

Abstract Submitted
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Holographic Generation and 3-D Ion Imaging of Focused Ultrashort Pulses of Complex Light¹ JAMES STROHABER, CHAD PETERSEN, CORNELIS UITERWAAL, Univ. Nebraska - Lincoln (cuitenwaal2@unl.edu) — We investigate an open question in intense-field physics: are excitation and ionization with ultrashort pulses affected by optical orbital angular momentum (OAM)? To answer this question, we holographically create Laguerre-Gaussian paraxial modes, which carry optical OAM. In our experiments we use a computer-controlled spatial light modulator to modulate the transversal profile of 50-fs, 800-nm pulses. Using phase-only masks that also encode the amplitude profile of the desired mode we create μm -sized foci of complex light. We analyze the mode purity of our foci on-site by imaging them with ions, which act as local intensity sensors. We obtain three-dimensional images of the foci without requiring assumptions about their geometry. We also use ion imaging to realize a photo-dynamical test tube, by recording ions created in the ‘hottest’ spot of the focus only, with unsurpassed μm resolution. This allows us to study ionization processes without having to integrate yields over the whole focal region. Finally, we also present a new set of steady-state modes in quadratic lenslike media; these modes are separable solutions in cylindrical parabolic coordinates. Recent progress will be discussed.

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