Isomer decays in N≅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 ≅ 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 β-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 β-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].

[1] B. S. Nara Singh, et al. Phys. Rev. Lett, 107, 172502 (2011)

[2] Y. Sun, Eur. Phys. J. A 20, 133 (2004) and Y Sun, M Wiescher, A Aprahmian, J Fisker, arXiv:nucl-th/0411081v3 (2005)