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Dipolar degrees of freedom and the dynamics of the Isospin equilibration process

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This contribution presents a study aimed at understanding the dynamics at Fermi energies related to isospin equilibration processes and the connection to key parameters describing the density dependence of the symmetry energy for asymmetric Nuclear Matter [1,2]. Specifically, as will be shown, the link between these equilibration processes and the dipolar signal is established through dynamic correlations between the multiplicity of produced fragments and their associated momenta.

The $48\text{Ca} + 27\text{Al}$ collision at 40 MeV/A was carried out using the superconducting cyclotron at the INFN Laboratori Nazionali del Sud. Charged fragments were detected with the CHIMERA multi-detector [3]. The dynamics of the isospin equilibration process (beyond statistical behaviour) are investigated by reconstructing the total average dipolar signal of the final system, obtained by measuring the charge and velocity of the various fragments produced in well-reconstructed events. Different degree of centrality were selected based on the degree of dissipation. Results from a comparison with calculations using the Constrained Molecular Dynamics model (CoMD-II) are also presented [4].

[1] M.Papa et al., Phys. Rev. C 91, 041601(R) (2015).

[2] G. Cardella et al., Phys.Rev.C 85, 064609 (2012) and references therein.

[3] A. Pagano et al., Nucl. Phys. A 734, 504 (2004); Nucl. Phys. News 22, 25 (2012).

[4] M.Papa, Nucl. Phys. A 1041 122780 (2024).

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