Dark energy is real, Anglo-German researchers argue

Chris Wickham, Reuters

(Reuters) - Dark energy, the mysterious cosmic force thought to be the fuel behind the accelerating expansion of the universe, is real, according to an Anglo-German team of astronomers.

After a two-year study, scientists at the University of Portsmouth in the United Kingdom and LMU University Munich in Germany [1] have concluded that the likelihood of dark energy's existence stands at 99.996 percent.

That's the same level of certainty as this year's celebrated discovery of the Higgs boson, or a subatomic particle that looks very much like it, by scientists at the CERN research center near Geneva.

Although accepted by many scientists as the best explanation for why the universe is expanding at an ever-faster rate, the theory of dark energy has its skeptics.

Astronomers studying the brightness of distant supernovae over a decade ago won the 2011 Nobel Prize for Physics for their conclusion that the expansion of the universe was accelerating. But some scientists argue this is an illusion, caused by the relative movement of Earth in relation to the rest of the cosmos. Others suggest shortcomings in our understanding of gravity are more likely responsible than dark energy.

"Dark energy is one of the great scientific mysteries of our time, so it isn't surprising that so many researchers question its existence," said Bob Nichol, a member of the Portsmouth team involved in the research, which was published in the academic journal Monthly Notices of the Royal Astronomical Society.

"But with our new work, we're more confident than ever that this exotic component of the universe is real - even if we still have no idea what it consists of."

A basic premise of modern cosmology is that the visible universe of stars, planets and gases makes up about 4 percent of the cosmos and is sitting like flotsam in a massive sea of unknown material referred to as dark energy. Dark energy is thought to make up 73 percent of the cosmos, while the slightly less mysterious dark matter comprises the remaining 23 percent.

One of the strongest pieces of evidence for dark energy is in the so-called Integrated Sachs Wolfe effect.

In 1967, Rainer Sachs and Arthur Wolfe theorized that light from the radiation from the heat left over from the Big Bang, would become slightly more blue as it passed

through the gravitational fields of lumps of matter in the universe, an effect known as gravitational redshift.

The existence of dark energy would cause light from this residual radiation to gain energy as it travels through large lumps of mass.

In 1996, astronomers Robert Crittenden and Neil Turok suggested overlaying a map of the local universe on the picture of the residual cosmic radiation could provide clues about where to look for the effect. In 2003, it was spotted, albeit weakly.

It was seen as supporting evidence for dark energy and hailed as the 'Discovery of the Year' in Science magazine.

But some scientists argued it could have been caused by cosmic dust and questioned the discovery.

The Anglo-German team that carried out the latest study was led by Crittenden and Tommaso Giannantonio. They re-examined all the arguments against the detection and have improved the maps used in the original work.

They conclude that dark energy is almost certainly responsible for the hotter parts of the cosmic microwave background.

"We have methodically addressed all of these issues and concluded none of them can explain the observations we see," Nichol told Reuters. "In the end, the only remaining explanation is dark energy - if it walks like a duck and quacks like a duck, it's probably a duck."

Radio telescopes like the huge Square Kilometre Array that will be sited in remote areas in South Africa and Australia [2], should improve the tricky process of measuring distances in the universe and give more definitive data, he said.

"What dark energy could be, theoretically, is another question," Nichol said.

(Editing by Stacey Joyce)

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