

Search for the leptonic CP violation with the ESSnuSBplus project

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The measurement of the unexpectedly high value of the third neutrino mixing angle, θ_{13} , opened the possibility of measuring the Dirac leptonic CP violating angle, δ_{CP} , using intense neutrino beams. The European Spallation Source neutrino Super Beam (ESS ν SB) is a long-baseline neutrino project that aims in measuring CPV in the leptonic sector at the second of the ν_{μ} to ν_e oscillation maximum, where the sensitivity is ~ 3 times higher than that at the first maxima. The use of the 5 MW proton beam of the ESS linac combined to a \sim cubic-km Water Cherenkov detector located at the second oscillation maximum paves the way to a precise measurement of δ_{CP} . The ESS ν SB CDR showed that after 10 years of data taking, more than 70% of the δ_{CP} range will be covered with 5σ C.L. to reject the no-CP-violation hypothesis. The expected value of δ_{CP} precision is smaller than 8° for all δ_{CP} values.

The next phase of the project, the ESS ν SB+, which started in 2023, aims in using the intense muon flux produced together with neutrinos to measure the neutrino-nucleus cross-section (the dominant term of the systematic uncertainty) in the energy range of 0.2 to 0.6 GeV, using a LEnuSTORM and a LEMNB facilities.

In this poster, an overview of the concluded phase and an update on the first-year design-study of the current phase of the project will be presented.

Poster prize

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