



香港中文大學統計學系

Department of Statistics

THE CHINESE UNIVERSITY OF HONG KONG

# SEMINAR

DEPARTMENT OF STATISTICS  
THE CHINESE UNIVERSITY OF HONG KONG

## Towards more reliable tensor learning - heteroskedastic tensor clustering and uncertainty quantification for low-rank tensors

### INVITED SPEAKER

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Department of Statistics

University of Illinois Urbana-Champaign.

### TIME

January 14th, 2025 (Tue) · 2:30 pm - 3:30 pm

### VENUE

LSB LT1 (1/F) · Lady Shaw Building LT1 · CUHK

### ABSTRACT

Tensor data, which exhibits more sophisticated structure than matrix data and brings unique statistical and computational challenges, has attracted a flurry of interest in modern statistics and data science. While tensor estimation has been extensively studied in recent literature, most existing methods rely heavily on idealistic assumptions (e.g., i.i.d. noise), which are often violated in real applications. In addition, uncertainty quantification for low-rank tensors, also known as statistical inference in this context, remains vastly underexplored.

In this talk, I will present our recent progress on tensor learning. The first part of the talk is concerned with heteroskedastic tensor clustering, which seeks to extract underlying cluster structures from tensor observations in the presence of heteroskedastic noise. A novel tensor clustering algorithm will be introduced to achieve exact clustering under an (almost) necessary signal-to-noise ratio condition for polynomial-time algorithms. The second part of the talk focuses on uncertainty quantification for tensor learning. Under a classical tensor PCA model, I will present a two-iteration alternating minimization procedure, and demonstrate that inference of principal components can be efficiently accomplished. These two developments represent the prolific interplay between statistics and computation in tensor learning.