For favour of Posting

THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

Probabilistic Latent Dynamics Networks: Uncertainty-Aware Modeling of Spatio-Temporal Systems

By

Miss Yonglin LIU

Abstract

In this work, we present Probabilistic Latent Dynamics Networks (PLDNs), a Bayesian extension of Latent Dynamics Networks (LDNets) for uncertainty-quantified prediction of spatio-temporal systems. PLDNs replace deterministic latent ODEs with neural stochastic differential equations (SDEs) and employ probabilistic reconstruction networks to capture both aleatoric and epistemic uncertainty. The architecture features calibrated uncertainty outputs that tightly correlate with approximation error, enabled by a novel loss function combining negative log-likelihood with uncertainty regularization. We detail efficient training strategies using automatic differentiation and minibatch techniques, and introduce rigorous uncertainty quantification metrics. Benchmarks on advection-diffusion and cardiac electrophysiology systems demonstrate a high error-uncertainty correlation while maintaining LDNet's parameter efficiency.

Date : 5 May 2026 (Tuesday)

Time : 11:00am

Venue : Room 2408 (near Lifts 17/18)

All are Welcome!