

# Sacred constant might be changing

April 11 2005

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*Scientists discover one of the constants of the universe might not be constant*

Physical constants are one of the cornerstones of physics – sacred numbers which we know to be fixed – but what if some of these constants are changing? Speaking at the Institute of Physics conference Physics 2005, Dr Michael Murphy of Cambridge University will discuss the "fine structure constant" – one of the critical numbers in the universe which seems to be precisely tuned for life to exist – and suggest that it might not be constant after all.

Dr Murphy has used the largest optical telescope in the world, the Keck telescope on Mauna Kea in Hawaii, to study light from distant quasars. This light has been travelling across the universe for billions of years, and seems to show that the fine structure constant, often known as "alpha", may be varying over time.

The fine structure constant governs the electromagnetic force which holds all atoms and molecules together. Scientists have known for many years that if its value was slightly different, life could not exist. Only the very tiniest changes over time could be tolerated, and most scientists believe that alpha today is the same as it always has been.

The constant also affects the absorption fingerprint of atoms, which can be detected when light shines through gas clouds. Murphy has used quasars as incredibly distant light sources, whose light encounters gas clouds on its way to Earth. The light takes time to reach Earth, so he sees

the fingerprints as they were billions of years ago. By comparing these fingerprints with those obtained in experiments on Earth, he concludes that alpha has changed by about one part in two-hundred-thousand during the last 10 billion years.

The speed of light depends on the fine structure constant. If one varies with time then the other probably does too, meaning Einstein got it wrong.

Other researchers have published results which suggest that alpha does not change. However Dr Murphy's work is the most detailed survey ever performed. He says that the internal checks in his method, which other research groups did not use, make this the most reliable measurement to date.

Murphy is careful not to claim that the case is closed, and he says that nobody can really say that alpha varies until another type of experiment has confirmed it. "We are claiming something extraordinary here," says Murphy, "and the evidence, though strong, is not yet extraordinary enough."

Dr Michael Murphy is a Research Associate at the Institute of Astronomy in the University of Cambridge, and a Research Fellow of Darwin College, Cambridge.

Source: Institute of Physics

Citation: Sacred constant might be changing (2005, April 11) retrieved 22 September 2024 from <https://phys.org/news/2005-04-sacred-constant.html>

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