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Protecting high-dimensional entanglement of twisted photons with adaptive optics

Spatial excitations of the electromagnetic field carrying orbital angular momentum (OAM), often called twisted photons, can be used to encode high dimensional quantum (entangled) states. These states are not only of fundamental interest, but also practically useful since they can enhance channel capacity and security in quantum communication. However, transmission across a turbulent atmosphere introduces random phase-fluctuations of the photon's wavefront that destroy the information encoded therein. In this talk we consider the propagation of OAM entangled qutrits and ququarts states and we show how phase front correction by methods of adaptive optics can significantly reduce crosstalk to OAM modes outside of the encoding subspace, and thereby improve high dimensional entanglement stability in atmospheric turbulence.