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## The European Spallation Source neutrino Super Beam plus Project

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The European Spallation Source neutrino Super Beam (ESS $\nu$ SB) is a long-baseline neutrino project that will measure the CP-violation (CPV) in the leptonic sector at the second, rather than the first,  $\nu$  to  $\nu_e$ , oscillation maximum, where the sensitivity is  $\sim 3$  times higher. The use of the 5 MW proton beam of the ESS linac combined to a  $\sim 3$  cubic-km Water Cherenkov detector located at the second oscillation maximum paves the way to a precise measurement of the CPV phase,  $\delta_{CP}$ . The ESS $\nu$ SB Conceptual Design Report showed that that after 10 years of data taking, more than 70% of the possible  $\delta_{CP}$  range will be covered with  $5\sigma$  C.L. to reject the no-CP-violation hypothesis. The expected value of  $\delta_{CP}$  precision is smaller than  $8^\circ$  for all  $\delta_{CP}$  values, making it the most precise proposed experiment in the field by a large margin. The next phase of the project, the ESS $\nu$ SB+, which has been started in Jan. 2023, for a 4-year design study program, 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 – 0.6 GeV, using a Low Energy nuSTORM (LEnuSTORM) and a Low Energy Monitored Neutrino Beam (LEMNB) facilities.

In this talk, an overview of successfully concluded design-study of the experiment and its physics reach will be presented. Moreover, the recently accepted, by the Horizon-Europe program, extension project, the ESS $\nu$ SB+, will be also presented.

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