Abstract Submitted
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Towards a quantum degenerate gas of ^{48}Ti[1] KAYLEIGH CASSELLA, SCOTT EUSTICE, DAN STAMPER-KURN, University of California, Berkeley, UNIVERSITY OF CALIFORNIA, BERKELEY TEAM — Titanium is fundamentally different from all the elemental atomic gases brought to quantum degeneracy to-date. Titaniums lowest energy electronic configuration [Ar] $3d^2 4s^2$ yields a ground level a^3F_2 that is characterized by non-zero orbital angular momentum yet a magnetic moment equivalent to that of the alkali-atoms. Hence, titaniums tensor polarizability supports anisotropic atom-light interactions, which can be implemented in a quantum degenerate gas that is free from the strong long-range dipolar interactions observed in systems of lanthanides. While a closed transition does not exist out of the ground state, a metastable state, a^5F_5 at 6843 cm^{-1} with electronic configuration [Ar] $3d^3 4s$, has a spin-allowed transition to an excited energy level $y^5G_6^0$ ([Ar] $3d^3 4p$) at 498.1713 nm. Existing spectroscopic data support the feasibility of laser-cooling and magneto-optical trapping (MOT); this transition is both closed and broad ($\Gamma = 2\pi \times 10.51$ MHz). We discuss the cooling and trapping scheme already underway: a spin-flip Zeeman slower followed by a MOT. We report on experimental progress towards a trapped, Doppler temperature gas of bosonic ^{48}Ti, the most abundant isotope, and future plans to achieve quantum degeneracy.

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