DUNE: The Deep Underground Neutrino Experiment

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Neutrinos are the second most numerous type of particle in the Universe. These almost “invisible” particles are incredibly difficult to detect, passing freely through matter. However, as a result of a series of innovative large experiments in the last 20 years, we have learnt a great deal about neutrinos. For example, we now know that neutrinos have a mass, providing clear evidence for physics beyond the our current understanding. This achievement was recognized through the award of the 2015 Nobel prize for physics to the leaders of the SNO and Super-Kamiokande experiments. The Deep Underground Neutrino Experiment (DUNE) is the next step in this decades long experimental programme. DUNE will address profound question in neutrino physics and particle astrophysics - it aims to do for neutrinos what the LHC did for the Higgs boson. DUNE consists of an intense neutrino beam fired a distance of 1300 km from Fermilab (near Chicago) to the 40,000 ton Liquid Argon DUNE detector, located deep underground in the Homestake mine in South Dakota. In this colloquium I will discuss why the mysterious neutrino may hold the key to understanding physics beyond the current Standard Model and describe how we intend to study neutrinos with unprecedented precision in the DUNE experiment