Centre de Nanosciences et de Nanotechnologies

Habilitation à Diriger des Recherches

Wednesday, March 17th, 2021
15h30

Daniel LANZILLOTTI KIMURA

"Nanophononics in the GHz-THz range"

Link: https://us02web.zoom.us/j/84187143413

Jury members :
Prof. Alexander BALANDIN, University of California at Riverside, USA, rapporteur
Prof. Lukas NOVOTNY, Swiss Federal Institute of Technology in Zurich, Switzerland, rapporteur
Prof. Eli YABLONOVITCH, University of California at Berkeley, USA, rapporteur
Prof. Hatice ALTUG, Ecole Polytechnique Fédérale de Lausanne, Switzerland
Prof. Markus ASPELMEYER, Universität Wien, Austria
Prof. Vitalyi GUSEV, Université Le Mans, France
Prof. Odile STÉPHAN, Université Paris-Saclay, France

Abstract :

Acoustic-phonons are usually seen as a primary source of unwanted effects in optoelectronics and quantum technologies based on solid-state platforms. This work presents a series of nanodevices and experimental optical techniques where acoustic-phonons constitute a central resource to unveil novel and exciting physical phenomena.

Acoustic waves at the nanoscale can be used as a simulation platform to evidence wave phenomena difficult or impossible to access in photonics and electronics, as a tool to control other solid-state excitations, and even as a new knob in the design of optoelectronic classical and quantum nanodevices. This work addresses, among other results, the implementation of effective potentials for acoustic nanowaves, the conception of phononic topological interface modes, and the demonstration of 3D opto-phononic resonators based on semiconductor micropillars and optical antennas. By bridging the gap with optomechanics, plasmonics, and quantum technologies, nanophononics has the potential to unlock new nanodevice engineering directions.

Daniel Lanzillotti Kimura obtained his Ph.D. in Physics in 2009 from both the Instituto Balseiro in Argentina and the Institute of Nanosciences in Paris. His field of research is nanophononics and nanomechanics. Between 2009 and 2015, he was a postdoctoral researcher in the Bariloche Atomic Center in Argentina, the University of California at Berkeley in USA, and the Laboratory for Photonics and Nanostructures in France. Since 2015, Daniel Lanzillotti-Kimura is a CNRS researcher at the Center for Nanosciences and Nanotechnology. In 2016 he was awarded an ERC Starting Grant

Figure caption: Optophononic micropillar able to confine near-infrared photons and GHz acoustic-phonons.

UMR9001 CNRS-UPSaclay
10 boulevard Thomas Gobert
91120 Palaiseau