

UCLA Department of Physics & Astronomy

COLLOQUIUM

Thursday, February 9 at 4 p.m.

1-434 PAB

Machine Learning Concepts for Inverse Design
in Soft and Living Matter

Andrea Liu
(University of Pennsylvania)



In order for artificial neural networks to learn a task, one must solve an inverse problem to find a network that produces the desired output. The method by which this problem is solved by computer scientists can be harnessed to solve inverse design problems in soft matter. I will discuss how we have used such ideas to design functional mechanical and flow networks, and to understand the process of dorsal closure during *Drosophila* development. I will also show how we can exploit physics to go beyond artificial neural networks by using local rules rather than global gradient descent approaches to learn in a distributed way without a processor.

Andrea Liu is a theoretical soft and living matter physicist who received her A. B. and Ph.D. degrees in physics at the University of California, Berkeley, and Cornell University, respectively. She was a faculty member in the Department of Chemistry and Biochemistry at UCLA for ten years before joining the Department of Physics and Astronomy at the University of Pennsylvania in 2004, where she is the Hepburn Professor of Physics. She is a fellow of the APS, AAAS and the American Academy of Arts and Sciences, and a member of the National Academy of Sciences. Liu has served as Speaker of the Council of the American Physical Society (APS) and Chair of the Physics Section of the American Association for the Advancement of Science (AAAS) and is currently a Councilor of the US National Academy of Sciences and the AAAS.

Refreshments at 3:30 p.m. on the PAB Patio. Undergraduates Welcome!