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Shapes, Softness and Non-Yrast Collectivity in 186W

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The tungsten isotopes exist in a region of deformed nuclei with soft, triaxial shapes that evolve into oblate deformation as the proton, *Z*, and (or) neutron, *N*, numbers increase, before reaching sphericity at $Z = 82$ [1]. The heaviest stable W ($Z = 74$) isotope is at $A = 186$. Its low-lying structure has been investigated in the past using Coulomb excitation [2] and β decay [3]; however, experimental data on the non-yrast, higher-spin states are sparse due to their inaccessibility through any suitable heavy-ion fusion-evaporation reactions. In this work, non-yrast, excited states in neutron-rich ^{186}W were populated via inelastic-scattering reactions using stable beams of ^{136}Xe nuclei accelerated to 725 and 800 MeV (10 and 20% above the Coulomb barrier) [4]. Scattered ions were detected in CHICO2, and de-exciting γ rays in Gammasphere. Considerable progress was made in extending the $K = 2^+$ (γ), $K = 0^+$ and $K = 2^-$ (octupole) bands. A staggering pattern observed in the energies of levels in the $K = 2^+$ band was found to be consistent with a potential that gets softer to vibration in the γ degree of freedom with increasing spin. The odd-even staggering of states in the $K = 2^-$ band was found to exhibit a phase opposite to that seen in the γ band. This effect is most probably associated with Coriolis coupling to other, unobserved octupole vibrational bands in ^{186}W.

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