Paderborn Photonics Lecture

12.06.2019
P8.4.09
15:15

Silicon Photonic Devices for Communications and Computing

Prof. Dr. Kambiz Jamshidi
Technische Universität Dresden

Abstract:
Electronic-photonic ICs could provide the advantages of both electronic and photonic world. However, CMOS compatible photonic devices, needs to be precisely modeled to clarify their advantages and disadvantages in different contexts. Although photonic devices can provide high bitrates for communications, they usually suffer from low energy-efficiency or high insertion loss. These are critical factors, which hinder the exploitation of these devices for short-range applications, like inter-chip or onboard interconnects. In the first part of the talk, modelling of a single device, i.e., an optical modulator, which is the bottleneck for the energy efficiency of an optical link, will be presented. The trade-offs between the bandwidth, energy efficiency and loss of the modulator, will be discussed and a scenario to improve the energy efficiency using corrugated waveguides will be presented [1]. In the second part of the talk, numerical modelling of an active nonlinear ring resonator will be presented. The scenarios for the implementation of an oscillator and possibilities to realize a heuristic computing algorithm using this device will be discussed [2].

[1] S. Hosseini, L. Mirzoyan, K. Jamshidi, „Energy Consumption Enhancement of Reverse Biased Silicon-Based Mach-Zehnder Modulators Using Corrugated Slow Light Waveguides,“ in IEEE Photonics Journal, Vol. 10, No. 1, Feb. 2018.
[2] R. Hamerly, D. Gray, C. Rogers, K. Jamshidi, “Conditions for Parametric and Free-Carrier Oscillation in Silicon Ring Cavities,” in IEEE Journal of Lightwave Technology, Vol. 36, No. 19, pp. 4671-4677, 2018.

CeOPP
Center for Optoelectronics and Photonics Paderborn

TRR 142
Tailored Nonlinear Photonics