Multinucleon Transfer Reactions to Study Nuclear Structural Evolution

P.H.Regan*

Department of Physics, University of Surrey, Guildford, GU2 7XH, UK

The investigation of the structural evolution of nuclear systems with increasing neutron excess is one of the major themes of current nuclear structure physics research. Major questions revolve around the robustness of the standard magic shell closures in nuclei with a large positive isospin projection, $T_z = {}^{(N-Z)}/2$. In addition to being of fundamental nuclear structure interest, such questions are thought to play a pertinent role with regards to the production of about 50% of the stable isotopes heavier than iron, formed via the rapid-neutron capture process. Over the course of the last decade, the group at Surrey have contributed to a variety of structural studies using multinucleon transfer reactions to study a range of neutron-rich and β-stable systems. Reactions studies carried out by our group include ^{86}Kr+^{110}Pd [1]; ^{136}Xe+^{198}Pt [2-5]; ^{136}Xe+^{100}Mo [6,7]; and ^{82}Se+^{192}Os [8,9,10]. This talk will review recent work on in-beam multinucleon transfer reactions aimed at studying the evolving structure in neutron-rich nuclei approaching (i) the N=50 shell closure and (ii) the classic region of K-isomerism associated with deformed prolate shapes for rare-earth and transitional isotopes with A~160-190. The utilisation of reaction parameters including (i) measured gamma-ray fold; (ii) dissipated energy; (iii) residue recoil angle; and (iv) binary partner and/or isomer tagging will be demonstrated in terms of improving the channel selection in such studies. Perspectives for upcoming experiments aimed at the study of nuclei around the ^{170}Dy valence *Np.Nn* maximum [11] will be outlined.

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