Abstract Submitted
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A High-Power, All-Solid-State Laser Source for Laser Cooling of Lithium R.W. STITES, J.R. WILLIAMS, E.L. HAZLETT, J.H. HUCKANS, K.M. O'HARA, The Pennsylvania State University, University Park, PA 16802 — We have constructed a diode-pumped Nd:YVO_4 ring laser operating at 1342 nm with an output power of several Watts. This solid state laser is injection locked by a low-power (60 milliWatt) 1342 nm diode laser to force uni-directional, single-frequency operation. The 1342 nm output radiation is frequency doubled in an external build-up cavity which contains a periodically-poled lithium niobate (PPLN) crystal. This system is capable of providing ≈ 1 Watt of single-frequency light at 671 nm (suitable for exciting the D1 and D2 transitions in ^{6}Li or ^{7}Li). This system can be scaled to multi-Watt output powers levels at 671 nm by employing a master-oscillator power-amplifier (MOPA) configuration in which the 1342 nm laser light is amplified by a second Nd:YVO_4 gain medium prior to frequency doubling. This powerful, narrow linewidth source can be used for laser cooling and trapping of lithium atoms or for providing optical dipole traps and optical lattices near 671 nm.

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