DETERMINATION OF THE θ_{23} OCTANT IN THE DEEP UNDERGROUND NEUTRINO EXPERIMENT

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Deep Underground Neutrino Experiment [1], or DUNE, is a next generation accelerator-based neutrino oscillation experiment where intense beams of muon neutrinos and antineutrinos are planned to be sent to traverse more than 1300 kilometers underground to be caught in a giant argon–filled neutrino detector. The main purpose of the experiment is to study how muon neutrinos oscillate into electron neutrinos, and provide answers to important questions such as why there is so little antimatter in the universe. The two main goals of this experiment is to resolve the ordering of neutrino masses and determine the degree of CP violation in the neutrino sector.

In this talk I will give a brief introduction to DUNE and review its prospects in finding answer to a third important question, which is the so called θ_{23} octant problem [2, 3]. It is known that the atmospheric mixing angle θ_{23} is close to $45°$, but what is not yet known is whether it resides in the high octant, $\theta_{23} > 45°$, or in the low octant, $\theta_{23} < 45°$. The octancy of θ_{23} needs to be resolved in order to perform precision measurements on other neutrino oscillation parameters, and to probe new physics in neutrino oscillations. We show how DUNE could resolve the θ_{23} octancy and discuss how, if confirmed, the presence of beyond Standard Model physics could enter the octant search and potentially ruin the measurement.

[1] The DUNE collaboration (R. Acciarri *et al.*), FERMILAB-DESIGN-2016-02.
[2] G.L. Fogli and E. Lisi, Phys. Rev. D54 (1996) 3667-3670
[3] C. R. Das, J. Maalampi, J. Pulido and S. Vihonen, JHEP 1502 (2015) 048.