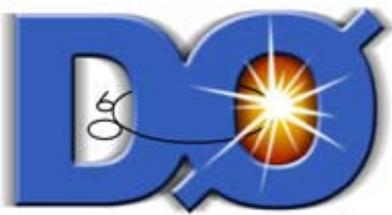




Shutdown

George Ginther
University of Rochester

10 February 2006



Run I Ib Shutdown Activities

- Install and commission Layer 0 detector
- Replace current L1Cal trigger with L1Cal trigger upgrade
- Replace current DFEAs in L1CTT with DFEA2
- Complete cabling/commissioning of L1Cal Track Match trigger
- Complete modifications to L2STT to accommodate Layer 0 inputs
- Complete hardware modifications to muon PDT readout to accommodate latency shift
- Refine V15 trigger list

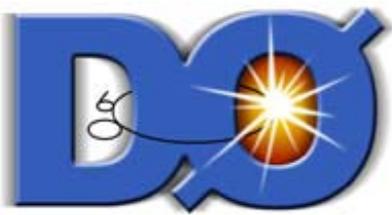
- Complete platform testing of pre-production AFEII-t



Some Additional Shutdown Activities

- Preparation for latency shift
- Routine subsystem maintenance and improvements
- Individual channel recoveries

- Luminosity Monitoring
 - Detector maintenance
 - Improve grounding, new preamps
- SMT
 - HDI recovery effort
 - BLM upgrade?
- CFT
 - New SBC in crate 0x52
- Calorimeter
 - ICD preamp modifications (and some phototube replacements)
 - Cable harness checks
 - Noise studies
- Muon
 - Source calibrations, HV calibrations, cable improvements, modifications to VME power supplies to improve radiation resistance
- L1Muon
 - Improve power supplies



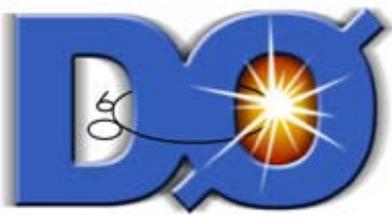
Prior to Shutdown

- High β Low Lumi Store (expected next week)
- Calorimeter Issues
 - Continue assessment of ICD channels that are candidate for repairs
 - Purple Haze investigation
 - Low energy high occupancy noise in the ECs
- AFEII platform tests
 - Hot spare slots
 - Stereo slot test
- Routine Layer 0 module readout
 - Test pedestal shift modifications in Collision Hall?
- Continue testing post-shutdown CTT equations
- Readout tests of L1CalTrack for store or two?
- Get sidewalk installation of L1Cal upgrade into steady state operation
- Continue tests of modifications to PDT readout
 - accommodate trigger latency change
- Enhanced Bias runs at high lumi ($\sim 150E30$)
- Other special runs?



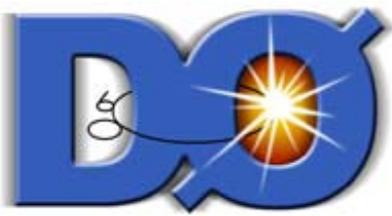
During Recent Collision Hall Access Opportunities

- Layer 0 Installation Prep
 - Fabricated platform for loading and unloading into/from EC beampipe
 - Routing plumbing for gas purges
- L1Cal Installation Prep
 - Rack infrastructure sub-assemblies
 - Fabricated
 - Pressure tested
- Online network upgrades
 - New supervisor module and 48 port Gb blade
- Attempted to get opening survey complete
 - Aborted due to calorimeter noise issues
- MDT repair completed
- Remote control of CFT pulser power supply implemented
- Mechanical and electrical maintenance issues addressed where possible



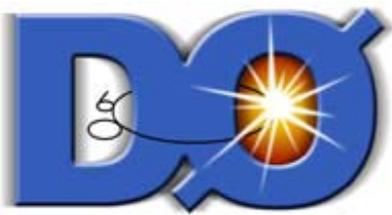
Opening and Closing

- Substantial second shift detector reconfigurations during the first week of shutdown while opening detector and preparing for Layer 0 installation
- Defer start of L1CAL and L1CTT installation to beginning of second week
 - General Collision Hall access limited during first week
 - Facilitates monitoring of calorimeter noise as detector is decoupled from accelerator complex
 - Trigger Framework will be down on Monday 6 March to separate connections between TFW and current L1Cal trigger infrastructure
- As the end of shutdown approaches, aim to have all possible subsystems back to full operational status to identify outstanding issues before detector is fully closed
 - EC scheduled to be closed ~11 May to proceed with beam pipe leak check
 - Aim at having subsystems fully functional by 23 May where possible
 - CF and EF scheduled to be closed ~30 May



Layer 0 Silicon

- Detector
 - Additional layer of silicon detectors designed to fit inside the current Silicon Microstrip Tracker
 - Mitigate tracking losses due to radiation damage and detector aging
 - Provides more robust tracking and pattern recognition to accommodate higher instantaneous luminosities
 - Improves impact parameter resolution
 - 12288 channels
- Installation Overview
 - Tight clearances ($\sim 1\text{mm}$) and substantial work handling and surrounded by delicate components
 - Requires detailed planning, numerous detector reconfigurations, and significant expertise, tooling and technique development and testing
 - Compromises Tevatron vacuum
 - Requires significant collision hall access
 - Our estimate of installation duration originally determined Tevatron shutdown duration



Recent Schedule Updates

- Installation schedule implemented in MS Project
 - Scheduled 5 day work week
 - Includes lab holiday (and treats it as such)
 - Parallel tasks implemented where detector configurations allow
 - 14 week duration (69 working weekdays)
 - Second shift activities when appropriate
 - 8 weekdays of explicit schedule contingency
 - Weekends serve as additional contingency
- Recent installation schedule updates
 - Update shutdown start date
 - Include power outages
 - Incorporate PDT mods
 - Include luminosity monitor maintenance
 - Implement additional details in CTT installation schedule
 - Implement additional details in L1Cal installation
 - Optimize aspects of LO installation

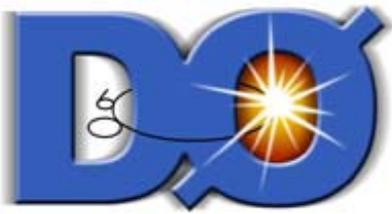


Silicon Installation Milestones

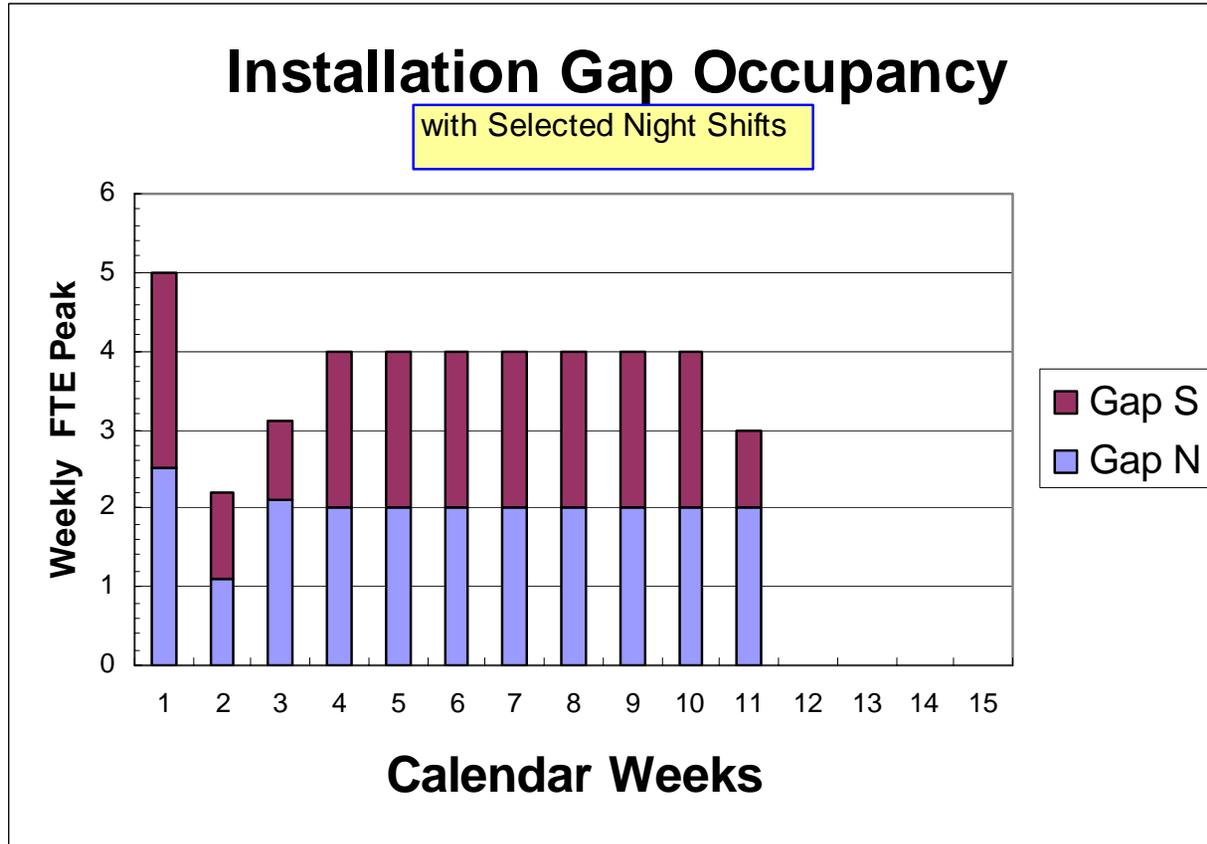
ID	WBS	TASK NAME	Forecast	Milestones	DURATION
2	1.5.1	Beginning of RunIIb Tevatron Shutdown	2/27/06	2/27/06	0 w
28	1.5.2.2.10	Detector Open, Ready for Access	3/02/06	3/07/06	0 w
34	1.5.2.3.4	RunIIa Be Pipe Disconnected	3/4/06	3/9/06	0 w
47	1.5.2.4.12	H Disks Removed	3/17/06	3/23/06	0 w
56	1.5.2.5.8	RunIIa Be Beampipe Removed	3/27/06	3/31/06	0 w
75	1.5.2.8.5	L0 Tooling and Mounts Ready	4/11/06	4/17/06	0 w
79	1.5.2.9.3	L0 Installed	4/13/06	4/19/06	0 w
91	1.5.2.10.11	RunIIb Be Pipe Connected, L0 Cabled	4/26/06	5/03/06	0 w
94	1.5.2.11.2	H Disks Installed	5/2/06	5/9/06	0 w
99	1.5.2.12.4	Silicon Cold and Ready for Technical Commissioning	5/5/06	5/12/06	0 w
103	1.5.2.13.3	Complete Technical Commissioning of Silicon	5/11/06	5/18/06	0 w
118	1.5.2.15.9	Detector Closed for Tevatron Resumption	6/02/06	6/2/06	0 w



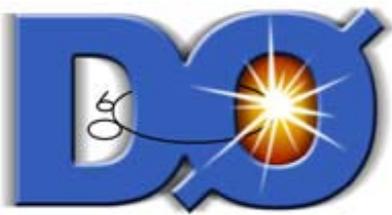
Tevatron Downtime 14 weeks
Includes 1.4 wks explicit contingency



Detector Gap Occupancy

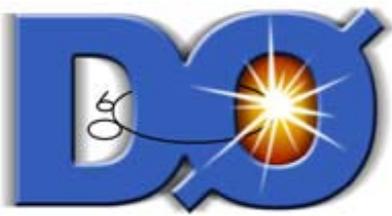


Per Gap Limit: 2



L1 Calorimeter Trigger

- Level 1 Calorimeter Trigger Upgrade
 - Replace 10 racks of Run I calorimeter trigger electronics
 - 80 Analog to Digital Filters (ADFs)
 - 8 Trigger Algorithm Boards (TABs)
 - 1 Global Algorithm Board (GAB)
 - Sharpens trigger turn-on curves
 - Provides specific object ID at Level 1 (electrons, jets, taus)
- Installation Overview
 - Does not require collision hall access
 - Trigger racks located in Movable Counting House
 - However, new electronics physically displaces current Level 1 Calorimeter trigger electronics
 - Decommissioning of current L1Cal trigger starts after beampipe is uncoupled (to facilitate calorimeter noise studies)
 - Installation duration ~10 weeks



L1 Cal Installation Tasks

ID	WBS	TASK NAME	START-DATE	FINISH-DATE	DURATION
2	1.5.1	Beginning of RunIIb Tevatron Shutdown	2/27/06	2/27/06	0 w
148	1.5.3.2.1.2	Final Cal Noise Studies	3/3/06	3/6/06	0.2 w
153	1.5.3.2.1.7	Decable BLS cables from Trigger Crates	3/7/06	3/14/06	1 w
161	1.5.3.2.1.15	Depopulate & Remove Run I Trigger Crates	3/23/06	3/29/06	2 w
165	1.5.3.2.1.19	Install New Heat Exchangers in Racks	4/3/06	4/5/06	3 w
167	1.5.3.2.1.21	Install Smoke Detectors, Test Safety Systems	4/11/06	4/13/06	2 w
168	1.5.3.2.1.22	Install Crates from Sidewalk Test Stand	4/14/06	4/18/06	1 w
171	1.5.3.2.1.25	Connect LVDS Cables	4/24/06	4/26/06	1 w
170	1.5.3.2.1.24	Connect Pleated Foil Cables	4/27/06	5/01/06	1 w
173	1.5.3.2.1.27	Connect BLS Cables	5/4/06	5/10/06	0.4 w
174	1.5.7.2.1.28	L1 Cal Ready for Technical Commissioning	5/10/06	5/10/06	0 w

L1 Cal Ready for Technical Commissioning

~ 3 weeks before beam Resumes



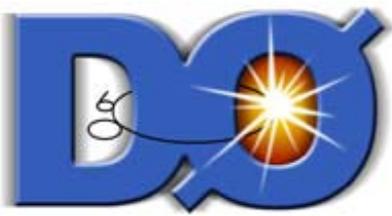
Central Track Trigger

- Level 1 Central Track Trigger Upgrade
 - Replace 40 Digital Front End Analog Boards and associated infrastructure with DFEA2
 - improve fake rejection capability of Central Track Trigger at higher occupancies due to increasing instantaneous luminosities
 - makes use of full granularity of Central Fiber Tracker inputs
- Installation Overview
 - Requires several weeks of collision hall access to remove current boards and install replacements
 - Activity on platform will not interfere with Layer 0 installation
 - Requires intermittent access thereafter for debugging and verification of cabling
 - Installation duration ~9 weeks



Additional Trigger Upgrades

- Level 1 Calorimeter Track Match
 - Electronics to provide new capability to match calorimeter and track objects at Level 1
 - Improved rejection and tau triggering capability
 - Requires change in trigger timing to implement this trigger upgrade
 - Latency measurements complete
 - Will require delay by $3 \times 132 \text{ nsec}$
 - Muon system Proportional Drift Tube COBO must be modified to accommodate this change
- Level 2 Silicon Track Trigger
 - Additional electronics to include Layer 0 detector inputs in Silicon Track Trigger
 - To be installed in Movable Counting House
- Level 2 Processor Upgrades
 - Facilitates handling of more complex events and implementation of improved algorithms
 - Installation in progress (no collision hall access required)



Mechanical Support

- Ops personnel will be working two shift schedule
 - First shift 0700-1530
 - Russ Rucinski
 - Pete Simon
 - Bob Kubinski
 - Chris Tolian
 - Dave Butler (Technical Centers)
 - John Cornele (Mechanical Department)
 - Ops Shifter
 - Dan Markley (for detector moves)
 - Second shift 1500-2230
 - Mike Sarychev
 - Jim Fagan
 - Bob Barger
 - Rolondo Flores
 - Chuck McNeal
 - Steve Jakubowski (Technical Centers)
 - Ops Shifter
 - Todd Nebel (Technical Centers--at start and end of shutdown)
 - Ops Shifters
 - Bill Frank, Bryan Johnson, Pat Healey, John Najdzion



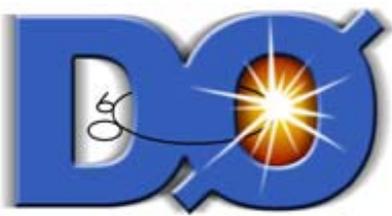
Electrical Support

- Operations and Shutdown support
 - John Anderson
 - John Foglesong
 - Mike Cherry
 - Victor Martinez
 - Shoua Moua
 - Johnny Green (Electrical Engineering Department)
 - Tim Martin (Electrical Engineering Department)
 - Bruce Merkel (Electrical Engineering Department)
- Plus ongoing support from EED Colliding Beam Experiments group
 - Lyn Bagby, Mike Matulik, Jamieson Olson, Mike Utes
- AFE II activities must continue in parallel

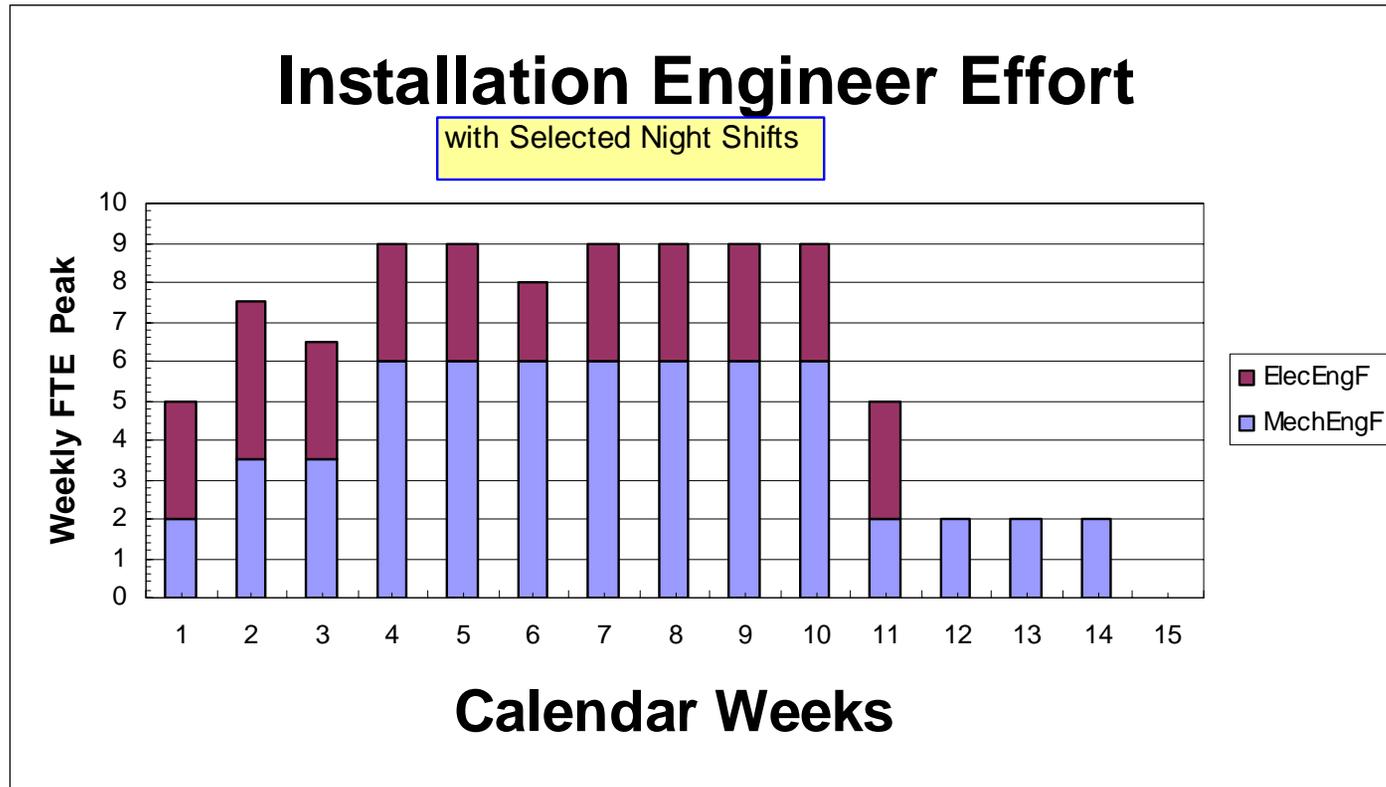


Additional Manpower

- Alignment
- Layer 0 Installation
 - Handling SNEGs, gate valves, leak checking (AD)
 - Dave Butler, Mike Roman, Joe Howell, Yuri Orlov (PPD)
 - Bert Gonzalez and Ken Schultz (PPD)
 - Randy Wyatt (Alignment) as backup for Mike Roman (PPD)
 - Welder for EC beampipe flanges (~1 day)
 - Ron Davis (Vacuum) to make beampipe joints (PPD)
- Trigger Upgrades
 - CTT Mixer Stefano Rapisarda (CD)
 - L1CalTrack visitor support
 - PDT modifications for latency shifts
 - Sten Hansen
 - 2 electrical techs for 3 to 4 weeks



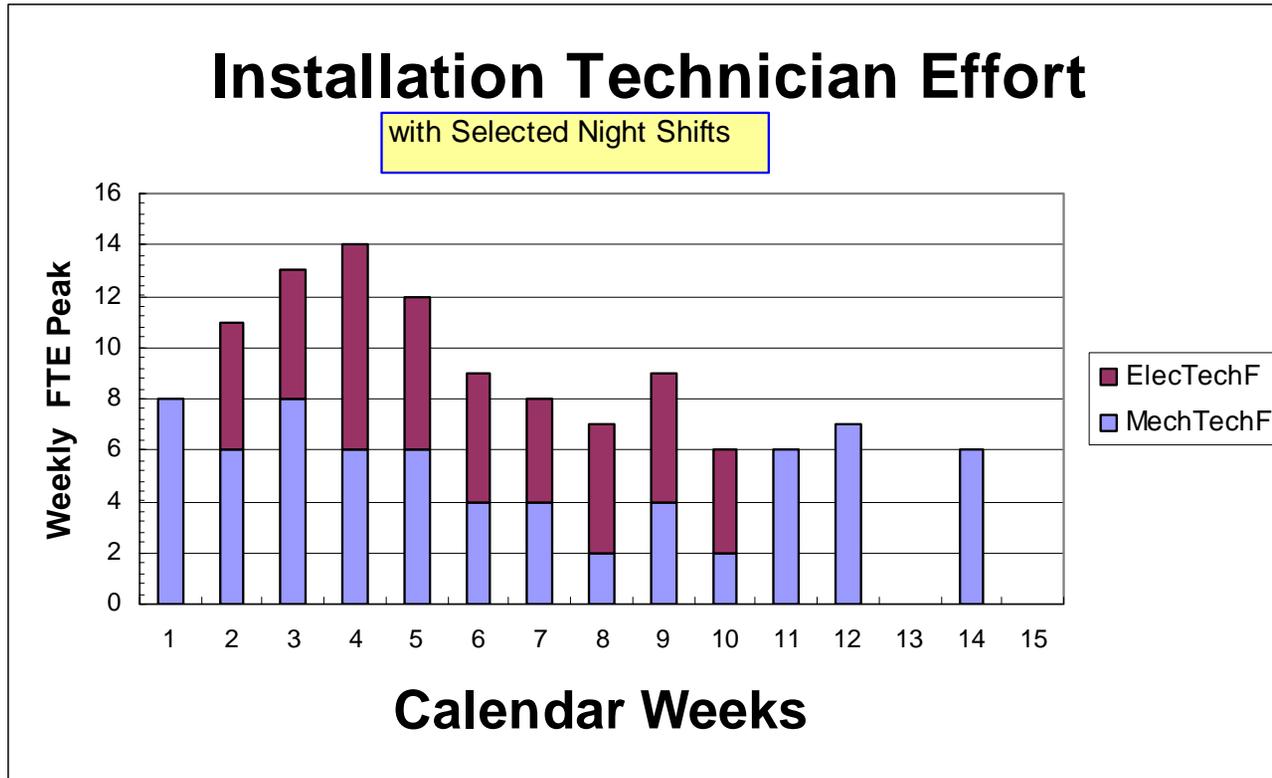
Upgrade Installation Effort



Workweek = Standard 5 days per week



Upgrade Installation Effort

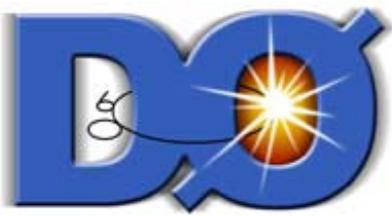


Workweek = Standard 5 days per week



What might happen to the schedule contingency ?

- Detector Maintenance Issues
- Beampipe related
 - Radiation survey results
 - Beryllium wipes results
 - Leak checking complications
 - Maintain purges during installation whenever practical
- North EC beampipe conditions
 - Interior Temperature
 - Weld diameter
 - Surface irregularities
- Detector alignment
- Unanticipated complications



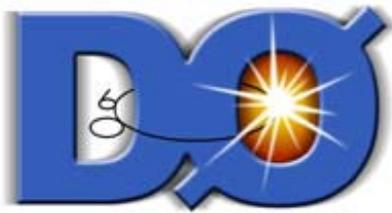
A Few Potential Concerns

- Low energy high occupancy noise in ECs
 - Currently in remission
 - Addressing this unidentified noise may be challenging
- Possible schedule conflicts since Dave Butler has been assigned to Mechanical Operations crew for duration of shutdown
 - Expect to call on Ken Schultz or Bert Gonzalez if Dave becomes effectively overcommitted
- Recent loss in L1Cal installation team
 - Learned that Alan Stone will not be available for L1Cal installation on 31 Jan 2006
 - Exploring responses with assistance of PPD
- Recent confirmation of loss for Layer 0 installation team
 - Sasha Leflat and Evgueni Zverev will not be available before May



Recommendations from 10/25/05 Director's Review

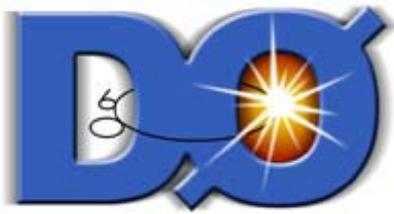
- 4.1 Work with the PPD Management and the Directorate to develop a reporting methodology that allows the Lab management to look at the schedule developments at a level deeper than the ~20 official milestones reported at the review.
- Have had an initial discussion with PPD Management regarding the issue of monitoring progress, and anticipate that this monitoring will be via informal weekly meetings with PPD Management. The topic of assessing milestones is addressed in the response to recommendation 4.2.



Recommendations from 10/25/05

Director's Review

- 4.2 Eliminate confusion with two schedule files by taking milestone dates determined for single shift schedule and setting dates for same milestone in the two-shift working schedule (second shift where appropriate + 6 Saturdays) with constraint type = must finish on. Weekend contingency must be used as it occurs, can't bank it for later use.
- We agree that maintaining two schedules generates potential confusion (as well as requires additional effort), but we use the "single shift" schedule to evaluate the proposed milestones, and felt we should try to be clear on how we arrive at those milestones. If we understand the recommendation correctly, we believe that the proposed solution does not eliminate the need for the second schedule, but does manage to conceal it (which may be adequate to address the underlying concern regarding confusion). We have explored other options in discussions with Bill Freeman, but have not yet found a satisfactory solution which addresses the competing needs. Willing to address the request as proposed.
- We intend to monitor progress and use Saturdays as appropriate.



Recommendations from 10/25/05

Director's Review

- Don't lose focus! Set definite milestones for completion of the remaining legacy pre-shutdown tasks well before start of shutdown: test run fraction of system with as close as possible readout now, pre-shutdown training, paperwork, ES&H, dress-rehearsals, etc. Make sure the status of these pre-shutdown tasks are monitored and checked.
- Sound advice. Specific target dates for the key activities were set, and the sub-projects hold regular meetings during which progress is assessed and plans are revised accordingly. Preparations have certainly continued since the review, but there is no question that the delay in the shutdown resulted in some slowdown in the pace of those activities, and also allowed those involved in the project to spend some time enjoying the holidays, and resulted in a loss of availability of significant team members. In addition, resources were diverted to take best advantage of unanticipated supervised access opportunities. Nevertheless, we expect to be ready to take best advantage of the shutdown.

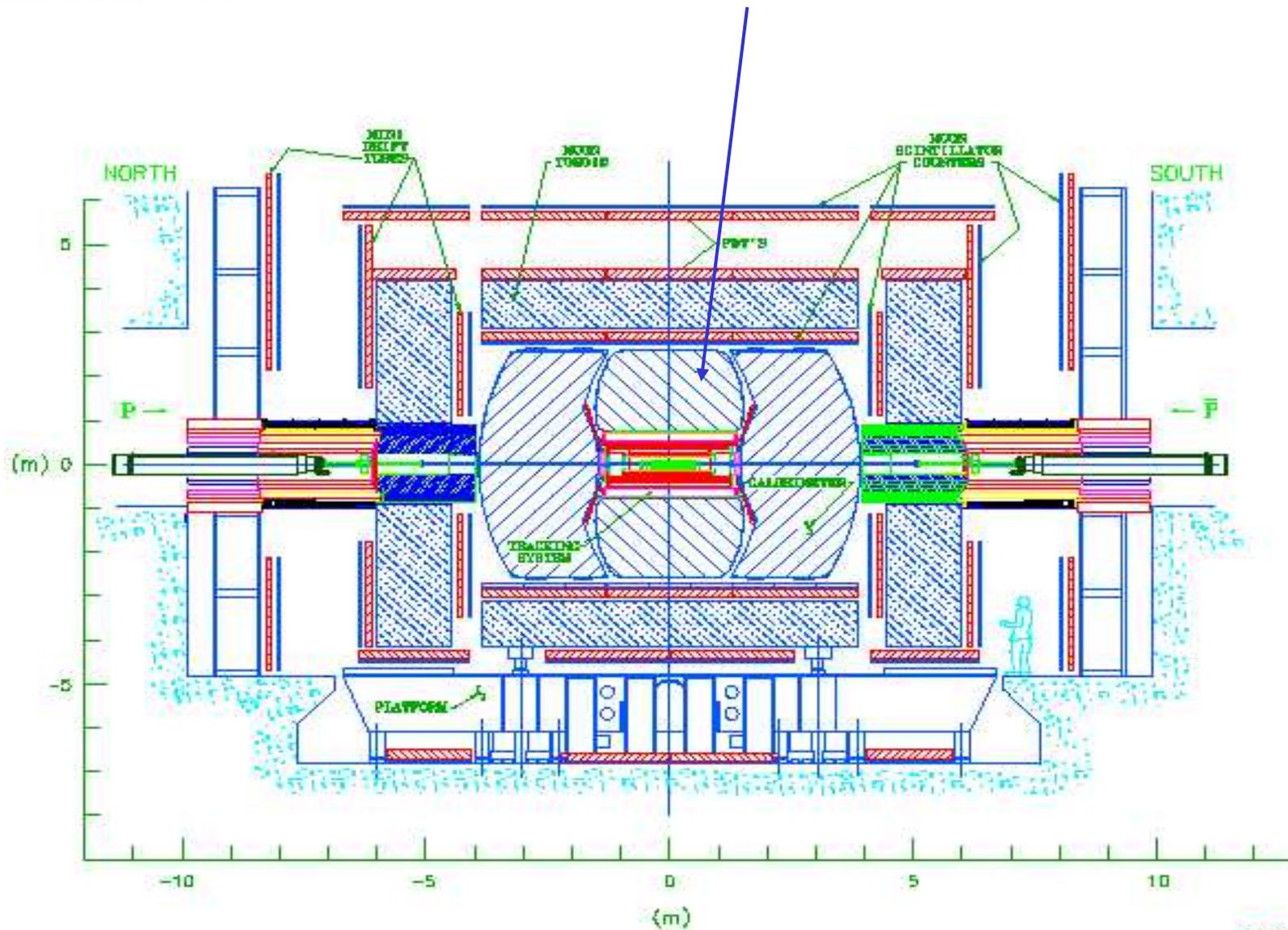


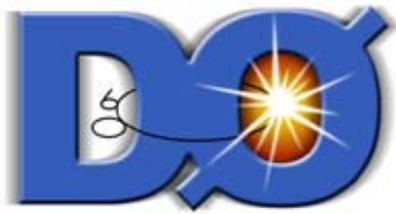
Summary

- Upgrade preparations are nearly complete
 - Running system tests --- Pre-installation commissioning in progress
 - Continuing to refine installation and commissioning plans
- Preparations for installation and final commissioning of Run IIb upgrades are nearly complete
 - The installation schedule includes ~20% schedule contingency in the 14 week shutdown duration (including Saturdays and double shifting)
 - Most resources identified (including backups for key Layer 0 installation team)
 - Attempting to address recent information regarding personnel availability (with lab assistance)
 - Additional Layer 0 installation practices anticipated
- Shutdown will involve substantial parallel efforts to upgrade the DZero detector and make a smooth transition to commissioning and operations
- Need to complete these activities in a timely manner
 - Lab is providing significant support for these activities - Thanks!

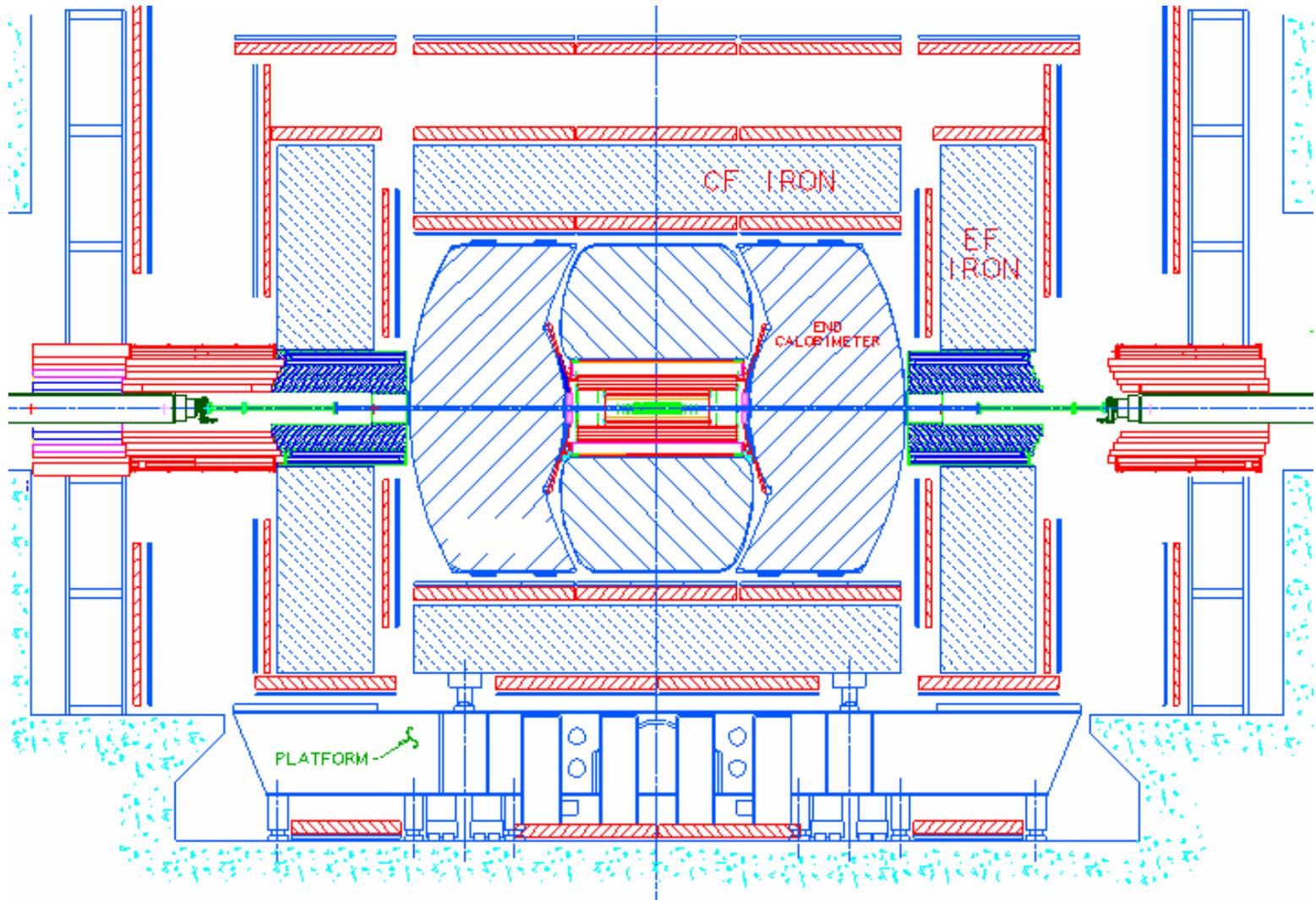


Closed Configuration



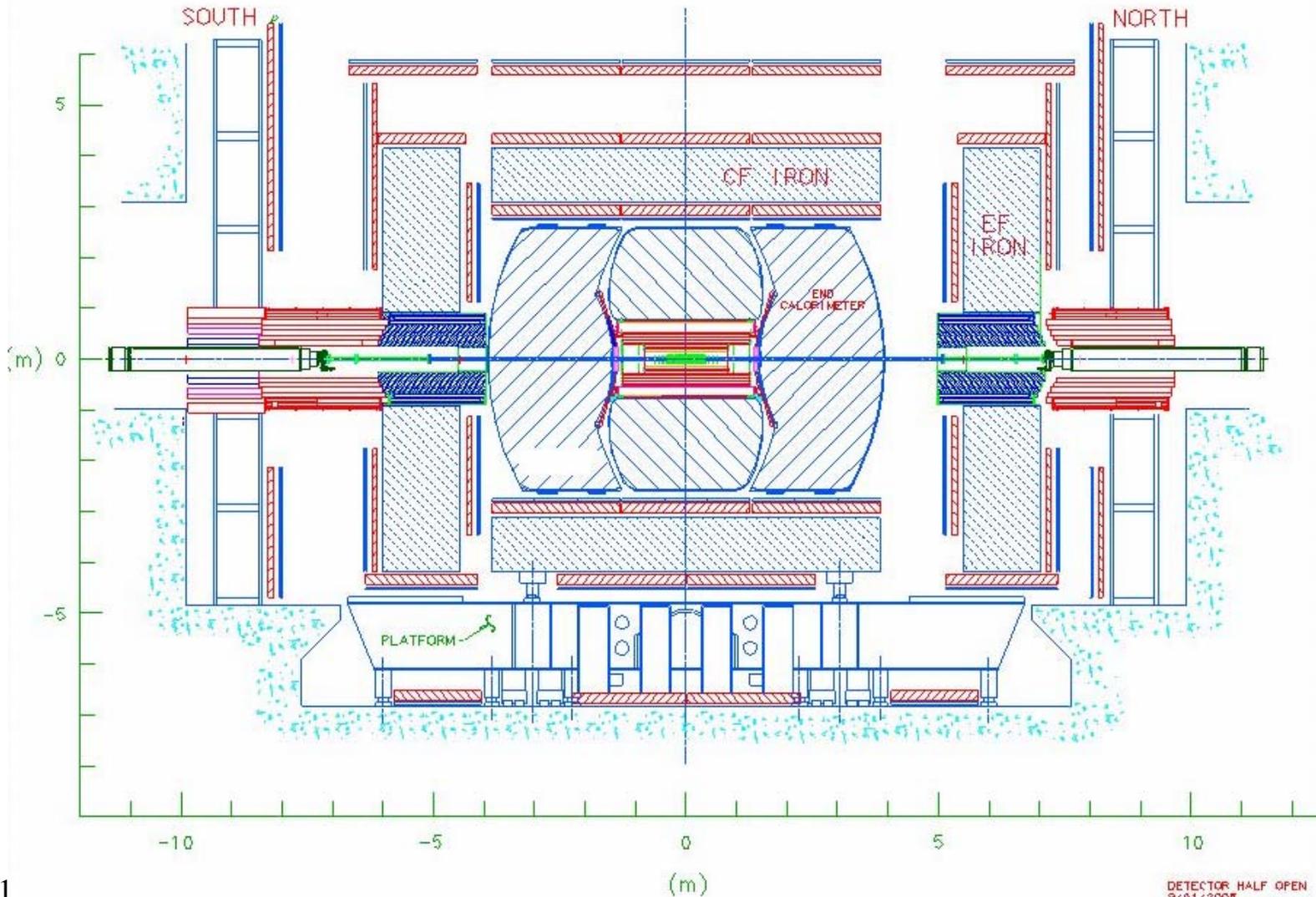


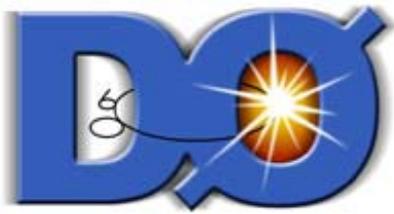
Clam shell open and muon shielding open on one end





One EF open





One EF and EC open allowing access to the gap (assuming CF is also open)

