# NEW ASSIGNMENTS IN THE $CH_2$ $\tilde{b} \leftarrow \tilde{a}$ SPECTRUM NEAR 1 MICRON

GREGORY E. HALL AND TREVOR J. SEARS, *Department of Chemistry, Brookhaven National Laboratory, Upton, NY 11973-5000.*

Improvements to a Ti:sapphire ring laser-based spectrometer operating near 10, 800 $cm^{-1}$ have enabled very high quality spectra of methylene to be recorded in a region not previously covered. The spectra were recorded in absorption using frequency modulation to enhance the sensitivity. $CH_2$ radicals were formed by pulsed excimer laser photolysis of ketene at 308 nm in a low pressure sample at ambient temperature. Laser control and data aquisition were implemented with a LabView program that archives the entire transient waveform at each wavelength step. The dynamic range in the spectrum is larger than $10^4$. The collisionless spectral line widths and shapes vary systematically with the energy of the absorbing state. The width and decay parameters for each spectral line can aid in spectral assignment, by supporting or refuting possible assignments based on a dense set of ground state combination differences. Every medium or higher intensity line may now be assigned to an absorption from a level with an energy that may be estimated to within a $\pm$ 100 $cm^{-1}$ uncertainty. Technical details of the spectrometer and the data acquisition procedures will be described as well as some examples of the data and assignments.