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Preliminary results on a new method for producing ultracold molecular ions WADE RELLERGERT, SCOTT SULLIVAN, KUANG CHEN, JULIA CLARK, STEVEN SCHOWALTER, ERIC HUDSON, University of California, Los Angeles — We describe a new method for the production of ultracold molecular ions. This method utilizes sympathetic cooling due to the strong collisions between appropriately chosen molecular ions and laser-cooled neutral atoms to realize ultracold, internal ground-state molecular ions. In contrast to other experiments producing cold molecular ions, our proposed method efficiently cools both the internal and external molecular ion degrees of freedom. The availability of truly ultracold molecular ions will impact fields as diverse as quantum chemistry, precision measurement, and quantum information/computation. Results from $BaCl^+$ trapping experiments, as well as work aimed at cooling trapped $BaCl^+$ ions using ultracold Ca atoms are presented.

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