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ESSnuSB, a new facility to discover CP violation in leptonic sector in Europe.

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 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 2023 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 of the proton pulses. 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. The use of this type of detector will extent the physics program to proton-decay, atmospheric neutrinos and astrophysics searches.

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