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Topological classification of particle-triaxial-rotor systems

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The rotational response of nuclei provides decisive evidence for triaxial shapes, because collective rotation about all three principal axes is possible. This new mode is entangled with the rotational response of high-j valence quasiparticles. Quantal approaches as the multiquasiparticle-triaxial rotor model or the triaxial projected shell model describe the coupling in a realistic way. Projecting the complex wave functions onto the pertaining subspaces of spin coherent states generates orbital-like images for the total, quasiparticle and rotor angular momenta. The topology of these orbitals is used to classify the entangled quasiparticle-rotor modes. The classification of the modes as transverse wobbling, longitudinal wobbling, chiral vibration and chiral rotation, which were introduced under the simplifying assumption of a fixed quasiparticle alignment, is generalized in a natural way to the topology of the orbits, which takes the quasiparticle realignment into account. The transition from transverse to longitudinal wobbling with increasing spin via special transitional modes is discussed.

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