

Could the Universe be tied up with cosmic string?

A team of physicists and astronomers at the University of Sussex and Imperial College London have uncovered hints that there may be cosmic strings - lines of pure mass-energy - stretching across the entire Universe.

Cosmic strings are predicted by high energy physics theories, including superstring theory. This is based on the idea that particles are not just little points, but tiny vibrating bits of string. Cosmic strings are predicted to have extraordinary amounts of mass - perhaps as much as the mass of the Sun - packed into each metre of a tube whose width is less a billion billionth of the size of an atom.

Lead researcher Dr Mark Hindmarsh, Reader in Physics at the University of Sussex, said: "This is an exciting result for physicists. Cosmic strings are relics of the very early Universe and signposts that would help construct a theory of all forces and particles."

His team took data from NASA's Wilkinson Microwave Anisotropy Probe (WMAP), which is a satellite currently mapping the intensity of cosmic microwaves from all directions, and carefully compared the predictions of what should be seen with and without strings.

Dr Hindmarsh said: "We cannot yet see these strings directly. They are many billion light years away. We can only look for indirect evidence of their existence through precision measurements of the cosmic microwave background, of cosmic rays, gravitational radiation, and looking for double images of distant quasars."

The four-person team are members of COSMOS, the UK's world-leading cosmology supercomputing consortium fronted by Stephen Hawking. Using a Silicon Graphics supercomputer they made predictions of how the strings would affect the Cosmic Microwave Background, relic radio waves from the Big Bang which fill the universe. It turned out that the best explanation for the pattern of this radiation was a theory which included strings.

Dr Hindmarsh said that better data is required before the existence of cosmic strings can be confirmed. He hopes this will be produced by the European Space Agency's Planck Satellite mission (due for launch this year).

The results are published in *Physical Review Letters* on 18 January, 2008.

Source: University of Sussex

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