



UNIVERSITY of
DENVER
PHYSICS AND ASTRONOMY

September 20, 4:00 pm, Olin 105

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Metasurfaces, physics, and applications

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. In this seminar, i'll briefly introduce the physics of light scattering and the mechanisms used for metasurface design. I will then present several applications of metasurfaces, including lasers wavefront control, LiDAR and detector arrays.

First, I will review our work on realization of directional light emission and collimation of VCSEL arrays and in particular on the spin-controlled laser emission[1,2]. 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 fields of views[3]. Finally, i will present our latest 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 retrieve 3D images[4].

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 point of views.

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