



The Most Abundant Particle in the Universe is a Shapeshifter

The ghostly neutrino is the most abundant identified matter particle in the universe, yet it is unknown to most people. Trillions pass through our body every second. Experiments carried out over the past half century have slowly revealed that neutrinos have three types, or flavors, and have the strange quantum property that they can transform from one flavor into another; a dramatic discovery recognized by several Nobel prizes in physics. In the next generation of experiments this “identity shifting” property of neutrinos will allow us to investigate the source of matter-antimatter asymmetries —a step toward unraveling the mystery of matter generation in the early Universe.

I will give an overview of the fundamental properties of the neutrino, including the phenomenon of flavor oscillations, and the key experiments that have led us to our current understanding. I will end with a description of future experiments with a focus on the US-hosted international Deep Underground Neutrino Experiment (DUNE) based on the Liquid Argon TPC technology, pioneered by the ICARUS experiment presently taking data at Fermilab.

About the speaker:

Robert Wilson is a Professor of Physics and Professor Laureate of the College of Natural Sciences at Colorado State University and is currently a visiting researcher at INFN Padova. He received his BSc. in Physics and Mathematics at the University of London in the United Kingdom, and his MS and PhD degrees at Purdue University in the United States followed by post-doctoral training at the Stanford Linear Accelerator Center in California. He was co-Spokesperson of the collaboration that led to the Deep Underground Neutrino Experiment (DUNE) and was Deputy Spokesperson of the ICARUS collaboration led by Carlo Rubbia, which is now taking data at the Short-Baseline Neutrino program at Fermilab.

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