SPECTRA OF VAN DER WAALS COMPLEXES: FINGERPRINTS OF INTERMOLECULAR INTERACTIONS

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The research interests of the Edmonton spectroscopy group center around the characterization of weak intermolecular interactions. Our approach is to generate weakly bound complexes, such as van der Waals dimers, trimers, and higher clusters, in a supersonic molecular expansion, and then to interrogate their rotational and ro-vibrational energy level structures with high resolution spectroscopic methods. These methods include Fourier transform microwave spectroscopy and millimeter wave and Terahertz techniques. A brief description of the spectrometers used and an explanation of their operating principles will be given.

Spectroscopic results of several weakly bound molecular systems that we have studied will then be presented and interpreted. The complexes studied can roughly be classified into three groups: i) ternary and quaternary clusters which address the issue of three-body non-additive interactions; ii) complexes which show large amplitude internal dynamics, such as internal rotation or inversion motions; iii) very weakly bound helium atom containing species.