

The Phase II of the DUNE Experiment: Scientific Opportunities, Detector Concepts and Technological Challenges

DUNE Collaboration

April 2023

1 A Staged Program for the DUNE Experiment

1.1 The DUNE Project and the Elements of DUNE Phase II

1.2 Long-baseline Neutrino Oscillation Physics with DUNE Phase II

1.3 Neutrino Astroparticle Physics with DUNE Phase II

1.4 Beyond the Standard Model Physics with DUNE Phase II

2 The DUNE Phase II Far Detector

2.1 Baseline Concept

2.2 Potential Enhancements

2.2.1 Improved Readout Schemes

2.2.2 Low-Background Configurations

2.3 R&D Roadmap

3 The DUNE Phase II Near Detector

3.1 Baseline Concept

3.2 R&D Roadmap

4 Summary