

“Advancing Long-Baseline Neutrino Beam Experiments to Probe New Physics”

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Engineering 100

Abstract

Neutrinos are fundamental particles with no electric charge and as-yet-unmeasured masses, allowing them to travel unimpeded through enormous amounts of material. Despite their elusiveness, a lot of compelling evidence shows that neutrinos have non-zero masses and change from one flavor to another. Intense neutrino beams generated by particle accelerators are now being used in order to more precisely probe the physics of neutrino masses and mixing. As an example of a current neutrino beam project, it will focus on the Tokai-to-Kamioka (T2K) experiment in Japan. T2K has uncovered hints that neutrinos and their anti-particles might not oscillate with the same probabilities, a possible indication of CP-violation. This talk will also discuss improvements being made in future long-baseline neutrino experiments, such as DUNE and Hyper-Kamiokande, including higher intensity beams, hadron production experiments to better predict the beam fluxes, larger far detectors, and more capable near detectors.

Biography

Alysia Marino is a Professor and the Jesse L. Mitchell Endowed Chair in Experimental Physics in the Department of Physics at the University of Colorado Boulder. Her research background is in experimental particle physics, and particularly in neutrino physics. She began her career studying solar neutrinos as a graduate student at the University of California at Berkeley on the Sudbury Neutrino Observatory, and then moved into studying neutrino properties using accelerator-generated neutrino beams. She has worked on several long-baseline oscillation experiments including MINOS, T2K, and DUNE. She is also a collaborator on the NA61/SHINE experiment at CERN, which aims to improve our knowledge of the flux produced in neutrino beams.