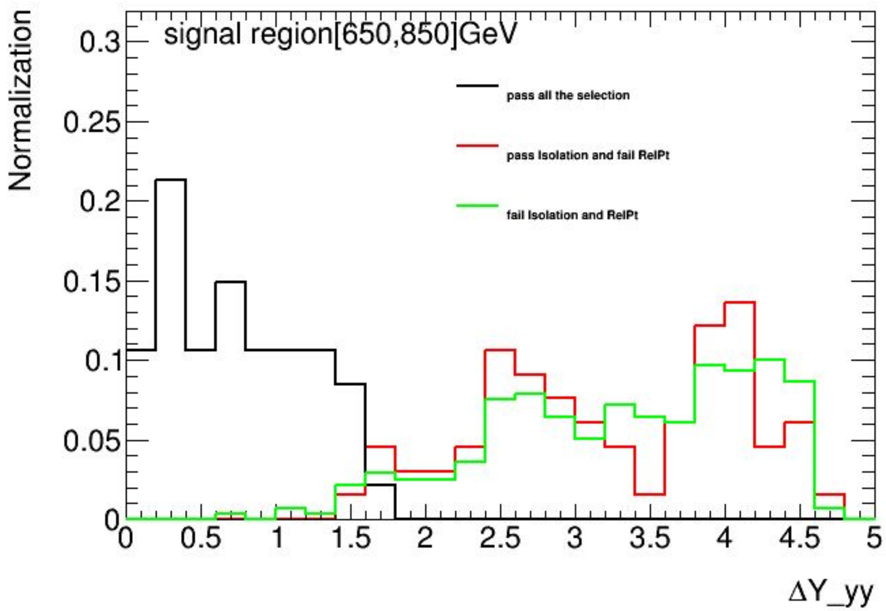
status

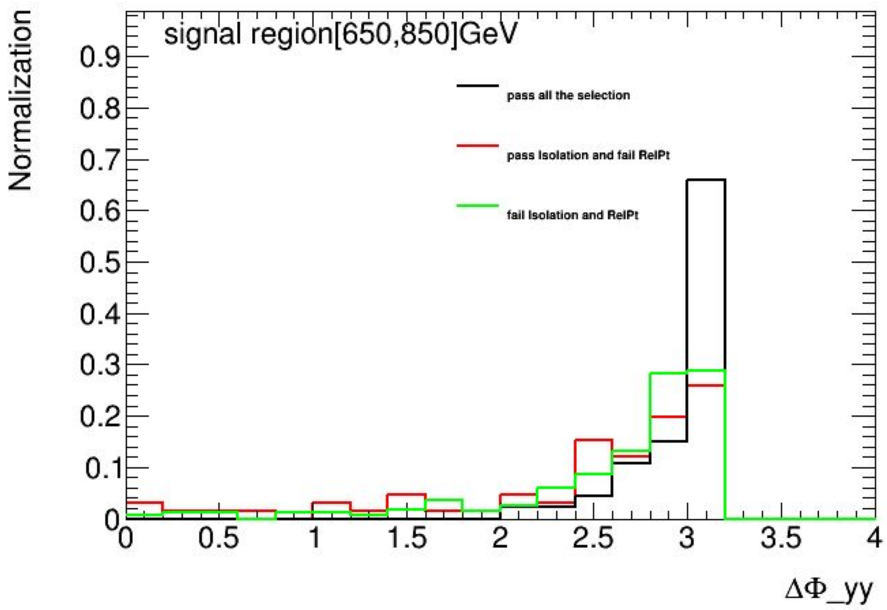
cross check

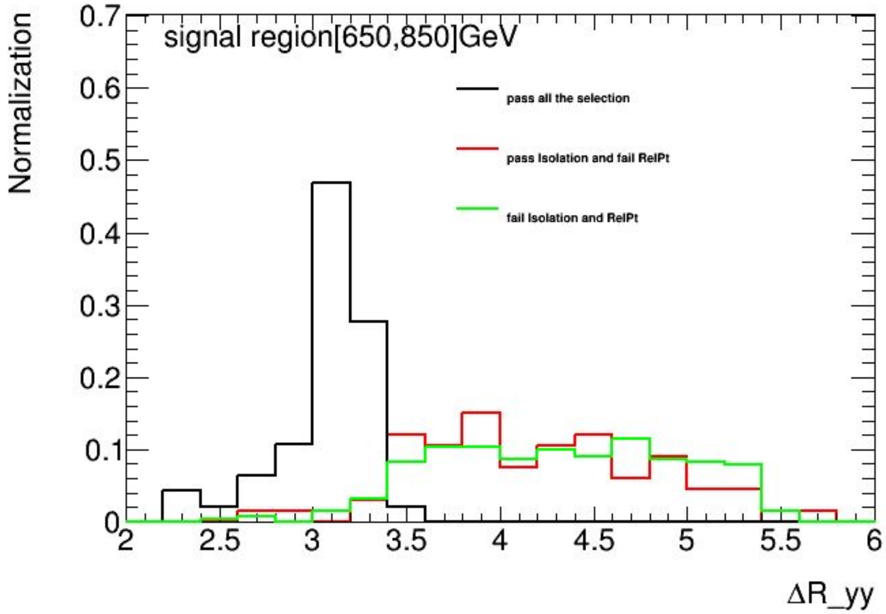
Yu Zhang

01.11

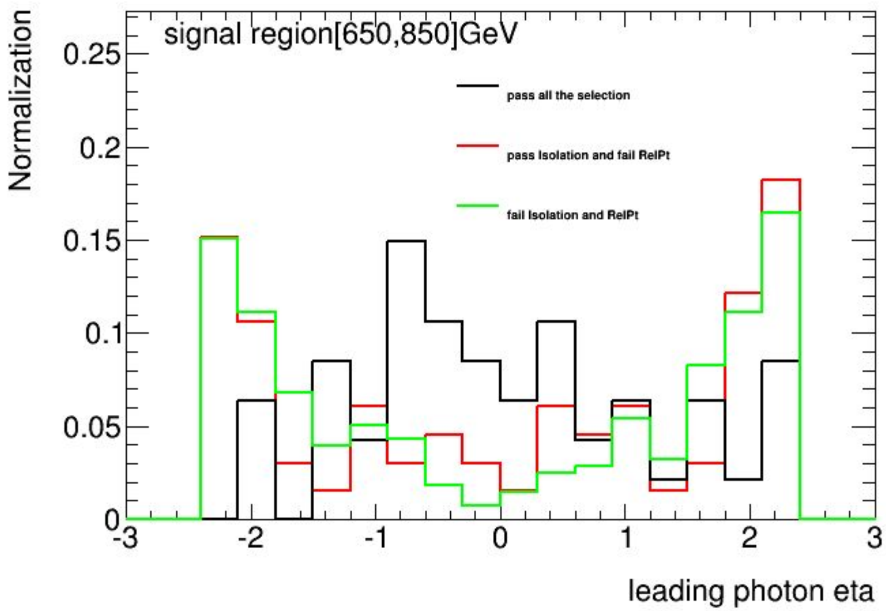
kinematics

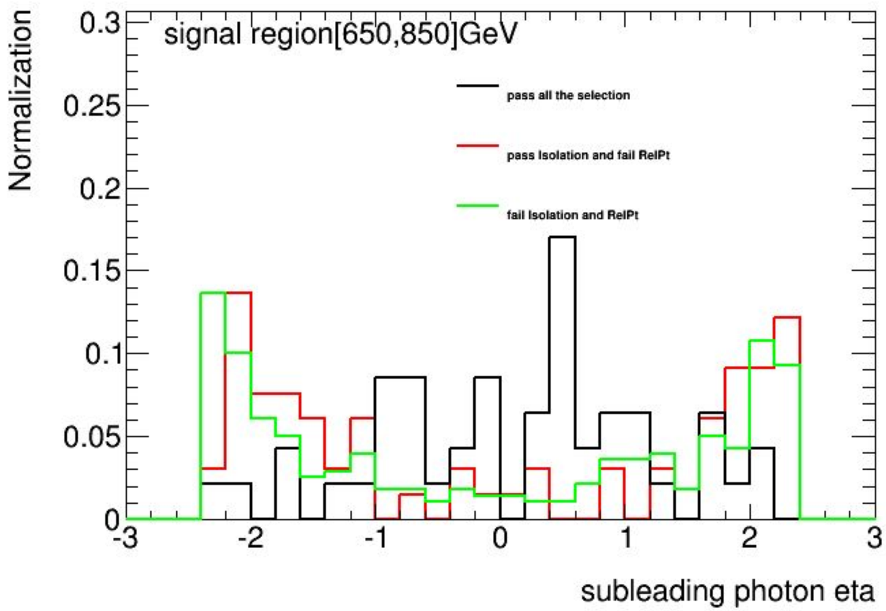

signal region[650,850]GeV
pass all the selection
pass Isolation and fail RelPt
fail Isolation and RelPt
Normalization
ΔY_yy

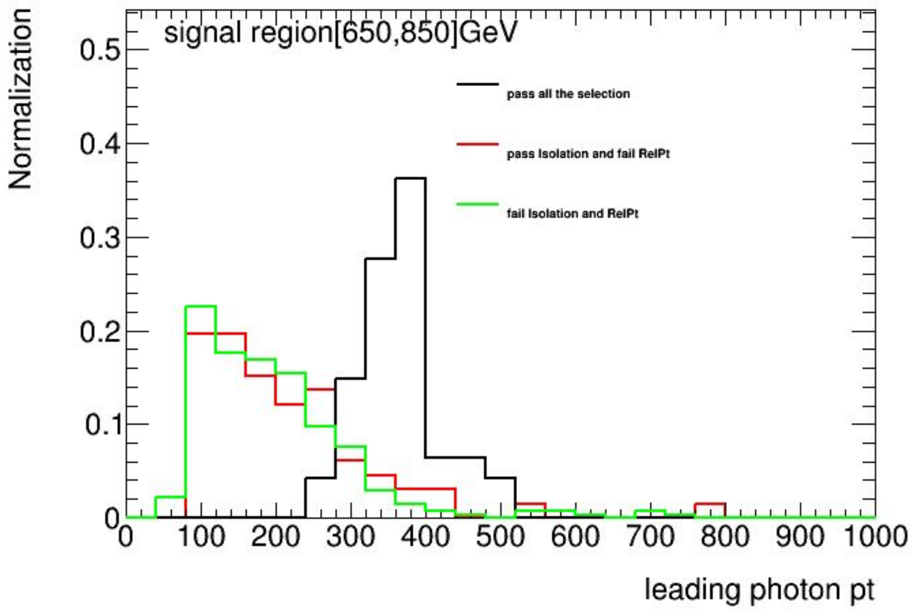

signal region[650,850]GeV
pass all the selection
pass Isolation and fail RelPt
fail Isolation and RelPt
Normalization
ΔΦ_yy

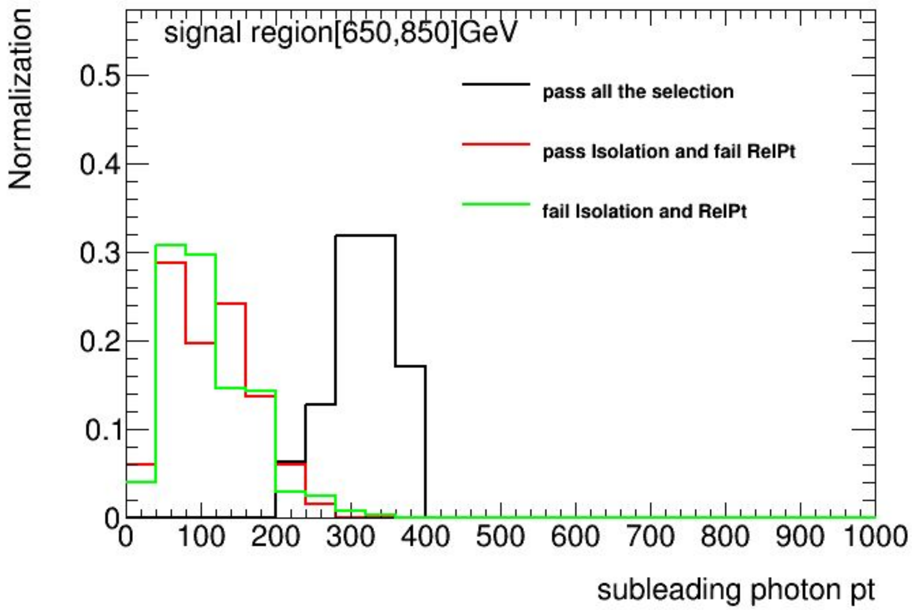

signal region[650,850]GeV
pass all the selection
pass Isolation and fail RelPt
fail Isolation and RelPt
Normalization
ΔR_yy

kinematics

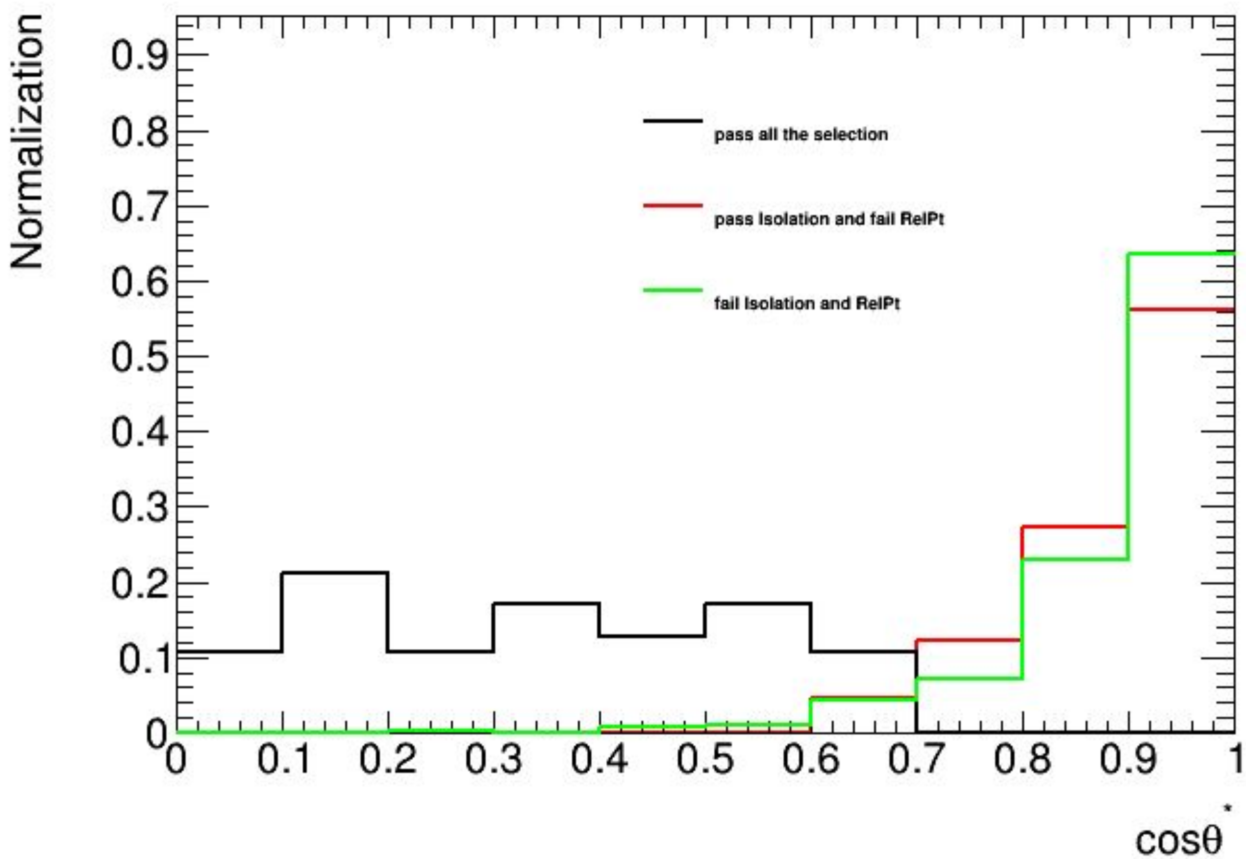

signal region[650,850]GeV
pass all the selection
pass Isolation and fail RelPt
fail Isolation and RelPt
Normalization
leading photon eta


signal region[650,850]GeV
pass all the selection
pass Isolation and fail RelPt
fail Isolation and RelPt
Normalization
subleading photon eta


signal region[650,850]GeV
pass all the selection
pass Isolation and fail RelPt
fail Isolation and RelPt
Normalization
leading photon pt

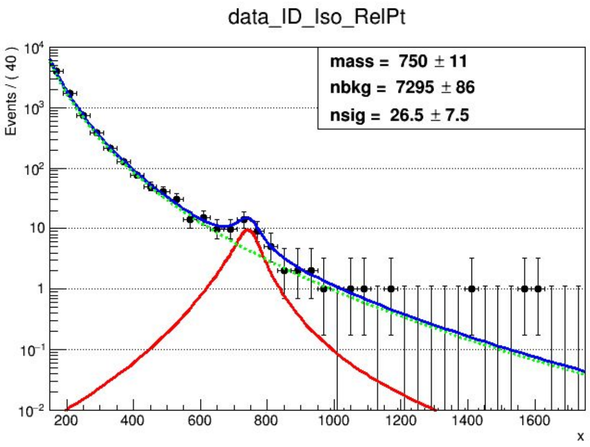

signal region[650,850]GeV
pass all the selection
pass Isolation and fail RelPt
fail Isolation and RelPt
Normalization
subleading photon pt

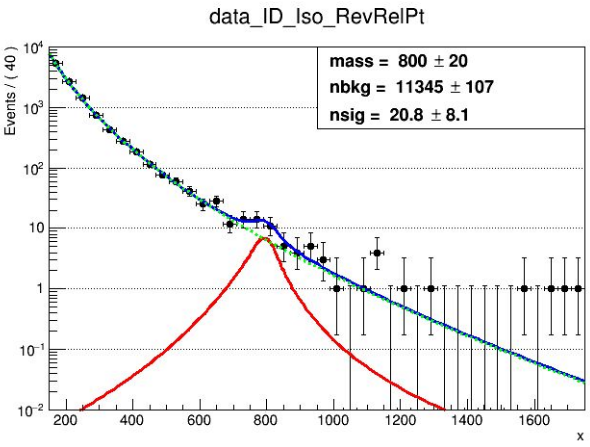
cos theta star

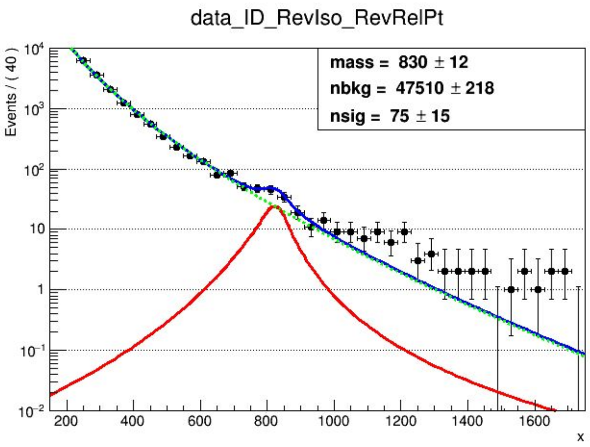


backup

S+B fit ---Large Width (bkg shape from bkg only fit)





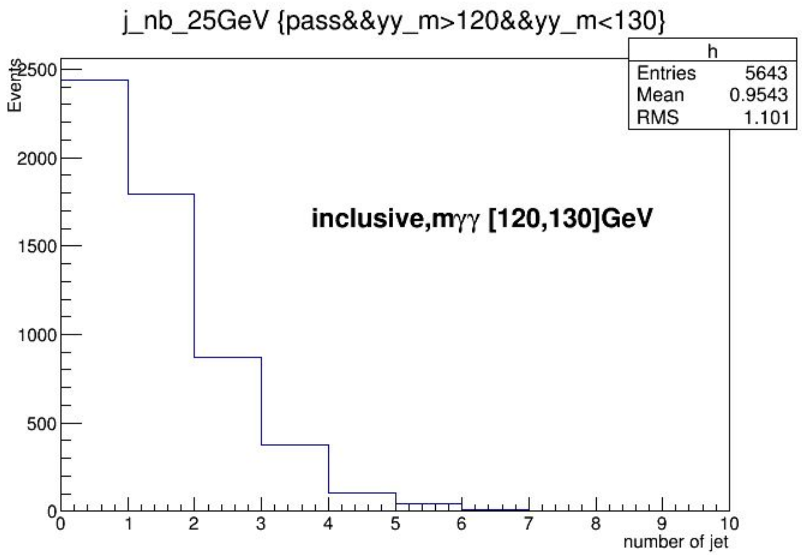


- Large Width result in note
  - Background events: 7299±86
  - Signal events: 22.4±7.4

summary

- Due to low statistic , it is hard to check the property of this resonance
- associated with some jets
- some excess events in control region

back up



j_nb_25GeV {pass&&yy_m>120&&yy_m<130}
h
Entries 5643
Mean 0.9543
RMS 1.101
Events
2500
2000
1500
1000
500
0
0
1
2
3
4
5
6
7
8
9
10
number of jet
inclusive,mγγ [120,130]GeV

isolation efficiency(copy)

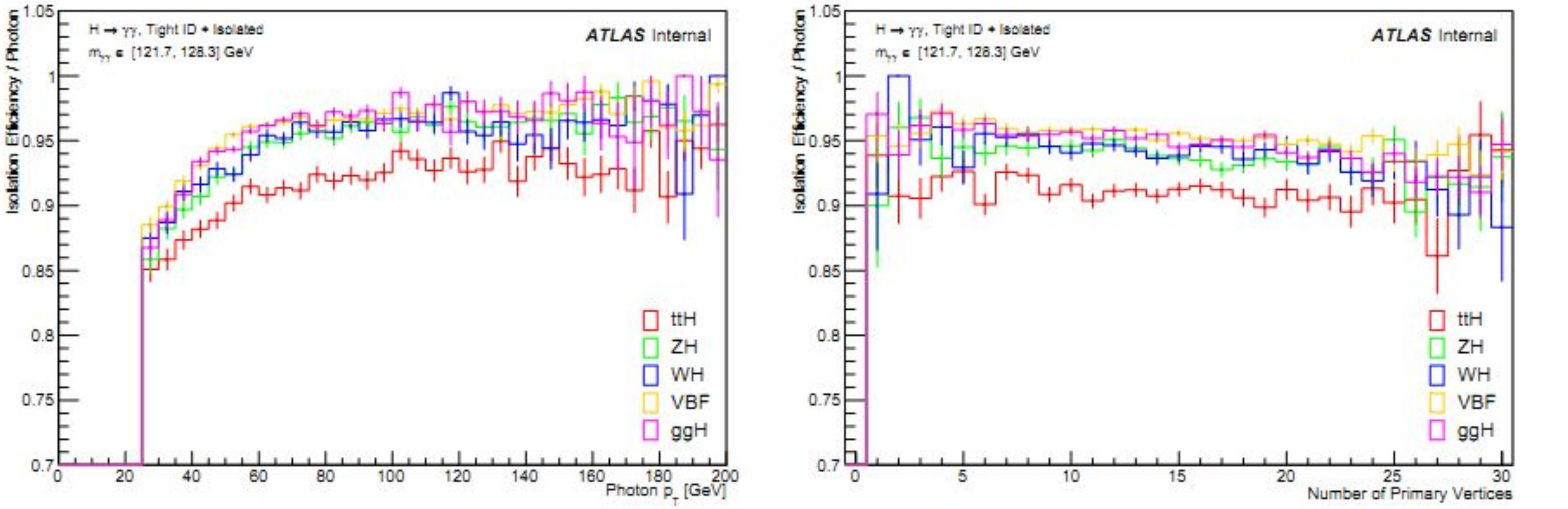
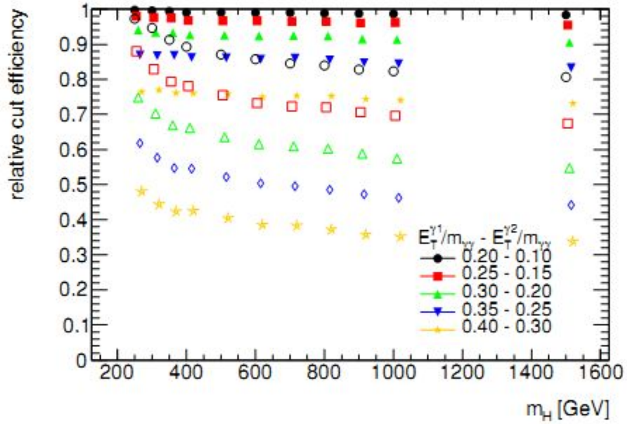
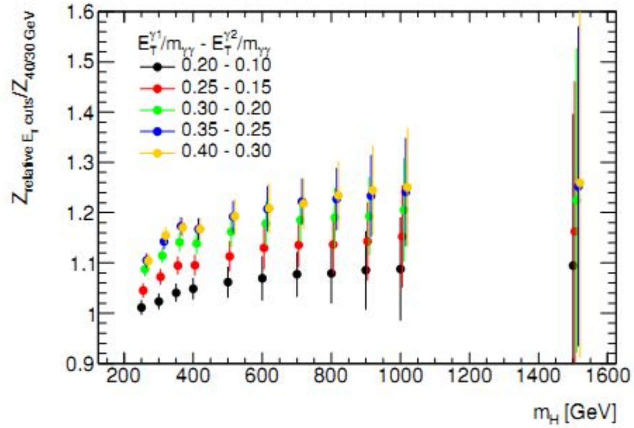
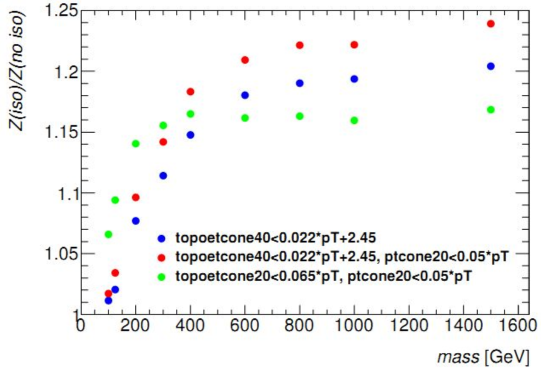


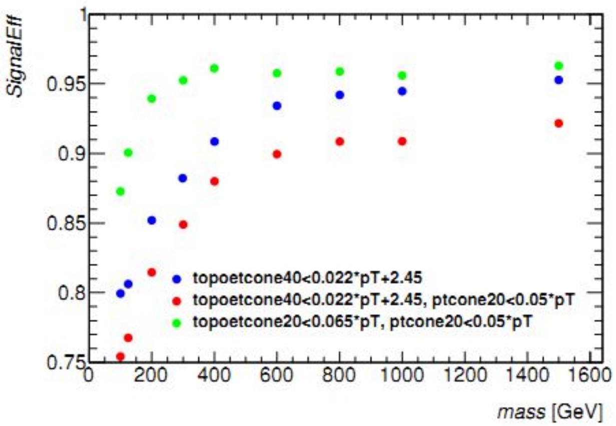
Figure 22: This figure shows the per photon isolation efficiency vs. Photon p_T and the number of primary vertices. Photons are selected to satisfy a tight ID, and fall in the mass range of 125 ± 3.3 GeV.

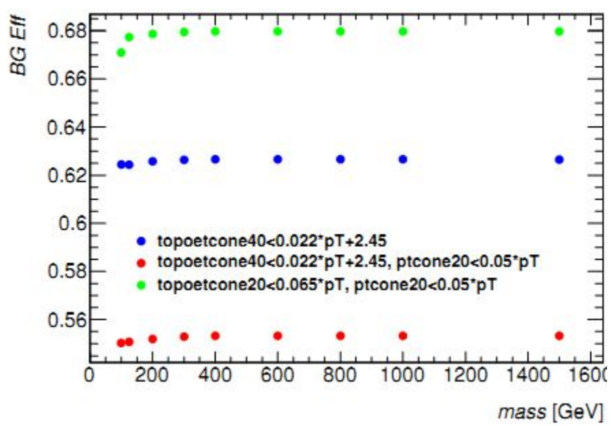
cut efficiency and significance improvements(copy)

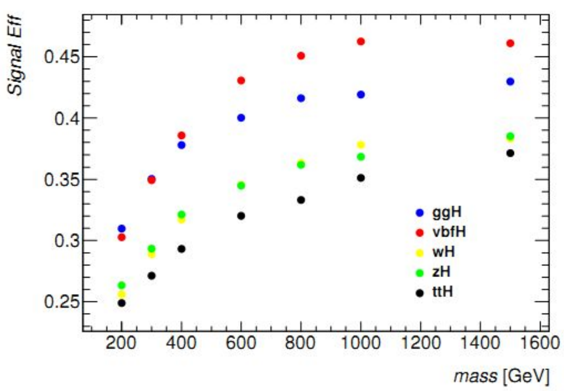












background modeling(copy)

- from dijet analysis

$$f_{k;d}(x; b, \{a_k\}) = (1 - x^d)^b x^{\sum_{j=0}^{k} a_j \log(x)^j}$$

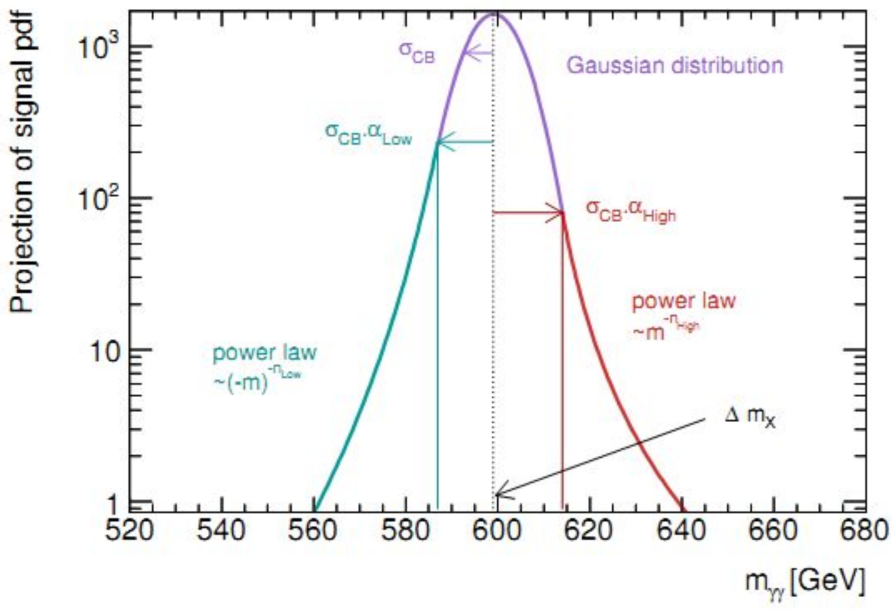
- spurious sinal, fit goodness
  - use S+B function to fit background sample
  - uncertainty of fitted background number of events $f_{k=0;d=1/3}(x; b, d, \{a_k\}) = (1 - x^{1/3})^b x^{a_0}$
  - fitted signal strength
  - user B only function to fit background sample , Chi2/ndf
  - final choice

signal modeling(copy)

- Double-Sided Crystal Ball (DSCB)
  - asymmetric and non-Gaussian low and high mass tails
  - six parameters: μ_{CB}, σ_{CB}, α_{Low}, α_{High}, N_{Low}, N_{High}

$$N \cdot \begin{cases} e^{-t^2/2} & \text{if } -\alpha_{Low} \geq t \geq \alpha_{High} \\ \dfrac{e^{-0.5\alpha_{Low}^2}}{\left[\frac{\alpha_{Low}}{n_{Low}}\left(\frac{n_{Low}}{\alpha_{Low}}-\alpha_{Low}-t\right)\right]^{n_{Low}}} & \text{if } t < -\alpha_{Low} \\ \dfrac{e^{-0.5\alpha_{High}^2}}{\left[\frac{\alpha_{High}}{n_{High}}\left(\frac{n_{High}}{\alpha_{High}}-\alpha_{High}+t\right)\right]^{n_{High}}} & \text{if } t > \alpha_{High}, \end{cases}$$

$$t = \Delta m_X/\sigma_{CB}, \Delta m_X = m_X - \mu_{CB}.$$



signal modeling(copy)

- parameter dependence on mass, $m_{nX} = \frac{m_X - 100}{100}$.
- Narrow Width Approximation(NWA)

Parameter	Parameterization	a	b	c
Δm_X	$a + bm_{nX} + cm_{nX}^2$	-0.014 ± 0.011	-0.042 ± 0.003	0.0008 ± 0.0003
σ_{CB}	$a + bm_{nX}$	1.528 ± 0.010	0.605 ± 0.002	
α_{Low}	$a + b/(m_{nX} + c)$	1.372 ± 0.013	5.466 ± 1.167	16.431 ± 4.587
n_{Low}	a	5.95		
α_{High}	$a + b/(m_{nX} + c)$	2.305 ± 0.015	-0.451 ± 0.112	2.0652 ± 0.527
n_{High}	a	3.15		

$$\Delta m_X = a + bm_{nX} + cm_{nX}^2$$

$$\sigma_{CB} = a + bm_{nX}$$

$$\alpha_{Low,High} = a + b/(m_{nX} + c)$$

$$N_{Low,High} = const$$

- Large Width

Crystal Ball parameter	Mass-dependence parameter	Value at $\alpha_X = 0.06$	Value at $\alpha_X = 0.10$
Δm_X	a	-0.00637	0.901
	b	-0.222	-1.19
	c	-0.0200	0.0146
σ_{CB}	a	3.64	4.19
	b	2.73	4.12
α_{Low}	a	-0.0220	-3.04
	b	30.6	673
	c	24.8	173
n_{Low}		2.5	6
α_{Hi}	a	1.26	1.09
	b	-0.0141	-0.160
	c	-0.803	-0.479
n_{Hi}		2.1	3.39