



THE CHINESE UNIVERSITY OF HONG KONG
Department of Physics
SEMINAR

Listening to the Radio Symphony of Cosmic Magnetic Fields

by

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Date: November 21, 2023 (Tuesday)

Time: 4:30 - 5:15 p.m.

Place: Rm G25, Science Centre North Block, CUHK

ALL INTERESTED ARE WELCOME

Abstract

Magnetic fields are everywhere, permeating across all scales from interstellar space to cosmic voids. Yet their origins and evolution remain poorly understood. On galactic scales and beyond, Faraday rotation measure (RM) at radio wavelengths is commonly used to diagnose large-scale magnetic fields. The magnetic field length scales are often inferred from correlations in the observed RM. However, RM is a quantity derived from the polarised radiative transfer (PRT) equations under restrictive conditions. In this talk, I will assess the use of rotation measure fluctuation (RMF) analyses for magnetic field diagnostics in the framework of PRT. I will demonstrate how density fluctuations can affect the correlation length of magnetic fields inferred from the conventional RMF analyses. For complex astrophysical situations, a covariant PRT calculation is essential to properly track the radiative and transport processes, otherwise, the interpretations of magnetism in galaxy clusters and larger-scale structures would be ambiguous. Lastly, I will discuss the implications of our work on radio observations, particularly with the upcoming Square Kilometer Array (SKA).