



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

## SEMINAR ON STATISTICS

# Approximate Message Passing algorithms for orthogonally invariant models

By

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### Abstract

Approximate Message Passing (AMP) algorithms have seen widespread use across a variety of applications. The Onsager corrections and state evolutions of these algorithms are closely tailored to the distribution of the input data, with the most common versions of AMP designed for matrices having i.i.d. entries. In this talk, I will describe an extended AMP algorithm that admits an exact state evolution characterization for a more general class of matrices which are orthogonally invariant in law, but which can have arbitrary spectral distribution. The forms of the Onsager corrections and state evolution are defined by the free cumulants of this spectral distribution. I will discuss applications of this algorithm to statistical Principal Components Analysis with a Bayesian prior, and to the analysis of spin glass models with orthogonally invariant couplings.

This is joint work with Xinyi Zhong, Tianhao Wang, and Yihong Wu.

**Date : 8 October 2021 (Friday)**

**Time : 10:00am**

**Zoom Meeting : <https://hkust.zoom.us/j/99036074373> (Passcode: 841388)**

*All are Welcome!*