

Fermilab accelerator operations summary for FY16 – Q2

1/4/2016 – 4/4/2016

Executive Summary:

During the reporting period beam was delivered to the NuMI target for NOvA, MINOS+ and MINERvA data taking. Beam was also delivered to Switchyard 120 for SeaQuest data taking and to support a program of test beam experiments at the Fermilab Test Beam Facility (FTBF), and to the BNB target for MicroBooNE data taking.

During the quarter there were periods of scheduled and unscheduled downtime. During the full reporting period, 16.60×10^{19} protons were delivered on target for NuMI and 13.46×10^{19} protons were delivered on the BNB target.

More detailed information is available in presentations at the weekly All Experimenters' Meetings. See reports on the web at

http://www.fnal.gov/directorate/program_planning/all_experimenters_meetings/index.html

Status and Plans:

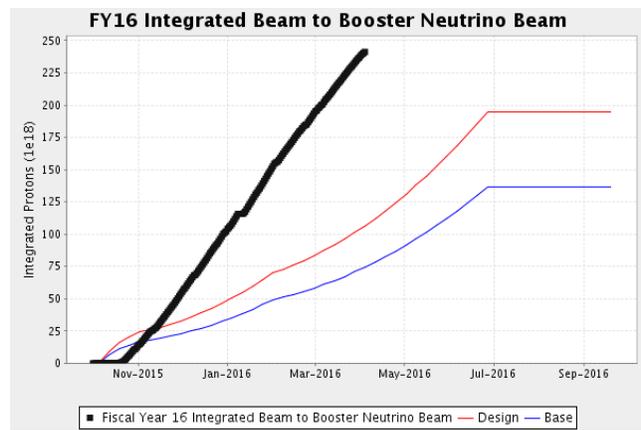
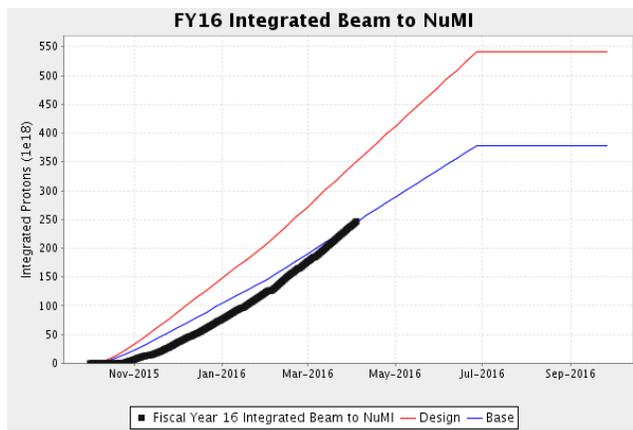
Work to implement DC Current Transformer (DCCT), used to measure beam intensity in the Recycler, continued throughout this quarter. Once it was clear the DCCT improvements were not going to be completed quickly, additional beam monitoring for transfer efficiency and Recycler RF monitoring were implemented. These measures allowed slip-stacking of 4+6 bunches in the Recycler to be put into full-time operations in January, without the DCCT. We were able to incrementally increase the power to the NuMI target from 310kW without slip-stacking to 550kW during 4+6 slip-stacking, while running Switchyard beam, by the end of the quarter. Peak power for more than an hour without running Switchyard beam topped out at 581kW. During this time we were able to achieve an internal goal of delivering 100 hours of greater than 500kW beam to NuMI while running Switchyard. The week of February 15th, we delivered 114 hours of 500.8kW beam to NuMI with Switchyard operations. This goal was repeated many times in the following weeks. In the final weeks of the quarter, we began 6+6 slip-stacking studies, and were fortunate to have a partially working DCCT for the studies. We plan to continue 6+6 slip-stacking studies to improve efficiencies, and complete the DCCT upgrade in the upcoming quarter. We do not intend to make 6+6 slip-stacking operational until after the summer shutdown. Increased beam to NuMI this quarter adds to the expectation to be able to meet the FY16 goal for beam delivery to NuMI.

BNB continued to receive quality beam at the required intensities, but we were not able to maintain a rate of 5 Hz once 4+6 slip-stacking began. The current limitation is the Booster shielding assessment,

which is under review and revision. Once it is complete we should be able to increase the BNB rate. We continue to be well ahead of the curve for meeting the FY16 goal.

Performance

	Metric	Achieved
Average protons on NuMI target per week	-	1.28×10^{19}
Integrated POT for NuMI for period	1.54×10^{20}	1.66×10^{20}
FY16 integrated POT for NuMI to date	2.69×10^{20}	2.47×10^{20}
FY16 actual NuMI uptime to date (hours)	-	3425.24
Percent Uptime (Recorded/Scheduled FY16)	-	90.0%
Average protons on BNB target per week	-	1.04×10^{19}
Integrated POT for BNB for period	4.37×10^{19}	1.35×10^{20}
FY16 integrated POT for BNB to date	8.16×10^{19}	2.55×10^{20}
FY16 actual BNB uptime to date (hours)	-	3548.03
Percent Uptime (Recorded/Scheduled FY16)	-	90.0%



Notes

- 1) "Metric" corresponds to the projected expected Protons-on-Target. The "Design" and "Base" profiles are respectively 125% and 87.5% of the "Metric" profile. The numbers quoted correspond to the proposed FY16 metric.
- 2) "Achieved" corresponds to the performance during the reporting period.
- 3) Percent uptime (actual/scheduled) since October 5th, 2015.