Two dimensional (2D) microwave spectroscopy experiments were carried out to study the correlations between the rotational energy levels using a novel broadband chirped pulsed Fourier transform microwave spectrometer (CP-FTMW) system. The talk will mainly focus on two dimensional autocorrelation spectrum of 1-Chloro-1-Fluoro Ethylene (CFE). Connectivities and correlations between closely lying nuclear quadrupole hyperfine transitions (due to $^{35}$ Cl) were clearly observed in the spectra. Both diagonal and off-diagonal peaks were observed in the spectra, similar to COSY experiments in NMR. Different pulse sequences were used to suppress the diagonal peaks. The large data set was worked up using a MathCAD program with a Kaiser Basel digital filter to obtain the frequency domain spectrum in both dimensions. 2D autocorrelation and double quantum correlation experiments were reported earlier on the CFE molecule with only 50 MHz bandwidth. In the present study, we extend this work to higher bandwidths (over 1 GHz) using CP-FTMW technique and monitored several rotational transitions at the same time.

---