SUB-MILLIMETER/THZ SPECTROSCOPY AT THE CONGESTION LIMIT

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Sub-millimeter/THz spectroscopy has long been viewed as a promising technique for chemical analysis given its high information content. For line-widths of 0.6 MHz, there exist 100,000 resolution elements in 60 GHz of spectral space. However, the analysis of large and complex molecules requires the identification of molecules with small rotational constants and/or many low energy vibrational and torsional states. This leads to spectra characterized by high line densities and large partition functions, potentially populating nearly every resolution element with weak lines. Here we report on a study of spectral congestion and will compare data and information taken from high resolution techniques that depend upon the narrow line-widths of individual lines for detection, modulation schemes based on the near universality of strong Stark modulation in large molecules at high J, and absolute absorption measurements based on cavities.