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NEUTRINO WEIGHT WATCHERS AWARDED PHYSICS NOBEL PRIZE

Vancouver, BC – Today, the Royal Swedish Academy of Sciences awarded the 2015 Nobel Prize in Physics to University of Tokyo (Kashiwa, Japan) Professor Takaaki Kajita of the Super-Kamiokande (Super-K) Collaboration, and Queen's University (Kingston, ON) Professor Emeritus Arthur B. McDonald of the Sudbury Neutrino Observatory (SNO). The Academy commended the duo “for the discovery of neutrino oscillations, which shows that neutrinos have mass” which “has changed our understanding of the innermost workings of matter.”

Produced in copious quantities by the Sun, neutrinos are elementary particles that interact extremely weakly with matter, travelling through the entire Earth with ease. The Super-K and SNO collaborations were able not only to detect many neutrinos but also to determine unambiguously that they have a tiny mass, in direct contradiction to the Standard Model of particle physics where neutrinos are postulated to be massless. They accomplished this by determining that the neutrinos switched (or “oscillated”) between their three different types (or “flavours”), which can happen only if they have mass. This solved a decades-old particle physics mystery known as the solar neutrino problem as well as providing the first direct evidence for particle physics not explained by the Standard Model.

In 1998, Kajita studied neutrinos created in reactions between cosmic rays and the Earth's atmosphere and discovered that the neutrinos actually oscillated between two of flavours on their way to the Super-K detector. Meanwhile in a nickel mine in Sudbury, ON, the SNO research group led by McDonald was studying neutrinos coming from the Sun. They demonstrated that the neutrinos were in fact not disappearing on their way to Earth, but also oscillated to another flavour before arriving at their detector.

McDonald was principal investigator of the SNO experiment and the Lab Director from its inception in 1989. In his career, McDonald had been an influential presence in Canadian physics, including being the Queen's University representative on TRIUMF's Board of Management from 1998 to 2002, and serving on many committees, like TRIUMF's Experiments Evaluation Committee. TRIUMF Director Jonathan Bagger praised McDonald's accomplishment: “TRIUMF and the whole of Canada's scientific community are absolutely thrilled with this well-deserved recognition. Art's accomplishment is a great source of pride for all who played a part in this great Canadian success story.”

Both efforts were global collaborations involving institutes from around the world, including TRIUMF, which contributed scientists, students, engineers, and technicians, as well as parts and components. TRIUMF has had a long connection to its fellow Canadian laboratory at SNO. Canada was the first international partner to join the related Japanese T2K neutrino collaboration.

Several key questions about the nature of the neutrino need to be answered before new theories beyond the Standard Model can be fully developed. What are the neutrinos' masses? Why are they so lightweight? Are there more types than the three currently known? Are neutrinos their own antiparticles? Why are they so different from other elementary particles? Neutrino

experiments continue worldwide in order to capture neutrinos and examine their properties. TRIUMF continues to pursue next-generation neutrino experiments through our ongoing collaborations with T2K and SNO's successor, SNOLAB.

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http://www.nobelprize.org/nobel_prizes/physics/laureates/2015/press.html

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About TRIUMF

TRIUMF is Canada's national laboratory for particle and nuclear physics. 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 the National Research Council Canada and building capital funds from the Government of British Columbia: University of Alberta, University of British Columbia, University of Calgary, Carleton University, University of Guelph, University of Manitoba, McGill University, McMaster University, Université de Montréal, University of Northern British Columbia, Queen's University, University of Regina, Saint Mary's University, Simon Fraser University, University of Toronto, University of Victoria, Western University, University of Winnipeg, York University. See <http://www.triumf.ca> and follow us @TRIUMFLab.

About the Nobel Prize®

This year marks the 275th anniversary of The Royal Swedish Academy of Sciences. The Academy was founded in 1739 and is an independent organization whose overall objective is to promote the sciences and strengthen their influence in society. The Academy takes special responsibility for the natural sciences and mathematics, but endeavours to promote the exchange of ideas between various disciplines.

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