ABSOLUTE CHEMICAL ANALYSIS OF COMPLEX MIXTURES IN THE SUBMILLIMETER/TERAHERTZ.

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There has been a resurgence of interest in spectroscopic sensors. Much of this has been driven by increases in performance made possible by advances in lasers and laser systems and the significant applications in medicine, environmental monitoring, and national security that these performance enhancements make possible. Similar increases in performance have occurred in sub-millimeter/THz solid state technology, allowing the development of SMM/THz sensors. In the SMM/THz the rotational fingerprints of small static gas samples provide complexly redundant signatures, resolvable for even moderately large molecules because of the small Doppler limit. These fingerprints, combined with the $> 10^5$ resolvable spectral channels and $> 10^6$ distinctly measureable frequencies of cw SMM/THz systems lead to 'absolute' specificity, even in complex mixtures. Additionally, clutter from common atmospheric gases is minimal. Interferents such as water, carbon dioxide, and methane either have no rotational spectra, or very sparse spectra in the SMM/THz. Details of the quantitative analyses of mixtures will be provided.