

Partial Wave Analysis of HADES Data for Two-Pion Production in Pion-Nucleon Reactions

Wednesday, June 12, 2019 5:00 PM (30 minutes)

The High Acceptance DiElectron Spectrometer (HADES) [1], installed at GSI Helmholtzzentrum in Darmstadt, was designed to measure emissivity of dense and hot baryonic matter. The microscopic description of the emissivity requires understanding of baryon-virtual photon couplings which can be studied in NN and π -N reactions. The elementary collisions, especially those with pion beams, also offer a great opportunity to unambiguously fix the description of baryonic resonances and their coupling to the light vector mesons rho and omega, which plays an essential role in baryon \rightarrow N γ^* transitions. Therefore, to understand resonances production mechanisms a systematic energy scan and high precision data are needed.

In 2014 a large dataset of π -p scattering have been obtained at the four pion beam momenta 0.656, 0.69, 0.748 and 0.8 GeV/c [2,3]. Two pion final states, $\pi^+\pi^-$ and $\pi^-\pi^0$, have been selected and investigated by the multichannel Partial Wave Analysis (PWA) developed by the Bonn-Gatchina group [4].

In this talk, total and a set of differential cross-section distributions of the two pion final states in a function of invariant masses, polar scattering, helicity and Gottfried-Jackson angles will be presented and compared to the PWA solutions. Moreover, separations of cross sections into dominant contributions like $\Delta(1232)\pi$, $N(938)\sigma$, $N(938)\rho$, $N(1440)1/2^+$ and $N(1520)3/2^-$ will be shown. The special attention will be paid to the role of ρ -N coupling.

[1] G. Agakichiev et al. (HADES Collab.), Eur. Phys. J. A 41 (2009) 243.

[2] W. Przygoda, EPJ Web of Conferences 130 (2016) 01021.

[3] I. Ciepał, W. Przygoda, EPJ Web of Conferences 199 (2019) 01024.

[4] A.V. Sarantsev, JPS Conf. Proc. 10 (2016) 010005.

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