Abstract Submitted
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Survey of Reflection-Asymmetric Nuclear Deformations ERIK OLSEN, Michigan State University, NOAH BIRGE, The University of Tennessee, Knoxville, JOCHEN ERLER, None, WITEK NAZAREWICZ, Michigan State University, ALEX PERHAC, The Ohio State University, NICOLAS SCHUNCK, Lawrence Livermore National Laboratory, MARIO STOITSOV[1], None, NUCLEI COLLABORATION — Due to spontaneous symmetry breaking it is possible for a nucleus to have a deformed shape in its ground state. It is theorized that atoms whose nuclei have reflection-asymmetric or pear-like deformations could have non-zero electric dipole moments (EDMs). Such a trait would be evidence of CP-violation, a feature that goes beyond the Standard Model of Physics. It is the purpose of this project to predict which nuclei exhibit a reflection-asymmetric deformation and which of those would be the best candidates for an EDM measuring experiment. Using nuclear Density Functional Theory along with the new computer code AxialHFB and massively parallel computing we calculated ground state nuclear properties for thousands of even-even nuclei across the nuclear chart: from light to superheavy and from stable to short-lived systems. Six different Energy Density Functionals (EDFs) were used to assess systematic errors in our calculations. Overall, 140 even-even nuclei (near and among the lantanides and actinides and in the superheavy region near N=184) were predicted by all 6 EDFs to have a pear-like deformation. The case of ^{112}Xe also proved curious as it was predicted by 5 EDFs to have a pear-like deformation despite its proximity to the two-proton drip line.

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