

Abstract for an Invited Paper
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Physics of a long and very long baseline neutrino program

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I will discuss opportunities in neutrino oscillation physics using conventional high energy accelerator neutrino beams. I will first discuss the properties of the beams and the expected event rates for various concepts that are under discussion. The physics goal is to measure known oscillation parameters precisely, find the conversion of muon to electron neutrinos at accelerator energies, and discover violation of the CP symmetry in the lepton sector if it exists. With the current knowledge of neutrino parameters, we already have a good understanding of the beam power level, detector size, and the baseline needed for such an experiment. We can optimize the experimental parameters to obtain the best possible sensitivity. I will describe this optimization. In my conclusion, I will describe a possible project that takes full advantage of existing accelerator facilities at Fermilab or Brookhaven and couples the beam to a very large detector at a new deep underground science laboratory.