Bayesian fit of event yield asymmetries

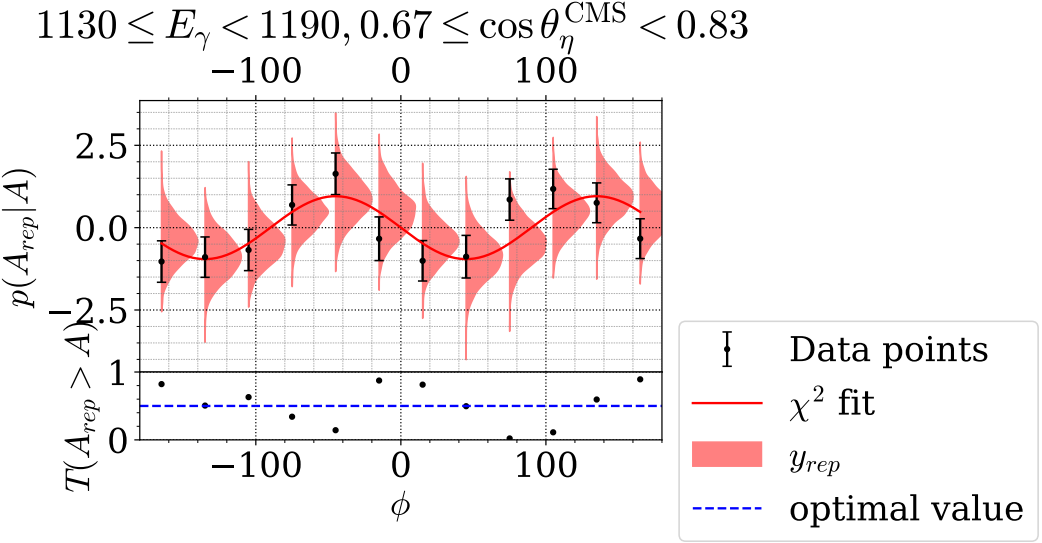
Markov-Chain diagnostics:

- Monte-Carlo Standard-Error (MCSE)
- $\hat{R}$

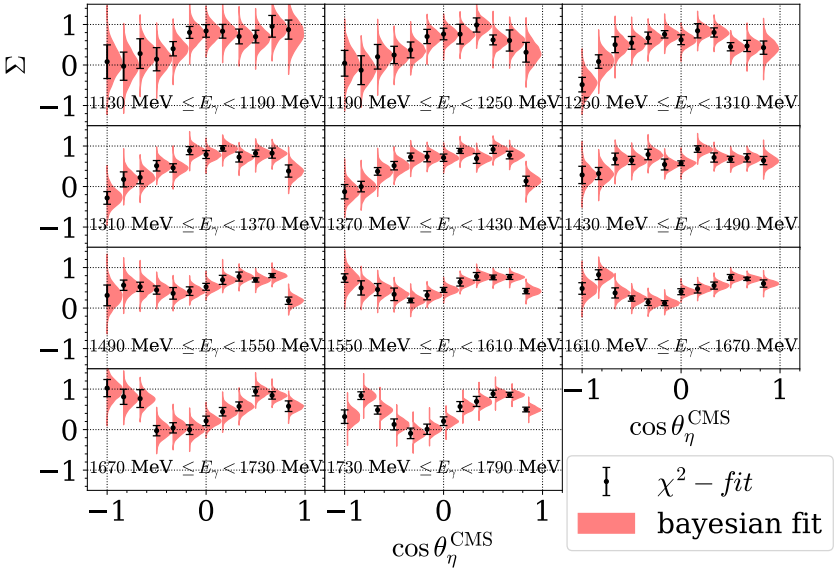
Goodness of Fit:

- p-value calculated from reproduced data

Bayesian fit of event yield asymmetries



Bayesian fit of event yield asymmetries



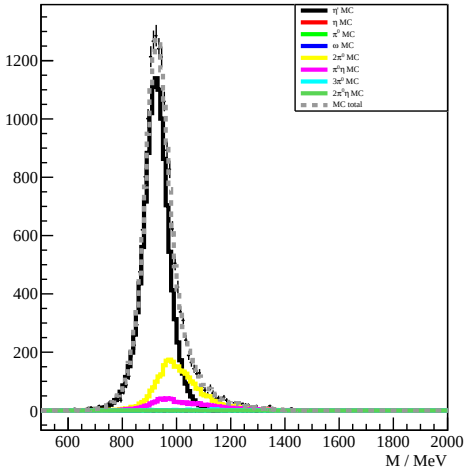
Event selection

2013 hydrogen beam time

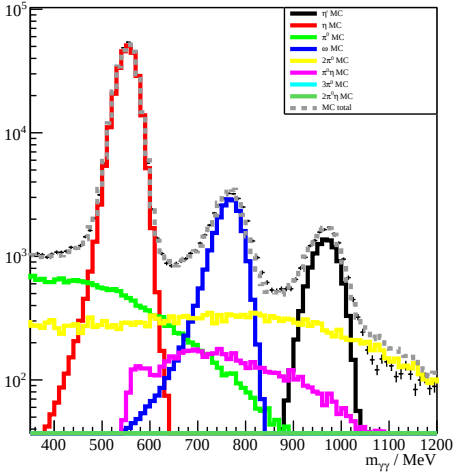
- charge cut (3 PED)
- time cuts (prompt peak and bkg substraction)
- $E_\gamma > 1400$ MeV
- ~~$E_\gamma^{\text{calc}} > 1447$ MeV~~
- coplanarity
- polar angle
- missing mass
- invariant mass

Event selection

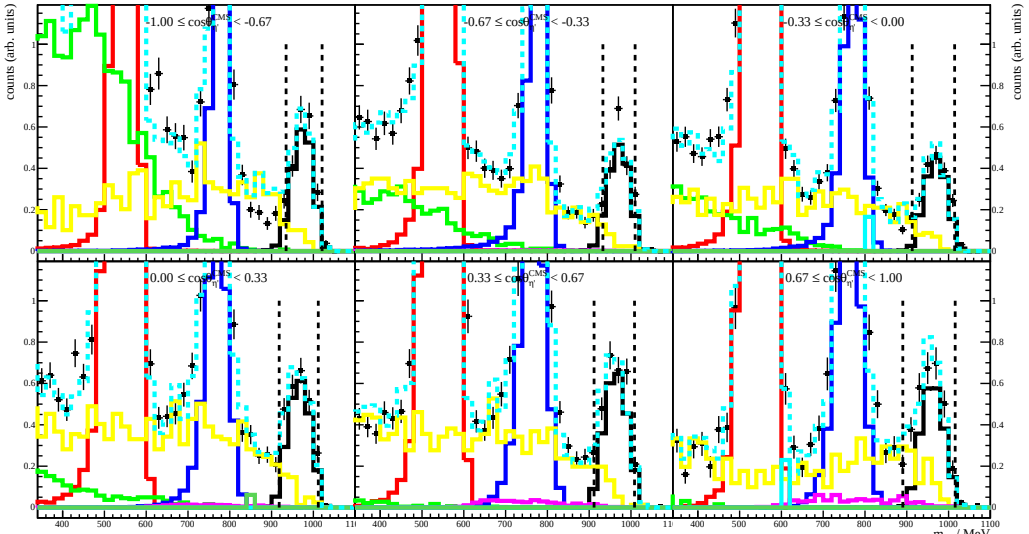
Missing mass



Invariant mass $m_{\gamma\gamma}$



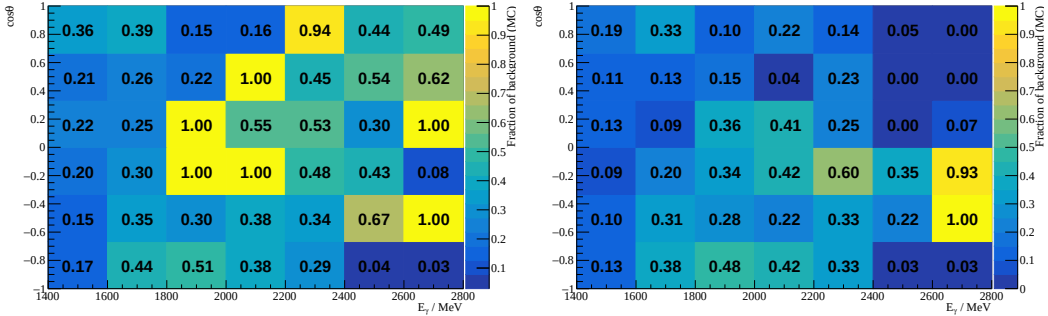
Event selection



Event selection

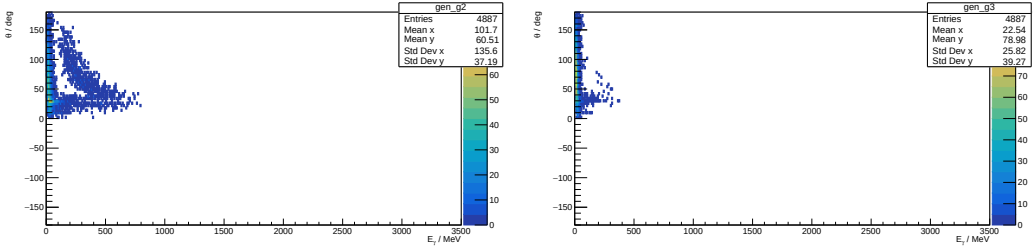
Additional cuts to (try to) reduce bkg:

- p in CB for $E_\gamma < 1500$ MeV
- $E_{\gamma_i} < 1500$ MeV
- ClusterPEDCount$(\gamma_i) = 1$
- Clustersize$(p) < 6$
- Clustersize (γ_i) in FW



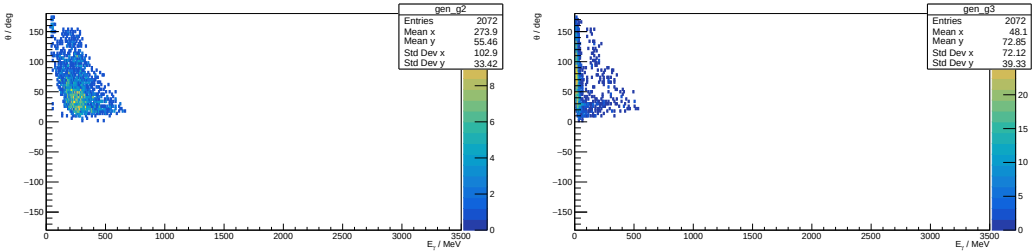
Investigation of Background contributions ($2\pi^0 \to 4\gamma$ and $\pi^0\eta \to 4\gamma$)

two cases: $E_\gamma \lesssim 20$ MeV, or $\theta_{\gamma_i} \approx \theta_{\gamma_j}$, combining two (or three) photons to one



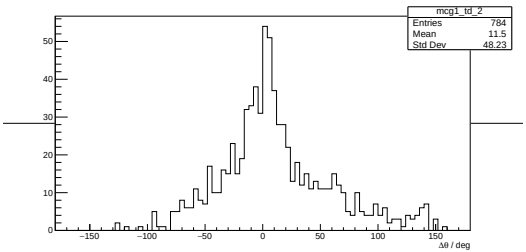
Two lowest energy photons of $2\pi^0$ production (MC)

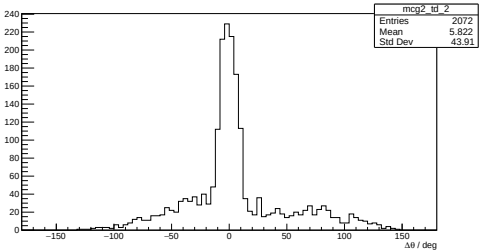
Investigation of Background contributions ($2\pi^0 \to 4\gamma$ and $\pi^0\eta \to 4\gamma$)



Two lowest energy photons of $\pi^0\eta$ production (MC)

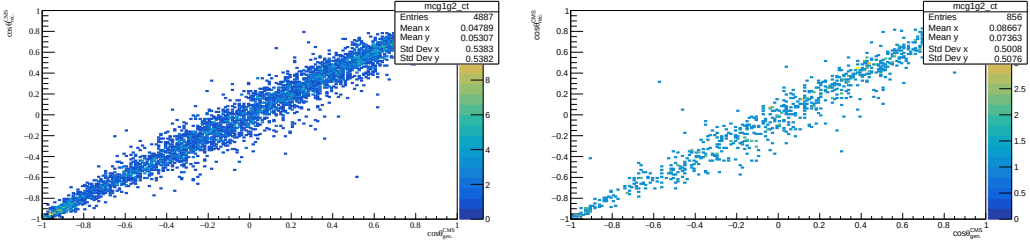
Investigation of Background contributions ($2\pi^0 \to 4\gamma$ and $\pi^0\eta \to 4\gamma$)





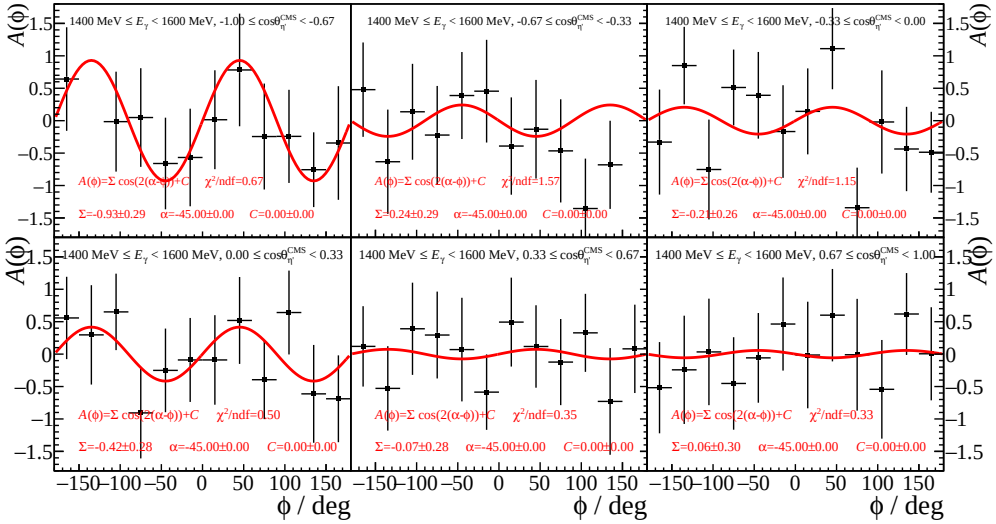
Angular difference between second lowest energy photon and one of the highest energy photons

Investigation of Background contributions ($2\pi^0 \to 4\gamma$ and $\pi^0\eta \to 4\gamma$)



gen. CMS angle vs. meas. CMS angle for background contributions

Asymmetry $A(\phi) = \frac{N^{\perp} - N^{\parallel}}{p_{\gamma}^{\parallel} N^{\perp} + p_{\gamma}^{\perp} N^{\parallel}} = \Sigma \cos\left(2\left(\alpha^{\parallel} - \phi\right)\right)$



Beam asymmetry Σ