Columbia University Optics and Quantum Electronics Seminar

"CMOS Integrated Silicon Nanophotonics for Exascale Computing"

Dr. William M. J. Green

Date/Time: Thursday, October 11th, 11.15AM – 12PM

Location: Davis Auditorium

Abstract: By the end of this decade, Exaflop-scale (10^{18} floating point operations per second) high-performance computing (HPC) systems are anticipated to become a reality. In comparison with today's Petaflop supercomputers, scaling system performance by two to three orders of magnitude will not only require tremendous increases in communication bandwidth and interconnect density, but will also demand significantly reduced power consumption per communicated bit. To enable next-generation HPC systems, hundreds of millions of optical links will be employed at all length scales within the system architecture, for interconnection of racks, modules, and individual chips. This talk will review the development of IBM CMOS integrated silicon nanophotonic technology, which accomplishes monolithic integration of deeply-scaled optical circuits into thefront-end of a standard CMOS process, and opens an avenue towards low-cost, low-power, massively pharallel optical transceivers for Exascale systems.

Bio: **William M. J. Green** is a Research Staff Member with the IBM Thomas J. Watson Research Center, located in Yorktown Heights, NY. He received the Ph.D. degree in Electrical Engineering from the California Institute of Technology in 2005, and the B.Sc. degree in Engineering Physics from the University of Alberta (Canada) in 1999. Dr. Green is a member of the IEEE Photonics Society and the Optical Society of America.

Since joining IBM, his research has been directed toward the development of low-power, high-density CMOS-integrated silicon nanophotonic transceivers, which have been identified as a key interconnect technology for enabling future Exascale high-performance computing platforms. Dr. Green also leads a program leveraging IBM's advanced integrated optics capabilities, along with highly efficient nonlinear optical processes in silicon waveguides, to extend the silicon nanophotonics platform to mid-infrared spectrum applications including environmental spectroscopic monitoring, medical diagnostics, and free-space communication.

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