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## **Free-Space Communication with Spatial Modes of Light**

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### **Abstract**

Current communication systems make use of polarization and wavelength multiplexing to increase transmission rates. To offer a further improvement, Orbital Angular Momentum (OAM) modes (or Laguerre-Gaussian modes) provide an infinite dimensional space. In this work, Laguerre-Gaussian modes are multiplexed and de-multiplexed by means of two Spatial Light Modulators (SLMs), making use of both their azimuthal and radial degrees of freedom. Due to the orthogonality of these modes, a modal decomposition technique is employed to detect the transmitted modes. Here we demonstrate this concept by transmitting an image over a 150 meter free-space link. The free-space link is also characterized in terms of its optical turbulence.