

Abstract Submitted  
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**Studying cold collisions and reactions in a hybrid atom–ion trap: towards ultracold molecular ions** CHRISTIAN SCHNEIDER, STEVEN SCHOWALTER, KUANG CHEN, SCOTT SULLIVAN, WADE RELLERGERT, ERIC HUDSON, University of California, Los Angeles — We report on our ongoing efforts to study ultra-cold  $\text{BaCl}^+$  ions [1] and reactions between different cold ions and atoms [2, 3]. We have implemented a new apparatus which joins a time-of-flight mass spectrometer (TOFMS) (a modification of [4]) and a new RF trap. This system allows for both studying ions in Coulomb crystals optically and detecting reaction products using the TOFMS. First experimental data are presented and we discuss further prospects of our development to gain insights into reactions at the quantum level.

- [1] W. G. Rellergert et al., *Nature* **495**, 490–494 (2013)
- [2] Rellergert et al., *Phys. Rev. Lett.* **107**, 243201 (2011)
- [3] Sullivan et al., *Phys. Chem. Chem. Phys.* **13**, 18859–18863 (2011)
- [4] Schowalter et al., *Rev. Sci. Instrum.* **83**, 043103 (2012)

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