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Scientists stunned to learn universe may be accelerating

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(CNN)

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WASHINGTON (CNN) -- Scientists are scratching their heads over a finding that indicates the universe, rather than slowing down, is being expanded by a mysterious force at an accelerating rate.

If true, says one astronomer, in billions of years many of the stars will be gone from the night sky.

"The universe will be a very lonely place to look at," says Robert Kirshner of the Harvard-Smithsonian Center for Astrophysics.

And if the finding is correct, it also supports a concept first proposed by Albert Einstein, who later dismissed it as his biggest blunder.

"It is such a strange result we are still wondering if there is some other sneaky little effect climbing in there," says



Adam Riess, an astronomer at the University of California, Berkeley.

Riess said he, Kirshner and others in the 15-member international team that made the discovery "have looked hard for errors" but found none.

The findings were discussed at a meeting of scientists in Los Angeles last month and reported in the journal Science.



Tracking the debris of exploded stars

Using the Hubble Space Telescope and ground-based telescopes in Hawaii, Australia and Chile, the astronomers tracked and repeatedly measured the debris of 14 supernovae, or exploded stars, 7 billion to 10 billion light-years from Earth.

A light-year is the distance that light travels in one year -- about 6 trillion miles.

Team members measured the speed at which these distant supernovae are moving away. The rate was then compared with the motion of supernovae much closer to Earth.

"How far away a supernova is, and how fast it's moving away from us, tells us how fast the universe is expanding," Riess says.

They expected to find that the expansion of the universe was slowing from the effect of gravity.

"People thought ... the universe was just coasting" from the force of the Big Bang, Kirshner said. "Instead, we found it is actually speeding up."

According to the Big Bang theory, the universe exploded from a tiny point of matter about 12 billion years ago and is still expanding, but at a slower and slower rate.

But Riess and the others found that it is actually expanding faster than it was 5 to 7 billion years ago.

Parallel study confirms finding

Rocky Kolb, a University of Chicago astronomer, said in Science that the finding is so startling, "I think everyone

should reserve judgment."

Kirshner said the conclusion will go through an intensive review before the results are accepted, although he noted that preliminary results from a parallel study by another astronomy group are in agreement.

"We are scratching our heads to think if there could be an alternative explanation for it," says Riess, "something more mundane than a repulsive force."

It is being called a repulsive force because it seems to be working against gravity to speed up the expansion of the universe.

"If it's confirmed by other results and other approaches, it's going to tell us there is something important, another constituent to the universe," says Kirshner.

A fifth force at work?

Unlike matter, which slows down as it moves through space, the new force -- if the researchers are correct -- moves faster.

"That's very weird," says Kirshner. "But it's not unprecedented that weird things might be true things."

Four forces are accepted by modern physics: the strong force, which holds the nucleus of an atom together; the weak force, which causes atomic decay; electromagnetic force, which holds electrons in orbit in an atom; and gravity.

Kirshner says a fifth force could be at work.

The idea of a fifth force has been speculated about by physicists, he says.

"They have impossible ideas before breakfast," he said. "The interesting thing is that some of these funny-sounding ideas might turn out to be right."

If the researchers are right and the universe is, indeed, accelerating, the finding could solve a problem for astronomers. Some measurements have put the age of the universe at about 10 billion years, which is younger than the measured ages of some stars.

With the acceleration of the universe factored in, said Riess, the universe would have to be about 14 billion years old, some 2 billion years older than the oldest star.

"That would no longer make the daughter older than the mother," he said.

Einstein's 'cosmological constant'

Einstein first proposed a "cosmological constant," which Riess described as "a repulsive force that is a property of vacuum in space and time."

Riess said the constant, which Einstein dismissed, is "the only explanation we have" for the acceleration.

"Our everyday experience tells us that a vacuum is empty, that there is nothing in it. But that might not be true," Riess said. "There may be an energy, a force, associated with a vacuum."

Over short distances, said Riess, this repulsive force can't be detected, but over distances of 7 billion to 10 billion light-years, "this force becomes something to reckon with, and is strong enough to overcome gravity and cause the universe to accelerate."

Riess said he isn't surprised that the force hasn't been detected before.

"The force is very weak on a small scale and it only becomes important when you are looking back," he said. "It's like a lot of little ants -- one is weak but a lot of them can lift a big weight."

Correspondent Ann Kellan, The [Associated Press](#) and [Reuters](#) contributed to this report.

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