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Multiply charged thorium ions for nuclear laser spectroscopy MICHAEL V. DEPALATIS, COREY J. CAMPBELL, LAYNE R. CHURCHILL, DAVE E. NAYLOR, ALEXANDER RADNAEV, MICHAEL S. CHAPMAN, ALEX KUZMICH, Georgia Institute of Technology — Coherent excitation of the electronic states of atoms and molecules with lasers is at the heart of modern spectroscopy and metrology. To extend these techniques to nuclear states would be a tremendous advance. However, the typical excitation energies for nuclear matter are in the keV to MeV energy range, out of reach of modern coherent radiation sources. In the unique case of the ^{229}Th nucleus, the energy splitting of the ground state doublet is only several eV,[1] which may be within the reach of coherent table-top UV lasers. Previously we demonstrated the direct laser cooling of $^{232}Th^{3+}$ in an rf Paul trap,[2] an important first step towards nuclear laser spectroscopy. Here we report progress towards loading and trapping $^{229}Th^{3+}$ from a Thorium nitrate source.

[1]L. A. Kroger & C. W. Reich, *Nucl. Phys. A* **259**, 29 (1976).
[2]C. J. Campbell *et al.*, *Phys. Rev. Lett* **102**, 233004 (2009).

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