



Contribution ID: 82

Type: not specified

Proposal to use a high intensity neutrino beam from the ESS proton linac for measurements of neutrino CP violation and mass hierarchy

It is proposed to complement the ESS proton linac with equipment that would enable the production - concurrently with the production of the planned ESS beam used for neutron production - of a 5 MW beam of ca 10^{23} 2.5 GeV protons per year in microsecond short pulses to produce a neutrino Super Beam, and to install a megaton underground water Cherenkov detector in a mine to detect ν_e appearance in the produced ν_μ beam. Results are presented of preliminary calculations of with which sensitivity measurements of neutrino CP violation and Mass Hierarchy could be made and of the neutrino base line distance at which optimal sensitivity would be obtained. The results indicate that, with 8 years of data taking with an antineutrino beam and 2 years with a neutrino beam and a base line distance of around 400 km, CP violation could be discovered at 5σ (3σ) confidence level in 48 % (73%) of the total CP violation angular range at and that, with the same base line distance, the neutrino Mass Hierarchy could be determined at 3σ level over most of the total CP violation angular range. There are several underground mines with a depth of more than 1000 m, which could be used for the creation of the underground site for the neutrino detector and which are situated within or near the optimal base line range.

Primary authors: Dr DRACOS, Marcos (IPHC-CNRS/IN2P3 Strasbourg); Prof. EKELÖF, Tord (Uppsala University)

Co-authors: Dr FERNANDEZ MARTINEZ, Enrique (CERN); Mr BAUSSAN, Eric (IPHC-CNRS/IN2P3 Strasbourg); Mr ÖHMAN, Henrik (Uppsala University); Dr VASSILOPOULOS, Nikolaos (IPHC-CNRS/IN2P3 Strasbourg)