Next Questions in Neutrino Physics and the NOvA Experiment

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Refreshments at 3:45PM
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Abstract

The discovery of neutrino mass in 1998 spawned a world-wide effort to better understand neutrino properties using neutrinos from the Sun, the atmosphere, reactors, and from accelerators. While much has been learned since then, several important questions remain: which neutrino is heaviest? Is there a symmetry in neutrino mixing? Do neutrinos break matter/antimatter symmetry? Is the framework we use to understand neutrinos complete or is there more? The NOvA experiment is designed to address each of these remaining questions and has recently completed construction and begun operations. I will summarize the important factors that guided the NOvA design, show some highlights from construction, and present the first results from measurements of muon neutrino disappearance and electron neutrino appearance from the experiment.

Biographical Information

Professor Mark Messier is an experimental physicist who studies the basic properties of a class of fundamental particles called neutrinos. He is the co-spokesman of the NOvA experiment at Fermilab.

Prof. Messier began his studies of neutrinos at Boston University working on the Super-Kamiokande experiment in Japan. His doctoral thesis, “Evidence for Oscillations of Atmospheric Neutrinos with Super-Kamiokande”, and accompanying paper in Physical Review Letters documented the first conclusive evidence that neutrinos have a non-zero mass. This paper ranks among the 25 most cited experimental and theoretical results in high energy physics.

After completing his doctoral work, Prof. Messier worked on the MINOS and MIPP experiments at Fermilab as a Research Fellow at Harvard University and joined the faculty at Indiana University in 2002. Messier’s early work to develop the NOvA experiment concept earned recognition with a Department of Energy Outstanding Junior Investigator award and he is a fellow of the American Physical Society.