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Multinucleon Transfer Reactions: Recent Insights from Experiments at LNL-INFN

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Transfer reactions are pivotal in nuclear structure and reaction studies. In heavy-ion transfer reactions, multiple nucleons can be transferred in a single collision along with significant energy and angular momenta from the relative motion to the intrinsic degrees of freedom [1,2]. This establishes multinucleon transfer reactions as an essential tool for probing a wide array of topics, from nucleon-nucleon correlations to reaction dynamics [3].

Recent experiments performed at the Legnaro National Laboratories (LNL, INFN) with the large solid angle magnetic spectrometer PRISMA have focused on studying nucleon-nucleon correlations with heavy-ion beams on medium-mass targets [4,5]. Transfer cross sections were measured across various range of energies in inverse kinematics, from near to far below the Coulomb barrier. Interpretations were derived from excitation functions, extending to large distances of closest approach, where nuclear absorption is minimal. Further studies targeted the production mechanism of neutron-rich nuclei [6-8], highlighting transfer processes as a competitive method for producing exotic species, especially heavy neutron-rich nuclei.

This presentation offers an overview of these experiments, focusing on key results, challenges, and recent advancements, especially in connection with the AGATA array currently coupled to PRISMA.

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