

Abstract Submitted
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Inelastic collisions of CaH molecules at cryogenic temperatures¹

VIJAY SINGH, University of Nevada Reno, MEI-JU LU, KYLE HARDMAN, MUIR MORRISON, JONATHAN WEINSTEIN — We are interested in using doublet-sigma molecules to investigate the role of electron spin in chemical reactions [1]. As a first step towards this goal, we are creating polarized samples of CaH molecules and studying their collisional properties. We create CaH molecules by laser ablation of a solid CaH₂ target and cool them by helium buffer gas cooling. To study the polarization changing collisions of CaH molecules with He atoms, we spin polarize CaH by optical pumping. We measure the spin depolarization rate by fitting the return to equilibrium. At 4 Kelvin, our measurement shows a depolarization rate coefficient of 10^{-11} cm³ s⁻¹, which is very large compared to the measured spin depolarization rate at 0.4 Kelvin[2]. This large depolarization rate is likely due to excited rotational states [3]. Progress towards measuring this rate coefficient as a function of temperature will be discussed.

[1] R. V. Krems, Physical Chemistry Chemical Physics 10, 4079 (2008)

[2] Weinstein et.al., Nature 395, 148 (1998).

[3] Maussang et.al., Phys.Rev.Lett. 94, 123002 (2004)

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