K-Isomers Near and Away the Line of Stability *

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Gamma-ray spectroscopy studies of deformed rare-earth and trans-fermium nuclei provide valuable information on the phenomena associated with high-K isomers and on the seniority dependence of the major residual interactions in deformed nuclei. Most of the studies in the A~180 region so far were focused on neutron-deficient nuclei that are accessible by heavy-ion fusion evaporation reactions. Recently deep-inelastic and multi-nucleon transfer reactions, in conjunction with time correlated γ–ray coincidence techniques and large γ–ray detector arrays, have been shown to represent a powerful tool to study nuclei near the valley of stability, as well as to access neutron-rich nuclei [1]. In addition, the discovery and characterization of high-K isomeric states in ^{254}No and neighboring trans-fermium nuclei [2] play an important role in better understanding the structure of the heaviest elements and in testing theoretical predictions of their stability.

This presentation will review the status of recent K-isomers studies in various regions of the nuclear chart, including nuclei near the line of stability where the longest-lived isomers are known to reside, proton- and neutron-rich nuclei away from the line of stability and trans-fermium nuclei at the limit of nuclear existence. Selected examples from γ–ray spectroscopy measurements using Gammasphere spectrometer and Fragment Mass Analyzer at Argonne National Laboratory will be presented. Properties of two-quasiparticle K-isomers in a number of even-even Cm, Pu, Fm and No nuclei and predictions of their excitation energies, quantum numbers and associate configurations, including comparisons with available experimental data, will be also discussed.

[1] G.D. Dracoulis et al., Phys. Lett. B584 (2004) 22 ; F.G. Kondev et al., Eur. Phys. J. A22 (2004) 23; G.D. Dracoulis et al., Phys. Lett. B635 (2006) 200; and references therein
[2] S.K. Tandel et al., Phys. Rev. Lett. 97 (2006) 082502; R.-D. Herzberg et al., Nature 442 (2006) 896; D. Peterson et al., Phys. Rev. C74 (2006) 014316; and references therein

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