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Fingerprints for chirality-parity violation in atomic nuclei with reflection-asymmetric triaxial particle rotor model

Since the pioneering work of nuclear chirality by Frauendorf and Meng in 1997 [1], candidate chiral doublet bands in more than 50 nuclei have been reported [2]. Based on the microscopic relativistic density functional theory, the phenomenon of multiple chiral doublets (MχD) was predicted [3]. The observation of MχD bands with octupole correlations in ^{78}Br further shows nuclear chirality can be robust against octupole correlations and encourages the exploration of the simultaneous chiral and reflection symmetry breaking in a reflection-asymmetric triaxial nucleus [4].

In this talk, the developed reflection-asymmetric triaxial particle rotor model (RAT-PRM) will be introduced [5]. This model is applied to investigate the nuclear Chirality-Parity (ChP) violation, which simultaneously breaks chiral and reflection symmetries in the intrinsic frame. The fingerprints for the ChP violation including the nearly degenerate quartet bands and the selection rules of the electromagnetic transitions are provided [6]. By using the RAT-PRM, the observed low-lying positive- and negative-parity structures in some nuclei have been studied [7,8].

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Notes

Primary author: ZHANG, Shuangquan (School of Physics, Peking University, Beijing)

Presenter: ZHANG, Shuangquan (School of Physics, Peking University, Beijing)