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Studies of pi-12C reactions at 0.7 GeV/c with the HADES spectrometer

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At incident momenta below 2 GeV/c pion nucleus scattering is an ideal tool to study properties of baryonic resonances in the nuclear medium. Previous measurements were mostly focused on the Δ(1232) resonance region and performed mostly with positive pions. In this energy range [1,2] pion absorption or scattering, including charge exchange reactions have been extensively studied. At higher energies, in the so-called second resonance region, where N* resonances dominate (N(1440), N(1520), N(1535),...) the data base is very scarce. Such information is however needed in the context of dense hadronic matter studies as a benchmark for the description of heavy-ion reactions at a few GeV/A, where pion-nucleus dynamics plays a crucial role. More generally, measurements of pion-induced spallation reactions and investigations of pion and proton differential spectra is very important for validation and further development of transport and hadronic cascade models. Especially the cascade models are used in the GEANT4 tool for various applications. In this talk I will focus on the analysis of the π−+12C data collected with the HADES (High Acceptance Dielectron Spectrometer) [3], using the GSI pion beam at an incident pion momentum of 0.7 GeV/c. Pion and proton differential spectra measured in various exit channel topologies (inclusive, pπ−, pπ+, pp, π+π−,..., ππpp) are compared to predictions of the INCL++ cascade [4] and of transport models (SMASH [5,6], rQMD-RMF [7], GIBUU [8]). The results allow to test selectively the capacity of such models to describe the various mechanisms (quasi-eleastic scattering, multipion production, rescatterings and pion absoprtion). The sensitivity of the data measured in the quasi-elastic channel to short range correlations is also investigated.

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Collaboration

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