TWO-DIMENSIONAL CHIRPED-PULSE FOURIER TRANSFORM MICROWAVE SPECTROSCOPY: INTRODUCTION TO TWO-DIMENSIONAL BROADBAND TECHNIQUES

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There is a gap in the electromagnetic spectrum where the microwave region is located when considering broadband two-dimensional spectroscopy. We introduce two-dimensional chirped-pulse Fourier transform microwave (CP-FTMW) spectroscopy as a way to directly identify coherences between coupled rotational levels. The theory and application of these experiments is a direct extension of traditional two-dimensional NMR techniques. Several different pulse sequences will be presented that allow for selective (narrowband) and non-selective (broadband) excitation. Data acquisition with broadband (10 GHz) detection enables several coupled transitions to be monitored simultaneously. Due to the extremely large amount of data acquired in each experiment, a new way of processing data is explained that allows a more straightforward analysis of the spectra. An autocorrelation study of 1-chloro-1-fluoroethylene is presented as a simple example of this application in the microwave region of the spectrum.