Abstract Submitted
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Cold Lithium Atom Interferometer KAYLEIGH CASSELLA, ERIC COPENHAVER, CHEN LAI, PAUL HAMILTON, BRIAN ESTEY, Univ of California - Berkeley, YANYING FENG, Tsinghua University, HOLGER MUELLER, Univ of California - Berkeley — Atom interferometers often use heavy alkali atoms such as rubidium or cesium. In contrast, interferometry with light atoms offers a larger recoil velocity and recoil energy, yielding a larger interference signal. This would allow for sensitive measurements of the fine structure constant, gravity gradients and spatially varying potentials. We have built the first light-pulse cold-atom interferometer with lithium in a Mach-Zehnder geometry based on short (100 ns), intense (2.5 W/cm^2) pulses. We initially capture approximately 10^7 lithium atoms at a temperature of about 300 μK in a magneto-optical trap. To perform interferometry, we couple the $F=1$ and $F=2$ hyperfine levels of the ground state with a sequence of two-photon Raman transitions, red-detuned from lithium's unresolved $2P_{3/2}$ state. Cold lithium atoms offer a broad range of new possibilities for atom interferometry including a large recoil velocity and a fermionic and bosonic isotope. Lithium's isotopes also allow for independent measurements of gravity thus constraining the equivalence principle violations predicted by the Standard-Model Extension. In the near future, we plan to perform a recoil measurement using a Ramsey-Bordé interferometer.

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