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The WiggleZ Galaxy Survey shows that dark energy is real

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The WiggleZ Dark Energy Survey on the Anglo-Australian Telescope has measured redshifts for 220,000 emission line galaxies. The galaxies sample a volume of 1 cubic Gpc and a redshift range of 0.2<z<1. This is the first survey to measure the cosmology of the universe over such a wide range of epochs. Our analysis provides strong evidence that dark energy is real.

In our first major results we made two successful tests of the standard ("LCDM") cosmological model dominated by a cosmological constant (L) and cold dark matter (CDM). First, we measured the effect of dark energy on the gravitational growth rate of cosmic structure. The measured growth rate is entirely consistent with the LCDM model over the whole redshift range measured. Second, we detected the imprint of baryon acoustic oscillations in the clustering of the WiggleZ galaxies, allowing us to measure the cosmological distance-redshift relation at z=0.6. The results confirm the LCDM model, as well as providing evidence for accelerating expansion of the universe that is independent of earlier supernova measurements.

In a very different analysis of the WiggleZ data we used a novel method to make a direct, geometric measurement of the expansion rate of the Universe as a function of time. The increase in the expansion rate over the last 7 billion years shows that the universe is accelerating, independent of any cosmological model.

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