Quantum cascade laser combs for spectroscopy and sensing

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Date: 30 April 2020, Thursday
Time: 4:00 PM
Venue: Remote via Zoom Join (Meeting ID: 878 1221 7238, Password: 028687)
https://us02web.zoom.us/j/87812217238?pwd=bTZlmtBT2pwWnA4ZnlSSU1WYjhNQT09
Host: Associate Professor David Wilkowski
Associate Professor Ranjan Singh

Abstract

The quantum cascade laser has recently been shown to operate as an optical frequency comb in both the mid-infrared and terahertz frequency range. We recently demonstrated a comb device delivering 1 watt of optical power over a bandwidth of more than 100 cm⁻¹ at 8μm wavelength. New experiments – in part from our group – have recently shed new light on the state and origin of this comb state.

Recent work has also shown applications of these devices for dual-comb spectroscopy, demonstrating on one hand very fast acquisition for real-time study of chemical reactions but also on the other hand very high resolution (<30MHz) gas spectroscopy over a wide (55cm⁻¹) frequency range in the mid-infrared.

Short Biography

Professor 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. 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 Terahertz metamaterial resonators.

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