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The ESS based neutrino Super Beam Experiment (ESS ν SB)

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In the search for the CP-violation in the leptonic sector, crucial information has been obtained from neutrino experiments. The measurement of the third neutrino mixing angle, θ_{13} , opened the possibility of discovering the Dirac leptonic CP violating angle, δ_{CP} with intense “super” neutrino beam experiments. In the light of these new findings, an urgent need has arisen to improve the detection sensitivity of the current long-baseline detectors, considering proton driver at MW scale with MegaTon scale detector, with a key modification to place the far detectors at the second, rather than the first, oscillation maximum.

The European Spallation Source neutrino Super Beam (ESS ν SB) aims to benefit from the high power of the European Spallation Source, ESS, LINAC in Lund-Sweden, to produce the world’s most intense second-generation neutrino beam enabling measurement to be made at the second oscillation maximum. Assuming a ten-year exposure with two-years running time in neutrino mode and eight-years in antineutrino mode, CP-invariance violation could be established with a significance of 5σ over more than 70% of all values of δ_{CP} and with an error in the measurement of the δ_{CP} angle of less than 8° for all values of δ_{CP} . More details on the physics potential of the experiment will be given in the talk. The current design study programs running within the collaboration, especially those that have direct impact on the precision measurements of δ_{CP} will be reviewed.

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