

Improved cosmological constraints from KiDS+VIKING

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Abstract content

Gravitational lensing represents a unique tool to study the dark Universe. Small distortions in the images of galaxies caused by the gravitational lensing effect of the matter distribution in the Universe can be detected over the whole sky. Measuring these coherent distortions makes dark matter structures “visible”, allows us to study their growth over cosmic time, and yields cosmological insights complementary to other probes like the cosmic microwave background (CMB). Ongoing wide-field imaging surveys exploit this weak gravitational lensing technique to come up with competitive constraints on important cosmological parameters and insights on fundamental physics.

In this talk I will first introduce the basic concepts of weak gravitational lensing, review the history and challenges of weak lensing measurements, and then concentrate on recent results from the ongoing European Kilo Degree Survey (KiDS) and VISTA Kilo-degree Infrared Galaxy Public Survey (VIKING) projects. These KiDS/VIKING measurements show some tension with CMB measurements from the Planck mission when the standard cosmological model is assumed. Does this tension represent a first hint at a crack in our tremendously successful standard model of cosmology? Or is our analysis of either of these measurements flawed in some way? Possible solutions to this discrepancy using extensions to the standard model of cosmology, like e.g. evolving forms of dark energy or massive neutrinos, and possible future developments will be discussed. I will conclude with an outlook towards the big experiments of the next decade in this field of research, Euclid and the Large Synoptic Survey Telescope that have the potential to yield some definitive answers to these questions.

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