CAVITY RING DOWN SPECTROSCOPY OF MOLECULAR IONS IN THE 3 $\mu$m REGION

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Ionic complexes may be thought of as intermediates whose potential energy surfaces will provide information on the reaction dynamics of molecule-ion reactions in space. Because ionic complexes possess significantly higher binding energies than their van der Waals analogues, they may survive the intense radiation conditions in space. Candidate complexes include $(CO\text{-}CO)^+$, $H_2\text{-}HCO^+$, $H_2\text{-}HN_2^+$, $H_2O\text{-}H_2O^+$, $N_2\text{-}N_2^+$, $N_2\text{-}H^+\text{-}N_2$.

An experiment is described in which ionic complexes are created in a continuous plasma jet emanating from a slit-nozzle and characterized with a quadrupole mass spectrometer. Cavity ring down spectroscopy is used to map the potential energy surfaces and to determine molecular parameters. A cw optical parametric oscillator, operating in the 3 $\mu$m region is used as a light source.

Presently, experiments are prepared to record fully resolved spectra of ionic complexes of astrophysical relevance, with a focus on species that may be considered reactive intermediates in ion-molecule reactions in space.