

What exactly is our universe? Are we part of one, infinite universe? Are we in just one of many finite universes? Do we actually exist as a speck of dust in somebody else's universe?

Cosmology is one of the most creative and bizarre areas of science. Explore some of the strangest ideas in this exclusive feature

1. Clashing branes

Could our universe be a membrane floating in higher dimensional space, repeatedly smashing into a neighbouring universe? According to an offshoot of string theory called braneworld, there are large extra dimensions of space, and while gravity can reach out into them, we are confined to our own "brane" universe with only three dimensions. Neil Turok of Cambridge University in the UK and Paul Steinhardt of Princeton University in New Jersey, US, have worked out how the big bang could have been sparked when our universe clashed violently with another. These clashes repeat, producing a new big bang every now and then - so if the cyclic universe model is right, the cosmos could be immortal.

2. Evolving universes

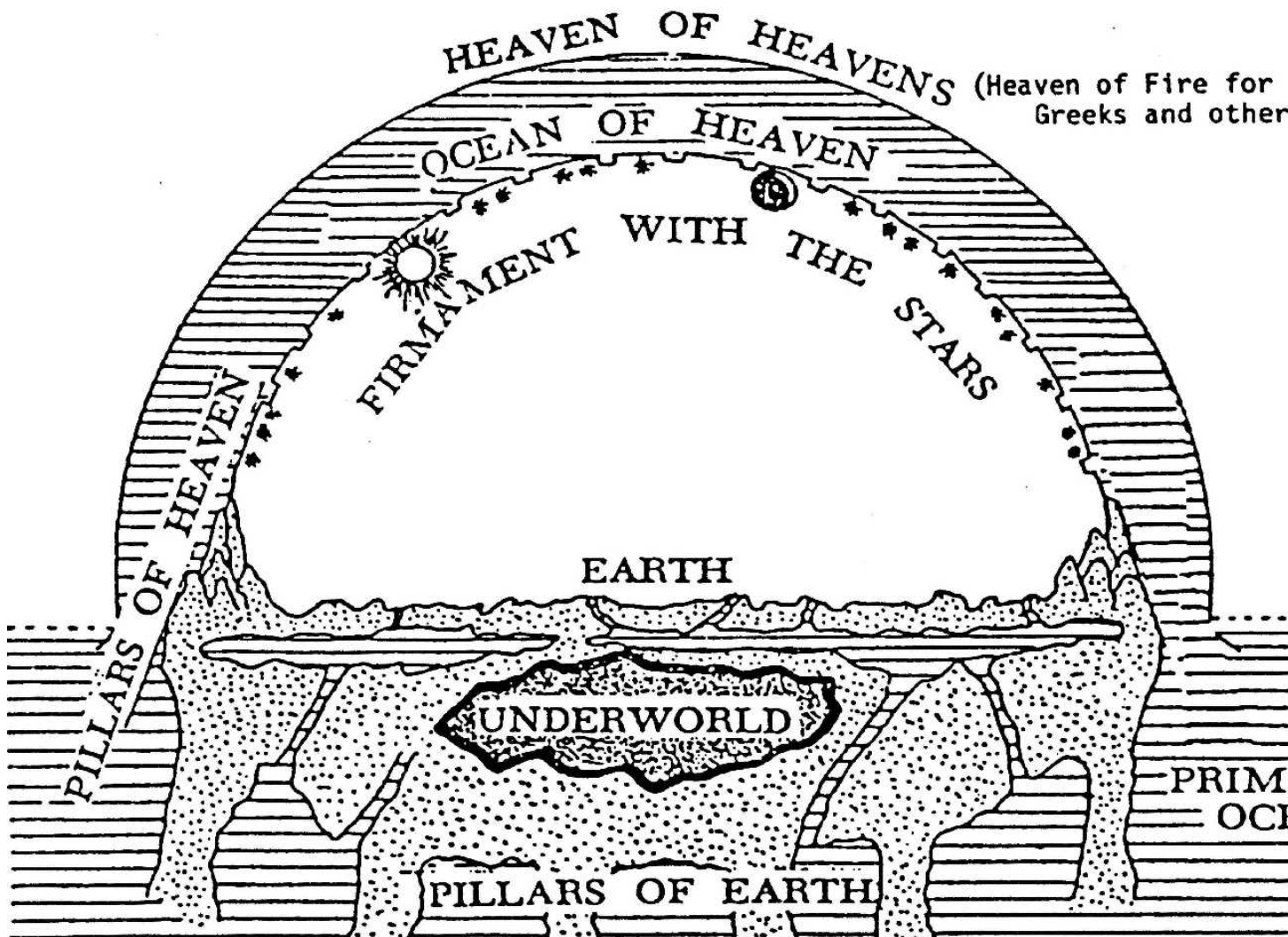
When matter is compressed to extreme densities at the centre of a black hole, it might bounce back and create a new baby universe. The laws of physics in the offspring might differ slightly, and at random, from the parent - so universes might evolve, suggests Lee Smolin of the Perimeter Institute in Waterloo, Canada. Universes that make a lot of black holes have a lot of children, so eventually they come to dominate the population of the multiverse. If we live in a

Weirdest cosmology theories

Written by Administrator

Friday, 15 March 2013 20:39 - Last Updated Friday, 15 March 2013 21:03

typical universe, then it ought to have physical laws and constants that optimise the production of black holes. It is not yet known whether our universe fits the bill.



□

3. Superfluid space-time

One of the most outlandish new theories of cosmology is that space-time is actually a superfluid substance, flowing with zero friction. Then if the universe is rotating, superfluid spacetime would be scattered with vortices, according to physicists Pawel Mazur of the University of South Carolina and George Chapline at Lawrence Livermore lab in California - and

those vortices might have seeded structures such as galaxies. Mazur suggests that our universe might have been born in a collapsing star, where the combination of stellar matter and superfluid space could spawn dark energy, the repulsive force that is accelerating the expansion of the universe.

4. Goldilocks universe

Why does the universe have properties that are "just right" to permit the emergence of life? Tinker with a few physical constants and we would end up with no stars, or no matter, or a universe that lasts only for the blink of an eye. One answer is the anthropic principle: the universe we see has to be hospitable, or we would not be here to observe it. Recently the idea has gained some strength, because the theory of inflation suggests that there may be an infinity of universes out there, and string theory hints that they might have an almost infinite range of different properties and physical laws. But many cosmologists dismiss the anthropic principle as being non-science, because it makes no testable predictions.



5. Gravity reaches out

Dark matter might not really be "stuff" - it could just be a misleading name for the odd behaviour of gravity. The theory called MOND (modified Newtonian dynamics), suggests that gravity does not fade away as quickly as current theories predict. This stronger gravity can fill the role of dark matter, holding together galaxies and clusters that would otherwise fly apart. A new formulation of MOND, consistent with relativity, has rekindled interest in the idea, although it may not fit the pattern of spots in the cosmic microwave background.

6. Cosmic ghost

Three mysteries of modern cosmology could be wrapped up in one ghostly presence. After making an adjustment to Einstein's general theory of relativity, a team of physicists found a strange substance popping out of their new theory, the "ghost condensate". It can produce repulsive gravity to drive cosmic inflation in the big bang, while later on it could generate the more sedate acceleration that is ascribed to dark energy. Moreover, if this slippery substance clumps together, it could form dark matter.

7. It's a small universe

The pattern of spots in the cosmic microwave background has a suspicious deficiency: there are surprisingly few big spots. One possible explanation is that the universe is small - so small that, back when the microwave background was being produced, it just could not hold those big blobs. If so, space would have to wrap around on itself somehow. Possibly the oddest suggestion is that the universe is funnel-shaped, with one narrow end and one flared end like the bell of a trumpet. The bent-back curvature of space in this model would also stretch out any smaller microwave spots from round blobs into the little ellipses that are indeed observed.

8. Fast light

Why do opposite sides of the universe look the same? It's a puzzle because the extremes of today's visible universe should never have been in touch. Even back in the early moments of the big bang, when these areas were much closer together, there wasn't enough time for light - or anything else - to travel from one to another. There was no time for temperature and density to get evened out; and yet they are even. One solution: light used to move much faster. But to make that work could mean a radical overhaul of Einstein's theory of relativity.

9. Sterile neutrinos

Dark matter might be made of the most elusive particles ever imagined -sterile neutrinos. They are hypothetical heavier cousins of ordinary neutrinos and would interact with other matter only through the force of gravity - making them essentially impossible to detect. But they might have the right properties to be "warm" dark matter, buzzing about at speeds of a few kilometres per second, forming the largish dark matter clumps mapped by recent observations. Sterile neutrinos could also help stars and black holes to form in the early universe, and give the kicks that send neutron stars speeding around our galaxy.

10. In the Matrix

Maybe our universe isn't real. Philosopher Nick Bostrom has claimed that we are probably living inside a computer simulation. Assuming it ever becomes possible to simulate consciousness, then presumably future civilisations would try it, probably many times over. Most perceived universes would be simulated ones - so chances are we are in one of them. In that case, perhaps all those cosmological oddities such as dark matter and dark energy are simply patches, stuck on to cover up early inconsistencies in our simulation.