# ABSORPTION SPECTRA AND ABSORPTION COEFFICIENTS FOR METHANE IN THE 7515 - 9205 Å REGION OBTAINED BY INTRACAVITY LASER SPECTROSCOPY

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Methane spectral features are prominent in the reflected sunlight spectra from the outer planets and some of their major satellites and can provide useful information on the atmospheres of those bodies. Methane bands occurring in the visible to near-IR are particularly important because for many of these planetary bodies, the methane bands occurring in the IR are saturated. Spectral observations of these bodies also are being made at increasingly higher resolution. In order to interpret the planetary spectra, laboratory data for methane obtained at appropriate sample conditions and spectral resolution are required. Since the visible to near-IR spectrum of methane is intrinsically weak, sensitive techniques are required to perform the laboratory measurements. We have employed the intracavity laser spectroscopy (ILS) technique to record methane spectrum in the 10,860 - 11,385 $cm^{-1}$ region for room and liquid nitrogen temperature (77 K) methane and spectra for the more strongly absorbing sections will be presented. These spectra are acquired at a resolution of 400,000 - 500,000. From the spectra, absorption coefficients are determined and these are presented as averages over 1 Å and 1 $cm^{-1}$ intervals. In order to obtain the results, spectra are deconvolved for the instrument function using a Fourier transform technique. The validity of the approach is verified from studies of isolated oxygen lines occurring in the *A* band. Good agreement is observed between the intensity values determined from the FT deconvolution and integration method and those derived by fitting the observed line profiles to Voigt line-shapes convoluted with the instrument function. The methane results are compared with low-resolution measurements on methane at room temperature and with absorption coefficients derived from methane features observed in spectra of the outer planets and Titan. This research was supported by NASA's Planetary Atmospheres Program under grant number NAG5-6091.