

## SEP SPECTROSCOPY OF THE HCCS RADICAL

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Stimulated Emission Pumping (SEP) spectroscopy has been applied to the study of the ground state vibronic structure of a linear tetra-atomic free radical, HCCS, which has two Renner-Teller active bending modes. The radical was produced in a supersonic jet by a pulsed discharge in a C<sub>2</sub>H<sub>2</sub> and CS<sub>2</sub> mixture diluted in Ar. Two Nd YAG laser pumped dye lasers with linewidths 0.02 cm<sup>-1</sup> are used to observe SEP spectra. Eight vibronic bands in the ground electronic states were observed from the <sup>2</sup>Π<sub>3/2</sub> origin band excitation, and 4 bands from the <sup>2</sup>Π<sub>1/2</sub> origin band excitation. Three of the observed bands are assigned to the CS stretching mode, and others to overtones and combinations of two bending modes with Π vibronic symmetry. The observed vibronic energy levels are successfully analyzed by taking into account the Renner-Teller interaction including the cross vibronic terms. The determined parameters agree with previous *ab initio* calculations<sup>a</sup> and mm-wave spectroscopy<sup>b</sup>.

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<sup>a</sup>P. G. Szalay, *J. Chem. Phys.*, 105, 2735 (1996), Y. Li and S. Iwata, *Chem. Phys. Lett.*, 273, 91 (1997).

<sup>b</sup>J. Tang and S. Saito, *J. Chem. Phys.*, 105, 8022 (1996).