Proposal Summary

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The DUNE experiment is a next generation long baseline neutrino oscillation experiment employing a 1300 km baseline and an on-axis neutrino beam in order to measure precisely all neutrino oscillation parameters including CP violation and the mass hierarchy order. The on-axis mostly muon neutrino/antineutrino beam is produced at Fermilab and aimed at the Homestake mine in South Dakota. The beam will be characterized by the near detector complex while evidence of neutrino/antineutrino flavor transmutations will be recorded by the Far Detector. The DUNE far detector technology will be liquid argon time projection chamber (LAr TPC) which has been first developed in Europe more than 2 decades ago. This technology is very promising but there are some necessary steps to ensure the success of DUNE. These are being addressed mostly by the ProtoDUNE prototype program with main goal to characterize the response of a DUNE scale LAr TPC for various species of particles with kinematic range relevant for DUNE. Furthermore, ProtoDUNE will develop and test new reconstruction and particle identification (PID) techniques. In addition to ProtoDUNE, the Far Detector (FD) Cold Electronics (CE) consortium will address issues related to the FD electronics. The FD CE consortium is tasked with developing hardware that will allow DUNE to reach its full physics potential.

The first half of 2019 will be a very busy time for both the FD CE consortium and ProtoDUNE. Most of the hands-on work will take place at Fermilab where one can work closely with collaborators on both projects. For the duration of the fellowship I propose to collaborate with colleagues at Fermilab on developing testing procedures and software which will be initially used to decide on the final electronics design for DUNE. This will be further informed by studying the performance of ProtoDUNE-SP. In addition, I propose to develop strategies for calibration of the then newly collected ProtoDUNE-SP beam data and use it for physics measurements.