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New Insights into Backbending from the Symmetry-adapted Shell Model[1] NICK HELLER, Harvey Mudd College, GRIGOR SARGSYAN, KRISTINA LAUNEY, Louisiana State University — We provide new insights into the backbending phenomenon from first principles and intrinsic deformation. Backbending refers to an abrupt increase of moment of inertia at high spins along the yrast band, as observed from the nuclear spectroscopy. Here, we use the ab initio symmetry-adapted no core shell model (SA-NCSM) [1] with chiral potentials, now applicable to heavy nuclei in its valence-shell version, to investigate backbending and moment of inertia from a microscopic perspective. For two traditional examples, ^{20}Ne and ^{48}Cr, the microscopic calculations confirm the important role of spin alignment and configuration mixing, but surprisingly unveil no anomalous increase in moment of inertia. Furthermore, for ^{48}Cr, we are able to reconcile contradictions between earlier mean-field and SU(3) shell models [2] while we confirm a spherical high-spin nucleus, we find a close interplay of prolate and oblate deformed configurations with an overall spherical shape. The outcome opens the path toward further understanding heavier nuclei systems, their rotations and moments of inertia. [1] K. D. Launey, et al., PPNP 89, 101 (2016). [2] R. A. Herrera and C. W. Johnson, PRC 95, 024303 (2017).

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Grigor Sargsyan
Louisiana State University

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