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Lithium atomic beam spectroscopy and phase sensitive detection using a diode laser[1] JACK HOULTON, BRANDON PEPLINSKI, LAUREN OTTO, DANIEL KLEMME, TOM GREENLEE, CHAD HOYT, Bethel University — We describe spectroscopy of a collimated lithium atomic beam using a home-built external cavity diode laser (ECDL) at 671 nm. The atomic beam is formed from an effusive oven containing Li at T≈450°C and a series of apertures. The ECDL light is split into two beams that counter-propagate at right angles to the atomic beam. Fluorescence spectra from the unresolved $2S_{1/2}$ F=2 $\rightarrow$ $2P_{3/2}$ D2 line of ^{7}Li were recorded over a large range of saturation parameters (0.1 s_0 - 50 s_0, where s_0 is the ratio of laser intensity to the saturation intensity). We modeled the effects of transverse atomic velocities (residual Doppler broadening), power broadening, and the saturation feature at high s_0. We calibrated the spectra by modulating the laser current at ∼110 MHz and observing the sideband spectra. We locked the frequency of the ECDL to the transition at low and high values of s_0 by phase sensitive detection in the fluorescence. The laser beam was electro-optically modulated at 100 kHz and the fluorescence signal was demodulated with a lock-in amplifier. The locked ECDL will be used for laser cooling and trapping experiments.

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