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The role of pairing in heavy-ion induced transfer reactions

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An experimental campaign to study heavy-ion induced one- and two-nucleon transfer reactions has been performed at INFN-Laboratori Nazionali del Sud in Catania (Italy). In particular reactions induced by 18O and 20Ne beams at energies above the Coulomb barrier on different target isotopes have been explored with high resolution (both in energy and angle) and in a quite wide angular range including zero degrees. The aim of this study is two-fold. First of all, the experimental observations and the analysis of the reaction mechanism in two-nucleon transfer reactions in a quantum-mechanical description can give interesting information on the role of the pairing force in populating specific excited states and resonances, such as the so called Giant Pairing Vibration. Moreover, the study of multi-nucleon transfer cross-sections is a crucial aspect for recently proposed research projects involving the use of nuclear reactions of double charge exchange in relation with the physics of neutrinoless double beta decay. The multi-nucleon transfer mechanism could compete with the double meson exchange mechanism in double charge exchange reactions and their role must be understood in order to extract accurate information on the nuclear matrix elements of interest.

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