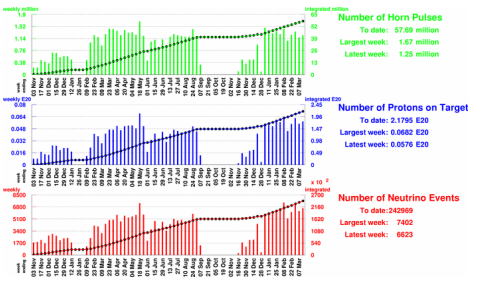
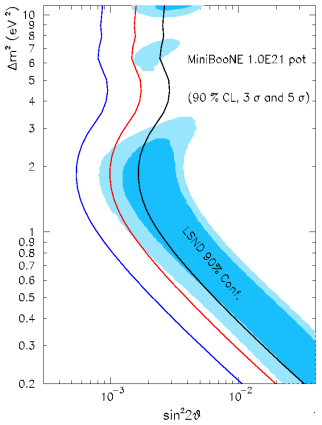
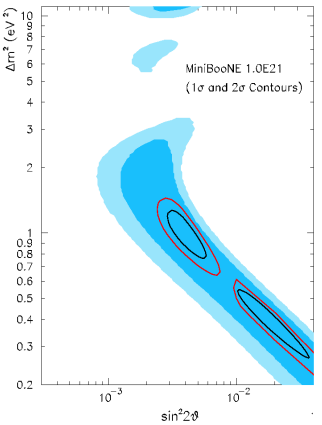
MiniBooNE Requires a LOT of Protons



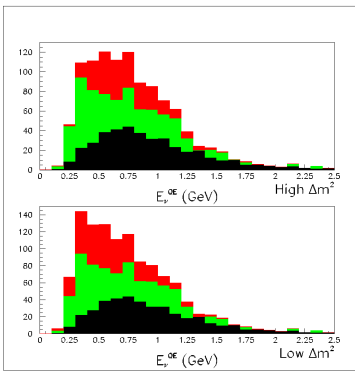
Our goal is 1 X 10^{21} to be exact! In fact the Booster has been running at record intensities for over a year now delivering protons to MiniBooNE. But for MiniBooNE we actually need more, so we continue to work with our colleagues in Accelerator Division to improve the Booster performance. More protons leads directly to better coverage of the LSND allowed regions as MiniBooNE is statistically limited.



This figure shows MiniBooNE's sensitivity and ability to cover the LSND allowed regions after collecting 1 X 10^{21} protons on target.



Should MiniBooNE see an oscillation signal, the above plot indicates the ability to distinguish between a low and high value for Δm^2 - 1.0 and 0.4 eV^2 in this case.



Summed reconstructed neutrino energy distribution for the oscillation signal and backgrounds. The black is intrinsic ν_e background, the green is NC π^0 events, and red is oscillation events. Again 1.0 and 0.4 eV^2 are used for Δm^2.

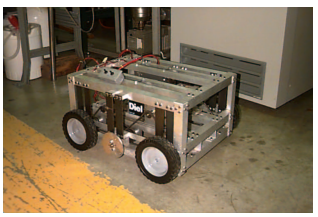
Booster Monitoring and Improvement Projects

The rate of protons deliverable by the Booster to MiniBooNE and the Main Injector is limited by activation of beam line components resulting from beam losses, and the rate at which certain elements are capable of running. There are several ongoing efforts and future plans for dealing with these issues.

- A collimation system was installed in 2003 to redirect inevitable beam losses to well shielded regions.
- A known dogleg problem at the extraction region was also fixed in 2003 eliminating a Booster lattice distortion.
- New, larger aperture RF cavities have been built and will soon be installed.
- There are planned upgrades in 2004 to increase the running rates of the ORBUMP magnets and power supplies from 7.5 Hz to 15 Hz.
- Many more.....

MiniBooNE collaborators are directly involved in many of the Booster improvement projects. Here are a few specific examples.

Radiation Worker Robot



MiniBooNE is currently working with colleagues in the Accelerator Division to develop a Radiation Worker Robot. The motivations for designing a robot include:

- Periodic calibration of the Beam Loss Monitor (BLM) system currently in use in the Booster by a single detector mounted on the robot.
- Perform routine radiation measurements without needlessly exposing accelerator personnel to high levels of radiation.
- Perform inspections of the Booster tunnel without waiting the necessary cool down time before human access is safe. The robot will be equipped with a camera to send images back to personnel via the wireless network in the tunnel.

Booster Monitor Program

Written by Gerald Guglielmo of the Computing Division, the Booster Monitor program is a diagnostic tool that requests snapshots of Booster devices and performs a statistical analysis of snapshot data of the device readings. Sixteen devices can be visualized on the interface at a given moment, although the program can simultaneously take data for many more devices. One can also use Booster Monitor data to investigate short and long-term stability of Booster devices and to study how device performances correlate and affect beam quality.