

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

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## Collaboration

HADES Collaboration

## Abstract content

The High Acceptance Di-Electron Spectrometer (HADES) [1], installed at GSI Helmholtzzentrum in Darmstadt, was designed to measure dielectrons in the 1-3.5 AGeV energy range. The experimental program of HADES focuses on two main goals: (I) measurements of dielectron emission of a compressed baryonic matter formed in heavy ion collisions and investigate in-medium hadron properties, and (ii) the study of dielectron production in elementary proton-proton (pp) and pion-proton ( $\pi p$ ) collisions and taking data about hadron electromagnetic structure as well. Both objectives are complementary in a sense that the understanding of the in-medium effects involves also investigations of the dielectron invariant mass spectra in elementary  $\pi p$ , pp 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 for the in-medium modifications. Therefore, to understand resonances production mechanisms a systematic energy scan and high precision data are needed. In 2014 a large dataset of  $\pi$ -p scattering have been obtained at the four pion beam momenta 0.656, 0.69, 0.748 and 0.8 GeV/c. The data have been included into the multichannel Partial Wave Analysis (PWA) developed by the Bonn-Gatchina group [2]. Separations of cross sections of the two pion final states ( $\pi^+\pi^-$  and  $\pi^0\pi^-$ ) into dominant channels will be presented and compared to other data. In particular the role of  $\rho N$  coupling will be emphasized in connection to electromagnetic form factors of baryonic resonances in the timelike region and dielectron production measured in the same experiment [3].

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

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

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

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