

***Weldon School of Biomedical Engineering
Prospective Faculty Seminar***

**Thursday, December 16, 2021
11:30-12:20am**

Via Zoom: <https://purdue-edu.zoom.us/j/99783454365?pwd=QWlZeHFpeGIRN2J1SzVaamRCMEE3dz09>

Next-generation optical imaging methods for probing the brain and spinal cord



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Abstract Multiphoton fluorescence microscopy has allowed researchers to observe biological phenomena inside living organisms, with enough resolution and sensitivity to capture fine morphological details and dynamic processes. Biological tissues, however, distort the light used by such microscopes, compromising the image signal and resolution. Such distortions ultimately limit the imaging depth – and hold back our understanding of many biological processes that take place deep within living organisms. During her postdoc, Cristina has been developing advanced optical microscopy techniques for imaging biological tissues at depth. Through her fascination for optics, she has combined three-photon fluorescence microscopy, adaptive optics, and volumetric imaging using Bessel beams, to push the boundaries of imaging depth, resolution, and speed. In this seminar, Cristina will present how she has applied these novel optical technologies to investigate the central nervous system, including imaging of synaptic structures in deep cortical and subcortical areas of the living mouse brain, and neuronal structures and somatosensory-evoked neuronal activity in the mouse spinal cord at unprecedented depths in vivo. For her future research, Cristina will continue developing novel optical tools that will help advance our understanding of previously underexplored biology. Specifically, she will discuss her plans for investigating tactile processing in the spinal cord under healthy and pathological pain conditions.

Bio: Cristina began her journey in physics as an undergraduate student in Venezuela and continued during her PhD at The University of New Mexico, where her research focused on nonlinear optics for efficient frequency conversion and microscopic imaging. Driven by her passion for understanding the brain, Cristina joined as a postdoctoral scholar the group of Professor Na Ji, at the HHMI Janelia Research Campus and currently at the University of California, Berkeley. Here, she has worked building the next-generation of microscopes to understand how the brain works, pushing the boundaries on imaging depth, resolution, and speed. More recently, funded by the Career Awards at the Scientific Interface from the Burroughs Wellcome Fund, Cristina has been applying these optical technologies to push the limits of in vivo spinal cord imaging in mice, with the goal of advancing our understanding of somatosensory processing. For her future research, Cristina will keep pushing the development of novel optical imaging tools for interrogating the central nervous system.

~BME Host: Vitaliy Rayz~