

Study of η meson production with polarized proton beam

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Collaboration

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Abstract content

The dynamics of η meson production and the interaction of η mesons with nucleons can be studied using the $\vec{p}p \rightarrow pp\eta$ reaction via measurements of the analyzing power A_y . Previous experiments measuring A_y suffer from low statistics [1,2,3] and large uncertainties, therefore further studies are desirable. To this end, we have performed a measurement of the $\vec{p}p \rightarrow pp\eta$ reaction using the large acceptance and φ symmetric WASA-at-COSY detector, for beam momenta of 2026 MeV/c and 2188 MeV/c. Protons ejectiles were registered in the forward part of the WASA detector, while the η meson decay products (e.g. $\eta \rightarrow \gamma\gamma$) were detected in the central Electromagnetic Calorimeter. The polarization for each beam momentum has been determined using pp elastic scattering. Furthermore, in order to control systematic effects caused by potential asymmetries in the detector setup, the spin of the proton beam has been flipped for every accelerator cycle. Systematic studies have been performed calculating the degree of polarization, which is different for spin up and spin down modes. The results of these studies show that the polarization is sensitive to the x - and y -coordinate of the vertex position [4,5]. Moreover, it seems now possible to control the polarization determined from the $\vec{p}p \rightarrow pp$ reaction with a systematic error of about 1%. In this talk we would like to present preliminary results of determination of the polarization for the $\vec{p}p \rightarrow pp$ reaction, and the status of the ongoing analysis of the $\vec{p}p \rightarrow pp\eta$ reaction.

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