

Abstract Submitted
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A Dual-species Trapped-ion System for Quantum Information Processing with $^{88}\text{Sr}^+$ and $^{133}\text{Ba}^+$. SUSANNA TODARO, JASMINE SINANAN-SINGH, JULES STUART, MIT, Department of Physics, COLIN BRUZEWICZ, MIT, Lincoln Labs, GABRIEL MINTZER, LUKE QI, ROBERTO GAUNA, ISAAC CHUANG, MIT, Department of Physics, JOHN CHIAVERINI, JEREMY SAGE, MIT, Lincoln Labs — Dual-species ion trapping is a potentially useful tool for scalable trapped-ion quantum information processing (QIP), since the second ion species can be used as a sympathetic coolant or as an ancilla qubit. $^{88}\text{Sr}^+$ and $^{133}\text{Ba}^+$ both have accessible visible laser wavelengths for cooling, state preparation, detection, and gate operations, making them a promising pair for QIP applications. The mass ratio is also appropriate for sympathetic cooling. Further, $^{133}\text{Ba}^+$ has a spin-1/2 nucleus so the qubit can be encoded in the ground-state hyperfine manifold, which can have long coherence times [1]. We show progress towards dual-species trapping and control of $^{88}\text{Sr}^+$ and $^{133}\text{Ba}^+$. [1] D. Hucol *et al.*, PRL **119** 100501 (2017).

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