Bayesian fit of event yield asymmetries

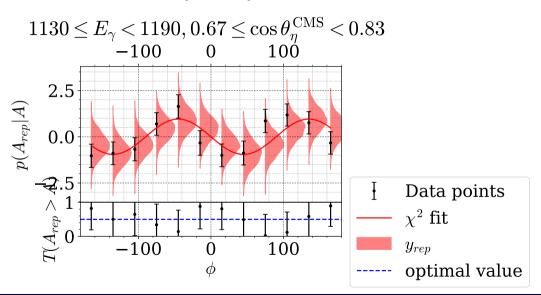
MARKOV-Chain diagnostics:

- ► MONTE-CARLO Standard-Error (MCSE)
- \blacktriangleright \hat{R}

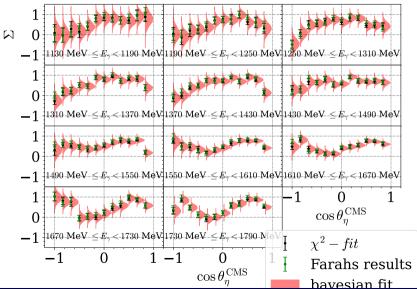
Goodness of Fit:

▶ p-value calculated from reproduced data

Bayesian fit of event yield asymmetries

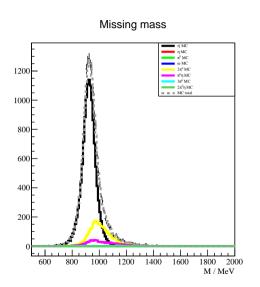


Bayesian fit of event yield asymmetries

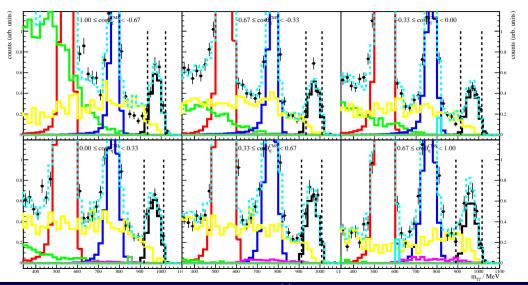


2013 hydrogen beam time

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

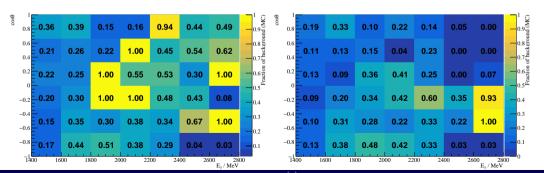


Invariant mass m,, 10^{5} 2π⁰n MC ■ MC total 10⁴ 10³ 10^{2} 1100 1200 m_{γγ} / MeV 400 500 600 700 800 900 1000

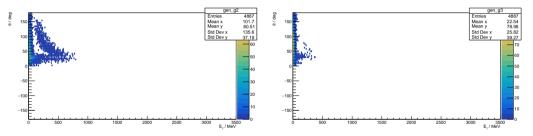


Additional cuts to (try to) reduce bkg:

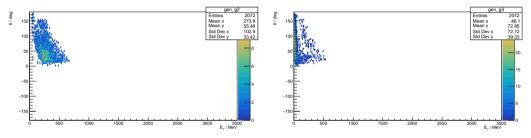
- ▶ p in CB for $E_{\gamma} < 1500$ MeV
- ▶ $E_{\gamma_i} < 1500 \text{ MeV}$
- ▶ ClusterPEDCount $(\gamma_i) = 1$
- ▶ Clustersize(p) < 6
- ▶ Clustersize (γ_i) in FW



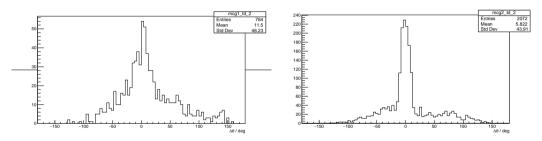
two cases: $E_{\gamma} \lesssim 20$ MeV, or $\theta_{\gamma_i} \approx \theta_{\gamma_i}$, combining two (or three) photons to one



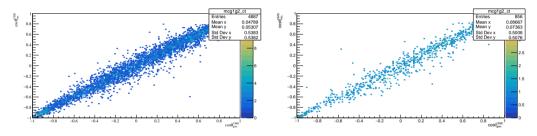
Two lowest energy photons of $2\pi^0$ production (MC)



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

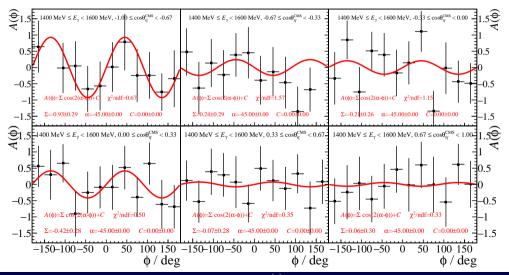


Angular difference between second lowest energy photon and one of the highest energy photons



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

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



Beam asymmetry Σ

