

## A COMPREHENSIVE INTENSITY STUDY OF THE $\nu_4$ TORSIONAL BAND OF ETHANE

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The torsional spectrum of  $C_2H_6$  has been investigated from 220 to 330  $cm^{-1}$  to measure the intensity of the fundamental and the first torsional hot band needed for atmospheric studies of Titan. Several spectra were measured at resolutions of 0.01 and 0.02  $cm^{-1}$  using the JPL Bruker IFS-125 coupled to a coolable multi-pass absorption cell originally developed at University of British Columbia.<sup>a</sup> Spectra were recorded at several temperatures from 293 K to 166 K, with the lower temperatures relevant to the stratosphere of Titan. Because this spectrum is very weak, a long absorption path of 52 m was used along with substantial sample pressures from 35 to 255 Torr. Intensities were analysed using a quantum mechanical model reported previously.<sup>b</sup> The torsional fundamental of  $C_2H_6$  is observed in the CIRS spectra of Titan. Line parameters for the torsional bands are required for accurate characterization of spectral features of Titan's far-infrared region. The current study should lead to a better understanding of the methane cycle in planetary atmospheres and permit the identification of the other molecular features in the CIRS data.<sup>c</sup>

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<sup>a</sup>E. H. Wishnow, A. Leung, and H. P. Gush, *Rev. Sci. Instr.*, 70, 23 (1999).

<sup>b</sup>N. Moazzen-Ahmadi, A.R.W. McKellar, J.W.C. Johns, and I. Ozier, *J. Chem. Phys.* 97, 3981 (1992).

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