Daniel Pershey – HEP Seminar - December 1, 2022
Duke University

Title:
Using the DUNE experiment as a galactic neutrino telescope

Abstract:
The Deep Underground Neutrino Experiment (DUNE) will be a flagship neutrino experiment and probe deep questions such as the nature of the neutrino mass. In this talk, we discuss the astrophysics questions DUNE will answer by observation of neutrinos produced across the galaxy and universe highlighting the importance of neutrinos in multi-messanger astronomy. Deep underground, DUNE will make precision measurements of these rare neutrino processes at a level not yet seen.

Among these topics, detection of a burst of supernova neutrinos released in the final moments of a massive star's life is covered. DUNE will monitor neutrino production and emission in such a violent explosion and offer a clear description of the exotic stellar interior as it transitions into either a neutron star or black hole. We also study neutrinos produced from fusion reactions within the sun. Solar neutrinos have been detected and studied on Earth for the past 70 years and were instrumental in discovering neutrino oscillations, but open questions about the solar flux still remain. We will also briefly discuss neutrino cross section measurements vital to the success of DUNE's astrophysics goals that are currently being surveyed by the COHERENT experiment.