

# Method and System for Telecommunications with Vectorial Optical Fields

**R**esearchers at the University of South Florida have developed two communication protocols that utilize vectorial optical fields as the information carrier.

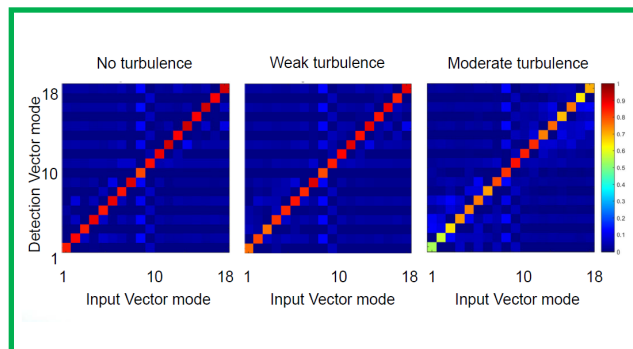
Many systems and methods are using phase differences in optical signals to encode data that can be subject to accurate decoding at a receiving end. Information carried by light may be characterized as either transmitting data in one dimensional space, two-dimensional space, or even higher dimensionality. As the dimensionality increases, the states of photons in the light are not orthogonal, requiring a balance between efficiency in encoding and the information density on an optical link transmission and accuracy in decoding. Hence, there is a need for the protocols to increase the photon efficiency and to carry the information through turbid media without data degradation.

Researchers at USF have developed a method for communicating optical data. This method utilizes vectorial optical fields as the information carrier. The information is directly encoded as different vectorial modes, and is decoded by using specific differential spatial phase decoders for high dimensional communication. For multiplexed operation, each channel uses one vectorial mode, and the information is sent through different modes simultaneously. These protocols are resistant to moderate atmospheric turbulence and can operate without the need for an adaptive optics module. This helps the system to be more efficient and reliable. The invention has applications in optical fiber communication.

### ADVANTAGES:

- Carries information through turbid media without data degradation
- Lower error
- Cheaper

### *Encoded Communication Protocols*



### *An Image of the Vector Beam with DSPS-Scheme*

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