

Updates on the ESSnuSB Target Station potentialities for CP violation discovery

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The large value of the last mixing angle of the PMNS mixing matrix measured by reactor experiments enable the search for CP violation in leptonic sector with a new generation of neutrino super beams. The ESSnuSB project proposes to use the European Spallation Source (ESS) based at Lund in Sweden to elaborate a high intensity neutrino super beam. The LINAC of this facility, under construction, will produce 5 MW proton beam with 2 GeV energy by 2025 and will be upgraded hereafter to produce in addition a neutrino super beam. This will require in addition an accumulator located at the end of the LINAC to reduce the initial time width (2.86 ms) of the proton pulses to microsecond level. The combination of the high beam intensity and these low energy protons allows the neutrino measurements to be made with a megaton Water Cherenkov detector installed 1000 m down in a mine at about 500 km from the neutrino source which is near the position of the second neutrino oscillation maximum. This baseline configuration allows to have improved sensitivity to CP violation compared to the first oscillation maximum. A parametric study of the magnetic horns and on the target station facility has been performed to optimize the ESSnuSB sensitivity to CP violation and will be presented.

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