Universe Has At Least 30 Billion Years Left

By Robert Roy Britt
Senior Science Writer
posted: 04:15 pm ET
20 February 2004

UPDATE: Story first posted 2:30 p.m. EST, February 20. 2004

Recent Hubble Space Telescope images of distant exploding stars add further confirmation to the permanence of a mysterious, repulsive force called dark energy that appears to dominate the universe.

While scientists are not ready to close the case, they said today that dark energy, which is thought to permeate the cosmos and work in opposition to gravity, does appear to be a constant presence as predicted.

The results bolster a theory that the universe won't end soon. But they leave researchers no more informed about the actual nature of dark energy.

"We still have almost no clue what it is," said study leader Adam Riess of the Space Telescope Science Institute (STScI) in Baltimore.

Dark energy was conjured to explain a phenomenal discovery in 1998: Nearly all galaxies in the universe are receding from each other at an ever-faster pace.

Gravity is losing some unknown battle, cosmologists admit. They theorize that about 70 percent of the universe is made up of dark energy, while most of the rest is another mysterious thing called dark matter and only a small fraction is real matter like stars, planets and living entities.

IMAGES

CLICK TO

Hubble observations most distant supern found.

CLICK TO

Caption: Possible fa universe.

MORE STOR

Einstein was the first to consider something similar, which he called a cosmological constant. He said even the emptiest space would have some of this strange stuff in it.

But when Edwin Hubble discovered the expansion of the universe in the 1920s, Einstein called his cosmological constant his greatest blunder.

Einstein is back

With the more recent finding that the expansion is accelerating, Einstein's idea was revived.

The new findings support Einstein's cosmological constant, which modern cosmologists say implies that dark energy should not characteristically change over time. If that's right, the universe will continue to expand at an accelerating fo

- **The Big Rip: Ne Universe by Sh Everything**
- **Strings Attache Puts Limits on Extra Dimensio**
- **All Galaxies to Ghosts, Frozen Space**
- **'Brane-Storm' C of Big Bang Th**

The new results suggest that even if Einstein and modern dark energy theory are both wrong, dark energy destroy the universe for at least 30 billion years, Riess and his colleagues say.

"Right now we're about twice as confident than before that Einstein's cosmological constant is real, or at le energy does not appear to be changing fast enough, if at all, to cause an end to the universe anytime soor

The universe is presently 13.7 billion years old.

Riess' team uses Hubble to find stars that exploded when the universe was about half its present age. A c these supernovas, as they are called, shine with a known brightness. So examining the light that reaches astronomers how far away each one is and the rate at which the universe was expanding when that star e

That rate of expansion has changed over time, other studies have shown. The initial expansion, after a the Bang, was the most rapid and was called inflation. Then things leveled off before another round of acceler apparently underway now.

Riess' team has now observed 42 of the very distant supernovas -- including 16 in the new work -- in its G Observatories Origins Deep Survey (GOODS) program.

The data was first presented last fall but has only now been fully analyzed. The results were discussed in a teleconference with reporters Friday and will be published in the *Astrophysical Journal*.

What's going on

There are two main ideas for the source of dark energy. It might percolate from empty space, as Einstein t is unchanging and of a fixed strength. The other holds that dark energy is associated with a changing ener "quintessence," something akin to a magnetic field. In that scenario, the field causes the current accelerati universe.

Another research team recently theorized that if the repulsion from dark energy gets stronger than Einstein the universe could expand so incredibly that it would end in a Big Rip. All matter -- galaxies, then stars, the everything right down to the atomic level -- would be torn apart.

If dark energy can change, it might also one day reverse course and pull the universe back together in a B "This looks like the least likely scenario at present," Riess said.

There are two initial questions scientists are trying to answer: What is the strength of dark energy today, a grow or decay with time?

The new data show that if the repulsive force is changing, "it is not changing very rapidly," Riess said.

There is a lot of work ahead.

"Determining these two properties still leaves us very, very far from understanding what dark energy is," sa
a theorist who heads the science division at the STScI. But until these first two parameters are determined
fundamental understanding of the cosmos will remain elusive. It remains possible, for example, that our ur
gravity "is completely lacking," Livio said.

There are other methods for probing dark energy, but none are as developed as the supernova observatio
near term, progress toward understanding dark energy will rely heavily on more observations of exploded
even farther away and deeper in time.

Astronomers worry, however, that if Hubble stops working by around 2007, which would be the case unde
current plan, they would lose their primary tool in the hunt for distant supernovas.

And with NASA's new human spaceflight plans, other useful projects are in jeopardy. Many missions unde
Beyond Einstein initiative, including proposed missions to study dark energy, have taken a budgetary back
programs that will help get humans back on the Moon and on to Mars.

Whatever methods are applied, Anne Kinney, director of NASA's Astronomy and Physics Division, caution
answers on the nature of dark energy will not likely come for a very long time. Science can sometimes be
she said: "You approach, you don't arrive."

- **The Stop-and-Go Universe**

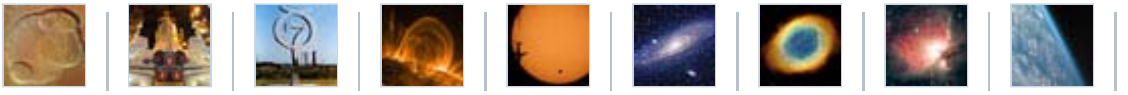
SPACE.com Top Stories

- Cosmic Collisions: A Striking New Planetarium Show
- Spirit Mars Rover In 'Drive Or Die' Situation
- The Moon to be Higher and Lower in 2006
- NASA KSC Takes a Safety Timeout
- Astronomers Detect First Split-Second of the Universe
- Saturn's Ring Spokes Depend on Sun Angle, Study Says
- NASA's Dawn Mission Cancellation Under Review
- Lawmaker Campaigns Against NASA Budget Cuts
- Cosmic 'DNA': Double Helix Spotted in Space
- NASA Seeks Customers for Space Shuttle Runway
- NASA Scrubs Launch of Microsatellite Trio
- Keeping Cool: Europe Adapts Spacesuit Tech for Work on Earth
- Faulty Fuel Tank Sensors Prompt Launch Delay for NASA's Next Shuttle Mission
- Angry Scientists Confront NASA Officials at Conference
- ASTRONOTES: Reality TV Show a Model for Long Space Flights, Former Astronaut Says

LiveScience Top Stories

- Cybugs: Military Mulls Army of Cyborg Insects
- Bacteria vs. Bacteria: The New Fight Against
- Possible Path to Humans for Avian Flu Found
- Greenhouse Gas Hits Record High
- 'American Inventor' Needs Major Tinkering
- Hamster 'Roid Rage
- Ivory-billed Woodpecker Debate Heats Up
- Animations Reveal How Dinosaurs Might Have
- Peace or War? How Early Humans Behaved
- Republicans Happier than Democrats
- New Type of Volcanic Hazard Discovered
- Dinosaur Find Raises Questions about the Ori
- How to Make Your Wife Happy
- Ultrasonic Frogs Croak in Secret
- Nanotech Restores Vision in Hamsters
- DNA Art: Origami Goes Nano

IMAGE GALLERIES, MULTIMEDIA and MORE CLICK ON IM



about us | FREE Email Newsletter | message boards | register at SPACE.com | contact us | advertise | terms of service | privacy statement

XML What is This?