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Selection rules of electromagnetic transitions for chirality-parity violation in atomic nuclei

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Chirality is a subject of general interest in natural science. Nuclear chirality was first predicted in 1997 [1], and up to now more than 60 candidate chiral doublet bands in around 50 nuclei have been reported [2]. Based on the covariant density functional theory, a phenomenon named multiple chiral doublets (MχD), i.e., more than one pair of chiral doublet bands in one single nucleus, was predicted in 2006 [3], which has attracted extensive attentions.
In 2016, the MχD with octupole correlations were reported in 78Br [4]. This observation provides the first example of chiral geometry in octupole soft nuclei and indicates that the simultaneous breaking of chiral and reflection symmetries, i.e., Chirality-Parity (ChP) violation, may exist in nuclei. In the reflection-asymmetric triaxial nuclei, one expects to establish four nearly degenerate $\Delta I = 1\hbar$ bands, i.e., ChP quartet bands, experimentally, which stimulates further interests.
In this talk, I will briefly introduce the recently developed reflection-asymmetric triaxial particle rotor model (RAT-PRM) [5]. RAT-PRM provides a useful tool for the description of the ChP quartet bands. It is applied to investigate the ChP violation in atomic nuclei [6]. A new symmetry for an ideal ChP violation system is found and the corresponding selection rules of the electromagnetic transitions are derived. The fingerprints for the ChP violation including the nearly degenerate quartet bands and the selection rules of the electromagnetic transitions are provided.

[1] S. Frauendorf and J. Meng, Nucl. Phys. A **617** (1997) 131.
[2] B. W. Xiong and Y. Y. Wang, At. Data Nucl. Data Tables **125** (2019) 193.
[3] J. Meng, J. Peng, S. Q. Zhang, and S.-G. Zhou, Phys. Rev. C **73** (2006) 037303.
[4] C. Liu et al., Phys. Rev. Lett. **116** (2016) 112501.
[5] Y. Y. Wang, S. Q. Zhang, P. W. Zhao, and J. Meng, Phys. Lett. B **792** (2019) 454.
[6] Y. Y. Wang, X. H. Wu, S. Q. Zhang, P. W. Zhao, and J. Meng, Sci. Bull. **65** (2020) 2001.

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