

Abstract Submitted
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Measurement of the first tune-out wavelength of K with an atom interferometer WILLIAM HOLMGREN, RAISA TRUBKO, IVAN HRMADA, ALEX CRONIN, Department of Physics, University of Arizona — We present a measurement of the tune-out wavelength of K between the D1 and D2 lines with picometer uncertainty. Tune-out wavelengths occur where the dynamic polarizability of an atom equals zero between two transitions [1,2]. We find the tune-out wavelength by focusing a laser beam on one path of an atom interferometer and measuring the differential phase shift as a function of laser wavelength. Our tune-out wavelength measurements can be excellent tests of atomic structure calculations because they are insensitive to systematic errors due to light intensity, atom beam velocity, and light polarization. Additionally, multi-species optical traps operating at tune-out wavelengths may yield new insights into many-body physics and quantum information processing. We will also discuss the feasibility of measurements of tune-out wavelengths in other atoms in our lab. This work is supported by the NSF and NIST.

[1] L.J. LeBlanc and J.H. Thywissen, Phys. Rev. A 75, 053612 (2007).

[2] B. Arora, M.S. Safronova, and C.W. Clark, Phys. Rev. A 84, 043401 (2011).

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