



The European Spallation Source neutrino Super Beam project.

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Auditorium & Webcast 16:00 h

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After the Big Bang, matter and antimatter were produced in exactly equal quantities through materialization of the huge energy released. Today, however, there is no antimatter at all in the Universe. To investigate this fundamental problem the ESSnuSB project, based on the use of the world-uniquely powerful proton accelerator of the European Spallation Source (ESS) currently under construction in Lund, was initiated. The ESS 5 MW proton linac will be the world's most powerful accelerator, enabling the production of the world's most intense neutron flux. The proton driver can also be used to produce a very intense neutrino beam for CP violation discovery in the leptonic sector, very important for the understanding of matter-antimatter asymmetry in the Universe. During the last four years

an EU supported Design Study of an ESS neutrino Super Beam (ESSnuSB) has been successfully performed with the participation of physicists from 15 European institutions. Within this study it has been designed the upgrade of the linac required to increase its power to 10 MW by the provision of extra H-pulses between the proton linac pulses, of a 400 m circumference accumulator ring to compress the 3 ms long linac pulses to 1.3 μ s, of a set of four high power neutrino targets with focusing horns and a kiloton near and a megaton far water Cherenkov neutrino detector, the latter at a distance of 360 km, at the location of the second neutrino oscillation maximum. The publication of the ESSnuSB Conceptual Design Report has been done in which all details are given including the facility costing. The physics performance obtained overpast all initial expectations. More recently a second EU-co-funded complementary study of the use of the intense muon flux produced together with neutrinos has been started, aiming at a design of, in the first stage, a low-energy nuSTORM facility for neutrino cross-section measurements and sterile neutrino searches, and ultimately a Muon Collider Higgs Factory. The plan for this High Intensity Frontier Initiative (HIFI) design work will also be presented.



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