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Three-boson spectrum in the presence of 1D spin-orbit coupling: Efimovs generalized radial scaling law[1] QINGZE GUAN, DOERTE BLUME, Univ of Oklahoma — Spin-orbit coupled cold atom systems, governed by Hamiltonians that contain quadratic kinetic energy terms typical for a particle's motion in the usual Schrödinger equation and linear kinetic energy terms typical for a particle's motion in the usual Dirac equation, have attracted a great deal of attention recently since they provide an alternative route for realizing fractional quantum Hall physics, topological insulators, and spintronics physics. The present work focuses on the three-boson system in the presence of 1D spin-orbit coupling. In the absence of spin-orbit coupling terms, the three-boson system exibits the Efimov effect: the entire energy spectrum is uniquely determined by the s-wave scattering length and a single three-body parameter, i.e., using one of the energy levels as input, the other energy levels can be obtained via Efimov's radial scaling law, which is intimately tied to a discrete scaling symmetry. It is demonstrated that the discrete scaling symmetry persists in the presence of 1D spin-orbit coupling, implying the validity of a generalized radial scaling law in five-dimensional space. The dependence of the energy levels on the scattering length, spin-orbit coupling parameters, and center-of-mass momentum is discussed.

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Qingze Guan
Univ of Oklahoma

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