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Future neutrino beam facilities

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Since the discovery of neutrino oscillations in 1998, the understanding of neutrino properties has grown very fast and it is the sole evidence of New Physics.

We know that neutrinos are massive, leptonic number is not conserved, their mixing parameters but one (θ_{13}) have been accurately measured.

The discovery of a non-zero θ_{13} is the goal of the present generation of experiments: T2K, Double CHOOZ, Reno, Daya Bay.

The outcomes of these searches will have a deep impact on the next generation of neutrino facilities and experiments. Indeed, the possibility of measuring the CP violation in the leptonic sector strongly relies upon the size of θ_{13} .

Three neutrino beam facilities based on different approaches have been proposed for the next generation of experiments: Super-Beam, Beta-Beta and Neutrino Factory. The goal of these facilities is to either provide a beam for the ultimate search for a non-zero θ_{13} or for the discovery of the CP violation in the leptonic sector. After a review of the basic principles of each facility and the status of the R&D, a comparison of their sensitivities both for a θ_{13} discovery and for a CP violation measurement is also presented.

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