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Diffraction from polarisation filtering axicons

Non-diffracting optical fields have exhibited numerous interesting properties, including self healing and radial acceleration, in addition to their propagation invariant intensities. Naturally, these properties have proven desirable in applications such as optical trapping, communication and metrology. One class of these fields is the set of Bessel-Gaussian modes which can be generated through the interference of conical waves from an axicon lens. Vectorial realisations of such fields have led to the observation of further interesting properties such as periodic acceleration and deceleration of local Stokes vectors. We investigate how the diffraction of orthogonal polarisation components across cylindrically asymmetric axicons recovers conical interference behaviour along the line of asymmetry. Total intensity sections as well as orthogonal polarization projections along lines of interest present proportionality to squared Bessel functions while orthogonal lines reveal no such structures. Total intensities maintain qualitative resemblance to parabolic non-diffracting beams, while the introduction of azimuthally varying phases associated with orbital angular momentum perturb the distributions. The results provide new insights into the nature of propagation invariant optical fields.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

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