TWO-DIMENSIONAL CHIRPED-PULSE FOURIER TRANSFORM MICROWAVE SPECTROSCOPY: APPLICATIONS TO MULTI-LEVEL SYSTEMS

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Two-dimensional chirped-pulse Fourier transform microwave (CP-FTMW) spectroscopy has been used to study rotational energy level connectivity of 1,3-difluoroacetone and m-methylbenzaldehyde. In this series of experiments, non-selective polarizing pulse sequences were used to probe both progressively and regressively connected systems through coherences of coupled rotational energy levels. Coherence propagation among shared energy levels will be demonstrated on 1,3-difluoroacetone. *Ab initio* calculations predict that the methyl rotor barrier of m-methylbenzaldehyde is less than 35 cm^{-1} therefore giving rise to large A-E splitting. Furthermore there are two conformers of m-methylbenzaldehyde making the assignment of the rotational spectrum extremely difficult. We will show how coherence propagation demonstrated by 1,3-difluoroacetone can be applied in a general way to assign complex ground state rotational spectra such as m-methylbenzaldehyde.