

STUDIES OF NEUTRON-RICH NUCLEI VIA DEEP INELASTIC COLLISIONS

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A deep inelastic reaction between a thin self-supporting $^{198}_{78}\text{Pt}$ target and an 850 MeV $^{136}_{54}\text{Xe}$ beam has been used to populate and study both neutron-rich nuclei around the beam and target masses and the reaction mechanism. Reaction γ rays were detected using the GAMMASPHERE γ -array [1]. The CHICO gas-filled PPAC ancilliary detector [2] was used in combination with GAMMASPHERE to detect both recoils, thus allowing an event-by-event Doppler shift correction to be made for prompt γ rays. An $I^\pi = 10^+$ isomeric state has been found in the $N = 80$ isotone $^{136}_{56}\text{Ba}$ [3] with a measured half-life of $91 \pm 2\text{ns}$. The structure of the predominantly $(\nu h_{11/2})_{10^+}^{-2}$ isomer is discussed in terms of shell model and pair-truncated shell model calculations and compared to the even-Z, $N = 80$ isotones ranging from $^{130}_{50}\text{Sn}$ to $^{148}_{68}\text{Er}$. A 4-quasiparticle isomer has been observed in $^{184}_{74}\text{W}$ [4] with a half-life of $188 \pm 38\text{ns}$. The results are compared with blocked BCS Nilsson calculations which favour the $K^\pi = 15^-$ interpretation. This isomer completes the even-A tungsten, 4-quasiparticle isomer systematics from $A = 176$ to 186. Using prompt-delayed γ -ray correlations, the complementary fragments of the reaction have been studied and used to try to identify new states in $^{196}_{76}\text{Os}$. The angular momentum transfer to the binary fragments in the reaction has been investigated in terms of the average total γ -ray fold versus the scattering angle of the recoils [3].

[1] M.A. Deleplanque, R.M. Diamond (Eds.), *Gammasphere Proposal*, LBNL Report 5202 (1988).

[2] M.W. Simon, et al., *Nucl. Intr. and Meth.* **A 452**, 205 (2000).

[3] J.J. Valiente-Dobón et al., *Phys. Rev.* **C 69**, 024316 (2004).

[4] C. Wheldon et al., *Eur. Phys. J.*, in press, (2004).