Population of neutron-rich nuclei around ^{48}Ca with deep inelastic collisions

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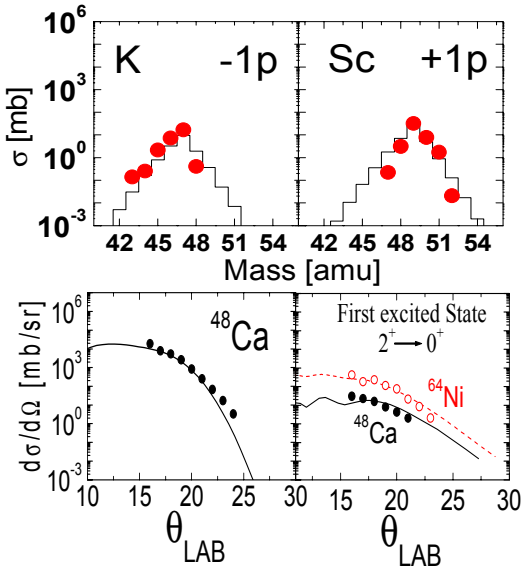
The population and γ-decay of n-rich nuclei around ^{48}Ca was measured at LNL using deep-inelastic collisions on ^{64}Ni, at an energy ~2.5 times above the Coulomb barrier. The experimental setup consisted of the CLARA Ge array coupled to the PRISMA magnetic spectrometer. These high energy collisions are proved to be a powerful tool for the production of nuclei far from stability. In this connection a good understanding of the reaction mechanisms is a starting point for extracting nuclear structure information. In fact, they provide information on basic physical quantities, such as potentials, spectroscopic factors, particle-vibration coupling and pair transfer. In this contribution we present a detailed investigation of the reaction properties: angular distributions for pure elastic scattering and for the inelastic excitation of the first excited states of target and projectile, as shown in the bottom part of the figure. In the top panels total cross sections of the most relevant transfer channels are shown. The experimental results are compared with predictions from the semiclassical multi-nucleon transfer model of ref. [1], which is found to reproduce well the data corresponding to (-1p) and (+1p) channels. In addition, for some of the most intense channels, energy integrated angular distributions are also obtained. Finally, for some one-nucleon transfer channels it has been possible to extract also the angular distributions corresponding to the excitation of the first excited state.



Measured total cross sections for -1p and +1p transfer channels (symbols) in comparison with predictions from the semiclassical multi-nucleon transfer model of ref. [1] (histograms).

Angular distribution Q-value integrated of ^{48}Ca and of the first excited states of ^{48}Ca and ^{64}Ni. Symbols refer to data, curves give the corresponding predictions from the semiclassical model of ref. [1] and DWBA calculations, respectively.

[1] A. Winther, Nucl. Phys. A594, 203(1995).

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