

Abstract Submitted
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Quantum Logic Spectroscopy of State Prepared AlH^+ : Current Progress¹ MARK KOKISH, MATTHEW DIETRICH, CHRISTOPHER SECK, BRIAN ODOM, Northwestern University — Recently demonstrated broadband rotational optical cooling of the aluminum monohydride ion (AlH^+) by our group² has provided an efficient tool for molecular ion internal state preparation, a prerequisite for molecular quantum logic spectroscopy (mQLS). Motional ground state cooling of the molecular and atomic ion pair will be achieved by continuous Raman sideband cooling and stimulated rapid adiabatic passage (STIRAP) sideband cooling. We will present recent progress on this experiment including the molecular ion source, the state preparation scheme, and motional ground state preparation in the single-ion-scale trap.

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²C.-Y. Lien, C. M. Seck, Y.-W. Lin, J. H. V. Nguyen, D. A. Tabor, and B. C. Odom, Nat. Commun. **5**, 4783 (2014).

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