OPERA experiment reports anomaly in flight time of neutrinos from CERN to Gran Sasso.

Geneva, 16 September 2011. The OPERA[1] experiment, which observes the CNGS neutrino beam from CERN 730 km away at Italy's INFN Gran Sasso Laboratory, has completed a complex three-year analysis that shows neutrinos arriving sooner than they should. The measurements indicate that the neutrinos from CERN's SPS accelerator arrive 60 nanoseconds earlier than the 2.4 milliseconds they are expected to take to cover the distance travelling at the speed of light. OPERA's results will be presented in a seminar at CERN this afternoon at 16:00 CEST, preceded by a press briefing at 15:00 CEST. Both will be webcast at http://webcast.cern.ch. Journalists wishing to ask questions during the press briefing can do so via twitter to @CERN.

The OPERA result is based on the observation of over 15000 neutrino events measured at Gran Sasso, indicating neutrinos travelling at a velocity that is 20 parts per million above the speed of light.

"This result comes as a complete surprise," said OPERA spokesperson, Antonio Ereditato. *"After many months of studies and cross checks we have not been able to explain the effect in terms of known systematic uncertainties. OPERA researchers and the entire community of particle physicists will have to conduct additional studies with the aim of confirming the result and investigating the nature of the observed effect."*

In order to perform this study, the OPERA Collaboration teamed up with experts in metrology from CERN and other institutions to perform a series of high precision measurements of the distance between the source and the detector, and of the neutrinos' time of flight. The distance between the origin of the neutrino beam and OPERA was measured with an uncertainty of 20 cm over the 730 km travel path. The neutrinos' time of flight was determined with an accuracy of less than 10 nanoseconds by using sophisticated instruments including advanced GPS systems and atomic clocks. The time response of all elements of the CNGS beam line and of the OPERA detector has also been measured with great precision.

"The potential impact on science is too large to draw immediate conclusions or attempt physics interpretations. My first reaction is that the neutrino is still surprising us with its mysteries." said Ereditato. *The seminar of today is meant to invite scrutiny from the broader particle physics community."*

The OPERA experiment was inaugurated in 2006, with the main goal of studying the rare transformation (oscillation) of muon neutrinos into tau neutrinos. One first such event was observed in 2010, proving the unique ability of the experiment in the detection of the elusive signal of tau neutrinos.

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[1] The OPERA detector has been designed and is being operated by a team of researchers from Belgium, Croatia, France, Germany, Israel, Italy, Japan, Korea, Russia, Switzerland and Turkey. The experiment constitutes a complex scientific enterprise that has been realised thanks to the skill of a large number of scientists, engineers, technicians and students, and with the strong commitment of the various actors of the project. In particular we mention the LNGS/INFN and CERN laboratories, and the major financial support of Italy and Japan with substantial contributions from Belgium, France, Germany and Switzerland. The Collaboration presently includes about 160 researchers from 30 institutions and 11 countries: