THE SEARCH IS OVER: DESIGN AND APPLICATIONS OF A CHIRPED PULSE FOURIER TRANSFORM MICROWAVE (CPFTMW) SPECTROMETER FOR GROUND STATE ROTATIONAL SPECTROSCOPY

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Aided by the development of fast digitizers (20 Gs per second and 40 Gs per second) and high bandwidth arbitrary waveform generators we have developed a new spectrometer that obtains the rotational spectrum from 7.5 to 18.5 GHz for every valve pulse. The advantages of this technique for pure rotational spectroscopy will be illustrated. Searching for transitions is now made simple because you see all of them over the bandwidth of the spectrometer with good signal-to-noise in 10 seconds. One could now imagine observing changes in rotational spectrum as a function of temperature or microwave power. This may lead to measurement of dimer dissociation energies or of dipole moments since the transition intensities are not skewed by the cavity Q. Also emphasized will be the agility of the arbitrary waveform generator in that now double resonance or multi-resonance is possible using only a single source.