



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

Phase Retrieval with Adversarial Outliers

By

Prof. Song LI

School of Mathematical Sciences, Zhejiang University

Abstract

In this talk, we investigate the phase retrieval problem perturbed by dense bounded noise and adversarial sparse outliers that can change an adversarially chosen s -fraction of the measurement vector. The adversarial sparse outliers may depend on both the observation and measurements. We demonstrate that the nonlinear least absolute deviation based on amplitude measurements can tolerate adversarial outliers up to a fraction of $s_1 \approx 0.2043$, while the intensity-based model can tolerate a fraction of $s_2 \approx 0.1185$. Furthermore, we construct adaptive counterexamples to show that these thresholds are theoretically sharp. This implies that the amplitude-based model exhibits superior adversarial robustness in comparison with the intensity-based model, which was in alignment with experimental observations from optics and images. A crucial aspect of our analysis is the exploration of the exact distribution of a combination of two non-independent Gaussian random variables, leading to the presentation of novel probability density functions to derive the sharp thresholds.

Date : 08 August 2025 (Friday)

Time : 10:00a.m.-11:00a.m.

Venue : Room 1410 (Lift 25/26)

All are Welcome!