

- π^0 exchange (unnatural parity) in the t-channel plays a significant role in the cross section of the electro- and photoproduction of ω mesons.
- Baryon resonances contribute significantly to both the total and differential cross section in ω electro- and photoproduction.
- We urgently need polarized observables to disentangle which resonances and by how much these resonances contribute to the cross section.

SPIN DENSITY MATRIX ELEMENTS

Extraction of Spin Density Matrix Elements $\rho_{\alpha ij}$ (SDMEs).

The SDMEs are bilinear combinations of helicity amplitudes and extracting these from the *angular distribution* in the helicity frame and/or the Gottfried-Jackson frame allows to compare with the theory.

$$W^L(\cos \theta, \phi, \Phi) = W^0(\cos \theta, \phi) - P_\gamma \cos 2\Phi W^1(\cos \theta, \phi) - P_\gamma \cos 2\Phi W^2(\cos \theta, \phi)$$

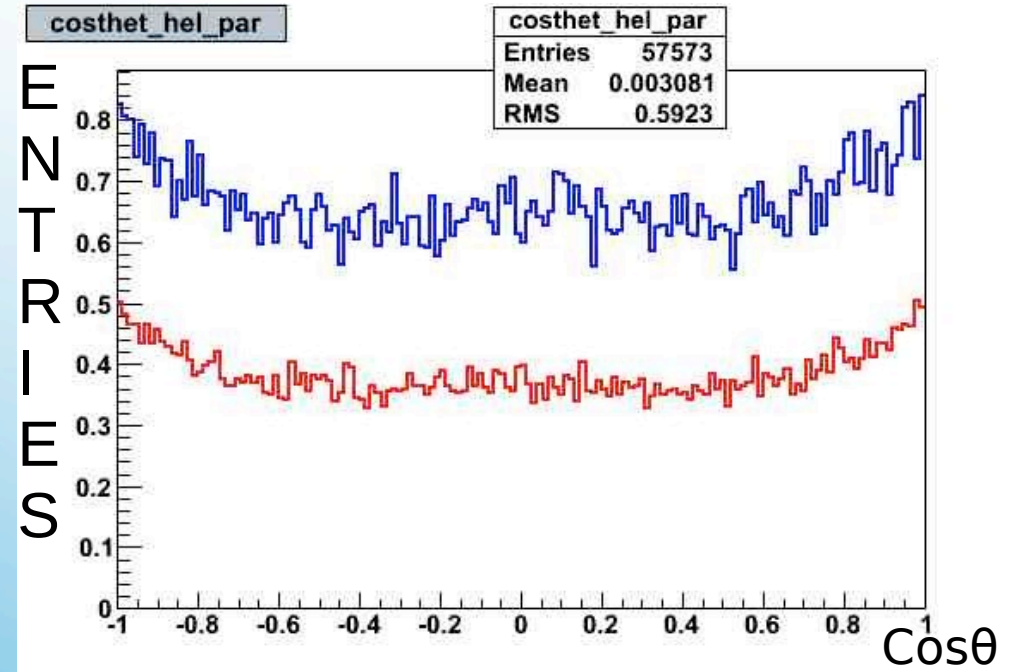
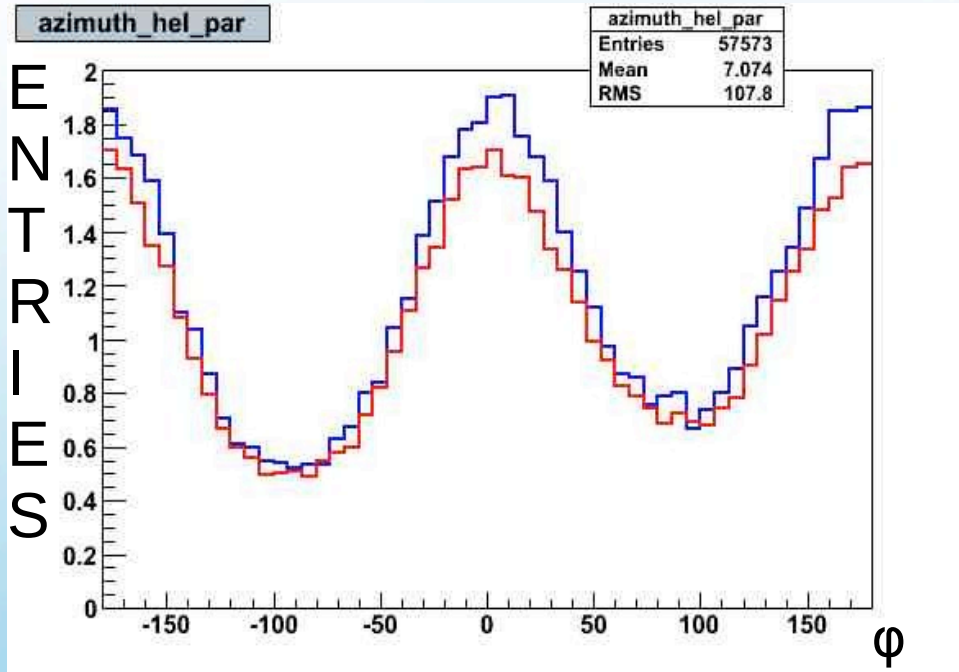
with

$$W^0(\cos \theta, \phi) = \frac{3}{4} \left[\frac{1}{2} (1 - \rho_{00}^0) + \frac{1}{2} (3\rho_{00}^0 - 1) \cos^2 \theta - \sqrt{2} \text{Re} \rho_{10}^0 \sin 2\theta \cos \phi - \rho_{1-1}^0 \sin^2 \theta \cos 2\phi \right]$$

$$W^1(\cos \theta, \phi) = \frac{3}{4} \left[\rho_{11}^1 \sin^2 \theta + \rho_{00}^1 \cos^2 \theta - \sqrt{2} \rho_{10}^1 \sin 2\theta \cos \phi - \rho_{1-1}^1 \sin^2 \theta \cos 2\phi \right]$$

$$W^2(\cos \theta, \phi) = \frac{3}{4} \left[\sqrt{2} \text{Im} \rho_{10}^2 \sin 2\theta \sin \phi + \text{Im} \rho_{1-1}^2 \sin^2 \theta \sin 2\phi \right]$$

SPIN DENSITY MATRIX ELEMENTS



Extracting the SDMEs starts by obtaining a series of independent angular distributions and fitting them so as to extract a series of parameters among which these Spin Density Matrix Elements play an important role.

SPIN DENSITY MATRIX ELEMENTS