Variational calculations of positronium-hydrogen scattering for L=0 to 5 [1]

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We are investigating low-energy elastic positronium-hydrogen (Ps-H) scattering for partial waves from L=0 to L=5 using the complex Kohn variational method and variants of this, including the Kohn and the generalized Kohn methods [1]. To describe Ps-H scattering, we use elaborate trial wavefunctions which include a large number of Hylleraas-type terms for the short-range part, including all 6 interparticle distances. We plan to compare the S-, P-, and D-wave phase shifts to the phase shifts from close coupling calculations [2,3] and also to compare the L=0 to 5 phase shifts with Born approximation phase shifts. While there is no rigorous bound to the phase shifts for positive energies, we plan to show how systematically adding short-range terms appear to improve the phase shifts.

1. Denton Woods, P. Van Reeth and S.J. Ward, http://meetings.aps.org/Meeting/MAR14/Event/215763 submitted to APS for DAMOP 2014; Denton Woods, S.J. Ward and P. Van Reeth, http://meetings.aps.org/link/BAPS.2013.DAMOP.Q1.122 (and references within).

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