



SPEAKER: Anselmo Cervera Villanueva

TITLE: **The DUNE experiment: neutrinos as a gateway to the origin of matter**

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PLACE: 500-1-001 - Main Auditorium

ABSTRACT

The Deep Underground Neutrino Experiment (DUNE) is a leading-edge, international experiment for neutrino science and proton decay studies. Discoveries over the past half-century have put neutrinos, the most abundant matter particles in the universe, in the spotlight for further research into several fundamental questions about the nature of matter and the evolution of the universe — questions that DUNE will seek to answer. DUNE will consist of two neutrino detectors placed in the world's most intense neutrino beam. One detector will record particle interactions near the source of the beam, at Fermilab. A second, much larger, detector will be installed more than a kilometer underground at the SURF laboratory, in South Dakota — 1,300 kilometers downstream of the source. These detectors will enable scientists to search for new subatomic phenomena and potentially transform our understanding of neutrinos and their role in the universe: could neutrinos be the reason that the universe is made of matter rather than antimatter? are there sterile neutrinos? could neutrinos from a core-collapse supernova in the Milky Way allow us to peer inside a newly-formed neutron star and potentially witness the birth of a black hole? DUNE far detectors will use the novel Liquid Argon TPC technology, which allows very big detectors — 70.000 tons of Liquid Argon at 87 K— with millimeter scale 3D precision and excellent calorimetric and particle identification capabilities. An ambitious prototyping program is being carried out at CERN, with two large prototypes, the first of which started data taking in September in 2018.