

## Detectors for leptonic CP violation at the Neutrino Factory

Studies carried out in the framework of the International Design Study for the Neutrino Factory (the IDS-NF) show that the sensitivity to the CP violating phase and the last unknown mixing angle  $\theta_{13}$  is maximised when two far detectors optimized to detect the sub-leading  $\nu_e$  to  $\nu_\mu$  oscillation are combined. Several technologies are being discussed for these detectors: magnetised iron calorimeters; giant liquid argon TPCs; and totally active scintillating detectors. The IDS-NF baseline option, a compromise between feasibility, cost, and performance, is documented in the Interim Design Report (IDR) that has recently been completed. It consists of two magnetised iron sampling calorimeters, similar to the existing MINOS detector, but with 10-20 times more mass and improved performance. A detector of mass 100 kton is assumed at the intermediate baseline (between 2500 km and 5000 km) and a 50 kton detector at the long baseline (between 7000 km and 8000 km). The other far-detector options, which have better granularity may be able to detect additional oscillation channels, thus improving the overall performance of the facility. However, these options are likely to be more expensive and require significant R&D. A near detector of much smaller mass for precise measurement of neutrino flux and neutrino cross sections will be situated close to the end of the muon storage ring straight section. The various detector options will be discussed, covering the most important aspects—performance and technological challenges—as well as the R&D program and cost drivers.

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