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The DUNE near detector

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The Deep Underground Neutrino Experiment (DUNE) aims to make precise measurements of the neutrino oscillation parameters. In particular, the measurement of CPV in neutrinos requires the systematic uncertainty be within few percent level. In order to highly constrain the flux, cross section and detector systematics, DUNE near detector is designed to be a robust system including various complementing sub-systems utilizing different technologies.

The DUNE near detector is considered to be comprised of a liquid argon TPC system, which employs the same nuclear target as the far detector, a high pressure gaseous argon system, which can give us opportunity to look closer to the neutrino interaction with lower detection threshold and charge separation, and a 3D projection scintillator tracker spectrometer, which provides a different nuclear target to tune the A -dependent nuclear model as well as neutron detection and beam monitoring in a magnetic field. In addition, the DUNE near detector system is considered to be movable to a number of off-axis positions. By doing so, reliance on the neutrino interaction models can be greatly reduced.

In this talk, the reasoning and design of the DUNE near detector system will be presented and various beam tests with different sub-systems will be shown.

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