

Efficient Plasmonic Circuits for Data Communications



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LECTURE ABSTRACT

In this talk we plan to discuss a novel class of nanoscale devices that address unmet performance demands for applications in data communications. The performance of emerging generations of high-speed, integrated electronic circuits is increasingly dictated by interconnect density and latency as well as by power consumption. To alleviate these limitations, data communications using photons has been deployed, where photonic circuits and devices are integrated on platforms compatible with conventional electronic technologies. Within the dominant platform; namely Si, dielectric waveguides confine light via total internal reflection. This imposes bounds on minimizing device dimensions and density of integration. Those bounds arise due to the diffraction limit and the cross-coupling between neighboring waveguides. Nanoscale Plasmonic waveguides provide the unique ability to confine light within a few 10s of nanometers and allow for near perfect transmission through sharp bends as well as efficient light distribution between orthogonally intersecting junctions. With these structures as a building block, new levels of optoelectronic integration and performance metrics for athermal transceivers with achievable bandwidths of 100s Gbps and detection sensitivity better than -55 dBs, will be overviewed in this talk. In addition, opportunities for the role that 2D materials may play in propelling these record performance metrics even further will be projected.

SPEAKER BIOSKETCH

Amr S. Helmy is a Professor in the department of electrical and computer engineering at the University of Toronto. Prior to his academic career, Amr held a position at Agilent Technologies - UK, between 2000 and 2004. At Agilent his responsibilities included developing lasers and monolithically integrated optoelectronic circuits. He received his Ph.D. and M.Sc. from the University of Glasgow with a focus on photonic fabrication technologies, in 1999 and 1994 respectively. He received his B.Sc. from Cairo University in 1993, in electronics and telecommunications engineering science.

His research interests include photonic device physics and characterization techniques, with emphasis on plasmonics, nonlinear and quantum photonics.

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