

## Studies of pion-induced reactions with HADES

*Monday, 6 February 2023 13:00 (1 hour)*

A main goal of the HADES (High Acceptance Di-Electron Spectrometer) experiment at GSI is to study medium effects in  $e+e-$  production in heavy-ion reactions in the SIS-18 energy range (1-4 GeV/nucleon). Its excellent particle identification capabilities allowed for a systematic investigation of dielectron, strange particles and pion production in pion, proton, deuteron or heavy-ion induced reactions on proton or nucleus. The obtained dilepton spectra measured at various beam energies show important contributions from baryon resonance decays ( $R \rightarrow N e+e-$ ) and a strong influence of the intermediate vector mesons ( $\rho/\omega/\phi$ ) in the corresponding time-like electromagnetic form factors ( $\epsilon TFF$ ).

In order to directly access such transitions, HADES has started a dedicated pion-nucleon program using the pion beam facility at GSI. For the first time, combined measurements of hadronic and dielectron final states have been performed in p-N reactions in the second resonance region, using polyethylene and carbon targets. Based on 2-pion production channels in p-p the baryon-meson couplings have been determined which are very crucial for the dilepton studies and finally the extraction of resonance Dalitz decay and  $\epsilon TFF$ .

The data collected with the carbon target have been used to study the pion and proton emission channels in various topologies (inclusive,  $p\pi-$ ,  $p\pi+$ ,  $pp$ ,  $\pi+\pi-$ , ...,  $\pi\pi pp$ ). The interest is to provide information on the pion dynamics, which is crucial for dense hadronic matter studies using heavy-ion collisions at a few GeV/nucleon at GSI and later at FAIR. Results are compared to predictions of the INCL++ cascade and of transport models (SMASH, rQMD, GIBUU) providing a detailed test of the ingredients of these models.

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