

The Photonics Institute

## Light, Energy and the Internet

By

**Prof David A. B. Miller**

*Ginzton Laboratory, Stanford University*

Date: 12 November 2015 (Thursday)  
Time: 11.00 - 12.00  
Venue: Hilbert Space (SPMS-PAP-02-02)  
Host: Prof N. Zheludev

### **Abstract**

Optics now carries nearly all our information over nearly all the distance it travels. The exponential growth of data on the Internet relies on optical fiber and photonic technology. But handling that data requires power, in environmentally significant amounts, with most of the energy dissipated for communicating inside machines and data centers. Without significant and continued reductions in the energy required for processing and communicating each bit of information, growth of the internet cannot be sustained. The physics of optics and optoelectronics uniquely promise the possibility of lower energies for information communications and processing, including connections at the ever higher densities needed inside machines. The necessary technology is, however, challenging, and continued progress will require new nanophotonic and nano-optoelectronic concepts in highly integrated systems. The talk will discuss requirements and prospects for such new science and technology to sustain society's insatiable demand for data.



### **Short Biography**

David Miller is the W. M. Keck Professor of Electrical Engineering and Professor by Courtesy of Applied Physics at Stanford University. He was with Bell Laboratories from 1981 to 1996, as a department head from 1987. His interests include nanophotonics, quantum-well optoelectronics, and optics in information sensing, interconnects, and processing. He has published over 260 scientific papers, holds over 70 patents, is the author of the textbook *Quantum Mechanics for Scientists and Engineers* (Cambridge, 2008), and has taught open online quantum mechanics classes to over 10,000 students. He was President of the IEEE LEOS (now Photonics Society) in 1995, and has served on Boards for various societies, companies, and university and government bodies. He was awarded the OSA Adolph Lomb Medal and the R. W. Wood Prize, the ICO International Prize in Optics, the IEEE Third Millennium Medal, and the 2013 Carnegie Millennium Professorship. He is also a Fellow of APS, OSA, IEEE, the Electromagnetics Academy, the Royal Society of London and the Royal Society of Edinburgh, holds two Honorary Doctorates, and is a Member of the US National Academies of Sciences and of Engineering

<http://www-ee.stanford.edu/~dabm/>

**SCHOOL OF PHYSICAL AND MATHEMATICAL SCIENCES**

DIVISION OF PHYSICS AND APPLIED PHYSICS

SPMS-PAP-02-01, 21 NANYANG LINK, SINGAPORE 637371

Tel: (65) 6316 2962 Fax: (65) 6795 7981



CENTRE FOR DISRUPTIVE PHOTONIC TECHNOLOGIES  
Nanyang Technological University, Singapore  
[www.nanophotonics.sg](http://www.nanophotonics.sg)