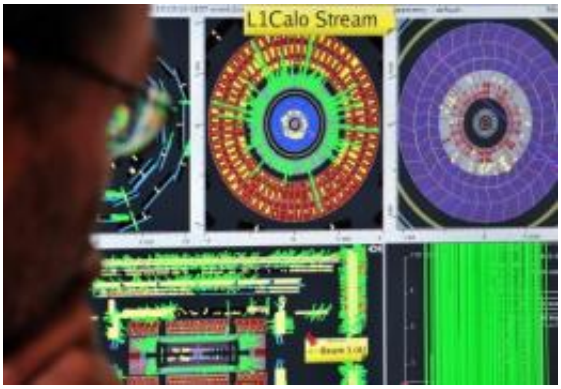
'Faster-than-light' particles fade after cross-check

March 16 2012



A scientist looks at computer screens showing experiments at the European Centre for Nuclear Research (CERN) near Geneva, Switzerland.

Neutrinos do not go faster than light, according to fresh measurements of a test last year that had suggested the particles broke the Universe's speed limit, CERN said on Friday.

The new measurements were made by a team working independently from the scientists who had made the tentative but hugely controversial claim about "faster-than-light" particles.

Their findings "indicate the neutrinos do not exceed the speed of light," the European Centre for Nuclear Research (CERN) said in a press release.

CERN said last month there may have been technical hitches that had skewed the initial measurements, something that critics of the findings said they had always suspected.

The controversy began last September, when CERN's so-called OPERA team cautiously announced that sub-atomic particles called neutrinos had travelled some six kilometres (nearly four) per second faster than the velocity of light, described by Einstein as the maximum speed in the cosmos.

The neutrinos were timed at their departure from CERN's giant underground lab near Geneva and again, after travelling 732 km (454 miles) through the Earth's crust, at their arrival at the Gran Sasso Laboratory in Italy.

To do the trip, the neutrinos should have taken 0.0024 seconds. Instead, the particles were recorded as hitting the detectors in Italy 0.00000006 seconds sooner than expected.

Knowing their findings would stir a storm, the OPERA team urged other physicists to carry out their own checks to corroborate or refute what had been seen.

Visitor to the CERN watch a projection at 'Universe of Particles' exhibition in

Geneva in 2011. Neutrinos do not go faster than light, according to fresh measurements of a test last year that had suggested the particles broke the Universe's speed limit

As part of this verification, an experiment called ICARUS at the Gran Sasso Laboratory took a separate look at the flight of seven neutrinos that had also been recorded by the OPERA team.

It used a new measuring technique, called a liquid argon time projection chamber.

"ICARUS measures the neutrino's velocity to be no faster than the speed of light," said Carlo Rubbia, a Nobel winner and spokesperson for the ICARUS project.

But he and CERN Research Director Sergio Bertolucci stoutly defended the rights of scientists to make exceptional claims and to the rights of others to verify them.

"Whatever the result, the OPERA experiment has behaved with perfect scientific integrity in opening their measurement to broad scrutiny and inviting independent measurements. This is how science works," said Bertolucci.

Rubbia added: "These are difficult and sensitive measurements to make and they underline the importance of the scientific process."

In February, CERN said that the OPERA team were verifying a cable connection and a timing instrument called an oscillator that may have flawed measurements of the neutrinos' flight time.

Strengthening this scenario, Bertolucci said on Friday "the evidence is beginning to point towards the OPERA result being an artefact of the measurement."

But he said further verifications were being made, including new experiments with particle beams in May, "to give us the final verdict."

When the OPERA team went public with their findings, they predictably unleashed a barrage of tough questions.

Particles that travel faster than light would smash a hole in Albert Einstein's 1905 theory of special relativity, a cornerstone of modern physics.

"If this result at CERN is proved to be right, and particles are found to travel faster than the speed of light, then I am prepared to eat my shorts, live on TV," Jim Al-Khalili, a professor of theoretical physics at Britain's University of Surrey, declared at the time.