Multinucleon transfer reactions studied with the PRISMA magnetic spectrometer

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Multinucleon transfer reactions with ^{40}Ca beam on closed shell nuclei ^{96}Zr and ^{208}Pb [1] at energies close to the Coulomb barrier were studied using magnetic spectrometers. A complete identification of the final reaction products has been achieved up to six neutron and proton transfer channels. The comparison between data and calculations, based on semiclassical models (CWKB), allowed to identify the different degrees of freedom that influence the evolution of the reaction, like deformation, single, and pair transfer modes [2,3].

The measured mass and charge distributions demonstrate that multinucleon transfer reactions are powerful tools for the population of (moderately) neutron rich nuclei. The yields of the populated levels confirm the ability of the transfer mechanism to reach excitation energy and angular momentum regions not accessible by other means. Population of states with pair-phonon structure underline that heavy-ion induced reactions preserve a significant degree of selectivity. A discussion will be presented on recent multinucleon transfer experiments performed with spectrometers, where also γ-particle coincidences were measured. From this one can extract the transfer strength to specific final states testing the predictive power of the theoretical models.

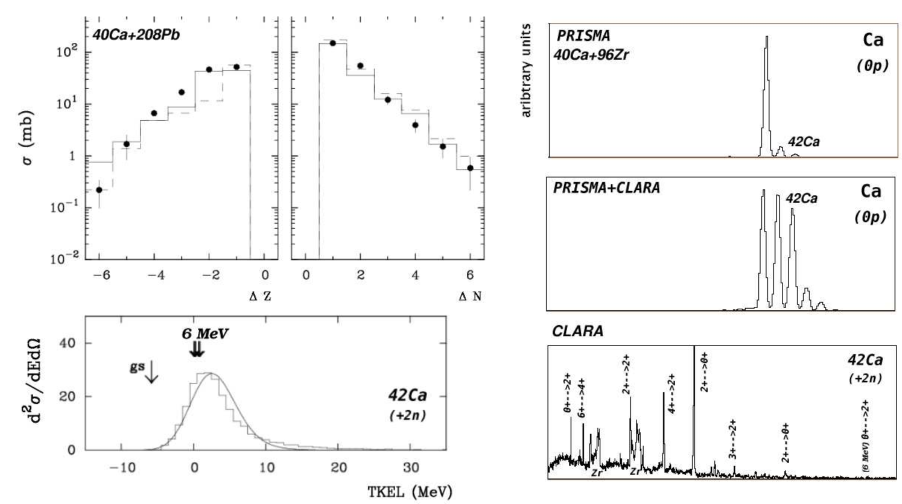

Figure 1: **Left**: *Total cross sections of pure proton stripping (top left) and neutron pick-up (top right) channels and Q-value distributions of +2n channel (bottom panel) of* $^{40}\mathrm{Ca}+^{208}\mathrm{Pb}$ *reaction studied with ToF spectrometer, together with the semiclassical calculation (CWKB).* **Right**: *Mass distributions of* $^{40}\mathrm{Ca}+^{96}\mathrm{Zr}$ *reaction obtained with the PRISMA spectrometer (top) and in coincidence with the CLARA γ array (middle), together with γ spectra of +2n transfer channel (bottom).*

[1] S. Szilner *et al.*, Phys. Rev. C, in press.
[2] S. Szilner *et al.*, Eur. Phys. J. A **21**, 87 (2004).
[3] L. Corradi *et al.*, Phys. Rev. C **66**, 024606 (2002).