

Abstract Submitted  
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**Towards quantum control of molecular ions**<sup>1</sup> DAVID HANNEKE, EDWARD KLEINER, ALEXANDER FRENETT, Amherst College — Many atoms and molecules possess interesting spectroscopic transitions, but lack dissipative transitions useful for control and detection of internal states. In particular, molecules are candidates for quantum memories, low-temperature chemistry studies, tests of fundamental symmetries, and searches for time-variation of fundamental constants, but most lack a convenient cycling transition. By co-trapping a molecular ion with an atomic ion, the atom can provide all dissipation and detection. We present a system capable of such quantum control and report progress towards its use. We also present candidate molecules with analysis of potentially interesting transitions and systematic effects.

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