

Abstract Submitted
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Quantum-State-Resolved Ion-Molecule Chemistry¹ GARY CHEN, TIANGANG YANG, WESLEY CAMPBELL, ERIC HUDSON, Univ of California - Los Angeles — We are working towards a new platform for quantum-state-resolved ion-molecule chemistry by utilizing a combination of cryogenic buffer gas cooling, laser-cooled ion sympathetic cooling, and integrated mass spectrometry in an RF Paul trap. Cold molecular species produced in a cryogenic buffer gas beam collide with target atomic carbon ions in an linear quadrupole trap. Ion imaging and time of flight mass spectrometry are then used to observe the resulting reaction rates and products. We can utilize the precision control over quantum states allowed by this neutral-plus-ion chemistry environment (N+ICE) to resolve state-resolved quantum chemical reactions without high-density molecular sample production; proposed extensions suggest true state-to-state chemistry is possible in this system. We report progress towards cold carbon and water chemistry, including co-trapping and sympathetic cooling of carbon ions with laser-cooled beryllium ions.

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