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European Contributions to Fermilab Accelerator Upgrades and Facilities for the DUNE Experiment

The Proton Improvement Plan (PIP-II) to the FNAL accelerator chain and the Long-Baseline Neutrino Facility (LBNF) will provide the world's most intense neutrino beam to the Deep Underground Neutrino Experiment (DUNE) enabling a wide-ranging physics program. This document outlines the significant contributions made by European national laboratories and institutes towards realizing the first phase of the project with a 1.2 MW neutrino beam. Construction of this first phase is well underway. For DUNE Phase II, this will be closely followed by an upgrade of the beam power to > 2 MW, for which the European groups again have a key role and which will require the continued support of the European community for machine aspects of neutrino physics.

Beyond the neutrino beam aspects, LBNF is also responsible for providing unique infrastructure to install and operate the DUNE neutrino detectors at FNAL and at the Sanford Underground Research Facility (SURF). The cryostats for the first two Liquid Argon Time Projection Chamber detector modules at SURF, a contribution of CERN to LBNF, are central to the success of the ongoing execution of DUNE Phase I. Likewise, successful and timely procurement of cryostats for two additional detector modules at SURF will be critical to the success of DUNE Phase II and the overall physics program.

The DUNE Collaboration is submitting four main contributions to the 2026 Update of the European Strategy for Particle Physics process. This paper is being submitted to the 'Accelerator technologies' and 'Projects and Large Experiments' streams. Additional inputs related to the DUNE science program, DUNE detector technologies and R&D, and DUNE software and computing, are also being submitted to other streams.

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