THE STARK EFFECT IN THE (0,0) $A^2\Pi_r$-$X^2\Sigma^+$ BAND OF CALCIUM MONOHYDRIDE, CaH

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Although investigations of the electronic states and associated electronic spectra of calcium monohydride, CaH, date back almost 100 years[a,b] the permanent electric dipole moment, μ, in any electronic state has not been experimentally determined. In the present study numerous branch features in the (0,0) $A^2\Pi$-$X^2\Sigma^+$ band system of calcium monohydride, CaH, have been studied by optical Stark spectroscopy. The Stark shifts, Stark splittings, and electric field induced transitions in the high resolution laser induced fluorescence spectra are analyzed to produce values for the magnitude of the permanent electric dipole moments, $|\mu|$, of 2.98(10) Debye and 2.358(9) Debye for the $X^2\Sigma^+$ (v=0) and $A^2\Pi$ (v=0) states, respectively. The determined value of $|\mu|(X^2\Sigma^+)$ is larger than all $ab\ initio$ predicted values in the range 10-30%. A comparison with a semi-empirical electrostatic model[c,d] prediction is given.

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