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# Theoretical Study on Properties of New Isotope $^{265}$Bh

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Abstract: The properties of nuclei belonging to the newly observed α-decay chain starting from $^{265}$Bh have been studied. The axially deformed relativistic mean-field calculation with the force NL-Z2 has been performed in the blocked BCS approximation. Some ground state properties such as binding energies, deformations, spins, and parities, as well as Q-values of the α-decay for this decay chain have been calculated and compared with known experimental data. Good agreement is found. The single-particle spectrum of the nucleus $^{265}$Bh is studied and some new magic numbers are found, while the magnitudes of the shell gaps in superheavy nuclei are much smaller than those of nuclei before the actinium region, and the Fermi surfaces are close to the continuum. Thus the superheavy nuclei are usually not stable. The α-decay lifetimes in the $^{265}$Bh decay chain are evaluated by different formulae, and compared with experimental data. The methods which give good agreement with the data are selected.

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Key words: relativistic mean field, superheavy nuclei, binding energy, lifetimes

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