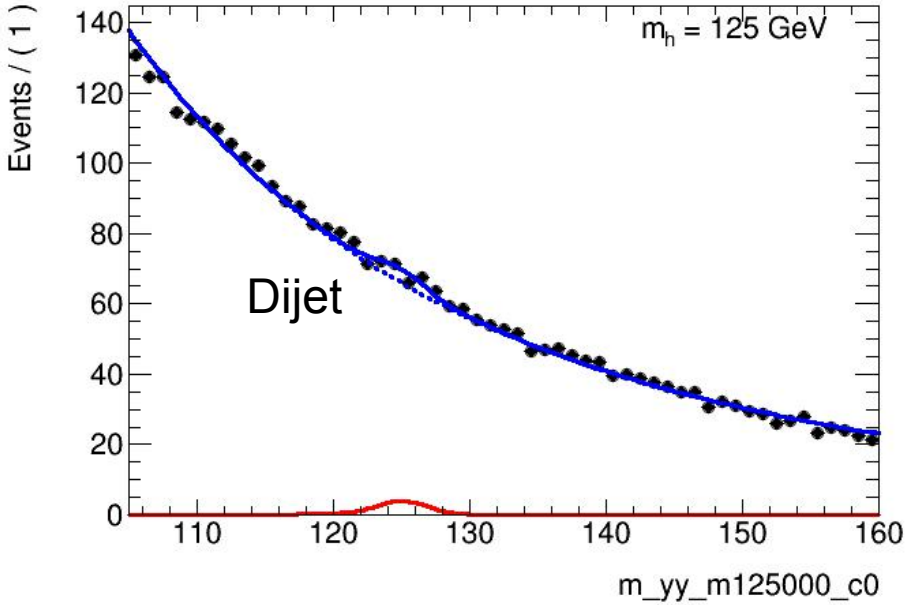

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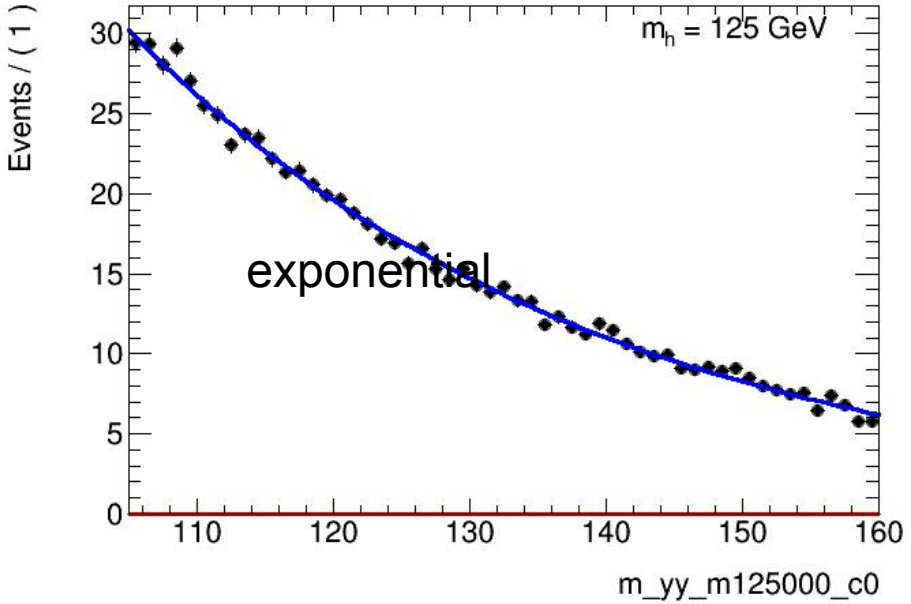

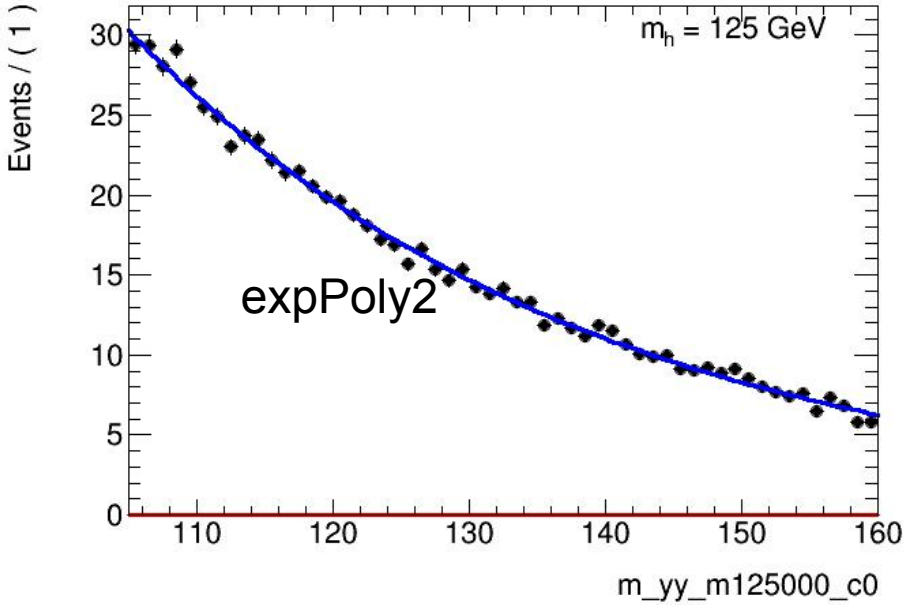

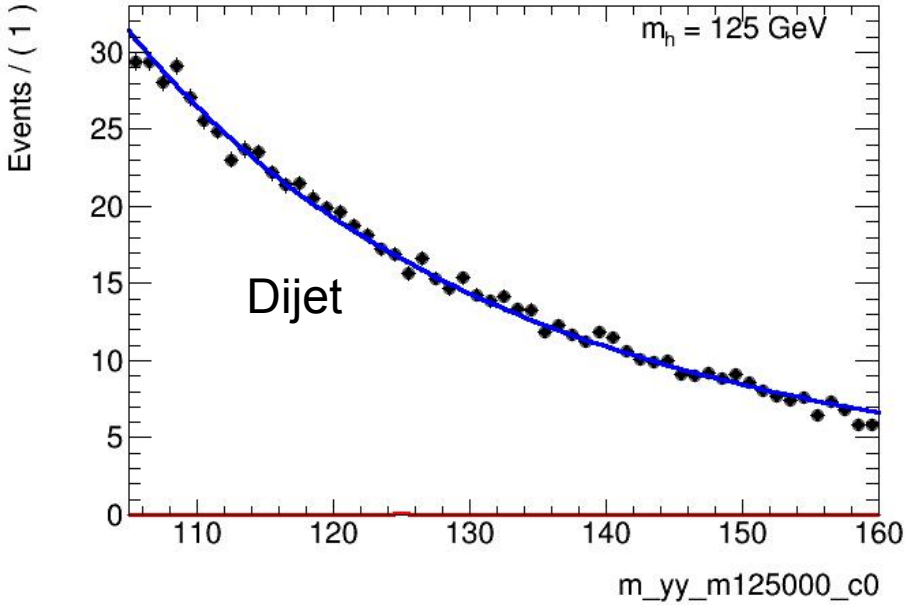

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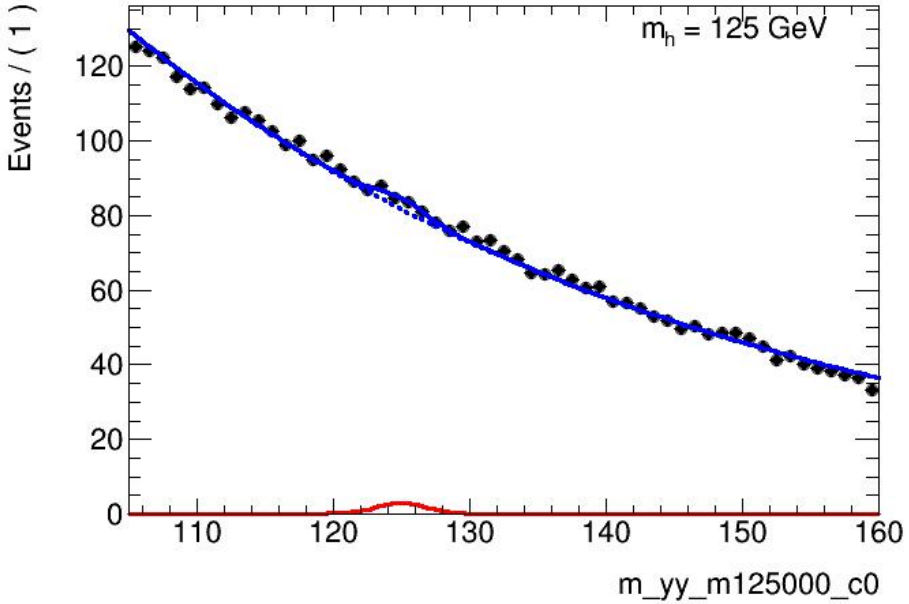

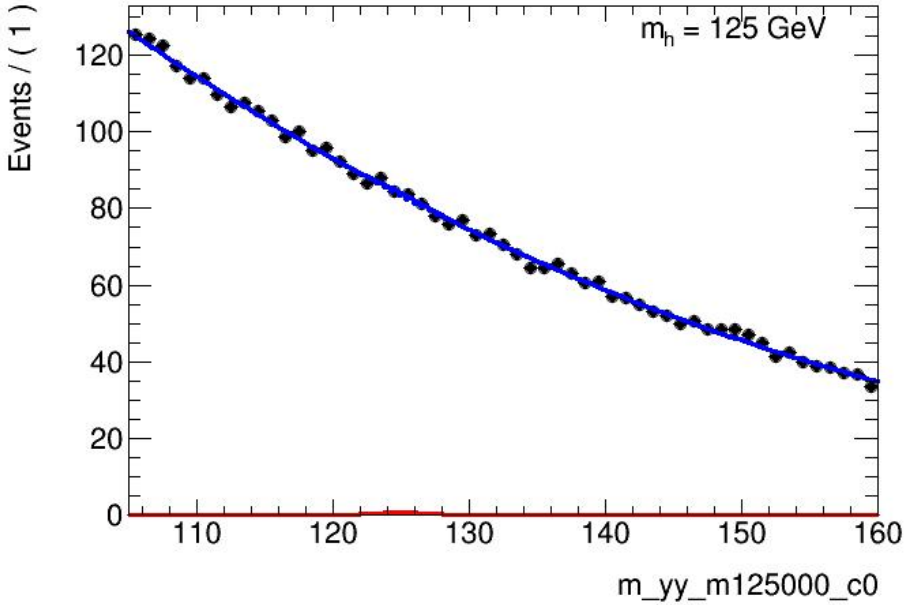

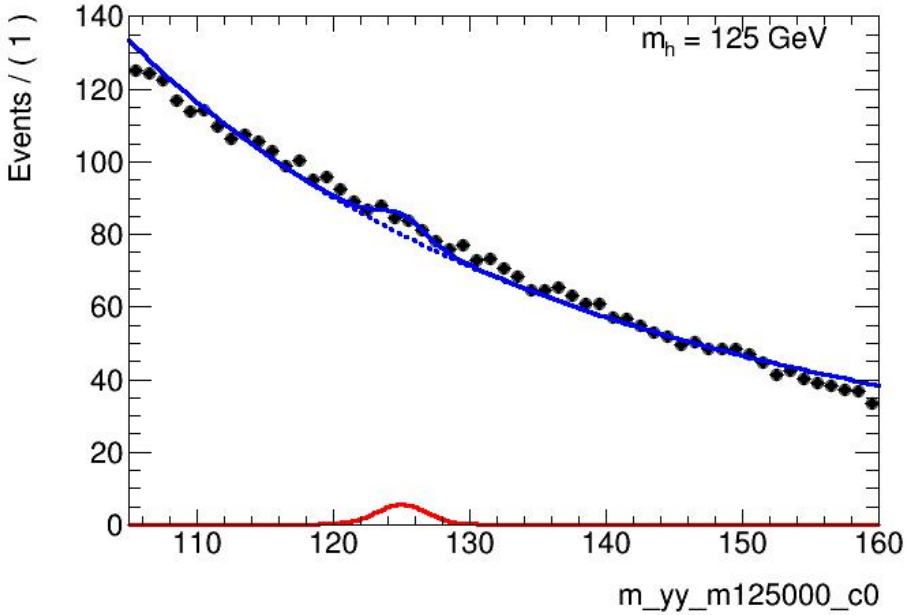

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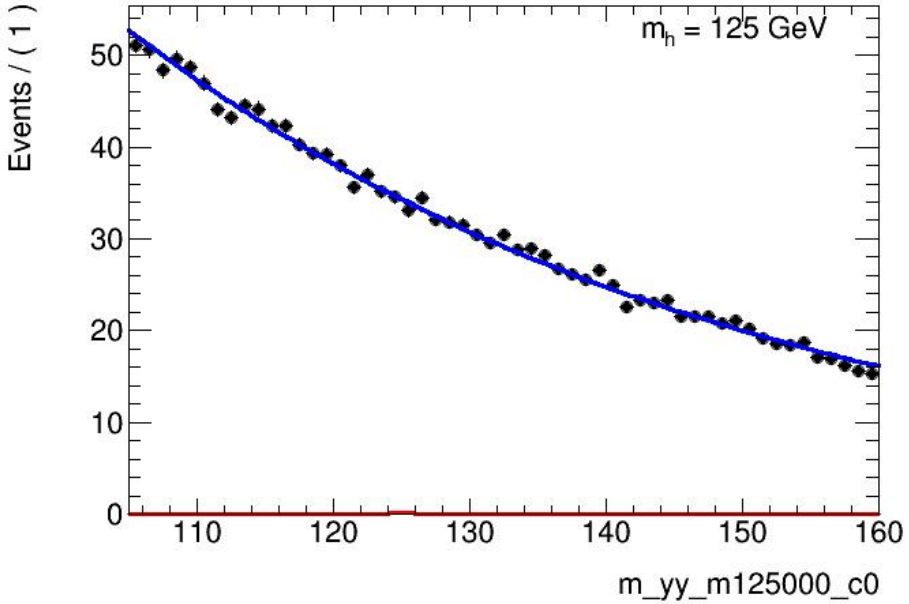

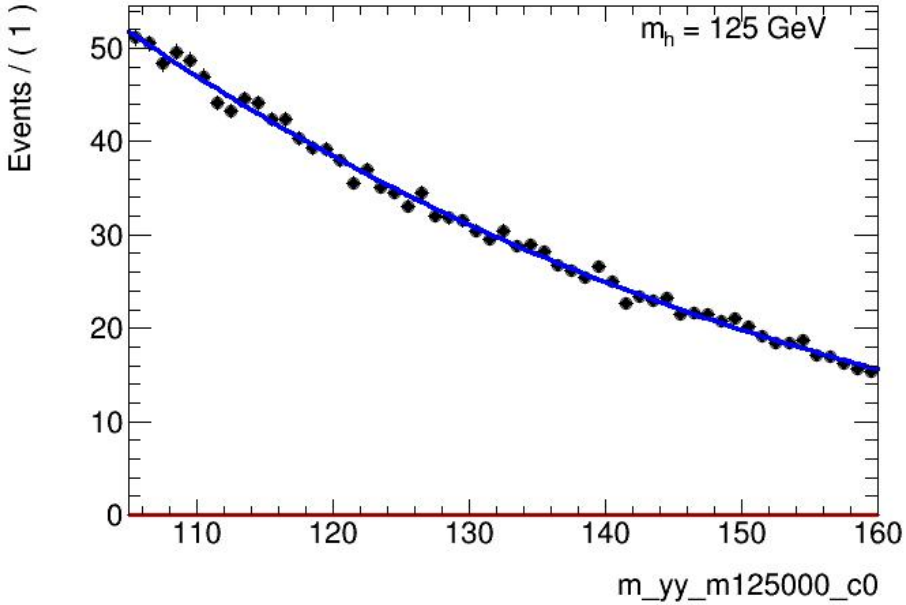

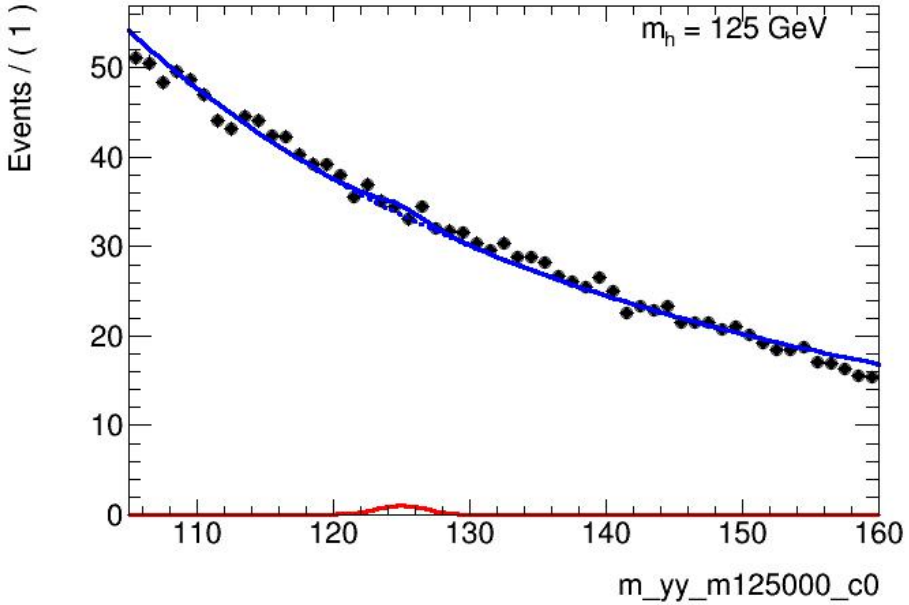

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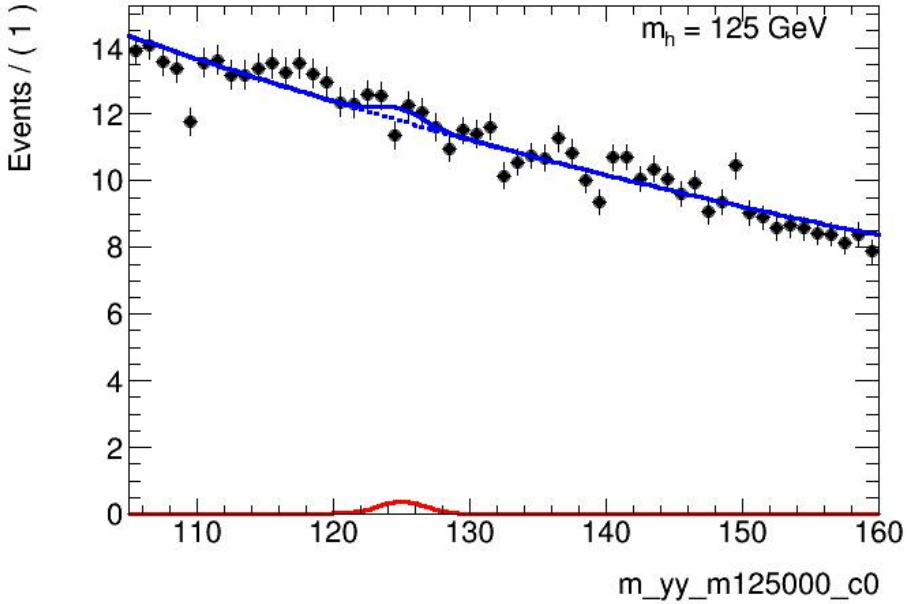

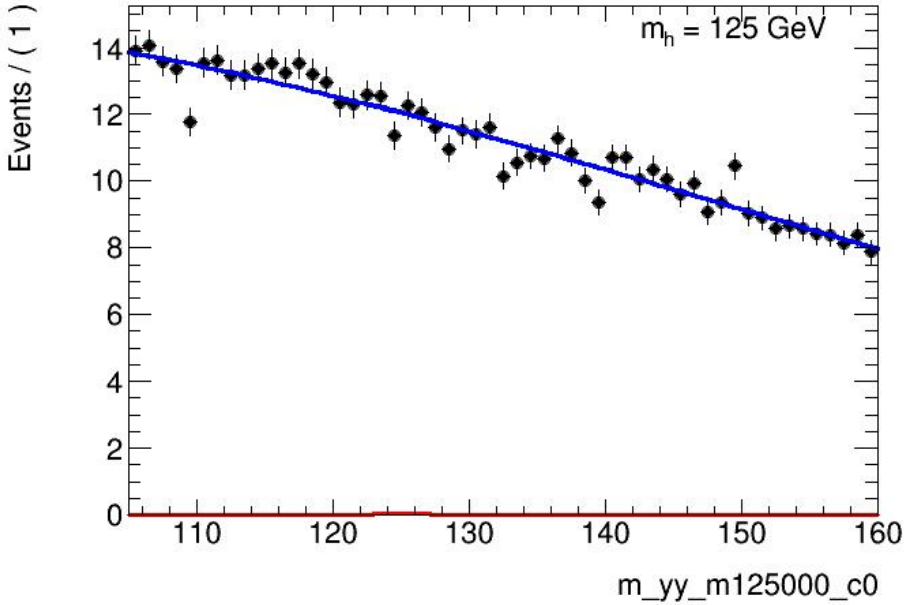

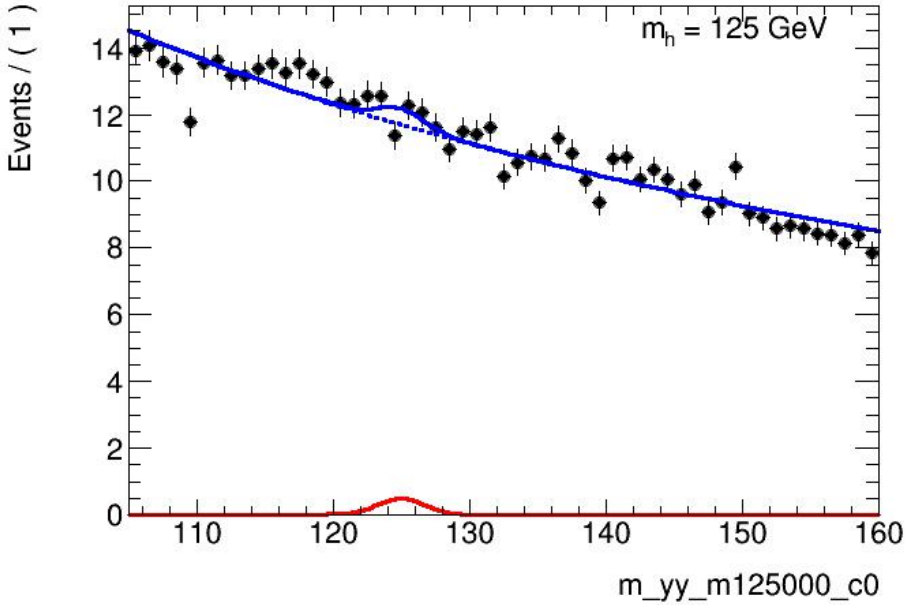

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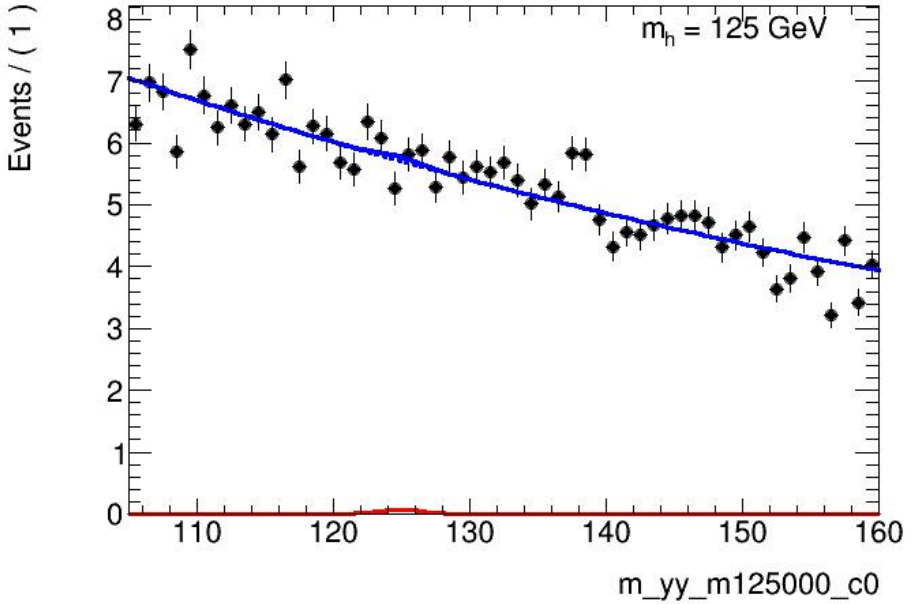

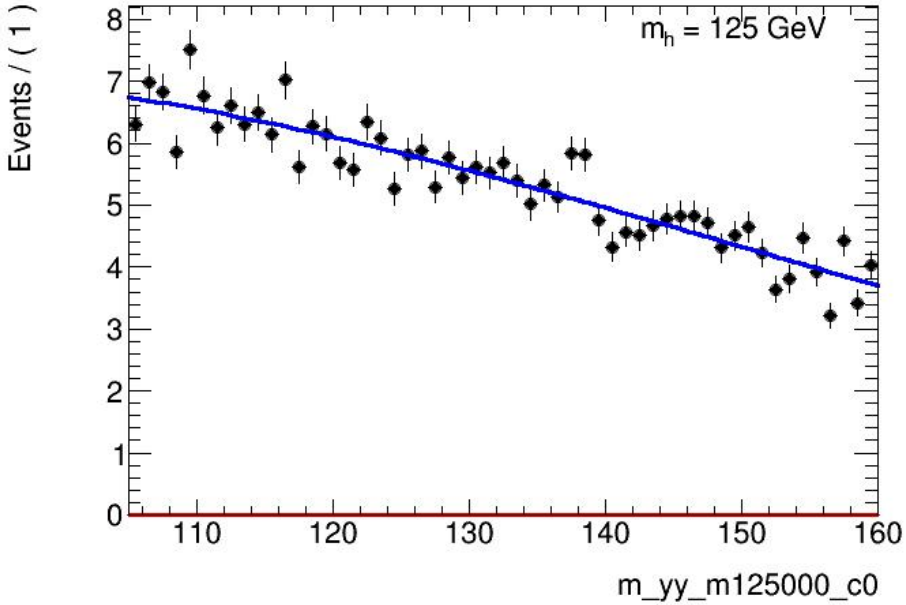

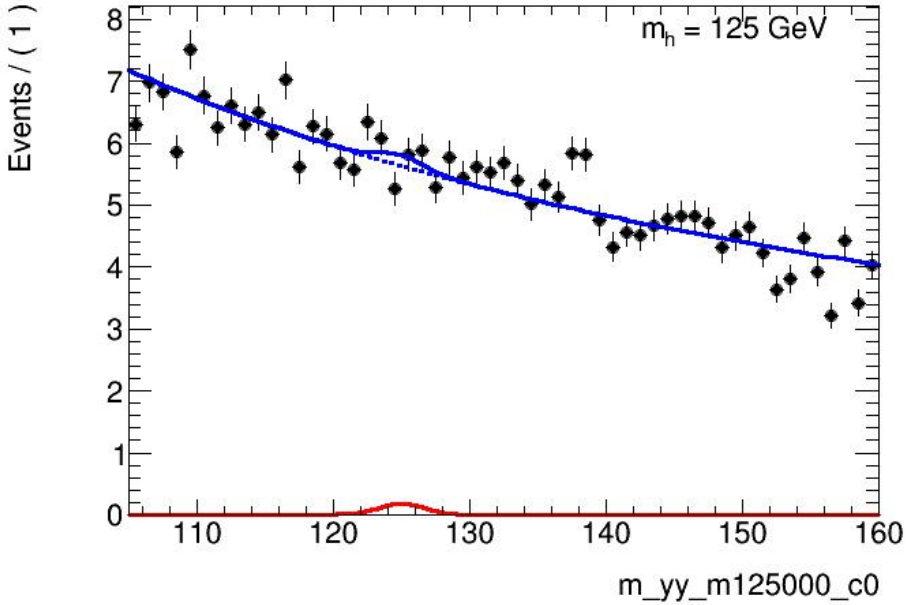

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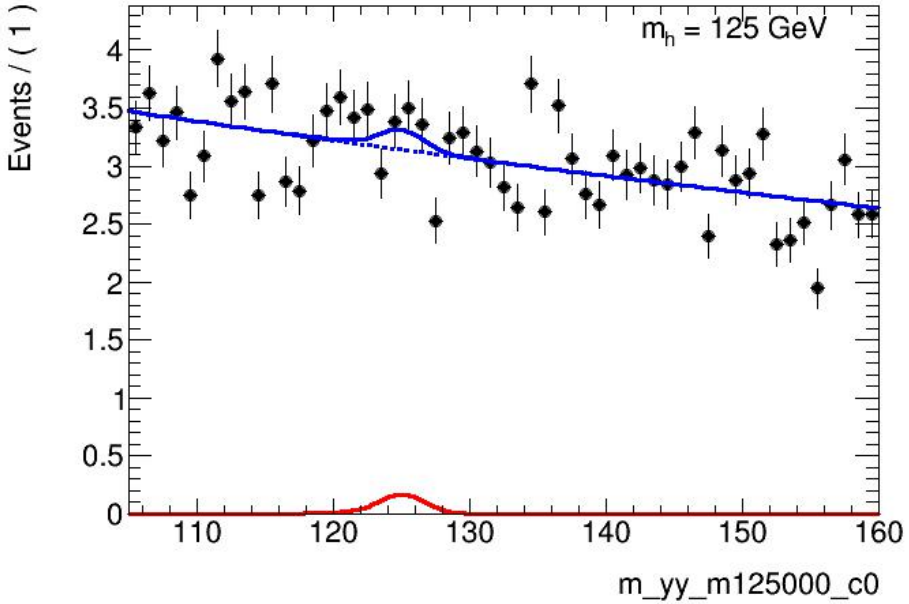
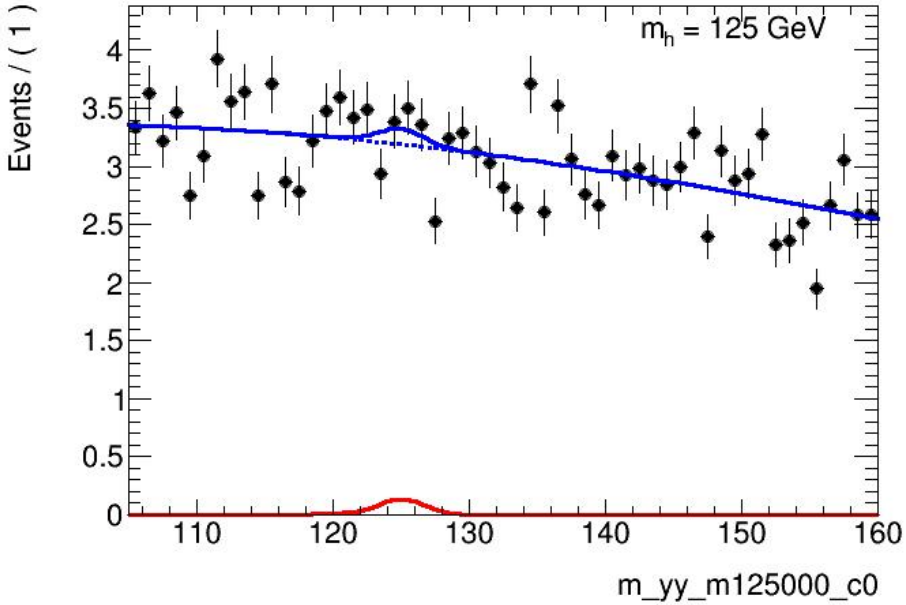
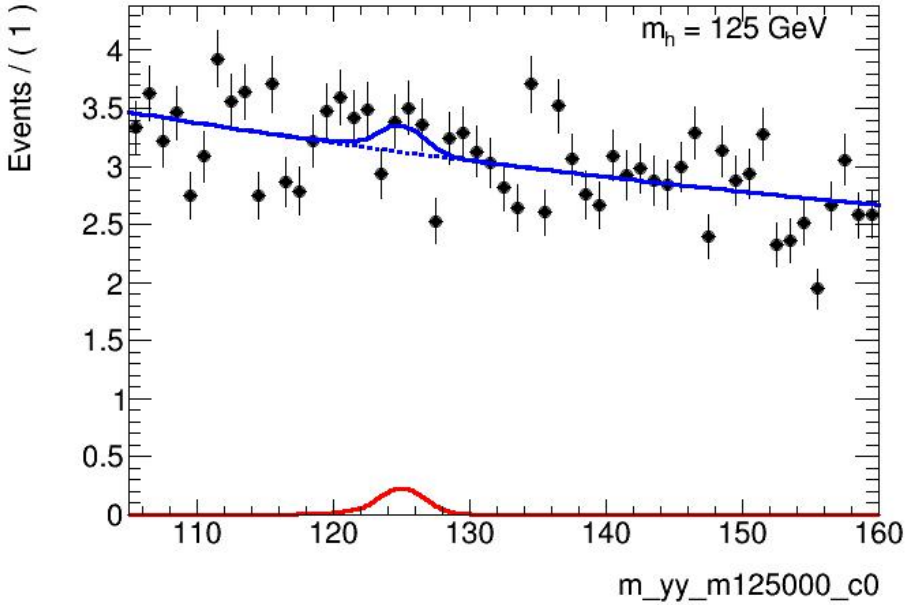
- a







500 4jet @mh=125

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