Abstract Submitted
for the NEF14 Meeting of
The American Physical Society

Construction of a Laser Frequency Stabilization System for a Magneto Optical Trap[1] TALIA MARTIN, EDWARD DEVENEY, Bridgewater State University — We detail the construction of a laser frequency-stabilization system for our 780 nm tunable external cavity diode laser (ECDL) based on a Yale design [J. Barry Thesis, Yale Univ.]. The ECDL is to be used for Bridgewater's (BSU) Rb Magneto Optical Trap (MOT). The ECDL has a frequency linewidth of <1 MHz ideal for selecting a trapping frequency within the <10 MHz line width typical of Rb. ECDL frequency can drift, however, by tens of MHz or more /hr with loss of trapping and a drift off of the atomic transition altogether. We incorporate the Yale feedback system (reported to stabilize for as long as 12 hrs) to stabilize our ECDL: Here, the ECDL is combined in a scanning Fabry Perot interferometer (FPI) with a drift stabilized (+/-2 MHz over 8 hours) HeNe laser. FPI output is adjusted to show the HeNe peaks separated by the Free Spectral Range (FSR) of the FPI (1.5 GHz) and the ECDL peak. A DAQ and custom Yale software use the FPI output and FSR to calibrate the frequency scale. The 1st HeNe peak serves as a frequency reference from which the drift of the ECDL can be monitored. A correction signal is then generated and fed back to the DC offset of the ECDL to bring the frequency back and stabilize The BSU stabilization system has been completed up to and including the generation of the feedback error signals and we hope to measure our stabilization time in near future.

[1]We would like to thank BSU's Adrien Tinsley Summer Research Program for their generous funding and the DeMille Group at Yale for their support.

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Date submitted: 10 Oct 2014 Electronic form version 1.4