

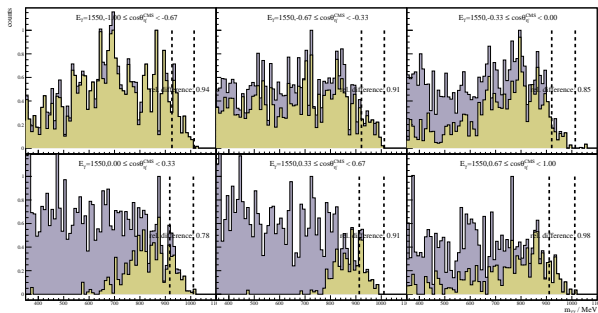
Event selection of $\eta' \rightarrow \gamma\gamma$

- background contributions from $2\pi^0, \pi^0\eta$,

$$\frac{N_{2\pi^0}}{N_{\eta'}} = \frac{\sigma_{2\pi^0} \cdot \text{BR}(2\pi^0 \rightarrow 4\gamma)}{\sigma_{\eta'} \cdot \text{BR}(\eta' \rightarrow \gamma\gamma)} \approx \frac{5\mu\text{b} \cdot 0.98}{1\mu\text{b} \cdot 0.02} = 245$$

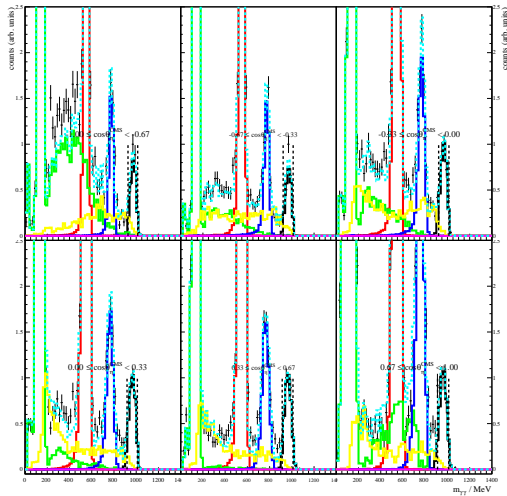
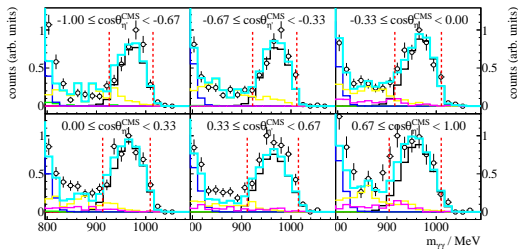
$$\frac{N_{\pi^0\eta}}{N_{\eta'}} = \frac{\sigma_{\pi^0\eta} \cdot \text{BR}(\pi^0\eta \rightarrow 4\gamma)}{\sigma_{\eta'} \cdot \text{BR}(\eta' \rightarrow \gamma\gamma)} \approx \frac{3\mu\text{b} \cdot 0.38}{1\mu\text{b} \cdot 0.02} = 57$$

- cuts (proton in MT, clustersizes, energy of photons) may reduce $2\pi^0, \pi^0\eta$ contributions but NOT within cut ranges..



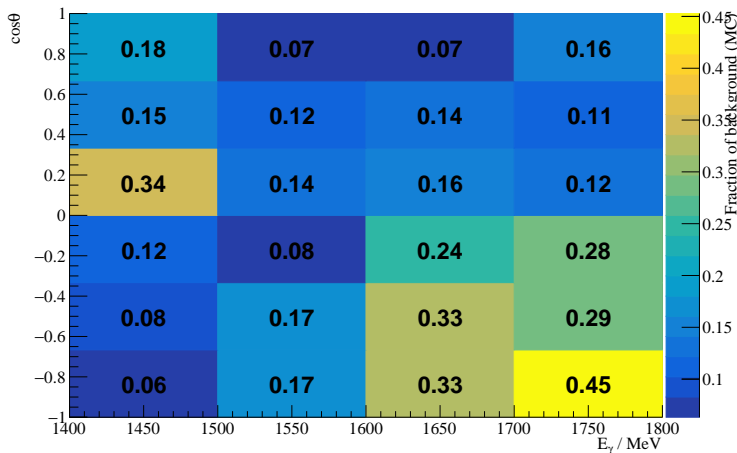
- keep bkg for a better MC fit, use PWA MC for better fit

Event selection of $\eta' \rightarrow \gamma\gamma$



→ treat $2\pi^0$ contributions rigorously and $\pi^0\eta$ as systematical error (?)

Event selection of $\eta' \rightarrow \gamma\gamma$



→ unbinned fits (Bayes and RooFit) $\Sigma = a \cdot \Sigma_{\eta'} + b \cdot \Sigma_{2\pi^0}$

Binned fits for $\eta \rightarrow \gamma\gamma$ toy MC

nbins	chi2	abserror	abserror_err	sigma_std	mean_sigma_err
5	1.0084	-0.136562	0.0106015	0.122244	0.115216
10	1.01608	-0.0807627	0.00745136	0.122413	0.116159
15	1.0213	-0.0453879	0.0060793	0.122955	0.116755
20	1.02628	-0.0204121	0.00526841	0.123345	0.117157
25	1.03135	-0.00104504	0.00472013	0.123842	0.117438
30	1.03643	0.0154211	0.00432156	0.124417	0.117639
35	1.04177	0.0308903	0.00401215	0.124929	0.117784
40	1.04692	0.0448043	0.00376464	0.125443	0.117886
45	1.05254	0.0575842	0.0035624	0.12597	0.117957
50	1.05817	0.0700262	0.00339457	0.126521	0.118002
55	1.06402	0.0818481	0.00325091	0.127102	0.118027
60	1.07006	0.09364	0.00312813	0.127734	0.118034
65	1.07618	0.105762	0.00302238	0.128386	0.118028
70	1.08248	0.117378	0.00292896	0.129054	0.118009
75	1.08918	0.129015	0.00284671	0.129795	0.11798