

The ESSnuSB Project: Search for and Precision Measurement of the Leptonic CP Violation

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The violation of CP symmetry was discovered in the hadronic sector, proving that CP is not a conserved symmetry of nature. However, the amount of asymmetry observed is more than two orders of magnitude too small to explain the disappearance of antimatter. It is therefore essential to search for and measure CP violation in the leptonic sector in neutrino oscillation experiments, which has the potential to explain the observed density of matter in the universe. There are several models describing the matter-antimatter asymmetry in the universe, as well as models describing the origin of flavors, whose predictions together cover a wide range of δCP values. It is therefore essential to measure δCP with the highest possible precision in order to confirm or falsify these models.

The European Spallation Source neutrino Super Beam (ESSnuSB) project aims at maximizing the event statistics at the second neutrino oscillation maximum which thanks to the powerful 5 MW ESS proton linac will lead to an error in δCP smaller than 8 degrees for all values of δCP . ESSnuSB is a phased program using a low energy monitored neutrino beam and a low energy nuSTORM to measure the neutrino cross sections in the first phase ESSnuSB+ to be followed by the main program to measure CP violation in the second phase.

In this talk, a general overview of the ESSnuSB design study program will be presented, with emphasis on the current phase of the project. This project is supported by the EU through two design studies, ESSnuSB and ESSnuSB+.

Poster prize

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Gender

Collaboration (if any)

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