

Abstract Submitted
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Towards a hyperspherical description of positronium-positronium scattering¹ JAVIER VON STECHER, CHRIS H. GREENE, Department of Physics and JILA, University of Colorado, Boulder, CO 80309-0440 — The interest in the scattering properties of the positronium (Ps) has grown with the possibility of creating a Bose-Einstein condensate of matter-antimatter. Such an experimental realization would not only permit an exploration of quantum effects at macroscopic temperatures, but it would also contribute to our understanding of the relationship between the Ps₂ molecule and more conventional molecules like H₂. A deep understanding of positronium's collisional properties is crucial for cooling techniques and for the realization of a Bose-Einstein condensate. A hyperspherical analysis of this four-body system with two electrons and two positrons allow us not only to benchmark calculations of the Ps-Ps scattering length which have been previously studied (see e.g. Ref. [1]) but also to analyze recombination processes such as Ps+e+e⁺ → Ps+Ps or Ps⁻ + e⁺, etc... We extend previous implementations of the correlated Gaussian hyperspherical method [2] to describe four-body systems with Coulomb interactions. The results from this hyperspherical analysis are compared with previous studies and correlated Gaussian calculations.

[1] I. A. Ivanov, J. Mitroy, and K. Varga. Phys. Rev. A 65, 022704 (2002)

[2] J. von Stecher and C.H. Greene. Phys. Rev. A 80, 22504(2009)

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