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Optical Transfer Cavity Stabilization using Tunable Sidebands of RF Current-Modulated Injection-Locked Diode Lasers.[1] PARISA BOHLOULI-ZANJANI, JAMES D.D. MARTIN, Department of Physics and Institute for Quantum Computing, University of Waterloo, Waterloo, ON, N2L 3G1, Canada — It is demonstrated that RF current modulation of a frequency stabilized injection-locked diode laser allows the stabilization of an optical cavity to adjustable lengths, by variation of the RF frequency. This transfer cavity may be used to stabilize another laser at an arbitrary wavelength, in the absence of atomic or molecular transitions suitable for stabilization. Implementation involves equipment and techniques commonly used in laser cooling and trapping laboratories, and does not require electro- or acousto-optic modulators. Using this technique, we stabilize a transfer cavity using a RF current modulated diode laser, which is injection locked to a 780 nm reference diode laser. The reference laser is stabilized using saturated absorption in a Rb cell. A Ti:sapphire laser at 960 nm is then locked to this transfer cavity and may be precisely scanned by varying the RF modulation frequency. We demonstrate the suitability of this system for the excitation of laser cooled Rb atoms to Rydberg states.

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