CAVITY RINGDOWN SPECTRUM OF THE ν_8 BAND OF METHYLENE BROMIDE USING A QUANTUM CASCADE LASER

BRIAN E. BRUMFIELD, *Department of Chemistry, University of Illinois at Urbana-Champaign, Urbana, IL 61801*; SUSANNA L. WIDICUS WEAVER, *Departments of Chemistry and Astronomy, University of Illinois at Urbana-Champaign, Urbana, IL 61801*; SCOTT S. HOWARD, CLAIRE F. GMACHL, *Department of Electrical Engineering, Princeton University, Princeton Institute for the Science and Technology of Materials, Princeton, NJ, 08544*; BENJAMIN J. McCALL, *Departments of Chemistry and Astronomy, University of Illinois at Urbana-Champaign, Urbana, IL 61801*.

In recent years the development of continuous wave quantum cascade lasers (QCLs) has enabled high-resolution laser spectroscopy at wavelengths between 4 μm and 12 μm. This is a major advancement in the availability of lasers in this wavelength region, as previously only lead salt diode lasers were available beyond 5 μm. Coverage in this region is necessary to allow for high-resolution spectroscopic studies of lower frequency stretching fundamentals, bending fundmentals, and overtones in a variety of molecules. In this study a sample of methylene bromide was expanded through a pinhole source and interrogated by continuous wave cavity ringdown spectroscopy (cw-CRDS) using a Fabry-Perot quantum cascade laser (FP-QCL). The primary motivation for this study was to use methylene bromide as a rotational temperature probe of the expansion in preparation for a cw-CRDS experiment of C_{60} (Widicus Weaver et al., this meeting). For this reason the cw-CRDS spectrum of the ν_8 band for the three dominant isotopomers of methylene bromide ($CH_2{}^{79}Br_2$,$CH_2{}^{81}Br_2$, $CH_2{}^{79}Br^{81}Br$) was acquired in the 8.5 μm region. This talk will discuss the current state of the assignment of the ν_8 band of methylene bromide for all three isotopomers, and will also describe the necessary steps taken to ensure adequate thermal and mechanical stability of the FP-QCL.