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Neutrino Experiment in Japan Starts Operation

Canada a Key Contributor

(Vancouver, B.C.) — At 19:09 (JST) on April 23, the Tokai to Kamioka (T2K) long baseline neutrino oscillation experiment confirmed the first production of neutrino beams by observing the muons produced by the proton beam in the neutrino facility at Japan Proton Accelerator Complex (J-PARC). Canada is a key contributor to this premier international science project.

“I am extremely happy to announce the commencement of T2K,” said KEK Professor Takashi Kobayashi, the acting spokesperson of the experiment. “The idea of T2K to search for muon neutrinos to electron neutrinos appearance originated from Totsuka-san and Nishikawa-san in 1999 and the history of the T2K collaboration dates back to 2001, when the first Letter of Intent was published. Today marks the start of our journey to a new realm of neutrino oscillation observations.”

Canadian scientists have been involved with T2K since its inception and are making key contributions to the experiment which will send a beam of muon neutrinos 295 km across Japan to see how their properties evolve. The T2K experiment is mounted by an international team of 400 physicists from 12 countries. The Canadian contributions to the T2K beam line include the off-axis beam design concept (a trick to get higher beam intensities at the correct energies), the proton beam transport scheme from the accelerator to the target, and the beam monitoring device which monitors critical properties of the incoming proton beam just before it strikes the target. Also, TRIUMF-based technology was used to provide remote handling systems for the maintenance of the final focus beam monitors, the target, and the horn system.

Canada is also making a major contribution to the near-detector complex of the experiment which will analyze the properties of the neutrinos prior to their journey across Japan. Currently, the T2K-Canada collaboration includes about 25 scientists, 25 technical staff, and 10 students from the University of Alberta, University of British Columbia, University of Regina, University of Toronto, York University, and TRIUMF who are funded by the Natural Sciences and Engineering Research Council and the National Research Council.

“The neutrino is perhaps the most elusive particle in the universe,” said Nigel S. Lockyer, director of TRIUMF, Canada’s national laboratory for nuclear and particle physics. “This project moves us one step closer to understanding the role of the neutrino in the early universe. This is a great success for the international community and for Canada, and it builds upon the tremendous achievements of SNO in the study of neutrinos.”

Neutrinos are elementary particles that belong to a category called leptons. Three types of neutrinos are known: electron neutrinos, muon neutrinos, and tau neutrinos. In 1998, the late Professor Yoji Totsuka, along with the Super-Kamiokande collaboration, first discovered a phenomenon called neutrino oscillation. They measured the ratio of muon neutrinos to electron neutrinos produced in the upper atmosphere by high energy cosmic rays. The ratio of the two types of neutrino varied as a function of the length of the flight path from their generation, which matched with a theoretical calculation of neutrino oscillation with finite masses.

J-PARC is a world-class high intensity proton accelerator research complex, which is jointly built by KEK and Japan Atomic Energy Agency (JAEA). The main ring of J-PARC successfully accelerated proton beams to 30 GeV in December.

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FOR EDITORS:

TRIUMF is Canada's national laboratory for particle and nuclear physics. Physically located on the south campus of the University of British Columbia, TRIUMF is owned and operated as a joint venture by a consortium of the following Canadian universities, via a contribution through National Research Council Canada and supported by the Province of British Columbia: University of Alberta, University of British Columbia, Carleton University, University of Manitoba, l'Université de Montréal, Simon Fraser University, University of Toronto, and University of Victoria. See <http://www.triumf.ca>.

T2K-Canada is a collaboration of about 50 scientific and technical members from across Canada and 10 students. The collaboration includes the University of Alberta, University of British Columbia, University of Regina, University of Toronto, York University, and TRIUMF. Their work is funded by the Natural Sciences and Engineering Research Council and the National Research Council. See <http://t2k-canada.nd280.org/>.

TRIUMF is operated as a Joint Venture by:

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