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Elastic scattering of three ultracold bosons

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Elastic scattering of three bosons at low energy is a fundamental problem in the many-body description of ultracold Bose gases, entering via the three-body scattering hypervolume D. We study this quantity for identical bosons that interact via a pairwise finite-range potential. Our calculations cover the regime from strongly repulsive potentials towards attractive potentials supporting multiple two-body bound states and are consistent with the few existing predictions for D. In particular, we present the first numerical confirmation of the universal predictions for D that are made in the strongly-interacting regime, where Efimov physics dominates, for a local nonzero-range potential. Our findings highlight how finite-range effects, such as d-wave interactions, become important as the interaction strength is reduced.

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