

NEW DISCRETE BASIS FOR NUCLEAR STRUCTURE STUDIES¹

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A complete discrete set of spherical single-particle wave functions for studies of weakly bound many-body systems is proposed. The new basis is obtained by means of a local-scale point transformation of the spherical harmonic oscillator wave functions. Unlike the harmonic oscillator states, the new wave functions decay exponentially at large distances. Using the new basis, characteristics of weakly bound orbitals are analyzed and the ground-state properties of some spherical doubly magic nuclei are studied. The basis of the transformed harmonic oscillator is a significant improvement over the harmonic oscillator basis, especially in studies of exotic nuclei where the coupling to the particle continuum is important.

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