

PHYSICAL CHEMISTRY SEMINAR



Prof. Dolores Bozovic

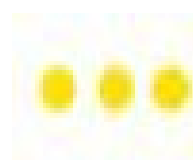
Department of Physics
University of California, Los Angeles

Monday, January 30, 2023

4:00 PM | YH 4222

Mani L. Bhaumik Collaboratory -
Dongwon Yoo Seminar & Conference Hall

Physics of the Auditory System



Abstract: Hair cells of the auditory system constitute a remarkable biological sensor that exhibits nanometer-scale sensitivity of mechanical detection. Our experiments explore the active nonlinear processes behind the detection of very weak signals. We demonstrate the presence of chaos in the innate motility of active bundles, and explore both theoretically and experimentally its role in enhancing the sensitivity of detection. We further show that these cells utilize weakly chaotic dynamics to combine sensitive response with high temporal resolution. The presence of chaos in individual hair bundles also aids in the synchronization between coupled hair cells, and gives rise to new dynamical states. Finally, we explore the neural mechanisms that reduce and control the responsiveness of the cell. Specifically, we show that the efferent neurons serve as a gain control system, which can strongly affect the very compliance of the mechanosensory cells.