

Heavy Ion Transfer Reactions : Status and Perspectives

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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). With the development of high resolution and high efficiency experimental set-up's, one could unambiguously detect in mass and charge the nuclei produced in multineutron and multiproton transfer reactions. 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. Further, the coupling of these spectrometers to the large gamma arrays allowed to perform gamma-particle coincidences, thus detecting the transfer strength to the lowest excited levels of binary products and performing gamma spectroscopy for nuclei moderately far from stability produced via nucleon transfer or deep-inelastic reactions, especially in the neutron-rich region. Moreover, one can study the population of specific nuclear levels via transfer of multiple pairs and valuable information about nucleon-nucleon correlations can be derived from the study of their decay modes.

In transfer reactions one of the most interesting item is how single particle and more complex degrees of freedom (e.g. pair modes) act in the transfer process and how these are connected with the competing reaction channels, like fusion (see [2, 3] and references therein for the most recent conferences on the subject). This can be probed by looking at the behaviour of the differential and total cross sections and total kinetic energy loss distributions of multineutron and multiproton transfer channels.

In the present talk an overview will be given on aspects more closely connected with the reaction mechanism, in particular with the properties of quasi-elastic and deep-inelastic processes and on recent measurements of transfer reactions at far sub-barrier energies.

References

- [1] L. Corradi et al, *J. of Phys.* **G36**, 113101 (2009).
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- [3] *Fusion08 : Int. Conf. on New Aspects of Heavy Ion Collisions Near the Coulomb Barrier*, Chicago (USA), September 22-26, 2008, AIP Proceedings Series, Vol. N. 1098 (2009), Melville (New York), K.E. Rehm *et al.* eds.

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