Nuclear Theory

Anomalous pairing vibration in neutron-rich Sn isotopes beyond the N=82 magic number

Hirotaka Shimoyama, Masayuki Matsuo

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Two-neutron transfer associated with the pair correlation in superfluid neutron-rich nuclei is studied with focus on low-lying 0^+ states in Sn isotopes beyond the N=82 magic number. We describe microscopically the two-neutron addition and removal transitions by means of the Skyrme-Hartree-Fock-Bogoliubov mean-field model and the continuum quasiparticle random phase approximation formulated in the coordinate space representation. It is found that the pair transfer strength for the transitions between the ground states becomes significantly large for the isotopes with $A \ge 140$, reflecting very small neutron separation energy and long tails of the weakly bound $3p$ orbits. In $^{132-140}$Sn, a peculiar feature of the pair transfer is seen in transitions to low-lying excited 0^+ states. They can be regarded as a novel kind of pair vibrational mode which is characterized by an anomalously long tail of the transition density extending to far outside of the nuclear surface, and a large strength comparable to that of the ground-state transitions. The presence of the weakly bound neutron orbits plays a central role for these anomalous behaviors.

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