VELOCITY MODULATION SPECTROSCOPY OF MOLECULAR IONS IN A SUPERSONIC SLIT JET DISCHARGE

S. DAVIS, M. FARNIK, D. UY, and D. J. NESBITT, *JILA, National Institute of Standards and Technology and Department of Chemistry and Biochemistry, University of Colorado, Colorado 80309-0440.*

We report an experimental apparatus for velocity modulation spectroscopy of molecular ions in a supersonic slit jet discharge. Rotationally and translationally (T ¡ 25 K) molecular ions are generated in a glow discharge, slit supersonic expansion. Detection of the ions is achieved via direct absorption of a high resolution (¡ 2 MHz) near infrared laser. Electrodes aligned perpendicular to the slit expansion provide a modulating electric field (300-500 V/cm at 30-100 KHz) which in turn modulates the absorption via Doppler shifts of the molecular ions. Lock-in detection at the modulation frequency provides descrimination both from low frequency noise and neutral species absorption. The sensitivities achieved and possible limitations will be discussed. Additionally, the most recent results obtained with this apparatus will be presented.