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Shape coexistence in Ne isotopes and hyperon impurity effect on low-lying states

Based on the beyond-mean-field Skyrme-Hartree-Fock model, we investigate the shape coexistence in Ne isotopes and the effect of Λ hyperon on the energy level structure in the nuclei. The up-to-date Skyrme-type $N\Lambda$ interaction SLL4 and the NN interaction SGII are employed. Low-lying energy spectra of ^{20,22,24,26,28,30,32,34}Ne, including the low-lying states with $J \leq 6$, are predicted, discussed in detail, and found in good agreement with experimental results. The electric quadrupole transition rate is also examined. The coexistences of a ground state rotational band and a β vibrational band are revealed in ^{20,22,24}Ne. Unlike the previously discovered shrinkage effect of Λ_s on the ground state nuclei, it is found that the Λ_s may alter the excitation mode of the second band by affecting the distribution of the collective wave function, thereby causing the β vibrational band transitions to a vibrational band with equidistant energy levels.

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