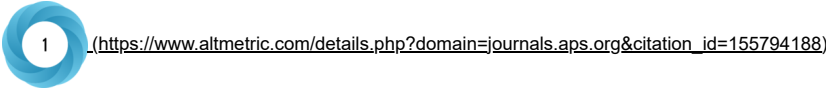


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Four-boson first excited state near two-body unitarity

Feng Wu, T. Frederico, R. Higa, and U. van Kolck
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ABSTRACT

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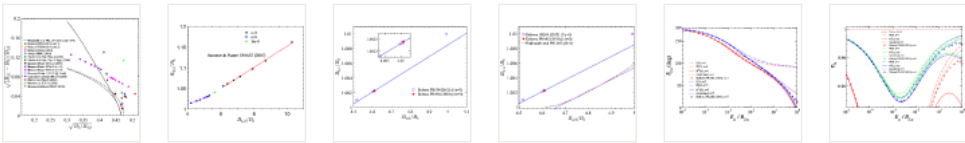
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ABSTRACT

Near two-body unitarity, the three-boson system is characterized by an approximate discrete scale invariance manifest in a geometric tower of bound states (the Efimov effect). In the absence of a strong four-body force, the four-boson system has two states associated with each Efimov state, one very nearly unstable, the other several times deeper. We study correlations between the excited- and ground-state properties, such as binding energies and radii, up to next-to-leading order in an effective field theory for short-range forces. We obtain the parameters in these correlations from similar correlations arising from existing precise calculations based on short-range potentials. We also derive correlations among excited-state properties that emerge from the proximity of the state to the break-up threshold into a boson and a three-boson bound state, using an effective field theory for “halo” states.



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