



Astronomers size up the Universe

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The Universe is at least 156 billion light-years wide, say astronomers.

The estimate comes from data obtained by a space probe that is examining the so-called Cosmic Microwave Background (CMB) radiation - often called the echo of the Big Bang.

The echo contains information of what the cosmos was like when it was young and how it might develop.

The cosmos is 13.7bn years old but the stretching of space with its expansion after the Big Bang means that simple distance measurements do not apply.

Stretched space

This age estimate comes from two independent lines of investigation - the age of stars and the expansion of the Universe.

This means that radiation reaching us from the earliest Universe has been travelling for more than 13 billion years.

But the assumption that flows from this - that the radius of the Universe is 13.7 billion light-years and that it is 27.4 billion light-years wide does not follow.

Astronomers realise the Universe is more complex. It has been expanding ever since the Big Bang when energy, space and time itself began.

According to Neil Cornish of Montana State University, US, and colleagues writing in the journal *Physics Review Letters*, the distance covered by the light in the early Universe gets increased by its overall expansion.

To get the picture try to imagine the Universe a million years after the Big Bang. Light travels for a year, covering one light-year. But at that time, the Universe was about a thousand times smaller than it is today meaning that one light-year has now become stretched to about a thousand light-years.

When this expansion is taken into account the Universe is bigger than it would appear to be.

Neither finite nor infinite

Because of this stretching, radiation from the early Universe cannot be said to have travelled 78 billion light-years.

What it means is that the starting point of a particle of light, a photon, reaching us today after travelling for 13.7 billion years is now 78 billion light-years away.

NASA'S WILKINSON PROBE

Launched to obtain full-sky images of 13 billion
+ year-old temperature fluctuations in CMB
Temperature differences correspond to "seeds"
that grew to become stars and galaxies
Data help answer questions about age and
geometry of Universe

And that is the radius of the Universe. Confused?

The new estimate comes from analysing data obtained by the Wilkinson Microwave Anisotropy Probe (WMAP) which has been studying the CMB which formed about 400,000 years after the Big Bang.

Subtle differences in the background radiation can tell astronomers the age of the Universe and other cosmological parameters.

One implication of the new analysis is to prove false the idea that one could, theoretically, look in one direction and eventually see the back of your head.

The researchers looked for evidence that multiple images of the same object could show up in different locations in space-time.

The predicted pattern in the CMB that would have shown the effect was not observed.

According to the researchers the latest work provides no evidence that the Universe is finite and no evidence that it is infinite either.

I said you might be confused.

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