

FAST-SCAN, PULSED-JET SUBMILLIMETER WAVE ABSORPTION SPECTROSCOPY

DMITRY G. MELNIK, SANDHYA GOPALAKRISHNAN, TERRY A. MILLER, *The Ohio State University, Dept. of Chemistry, Laser Spectroscopy Facility, 120 W. 18th Avenue, Columbus, Ohio 43210*; FRANK C. DE LUCIA, *The Ohio State University, Department of Physics, Microwave Laboratory, 174 W. 18th Avenue, Columbus OH 43210*.

A newly developed pulsed jet spectrometer utilizing an extension of the previously reported FASSST technique^a is discussed. The output beam from a backward wave oscillator (BWO) is focused on a pulsed supersonic jet and rapidly scanned in frequency (up to 10^5 Doppler linewidths per second), covering the entire accessible spectrum range. The absolute frequency calibration and system synchronization is performed in real time by linking the output signal to a computer running appropriate software. The sensitivity of the apparatus is such that $^{13}\text{C}^{18}$ can be seen in natural abundance with modest integration time. The apparatus is optimized for searching for weak molecular lines.

The method and apparatus has been developed for use in the spectroscopy of low lying vibrational modes corresponding to conformational, torsional, and pseudorotational motion of non-rigid molecules, including Van der Waals clusters. Initial experiments have involved complexes of the CO molecule. These and related results will be discussed.

^aPetkie D. T.; Goyette T. M.; Bettens R.P. A.; Belov S. P.; Albert S.; Helminger P; and De Lucia F. C., *Rev. Sci. Instrum.*, **1997**, 68(4), 1675