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Low-Energy Scattering Properties of Ground-State and Excited-State Positronium Collisions[1] MICHAEL D. HIGGINS, KEVIN M. DAILY, CHRIS H. GREENE, Purdue University — Low-energy elastic and inelastic scattering in the Ps(1s)-Ps(2s) channel is treated in a four-body hyperspherical coordinate calculation. Adiabatic potentials are calculated for triplet-triplet (TT), singlet-singlet (SS), and singlet-triplet (ST) spin symmetries in the spin representation of coupled electrons (S_-) and coupled positrons (S_+), with total angular momentum $L = 0$ and charge conjugation and parity both equal to +1. Multichannel scattering calculations were performed to obtain preliminary estimates of the s-wave scattering length in the asymptotic Ps($1s$)-Ps($2s$) channel for each spin configuration. Spin re-coupling is implemented to obtain scattering lengths and cross-sections for collisions of Ps atoms in different spin configurations through properly symmetrized unitary transformations. Calculations of experimentally relevant scattering lengths and cross-sections are carried-out for collisions with total spin, $S_{\text{tot}} = 0$, 1, and 2.

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