

Title:

Silicon Quantum Photonics

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Abstract:

Quantum information technologies offer a new and powerful ways to processing and communicating information. Of the various approaches to quantum technologies, photons are appealing for their low-noise properties and ease of manipulation at the single qubit level; while the challenge of entangling interactions between photons can be met via measurement induced non-linearities. Historically bulk optical elements on large optical tables have been the means by which to realise proof-of-principle demonstrators in quantum optics. More recently, integrated quantum photonics has enabled a step change by utilising state-of-the-art photonic engineering approaches to deliver complex and compact quantum circuits. In this talk, I will specifically focus on recent developments of a silicon integrated quantum technology platform, where quantum states of light are generated and manipulated in ultra-compact silicon waveguide circuits, and where integration of the required components (sources, detectors, filters, switches, delay lines) are being realised in increasingly sophisticated circuits containing 100's of photonic elements. Highlights include chip-to-chip quantum communications, programmable quantum circuits, quantum simulations, 16-dimensional entanglement and routes to scalable quantum information processing.

Biography:

Mark Thompson is Professor of Quantum Photonics at the University of Bristol, UK. He obtained his Master in Physics and PhD in Electrical Engineering from the Universities of Sheffield UK and Cambridge UK respectively. Prior to joining Bristol he worked for Corning Cables UK, Bookham Technology UK (world's first silicon photonics company), Toshiba Corporate R&D Japan, and was Research Fellow at the University of Cambridge UK. He holds prestigious research fellowships from EPSRC UK and European Research Council award, he established the Bristol Centre for Doctoral Training in Quantum Engineering, the Bristol Quantum Technology Enterprise Centre and was lead on the UK Quantum Communications Technology Hub. He is founder of a number of start-up companies. At Bristol he leads the development of advanced integrated quantum photonic technologies for applications in quantum communications and computation.