

Galaxies Far, Far Away... Probing the Universe with Weak Lensing and Galaxy Clustering

It is a thrilling time in cosmology, with new data challenging our consensus model. For example, recent measurements of the BAO from DESI, combined with supernovae and the CMB, suggest that dark energy may evolve with time, unlike a cosmological constant. Alongside these probes, a central pillar of observational cosmology is the combination of gravitational lensing and galaxy clustering measured from large imaging surveys. I will describe how we use these data to test the underlying model. I will focus on the final analysis of the Dark Energy Survey, which is nearly complete. In the second half of this talk, I will discuss one of the main challenges in performing this type of analysis: understanding the connection between the galaxies we observe and the underlying structure we are trying to study. In particular, the shapes of galaxies (“intrinsic alignments”) and their positions (“galaxy bias”) are important astrophysical components of our model. I will describe our work in understanding IA and bias using analytic theory, simulations, and deep learning. I will conclude with a brief look towards some exciting prospects as the “next generation” of projects -- Rubin, Roman, and Euclid – begin.

**Monday April 28th**

2:30 - 3:30 p.m.

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