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A low-cost, tunable laser lock without laser frequency modulation[1] MARGARET E. SHEA, PAUL M. BAKER, DANIEL J. GAUTHIER, Duke University — Many experiments in optical physics require laser frequency stabilization. This can be achieved by locking to an atomic reference using saturated absorption spectroscopy. Often, the laser frequency is modulated and phase sensitive detection used. This method, while well-proven and robust, relies on expensive components, can introduce an undesirable frequency modulation into the laser, and is not easily frequency tuned. Here, we report a simple locking scheme similar to those implemented previously.[2,3] We modulate the atomic resonances in a saturated absorption setup with an AC magnetic field created by a single solenoid. The same coil applies a DC field that allows tuning of the lock point. We use an auto-balanced detector[4] to make our scheme more robust against laser power fluctuations and stray magnetic fields. The coil, its driver, and the detector are home-built with simple, cheap components. Our technique is low-cost, simple to setup, tunable, introduces no laser frequency modulation, and only requires one laser.

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[3]S Pradhan, R Behera, and AK Das, *Pramana - J. Phys.* **78**, 4 (2012)
[4]PCD Hobbs, *Appl. Opt.* **36**, 903-920 (1997)

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