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Tailoring light in the mid-IR

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Optical communication systems optimize multiplexing in polarization and wavelength both transmitted in fiber and free-space to attain high bandwidth data communication. We are expected to reach a bandwidth ceiling in the near future due to non-linear effects in fiber. Communications using orbital angular momentum (OAM) carrying modes offers infinite dimensional states, providing means to increase link capacity by multiplexing spatially-varying modes in both the azimuthal and radial degrees of freedom. OAM modes are multiplexed and de-multiplexed by the use of spatial light modulators. Implementation of complex amplitude modulation is employed on a laser beam's phase and amplitude to generate Laguerre-Gaussian modes. The modal decomposition technique is employed to detect these modes due to their orthogonality as they propagate in space. We demonstrate data transfer by sending images as a proof-of concept in a lab-based scheme. We demonstrate the creation and detection of OAM modes in the mid-IR region as a precursor to a mid-IR free-space communication link and attempt to improve data transmission in the atmosphere and show improved image resolution by reconstructing the wave front of mid-IR light.

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

Yes

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

Msc

Main supervisor (name and email) and his / her institution

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Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

Yes

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