DEVELOPMENTS IN FAST SCAN SUBMILLIMETER SPECTROSCOPIC TECHNIQUE (FASSST) AND COMPUTER AIDED ASSIGNMENT OF ASYMMETRIC ROTOR SPECTRA (CAAARS) SOFTWARE SUITE.

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Most molecules of astrophysical, chemical, and environmental importance exhibit strong maxima in their interaction strengths with electromagnetic radiation in the millimeter and sub-millimeter spectral range. Over the past decade or so, we have developed the Fast Scan Submillimeter Spectroscopic Technique (FASSST) [a] [b], which makes possible rapid interrogation of a large number of rovibrational transitions. We have also developed automated approaches for the analysis of the resulting large spectral data sets, most notable of these being CAAARS [c] (Computer Aided Assignment of Asymmetric Rotor Spectra). This work has been a process of continual enhancement of both hardware and software. In this talk we will describe the current state-of-the art for this hardware/software combination, recent extensions, and potential future enhancements. This will include a multiplier based extension of the spectral range based on the more well behaved lower frequency BWOs. Recent spectroscopic work will be used to illustrate the characteristics of the system.

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[a] D.T., Petkie, T.M. Goyette, R.P.A. Bettens, S.P. Belov, S. Albert, P. Helminger, and F.C. De Lucia,Review of Scientific Instruments, 1997. 68: p. 1675-1683.

[b] I., Medvedev, M. Winnewisser, F.C. De Lucia, E. Herbst, E. Bialkowska-Jaworska, L. Pszczolkowski, and Z. Kisiel, Journal of Molecular Spectroscopy, 2004. 228 (2): p. 314-328.

[c] I.R., Medvedev, M. Winnewisser, B.P. Winnewisser, F.C. De Lucia, and E. Herbst, Journal of Molecular Structure, 2005. 742(1-3): p. 229-236.