Status

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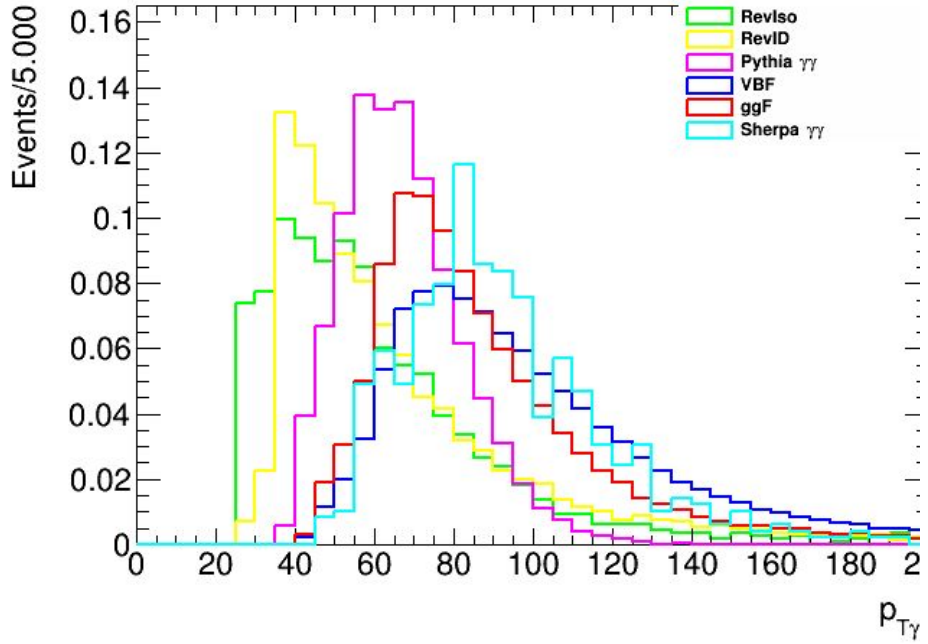
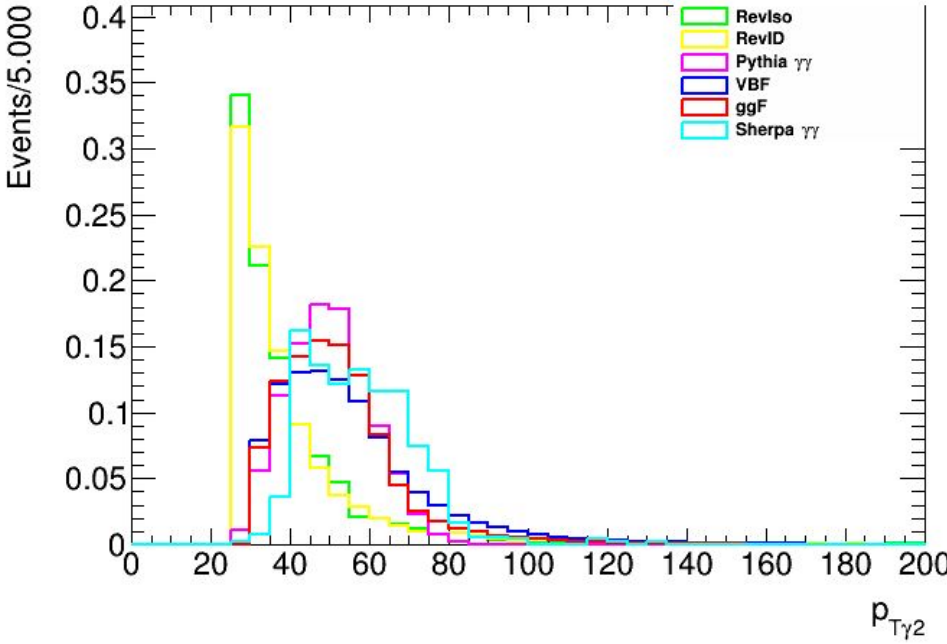
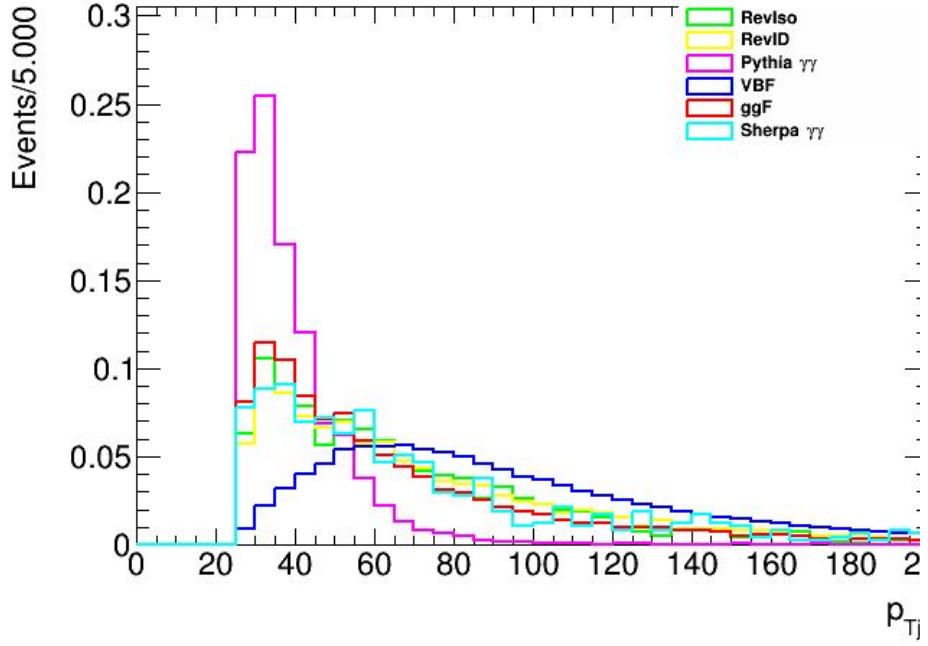
09-07

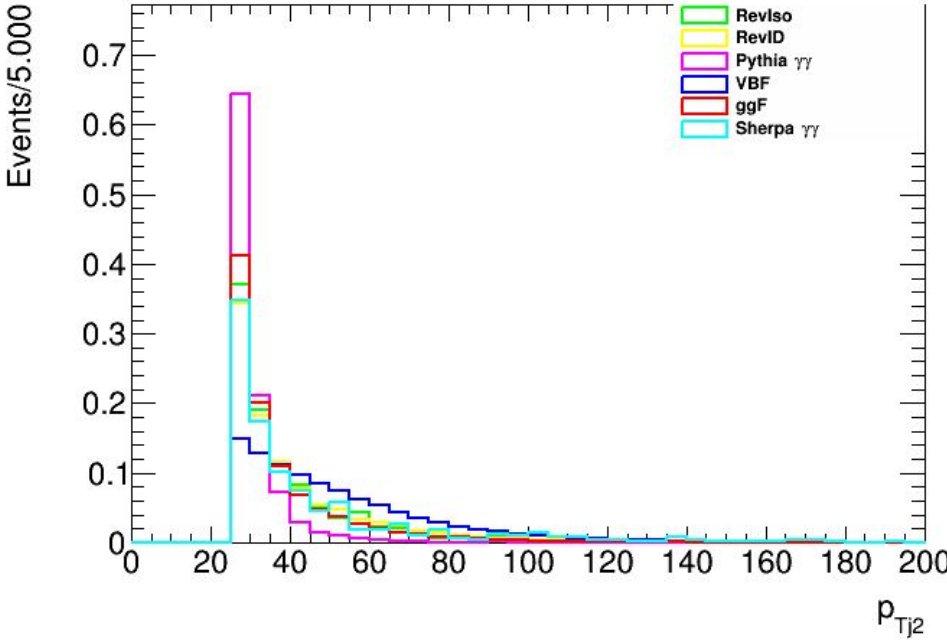
outline

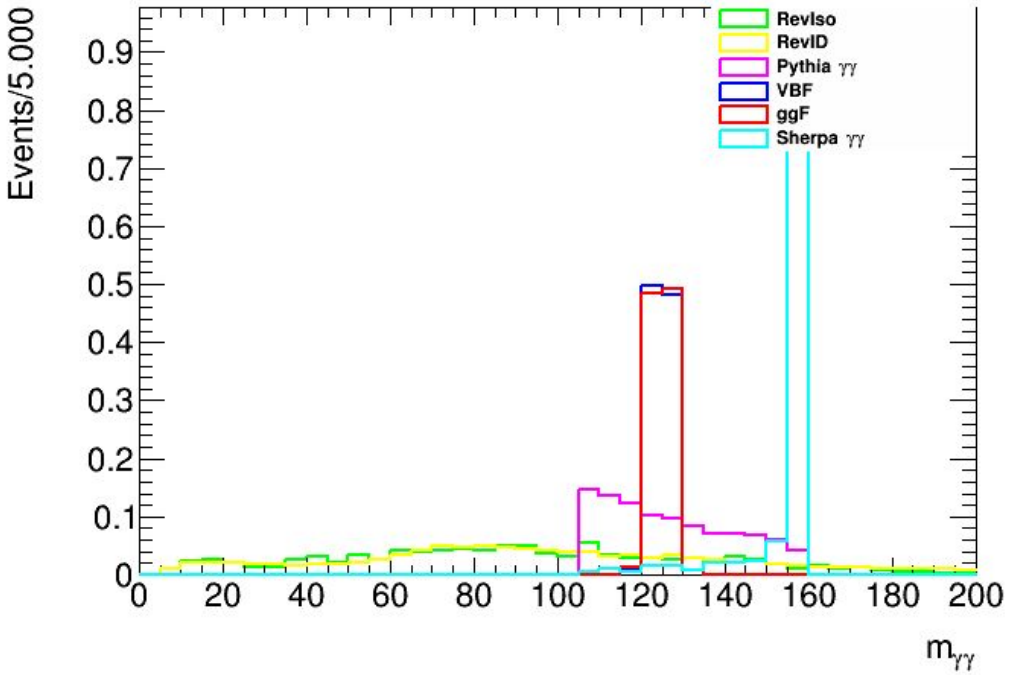
- futher check
  - pythia $\gamma\gamma$,RevID,sherpa $\gamma\gamma$
  - m$\gamma\gamma$ of RevID ,RevIso,pythia and sherpa
  - sherpa +0,1,2jets:500 events after VBF preselection
- signal parameterization:HGamTools
  - function:CB+GA,DoubleCB
  - Single:fit one resonance for each category
  - Parameterization:fit multiple mass point and give yield and shape dependence on mass point
  - memory leak locally,try to fix it (give some histograms the same name)

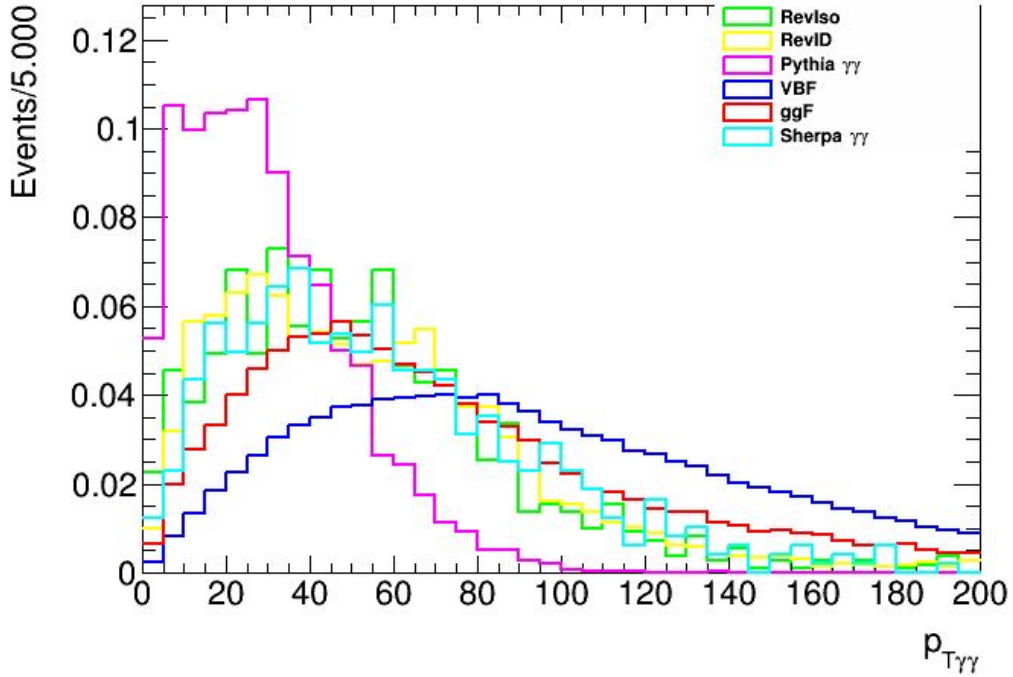

Events/5.000
RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
$p_{T\gamma}$

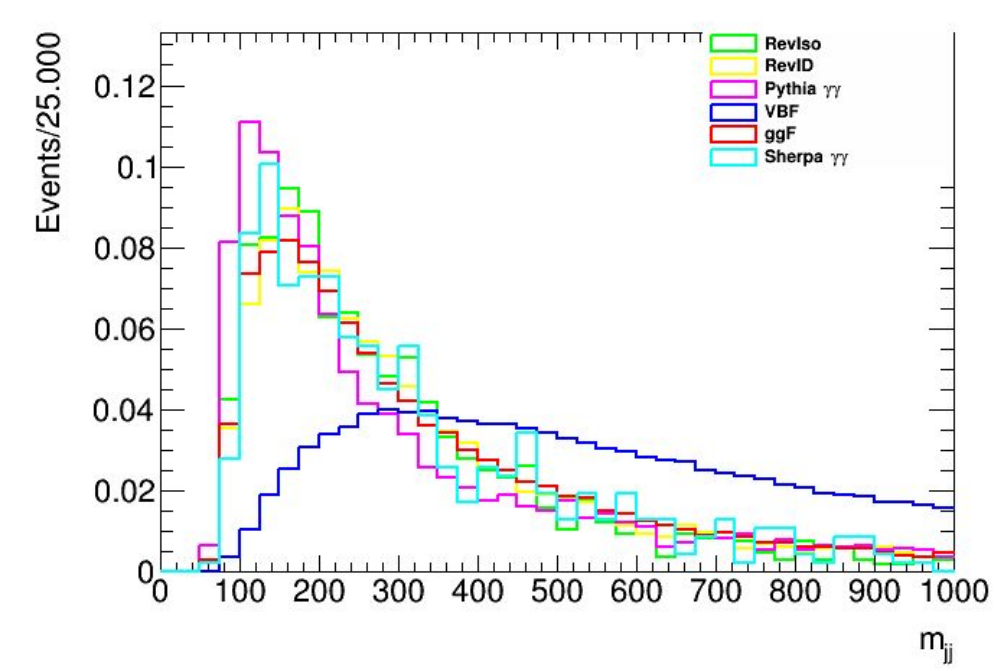

Events/5.000
RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
$p_{T\gamma 2}$

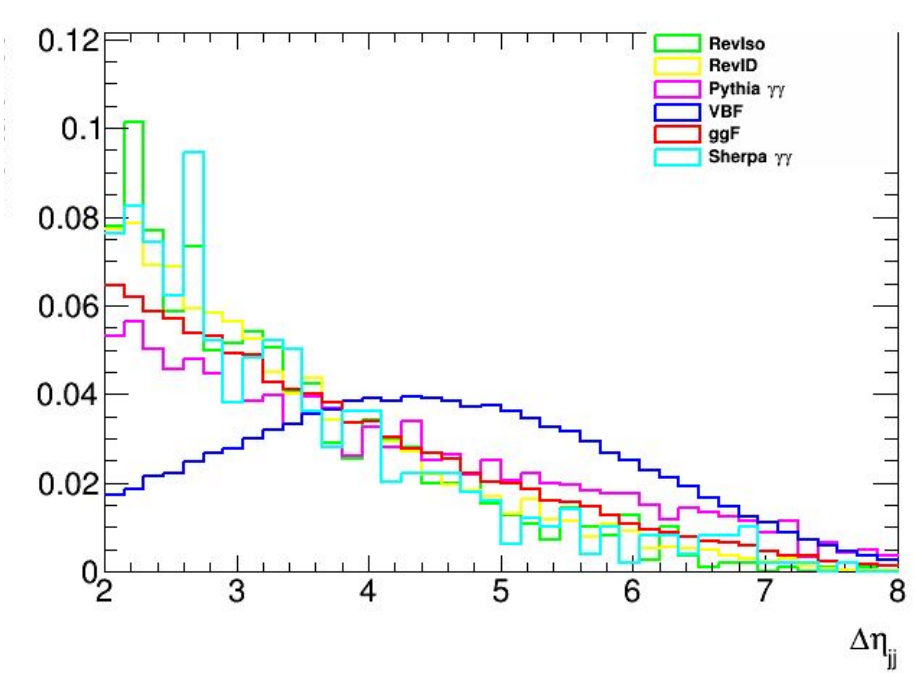

Events/5.000
RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
p_{Tj}

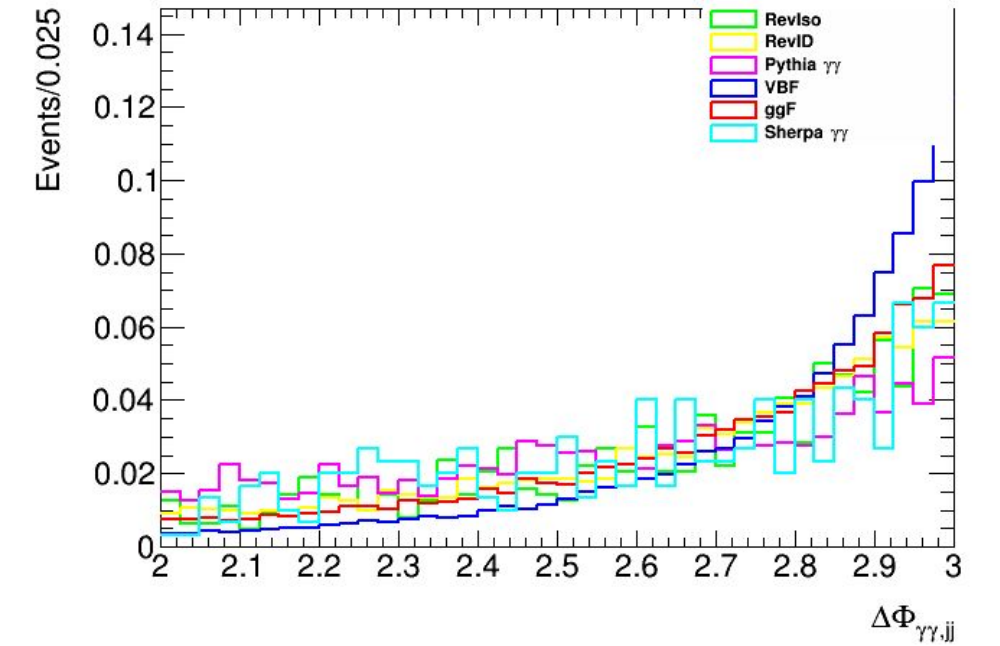

Events/5.000
RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
p_{Tj2}

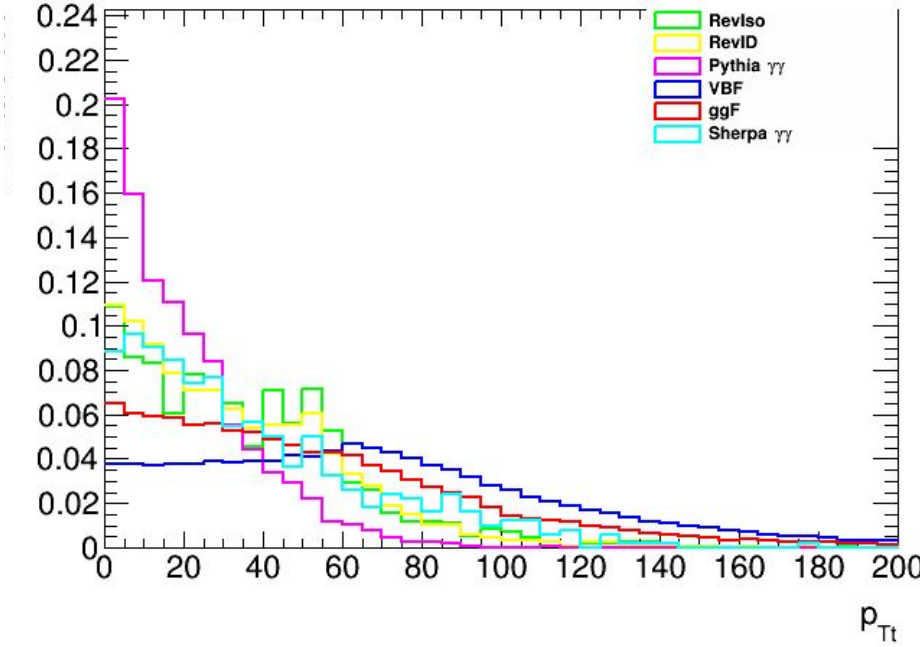

Events/5.000
RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
80
100
120
140
160
180
200
$m_{\gamma\gamma}$

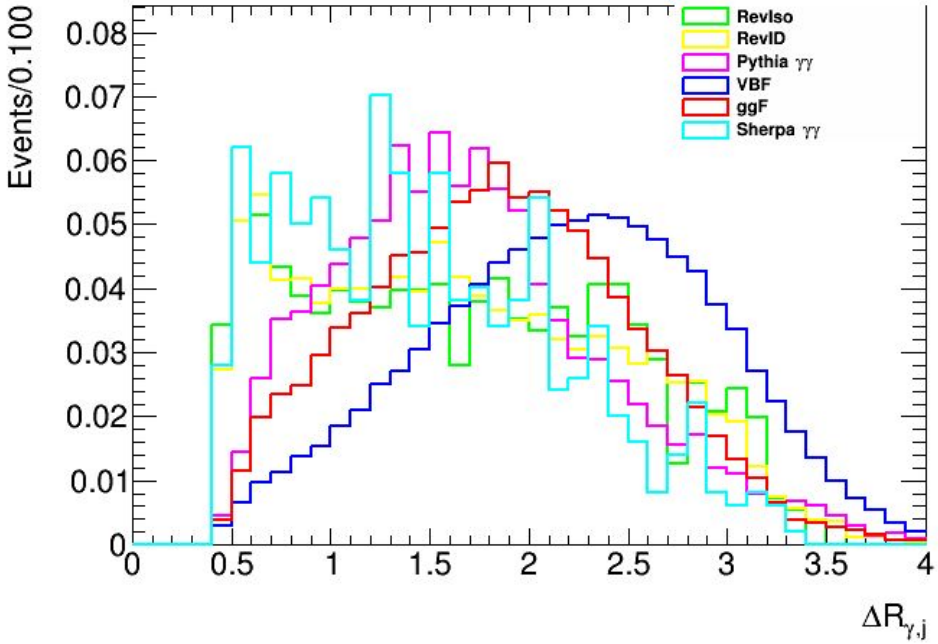

Events/5.000
RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
0.12
0.1
0.08
0.06
0.04
0.02
0
0
20
40
60
80
100
120
140
160
180
200
$p_{T\gamma\gamma}$

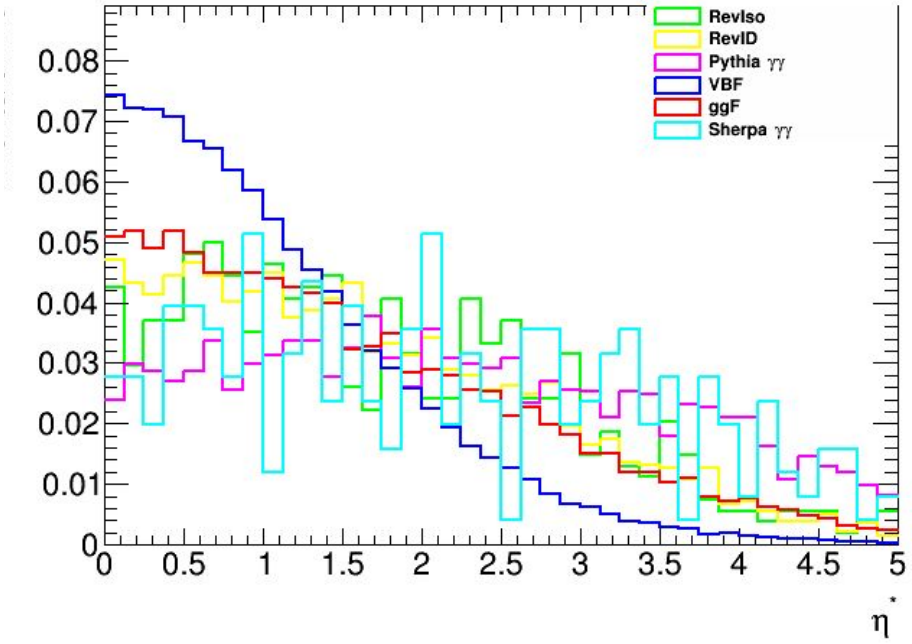

Events/25.000
RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
0.12
0.1
0.08
0.06
0.04
0.02
0
0 100 200 300 400 500 600 700 800 900 1000
m_jj


RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
0.12
0.1
0.08
0.06
0.04
0.02
0
2 3 4 5 6 7 8
Δη_jj


Events/0.025
RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3
ΔΦ_γγ,jj


RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0 20 40 60 80 100 120 140 160 180 200
p_Tt

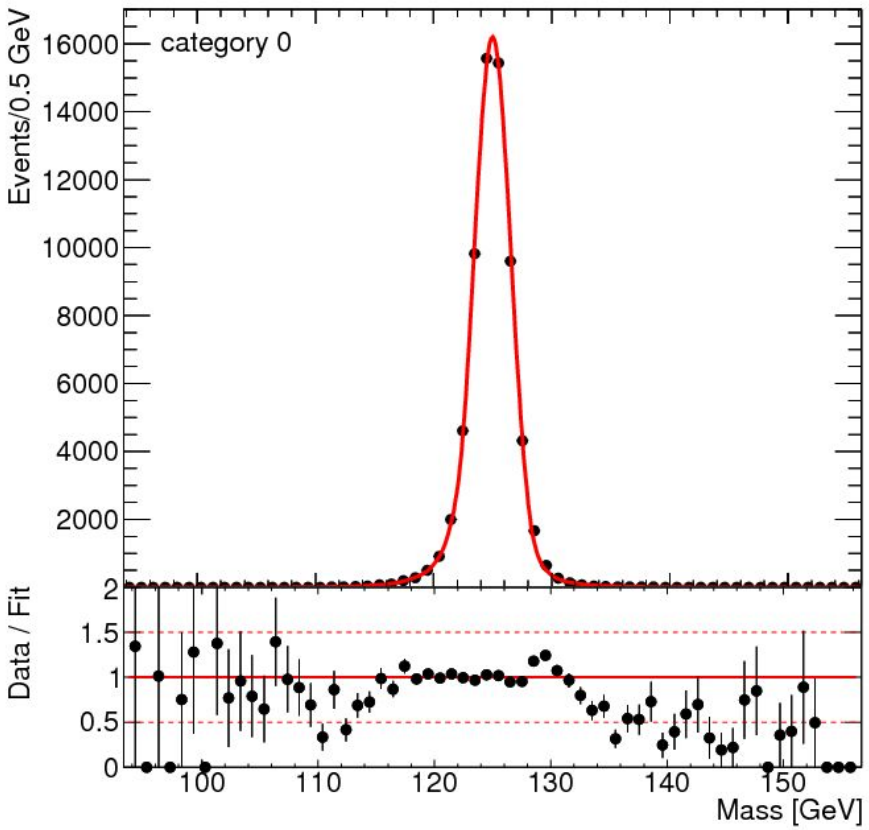

RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
Events/0.100
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
0.5
1
1.5
2
2.5
3
3.5
4
ΔR_γ,j

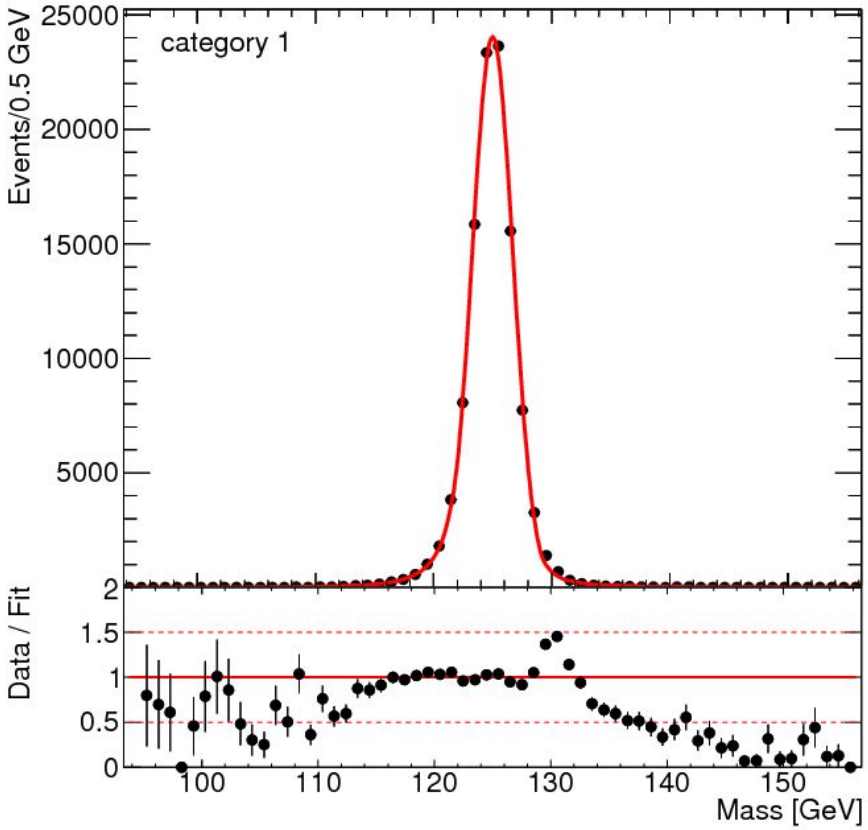

RevIso
RevID
Pythia γγ
VBF
ggF
Sherpa γγ
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
η*

conclusion

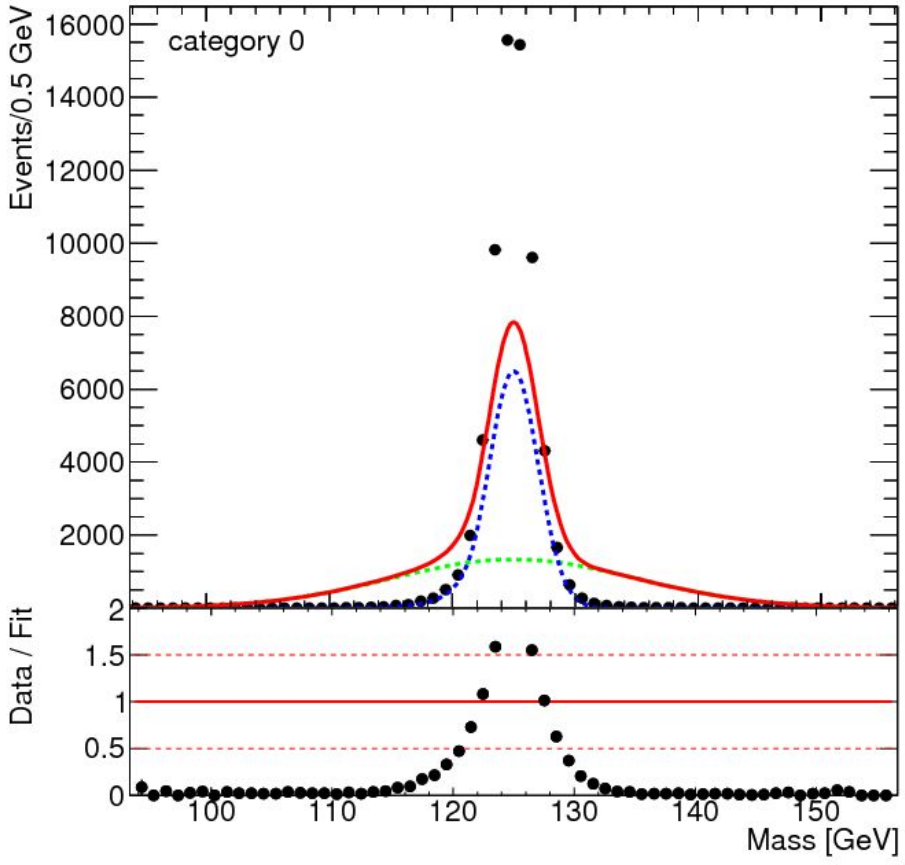
- RevIso,RevID:
  - soft photons,invMass flat
  - shall we do invMass cut?
  - similar varable distribution
- Pythia $\gamma\gamma$:
  - soft jets(ok to be used as diphton bkg?)
- Sherpa $\gamma\gamma$:(MxAOD by myself)
  - 301575 events pass diphoton preselection
  - 3551 events pass invMass events
  - 500 events pass VBF preselection
  - another sherpa gamgam+0,1,2,3jets running

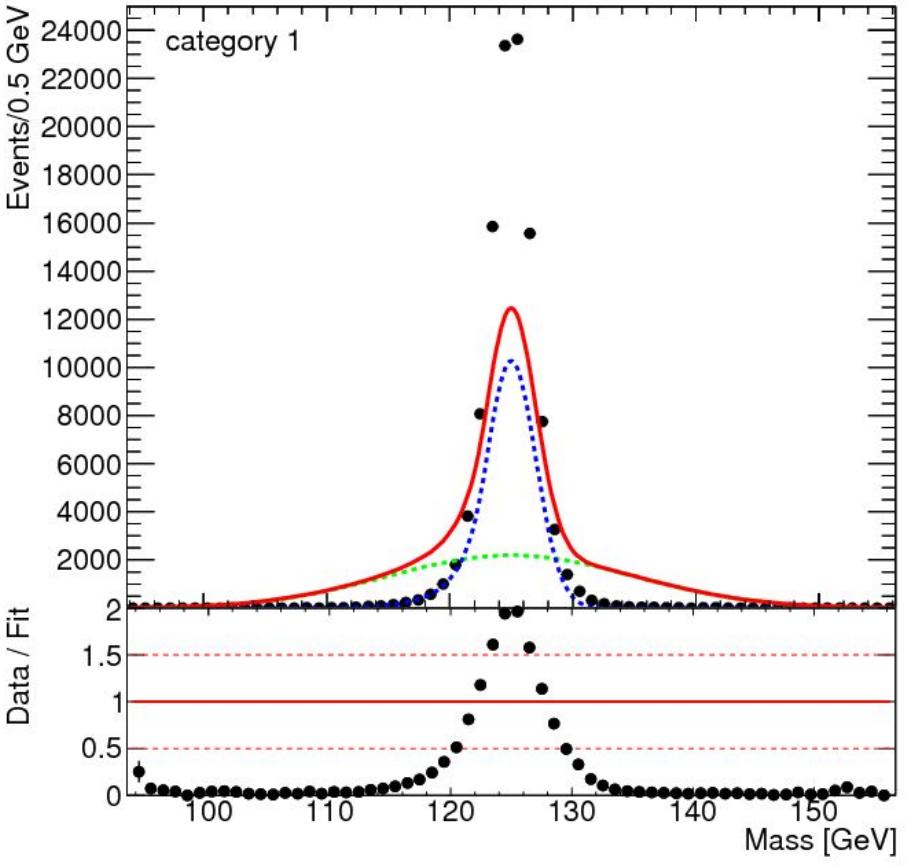
signal parameterization





- fit tight and loose category with DoubleCB





- fit tight and loose category with CB+GA
- not good!

Parameterizations of Variables

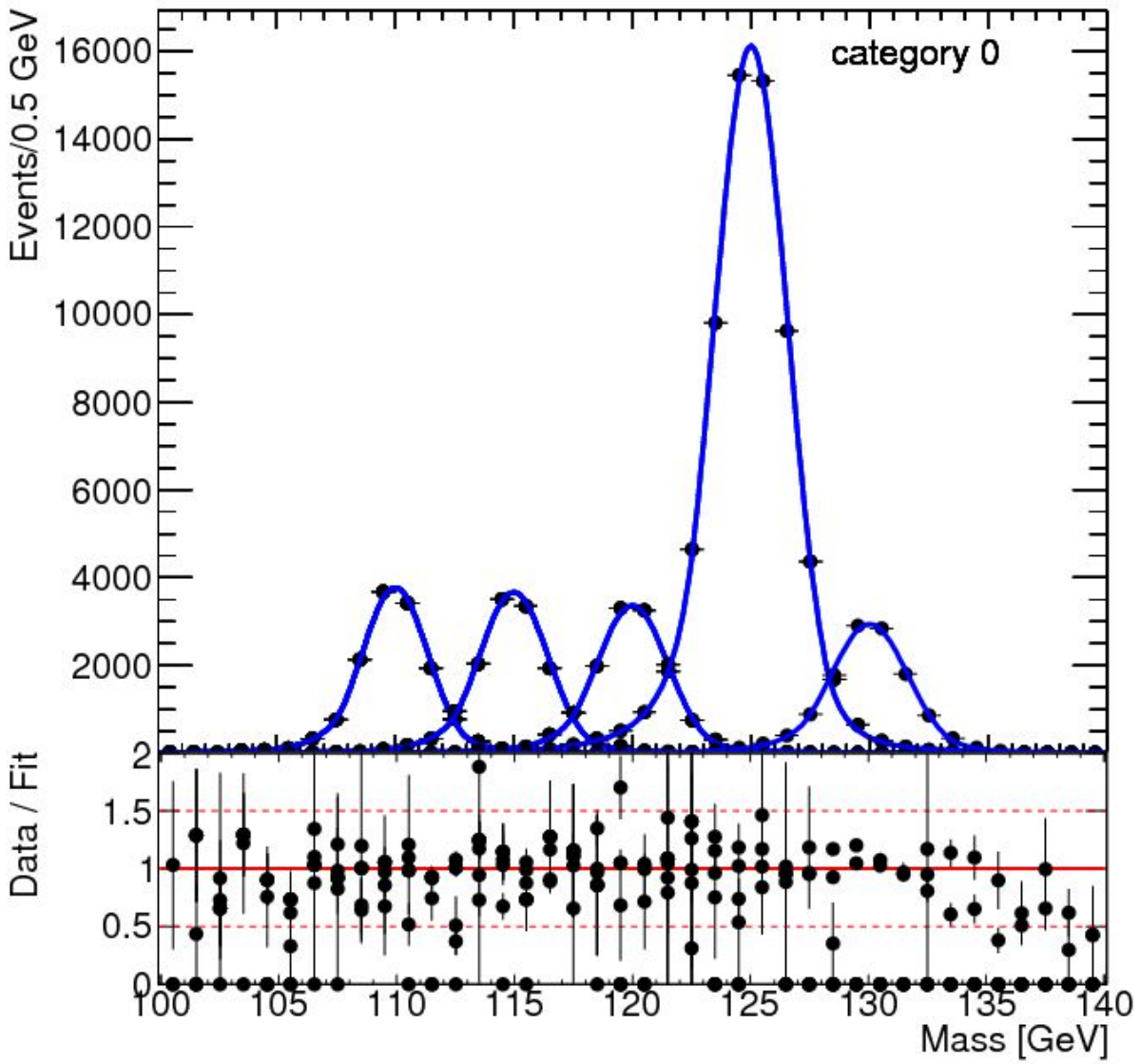
Double-sided Crystal Ball function

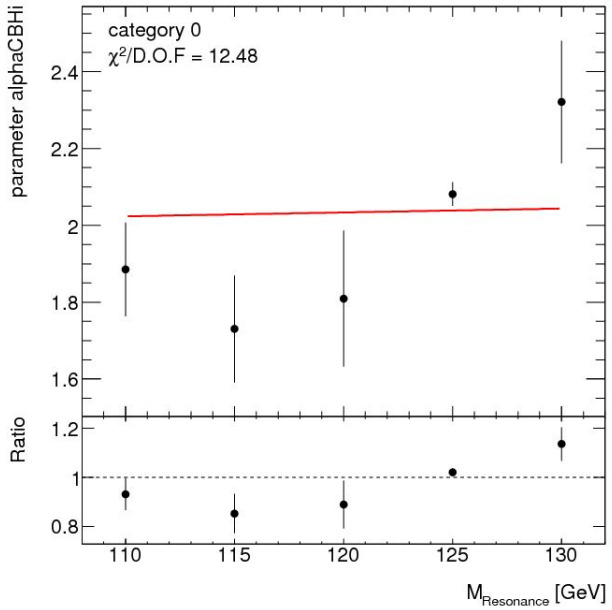
Fit variable	Parameterization	Functional Form
μ (mean)	quadratic	$a_2 m_R^2 + a_1 m_R + a_0$
σ (width)	linear	$a_1 m_R + a_0$
α_{Low}	custom	$a_0 + [a_1 / (a_2 + \mathbf{m_R})]$
N_{Low}	constant	a_0
α_{High}	linear	$a_1 \mathbf{m_R} + a_0$
N_{High}	constant	a_0

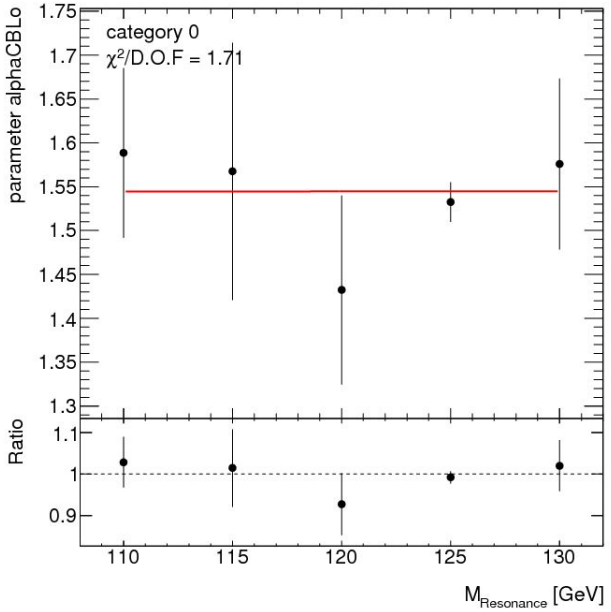
We plan to enable user modifications to parameterization functions soon

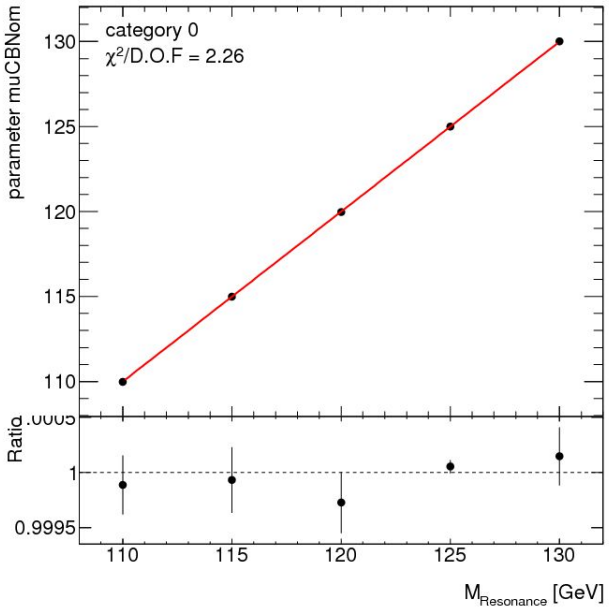
Crystal Ball + Gaussian function

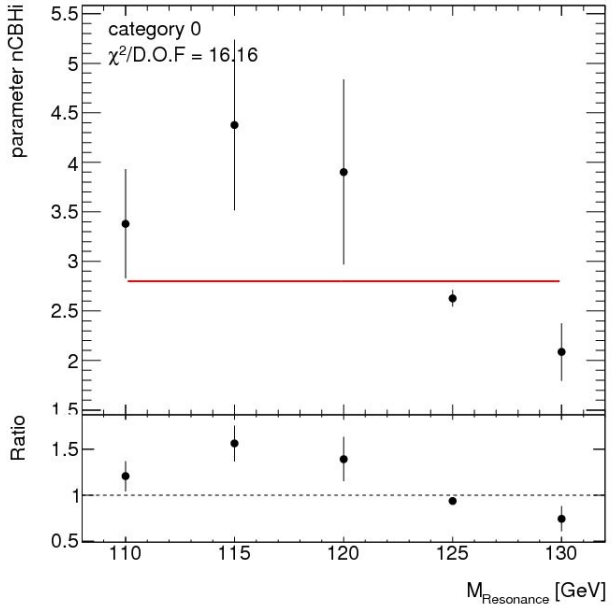
Fit variable	Parameterization	Functional Form
μ (mean)	quadratic	$a_2 m_R^2 + a_1 m_R + a_0$
σ_{CB} (CB width)	linear	$a_1 m_R + a_0$
α	linear	$a_1 \mathbf{m_R} + a_0$
N	constant	a_0
σ_{GA} (GA width)	linear	$a_1 \mathbf{m_R} + a_0$
$fraction_{CB}$	constant	a_0

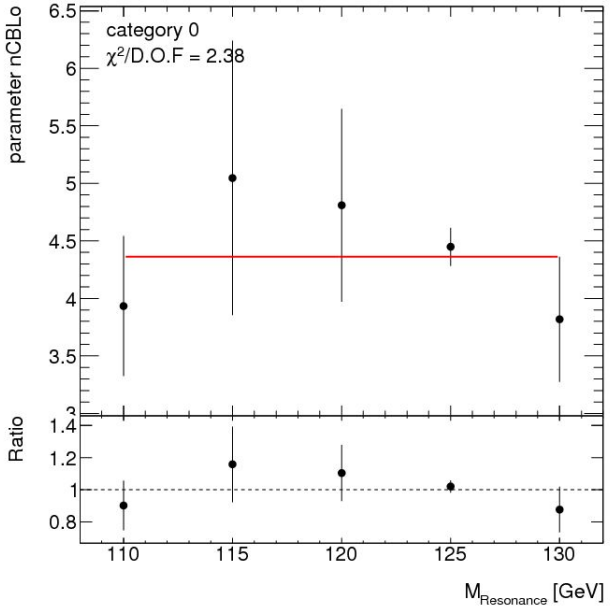

category 0
Events/0.5 GeV
16000
14000
12000
10000
8000
6000
4000
2000
Data / Fit
2
1.5
1
0.5
0
100
105
110
115
120
125
130
135
140
Mass [GeV]

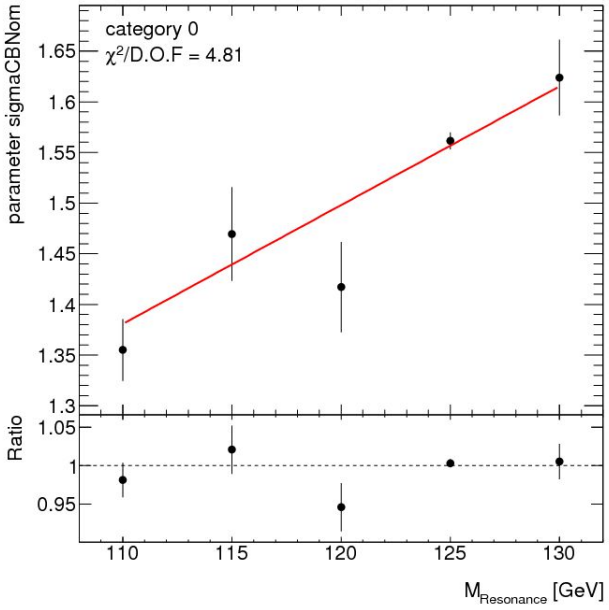

category 0
χ^2/D.O.F = 12.48
parameter alphaCBHi
Ratio
$M_{Resonance}$ [GeV]


category 0
χ^2/D.O.F = 1.71
parameter alphaCBLo
Ratio
$M_{Resonance}$ [GeV]


category 0
χ^2/D.O.F = 2.26
parameter muCBNom
Ratio
$M_{Resonance}$ [GeV]


category 0
χ^2/D.O.F = 16.16
parameter nCBHi
Ratio
$M_{Resonance}$ [GeV]


category 0
χ^2/D.O.F = 2.38
parameter nCBLo
Ratio
$M_{Resonance}$ [GeV]


category 0
χ^2/D.O.F = 4.81
parameter sigmaCBNom
Ratio
$M_{Resonance}$ [GeV]

to do list

- shape parameter
  - fit each category and production mode
  - give shape dependence on mass
- expected signal and bkg yield
  - lumi,Xsec,br,cut efficiency
- give the significance