PHYSICS COLLOQUIUM: Mechanobioengineering Epithelial Tissues for Disease Study

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University of California, Los Angeles

Date:
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Time:
10:30 AM - 11:50 AM

Location:
KOLLIG 217

About The Speaker:

Dr. Neil Lin is Assistant Professor in the Mechanical Aerospace Engineering Department at UCLA. He earned his Ph.D. degree in Physics from Cornell University in 2016 and conducted his postdoc training at Harvard University. As a postdoc, Dr. Lin was a recipient of NIH Ruth L. Kirschstein F-32 Fellowship (2018) and F. Hoffmann-La Roche Postdoc Fellowship (2016). Dr. Lin's recent awards include NIH NIGMS R35 MIRA, UC Hellman Fellowship, and Prostate Cancer Foundation Young Investigator Award. Dr. Lin's lab develops mechanical engineering approaches for generating biological tissues (e.g., stem cell-derived organoids and cancer tumoroids), that better recapitulate human responses for cutting-edge therapeutic developments.

Abstract:

Lab-grown biological tissues play a pivotal role in both basic research and translational applications, such as drug screening and organ transplant. Currently, most life science studies still largely rely on the use of traditional 2D culture (i.e., cells on plastic), which typically exhibits suboptimal cell behavior. In this talk, I will discuss how my lab utilizes mechanical engineering approaches to improve the quality and yield of tissue manufacturing. I will first discuss how deep learning can be employed for performing molecular-based noninvasive tissue phenotyping. In this experiment, we showed that AI image translation can accurately and reliably translate label-free phase contrast images of live cells in immunofluorescent-like images. In modeling cancerous and developing tissues, I will introduce a high-throughput flow culture platform for creating physiologically relevant samples at scale, in which we observed enhanced neuroepithelial development in brain organoids and improved metabolic phenotype in prostate cancer tumoroids. The combination of our tissue model and AI microscopy will lead to a powerful platform for therapeutic development.

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