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Field Enhancement Cavity for Pondermotive Optical Lattices STEFAN ZIGO, GEORG RAITHEL, University of Michigan — Rydberg atoms trapped in ponderomotive optical lattices (POLs) have a number of applications in atomic physics such as quantum information and computation, and high-resolution spectroscopy. Many of the effects that can be induced by subjecting highly-excited atoms to a ponderomotive optical lattice potential,$V = \frac{e^2|E(r)|^2}{4m_e\omega^2}$, require lattice depths that are larger than what can be readily created by counter-propagating, focused laser beams. In particular, spectroscopic studies of the adiabatic lattice potentials of Rydberg atoms in lattices will require potentials that are several GHz deep. Here, we explore the use of concentric optical resonators to create high-intensity, continuous (cw) standing-wave fields that will generate deep optical-lattice potentials. We have tested and characterized a concentric cavity with a finesse of about 30 using a 10W, 1064nm, single frequency, cw-laser. The cavity is stabilized by utilizing a Pound-Drever-Hall locking scheme. We will present schemes how the cavity will be used in future optical-lattice experiments.

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