



University of Pavia

**Ph.D. School of Electrical and Electronics Engineering and Computer Science
Ph.D. School in Microelectronics**

SEMINAR

Silicon photonics technologies for future optical network systems

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University of Southampton

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Aula Seminari ex Dept. Of Electronics (floor D)

Over the last decade, Silicon Photonics has established itself as a mature technology for the realization of low cost, scalable, optical integrated circuits that can meet the requirements of future optical networks. Silicon photonics circuits are now widely employed for the development of electro-optical components that can meet the requirements of the forthcoming new digital era. Communication traffic grows relentlessly in today's networks, and with ever more machines connected to the network, this trend is set to continue for the foreseeable future. It is widely accepted that increasingly faster communications are required at the point of the end users, and consequently optical transmission plays a progressively greater role even in short- and medium-reach networks.

The optical modulator, accompanied by its RF driver, is one of the key component of the future optical circuits. In this seminar I will illustrate the latest advances on the development of high-speed (>40 Gb/s), integrated silicon optical modulator, and its RF driver, that is currently carried out at the Optoelectronics Research Centre. Advanced modulation format (PAM-n and DMT) are also used to operate such devices, dramatically increasing the spectral efficiency of the transmission system and, at the same time, reducing the electrical bandwidth requirements of the RF drivers.

All optical signal processing is also a key requirement for the future optical settings. Nonlinear silicon photonics can be explored in order to provide a low cost, low power, efficient nonlinear platform. Unfortunately, Two Photon Absorption and linear loss, usually degrade the overall nonlinear efficiency of Si-based devices making them unsuitable for real applications. At the ORC we are developing a novel Si-Silicon nitride based platform that can provide very high nonlinear response with no sign of TPA within the telecom window, allowing to produce large nonlinear phase shift, at room temperature, with a single passive device. Latest results on this topic will be also shown to the audience.

Bio: Cosimo graduated with honours in Electronic Engineering at the University of Pavia in 2011. He then joined the Quantum Electronics research group at the University of Pavia, as PhD student, working on nonlinear optical properties of compact, integrated waveguides, mainly made by using the silicon photonics platform. He obtained his PhD in Optoelectronics and Electronic Engineering in 2014. He continued working at the Quantum Electronics Laboratory as Postdoc researcher. He is currently a Research Associate at the Optoelectronics Research Centre, Silicon Photonics research group. He is working on the development of Silicon optical modulator for advanced modulation format and on nonlinear silicon photonic devices for all optical signal processing.

Organizer

Prof. Ilaria Cristiani

Ph.D. Coordinators

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