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Futures Perspect in Neutrino Physics: the LAGUNA-LBNO case

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In future decades, AstroParticle and Neutrino Physics programs are going to be combined within a single experiment. This requires the development of techniques, new infrastructures and a new concept of Detector: next years will be the era of Giant (50-600 kt) Multipurpose Detectors. In particular, 45 European Institutions, connecting scientists with industrial support, are involved in the Design Study LAGUNA-LBNO aiming to the feasibility study of a new large European underground infrastructure for the observation of proton decay, low-energy neutrinos and Beta-Beam and Super-Beam neutrinos from CERN. This last topic will allow the measurements of the still unknown CP violation phase in the lepton sector and the neutrino mass hierarchy. Three detector techniques are currently under study: Liquid Argon (GLACIER), Liquid Scintillator (LENA) and Water Cherenkov (MEMPHYS). Two sites are investigated at the moment: the Pyhasalmi (Finland) mine at a distance of 2300 km from CERN and the Fréjus Laboratory (LSM) at a distance of 130 km from CERN. The LAGUNA-LBNO program gives the first priority to the Liquid Argon detector at Pyhasalmi (with the possibility of adding the LENA detector for the very low energy physics) and the second priority to the MEMPHYS detector at Fréjus. The collaboration efforts are now focused in two directions: the detailed studies of the three detector performances and the evaluation of cost, safety and operation for the excavation and the construction in both sites.

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