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Lithium in a Magneto-Optical Trap DAN KLEMME, CHAD HOYT, Bethel University — We recently cooled and trapped $\sim 10^7$ neutral ^{7}Li atoms in a magneto-optical trap. Our laser source is a home-built external cavity diode laser at 671 nm and a semiconductor tapered amplifier. Acousto-optic modulators are used to generate five different laser detunings that are necessary for repumping between hyperfine states in the trapping and slowing laser beams. The laser is locked by phase-sensitive detection of fluorescence produced by a frequency-modulated laser beam normally incident to the lithium atomic beam. The laser is tuned to the $2S_{1/2}(F = 2) \rightarrow 2P_{3/2}(F')$ D2 transition. Two coils of wire with $\sim$100 A of current flowing through them in an anti-Helmholtz orientation generate the magnetic field gradient whose magnitude increases from zero with distance from the center of the trap. We describe a few preliminary measurements on the trapped atoms such as temperature, atom number, and loading/unloading times. Eventually, the cold lithium will be used to demonstrate single-photon cooling in an optical dipole trap. Additionally, we plan to use the trap to do high-resolution, cold atom spectroscopy.

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