

PRISMA+ Colloquium

May 31, 2023 at 1 p.m.
Lorentz-Raum, 05-127, Staudingerweg 7

Prof. Robert Wilson
Colorado State University, USA

Short-Baseline Neutrino Program at Fermilab: Physics Beyond the Standard Model

Forty years ago as an undergraduate contemplating graduate school in high energy physics, the referent declined a research assistantship to work on a neutrino experiment because neutrinos weren't interesting ... they were massless and weakly interacting so produced frustratingly few events to analyze even in massive detectors. How things have changed! The more we learn, the more we realize the importance of the most abundant known matter particle in the universe. In the decades since my naïve snubbing of this intriguing particle we have developed a well-established three-flavor paradigm that may help explain the matter-antimatter asymmetry of the universe. Yet beyond that, a few intriguing measurement "anomalies" hint at the existence of something stranger still, a neutrino that does not interact via any known forces except gravity, a sterile neutrino.

Robert Wilson will give a brief overview of the results that motivated a definitive search for sterile neutrinos with a mass in the 1 eV/c² range – the Short-Baseline Neutrino program at Fermi National Accelerator Laboratory. He will describe the physics sensitivity and the detectors that will measure the appearance of electron-type neutrinos in a muon-type neutrino beam using massive liquid argon time-projection chambers with an emphasis on the 760-ton far detector developed by the ICARUS collaboration. Operating both in Italy's Gran Sasso underground laboratory and now at Fermilab, this detector demonstrated the viability of the technology for large-scale experiments such as the international Deep Underground Neutrino Experiment (DUNE).