

Nature of universe is still a mystery to Nobel winners

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Saul Perlmutter and Adam Riess of the United States and US-Australian Brian Schmidt won the 2011 Nobel Physics Prize Tuesday for their research on supernovae, the Nobel jury said.

<u>They won the Nobel Prize</u> for changing our understanding of the universe, but their discovery left an even larger mystery -- what is this dark energy that is propelling the universe to expand so fast?



US astronomer Saul Perlmutter, 52, and his one-time competitors Adam Riess and Brian Schmidt shared the Nobel Prize for Physics on Tuesday for their discovery in 1998 that the universe was expanding at an accelerating rate.

Back then, Riess and Schmidt were working at University of California, Berkeley, literally down the hill from a competing team led by Perlmutter at Lawrence Berkeley National Laboratory.

Both groups were analyzing telescope data and were in a race to be first, but also to be right.

By studying dozens of distant supernovae, or <u>stellar explosions</u>, they found that light from the dying stars was weaker than expected, meaning they were further away than thought.

That meant the universe was expanding at an accelerating rate after the <u>Big Bang</u> that created it some 14 billion years ago, and galaxies in the universe are on a path toward ripping apart.

At first, Riess was convinced that he had to be wrong.

"Everybody knew the universe was supposed to be slowing down, not speeding up," the 41-year-old told AFP.

"It took weeks of going through and checking everything over to make sure it wasn't a stupid error. After a few weeks I couldn't find anything that seemed wrong."

Then, the two teams -- the Supernova Cosmology Project led by Perlmutter and the competing High-z Supernova Search team -- started to hear that they were each seeing the same thing.





American physicist Saul Perlmutter, a joint winner of the 2011 Nobel Physics prize, said the Nobel Prize Committee must have had the wrong number because he did not hear the news from them Tuesday that he was a winner.

"Then it got really exciting because we all started thinking that this might be right."

But while Riess shook off the disbelief that surrounded the early days of his discovery, he has since been confronted with an even larger mystery that astronomers and physicists are not sure how to solve.

"Really, we created a bigger question than we answered," said Riess, a professor of astronomy and physics at Johns Hopkins University in



Baltimore, Maryland.

"We discovered that the universe is accelerating and it is filled with dark energy, but the question we created is, 'What is dark energy?' We don't understand the physics of it.

"It seems to live at the nexus between quantum mechanics and general relativity, two of our great theories of physics, but it lives just at that nexus where they don't work together."

Perlmutter told AFP he too is grappling with the enormity of what they found, and did not find.



This undated photo courtesy of Johns Hopkins University in Baltimore, Maryland shows Adam Riess. Riess was awarded the 2011 Nobel Prize in Physics by the Royal Swedish Academy of Sciences.



"It's a mysterious force... it may be three-quarters of all the stuff in the universe is this form and we did not know that before."

Albert Einstein, while crafting his theory of general relativity in 1917, came to believe there was some cosmological constant, a force that opposed gravity and kept the universe from collapsing into itself. Later he dismissed this idea as a major blunder.

According to Perlmutter, more data is needed to narrow down the theoretical alternatives that come into play now that astronomers know the <u>universe</u> is expanding fast.

"It could be that we will have to modify Einstein's theory of relativity," said Perlmutter.

"We need to build new telescopes and instruments to do it," he told AFP. "The ball is in our court again we have to give theorists more data."

<u>Physicists</u> at the Illinois-based Fermilab run by the Department of Energy are gearing up for the launch next year of the Dark Energy Survey, or DES, which uses the Dark Energy Camera, called DECam.

The project will hunt for clues about dark energy "by measuring the distribution of galaxies throughout space, how the gravity of dark matter distorts their shapes, how galaxies cluster and the brightness of exploding stars called supernovae," said Fermilab.

The European Space Agency also plans to launch a space telescope known as Euclid to study dark energy by 2019.

Riess said the Hubble Space Telescope has been a major tool for their



work so far but the NASA project under way to built a more advanced version, the multi-billion dollar James Webb Space Telescope, could propel science further.

"We have struggled theoretically to understand it, so we use telescopes like Hubble now and hopefully the James Webb <u>Space Telescope</u> someday to get the best clues we can about the nature of <u>dark energy</u>," said Riess.

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