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Propagation of cylindrical vector beams through fibres

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Abstract content
   (Max 300 words)
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Light carrying orbital angular momentum (OAM) has been investigated for the past 20 years. The optical field of beams carrying OAM has been shown to be quantized; defining an infinite dimensional Hilbert space. As such there is an infinite amount of information that can be encoded onto such beams. We demonstrate techniques to generate OAM carrying beams using spatial light modulators (SLMs), where the phase and amplitude are modulated. We also make use of an SLM to detect the amount of OAM present in a beam by spatial correlation filtering, also known as mode decomposition. Lastly, we investigated the effect of propagating these OAM modes through an optical fibre. Fibres have the advantage of being efficient for long distance communication and are not susceptible to atmospheric turbulence, which impedes the propagation of OAM beams. Optical Fibres possess intrinsic modes, known as the cylindrical vector (CV) modes. These modes display azimuthal symmetry in both field distribution and polarisation. We show that the polarisation and OAM density of the CV modes is preserved through the fibre and that the OAM and polarisation are non-separable before and after the fibre.

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Main supervisor (name and email)
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