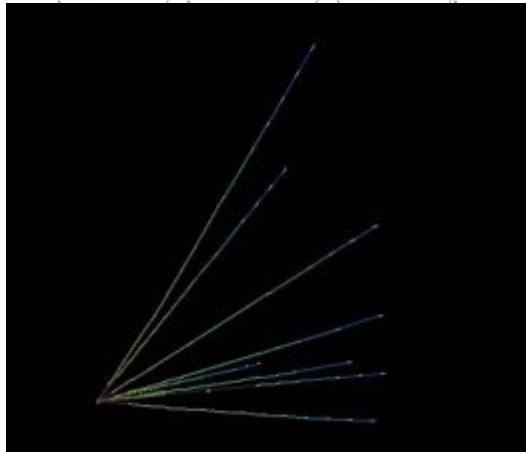


# Oops! Speed of Light May Still Be the Limit

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(Photo credit: CNN)

*By Christopher Cottrell, CNN*

It could have shaken the very cornerstones of modern physics, but (oops!) it experienced some technical difficulties. An experiment suggesting that particles could travel faster than the speed of light had some potential flaws, scientists announced Thursday.

The contemporary understanding of how the universe works is based on Albert Einstein's 1905 Special Theory of Relativity, which says the speed of light is a constant that cannot be exceeded — it's the universe's speed limit. To go beyond it would be to look back in time, the late German physicist said.

Scientists at OPERA — which stands for Oscillation Project with Emulsion-Racking Apparatus — were surprised last year to find that tiny particles called neutrinos were arriving at their destination faster than expected. They were tasked with tracking tiny particles as they soar through 730 kilometers of solid rock between a particle accelerator at CERN in Geneva and the Gran Sasso underground laboratory in Italy.

The team then turned to the scientific community to confirm its results. Several institutions around the world are working to replicate the experiment.

But experts at the European Organization for Nuclear Research (CERN) in Geneva said Thursday that the possible discovery might have been tainted by loose wiring.

Specifically, a loose fiber optic cable that synchronizes an external GPS signal to the master clock of its OPERA experiment might have caused their speed measurements to be off.

This important component, however tiny, helps keep the clock accurate to the nanosecond, or one billionth of a second.

CERN said in a statement Thursday that the clock “may not have been functioning correctly when the measurements were taken,” which could have caused the scientists to underestimate the time of flight of the elusive, faster-than-light neutrinos.

But another possible explanation is that an oscillator used to mark start and stop times for GPS synchronizations — basically, a very accurate stopwatch — malfunctioned and led scientists to overestimate the neutrinos’ flight time.

Either way, CERN says it is planning new tests for May to verify the cause of the mistake and determine just how this would have affected measurements.

“This is the normal process. This isn’t the first time that something could have affected the results,” Marsollier Arnaud, a press officer at CERN, told CNN. “They would like to redo the measurements with these two things properly calibrated.”

Only then will the thinkers at CERN know for sure whether a faulty oscillator or a loose cable affected their results. But even then, their findings will remain mere speculation until confirmed by other scientists.

“Only another measurement by another experiment can confirm or kill the measurements,” Arnaud said. “So even if they do all the checks they want, as long as they’re the only ones doing this measurement, we’ll still have doubts.”

Brian Greene, theoretical physicist at Columbia University, told CNN Light Years earlier this month that while it’s technically possible that neutrinos travel faster than the speed of light, it is very unlikely.

“I would bet just about anything that those experiments will not hold up to the kind of scrutiny that they need to be given to be believed,” Greene said. “There’s a huge amount of experimental evidence against the possibility that something would go faster than the speed of light.”

But Greene added that one of the most remarkable things about theoretical physicists is their ability to come up with new ideas when faced with data that runs afoul of widely accepted beliefs.

“They need to have completely independent confirmation by a separate experiment, ideally using different experimental methods,” Greene said. “And if that were to happen, that would make many of us sit up in our chairs, or maybe even fall off our chairs.”

In the meantime, CERN said there is enough to do to prepare for May.

“It’s a complicated experiment — there are many cables, computers and clocks and all these things,” Arnaud said.

– *CNN’s Elizabeth Landau contributed to this report.*