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Introduction to Integrated Photonics and Silicon Photonics

Tuesday, 5 September 2023 09:00 (1h 40m)

Abstract:

Photonics is defined as the field of science and engineering that involves the precise manipulation of light, and particularly at a microscopic level (i.e. the scale of the wavelength of light). One of the key technologies that enable this field is the use of Photonic Integrated Circuits, i.e. chips which make it possible to generate, guide, distribute, diffract, filter, modulate and detect light. By using chip technology, integrated photonics enjoys the same benefits of integrated electronics: smaller form factor, lower energy consumption, better stability, and potentially lower cost and large-volume manufacturing.

In this lecture, we will cover the basics of photonic integrated circuits, the basic operational principles, the various functions we want to perform and the different technological implementations. We will also explore the different applications for photonic chips.

We will then dive deeper into one particular technology platform for photonic circuits: silicon photonics. Silicon photonics builds on the materials and manufacturing infrastructure for CMOS electronics, and even though silicon is not the most ideal material for most optical functions, it has become a key driver for the use of photonic circuit, especially powering the growing communication networks in datacenters.

Lecturer: Wim Bogaerts is a professor in the Photonics Research Group at Ghent University and the IMEC nanotechnology research center in Belgium. He completed his PhD in 2004, pioneering the use of industrial CMOS fabrication tools to build photonic circuits. Between 2000 and 2010, he was the driver behind the buildup of IMEC's silicon photonics technology. In parallel, he started developing design automation tools to implement complex silicon photonic circuits. In 2014, he co-founded Luceda Photonics, bringing the design tool IPKISS to the market. Since 2016 he is back full-time at Ghent University and IMEC on research grant of the European Research Council, focuses on the challenges for large-scale photonic circuits and the new field of programmable photonics. He is an IEEE Fellow, and senior member of OSA and SPIE (Text informed by the Lecturer).

To be noticed: The school attendants will have the possibility to deepen their knowledge on this topic thanks to the Hands-on-Laboratory related to this lecture and developed by Prof. Wim Bogaerts (see the INFIERI2023-Labs Booklett)

Presenter: Prof. BOGAERTS, Wim (Gent University and IMEC (BE))

Session Classification: Introduction to the Photonics World