Sub-millimeter Spectroscopy of Astrophysically Important Molecules

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Abstract

With the advent of SOFIA, Herschel, and SAFIR, new wavelength regions will become routinely accessible for astronomical spectroscopy, particularly at sub-mm frequencies (0.5-1.1 THz). Molecular emission dominates the spectra of dense interstellar gas at these wavelengths. Because heterodyne detectors are major instruments of these missions, accurate knowledge of molecular transition frequencies is crucial for their success. The Ziurys spectroscopy laboratory has been focusing on the measurement of the pure rotational transitions of astrophysically important molecules in the sub-mm regime. Direct absorption methods and ion-selective velocity modulation techniques have been employed. Of particular interest have been metal hydride species and their ions, including CrH, CrH^+, VH, and MnH. Also of interest have been metal halides such as ZnF and metal cyanides, including CrCN. A new avenue of study has included metal bearing molecular ions such as $FeCO^+$. Large organi c species with internal rotation have also been investigated, such as hydroxyacetone. Results of these various molecules will be discussed.

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