

Studies of the Front End of a Neutrino Factory*

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A neutrino factory employs muons which are produced, collected, cooled, accelerated and then stored so that their eventual decay produces an intense neutrino beam. A general description may be found in the paper by Geer [1], and two upcoming *Comments on Nuclear and Particle Physics* articles [2]. In this contribution, we use analytic and numerical tools to investigate the performance of the front end of a neutrino factory. This region starts just after the target and ends just prior to the recirculating accelerators. Extensive previous work has resulted in designs used in the Fermilab Study of 1999-2000 [3] and the Brookhaven Study of 2000-2001 [4]. Here we explore variations away from these particular designs, seeking possible improvements in final muon output, risk reduction, and ultimate cost. Our variations include, for example, changes in the overall front end geometry, acceleration and deceleration parameters in the phase rotation and mini-cooling sections, choice of RF frequency, strength of solenoidal magnetic fields, and the use of helices, *etc.*

[1] S. Geer, Phys. Rev. D 57, 1 (1998)]

[2] S. Geer, "Future prospects for muon facilities", see <http://www-mucool.fnal.gov/mcnotes/muc0154.ps>; also A. M. Sessler, "Neutrino Factories: The Facility", <http://www-mucool.fnal.gov/mcnotes/muc0155.pdf>]

[3] http://www.fnal.gov/projects/muon_collider/nu-factory/fermi_study_after_april1st/

[4] <http://www.cap.bnl.gov/mumu/studyii/>

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