



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

**Stability, Fluctuations, and Non-Chaos in
Gaussian Mixture NPMLEs**

By

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Abstract

This talk introduces the Gaussian mixture Non Parametric Likelihood Estimation (NPMLE) problem from first principles and explains why it is natural to view it as a random optimization problem. Recent results show that the NPMLE landscape is stable: approximate maximizers remain close to the truth in Hellinger and Kullback–Leibler loss, with guarantees that tolerate finite-time optimization error. The talk also discusses fluctuation results for the optimized likelihood, their consequences for differential entropy estimation, and a non-chaos result showing that small perturbations of the data do not produce macroscopically different fitted densities. The final part interprets these results through a statistical mechanics lens, connecting likelihood landscapes to ideas such as ground states, free energy, asymptotic essential uniqueness, superconcentration, and chaos. This perspective suggests a useful common language for robustness, fluctuations, and stability in non-parametric likelihood problems.

Date : 16 June 2026 (Tuesday)

Time : 3:00p.m. – 4:00p.m.

Venue : Room 1409 (Lift 25 & 26)

All are Welcome!