



# Optics for the Cloud

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## Photons in the cloud: communicating and storing data

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4.00 - 5.30 pm, followed by refreshments

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Photons underpin our lives, from our ability to see through to our communication systems. While computers are built around electronics, long-haul communications are built around light. Photonic integrated circuits (PICs) are the optoelectronic equivalent of the silicon chips that have revolutionised society over the last 70 years. PIC devices such as lasers, modulators, waveguides and detectors are widely used in communications, sensing, healthcare and quantum technology. Optical communications represents almost 60% of this market, with PICs currently deployed mainly in the long-haul network. However, because of society's ever-increasing demands for data, they are migrating rapidly into the office and home.

PICs are also key to the next generation of magnetic disk drive technology for use in the cloud. Currently, no other storage technology can meet the cost/performance criteria, but new approaches are needed to increase the storage density. Heat-assisted magnetic recording (HAMR) involves local heating of magnetic media, so data can be written at densities above 1 Tbit/in<sup>2</sup>. By integrating lasers, waveguides and plasmonic antennas, PICs focus enough energy on the disk to raise the local temperature to up to 500 °C within 1 ns. The market for HAMR is expected to be billions of units per annum, a truly exciting volume application for PIC technology.

*John Marsh studied Engineering and Electrical Sciences at Cambridge before pursuing a PhD in compound semiconductors at the University of Sheffield. He moved to the School of Engineering at Glasgow in 1986 where he was appointed Professor in 1996. He is a Fellow of the Royal Academy of Engineering, Royal Society of Edinburgh and IEEE.*

