EMISSION SPECTROSCOPY AND MOLECULAR ASTRONOMY

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Although emission spectroscopy is common in the visible and ultraviolet regions, the technique has been neglected in the infrared and far infrared regions. Fourier transform emission spectra of infrared electronic transitions, vibration-rotation bands and pure rotational transitions will be presented. The molecules of interest range from diatomics such as LiH and TiF to large molecules such as DNA bases, polycyclic aromatic hydrocarbons and C_60. Even at long wavelengths in the far infrared region excellent spectra of hot gas phase molecules could be recorded. One of the primary applications of our laboratory emission spectra has been the assignment of astronomical spectra of objects such as the sun, sunspots, carbon stars and planetary nebulae. The discovery of hot water vapor in sunspots and the origin of the ”unidentified infrared emission bands” will be discussed.Finally, some spectra obtained with a new cryogenic echelle spectrograph will be compared with spectra recorded with a Fourier transform spectrometer.