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Thursday, January 4, 2018
1:30 PM
Computer Studies Building, Room 426

High Performance Electronic-Photonic Integrated Circuits for Optical Interconnects Applications

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Silicon photonics promise low cost and high volume production of highly integrated electronic-photonic systems by taking advantage of the well characterized and maintained complementary metal-oxide semiconductor (CMOS) manufacturing infrastructures in the microelectronic industry. It is considered as a promising solution to meet the future demand for high speed optical interconnect which continue replacing its electrical counterpart. High performance silicon photonic devices fabricated on standard CMOS or CMOS compatible processes have been studied intensively. The convergence of photonics and electronics into a single platform catalyzes the development of electronic-photonic integrate circuits (EPIC). Complete electro-optical systems including both the electronic and photonic circuits have been demonstrated through either monolithic or multi-chip integration with good performance. However, challenges still remain in photonic device performance and electronic-photonic system co-design and integration. First of all, silicon does not have a strong electro-optical effect. It is challenging to make a modulator that can operate at high speed and at the same time has large modulationi1(u)6((al)0.(o)5.9()0.o(p)(i1(u)6((ac)0.9i7a1)1.
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