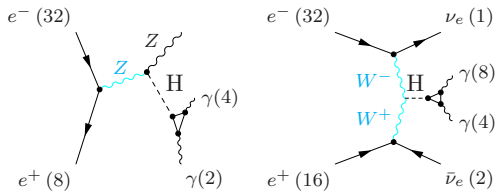


$H \rightarrow \gamma\gamma$ @250 GeV, 500 and 1000 GeV

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H \rightarrow $\gamma\gamma$ STATUS



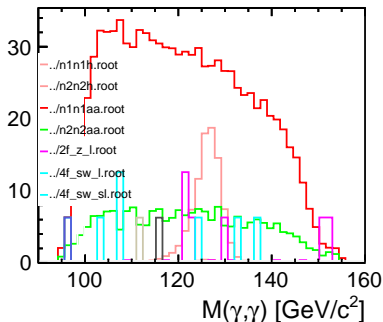
external Z in the left hand plot decaying to: $Z \rightarrow l^+ l^-$, $Z \rightarrow \nu \bar{\nu}$, $Z \rightarrow q \bar{q}$ (*)

1000 gev

- 1000: estimated significance 10.2.
- 500: estimated significance 4.3. (Reoptimizing)
- 250 not final selection yet.
- No qqh modes yet.

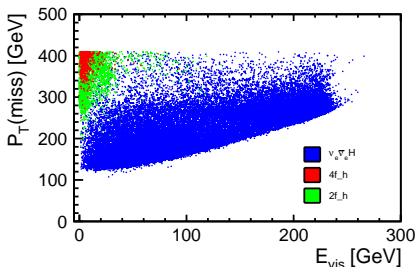
(*) On red the reconstructed modes on this Analysis (no $Z \rightarrow l^+ l^-$).

NNH: $H \rightarrow \gamma\gamma$ 500 GeV



- Significance: 4.3
- Currently reoptimizing my final selection.

1	Preselection
2	$M > 140 \text{ GeV}/c^2$
3	$E_T > 20 \text{ GeV}$
4	$E > 250 \text{ GeV}$
5	$\cos(\gamma_1, \gamma_2) > -0.85$
6	$\text{cone}E(\gamma) < 10 \text{ GeV}$
7	$P_T(\gamma_1) + P_T(\gamma_2) \geq 100 \text{ GeV}$
8	$120 < M(\gamma, \gamma) < 132 \text{ GeV}/c^2$



Cut Flow NNH 500

Process	signal	vva	2f	4f	aa_4f	5f	6f	Signf
Cross Section	0.387	41.6	2.64e+04	3.24e+04	210	143	1.18e+03	
Expected	193	2.08e+04	1.32e+07	1.62e+07	1.05e+05	7.17e+04	5.89e+05	
Generated	7.83e+04	7.02e+05	3.3e+06	3.27e+06	1.11e+05	8.16e+04	4.74e+05	
Cut1	169	7.68e+03	2.9e+04	5.3e+04	75	75.5	350	0.562
Cut2	147	5.54e+03	9.59e+03	9.86e+03	21.6	13.6	37	0.924
Cut3	137	4.53e+03	5.73e+03	6.77e+03	9.82	6.55	30.4	1.05
Cut4	123	3.35e+03	1.32e+03	1.83e+03	5.84	3.84	19.6	1.51
Cut5	120	3.08e+03	193	347	0.984	0.000977	1.35	1.96
Cut6	101	1.32e+03	80.8	93.8	0	0	0	2.52
Cut7	94.3	339	25.9	6.29	0	0	0	4.37

Status

- NNH mode 1000 Gev significance: 10.2
- NNH mode 500 Gev significance: 4.3 (reoptimizing selection).
- QQH mode 1000 Gev (working on it).
- QQH mode 500 Gev (working on it).
- NNH mode 250 Gev (stand by).
- QQH mode 250 Gev (stand by).

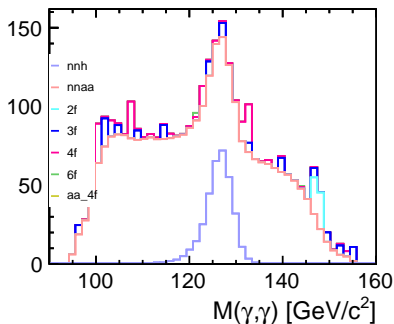
Plan

- LCWS13

Back Up

NNH: $H \rightarrow \gamma\gamma$ 1000 GeV

1	Preselection
2	missing mass $> 400 \text{ GeV}/c^2$
3	$ \cos(\theta) < 0.95$
4	$\text{cone}E(\gamma) < 20 \text{ GeV}$
5	$P_T(H) > 40 \text{ GeV}$
6	$P_T(\gamma_1) + P_T(\gamma_2) > 55 \text{ GeV}$
7	n charged PFO ≤ 15
8	$120 < M(\gamma, \gamma) < 132 \text{ GeV}/c^2$



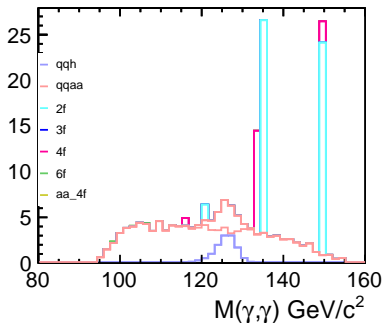
● Significance: 10.2

NNH: $H \rightarrow \gamma\gamma$ 1000 GeV Cut Flow

Process	signal	vvaa	2f	4f	3f	aa_4f	6f	Signf
Cross Section	0.922	43.9	7.78e+03	3.1e+05	2.83e+05	1.13e+03	693	-
Expected	922	4.39e+04	7.78e+06	3.1e+08	2.83e+08	1.13e+06	6.93e+05	-
Generated	5.94e+04	5.96e+06	5.19e+05	1.3e+07	6.01e+06	1.03e+05	4.94e+06	-
Cut1	770	1.49e+04	4.73e+04	3.36e+05	1.71e+05	4.99e+03	8.11e+03	1.01
Cut2	714	1.3e+04	5.84e+03	9.45e+04	7.03e+04	2.51e+03	453	1.65
Cut3	595	4.74e+03	3.31e+03	1.48e+04	9.08e+03	1.67e+03	279	3.2
Cut4	591	4.69e+03	214	1.47e+03	662	20.6	14	6.76
Cut5	513	3.73e+03	144	922	458	0	8.14	6.75
Cut6	513	3.67e+03	144	913	452	0	8.14	6.8
Cut7	348	2.51e+03	46.5	256	111	0	3.32	6.08
Cut8	325	626	0	52.8	18.1	0	2.69	10.2

QQH: $H \rightarrow \gamma\gamma$ 1000 GeV

1	Preselection
2	missing mass $< 200 \text{ GeV}/c^2$
3	$\cos(\gamma, \gamma) > 0.65$
4	coneE(γ) $< 20 \text{ GeV}$
5	$ \cos(\theta) < 0.85$
6	$P_T(H) > 350 \text{ GeV}$
7	$\cancel{E} < 100 \text{ GeV}$
8	$120 < M(\gamma, \gamma) < 132 \text{ GeV}/c^2$



● Significance: 1.85

QQH: $H \rightarrow \gamma\gamma$ 1000 GeV Cut Flow

Process	signal	vvaa	2f	4f	3f	aa_4f	6f	Signf
Cross Section	0.0405	37.8	7.78e+03	3.1e+05	2.83e+05	1.13e+03	698	-
Expected	40.5	3.78e+04	7.78e+06	3.1e+08	2.83e+08	1.13e+06	6.98e+05	-
Generated	7.82e+04	4.19e+06	5.26e+05	1.3e+07	6.01e+06	1.13e+05	4.93e+06	-
Cut1	34.5	1.43e+04	2.78e+05	1.74e+06	1.07e+06	1.02e+04	5.44e+04	0.0194
Cut2	29	1.14e+04	2.2e+05	1.12e+06	6.48e+05	3.88e+03	4.55e+04	0.0203
Cut3	21.7	2.92e+03	1.53e+04	3.83e+04	2.26e+04	65.1	211	0.0771
Cut4	19.3	1.99e+03	3.17e+03	1.46e+04	9.82e+03	0	39.7	0.112
Cut5	16.6	249	78.5	90.8	0	0	3.65	0.795
Cut6	13.4	119	50	22	0	0	0.339	0.933
Cut7	12.5	113	48.3	14.5	0	0	0.339	0.912
Cut8	11.9	27.6	1.72	0	0	0	0	1.85