## BENEMÉRITA UNIVERSIDAD AUTÓNOMA DE PUEBLA



INSTITUTO DE FÍSICA "Ing. Luis Rivera Terrazas"

SEMINARIO SEMANAL "Jesús Reyes Corona"



## "Metasurface system integration, from laser directional emission to 3D imaging"

## **Prof. Patrice Genevet**

Professor of physics Colorado School of Mines, CO, USA

Metasurfaces are artificial optical interfaces designed to control the phase, the amplitude, and the polarization of an optical wavefront. They use physical mechanisms that rely on the coherent scattering of light by nano-scatterers of various shapes and material compositions. After introducing our recent fundamental works on the poles and zeros of scattering parameters to design metasurfaces, I will present several on-chip integrations of metasurfaces, including lasers, LiDAR and detector arrays, and discuss how these innovative functionalities push the frontiers of optoelectronic systems beyond conventional devices.

I will briefly review our work on realization of directional light emission and collimation of VCSEL arrays and on the spin-controlled laser emission. I will then present new imaging capabilities provided by 3D LiDAR metasystem, emphasizing on the unprecedented performances achieved, in terms of frame rate, field of view and the simultaneous acquisition of multiple field of views.

Finally, i will present our results on 3D insect-inspired directional imaging devices. We show that mimicking the peripheral vision of insect using planar metalens arrays, we could measure simultaneously the light coming from several directions to reconstruct 3D images.

I will conclude this seminar by drawing perspectives and highlighting the opportunities that this field of research still has to offer, both from fundamental and application points of view.

Auditorio del Instituto Viernes 19 de enero de 2024 13:00 hrs