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Study of exclusive η meson production in proton-proton collisions with HADES

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Proton–proton collisions at a beam energy of 4.5 GeV, measured with the HADES detector at GSI, provide a great opportunity to study the production mechanisms of mesons. At this energy, the production of mesons occurs in the transition region between near-threshold energies, well described by effective Lagrangian models, and the regime, where Regge phenomenology can be applied. Measurements at these energies help to bridge both descriptions and contribute to a better understanding of nonperturbative QCD dynamics. In addition, these studies are also important to provide a reference for the interpretation of dilepton spectra in proton–proton and heavy-ion collisions.

The collected data provide high statistics of η mesons reconstructed in the $\pi^+\pi^-\pi^0$ decay channel. The recently installed Forward Detector enables measurements in previously inaccessible regions of phase-space. The analysis includes kinematic fitting with missing π^0 mass constraint, background subtraction and acceptance and efficiency corrections.

In this contribution, preliminary total and differential cross sections for exclusive η production will be presented. The differential results include angular distributions and invariant-mass spectra, which are crucial for probing the underlying production dynamics. The results will also be compared with selected effective Lagrangian models calculations.

Collaboration

HADES

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