

NuMI Primary Beam

Readiness

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April 15, '04



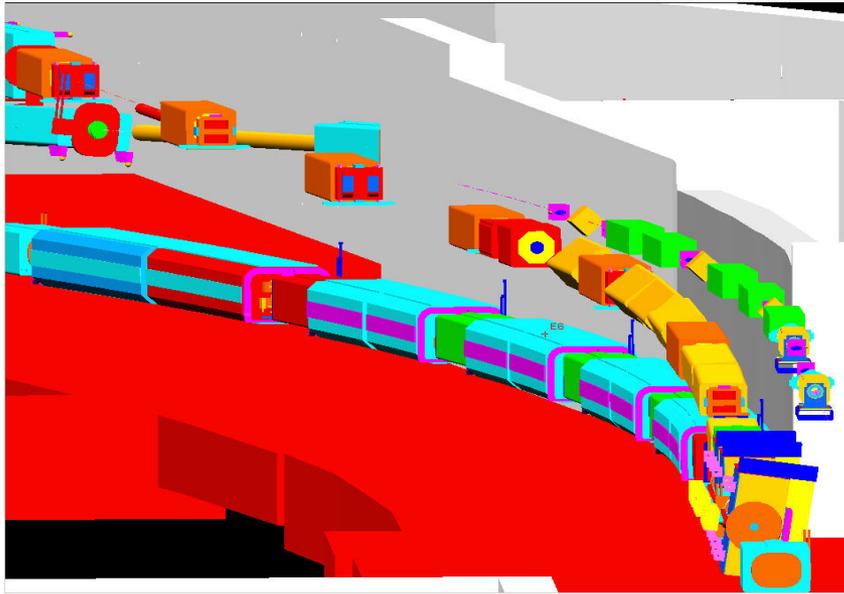
Overview



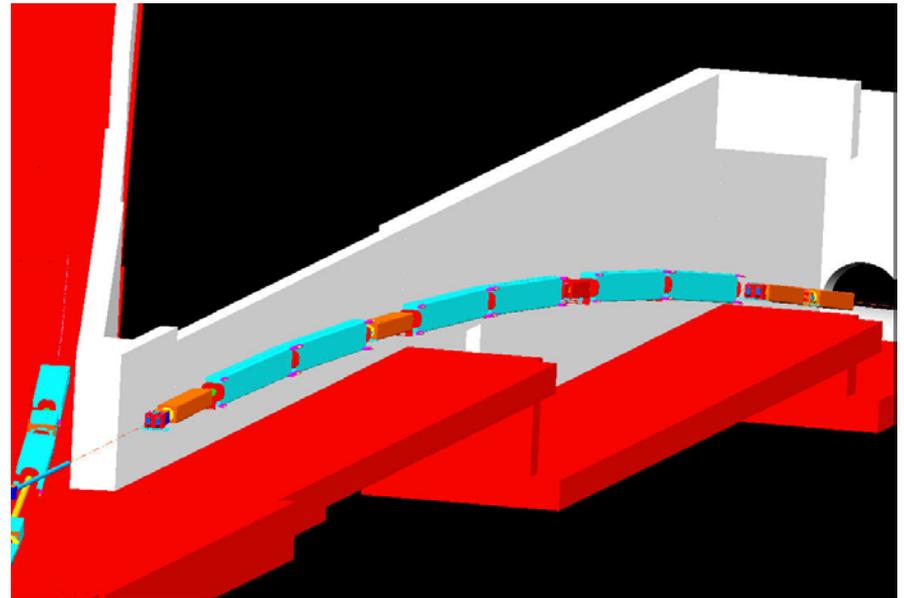
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- Beam Layout
 - Installation Status
 - Readiness of Other Components
 - Schedule
 - Pre-commissioning
 - Summary



Beam Layout – MI Interlock Region



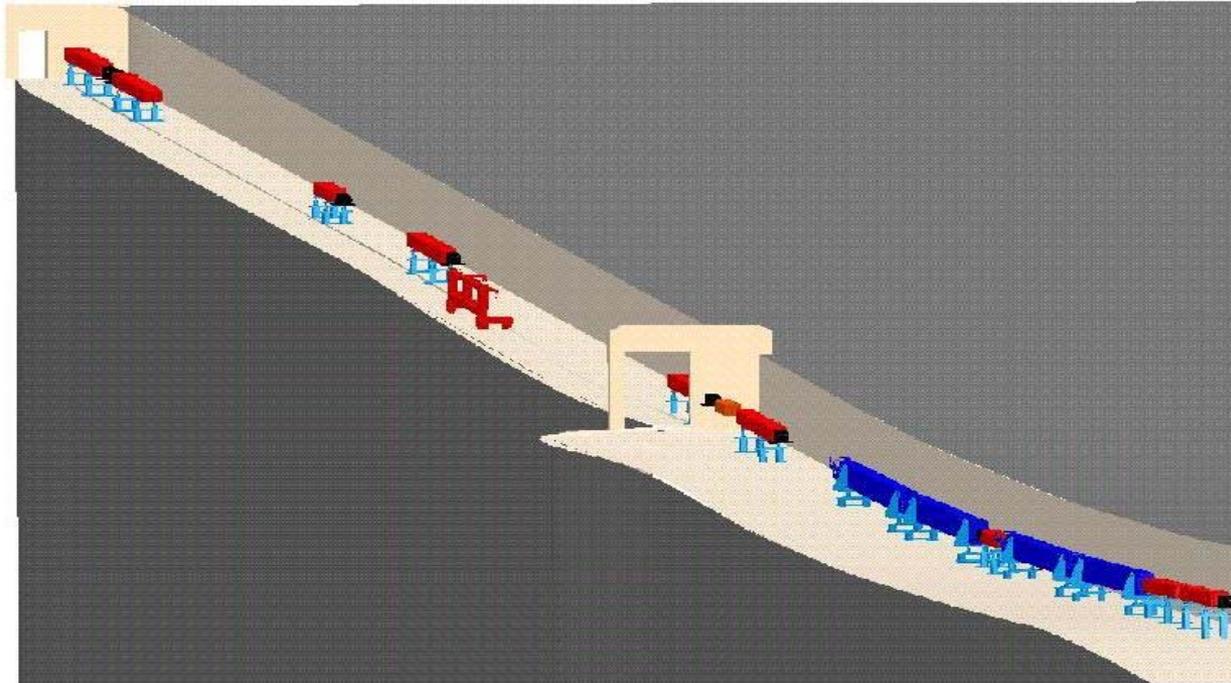
MI-60



NuMI Stub



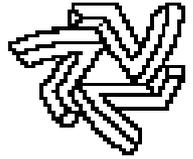
Beam Layout – Pretarget Region



**Upper tunnel region shown is “Lower Hobbit”.
Lower region is “Pretarget”. Carrier tunnel in MI
interlock system is just upstream of Lower Hobbit.**



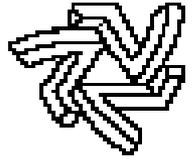
Extraction & Primary Magnets



- 3 Kickers – Typical MI extraction uses 2
- 3 Lambertsons - #1 and #2,3 on separate power supplies
 - Changes from normal extraction are to give much lower extraction beam loss at Lambertsons; more kick plus better clearance for limited Q608 aperture.
- 6 EPB Dipoles – 15 Kg, 35 mm aperture
- 10 B2 Dipoles - ~ 20 Kg, 50 mm aperture, bend down plus bend up string
- 21 3Q Quads – To ~ 4 Kg.m
- 19 MI style correctors - 30 amp supplies
- 2 SY style trim dipoles



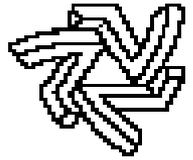
Primary Instrumentation



- 24 BPM's - Split Plate Detectors, Digital Receiver Electronics, also instrument 4 MI detectors in extraction region.
- 10 Profile Monitors – 5 micron thick Ti foils with 1.0, 0.5 mm pitch. Provided by U. Texas, Austin
- 2 Toroid Intensity Monitors
- 50 BLM's – Standard TeV style sealed units
- 4 TLM's – Continuous coverage along beam transport
- 1 Resistive Wall Monitor – 1 GHz bandwidth



Installation Status



- Lambertsons plus all large dipoles plus all quads installed
- Correctors installed in Pretarget region – as of this week
- Tunnel electrical hookup for dipoles, quads nearing completion
- LCW flowing, valved into Pretarget magnets, next shutdown valve into MI region magnets
- Rough alignment for magnets in progress
- Power supply installation, checkout in progress



MI-60 Installation



Installation of three Lambertsons, one C-magnet, six EPB dipoles, and six 3Q Quads in this region. All large magnets except kickers installed. Most difficult region due to wall supported magnets & limited access.



NuMI Stub Installation



Installation of six B2 dipoles and six 3Q quads in this region. Three different levels, monorail crane. Major magnet installation complete.



Lower Hobbit Installation



Installation of five 3Q quads & five correctors in this region. Narrow tunnel, steep slope, custom installation cart. Magnet installation complete.



Pretarget Installation



Drop shaft & access hatch size “just right” for B2 dipoles. Installation of four B2’s, four quads. one trim dipole & four correctors in this region. Magnet installation complete.



Readiness of Other Components



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- Kickers built, Load prototype tests complete, components fabricated, assembly Apr-May. Final upstairs testing in MI-60 June-July.
 - MI-60 area stands for correctors, instrumentation. Adjusters in fabrication, supports engineering complete early May.
 - Vacuum components are in fabrication; pumps delivered.
 - Downstream Be vacuum window is being fabricated.



Instrumentation Status



- **Toroids** -Ready
- **Beam Loss Monitors** - Ready mid-May
 - 30 ready now, remaining 22 in fabrication
- **Total Loss Monitors** – Upstream 2 ready during summer shutdown, downstream 2 end of May
- **Profile Monitors** :- 6 by 7/1/04, 6 by 9/1/04
 - Texas Foil SEM's: 2 arriving this week (1 for destructive testing, 1 production unit) all parts received, starting assembly of remaining 11 (10 plus 2 spares)
- **Fermilab Backup Multiwires** - 6 fabricated end of May



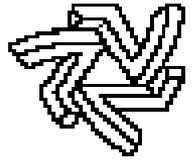
Instrumentation Status (cont)



- **Beam Position Monitors** -Ready end of June
 - Final electronics design design testing nearing completion (filters, calibration). Majority of components delivered.
 - Detectors built, preparations for fiducializing ongoing.
- **Calibration Target** - Ready end of May
- **Resistive Wall Monitor** – Ready for .04 shutdown
 - Component procurement



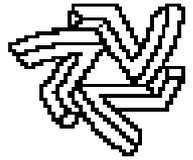
Controls /Applications



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- All controls pages to be with existing applications. Limit new software effort.
 - Hardware status
 - Crates & slot assignments made
 - Digital hardware installation ongoing
 - Database entries – Most database info in hand. Ongoing effort to complete A/D channel assignments



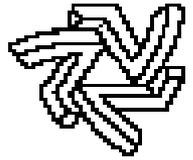
Control Applications (cont)



- **Application pages** – Contact person [coordination Peter Lucas]
 - ** Parameter Pages – J. Smedinghoff
 - ** Power Supply Ramp Setup – G. Wu
 - BPM/BLM Control & Display – L. Winterowd
 - Profile Monitor Control & Plotting - J. Wang
 - Timer Cards Page – L. Winterowd
 - LCW Map – B. Hendricks
 - ** Vacuum – Y. Ivanov
 - Beam Budget Monitor – W. Marsh
 - ** Beam Permit System - B. Hendricks
 - ** AUTOTUNE – J. DeVoy
- **Project June Completion**
 - ** NuMI page has been set-up



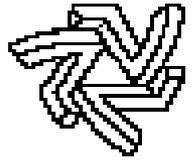
Installation Completion / Schedule



- Due to delayed '04 shutdown, are fast tracking Pretarget installation → **Substantial completion before shutdown** [when technical resources needed for shutdown activities]
- For MI interlock region, complete installation during '04 shutdown.
- **A strong goal is to begin NuMI beam commissioning early in accelerator complex start-up after '04 shutdown!**



Pre-commissioning



- **One of the most critical steps.** Due to very low tolerance for NuMI beam loss and very limited MI region access after long shutdown – we need all systems to be functional and fully tested before begin beam commissioning. Pre-commissioning for each system commences as installation is complete.



Summary



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- We are on track for, and are requesting commissioning beam cycles for NuMI as start-up after '04 shutdown.