Extreme ultraviolet vortex, and vector-vortex beams

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The generation of light beams carrying topological singularities has received increasing attention in the recent past due to their numerous prospective applications[1]. Such beams exhibit a transverse spiral phase with exp(*il*Ø) dependence: the so-called topological charge *l* is the number of 2π phase shifts along the azimuthal coordinate Ø of the beam [2]. Moreover, high harmonic generation (HHG) in rare gases has proven to be a convenient way to synthesize extreme-ultraviolet (EUV) vortices of low and high topological charges [3, 4], and EUV vector beams exhibiting radial and azimuthal polarization states [5].

In this work, we will present an experimental intensity and phase characterization of the infrared vortex driver as well as the resulting upconverted high-charge EUV vortex until *l* = 100 obtained through HHG in an extended 15 mm long Argon filled gas cell. Furthermore, we will present our recent results on the generation and characterization of EUV vector beams, and vector-vortex beam bearing a non-uniform polarization state in addition to the helical wavefront.

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