V117b Application of machine learning in Faraday tomography

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Faraday tomography is a novel technique that can provide tomographic information on magnetized astronomical objects, such as quasars, galaxies, or galaxy clusters. Faraday dispersion function (FDF), which contains this information, is calculated from the linear polarization data obtained through broadband polarimetry. However, to access the magnetic information from FDFs, we need to overcome two complexities. Firstly, the limited wavelength coverage of the observing instrument "blurs" the intrinsic FDF of the object. Additionally, an intrinsic FDF is also highly dependent on the configuration of turbulence. Thus, even the same global physical properties produce different intrinsic FDFs (Ideguchi et al. 2014), making inferences of the global physical properties from observations extremely difficult. In this work, we explore machine learning for inference of physics from observations. Our preliminary results suggest that machine learning methods can successfully aid Faraday tomography. Proposed machine learning approaches will be necessary for effective cosmic magnetism studies using the Square Kilometre Array and its precursors.