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Universal Alignment

Could the cosmos have a point?

By Michael Moyer | Friday, December 9, 2011

The universe has no center and no edge, no special regions tucked in among the galaxies and light. No matter where you look, it's the same—or so physicists thought. This cosmological principle—one of the foundations of the modern understanding of the universe—has come into question recently as astronomers find evidence, subtle but growing, of a special direction in space.

The first and most well-established data point comes from the cosmic microwave background (CMB), the so-called afterglow of the big bang. As expected, the afterglow is not perfectly smooth—hot and cold spots speckle the sky. In recent years, however, scientists have discovered that these spots are not quite as randomly distributed as they first appeared—they align in a pattern that points out a special direction in space. Cosmologists have theatrically dubbed it the “axis of evil.”

More hints of a cosmic arrow come from studies of supernovae, stellar cataclysms that briefly outshine entire galaxies. Cosmologists have been using supernovae to map the accelerating expansion of the universe (a feat that garnered this year's Nobel Prize in Physics). Detailed statistical studies reveal that supernovae are moving even faster in a line pointing just slightly off the axis of evil. Similarly, astronomers have measured galaxy clusters streaming through space at a million miles an hour toward an area in the southern sky.

What could all this mean? Perhaps nothing. “It could be a fluke,” says Dragan Huterer, a cosmologist at the University of Michigan at Ann Arbor, or it could be a subtle error that has crept into the data (despite careful efforts). Or, Huterer says, perhaps we are seeing the first signs of “something amazing.” The universe's first burst of expansion could have lasted a little longer than we thought, introducing a tilt to it that still persists today. Another possibility is that at large scales, the universe could be rolled up like a tube, curved in one direction and flat in the others, according to Glenn D. Starkman, a cosmologist at Case Western Reserve University. Alternatively, the so-called dark energy—the bewildering stuff accelerating the universe's expansion—might act differently in different places.

For now, the data remain preliminary—subtle signs that something may be wrong with our standard understanding of the universe. Scientists are eagerly anticipating the data from the Planck satellite, which is currently measuring the CMB from a quiet spot 930,000 miles up. It will either confirm earlier measurements of the axis of evil or show them to be ephemera. Until then, the universe could be pointing us anywhere.

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