MICROWAVE SPECTROSCOPY AT THE DISSOCIATION LIMIT

ALAN CARRINGTON, *Department of Chemistry, University of Southampton, Southampton S09 5NH, United Kingdom*.

We have developed an ion beam technique for studying the microwave spectra of small molecular ions in energy levels lying very close to the dissociation limit. Electric field dissociation of the weakly bound levels results in fragment ions with characteristic kinetic energies which can be separated from all other ions and detected. Microwave transitions in the ion beam induced prior to field dissociation result in population transfer and consequent changes in fragment ion current. We have so far studied the spectra of eleven different ions; the microwave transitions detected are, in different systems, electronic, vibrational or rotational. In six of these systems the spectra have been assigned with high accuracy, with the aid of either ab initio or scattering calculations. The remaining five ions, including the long-range complex He..H2+ are still under investigation. The difficult problems which arise will be described.