

Abstract Submitted  
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**Three-body scattering hypervolume for ultracold atoms with a model two-body potential** SHANGGUO ZHU, SHINA TAN, Georgia Institute of Technology — It has been known that the three-boson low energy effective interaction influences the dynamic and the static properties of many bosons, including the ground state energies of dilute Bose-Einstein condensates. The three-body scattering hypervolume, which is a three-body analogue of the two-body scattering length, characterizes this effective interaction. Surprisingly, knowledge of this fundamental quantity has still been lacking, except for hard sphere bosons and bosons with large scattering length. For bosons with a soft-ball potential - the repulsive Gaussian potential, we determine the scattering hypervolume by solving the three-body Schrödinger equation numerically, and matching the solution with the asymptotic expansions for the wave function at large hyperradii. Our analyses of the three-body scattering hypervolume can be extended to the long-range Van der Waals potential. They will be necessary in the precise understanding of the energetics and dynamics of three, more, or many ultracold bosonic atoms.

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