Quantum Mechanics with Patterns of Light

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报告摘要：

Photons can be described in terms of their spatial modes – the “patterns” of light. As there are an infinite number of spatial modes, entanglement in this degree of freedom offers the opportunity to realise high-dimensional quantum states. In this talk I will review the recent progress in quantum entanglement of photons in their spatial degree of freedom. I will explain how to create high-dimensional quantum states in the laboratory, how to measure them, and what the present state of the art is in terms of applications. In particular, I will outline the advantages and disadvantages of using such entangled states as a means to encode information for secure quantum communication channels, and will consider the preservation of entanglement through noisy channels, e.g., a turbulent atmosphere. Finally, I will outline some ideas on mimicking quantum entanglement behaviour with classical light.

报告人简介：

Prof. Andrew Forbes received his PhD (1998) from the University of Natal (South Africa), and subsequently spent several years working as an applied laser physicist, first for the South African Atomic Energy Corporation and then later in a private laser company. In 2004 he joined the CSIR National Laser Centre where he was Chief Researcher and Research Group Leader of the Mathematical Optics group. In March 2015 Andrew joined the University of Witwatersrand (Wits Univ.) as a Distinguished Professor and has established a new laboratory for Structured Light. Andrew chairs or serves on the committees of several international conferences, OSA and SPIE committees, and serves on the editorial boards of Optics Express, J. Optics and PhotoniX. He is active in promoting photonics and popularizing science, a founding member of the Photonics Initiative of South Africa, a Fellow of both SPIE and the OSA, and an elected member of the Academy of Science of South Africa. He has published more than 300 scientific papers, several in Nature journals, and his work has made international news. In 2015 Andrew won a national award for his contribution to photonics in Africa. He spends his time having fun with the taxpayers’ money, exploring structured light in classical and quantum optics.