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The Thomas and Effimov Effects for General Partial Waves
JAMES STERNBERG, University of Tennessee, JOSEPH MACEK, University of Tennessee and Oak Ridge National Laboratory — Description of the two-body interactions between particles is a fundamental step in modeling many-body systems. Because s-wave scattering dominates at ultra-cold temperatures, zero-range potentials (ZRPs) have been a popular way to describe the two-body interactions. Recent experiments enhance higher partial waves and this has led to interest in extending the zero-range model beyond $l = 0$[**?**]. In this work we use a ZRP model to examine three body systems. Of particular importance in these systems is the Thomas effect, which is the divergence of the wave function when all three particles are close together. The Thomas effect is known for spin zero particles when $l = 0$. In addition there is the Effimov effect, in which there are an infinite number of three body bound states if the zero-range potential boundary conditions separate in hyperspherical coordinates as the scattering length $a_l \to \infty$. We show that the Effimov effect occurs for not only the well-known $l = 0$ case, but for spin 1/2 fermions via the $l = 1$ pseudopotential of ref. [1] This research is supported by Department of Energy Grant DE-FG02-02ER15283

[1] René Stock, Andrew Silberfarb, Eric. L. Bolda, and Ivan H. Deutsch, Phys Rev. Lett. **94** 023202 (2005)

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