Heavy–ion transfer reactions at large internuclear distances using the PRISMA magnetic spectrometer

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The study of two-neutron transfer reactions is a powerful tool to investigate correlations between nucleons in nuclei. In heavy-ion reactions many nucleon transfer channels are available, giving the possibility to compare the relative role of single particle and pair transfer modes [1]. Furthermore, at bombarding energies below the Coulomb barrier, nucleons are transferred in a restricted excitation energy window and colliding nuclei, being at large internuclear distances, are only slightly influenced by the nuclear potential. Under these conditions the complexity of theoretical calculations diminishes and more information on pair correlations can be extracted from data [2,3].

Using the large solid angle magnetic spectrometer PRISMA, at the Laboratori Nazionali di Legnaro (LNL), a first reaction at sub–barrier energies has been performed in inverse kinematics for the closed shell system ^{96}Zr+^{40}Ca [4]. An excitation function ranging from above to well below the Coulomb barrier has been measured and transfer probabilities [5] have been extracted for the neutron transfer channels. The comparison between data and microscopic calculations shows the importance played by transitions to 0^+ excited states.

We recently perfomed at LNL a similar experiment in inverse kinematics for the superfluid system ^{60}Ni+^{116}Sn, for which the ground state Q–values for neutron transfers are close to their optimum Q–values. Measurements of transfer cross sections have been obtained on the basis of an event-by-event reconstruction of the ion trajectories inside PRISMA [6] and transfer probabilities have been measured. It is therefore 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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