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Production and Storage of H_3^+ in an RF Ion Trap.[1] L. REYNOLDS, S. BREWER, J. GLEESON, B. MYER, R. STAMILIO, A. DAW, A. CALAMAI — H_3^+ is a ubiquitous molecular ion in astrophysical plasmas and has been the subject a variety of experimental and computational studies. We have observed the production and subsequent storage of a significant H_3^+ population following electron bombardment of H_2 inside a cylindrical rf ion trap. We combined a simple time-of-flight (TOF) mass spectrometer in tandem with the trap to monitor the temporal evolution of an H_3^+ population as H_2^+ exothermically reacts with H_2 after the electron impact interval. At precisely determined times following electron impact, the stored ions are extracted from the trap into an 82- cm flight path terminated by an active-film detector. A 200-MHz digital oscilloscope records the TOF spectrum by monitoring the detector's current output through a 1kΩ load. As charge- transfer (CT) reactions typically dominate ion losses from the trap for neutral gas pressures $\geq$ 10^{-8} Torr, an analysis of the TOF spectra as a function of the delay time until the extraction pulse will yield the production and loss rate of H_3^+ at a given pressure. A discussion of the apparatus, data associated with the reaction $H_2^+ + H_2 \rightarrow H_3^+ + H$, and a plan for measuring CT rate coefficients between H_3^+ and various neutral target molecules will be presented.

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