HIGH-POWER MICROWAVE MEASUREMENTS OF THE ROTATIONAL SPECTRA OF SINGLE EIGENSTATES OF PROPYN-1-OL

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The rotational spectra of several molecular eigenstates of propyn-1-ol near 3330 cm^{-1} and 3660 cm^{-1} were measured using infrared-microwave saturation spectroscopy with a high-power (20 W) microwave source. This technique provides a complimentary view of the energy region that is obtained using infrared spectroscopy. By measuring the rotational spectra of several nearby eigenstates, we can obtain several views of the same energy region. We find that different quantum states are observed in the same energy region by using different eigenstates. These rotational spectra differ significantly from the infrared spectra. In particular, we find large increases in the measured state density when rotational spectroscopy is used. This result suggests that infrared spectroscopy measurements of the state density can be low by a factor of 3-10. The correlation of different eigenstate rotational spectra is used to characterize the ergodic properties of the rovibrational energy flow.