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Future neutrino physics using the upgraded ND280 detector of the T2K experiment

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The T2K experiment is moving towards the T2K-II phase. The plans for T2K-II foresee an increase of the beam power and an upgrade of its near detector ND280 in 2022. The aim is to increase the statistics while reducing at the same time the systematic error from 6% to 4%. This will enable T2K to significantly improve the recently published first measurement of δ_{CP} which indicates the observation of matter antimatter asymmetry in the leptonic sector.

The ND280 upgrade concept consists on the installation of several new sub-detectors: two time-projection-chambers to measure tracks at high angle (HA-TPCs) and a fully active Super-Fine-Grained-Detector (Super-FGD) both fully surrounded by six time-of-flight (TOF) panels.

The new sub-detectors will not only increase the angular detection efficiency making it more similar to that in the far detector, Super Kamiokande, but will have some features which will allow achieving a deeper understanding of the neutrino interactions. Among other improvements, the upgraded ND280 will have 3D tracking capabilities, improved timing information, lower proton detection threshold and the ability to detect neutrons released in the interaction.

Overall, the upgraded ND280 is expected to significantly boost its current performance. In this talk the motivation, status and physics benefits of the upgraded ND280 detector will be presented.

Collaboration name

T2K collaboration

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