

COSMOLOGY

A clustering of constraints

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What is dark energy, the force believed to be accelerating the expansion of the Universe? The Dark Energy Survey (DES) is a five-year project to image 5,000 square degrees of the southern sky, mapping 300 million galaxies and tens of thousands of galaxy clusters, as well as thousands of supernovae, in an effort to test the standard cosmological model, the Λ cold dark matter model (Λ CDM). In its first year, the camera captured 1,321 square degrees of sky. Timothy Abbott and collaborators focus on the clustering of galaxies and the cosmic shearing of galaxy shapes from weak gravitational lensing as complementary probes of the underlying matter density field. The aim is to provide the tightest cosmological constraints possible.

From the Planck mission, we have precise constraints of Λ CDM from the primordial Universe. But these numbers should agree with those obtained from a census of galaxies of the late Universe, following the growth of structure. And in fact, the two sets of measurements of the matter density and the amplitude of density fluctuations are entirely consistent, which is remarkable. When other low redshift data, such as supernovae and baryon acoustic oscillation measurements, are thrown into the mix, we have a set of the tightest constraints possible for Λ CDM, including a constant energy density. It remains to explain Λ CDM, beyond testing it to higher precision. Hopefully, the next data release (covering the first three years of DES), plus the addition of complementary probes and more precise models, will help us get to grips with the dominant force in our Universe.

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