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A Very Intense Neutrino Super Beam Experiment for Leptonic CP Violation Discovery based on the European Spallation Source Linac

The European Spallation Source (ESS) linac with 5 MW proton power has the potential to become the proton driver of - in addition to the world's most intense pulsed spallation neutron source - the world's most intense neutrino beam. The physics performance of that neutrino Super Beam in conjunction with a megaton Water Cherenkov neutrino detector installed 1000 m down in a mine at a distance of about 500 km from ESS will be described. In particular, the superior potential of such a neutrino experiment placed at the 2nd oscillation maximum to discover the lepton CP violation in order to explain the matter-antimatter asymmetry in Universe and also the neutrino mass hierarchy will be presented. In addition, the choice of such detector will extent the physics program to proton-decay, atmospheric neutrinos and astrophysics searches. The ESS proton linac, the target station optimization and the physics potential will be described.

Primary author: Dr DRACOS, Marcos (IPHC-IN2P3/CNRS)

Co-author: Prof. EKELOF, Tord (Uppsala University)

Presenters: Dr DRACOS, Marcos (IPHC-IN2P3/CNRS); Prof. EKELOF, Tord (Uppsala University)

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