ICFO

INSIGHT SEMINAR: Quantum structured light takes shape

ANDREW FORBES

April 23, 2025
12:00 to 13:00
Elements Room

ABSTRACT:
Quantum structured light offers a roadmap to high-dimensional and multi-dimensional quantum states by exploiting all of light's many degrees of freedom at the quantum level. I this talk, I will review the recent progress in quantum entanglement of photons in their spatia degree of freedom: quantum structured light. I will explain how to create high-dimension l quantum states in the laboratory, how to measure them, and review the present state of t e art in the field. I will show how the patterns can be abstracted, mixing degrees of freedom to produce quantum topologies in light, introducing new paradigms for quantum st te observables and classification. Finally, I will outline the advantages and disadvantage of using such single photon and entangled states in real-world applications, offeri g a perspective on the present challenges and exciting opportunities in the fi

BIO:

Andrew has at various times in his career found himself as teacher, janitor, secretary, receptionist, web-master, systems engineer, sales rep, manager, director, and sometimes a scientist. Andrew is presently a Distinguished Professor within the School of Physics at the U Witwatersrand (South Africa) where leads a laboratory for Structured Light. Andrew is activ in promoting photonics in Africa, a founding member of the Photonics Initiative of Sout Africa and Director of South Africa's Quantum Technology Initiative. He is a Fellow of SPI , Optica, the South African Institute of Physics (SAIP), and an elected member of the Acade y of Science of South Africa. He holds an A-rating by the South African NRF, 4 honor ry professorships, is editor-in-chief of the IoP's Journal of Optics and sits on the editorial bo rd of five other international journals. Andrew has won several awards, including the N TF national award for his contributions to photonics in South Africa (2015), the Georg Fors er prize from the Alexander von Humboldt Foundation for outstanding contributions to photonics (2020), the SAIP Gold Medal (2020), the highest award for physics in South Afri a, making him the youngest winner to date, the Sang Soo Lee award (2022) from Optica and he Korean Optical Society and the TWAS Prize for Physics (2024). Andrew spends his ime having fun with the taxpayers' money, exploring structured light in lasers as well as class cal and quantum optics.

Hosted by: Prof. Dr. Juan P. Torres