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Nuclear Theory

The three-boson system at next-to-leading order in an effective field theory for systems with a large scattering length

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We analyze how corrections linear in the effective range, r_0, affect quantities in the three-body sector within an effective field theory for short-range interactions. We demonstrate that observables can be obtained straightforwardly using a perturbative expansion in powers of r_0. In particular, we show that two linear-in-r_0 counterterms are needed for renormalization at this order if scattering-length-dependent observables are considered. We exemplify the implications of this result using various three-body observables. Analytic results for the running of the next-to-leading-order portion of the three-body force in this effective field theory are provided. Expressions which incorporate $O(r_0)$ corrections and relate the positions of features observed in three-atom recombination near a Feshbach resonance are presented.

Submission history

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