AN EXPERIMENTAL APPROACH TO THE PREDICTION OF COMPLETE MILLIMETER AND SUBMILLIMETER SPECTRA AT ASTROPHYSICAL TEMPERATURES.

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Unidentified features in interstellar spectra (U lines) have persisted almost from the beginning of the field. In recent years, the number of such lines has rapidly increased in parallel with the sensitivity and frequency range of new observational facilities. The origins of the large fraction of these unidentified weeds are overwhelmingly from previously observed large molecules with dense spectra. The origin of the weeds problem lies in the nature of the spectroscopic approach that has typically been used in the millimeter and submillimeter spectral region: the bootstrap narrow-band-observation, assignment, and theoretical prediction cycle. Unfortunately, the weeds arise from complex spectra involving many low lying and often interacting vibrational states that are not typically part of the bootstrap process. This talk describes a purely experimental approach to this problem that does not require spectra assignment but rather relies on the observation of complete spectra over a range of temperatures. This approach is enabled by the FASSST (Fast Scan Submillimeter Spectroscopic Technique) spectroscopic system and the use of Collisional Cooling cells to provide reference spectra at low temperature. Experimental and theoretical results are presented.