



Department of Mathematics

香港城市大學  
City University of Hong Kong

## DEPARTMENT OF MATHEMATICS

City University of Hong Kong

### A kernel method for the learning of Wasserstein geometric flows

by

**Dr. Jianyu Hu**

*Nanyang Technological University, Singapore*

**Date: 2 February 2026 (Monday)**

**Time: 3:00pm – 4:00pm**

**Venue: G5-315, Yeung Kin Man Academic Building**

#### ABSTRACT

In this talk, we address the inverse problem of simultaneously recovering free energy defined on the density manifold from discretized observations of the density flow, which generated by Wasserstein gradient or Hamiltonian flow. We formulate the problem as an optimization task that minimizes a loss function specifically designed to enforce the underlying variational structure of Wasserstein flows, ensuring consistency with the geometric properties of the density manifold. Our framework employs a kernel-based operator approach using the associated Reproducing Kernel Hilbert Space (RKHS), which provides a closed-form representation of the unknown components. Furthermore, a comprehensive error analysis is conducted, providing convergence rates under adaptive regularization parameters as the temporal and spatial discretization mesh sizes tend to zero. Finally, a stability analysis is presented to bridge the gap between discrete trajectory data and continuous-time flow dynamics for the Wasserstein Hamiltonian flow.

~ALL ARE WELCOME~

