

Momentum Distribution Studies of Projectile Fragments from Peripheral Collisions Below the Fermi Energy: Investigating a Pathway to the Nuclear Chart Limits

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Studying the production of neutron rich elements close to the r-process path and the neutron drip line is among the fundamental endeavors of contemporary nuclear science [1-3]. Apart from fragmentation, multinucleon transfer at Fermi energies provide us with a means of production for these isotopes [4]. The study of the mechanisms of these reactions is a central part of our group's work [5-8]. We focus on the study of momentum distributions of projectile-like fragments that were recently extracted from original experimental data from reactions of a ⁸⁶Kr beam at 15 and 25 MeV/nucleon and an ⁴⁰Ar beam at 15 MeV/nucleon with targets of Ni and Sn. These data were obtained from our previous works at the MARS spectrometer at Texas A&M University [5,6]. Two body kinematics was used to characterize the excitation energies of the various momentum distribution peaks. Calculations with the Deep-Inelastic Transfer Model (DIT) [9] and with the Constrained Molecular Dynamics model (CoMD) [10] for the dynamic part of the reaction were also performed. The deexcitation of the hot projectile-like fragments was performed with the GEMINI model [11]. Through the thorough studies of the mechanisms of these reactions it may be possible to elucidate how the energy of the beam and the different targets affect the multinucleon transfer channels leading to the production of extremely neutron rich nuclei.

References

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