Gee Whizzz! Basics on faster-than-light research

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Map shows path of subatomic beam from Geneva, Switzerland to Gran Sasso, Italy

Some questions and answers about the experiment that appeared to show particles speeding faster than light.

Q. What is being reported?

A. Over the past two years, Europeans scientists observed more than 15,000 particles called neutrinos shot from Geneva through Earth's crust to an underground lab 454 miles away in Italy. They found that the particles appeared to travel just a tiny bit faster than the speed of light -

just 20 parts per million faster. That was a surprise because the speed of light, about 186,000 miles per second, is supposed to be the fastest anything can move.

Q. Why has this caused such a stir?

A. It threatens Einstein's special theory of relativity, a bedrock of modern physics that Albert Einstein produced in 1905. That theory sets the speed of light as the cosmic speed limit for material objects, although it's better known for the equation E equals mc2, which basically says mass and energy can be changed into each other. If that theory is proven wrong, it could dramatically shake up our understanding of basic laws of the universe.

Q. And would that affect my daily life?

A. Not for now. It's impossible to say what unknown physical effects might be exploited, and how. The findings - even if proven - may end up as nothing more than a footnote in physics textbooks, or they could lead to new technological breakthroughs. As one skeptic jokingly said, if it's real, people "could use `neutrinomail' rather than email. It's faster."

Q. How likely is it that this finding is correct?

A. Experts are skeptical. Einstein's relativity theory has withstood a lot of experimental tests over the years. The scientists who reported the finding say they're still looking for flaws in their experimental procedures, and they've asked other labs to try to duplicate the results.

Q. What kind of flaws could there be?

A. The measurement is very complex, and all kinds of factors can enter in. For example, when the results were formally presented at a seminar

Friday, a scientist in the audience suggested that the position of the moon could make a difference, because its gravity can deform the terrestrial crust through which the neutrinos passed. A spokesman for the researchers said that didn't appear to be a problem.

Q. So what happens now?

A. Scientists at Fermilab in Illinois have already started planning their own experiment. They have some experience. In 2007, they got a similar result, but the margin of error in their measurements was too big to make a definitive claim.