

# SAIP2014



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## **Propagation of vortex modes through fibres**

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### **Abstract :**

Spatial light modes that carry orbital angular momentum (OAM) have become popular within a range of optical fields; optical tweezing, microscopy, atom manipulation and quantum entanglement. These OAM modes span an infinite dimensional Hilbert space, offering an increase in the information capacity per photon for quantum communication. This obvious advantage over the 2-dimensional polarisation states is countered by the poor propagation of OAM modes through turbulent media such as the atmosphere. We therefore seek an alternative mode of propagation in the form of optical fibres. Multimode fibres suffer from strong intermodal coupling, which typically destroy the fragile quantum correlations carried by the spatially entangled state. We use classical back-projection as an experimental tool to study the effect of fibre transport on OAM modes. We show that our fibre system has the potential to transport high-dimensional entangled states.

### **Award :**

Yes

### **Level :**

PhD

### **Supervisor :**

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### **Paper :**

No

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