Abstract Submitted
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Robust cooling of lithium for testing Einstein's equivalence principle GEENA KIM, PAUL HAMILTON, BISWAROOP MURKHERJEE, DANIEL TIARKS, TRINITY PRADHANANGA, HOLGER MUELLER, UC Berkeley — We demonstrate a new cooling method for lithium which combines Sisyphus cooling and adiabatic expansion. Lithium's unresolved hyperfine structure was long thought to make it impossible to reach sub-Doppler temperatures by Sisyphus cooling [1,2]. Most lithium experiments rely on evaporative cooling to achieve lower temperature. Cooling of lithium by adiabatically reducing a far-detuned lattice has been demonstrated [3], however both methods are lossy and leave a small fraction of cooled atoms. Our method cools ^{7}Li atoms to about 3 times the recoil velocity and gives cooled fraction of about 30-50%. The cooling easily works for frequency detuning across ^{7}Li D1 and D2 line with moderate laser power(few tens of mW). The cooling does not require certain magnetic field and polarization orientation as Raman sideband cooling. We discuss our idea about lattice interferometer to test the Einstein equivalence principle.

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