

Abstract Submitted
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Proton-hydrogen collision at cold temperatures¹ MING LI, BO GAO, University of Toledo — We study the proton-hydrogen collision in the energy range from 0 to 5 K where the hyperfine structure of the hydrogen atom becomes important. A proper multichannel treatment of the hyperfine structure is found to be crucial at cold temperatures compared to the elastic approximation traditionally used at higher temperatures. Both elastic and hyperfine-changing inelastic processes are investigated, using both a newly developed multichannel quantum-defect theory (MQDT) and the coupled-channel numerical method. Results from the two methods show excellent agreement with MQDT providing an efficient and basically analytic description of the proton-hydrogen interaction throughout this energy range. We also discuss the validity of the elastic approximation and its relation to other methods.

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