Machine Learning Calibration of Cosmic Shear Redshift Distributions

Angus Wright*[1]

[1]Ruhr University Bochum – Germany

Abstract

Cosmic shear cosmology is increasingly reliant on unsupervised machine learning techniques for the calibration of source redshift distributions. Analyses from both the Kilo Degree Survey (KiDS) and the Dark Energy Survey (DES) utilise self-organising maps, a form of unsupervised manifold-learning, for mapping the relationship between galaxy colours and redshift. This mapping is used, within pipelines of various complexity, to match known redshift sources to those with wide-field photometry. However these techniques have their own inherent systematic biases, which must be understood and addressed prior to the use of these techniques for the calibration of, e.g., Euclid and Rubin cosmic shear. In this talk, I will present the current state-of-the-art in the use of machine learning calibration techniques for cosmic shear redshift distribution calibration, and will discuss the current analyses that have been performed in an attempt to understand the systematic biases hidden within these new techniques. In the context of Stage-IV surveys, I will discuss plans for addressing systematic biases in these methods, and present material to prompt discussion as to whether these plans are likely to be sufficient for the precision-cosmology analyses that are planned within Euclid and Rubin.

Keywords: Redshift Distribution, Calibration, Unsupervised, Photo, z, Systematic Bias

*Speaker