MILLIMETER-WAVE TIME-RESOLVED STUDIES OF THE FORMATION OF CO^+ BY ELECTRON IMPACT

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In order to study interactions among ions, electrons, and molecules in the gas phase, we have developed a time-resolved spectroscopic experiment which utilizes an electron gun to create molecular ions. By locking a klystron to the center of a rotational resonance and gating the electron beam, we monitor the time dependent rotational state distribution of a molecular ion during its formation and subsequent relaxation and decay in order to determine the rates at which chemical and energy transfer processes occur. Time resolved data of the formation, relaxation, and decay of the CO^+ ion in a CO environment as a function of pressure, electron beam current, and electron energy will be presented for several rotational resonances.