Weekly Meeting

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IHEP

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MC status

- All are referring to WWγγ

Mass points	smhh	260	275	300	325	350	400	450	500	BKG
status	done	Studying	Studying	Studying	Studying	Studying	Studying	Studying	Studying	requesting

- All the existed studies are for non-res

Cut flow

$\epsilon - jjl\upsilon\gamma\gamma$		SM Higgs Pair
Generated		100%
Trigger		78.5%
GRL	Pre-slecetion	78.5%
Detector DQ		78.5%
has PV		78.5%
2 loose photons		65.0%
e-y ambiguity		64.4%
tight ID		53.8%
Isolation		45.2%
rel.Pt cuts		43.0%
Jet Multiplicity		39.2%
Bveto		28.7%
Lepton		9.6%
$105 < m_{\gamma\gamma} < 160$		9.6%

$\epsilon - jjj\gamma\gamma$		SM Higgs Pair
Generated		100%
Trigger		78.5%
GRL	Pre-selection	78.5%
Detector DQ		78.5%
has PV		78.5%
2 loose photons		65.0%
e-y ambiguity		64.4%
tight ID		53.8%
Isolation		45.2%
rel.Pt cuts		43.0%
Jet Multiplicity		28.3%
Bveto		18.0%
$105 < m_{\gamma\gamma} < 160$		18.0%

Background Estimation

- These are for jjlυγγ

ϵ	ggH	VBF	WH	ZH	ttH
Jet Multiplicity	9.6%	20.7%	15.5%	15.8%	31.4%
Bveto	8.8%	18.4%	12.4%	11.2%	23.8%
Lepton	0.099%	0.20%	1.0%	0.64%	0.93%
$105 < m_{\gamma\gamma} < 160$	0.099%	0.20%	0.99%	0.63%	0.92%

	ggH	VBF	WH	ZH	ttH
Event yeild					

Background Estimation

- These are for jjjjγγ

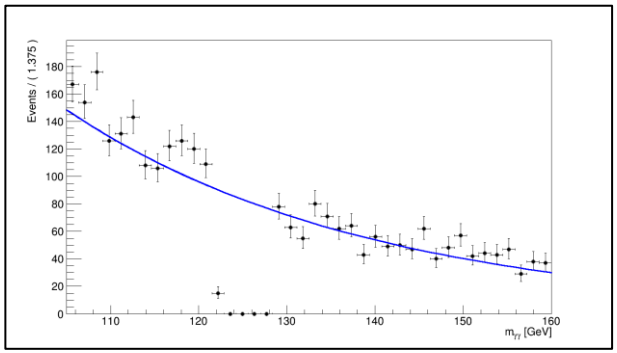
ϵ	ggH	VBF	WH	ZH	ttH
Jet Multiplicity	10.5%	24.5%	17.5%	17.9%	32.3%
Bveto	9.6%	21.7%	14.0%	12.7%	2.4%
$105 < m_{\gamma\gamma} < 160$	9.6%	21.7%	13.9%	12.6%	2.4%

	ggH	VBF	WH	ZH	ttH
Event yeild					

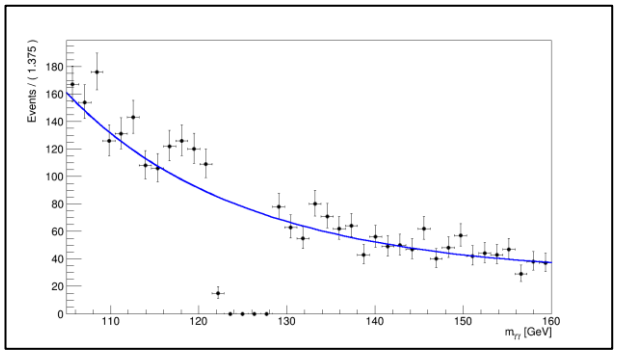
jjlυγγ

1) jjlυγγ ($p_\mu^T > 10GeV, p_e^T > 10GeV$)
   - I. BKG: Sideband, estimated from 2jets+2photons inclusive events
   - *II.* $\epsilon_{\gamma\gamma}^{B} = 0.1383$
   - III. $S = \epsilon \times L \times \sigma \times Br(hh \to WW\gamma\gamma \to jjj\gamma\gamma) = 0.130$
   - IV. $B = \frac{\epsilon_{\gamma\gamma}^{B}}{1-\epsilon_{\gamma\gamma}^{B}} \times 9 = 1.44$
   - V. $Z = \sqrt{2[(S+B) \times \ln\left(\frac{S+B}{B}\right) - S]} = 0.11$

$\epsilon_{\gamma\gamma}^{B} = 0.1300$
$U = 5.9\%$



The efficiency $\epsilon_{\gamma\gamma}^{B}$ using e^{ax} for continuous background extracted with 2jets+2photons events



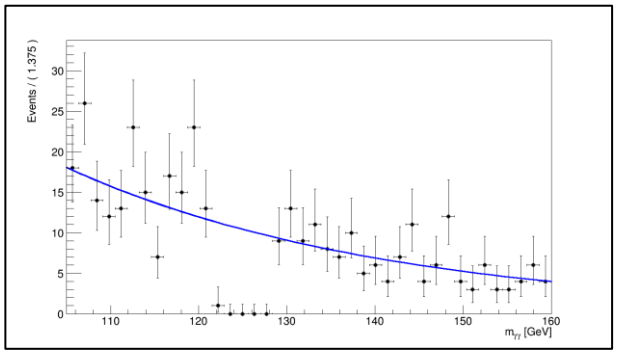
The efficiency $\epsilon_{\gamma\gamma}^{B}$ using 2nd order e^{ax+bx^2} for continuous background extracted with 2jets+2photons events

jjjjγγ

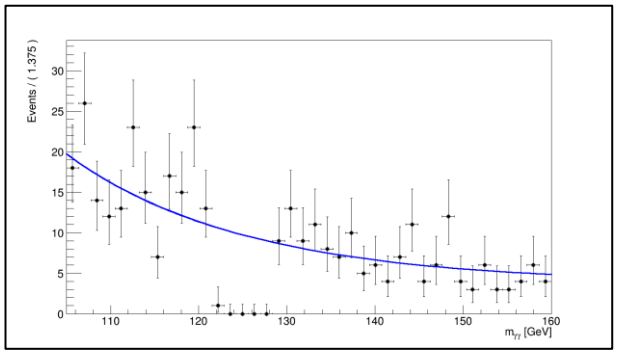
2) jjjjγγ

- BKG: Sideband, estimated form 4-jets inclusive events
- $\epsilon_{\gamma\gamma}^{B} = 0.1382$
- $\mathrm{S} = \epsilon \times \mathrm{L} \times \sigma \times \mathrm{Br}(\mathrm{hh} \to \mathrm{WW}\gamma\gamma \to \mathrm{jjj}\gamma\gamma) = 0.257$
- $\mathrm{B} = \frac{\epsilon_{\gamma\gamma}^{B}}{1-\epsilon_{\gamma\gamma}^{B}} \times 405 = 65.0$
- $\mathrm{Z} = \sqrt{2[(\mathrm{S}+\mathrm{B}) \times \ln\left(\frac{\mathrm{S}+\mathrm{B}}{\mathrm{B}}\right) - \mathrm{S}]} = 0.032$

$\epsilon_{\gamma\gamma}^{\mathrm{B}} = 0.1298$
$\mathrm{U} = 6.0\%$



The efficiency $\epsilon_{\gamma\gamma}^{B}$ using e^{ax} for continuous background extracted with 4jets exclusive events



The efficiency $\epsilon_{\gamma\gamma}^{B}$ using 2nd order e^{ax+bx^2} for continuous background extracted with 4jets exclusive events

Next to do

- Optimize the cuts at jjl$\upsilon\gamma\gamma$
- Extract the uncertainties at jjl$\upsilon\gamma\gamma$
- Calculate the upper limits at at jjl$\upsilon\gamma\gamma$