



Jonathan Stone

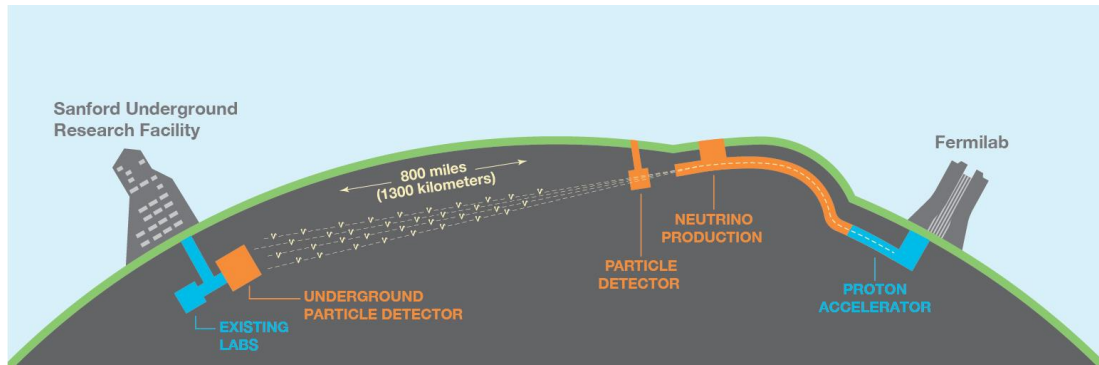
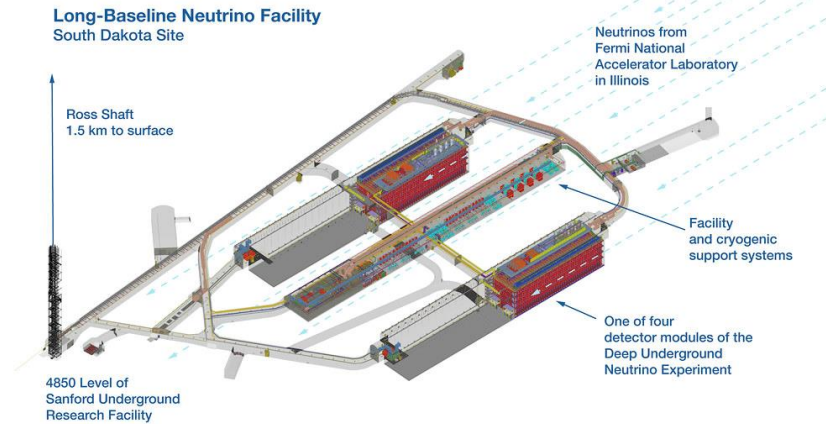
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Project: Lifting Mechanism for DUNE CRPs
Advisor(s): Prof. Franklin Miller
Sponsor: DUNE (Cern and Fermilab)



Background



- The Deep Underground Neutrino Experiment (DUNE) aims to explore oscillations in neutrinos. In the experiment, a beam of neutrinos will be sent from Fermilab in Illinois, through the Earth, to a large cryostat filled with liquid argon and neutrino sensors at the Sanford Underground Research Facility in South Dakota.
 - Inside the cryostat, 160 sensors will be placed with less than 5mm of space between them.
 - Neutrinos exist in three types, known as flavors: Muon, Tau, and Electron.
 - Neutrinos switch between these flavors through a process called oscillation.
- The sensors used for this experiment measure 3m by 3m and weigh 255 kg each.
 - Sensors will be installed on both the ceiling and floor of the cryostat.
 - Due to their large size and weight, the installation process prioritizes safety and efficiency, ensuring that the lifting system is user-friendly and includes safety features.



Project Goals

- The purpose of the Charge Readout Plane (CRP) installation control system is to ensure the safe, efficient, and precise installation of CRPs. The system manages the vertical lifting of each CRP using a winch, while stepper motors and a screw jack control the fine-tuned adjustment of the tines to ensure accurate placement on a truss.
- Each CRP is lifted 1.2 meters above the false floor and placed onto a truss for cable connection.
- It provides operators with a user-friendly interface via a console equipped with a joystick, selector switches, and indicators. The system incorporates safety features like limit switches, fuses and emergency stops to protect both the equipment and personnel.
- The system enhances operational safety, improves installation accuracy, and ensures compliance with industry standards for electrical and mechanical systems.

