Rare find backs shape-shifting neutrino

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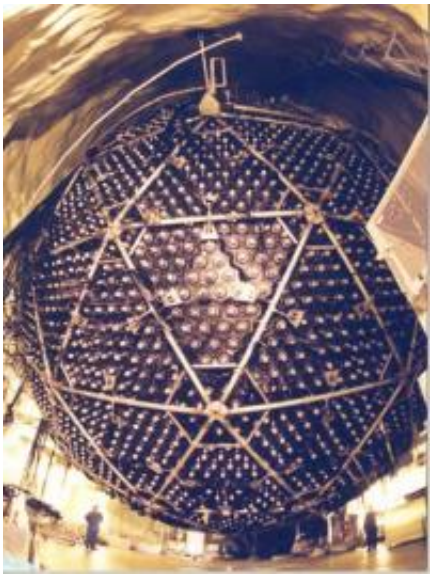

The Sudbury Neutrino Detector. Credit: A. B. McDonald (Queen's University) et al., The Sudbury Neutrino Observatory Institute

Physicists announced further proof Wednesday for a theory that mysterious particles called neutrinos which go "missing" on the journey from the Sun to Earth are in fact shape-shifting along the way, arriving undetected.

The evidence: a muon-type neutrino dispatched from the CERN research laboratory near Geneva had arrived as a tau neutrino at the INFN Gran Sasso Laboratory in Italy, 730 kilometres (450 miles) away, they said in a statement.

It is only the third time that the mutation has been observed by the OPERA experiment, an international project launched in 2001 specifically to detect the bizarre change.

"Its observation confirms something scientists have been studying for more than 40 years: the fact that neutrinos induced by cosmic rays impinging on the Earth atmosphere arrive far fewer than expected," said the statement.

A Nobel-winning 1969 hypothesis shed light on the mystery by suggesting the subatomic particles were in fact changing type.

There are three types, or "flavours," of neutrino—an electrically-neutral subatomic particle that rarely interacts with matter.

Under the prevailing Standard Model of physics, neutrinos cannot have mass, but the outcome of the experiment suggests that in fact they do.

For the OPERA experiment, a beam of neutrinos produced at CERN is sent to the Gran Sasso underground laboratory, which houses a 4,000-tonne detector.

The detector scans the arriving particles for tau neutrinos, knowing that only muons had set out from CERN.

Finding a tau neutrino proves that "oscillation" or change happened along the way.

OPERA detected its first tau neutrino in 2010 and the second in 2012.

The observation of a third tau neutrino "is an important confirmation of the two previous observations", OPERA scientists Giovanni De Lellis said in a statement.

"From a statistical point of view, the observation of three tau neutrino candidates provides the evidence of oscillations in the muon-to-tau neutrino channel."

The search for tau neutrinos will continue for another two years, said the statement.

More information: www.infn.it/news/newsen.php?id=663