

The Low-Energy Neutrino Factory

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To date most studies of Neutrino Factories have focused on facilities where the energy of the muon in the storage ring has been in the range of 25-50 GeV. In this paper we present a concept for a Low-Energy (≈ 4 GeV) neutrino factory. For baselines of $O(1000\text{ km})$, the rich oscillation pattern at low neutrino interaction energy ($0.5 - \approx 3\text{ GeV}$) provides the unique performance of this facility with regard to its sensitivity to CP violation and the determination of the neutrino mass hierarchy. A unique neutrino detector is needed, however, in order to exploit this oscillation pattern. We will describe the basic accelerator facility, demonstrate the methodology of the analysis and give an estimate on how well the Low-Energy neutrino factory can measure θ_{13} , CP violation and the mass hierarchy. We will also describe the detector concept that is used, show a preliminary analysis regarding its performance and indicate what R&D is still needed. Finally we will show how the Low-Energy neutrino factory could be a step towards an energy frontier muon collider.