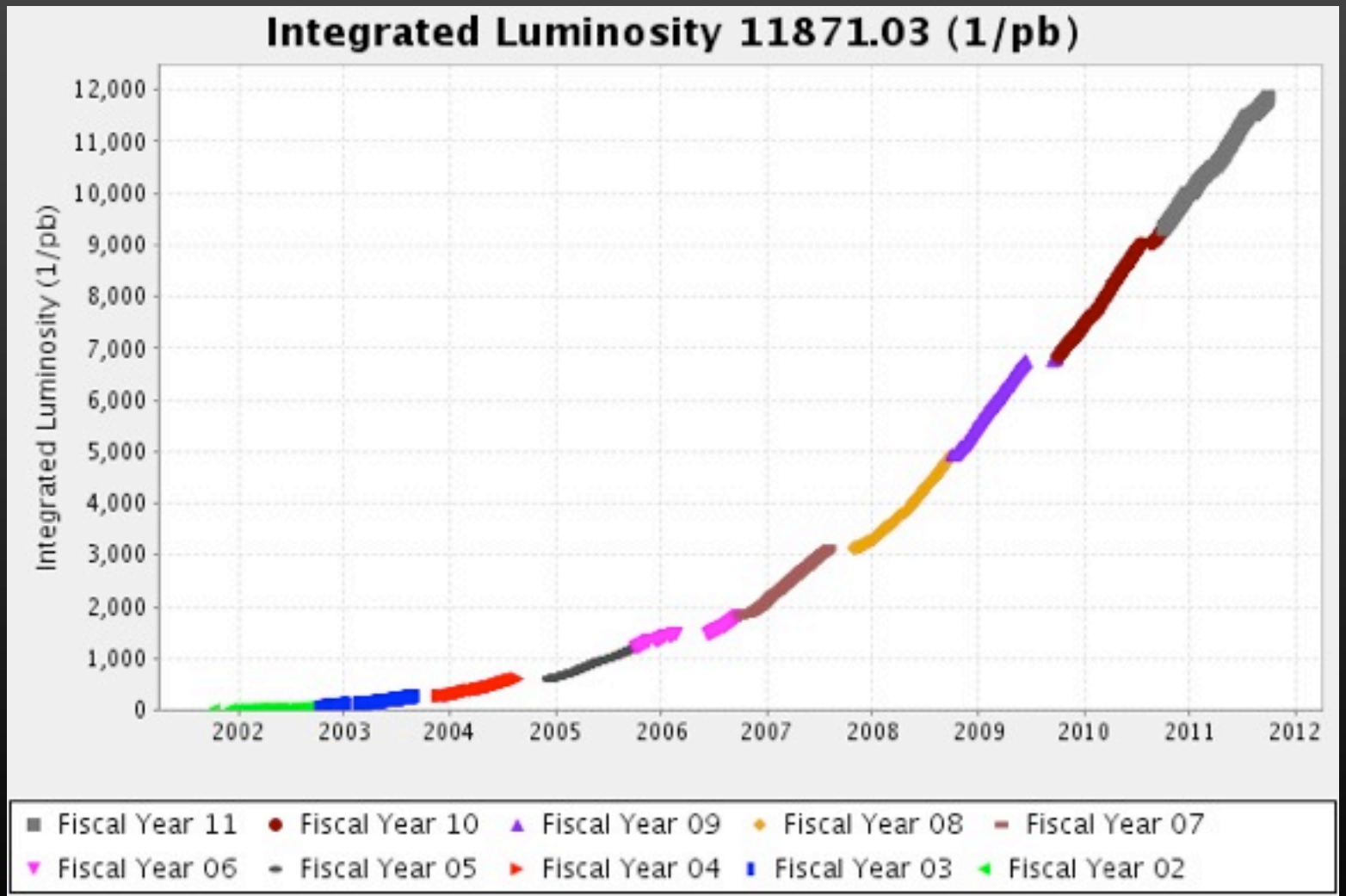
Recent Accelerator Operations, PIP, and Shutdown Plans

R. Dixon

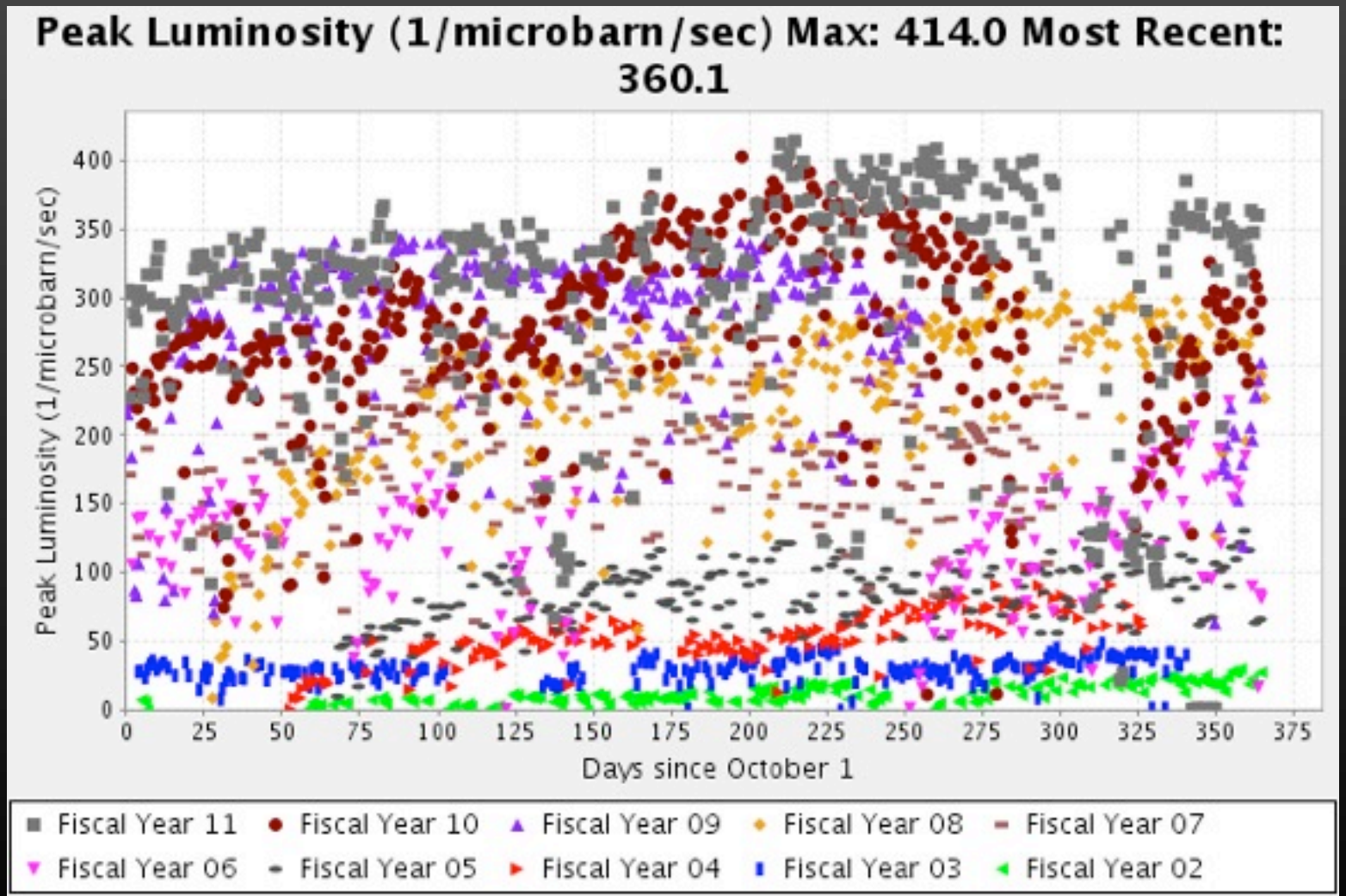
Overview

- Quick Tevatron Summary
- Neutrino Running at 8 GeV and 120 GeV
- Proton Improvement Plan Progress
- Shutdown Progress on NOvA and NuMI

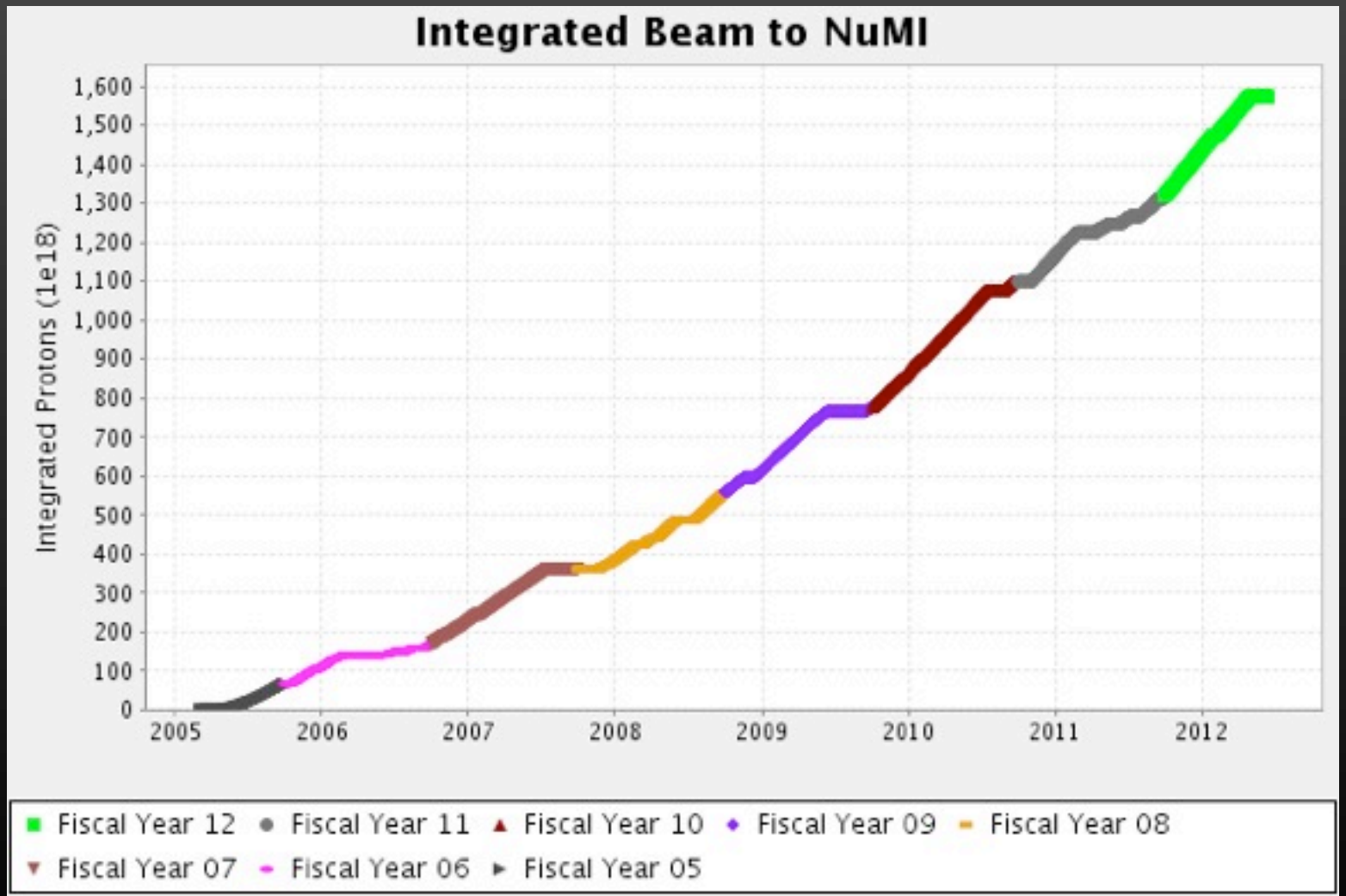
Final Integrated Luminosity for Run II



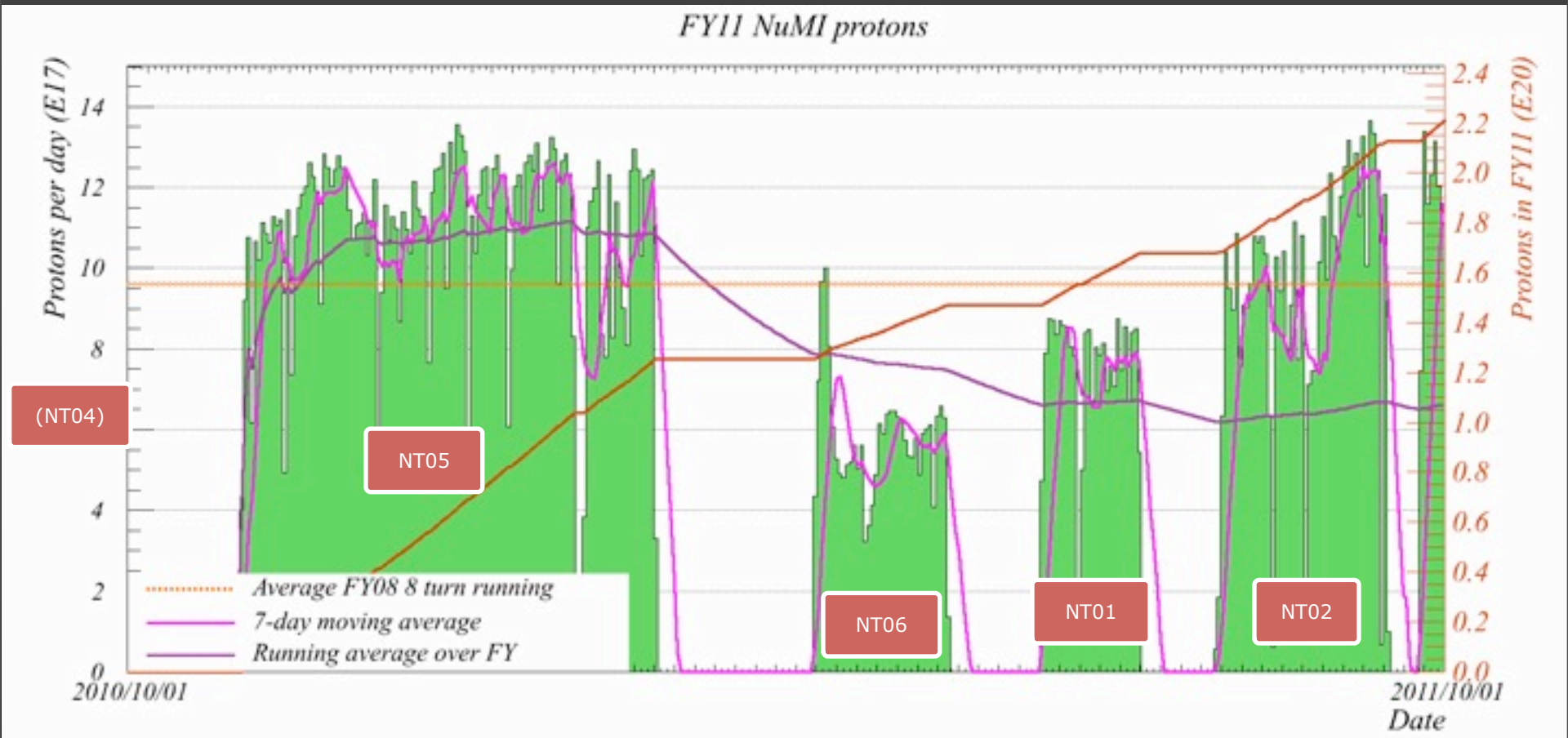
Peak Luminosity



Total Integrated Protons to NuMI

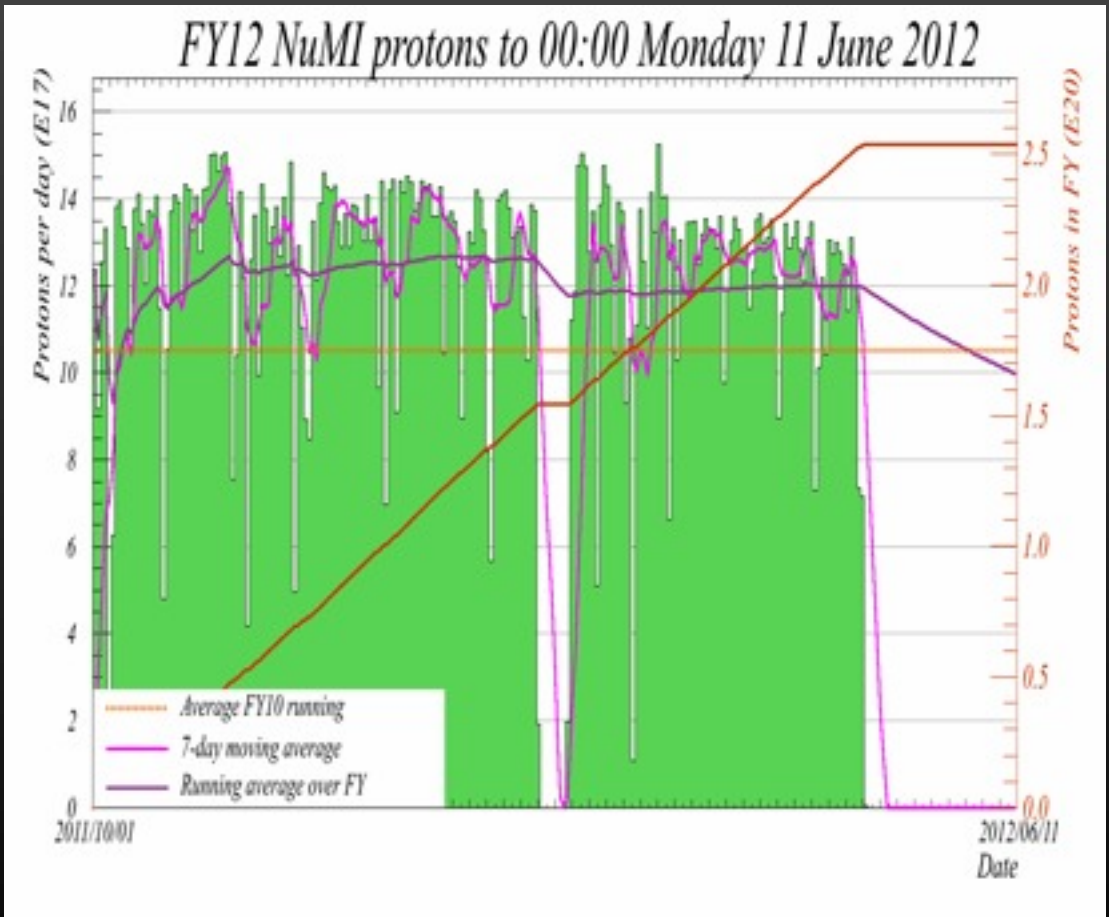


FY11: Target Problems



- Got 2.2E20 in FY11, thanks to heroic efforts from target folks (and delay to future projects)
- New target NT07 installed at end of FY11

FY11: Target Problems



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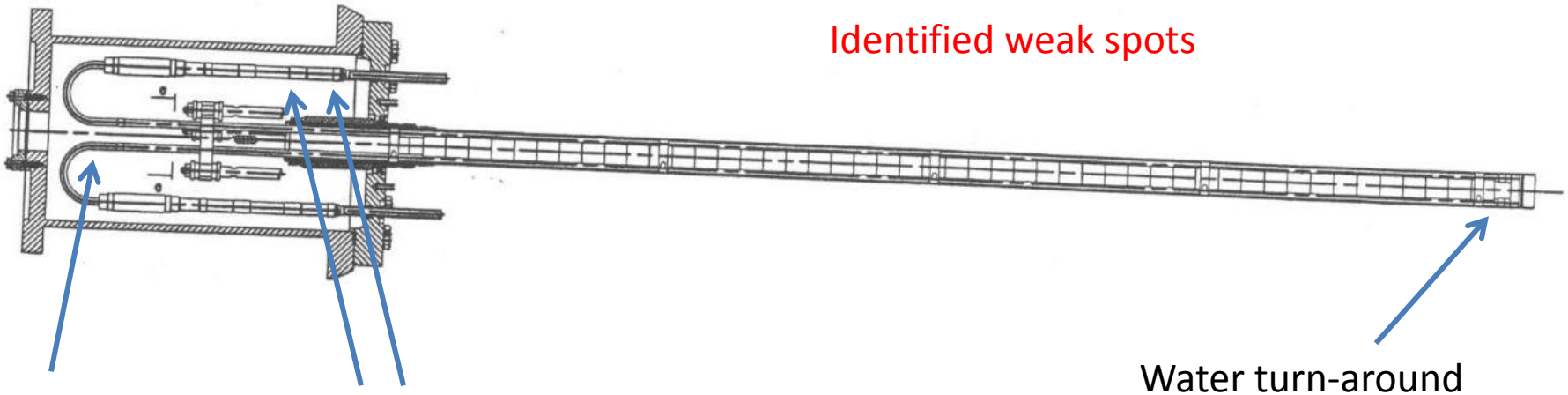
Goal of design modifications
- reduce risk of water leaks inside helium volume

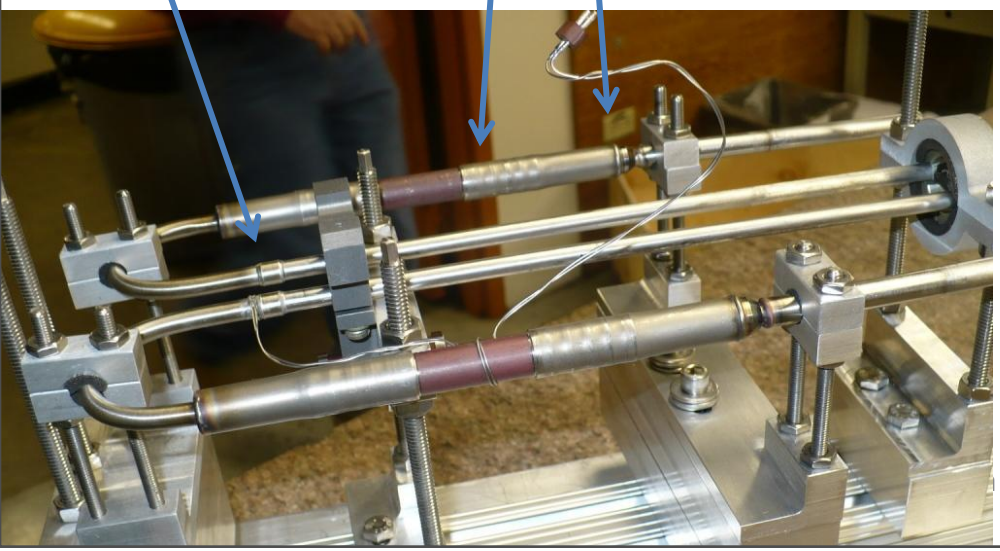


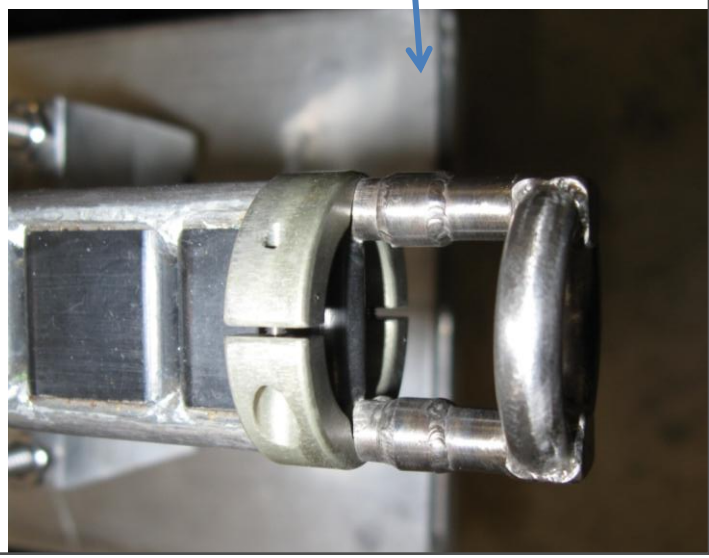
Identified weak spots

Weld sleeve

Ceramic transitions

Water turn-around

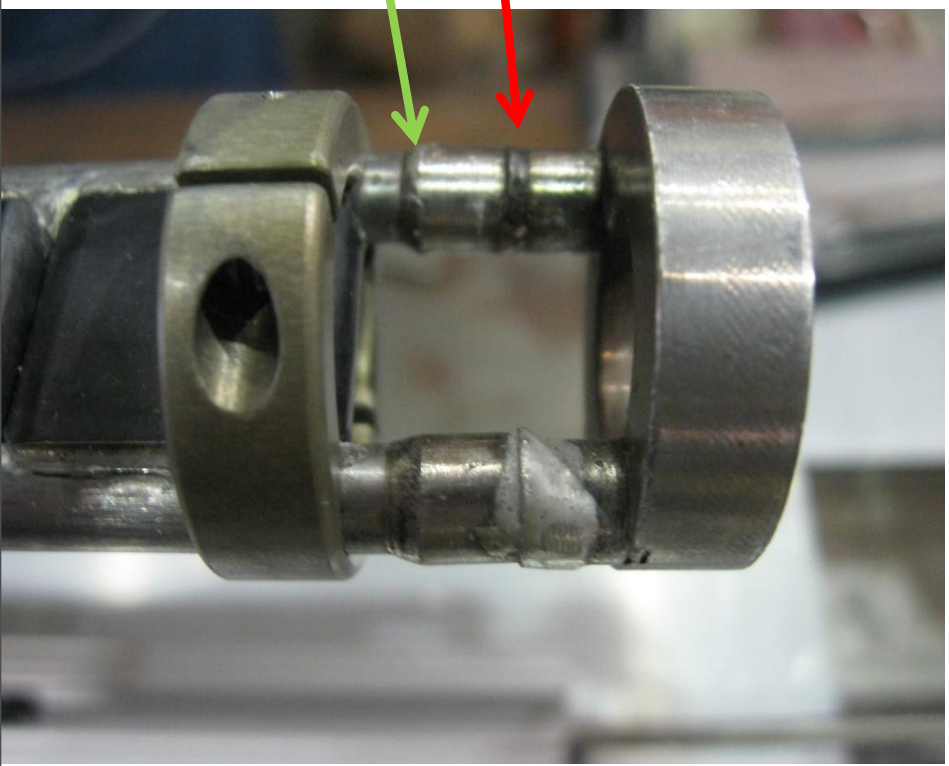




- Jim Hylen

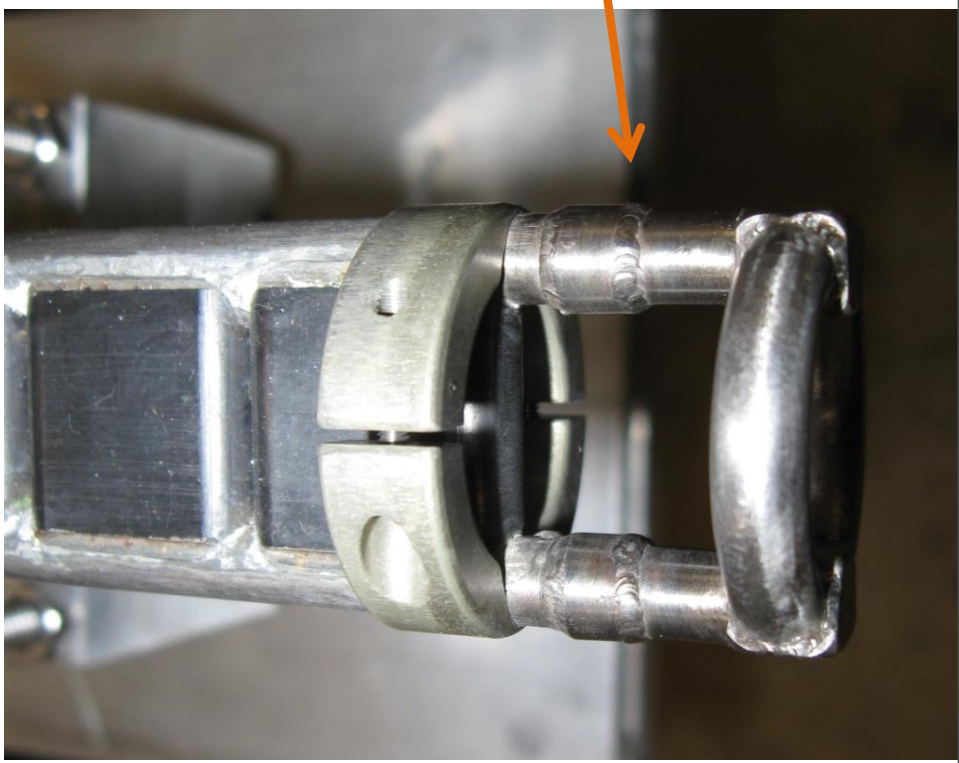
NT-07 IHEP steel cooling line downstream turnaround reworked

NT-05 and NT-01 autopsies saw leak at IHEP laser weld, not ebeam weld .



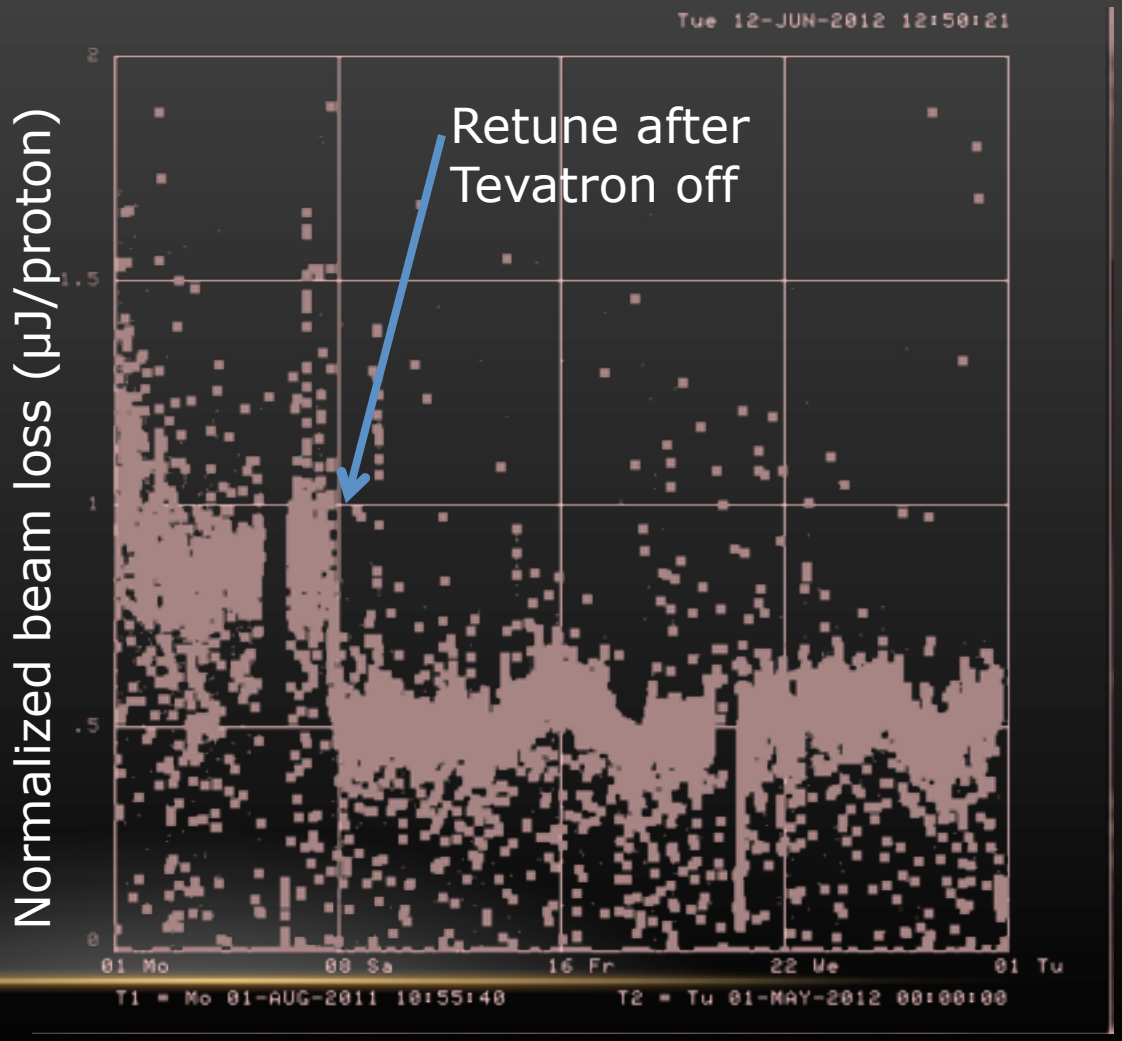
X-ray of NT-07 IHEP ebeam weld looks good. Will tig weld FNAL turnaround on, as for NT-06

This weld did not fail on NT-06

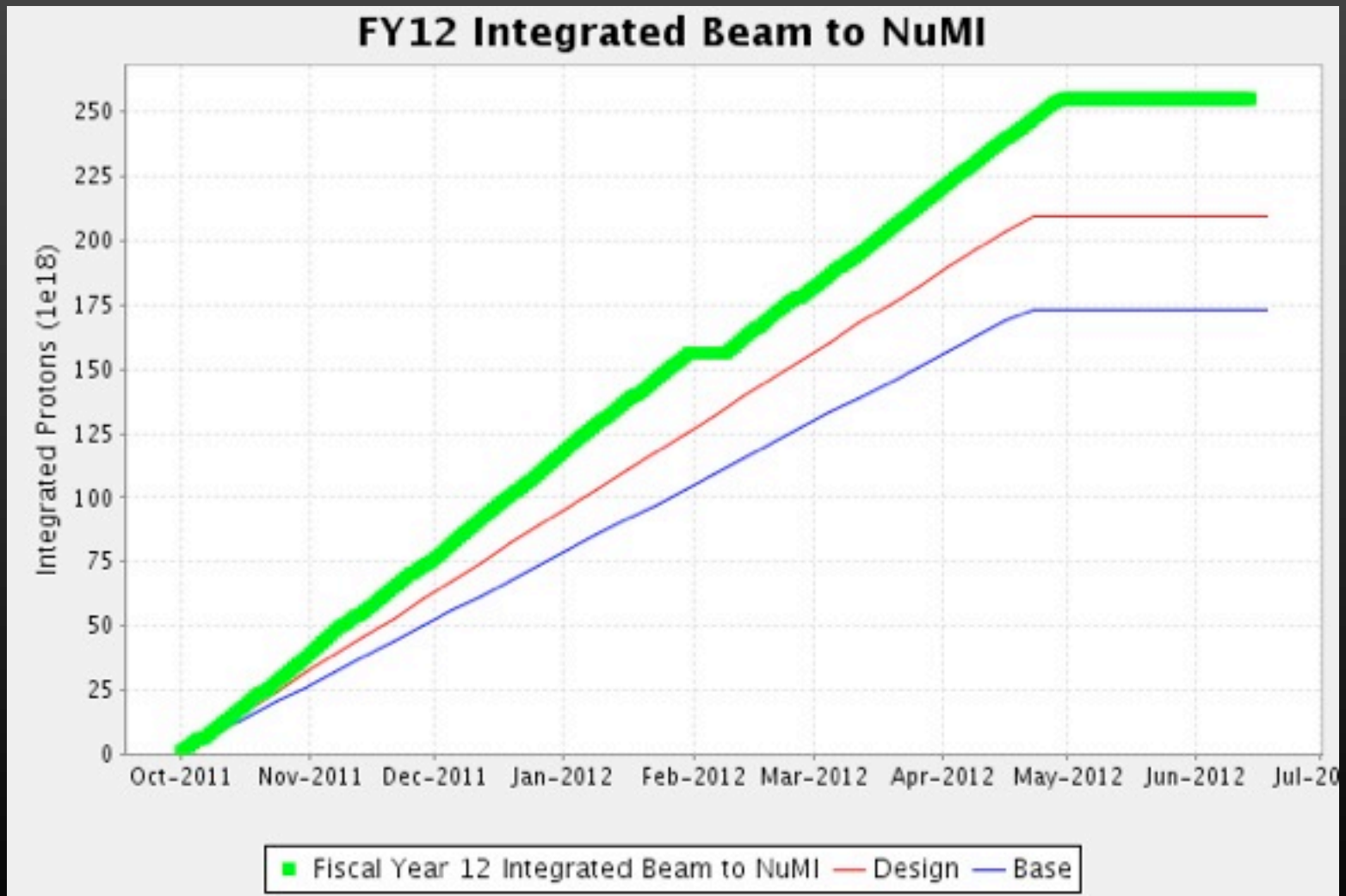


Main Injector

- After Tevatron off, re-adjusted slip-stacking to fulfill request from NuMI with minimum losses
  - Beam loss per proton accelerated reduced by almost a factor of 2
  - ALARA



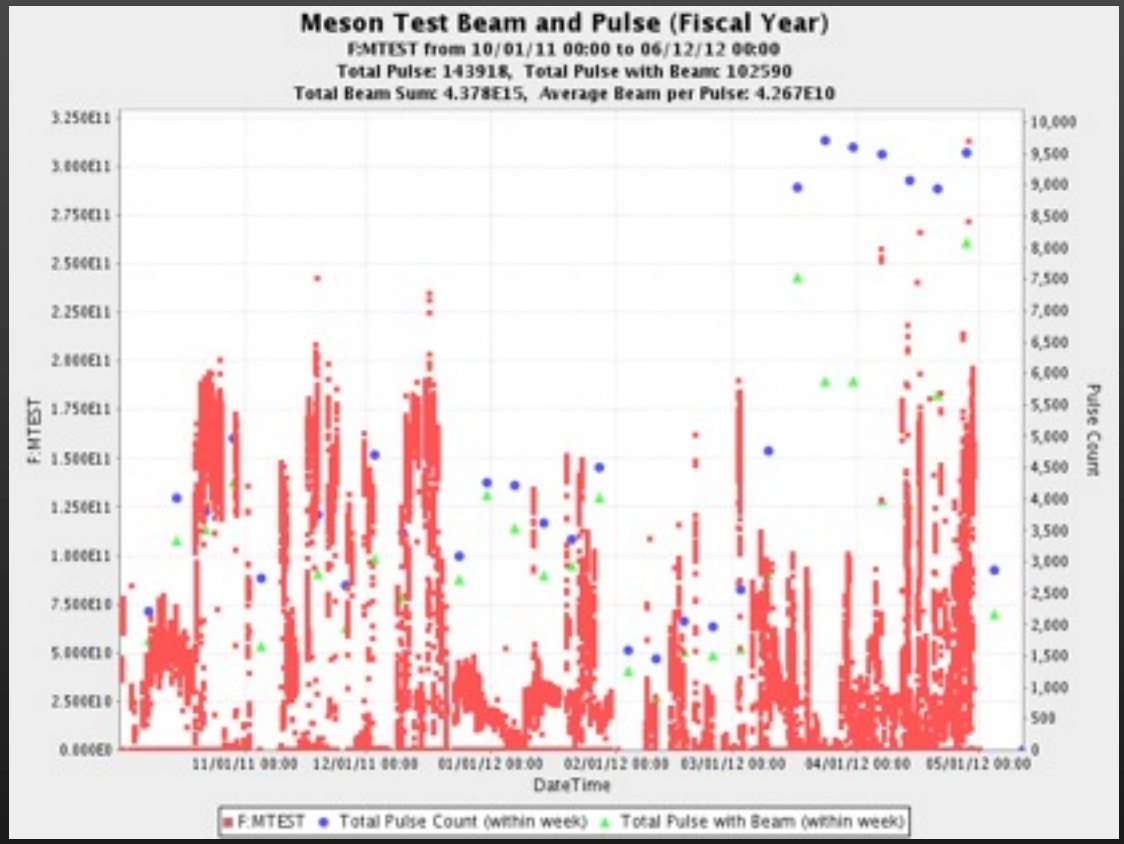
FY12 Integrated Protons to NuMI



FY12 Integrated Booster Neutrino Beam

SY120

- Test Beam typically run 10^{11} protons per spill
- SeaQuest began running in March
  - Want 2 orders of magnitude more beam
  - Fixing buried beam pipe
  - Spill problems
    - Installing more instrumentation



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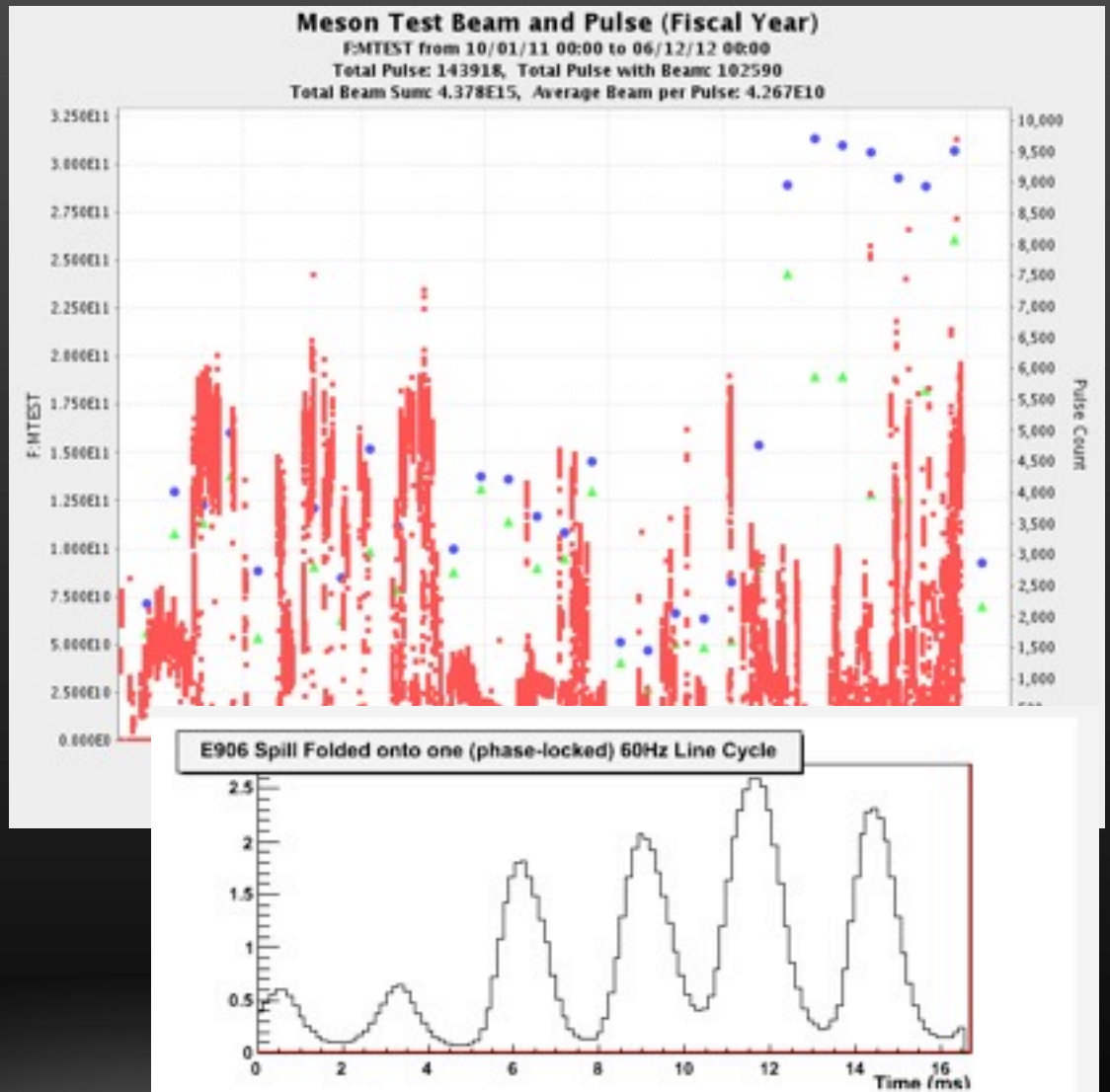
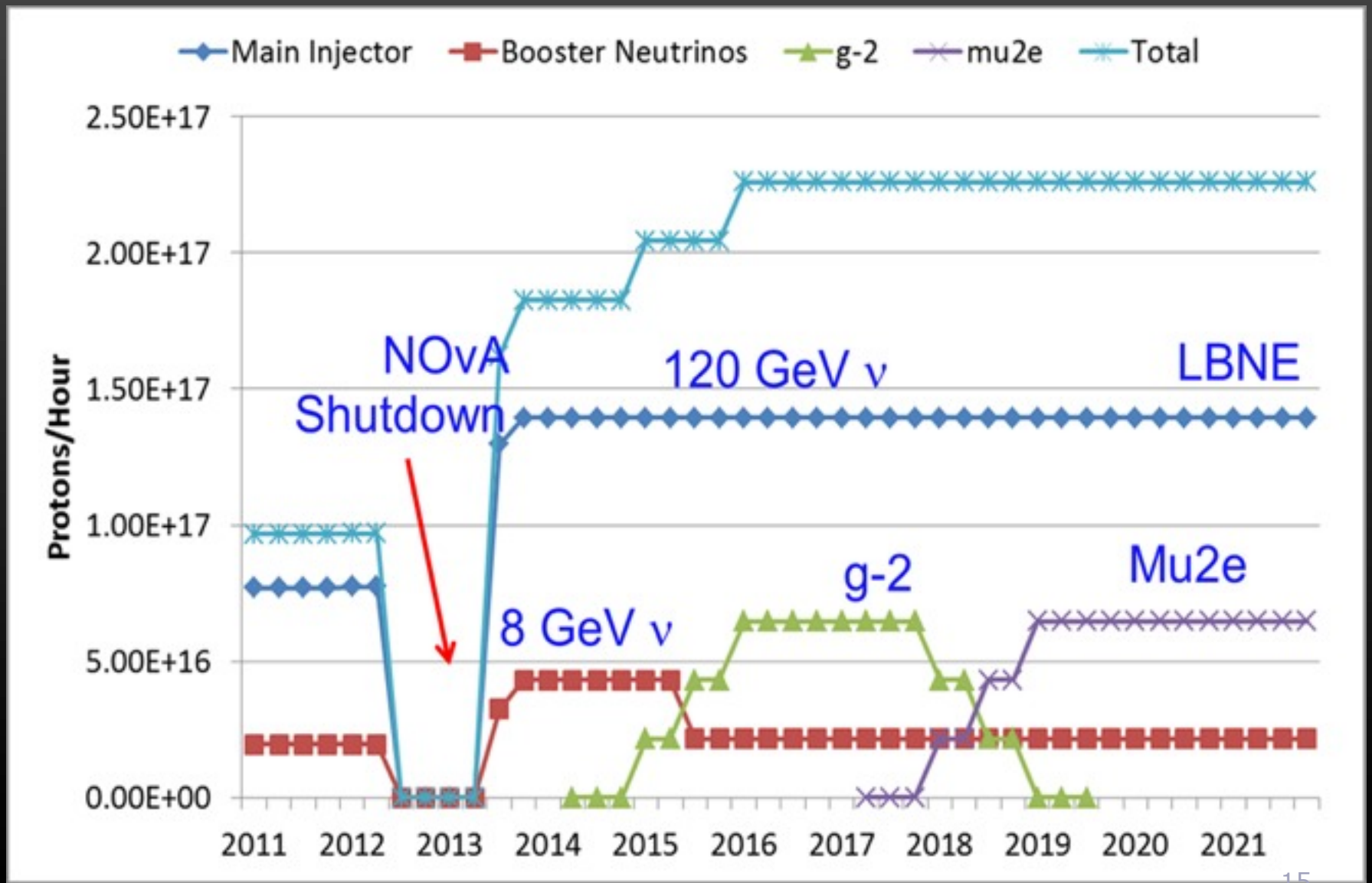


Future Proton Needs



Proton Improvement Plan

- Proton source is 40 years old
  - Must run for at least 15 more years to support lab physics program
- Need upgrades to permit higher rep rate for intensity frontier
- Identify weaknesses and remedy
  - Cockcroft-Waltons
    - (2009 I- off for ~ 1 year for repair)
  - Solution – RFQ Based Injector
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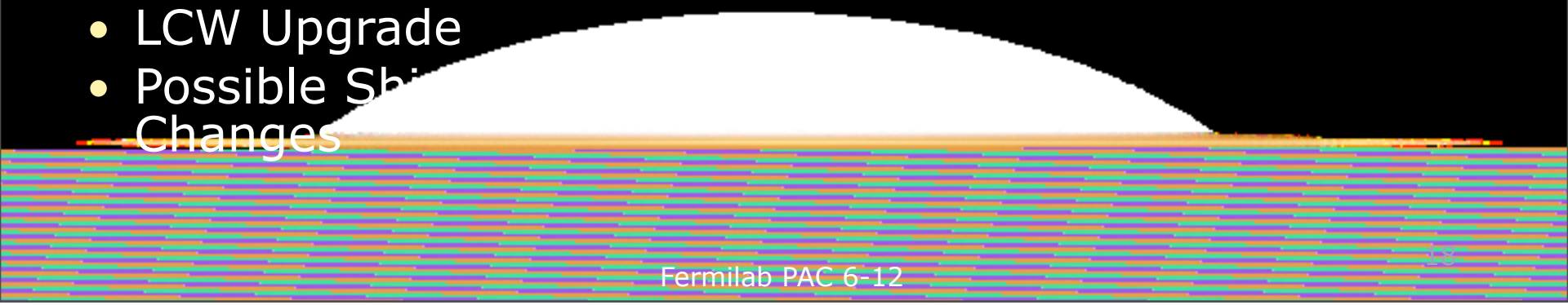
RFQ

- New LEBT slide installed in test area, aligned this week
- RFQ energy investigation
  - Manufacturer making thinner rods
  - Simulation shows ~5% energy loss at the extraction gap
  - Next week measure energy with endplate removed

Proton Improvement Plan

- Linac
  - Linac Dump Repair
  - Vacuum Upgrades
  - BPM Upgrade
  - Klystron Maintenance
  - Low Energy Maintenance
- Booster
  - Solid State Upgrade
  - Booster Cavity Refurb.
  - Gradient Magnet Moves
  - Beam Absorber Install
  - LCW Upgrade
  - Possible Sh
    Changes



Technical Progress

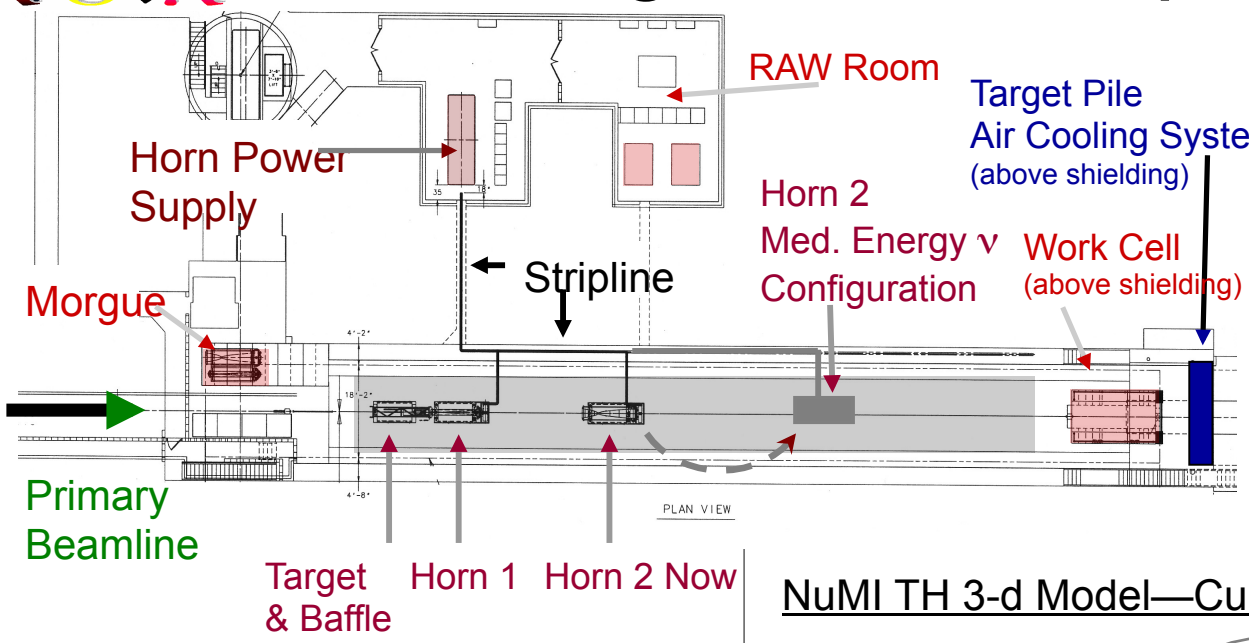
- Magnets
  - Finished Permanent Quads (RQN 43 magnets), Powered Quad Trims (MQT 39), Powered Transfer Line Dipoles (ADCW 3) since last August
  - Remaining are kickers RKB (4) RKD (2) and transfer line lambertsons (MLAW 2)
- End shim design:
  - RR uses permanent magnets, edge fields contribute to higher order components – affect tune and chromaticity
  - Want to change base chromaticity for slip stacking in RR
  - Lost art, so in summer 2010 Dan called his congressman for assistance
  - Complete design and going out for manufacturing

ANU Schedule

Is ANU on the Critical Path?

- ANU is not directly on the project critical path
  - 400+ days of float from “Accelerator shutdown complete” to CD-4
  - All planned ANU activities complete: Sep 30 2013
    - Last task: As-built documentation
  - Coupled to “Neutrino Detected” milestones in each superblock – commissioning and operations a laboratory responsibility
- Internal critical path considerations:
  - Fabrication and installation of 3 RF cavities
  - Fabrication and installation of kicker magnets (RKB/RKD)

Target Hall: Scope of work

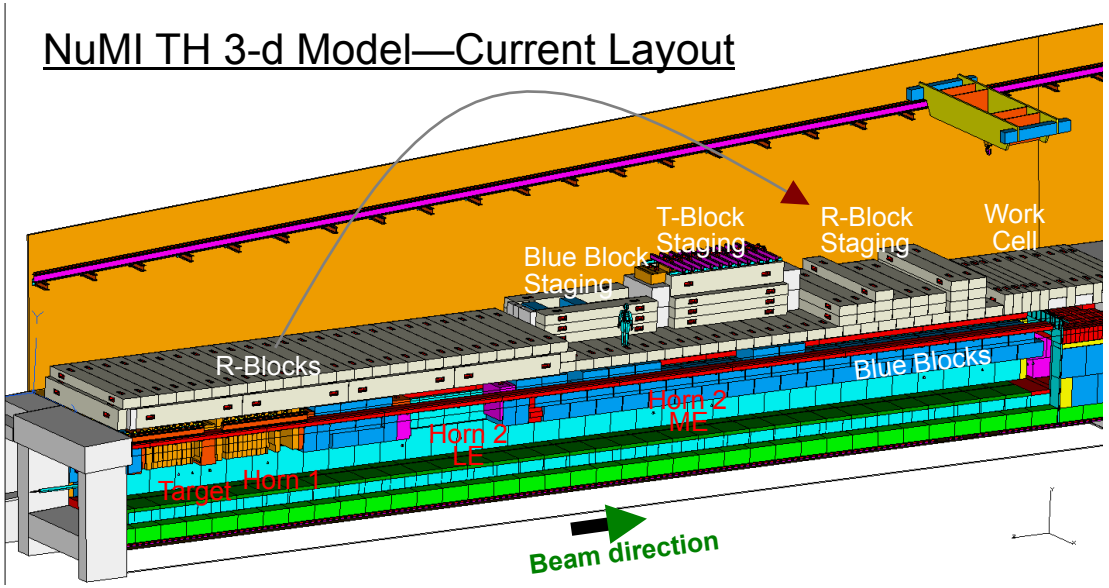


Utility work associated with upgrades: RAW most significant

Coordinated by Mike Andrews

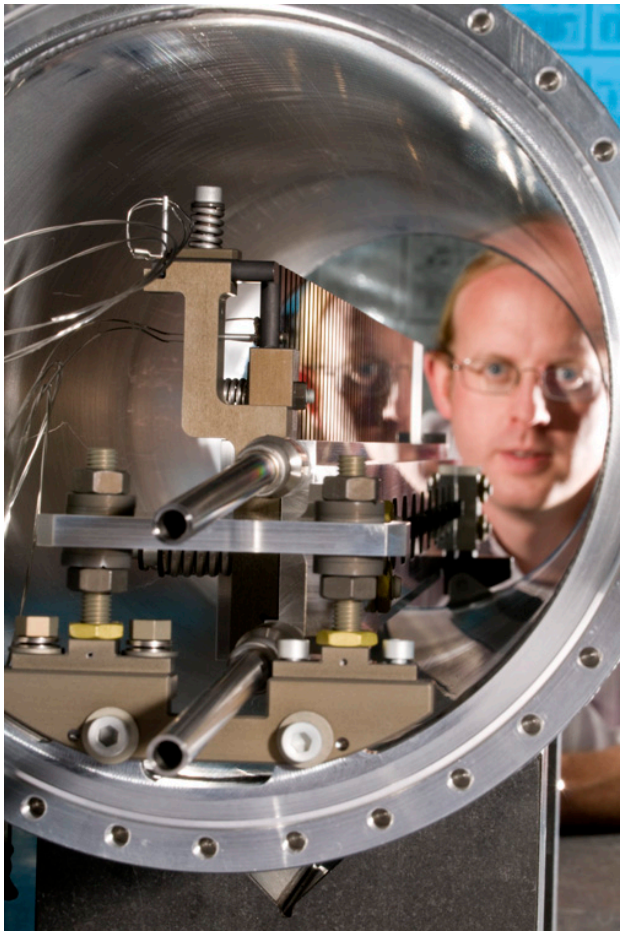
Limited space available for Target Hall activities (Horn 2 move, Target & Horn change outs & repairs, Radioactive Component Repair/ Removal)

NuMI TH 3-d Model—Current Layout



Target

- Target fabrication in collaboration with RAL



Shipped May 3rd!

In customs at O'Hare

Mount on target carrier by June 1

Ready for installation by August 1

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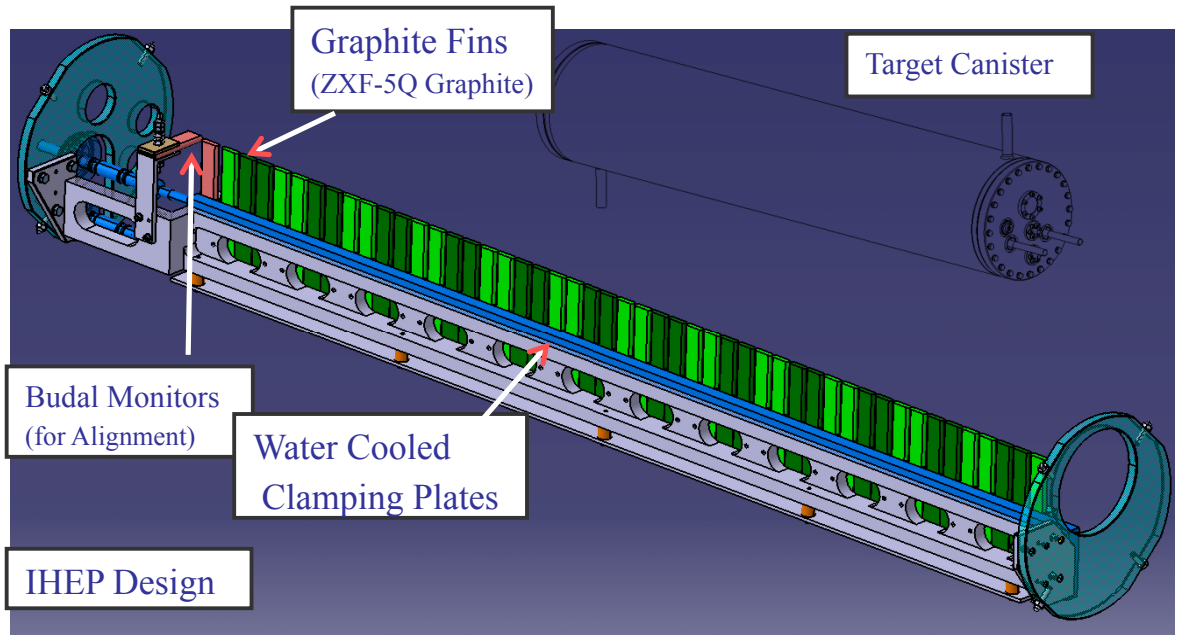

Summary

- Accelerator performance over the past year was good
- Proton Improvement Plan underway with budget reduction of 50% for the next year
- NOvA modifications to the MI and Recycler underway and on schedule so far
  - On schedule so far
- NuMI upgrades and reconfiguration going well
- Given the budget outlook, it will be quite a challenge to maintain our momentum