IMPROVING THE SENSITIVITY OF CHIRPED-PULSE FOURIER TRANSFORM MM-WAVE DETECTION IN UNIFORM SUPERSONIC FLOWS

OMAR ABDELKADER KHEDAOUI, BRIAN M HAYS, ILSA ROSE COOKE, THOMAS SANDOW HEARNE, THEO GUILLAUME, DIVITA GUPTA, MYRIAM DRISSI, IAN R. SIMS, *CNRS, IPR (Institut de Physique de Rennes) - UMR 6251, Univ Rennes, F-35000 Rennes, France*.

The CPUF (Chirped Pulse in Uniform supersonic Flow) technique is a combination of the CRESU (Cinétique de Réaction en Ecoulement Supersonique Uniforme, or Reaction Kinetics in Uniform Supersonic Flow) technique to provide a very low temperature (down to 5 K) gas-phase collisional environment with chirped pulse Fourier transform mm-wave/microwave (CPFTMW) spectroscopic detection. The goal of the current CRESUCHIRP project is to determine branching ratios of astrochemically relevant bimolecular reactions at low temperatures using the CPUF technique. Two new CPFTMW spectrometers have been built and characterized in the Ka band (26.5-40 GHz) and the E-band (60-90 GHz). While reaction products have been successfully detected at temperatures down to 10 K in continuous CRESU flows in Rennes, the sensitivity of the CPFTMW technique is reduced by collisional broadening in the relatively high pressure CRESU flows. Reducing the collisional frequency rate is critical, and one of the methods that have been developed to achieve this aim is molecular beam sampling of the uniform flow via a skimmer to create an expansion into a much higher vacuum environment where both the temperature and pressure of the gas will be lowered, creating favorable conditions for the detection of the molecular signal. The latest results from these experiments will be presented.