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Transfer probability measurements in the superfluid ^{116}Sn+^{60}Ni system

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In transfer reactions between heavy ions it is possibile to study at the same time many transfer channels and, in particular, to compare the relative role played by the singel- and the multiple pair-nucleon transfer processes [1]. In particular the study of the two-nucleon transfer mechanism is a powerful tool to investigate correlations of nucleons in nuclei.
At energies below the Coulomb barrier nuclei are at large distances, so that the transfer probabilities depend on the tail of their wave functions and are only slightly influenced by the nuclear potential. In this energy regime, reaction products are excited in a restricted energy region (few MeV). This minimizes the complexity of coupled channel calculations and allows to extract more quantitative information on the correlations close to the ground states [2,3].
A first experiment in inverse kinematics has been performed at the Laboratori Nazionali di Legnaro (LNL) using the large solid angle magnetic spectrometer PRISMA. An excitation function, from above to far below the barrier, for the closed shell system ^{96}Zr+^{40}Ca has been measured [4] and transfer probabilities [5] have been extracted for the neutron transfer channels. Data have been compared with microscopic calculations showing the importance of the transition to the 0^+ excited states.
More recently we performed a study of the main transfer channels in the superfluid ^{116}Sn+^{60}Ni system, where the ground state Q-values for neutron transfers are close to their optimum Q-values. The experiment has been done in inverse kinematics at different bombarding energies from above to well below the Coulomb barrier, detecting the lighter target-like ions with the magnetic spectrometer PRISMA at very forward angles. Measurements of neutrons and protons transfer probabilities have been obtained on the basis of an event-by-event reconstruction of the ion trajectories inside PRISMA [6]. It will be interesting to compare the behaviour of the transfer mechanism to the previously measured closed shell system and to the same kind of theoretical calculations. In this talk the results of this recent measurement will be presented, and a discussion will be made on the possibilities offered in the field by exploiting large solid angle spectrometers.

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