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Astronomer sees a 'brake' in cosmic expansion

By Dan Vergano
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WASHINGTON, D.C. — The universe's expansion underwent an unexpected braking in its first billion years, an astronomer suggested Wednesday.

The report throws a curve at an idea first proposed by Einstein that cosmic expansion occurs at a constantly increasing rate known as the cosmological constant.

But the motion of distant, massive exploding stars called gamma ray bursts suggests something is amiss, says astronomer Bradley Schaefer of Louisiana State University in Baton Rouge. "The first results point in the direction of the cosmological 'constant' not being constant," Schaefer says.

In 1999, astronomers revived Einstein's idea and found that the universe is expanding at an accelerating rate. The motion seen in distant galaxies and exploding stars called supernovas, hurtling farther apart at faster and faster speeds, provided the evidence. Cosmologists created the term "dark energy" to describe the force pulling the universe apart at an accelerating rate.

Schaefer examined 52 gamma ray bursts in his study, which was reported at the American Astronomical Society meeting here. Gamma ray bursts are blasts from exploding stars that act like bigger and brighter versions of supernovas. They are the brightest explosions in the cosmos.

Looking at more distant bursts is effectively looking back in time, because it takes light time to travel through space. (Light travels about 5.9 trillion miles in a year.) So the farther away the burst, the earlier the time it occurred in the universe. And the most distant bursts in Schaefer's survey date to the first billion years of the universe.

At that time period, as far back as about 12.8 billion years ago, the universal expansion demonstrated by the motion of the bursts looks slower than in more recent times. That's a deviation from Einstein's prediction, Schaefer says.

If verified — and that's a big "if," says cosmologist Michael Turner of the National Science Foundation — the news would throw open the door to all sorts of "weird" theories about the true nature of dark energy, ones far different from anything supposed by Einstein. Some cosmologists have suggested that hidden dimensions, ones unlike the familiar up, down, right and left of the everyday world, might make dark energy act unexpectedly.

Reaction from astronomers to the report, which Schaefer acknowledges as tentative, was cautious. Astrophysicist Eric Linder of the University of California-Berkeley noted that light from the bursts may vary more than expected, which would throw off Schaefer's calculations. And light from more distant parts of the universe may be disproportionately bent by the gravity of stars closer to Earth, another of Einstein's predictions.

"It's wrong, just wrong,' says Adam Riess of the Space Telescope Science Institute in Baltimore. He argues that not enough is known about gamma ray bursts to rely on them for analysis.

DISCUSSION

- What is the cosmological constant? Why does astronomer Bradley Schaefer believe the idea may be flawed?
- Why did astronomers revive Einstein's cosmic expansion theory in 1999?
- Why is studying distant gamma ray bursts like looking back in time?
- What "weird theories" about dark matter could Schaefer's study, if verified, give credence to? How did other scientists react to his report?

ACTIVITY

Review the article and information from the NASA Goddard Space Flight Center website.* Then, using the graphic organizer below, describe six concepts related to dark energy. (Use clear, simple language.) Finally, in the second graphic organizer, outline your ideas for a science-fiction story inspired by one concept from your research.

http://imagine.gsfc.nasa.gov/docs/science/mysteries_l1/dark_energy.html

VOCABULARY

cosmological
dark energy
deviation
dimensions
gamma ray bursts
super novas