Abstract Submitted
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Spin flipping collisions of hydrogen atoms[1] BERNARD ZYGELMAN, University of Nevada, Las Vegas — We present a unified multichannel approach to calculate electron spin exchange and spin flipping transition cross sections for collisions of H with H, H with T, and T with T. We use the theory to calculate the hyperfine quenching cross sections for collision energies that range from 1 mK to thermal temperatures. We show that spin flipping transitions are induced by the splitting of the $b^3\Sigma_u$ Born-Oppenheimer potential via the long-range magnetic interactions among electrons. We find that the spin flipping cross sections in the tritium dimer are about a magnitude larger than that predicted by mass scaling the H-H cross sections. For the former, we show that the spin exchange cross sections are several magnitudes larger, at cold temperatures, than that of the hydrogen system. We compare the results of the multichannel approach with those obtained using approximate methods such as the degenerate internal state approximation, the elastic and Born approximations and discuss their respective range of validity.

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