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The Calibration Of The Most Precise LArTPC Detector Ever To Be Built –DUNE

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The Deep Underground Neutrino Experiment, DUNE, is a next-generation, long-baseline, neutrino experiment and flagship project of the U.S. It is poised to perform some of the most precise measurements of the properties of neutrinos to elucidate their role in the outstanding matter-antimatter asymmetry. DUNE will make use of the most intense neutrino beam, produced at the Fermi National Accelerator Laboratory, and which is directed at its Far Detector (FD) located 800 miles away and a mile underground at the Sanford Underground Research facility in Lead, South Dakota.
At a nominal 70 kilotons of liquid argon in four identical modules, the DUNE far detector will be the largest Liquid Argon Time Projection Chamber (LArTPC)-based neutrino observatory in the world. The level of precision required to answer the questions sought after by DUNE results in unprecedented requirements in our understanding of the detector response. We must, therefore, carefully address various systematic uncertainties, particularly those in position and energy reconstruction of neutrino interactions and their byproducts. I will talk about the challenges involved in calibrating the largest LArTPC ever to be built and elaborate on the novel calibration systems, tailored for DUNE, to provide the precision required to achieve future breakthrough discoveries.

Neutrino Properties

3

Neutrino Telescopes & Multi-messenger

2

Neutrino Theory & Cosmology

4

Data Science and Detector R&D

1

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