Russell Berrie Nanotechnology Institute
Technion - Israel Institute of Technology

Prof. Jérôme Faist

Institute for Quantum Electronics,
ETH Zurich

"Quantum cascade lasers and frequency combs: towards chip-based optical chemical sensors"

*****Tuesday,**
13 June, 2017

12:30 refreshments
13:00 lecture

Wang Auditorium
The Dalia Maydan Building
Faculty of Materials Science and Engineering

RBNI Monthly Seminar Series 2017

TECHNION
Israel Institute
of Technology

Title:

Quantum cascade lasers and frequency combs: towards chip-based optical chemical sensors

Jérôme Faist

The mid-infrared and terahertz spectral range is key to many applications for sensing and imaging, as many molecules have their fundamental vibration modes in that frequency region. Using traditional multipass cells and single frequency quantum cascade lasers, detection of light molecules with sup-ppb sensitivity and isotopic selectivity has been achieved.
There is a strong interest in extending these results to multiple gases and to miniaturized, portable systems. Towards this goal, the recent demonstration of comb operation in quantum cascade lasers opens up new avenues for broadband spectroscopy. We recently demonstrated a comb device delivering 1 watt of optical power over a bandwidth of more than 100cm^{-1} at 8um wavelength. These devices were achieved by a engineering the waveguide dispersion using plasmonic resonances. We also discuss the prospects of performing self-referencing after achieving an octave-spanning gain in the Terahertz.

Bio:

Jérôme Faist was born in Switzerland and obtained his Ph.D. in Physics in 1989 from the Swiss Institute of Technology in Lausanne. He then worked successively at IBM Rueschlikon (89-91) and Bell Laboratories (91-97). He was nominated full professor in the physics institute of the University of Neuchâtel (1997) and then full professor in the ETH Zurich (2007).
His key contribution to the development of the quantum cascade laser was recognized by a number of awards that include the IEEE/LEOS William Streifer Award for Scientific Achievement and National Swiss Latsis Prize 2002. His present interests include the development of mid-infrared and terahertz quantum cascade lasers and frequency combs and the physics of strong light-matter coupling in metallic resonators.