

Omega Cross-Section

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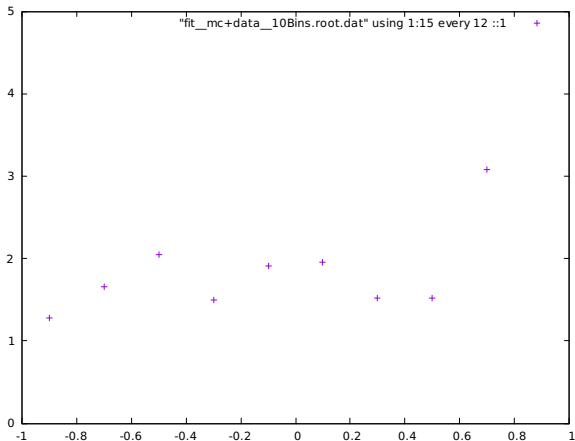


Figure 1: Olis Cross Section; Dip at about $\cos(\theta) = -0.3$

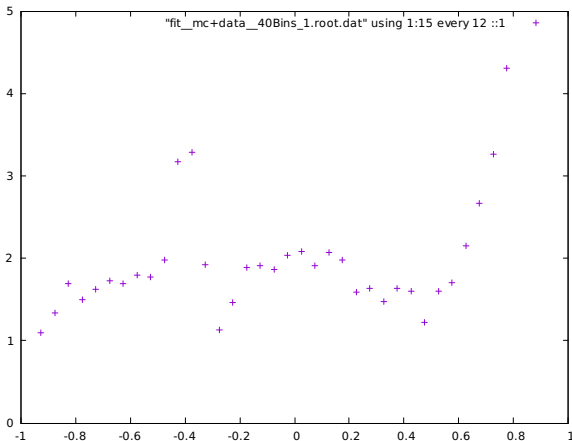


Figure 2: Increased number of bins to 40; now there is still a dip at $\cos(\theta) = -0.3$ but also a peak at $\cos(\theta) = -0.5$

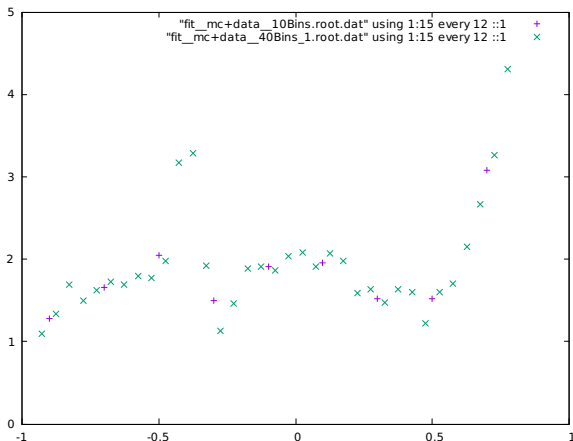


Figure 3: Both Cross Sections are shown.

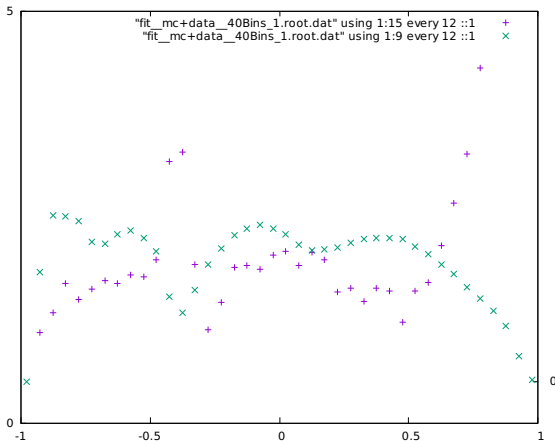


Figure 4: Cross Section and efficiency. There is an efficiency drop at $\cos(\theta) \approx -0.3$

$$\omega \rightarrow \gamma \pi^0$$

$\hookrightarrow \gamma\gamma$

Closer look at:

- ω
- Bachelor Photon
- π^0
- $\gamma\gamma$
- Proton
- $\cos(\theta) = [-0.35, -0.25]$ Dip
- $\cos(\theta) = [-0.45, -0.35]$ Peak

and compare MC with Beamtime Data (both reconstructed)

What was used?:

- Prompt Random Subtraktion
- `w_taggW ("TaggW");`
- `w_mass_Cut("ggg.M()>700");`
- `cut_KCut("KinFitProb > 0.2 && nCandsInput == 4 && copl_angle < 0.05");`

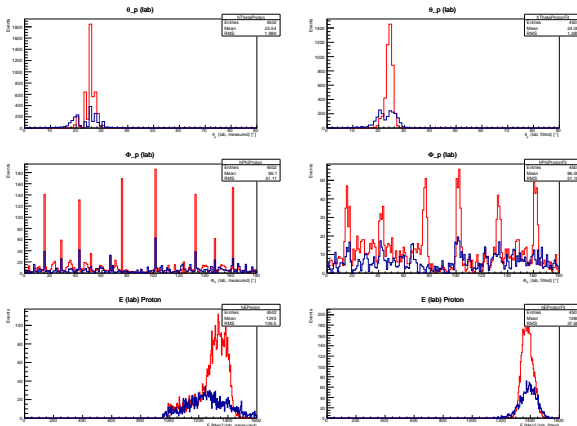


Figure 5: Red: MC; Blue Beamtime Data; Protons for $\cos(\theta_\omega) = [-0.35, -0.25]$; Right Side are fitted data

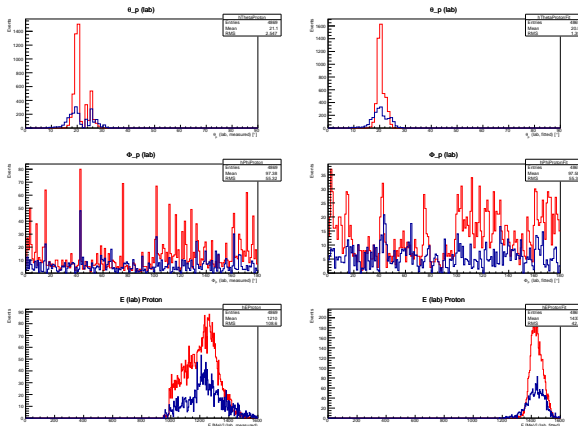


Figure 6: Red: MC; Blue Beamtime Data; Protons for $\cos(\theta_\omega) = [-0.45, -0.35]$; Right Side are fitted data

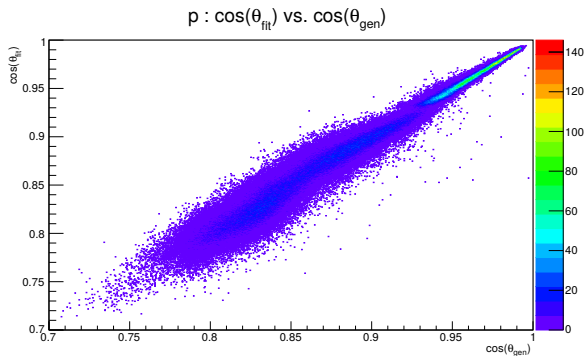


Figure 7: $\cos(\theta_{fit})$ vs. $\cos(\theta_{gen})$ for all protons.

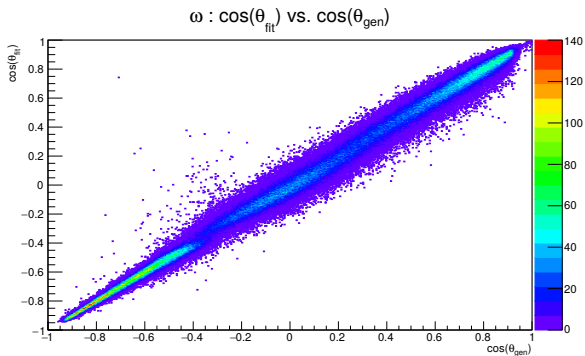


Figure 8: $\cos(\theta_{fit})$ vs. $\cos(\theta_{gen})$ for all ω .

Unfolding



- 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

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

- Using MC we can train the unfolding algorithm
- Create a 2D-Hist with $\cos(\theta_\omega)$ of all generated and all reconstructed ω (ω which are generated but not reconstructed are label *miss*)
- Then we can solve for μ iteratively

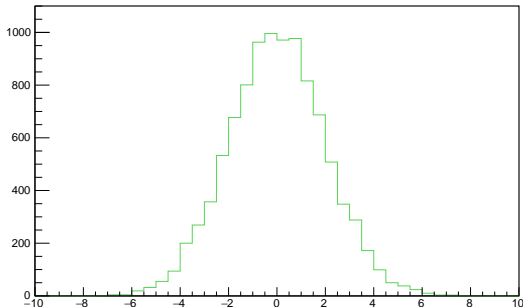


Figure 9: Example for a working Unfolding Algorithm

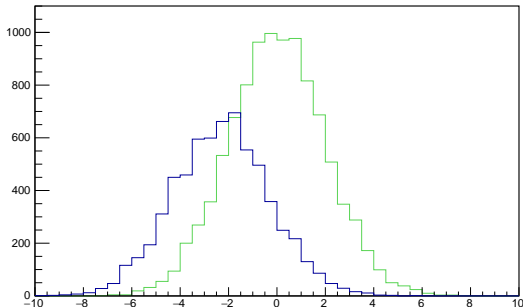


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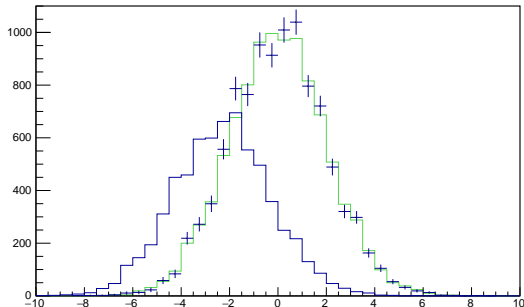


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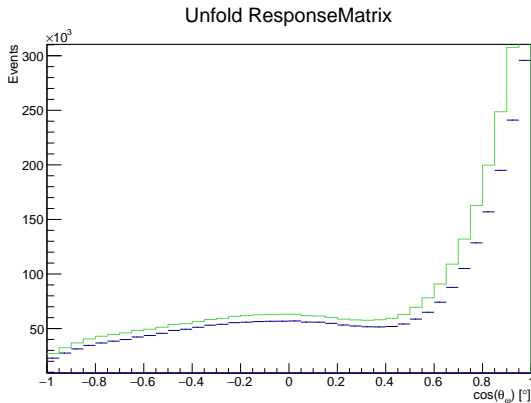


Figure 10: Folded; same cuts

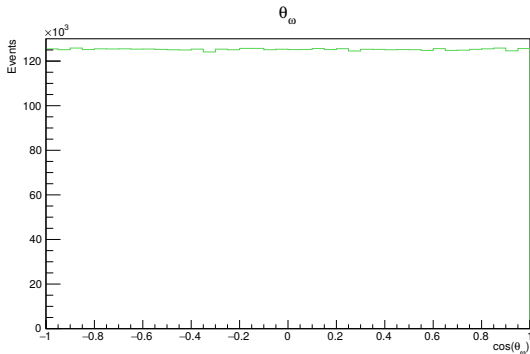


Figure 11: Distribution of the ω in center of mass frame

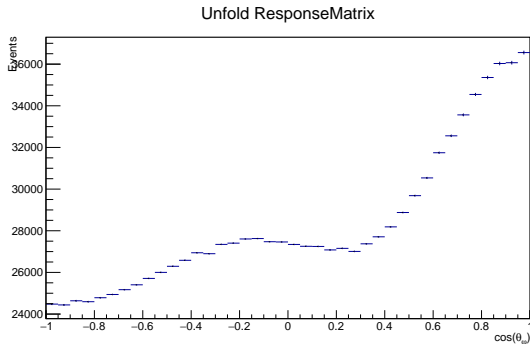


Figure 12: Flat ω was used. MC fitted data were folded.