

Abstract Submitted
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Toward All-Optical Loading of Co-Trapped Be^+ and O_2^{+1}
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HANNEKE, Amherst College — Trapped and sympathetically cooled O_2^+ ions are
a promising system for precision measurements, optical frequency metrology, and
searches for new physics. We describe our techniques to load O_2^+ along with Be^+
coolant ions through resonance-enhanced photoionization. For beryllium, a custom-
designed monolithic doubling cavity generates 235 nm light for single-color 1 + 1
ionization on the $^1S_0 \rightarrow ^1P_1$ transition. In O_2 , a cold molecular beam is photoion-
ized via single-color 2+1 REMPI on the $X^3\Sigma_g^- \rightarrow d^1\Pi_g \rightarrow X^2\Pi_g(\text{O}_2^+)$ transition.
This transition is vibrationally selective and loads ions in a small number of rota-
tional states. We describe initial work conducting spectroscopy of the molecular
transition and plans for integrating the cold beam into our trap.

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