



Spectroscopy of hydrocarbons and nitriles below 1 micron: Goals of the Cassini/Huygens mission

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Three of four remote sensing optical instruments on the Cassini spacecraft and the Descent Imager and Spectral Radiometer (DISR) on the Huygens Probe rely on interpretation of spectra at wavelengths below 1 micrometer. These spectra are dominated by absorption features of methane and other hydrocarbons and (for Titan at UV wavelengths) HCN. Instrument resolution is not sufficient to resolve individual lines, and for methane the lines are highly blended because of the high density of lines coupled with pressure broadening. High resolution laboratory measurements over relatively small spectral intervals are not as useful as measurements which cover the broad spectral regions at resolution comparable to the resolution of the instrument. The combination of long path lengths and low temperatures at pressures typical of photons which scatter in the atmospheres of the giant planets and Titan are impossible to achieve in the lab. Measurements by the Cassini and Huygens instruments reveal differences between laboratory measurements and observations for some constituents at some wavelengths. The Cassini and Huygens observations can be used to improve the absorption coefficient database but the planetary radiative transfer problem must be understood to extract coefficients from observations. This talk will describe recent progress in this area.