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Efficient Generation of Pure High-Order Laguerre-Gaussian Laser Beams Y. ZHANG, E.L. HAZLETT, R.W. STITES, K.M. O'HARA, The Pennsylvania State University — High-order Laguerre-Gaussian laser beams are useful for trapping atoms, transferring angular momentum to cold gases and microscopic objects, and increasing the sensitivity of gravitational wave detectors. We report the experimental generation of pure high-order Laguerre-Gaussian laser beams $\mathrm{LG}_{p=0}^{l=12}$, where l and p are the azimuthal and radial mode indices respectively. We use a spiral phase plate with a $12 \times (2\pi)$ total phase winding to convert a fundamental Gaussian beam to a superposition of $\mathrm{LG}_{p}^{l=12}$ beams. A plano-concave optical cavity is then used as a spatial filter to remove all radial modes of the beam except the $p = 0$ mode. We will report on how we optimize the overall efficiency of this technique to maximize the power in the pure $\mathrm{LG}_{p=0}^{l=12}$ mode.

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