

FAST SWEEPING DIRECT ABSORPTION (SUB)MILLIMETER SPECTROSCOPY BASED ON CHIRPED-PULSE TECHNOLOGY

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Chirped-pulse Fourier Transform Microwave (CP-FTMW) technology has transformed traditional microwave spectroscopy into a rapid-acquisition, broadband spectral technique. The CP-FT technique has recently been expanded to the millimeter-wave region, but this approach requires costly equipment that is not readily available in most spectroscopy labs. To overcome this challenge, a new experiment has been designed that combines the broadband aspects of CP-FTMW with the high sensitivity of (sub) millimeter absorption spectroscopy. Using the arbitrary waveform generator from a CP-FTMW experiment, and the frequency multipliers and hot electron bolometer detector from a (sub) millimeter wave experiment, we have designed and benchmarked a highly sensitive spectrometer that offers broad spectral coverage and rapid spectral acquisition speeds. This technique is comparable in performance to other rapid-acquisition techniques currently used in the (sub) millimeter range, but offers more sensitivity after averaging. The design of this instrument and the benchmarking results will be presented.