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Dark energy: space mystery

Cosmologists, astrophysicists, and other scientists study the origin and the fate of the universe. The prevailing theory is that the universe began with the Big Bang, an explosion that released massive amounts of energy, and has been expanding since then. However, galaxies, stars, and other cosmic bodies with mass obey the laws of gravity and keep the parts of the universe together. Although the universe is expanding, the force of gravity is slowing the rate of expansion, preventing a Big Rip (Merali).

In 1998, the Hubble Space Telescope captured images of very distant stars called supernovae for the first time. The images showed that many millennia ago, the universe was expanding more slowly than it is today. Gravity was not slowing the expansion of the universe, as scientists thought, but for an unknown reason, the universe was expanding more rapidly. Scientists did not know how to explain this observation, but they did know something had to be causing the accelerating expansion.

Physicists now call this antigravity force dark energy (Shu 10). What exactly is dark energy? “Dark energy is the biggest puzzle of modern physics. No one agrees where dark energy comes from, how it works, or if it actually exists,” explains astrophysicist Ed Shu.

Scientists now offer four possible explanations for dark energy:

1. Cosmological constant – This theory is related to Albert Einstein’s prediction that seemingly empty space can have its own energy. Because this energy is a characteristic of space itself, it would not be diluted as the universe expands, but would remain as a cosmological constant. Later scientists applied Einstein’s idea to dark energy, explaining that it has been steady and constant throughout time and will remain that way.
2. Quantum theory – Scientists speculate that space is actually full of temporary, or virtual, particles that continually form and disappear, generating energy. When scientists calculated how much energy this process contributes to space, the results were incorrect, adding to the mystery of dark energy.
3. Fluid theory – This idea says that some kind of dynamic energy fluid called quintessence fills space and has properties opposite to matter and normal energy. However, scientists do not know what the fluid is like, what it interacts with, or why it exists.
4. Theory of gravity – Einstein’s theory of gravity could be incorrect. Instead of gravity pulling all matter together, dark energy might affect matter in a different way. However, Einstein’s theory of gravity accurately describes the motion of bodies in the solar system, so it should not be discarded yet.

In short, dark energy is a mystery that requires study, observation, and data to understand.

While trying to understand dark energy and the nature of the universe with sophisticated telescopes, scientists have concluded that all the stars and galaxies they see in the sky constitute only 5 percent of the observable universe, according to an article in *Cosmos Research* (Brown).

Furthermore, of the invisible parts of the universe, 68 percent is dark energy and 27 percent is dark matter, another mysterious force or substance (Merali 25). Scientists are not certain what dark matter is, but they know it is dark. In other words, it does not appear in the form of stars and planets that we can see, nor does it take the form of dark clouds of normal matter because dark matter does not absorb radiation. It is not antimatter because antimatter involves gamma rays and dark matter does not. Finally, dark matter is not related to black holes, regions of space with intense gravitational fields that no matter or radiation can resist (NASA Science Committee).

The mysteries of dark energy and dark matter indicate that the universe might be configured in a way scientist have not yet considered. According to the Space Telescope Science Institute, “The strangeness of dark energy is thrilling” (Space Telescope Science Institute). Similar puzzles have fueled past scientific inquiry. Einstein’s Theory of General Relativity was proposed in part to solve a mystery involving the orbits of the planet Mercury. The origins of quantum physics can be traced to a puzzle about how heat is radiated. The enigma of dark energy could lead to similar discoveries. As the astronaut Neil Armstrong said, “Mystery creates wonder and wonder is the basis of man’s desire to understand.”

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