3-D SUBMILLIMETER SPECTROSCOPY FOR ASTROPHYSICS AND SPECTRAL ASSIGNMENT

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We have previously reported on the experimental spectroscopic approach that makes possible the calculation of lower state energy levels and transition strengths without the need for spectral assignment [1]. The approach is based on the recording of intensity-calibrated spectra over a range of temperatures and calculating appropriate ratios of spectral intensity. Ordinarily, spectra contain 2 – D information: intensity as a function of frequency. However, this approach provides a third dimension, the lower state energy. In addition, analysis of the temperature dependent measurements significantly improves the estimate of the lower state energy. In our most recent measurements we employed solid state multiplier based FASSST spectrometer operating in 550-650 GHz spectral range. This allowed us to record spectroscopic line shapes not affected by the irregularities in the sweep rate of the backward wave oscillator based FASSST [2]. In this talk we will discuss latest experimental and theoretical developments and results.

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[1] "An experimental approach to the prediction of complete millimeter and submillimeter spectra at astrophysical temperatures: Applications to confusion-limited astrophysical observations," I. R. Medvedev and F. C. De Lucia, Ap. J. 656, 621-628 (2007).

[2] "The millimeter- and submillimeter-wave spectrum of the trans-gauche conformer of diethyl ether, ." I. Medvedev, M. Winnewisser, F.C. De Lucia, E. Herbst, E. Białkowska-Jaworska, L. Pszczółkowski, and Z. Kisiel, Journal of Molecular Spectroscopy 228 (2), 314-328 (2004).