Heavy ion transfer reactions: ongoing and future experiments performed with large acceptance magnetic spectrometers

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Significant advances have been achieved in the last years in the field of multinucleon transfer reactions (see Ref. [1] and references therein for the last review on the subject). The advent of the last generation large solid angle magnetic spectrometers pushed the detection efficiency more than an order of magnitude above previous limits, with a significant gain in mass resolution for very heavy ions. The coupling of these spectrometers to large gamma arrays allowed to perform gamma spectroscopy for nuclei moderately far from stability produced via nucleon transfer or deep-inelastic reactions, especially in the neutron-rich region.

In the last period we focused mostly on transfer measurement at sub-barrier energies, an ideal energy range to probe nucleon-nucleon correlations. By exploiting the advantages of inverse kinematics, transfer probabilities have been studied for the closed shell ^{96}Zr+^{40}Ca [2] and superfluid ^{116}Sn+^{60}Ni [3] systems. The comparison between experimental and theoretical transfer probabilities, especially at large internuclear distances, provides precious inputs to probe nucleon-nucleon correlations.

These inverse kinematics experiments are also very useful to efficiently detect both binary partners and to study the production yield in the neutron rich regions. Besides the "light" partner products, the "heavy" partners are presently receiving peculiar attention. In fact, certain regions of the nuclear chart, like that below ^{208}Pb or in the actinides and transactinides, can be hardly accessed by fragmentation or fission reactions, and multinucleon transfer represents a suitable (if not the only one) mechanism to approach those neutron rich areas.

A presentation will be given on these items, focusing on specific aspects also important for future experiments with radioactive beams.

[1] L. Corradi, G. Pollarolo and S. Szilner, J. Phys. G: Nucl. Part. Phys. **36**, 113101 (2009).

[2] L. Corradi *et al.*, Phys. Rev. C **84**, 034603 (2011).

[3] D. Montanari *et al.*, NN2012, S.Antonio, Texas (USA) May 27 - June 1, 2012, to be published in J. of Phys. G.