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Behavior of Pulsed and Continuous-Wave Optical Dipole Force Traps M. SHIDDIQ, E.M. AHMED, M.D. HAVEY, C.I. SUKENIK, Department of Physics, Old Dominion University, Norfolk, VA, R.R. JONES, Department of Physics, University of Virginia, Charlottesville, VA, D. CHO, Department of Physics, Korea University, Seoul, Korea — To date, almost all far-off-resonance traps (FORT) for confining ultracold atoms have used continuous-wave (cw) laser light. Recently, in addition to studies of a cw FORT, we have been investigating the behavior of a pulsed FORT constructed using a mode-locked Nd:YAG laser with 100 picosecond pulses. Both FORTs are loaded from a rubidium magneto-optical trap (MOT). For cw and pulsed traps of equal average power, we will present a quantitative side-by-side comparison of the trap loading and holding dependence on such quantities as MOT intensity and detuning, MOT hyperfine repumper laser intensity, loading time, and FORT power. We have found that although the pulsed and cw traps behave similarly in most respects, there is a notable difference in dependence on MOT laser detuning during FORT loading. We will also present preliminary spectroscopic data of atoms confined in both the cw and pulsed FORTs. Finally, we will discuss progress on implementing the free electron laser (FEL) at Jefferson Lab to make an optical trap for atomic physics and cold chemistry applications with a well depth several orders of magnitude greater than achievable with a typical table-top laser. Supported in part by the National Science Foundation, Jefferson Laboratory, and Old Dominion University.

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