Omega Cross-Section

Martin Sobotzik

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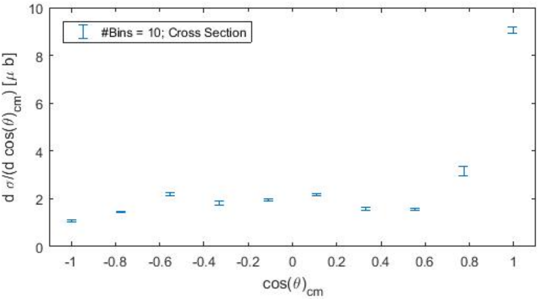
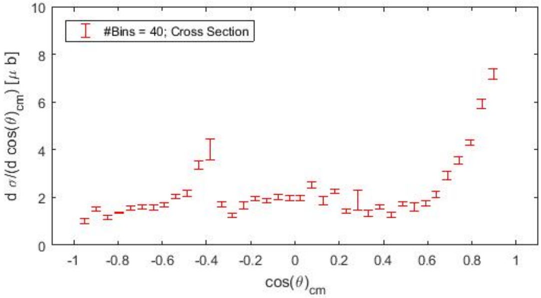
Institute for Nuclear Physics
Johannes Gutenberg University of Mainz

Starting Point



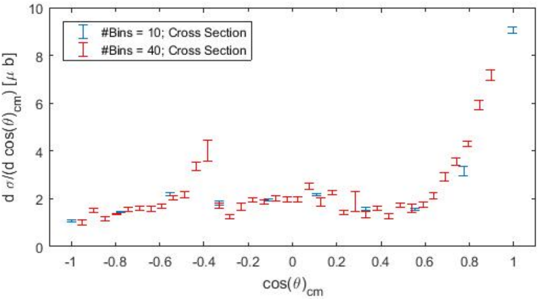
Olis Cross Section; Dip at about $\cos(\theta) = -0.3$

Increasing the Number of Bins



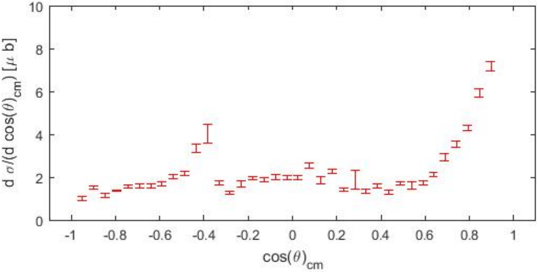
Increased number of bins to 40; now there is still a dip at $\cos(\theta) = -0.3$ but also a peak at $\cos(\theta) = -0.5$

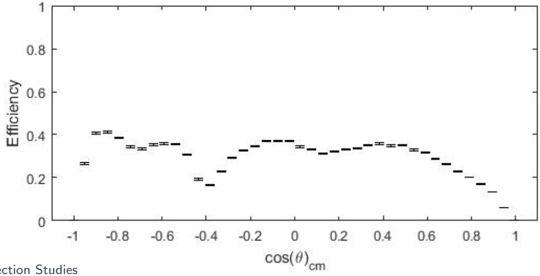
Comparing 10 Bin to 40 Bin Cross Section



Both Cross Sections are shown.

Efficiency



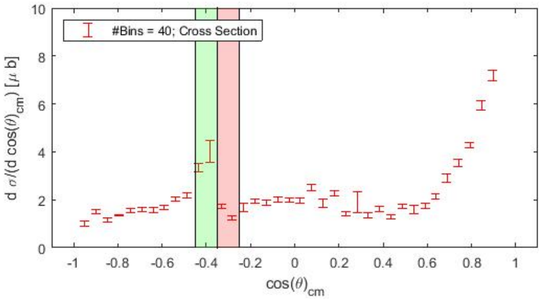


Taking a closer Look

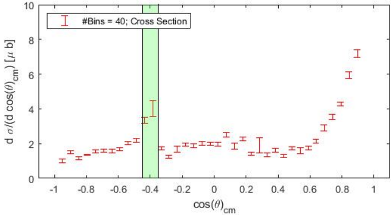
$$\omega \to \gamma \;\; \pi^0 \;{\hookrightarrow}\gamma\gamma$$

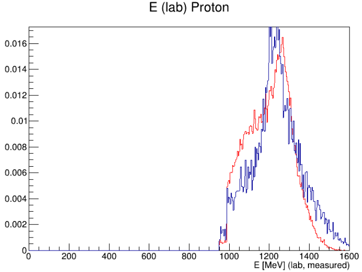
Closer look at:

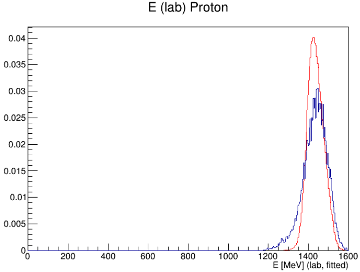
- ω
- Bachelor Photon
- π^0
- $\gamma\gamma$
- Proton



Energy of Proton for $\cos(\theta_\omega) = [-0.45, -0.35]$ (Peak)







Energy of protons for $\cos(\theta\omega) = [-0.45, -0.35]$. Red are MC and blue are beamtime data. Left side is just measured, right side is after KFit.

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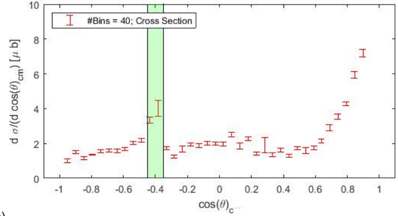

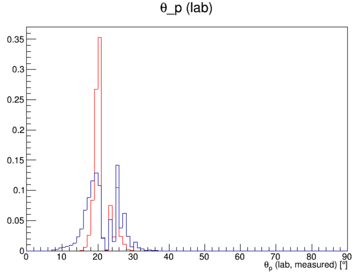

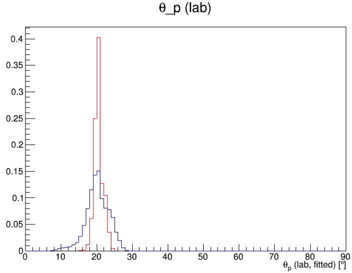

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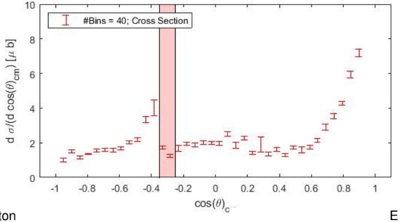
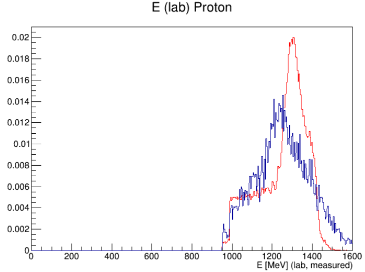
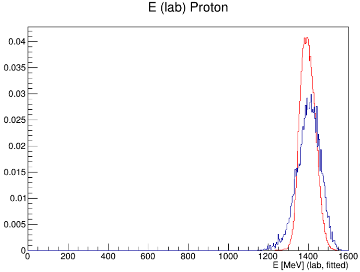
Energy of Protons for $\cos(\theta_\omega) = [-0.35, -0.25]$ (Dip)







Energy of protons for $\cos(\theta\omega) = [-0.35, -0.25]$. Red are MC and blue are beamtime data. Left side is just measured, right side is after KFit.

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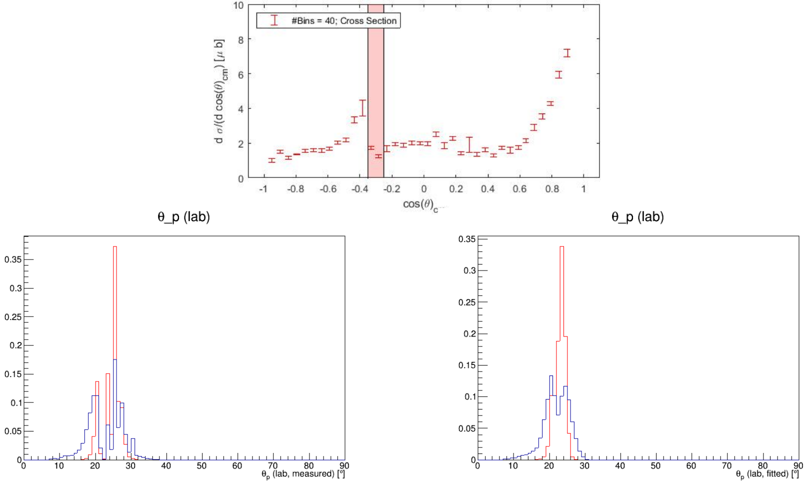

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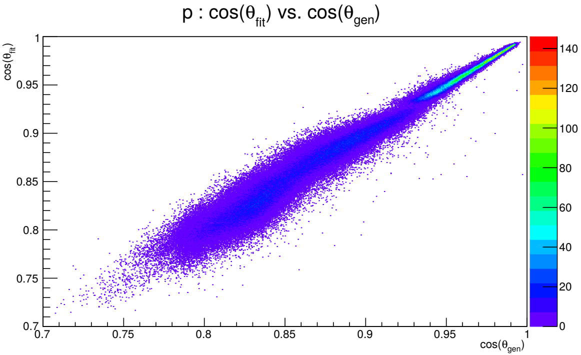
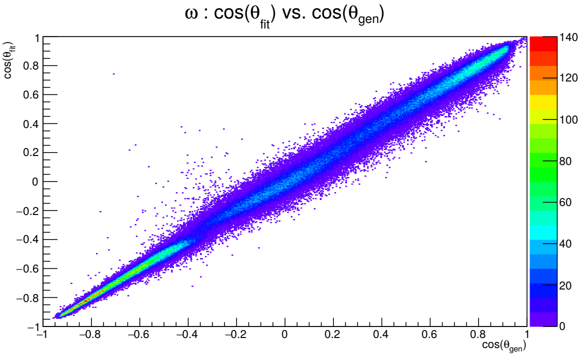
Proton: θ_{fit} vs. θ_{gen}



$\cos(\theta_{fit})$ vs. $\cos(\theta_{gen})$ for all protons.



$\cos(\theta_{fit})$ vs. $\cos(\theta_{gen})$ for all ω.

Unfolding

Motivation

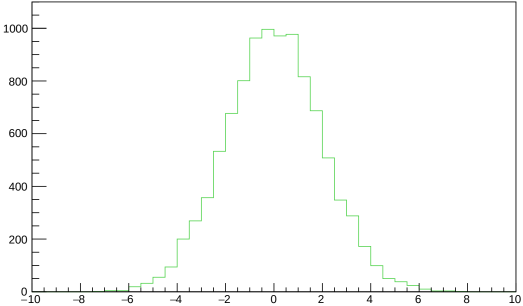
- μ is the *true* distribution given by nature
- detector effects are then described by the response function R. (inefficiencies, bias and smearing)
- This results in the distribution ν.

$$\nu_i = \sum_{j=1}^{M} R_{ij} \mu_j$$

- With infinite statistics, it would be possible to recover the original distribution by inverting the response matrix

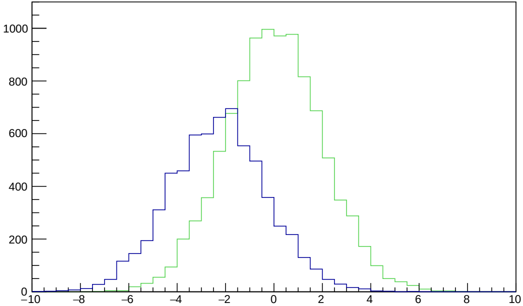
$$\mu = R^{-1} \nu$$

Example with Gaussian



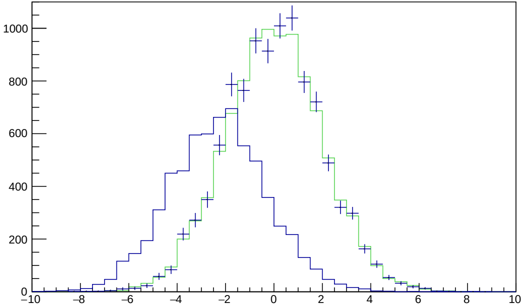
Example for a working Unfolding Algorithm

Example with Gaussian



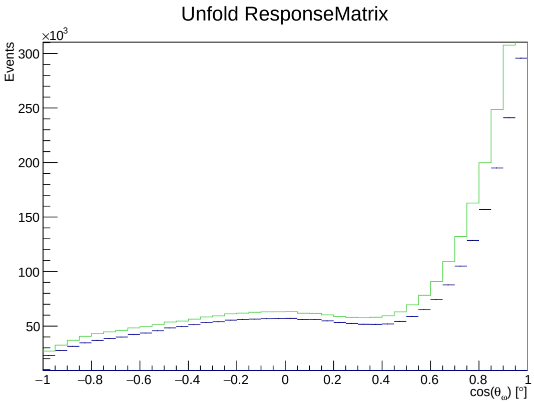
Example for a working Unfolding Algorithm

Example with Gaussian



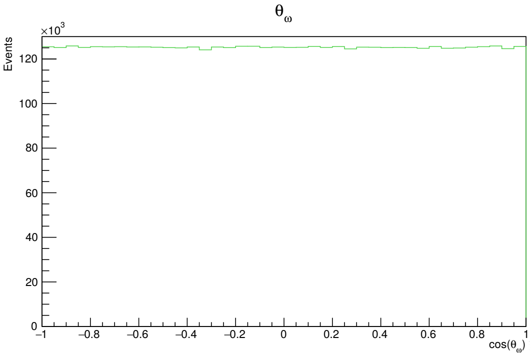
Example for a working Unfolding Algorithm

Folded



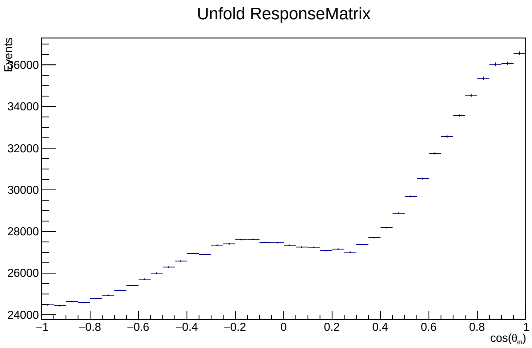
Folded; same cuts

Flat ω



Distribution of the ω in center of mass frame

Flat ω; Folded MC Data



Flat ω was used. MC fitted data were folded.