

## SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING  
COLLEGE OF DESIGN AND ENGINEERING

Website: <https://cde.nus.edu.sg/ece>

**Area: Microwave & Radio Frequency**

**Host: Associate Professor Qiu Cheng Wei**

TOPIC	:	Tailoring Quantum Landscapes with Waves
SPEAKER	:	Professor Andrew Forbes University of the Witwatersrand, South Africa
DATE	:	Monday, 10 July 2023
TIME	:	10:00AM to 11:30AM
VENUE	:	Block E5, E5-02-32 College of Design and Engineering, NUS

### ABSTRACT

Structured wave is an exploding topic, giving rise to new applications from classical to quantum. The structuring can be done with single photons and entangled states for tailored photonic quantum landscapes, offering access to the infinite alphabet of patterns of light for high-dimension quantum information processing. 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. I will outline the progress in using such entangled states as a means to encode information for secure quantum communication and will consider the preservation of entanglement through noisy channels by tailored quantum wavefunctions.

### BIOGRAPHY



Andrew has at various times in his career found himself as teacher, janitor, secretary, receptionist, webmaster, 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 in 2015 he established a new laboratory for Structured Light. Andrew is active in promoting photonics in Africa, a founding member of the Photonics Initiative of South Africa and Director of the South African Quantum Roadmap. He is a Fellow of SPIE, the OSA, the SAIP, and an elected member of the Academy of Science of South Africa. He holds an A-rating by the South African NRF (the only photonics A-rated researcher in South Africa), 4 honorary professorships, is editor-in-chief of the *IoP Journal of Optics* and sits on the editorial board of four other international journals. Andrew has won several awards, including the NSTF national award (2015) for his contributions to photonics in South Africa, the Georg

Forster prize from the Alexander von Humboldt Foundation for outstanding contributions to photonics over a lifetime (2019), and the SAIP Gold Medal (2020), the highest award for physics in South Africa, making him the youngest winner to date. In 2021 he was awarded the Vice-Chancellors Research Award, the highest award for research from the university, and in 2022 the Sang Soo Lee award from the OSA and the Korean Optical Society. He has been announced as the 2024 TWAS prize for Physics winner for seminal contributions to structured light. Andrew spends his time having fun with the taxpayers'money, exploring structured light in lasers as well as classical and quantum optics.

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