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Phase-shifting Digital Holography for Measuring the Complete Phase Structure of Twisted Light ANDREW VOITIV, WILLIAM HOLTZMANN, JASMINE KNUDSEN, SAMUEL ALPERIN, MARK SIEMENS, University of Denver — Light that has orbital angular momentum (OAM) is characterized by a helical phase front, which can be thought of as twisting around the axis of propagation. Allen et al showed that these twisted light beams carry an OAM of $l\hbar$ per photon, where l represents the helical mode as an integer. Light with OAM can be fully characterized by measuring its helical phase and amplitude. By utilizing a co-propagating reference beam and applying phase-shifting digital holography, we can measure the complete phase structure and amplitude of a vortex beam, with the advantages of high resolution, high fidelity, and low cost. In addition, these measurements allow for an effortless full modal decomposition. This is a direct and easily-accessible technique for the characterization of OAM.

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