



**THE CHINESE UNIVERSITY OF HONG KONG**  
**Department of Electronic Engineering**

**SEMINAR**

Multimode silicon photonics

By

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Time: 10:30 a.m.

Venue: Rm 513 William M.W. Mong Engineering Building, CUHK

Abstract:

In recent years, multimode silicon photonics beyond the single-mode regime is becoming extremely attractive because the introduction of multimode photonic waveguides brings tremendous opportunities for the development of photonic chips. In this talk, I will give a review for recent progress of multimode silicon photonics and the applications, particularly including two parts. One part is the realization of monomode light propagation in multimode photonic waveguides for ultralow-loss and low-phase-error on-chip light propagation, which provides the physical foundation for enabling significant performance improvement of various representative photonic devices, such as low-loss optical delay lines, high- $Q$  optical resonators, low-crosstalk arrayed-waveguide gratings, calibration-free Mach-Zehnder interferometer switches, and calibration-free high-order microring resonator filters. The other part is to develop some novel higher-order-mode-assisted photonic devices (which are hardly realized without higher-order modes), including circulator-free photonic filters based on multimode waveguide grating as well as polarization-handling devices with the assistance of the  $TE_0$ - $TE_1$  mode conversion. Finally, I will give an outlook for the challenges and opportunities for the future development of multimode silicon photonics.

Biography



Prof. Daoxin Dai received the B. Eng. degree from the Department of Optical Engineering of Zhejiang University in 2000 and the Ph. D. degree from the Royal Institute of Technology (KTH), Sweden, in 2005. He joined Zhejiang University as an assistant professor in 2005, became an associate professor in 2007 and a full professor in 2011. He worked at the University of California, Santa Barbara as a visiting scholar in 2008–2011. Currently, he is the Qiushi Distinguished Professor and the Dean of the College of Optical Science and Engineering at Zhejiang University.

At Zhejiang University, he is leading the Silicon Integrated Nanophotonics Group. He has developed multimode silicon photonics and silicon-plus photonics for enabling high-performance silicon photonic devices and large-scale photonic integrated circuits, including ultralow-loss silicon photonic waveguide delay lines, ultrahigh- $Q$  silicon photonic resonators, ultralow-crosstalk arrayed-waveguide gratings, FSR-free multimode waveguide grating filters, calibration-free photonic switches,  $2 \times 2$  FP cavity optical modulators, record-high gain-bandwidth-product Ge/Si avalanche photodiodes, digitally tunable dispersion controllers, etc. His research has led to >300 international journal papers in *Science*, *Nature*, *Nature Photonics*, *Nature Communications*, *Light: Science & Applications*, *Optica*, *Laser & Photonics Reviews*, etc.

Prof. Dai is one of the most cited Chinese researchers (Elsevier) and has given >100 plenary/keynote/tutorial/invited talks at prestigious international conferences. He is the Chair of Optical Society of Zhejiang Province and has served as a general co-chair of ACP 2022, OECC 2023, etc. He is an awardee of National Science Fund for Distinguished Young Scholars (2017), Wang Daheng Award of Optics (2020), the first-class Natural Science Award of Zhejiang Province (2020), and the first-class Award of Optics of Chinese Optical Society (2020). He has been elected an Optica (formerly OSA) Fellow in 2021.

ALL ARE WELCOME

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