

Stef Roux  
fsroux@csir.co.za,

## **The decay of orbital angular momentum entanglement in atmospheric turbulence**

Secure quantum communication is one of the promising new quantum information technologies. The orbital angular momentum (OAM) modes of light provide a higher dimensional space, which increases the amount of information that can potentially be encoded per photon. The challenge for OAM based quantum communication through the atmosphere is the fact that turbulence distorts the OAM modes. As a result the quantum entanglement of the photonic quantum states decay during propagation through the atmosphere. In this lecture we address the decay of OAM entanglement in atmospheric turbulence. We'll review some aspects of classical scintillation; discuss the current theories for the decay of OAM entanglement in atmospheric turbulence, which include the single phase screen approach and the infinitesimal propagation approach; describe how one can simulate this entanglement decay process numerically; and present results of experimentally measured decay of entanglement due to simulated turbulence.