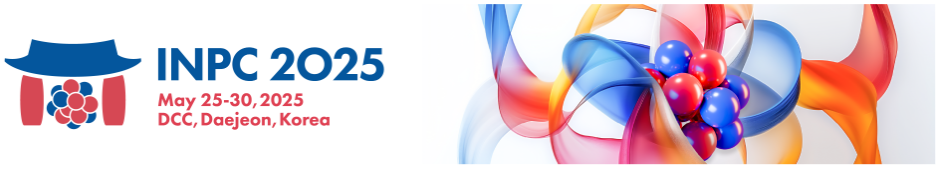

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Model-independent measurement of isospin diffusion at Fermi energies with INDRA-FAZIA: towards new quantitative constraints on symmetry energy

Thursday, 29 May 2025 11:00 (25 minutes)

Heavy ion reactions provide a unique opportunity to gain insight in the equation of state of baryonic matter over varying densities, but many delicate aspects must be taken into account in order to get quantitative constraints through the comparison with trasport model predictions, including, e.g., a proper choice of the observables, and their evaluation in similar conditions between experimental and simulated data. In particular, a proper treatment of the reaction centrality is crucial to take care of the latter aspect.

In this contribution we present a model-independent experimental measurement of the effect of isospin diffusion in ^{58,64}Ni+^{58,64}Ni collisions at 32 MeV/nucleon, studied directly as a function of the impact parameter. This result has been obtained by combining two datasets having common characteristics, but bearing complementary information. The first dataset has been acquired with the INDRA setup [1] and used to implement a model-independent reconstruction of the impact parameter [2], while the second one has been acquired in the first experimental campaign of the coupled INDRA-FAZIA apparatus at GANIL [3-5]. The neutron-to-proton content of the quasiprojectile remnant measured by FAZIA [6,7] has been employed as isospin observable. The isospin transport ratio technique [8] has been employed to highlight the effect of isospin diffusion, and the evolution towards equilibration as a function of the impact parameter of the collision is clearly extracted [9].

The experimental result is then compared to model predictions based on the BUU@VECC-McGill transport model [10], where, by exploiting the metamodeling technique of Ref.[11], different parametrizations of the Nuclear Equation of State available in the literature have been considered, including two extreme χ-EFT interactions: a good agreement is found within the chiral constraint [12]. Further details of the diffusion process, including the densities explored by the system during the collision, have been also studied in the framework of the BUU@VECC-McGill model.

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