320. Title:Chirped-pulse terahertz spectroscopy for broadband trace gas sensing
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Abstract:We report the first demonstration of a broadband trace gas sensor based on chirp-pulse terahertz spectroscopy. The advent of newly developed solid state sources and sensitive heterodyne detectors for the terahertz frequency range have made it possible to generate and detect precise arbitrary waveforms at THz frequencies with ultra-low phase noise. In order to maximize sensitivity, the sample gas is first polarized using sub-μs chirped THz pulses and the free inductive decays (FIDs) are then detected using a heterodyne receiver. This approach allows for a rapid broadband multi-component sensing with low parts in 109 (ppb) sensitivities and spectral frequency accuracy of <20 kHz in real-time. Such a system can be configured into a portable, easy to use, and relatively inexpensive sensing platform.