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## Partial Wave Analysis for Pion-Induced Resonance Studies in the HADES Experiment

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The High Acceptance Di-lepton Spectrometer (HADES) collaboration at GSI employs a pion beam to examine the characteristics of baryonic resonances and their decay channels. This pion-beam facility enables the generation of baryonic resonances at a fixed center of mass energy ( $\sqrt{s}$ ), i.e. in the S-channel. Consequently, these beams possess a significant advantage over proton-induced reactions and are complementary to photo-induced studies conducted elsewhere. Partial Wave Analysis (PWA) techniques are used to study the coupling of the resonances to different final states. HADES has a particular interest in studying the role and medium modification of vector mesons in heavy-ion collisions in baryon-dense matter. Elementary pion-induced studies on the proton combined with a PWA will provide insights into the couplings of baryonic resonances to  $\rho N$  and  $\omega N$  final states in greater detail will provide insights into the impact of the melting of the  $\rho$  meson in heavy ion collisions and the involvement of intermediary vector mesons in dilepton emissions.

In anticipation of conducting a more comprehensive exploration of the resonance regions in pion-proton collisions, a new implementation of the K-Matrix & N/D frameworks is currently under development. This updated implementation aims to offer a refined mapping of these regions. Example fits will be presented showing current status and the potential of the new framework.

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