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Measurements of cold lithium atoms in a magneto-optical trap[1]
DAN MOHR, JAY BROOKS, Bethel University, DAN KLEMME, University of Minnesota, CALEB LOGEMANN, CHAD HOYT, Bethel University — We present measurements of cold ^{7}Li atoms in a magneto-optical trap based on an amplified external cavity diode laser at 671 nm. The temperature of the atoms is measured to be 550 $\pm$ 70 μK using a time-lapsed absorption imaging and cloud radius measurement technique. This temperature is confirmed using the release-and-recapture method with a trap diameter of $d = 1.9\ cm$. We recorded the frequency spectrum of the cold atoms at approximately 1.5 mK on the D2 unresolved lines ($2S_{1/2}\,F = 2 \rightarrow 2P_{3/2}\,F'$) in ^{7}Li using fluorescence imaging. The spectroscopic line width of the $F = 2 \rightarrow F' = 3$ transition is approximately 11 MHz full-width at half-maximum, consistent with temperature measurements and a Voigt spectral line shape with natural line width $\gamma/2\pi = 5.87$ MHz. We observed line shape effects due to probe laser beam polarization in the presence of an equal irradiance re-pumping beam on the $F = 1 \rightarrow F'$ transition, which included a peak shift of approximately 1 MHz.

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