

Looking to the Future: A Fermilab Viewpoint

H. E. Montgomery^a

^aFermi National Accelerator Laboratory,
P.O. Box 500, Batavia, Illinois 60510, U.S.A.

This is a short paper summarising a presentation of the evolution of the Fermilab program for the next five to ten years. Emphasis is given to the Fermilab accelerator complex, but external collaboration is emphasised.

1. Introduction

An informal public discussion was held near the end of the program of presentations at the High Intensity Frontier Workshop on Elba in the spring of 2005. This was close to the point (July 1, 2005) at which Fermilab changed its Director. At the time of the discussion, the incoming Director, Piermaria Oddone, had made a presentation[1] giving his vision for the laboratory. While outlining the current program and looking toward potential directions for collaboration, this presentation and paper leans heavily on Oddone's presentation.

2. Current Program

The future planning at Fermilab is founded on the current accelerator-based physics program. This program is dominated by the Tevatron Collider experiments which enjoy the highest energies available in the laboratory and will continue to do so until the Large Hadron Collider (LHC) comes online at CERN later in this decade. At present approximately one fb^{-1} of integrated luminosity has been delivered to each experiment. Peak instantaneous luminosities of greater than $10^{32} \text{ cm}^{-2} \cdot \text{sec}^{-1}$ are common and prospects for yet higher luminosity are bright.

The neutrino program now has several components. The MiniBooNE experiment is searching for neutrino oscillations corresponding to the indications observed by the LSND experiment at Los Alamos a few years ago. This experiment has received approximately 6×10^{20} protons on

target from the Booster Accelerator at 8 GeV; we are eagerly looking forward to the results. During the past year the Neutrino at the Main Injector (NuMI) beamline was completed, commissioned, and is now operating. The MINOS experiment, a long baseline neutrino oscillation experiment using that beam line, hopes to receive a good fraction of 10^{20} protons on target by years end. We hope soon to mount the MINER ν A neutrino scattering experiment. To complement these immediate endeavours there has also been R&D on muon cooling related to future neutrino factories

Fermilab has been a major player in the construction of the interaction region magnets for the Large Hadron Collider (LHC), which is being constructed at CERN in Europe. This has been in collaboration with two other US laboratories and with the KEK laboratory in Japan. Fermilab is the host laboratory for US-CMS, the collaboration which is building the U.S. contributions to the Compact Muon Solenoid (CMS) experiment. Fermilab physicists have enjoyed leadership rôles in the construction project and the computing and software program. They are now taking the lead in the maintenance and operation. Recently an LHC Physics Center (LPC) was initiated; it is hoped that this will enable US scientists to enhance their places in the analysis phases of the experiment and that CMS will see increased activity in this vital area.

The Laboratory is host to a suite of astroparticle physics experiments which include the Sloan Digital Sky Survey, The Pierre Auger cosmic ray observatory, and the Cryogenic Dark Matter Search experiment in the Soudan mine. Each of