

Abstract Submitted
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Highly Flexible Home-built ND:YVO4 Modelocked Laser System for Trapped Ion Qubit Raman Transitions¹ TOMASZ SAKREJDA, JOHN WRIGHT, RICHARD GRAHAM, ZICHAO ZHOU, BORIS BLINOV, Univ of Washington, MUSIQC TEAM — A passively mode-locked ND:YVO4 laser system for driving Raman transitions in Ba⁺ and Yb⁺ is constructed and evaluated. Based on a commercial CW laser platform, we make straightforward modifications to the cavity to effect passive mode locking. With 20W of 808nm diode pump light, we achieve over 4 W 1064 nm output power, 150 MHz repetition rate, and 17 ps pulse duration. Laser cavity parameters can be easily modified to facilitate changes in pulse duration or repetition rate. Stable mode locking is achieved at start-up with no perturbations to the cavity resonator. The output 1064nm light can frequency-doubled in an external LBO crystal to generate up to 130 mW of 532 nm light in a single pass. The 532 nm light is close enough to the 493 nm line in Ba⁺ to drive ground state qubit flips with a single laser pulse. We plan to use this laser to drive qubit gates in both Ba¹³⁸⁺ and, with a third harmonic (355 nm) generation system, in ¹⁷¹Yb⁺.

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