

# CSU PHYSICS COLLOQUIUM

**“Doing ‘Statistical Mechanics’ with Big Data”**

**Professor Andrea J. Liu**

**University of Pennsylvania**

Monday February 22nd at 4:00pm

Virtual via Zoom (see announcement for link)

## **Abstract**

Statistical mechanics has been the workhorse that condensed matter physicists have used to make the connection between microscopic properties and macroscopic, collective phenomena. Establishing this connection requires reducing masses of microscopic information (dimensional reduction) to a few relevant microscopic variables and their distributions. Data science methods are designed for dimensional reduction, so they are a natural tool to turn to when statistical mechanics fails. But it requires physics to identify the relevant microscopic quantities as well as the most appropriate data science methods to use to access them. I will discuss two problems where we have made progress with this approach: we have applied machine learning to glassy dynamics and persistent homology to the phenomenon of allostery.

## **Biography**

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 and the Director of the interdisciplinary Center for Soft and Living Matter. Liu is currently Past Speaker of the Council of the American Physical Society (APS) and Past Chair of the Physics Section of the American Association for the Advancement of Science (AAAS). 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.