Theoretical Investigation of the Rotational Spectra of Reflection Asymmetric Nuclei

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As a microscopic quantum many-body system, the atomic nucleus carries a wealth of symmetries and symmetry breakings. Spontaneous symmetry breaking plays a crucial role in understanding the structure of atomic nuclei. Refection symmetry breaking of atomic nuclei occurs in nuclei with octupole deformations (such as pear-shaped nuclei). This is related to the charge parity (CP) symmetry violation beyond the standard model and has been at the frontier of both nuclear physics and particle physics. In this talk, I will focus on the study of the rotational spectra of reflection-asymmetric nuclei based on the quantized reflection-asymmetric particle rotor model and the microscopic cranked covariant density functional theory in a three-dimensional lattice space. Moreover, the status of observations of the interleaved positive- and negative-parity bands in even-even nuclei and the parity doublet bands in odd-A and oddodd nuclei for the A$\sim$150 and 220 mass region is summarized.