

The 3rd KMI School Machine Learning in Particle and Astrophysics

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Breakout room #1: Seeing and measuring the invisible: cosmic magnetic fields

Tuesday 17 Nov 2020 at 14:20 (01h40')

Content :

The cosmic web is permeated by large-scale magnetic fields, which are generally weak but can still leave observable imprints in the radio sky. Therefore, Rotation Measure Fluctuation (RMF) analysis at radio wavelengths is commonly used to diagnose cosmic magnetism. It is argued that the length-scales on which magnetic fields vary in large-scale, diffuse astrophysical media can be inferred from correlations in the observed RM. In this poster, we assess the usage of RMF analyses for magnetic field diagnostics in the framework of polarised radiative transfer. We simulate various models of magnetic fields and electron densities to investigate how density fluctuations could affect the correlation length of magnetic fields inferred from the conventional RMF analyses. We caution against interpretations of RMF analyses when a characteristic density is ill-defined, e.g. in the cases of log-normal distributed and fractal-like density structures. Lastly we discuss the implications of our work on future radio observations and highlight how machine learning would be particularly useful when the Square Kilometre Array (SKA) is expected to be able to measure over ten million extragalactic RMs.

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