3-D SUBMILLIMETER SPECTROSCOPY OF ASTRONOMICAL 'WEEDS' — EXPERIMENTAL AND THEORETICAL ASPECTS OF DATA PROCESSING AND CATALOGING

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In this presentation we report on the latest enhancements and improvements of the temperature resolved 3-dimensional spectroscopic technique as applied to the astronomical 'weed' problem. Experimental determination of the lower state energy and transition strength for every transition in a molecular spectrum provides the ability to predict spectra over a wide range of temperatures.
We have extended the spectral range of our experiment to 210–270 GHz. A heterodyne receiver has been employed in this range to enhance sensitivity and suppress undesirable harmonics in the output of the multiplier chain.
The previously reported analysis of the ethyl cyanide spectrum in the 575–645 GHz spectral range[a] has been successfully integrated into the Splatalogue database (www.splatalogue.net). In addition to cataloging frequencies, lower state energies and transition strengths we provide the end-users with the complete experimental dataset. We also have developed algorithms to calculate complete experimental spectra at an arbitrary user-specified temperature.

[a]"A new approach to astrophysical spectra: The complete experimental spectrum of ethyl cyanide (CH_3CH_2CN) between 570 and 645 GHz," Fortman, S.M., Medvedev, I.R., Neese, C.F. and De Lucia, F.C. Astrophysical Journal, in press, (2010).