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Generation of a Hybrid Mode Vector Beam

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Vector beams have inhomogeneous polarisation distributions that introduce a new degree of freedom that can be used to structure light. Pure vector beams have spatial and polarisation components that are non-separable affording them various interesting properties. Common examples include cylindrical vector vortex modes, Poincaré beams and vector beams on the Higher Order Poincaré Sphere. These beams are created using orthogonal modes from the same mode set, on two orthogonal polarisation bases. Vector modes have been studied in atmospheric turbulence and have displayed no specific advantage over scalar modes. Interestingly, it has recently been shown that different modal bases experience turbulence differently- can we use this to improve the robustness of a vector mode in turbulence by creating a "hybrid mode vector beam" that makes use of orthogonal component modes from the Hermite-Gaussian and Laguerre-Gaussian bases? Here we present an analysis of experimentally generated hybrid mode vector beams by determining the state of polarisation through Stokes' polarimetry and by calculating the vector quality factor.

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

Yes

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

MSc

Primary author: Ms DROZDOV, Alice Vadimovna (University of the Witwatersrand)

Co-authors: Dr COX, Mitchell A. (University of the Witwatersrand); Mr SINGH, Keshaan (University of the Witwatersrand); Prof. FORBES, Andrew (University of the Witwatersrand)

Presenter: Ms DROZDOV, Alice Vadimovna (University of the Witwatersrand)

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