



SEMINARIO

AULA SAVAGNONE – VENERDI' 09/10/2015 – ore 12:00

Novel integrated devices based on nonlinear frequency generation

ABSTRACT While the demand for bandwidth is still increasing, electronics is now approaching many fundamental limitations in speed. Very likely the next generation of processors will implement optical methods to transport the signal to different part of the chip. Hence photonics materials and optical integration strategies will have to meet the current CMOS technology and platform. Ultimately a number of optical functionalities will have to be realized in an all-optical way. In particular, future time-domain multiplexed optical networks will exploit stable pulsed sources exceeding hundreds GHz repetition rates, possibly based on passive mode locked lasers. We recently demonstrated that it is possible to obtain stable, high repetition mode-locked soliton emission, by using a nonlinear high-finesse filter, thus exploiting a novel interaction mechanism that we named Filter-Driven Four Wave Mixing (FD-FWM) and which extends the DFWM operating mechanism through the use of a highly nonlinear integrated micro-ring resonators. The same mechanism can be used for other interesting applications, including the possibility of realizing integrated multiplexed sources of heralded photons on a chip.

Roberto Morandotti received a MSc in Physics from the University of Genova in 1993 and a PhD in Electronic Engineering at the University of Glasgow (Scotland) in 1999, where his research activity focused on the study of the linear and nonlinear properties of optical discrete systems. In June 2003 he joined *INRS-EMT (University of Quebec)* in Montreal, where he is a Full Professor since 2008. His research interests mainly deal with the linear and nonlinear properties of periodic structures, both in III-V semiconductors and silica, as well as with optics at unusual wavelengths, including THz. Prof. Morandotti is author and coauthor of more than 600 papers in scientific journals and conferences, and gave over 100 invited and keynote talks in various international conferences. He is currently serving as a subcommittee chair/technical committee member for several OSA, LEOS and SPIE meetings. He is an E.W.R. Steacie Memorial Fellow 2011, a Fellow of the Royal Society of Canada, a Fellow of the American Physical Society, a Fellow of the Optical Society of America, a Fellow of the SPIE, and a Fellow of the Institute of Physics, among others.