

MEDIA RELEASE

Embargoed to 3pm (AEST)
Thursday 19 May 2011



Dark energy is real

A survey of more than 200,000 galaxies led by Australian astronomers has shown that 'dark energy' is real and not a mistake in Einstein's theory of gravity.

The finding is conveyed in two papers led by Dr Chris Blake from Swinburne University's Centre for Astrophysics and Supercomputing, which will be published in the *Monthly Notices of the Royal Astronomical Society*.

Using the Anglo-Australian Telescope, 26 astronomers contributed to the 'WiggleZ Dark Energy Survey' which mapped the distribution of galaxies over an unprecedented volume of the Universe. Because light takes so long to reach Earth, it was the equivalent of looking seven billion years back in time – more than half way back to the Big Bang.

The survey, which took four years to complete, aimed to measure the properties of 'dark energy' a concept first cast by Einstein in his original Theory of General Relativity. The scientist included the idea in his original equations and later ruefully admitted that it was "his greatest blunder".

However, in the late 1990s when astronomers began to realise that the Universe was expanding at an accelerating rate, the concept of 'dark energy' was revived. This was done by studying the brightness of distant supernovae—exploding stars.

"The acceleration was a shocking discovery, because it showed we have a lot more to learn about physics," Dr Blake said. "Astronomers began to think that Einstein's blunder wasn't a blunder at all, and that the Universe really was filled with a new kind of energy that was causing it to expand at an increasing speed."

WiggleZ used two other kinds of observations to provide an independent check on the supernovae results. One measured the pattern of how galaxies are distributed in space and the other measured how quickly clusters of galaxies formed over time.

"WiggleZ says dark energy is real," said Dr Blake. "Einstein remains untoppled."

According to Professor Warrick Couch, Director of Swinburne's Centre for Astrophysics and Supercomputing, confirming the existence of the anti-gravity agent is a significant step forward in understanding the Universe.

"Although the exact physics required to explain dark energy still remains a mystery, knowing that dark energy exists has advanced astronomers' understanding of the origin, evolution and fate of the Universe," he said.

According to one of the survey's leaders, Professor Michael Drinkwater from the University of Queensland, the researchers have broken new ground. "This is the first individual galaxy survey to span such a long stretch of cosmic time," he said.

The WiggleZ observations were possible due to a powerful spectrograph located at the Anglo-Australian Telescope. The spectrograph was able to image 392 galaxies an hour, despite the galaxies being located halfway to the edge of the observable Universe.

“WiggleZ has been a success because we have an instrument attached to the telescope, a spectrograph, that is one of the best in the world for large galaxy surveys of this kind,” said Professor Matthew Colless, director of the Australian Astronomical Observatory.

The WiggleZ survey involved 18 Australian astronomers, including 10 from Swinburne University of Technology. It was led by Dr Chris Blake, Professor Warrick Couch and Professor Karl Glazebrook from Swinburne and Professor Michael Drinkwater from the University of Queensland.

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