Einstein's $E=mc^2$ challenged

One of the very pillars of physics and the theory of relativity – that nothing can go faster than the speed of light – is on shaky ground thanks to a particle discovered by CERN that breaks the light-speed barrier

European researchers said they clocked an oddball type of subatomic particle called a neutrino going faster than 1,86,282 miles per second, long considered the cosmic speed limit.

The claim was met with scepticism, with one outside physicist calling it the equivalent of saying you have a flying carpet. In fact, the researchers themselves are not ready to proclaim a discovery and are asking other physicists to independently try to verify it.

"The feeling that most people have is this can't be right, this can't be real," said James Gillies, a spokesman for the European Organisation for Nuclear Research, or CERN, which provided the particle accelerator that sent neutrinos on their breakneck 454-mile trip underground from Geneva to Italy.

EINSTEIN'S THEORY

Going faster than light is something that is just not supposed to happen according to Einstein's 1905 special theory of relativity — the one made famous by the equation E equals mc2. But no one is rushing to rewrite science yet.

It is "a revolutionary discovery if confirmed," said Indiana University physicist Alan Kostelecky, who has worked on this concept for a quarter of a century. "It's a shock. It's going to cause us problems, no doubt about that – if it's true," said Stephen Parke, who is head theoretician at the Fermilab.

Even if these results are confirmed, they won't change at all the way we live or the way the world works. After all, these particles have presumably been speed demons for billions of years. But the finding will fundamentally alter our understanding of how the universe operates, physicists said.

Einstein's special relativity theory, which says that energy equals mass times the speed of light squared, underlies "pretty much everything in modern physics," said John Ellis, a theoretical physicist at CERN. "It has worked perfectly up until now."

NEUTRINO POWER

CERN reported that a neutrino beam fired from a particle accelerator near Geneva to a lab 730 kilometres away in Italy travelled 60 nanoseconds faster than the speed of light. Scientists calculated the margin of error at just 10 nanoseconds. (A nanosecond is one-billionth of a second.)

Given the enormous implications of the find, the researchers spent months checking and rechecking their results to make sure there were no flaws in the experiment. A team at Fermilab had similar faster-than-light results in 2007, but a large margin of error undercut its scientific significance.

If anything is going to throw a cosmic twist into Einstein's theories, it's not surprising that it's the strange particles known as neutrinos. These are odd slivers of an atom that have confounded physicists for about 80 years.

The neutrino has almost no mass, comes in three different "flavours," may have its own antiparticle and has been seen shifting from one flavour to another while shooting out from our sun, said physicist Phillip Schewe.

THEORY OF RELATIVITY EXPLAINED

Visit the Web link:
http://bit.ly/q14XY4
or
Use a barcode scanner to watch the video on your phone or tablet PC

DISPROVING NEUTRINO SPEED

"Neutrinos theoretically can travel at different speeds depending on how much energy they have. And some mysterious particles whose existence is still only theorised could be similarly speedy," said Columbia University physicist Brian Greene.

Fermilab team spokeswoman Jenny Thomas, a physics professor at the University College of London, said there must be a "more mundane explanation" for the European findings. She said Fermilab's experience showed how hard it is to measure accurately the distance, time and angles required for such a claim. Nevertheless, Fermilab has already begun working to try to verify or knock down the new findings.

And that's exactly what the team in Geneva wants.

Drew Baden, chairman of the physics department at the University of Maryland, said it is far more likely that the CERN findings are the result of measurement errors or some kind of fluke. Tracking neutrinos is very difficult, he said.

"This is ridiculous what they're putting out," Baden said. "Until this is verified by another group, it's flying carpets. It's cool, but..."

So if the neutrinos are pulling this fast one on Einstein, how can it happen? Parke said there could be a cosmic shortcut through another dimension – physics theory is full of unseen dimensions – that allows the neutrinos to beat the speed of light.

If the European findings are correct, "this would change the idea of how the universe is put together," Columbia's Greene said. But he added: "I would bet just about everything I hold dear that this won't hold up to scrutiny." AP

