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Communicating through turbulence using classical-entanglement

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The classical concurrence (i.e. non-separability) of vector beams has the intriguing property that it is invariant to general unitary transformations, most notably pure phase aberrations such as those induced by propagation through atmospheric turbulence. Free space communication using structured light aims to increase data transmission rates by encoding simultaneous signals in superpositions of spatial modes which carry independent data streams. The efficacy of these systems is severely affected by atmospheric turbulence due to the induced modal crosstalk. We propose a method of encoding information into a basis formed by the discretized concurrence of classical vector beams. We show how the discretization of the concurrence into n elements will result in the ability to encode $d = \ln(n)/\ln(2)$ simultaneous bit streams. We demonstrate the efficacy of the concept in a dynamic experiment. We believe this robust encoding scheme will be of value to the optical communication community.

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

Yes

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

PhD

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