

ASTRONOMY

Possibility of 'hyperuniverse' may never be confirmed

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My wife and I just returned from a spring-break vacation at Mammoth Cave National Park. Over millions of years, water has cut hundreds of miles of caves into the Kentucky limestone. That water has reshaped the rock into fantastic forms.

New caves are still being formed deep underground. I told the park ranger that I like the idea that there could be places of incredible beauty that would never be seen by human eyes.

It's a lesson of nature that there are places we can't go and things we can't see. In astronomy, it's about reading the clues we can see, and using reason and mathematics to figure out what happens behind the scenes.

Recent results from a probe provide support for some of the strangest ideas of cosmology. Because of unseen substances filling intergalactic space, the universe has had at least two episodes of accelerating expansion.

These substances are so foreign that scientists can't agree on what to call them. "Vacuum energy," "dark energy" and "cosmological constant" are some of the terms being discussed.

That's consistent with Einstein's theory of general relativity, our best understanding of how space, time and gravity work.

But when we look deeper into the equations of general relativity, we find the laws of nature may allow our universe to be a part of a larger reality.

There are dozens of ways to mathematically imagine a larger universe that our universe is only a part of. One is for universes to bud off each other. We'd be directly connected to zillions of other universes, but we'd never find them unless we stumbled on one of the submicroscopic connections.

Another possibility is that our universe is like an expanding bubble in a pot of soup. The soup itself would be expanding, so the bubbles never touch. If we lived in this kind of universe, it would be impossible to get any information about the universe beyond our bubble.

All this might be nothing but speculation. Mathematically, there's no requirement that our universe has to have a bigger hyperuniverse to live in.

But the idea that there could be entire universes that we can never see is tremendously exciting. And the understanding that there are fundamental limits to knowledge is something that humans will be struggling to cope with for centuries to come.

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