

Abstract Submitted
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Ion-Neutral Chemistry Near Absolute Zero¹ BENJAMIN SLAYTON, Wentworth Institute of Technology, JONATHAN KWOLEK, University of Connecticut, DOUGLAS GOODMAN, Quinnipiac University, WINTHROP SMITH, University of Connecticut, MEASUREMENT OF CHARGE-EXCHANGE BETWEEN NA AND CA+ IN A HYBRID TRAP TEAM — Laser techniques enable us to study cold quantum chemistry and control the electronic states of atoms and ions undergoing a chemical reaction. This level of control can be used to distinguish between individual reaction channels, and could ultimately be used to create molecular ions. We present results from an experimental study of laser-controlled charge-exchange reaction rates between cold sodium atoms (500 uK) and calcium ions (100 K) held within a hybrid atom-ion trap. We manipulate and measure reaction rates by changing the reactants' electronic states and/or collision energy. Of the channels studied, the Na[P] + Ca+[D] channel was the strongest with a rate coefficient $10^{-8} \frac{cm^3}{s}$ at an ion temperature of 200 K, which is above the classical Langevin rate limit.

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