Isomer decays in \(N\neq Z\) nuclei studied via Fragmentation Reactions

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This presentation will discuss new results obtained from experiments designed to investigate the decay properties of isomeric states in \(N\approx Z\) nuclei. Specifically new decay properties of the known [1] \(16^+\) spin-gap isomer in \(^{96}\)Cd [1] will be presented along with data which suggest the presence of isomeric gamma decaying states in this nucleus and the first, preliminary, results for the identification of a low-K, 2-quasi-particle, isomer in \(^{70}\)Se. In both cases the experiments were performed at the Radioactive Isotope Beam Factory (RIBF) at RIKEN as part of EURICA campaigns. The nuclei of interest were produced by the fragmentation of a 345 MeV/nucleon \(^{124}\)Xe primary beam colliding with a \(^9\)Be target and the isotopes of interest were identified using the BigRIPS spectrometer.

The first evidence for \(\beta\)-delayed proton decay from the \(16^+\) isomer in \(^{96}\)Cd will be presented. The beta delayed proton branching ratio has been measured, along with upper and lower limits for the B(GT) strength of the decay from the \(16^+\) isomer to the \(15^+\) isomer in \(^{96}\)Ag and decays to the predicted [1] ‘resonance-like’ states, respectively. The experimental \(\beta\)-delayed proton observations reveal some discrepancies with large scale shell-model calculations [1] for \(^{96}\)Ag using the \(sdg\) model space, which necessitates further theoretical investigation. New isomer data in \(^{96}\)Cd will be discussed.

For \(^{70}\)Se, preliminary results will be presented showing evidence for a high energy isomeric gamma transition, which is associated with the decay of a level with a mean-lifetime of 750 ns. The result can be understood, with the aid of projected shell model calculations, to arise from the decay of a low-K 2-quasi-neutron structure. This is believed to be the first observation of a K-isomer in this region, despite long standing predictions for the existence of high-K isomers in \(N = Z\) nuclei [2].