QUANTITATIVE IMAGING OF VECTORIAL LIGHT BEAMS BY VECTORIAL PTYCHOGRAPHY

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Vectorial beams involve complicated spatial distributions of intensity, phase an state of polarization. One can cite orbital angular momentum (AOM) beams that the ability to generate novel light-matter interactions opens new exciting perspectives in non-linear and quantum optics. Although such beams are relatively easy to be made in the laboratory, their complete characterization remains challenging.

Here we propose to extend vectorial ptychography, a recently developed reference-free quantitative imaging method [1,2], to the full characterization of arbitrary polarized field distributions. We succeed in mapping at a microscopic resolution the phase, amplitude and state of polarization of various kind of arbitrary beams, including vortices, AOM beams (Fig. 1), as well as speckle fields [3].

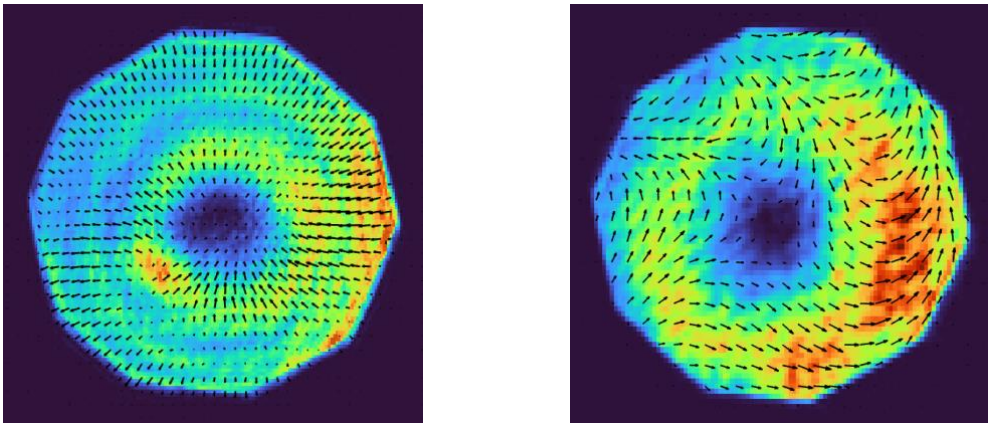

Figure 1. Reconstructed experimental vector light fields. Left: A radially-polarized beam. Right: Circularly-polarized OAM beam. Beam diameter is approximately 500 µm.

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