



TELEGRAMME



# Silence is olden

Forget the big bang, the birth of the universe was a very quiet affair, whispers Michael Brooks

**E**VERYONE knows that, in space, no one can hear you scream. Very few people, however, realise just how deep the cosmic quiet can be. The moment our universe came into existence, the silence was truly extraordinary. It was a split second of utter isolation when nothing and nowhere was connected. If you did let out a scream, it wouldn't even make it past your lips. "Each point of space lived its own life," says Aurélien Barrau, a cosmologist at the Joseph Fourier University in Grenoble, France.

This is a radical departure from our usual picture of space-time as a smooth, continuous fabric. And it comes courtesy of researchers trying to work quantum theory into our current understanding of the universe, which is based on Einstein's general theory of relativity. This does a fine job of describing gravity on the scale of stars and galaxies, but when it comes to the entire history of the universe, the theory is left wanting.

In a sense, general relativity predicts its own demise. As we wind back the clock on the cosmos, things get closer together and gravity becomes ever stronger. According to general relativity, the cosmos arose out of a point of infinite density called the singularity, where space and time curved so radically that the physics breaks down. So this theory alone can't tell the full story of the universe's birth.

Once things get very small, quantum theory is king. To describe the start of everything, then, we need the two theories to combine into a single theory of quantum gravity.

Contrary to what you might have heard, we have ways of doing this. String theory is the most widely known example. It describes how the messy array of particles that make up matter and forces, including gravity, can be pared down to vibrations of one-dimensional strings. But it doesn't tell us much about the fundamental nature of space and time, so several alternatives have emerged in recent years.

Although it is early days and we don't know whether any of these theories will work in every detail, we are already seeing some fascinating results. Most tantalising of all is that at least three entirely independent quantum gravity theories have the cosmos kicking off with something we could call a moment of silence.

Winding back the clock, we seem to reach an instant when every point in space becomes disconnected from every other point. This means that nothing – no sound, no information, no light – can travel between them. Perhaps this moment of silence will give us a new telling of the oldest story?

Steven Carlip of the University of California, Davis, was one of the first to spot that the various paths to quantum gravity were converging. In 2012, he gathered up all the theories and found that many of them shed a spatial dimension or two as the universe winds back to its hot, dense start. In other words, geometry appears to have been radically different in the beginning.

The moment of silence goes further and ➤

Download English Version:

<https://daneshyari.com/en/article/114227>

Download Persian Version:

<https://daneshyari.com/article/114227>

[Daneshyari.com](https://daneshyari.com)