THE CHINESE UNIVERSITY OF HONG KONG

Department of Physics

COLLOQUIUM

Transcending the Limits of Astrostatistics with Machine Learning Methods

by

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Date: May 3, 2024 (Friday)
Time: 4:00 - 5:00 p.m.
Place: L2, Science Centre, CUHK

(Light refreshments will be served at SCNB 1/F lobby from 3:30 to 3:50 p.m.)

ALL INTERESTED ARE WELCOME
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Abstract

Recent advancements in astronomical instrumentation have led to an unprecedented influx of data, revolutionizing the field of astronomy. However, the inherent complexity and multi-dimensionality of astronomical observations, ranging from intricate imaging of weak lensing, reionization, and protoplanetary disks to the comprehensive analysis of galaxy mergers across cosmic history, pose significant challenges to traditional astrostatistical methods. In this colloquium, I will discuss two distinct machine learning approaches aimed at tackling these complex astronomical systems. First, I will explore the Mathematics of Information, focusing on how machine learning can optimize information compression and extract higher-order moments in stochastic processes. Second, I will introduce a Generative Paradigm, demonstrating how generative models, such as normalizing flows and diffusion models, enable precise modeling of astronomical datasets, facilitating accurate inferences on intricate astronomical systems. By leveraging these cutting-edge machine learning techniques, we can transcend the limitations of conventional astrostatistics, furthering making inferences on complex astronomical systems.

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