ID de Contribution: **60** Type: **Invited presentation**

The INDRA-FAZIA setup: an overview of the most recent results on isospin transport phenomena

mardi 26 septembre 2023 11:30 (25 minutes)

Heavy-ion collisions in the intermediate energy regime (20-100 MeV/nucleon) are a widespread tool to probe the properties of nuclear matter far from equilibrium: among other topics, they allow to investigate isospin transport phenomena, which can be interpreted in the framework of the Nuclear Equation of State (NEoS), i.e. the thermodynamic description of nuclear matter.
The INDRA-FAZIA apparatus, operating in GANIL, is particularly well suited to investigate such kind of phenomena, exploiting the best characteristics of INDRA and FAZIA: twelve FAZIA blocks cover the forward polar angles (from 1.4° to 12.6°) providing good charge and mass identification for the heavy quasi-projectile residue and for most of the reaction products, while twelve INDRA rings provide a large angular coverage (from 14° to 176°). The coupling of the two apparatuses was completed in 2019, and the first experiment was devoted to the study of isospin diffusion in ^{64,58}Ni+^{58,64}Ni at 32 and 52 MeV/nucleon.

In this talk the most recent results from the INDRA-FAZIA apparatus will be presented, focusing on its first experiment. The identification capability of the apparatus allowed us to highlight the isospin transport effects on the neutron content of light and heavy fragments belonging to the QP phase space, obtaining coherent indications of the evolution towards isospin equilibration. Moreover, the high granularity of FAZIA makes it suitable to study the isospin content of the two heavy fragments produced in the quasi-projectile breakup, which in most cases can be simultaneously detected and mass identified. An in-depth analysis of this exit channel of semiperipheral collisions has been carried out, leading to novel results that add valuable information for a comprehensive view of the process.
The experimental results are also compared to the predictions of the antisymmetrized molecular dynamics (AMD) model, coupled with GEMINI++ as afterburner, in order to validate the event selection procedure and to inspect the dynamical features of the reactions. More specifically, the AMD calculations have been used to extract the information on the relevant timescales of the interaction process, thus helping with the interpretation of experimental observations.

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Classification de Session: Heavy ion collisions