Chirped-pulse Fourier transform microwave spectroscopy (CP-FTMW) allows the simultaneous measurement of pure rotational transitions across a bandwidth of more than one gigahertz. Advantages of the new technique include the possibility of rapid data acquisition and the opportunity to compare transition intensities across a broad frequency interval. The design of a CP-FTMW spectrometer recently constructed at the University of Bristol will be described. The spectra of Kr⋯ICF$_3$, OC⋯ICF$_3$, H$_3$N⋯ICF$_3$ and (CH$_3$)$_3$N⋯ICF$_3$ have been assigned to determine the length of the halogen bond in each complex and observe internal rotation in H$_3$N⋯ICF$_3$ and (CH$_3$)$_3$N⋯ICF$_3$.

The spectra of H$_2$O⋯ICF$_3$ and H$_2$S⋯ICF$_3$ display interesting features that cannot be modelled using simple Hamiltonians. A laser ablation source has recently been added to the CP-FTMW spectrometer allowing the study of metal-containing complexes. The molecular geometries of OC⋯AgI and H$_2$S⋯AgI have been determined from their broadband rotational spectra. These results will be placed in context of other recent work to characterise the molecular geometries of H$_2$O⋯MCI, H$_2$S⋯MCI, H$_3$N⋯MCI and C$_2$H$_4$⋯MCI by microwave spectroscopy, where M=Cu or Ag.