



SC-IPC First Report

- Overview of Executive Summary



Generating the Report

- **Guidance to Working Group Leaders**
 - ◆ **Develop Timeline/Effort Schedule for Install→Technical Commission→Physics Commission: “return detector to pre-shutdown capability (or better)”**
 - ◆ **Effort Accountancy: Knowledgeable Expert**
 - ◆ **Use Spaulding 8/04 BD Schedule to Estimate Luminosity Costs**
 - ◆ **Itemize Necessary Infrastructure Jobs needed beforehand**
 - ◆ **Silicon, Trigger Hardware**
 - ◆ **Software**
 - ◆ **Note any testing/certification not possible until item is installed in Detector**
 - ◆ **Account for dependencies on other Upgrade elements**



Features of the Report

- Upgrade Project Managers checked Report for duplication (& omissions!)
 - ◆ Trigsim most complex
- Specific Recommendations from 3 Working Groups
 - ◆ Task Leaders for Trigger, L0 Software, L1Cal Commissioning
- No “Show-stoppers” but lots of dedicated effort needed
 - ◆ Schedule for L1Cal Hardware slipping behind Layer Zero?
- By assumption, all upgrades installed during single (e.g. 2005) Tevatron shutdown
- (Fully Loaded MS Project Plan correlated to Report)



Contents of First Report

- **First Report Contents**
 - ◆ **1. Introduction & Charge**
 - ◆ **2. Working Groups:**
 - ◆ 1: L2CalTrig (Johns)
 - ◆ 2: L1CalTrak & CTT (Grunendahl)
 - ◆ 3: L2Beta & STT (Hirosky)
 - ◆ 4: TrigSim (Hays)
 - ◆ 5: Layer Zero (Quinn)
 - ◆ 6: AFE II – not yet
 - ◆ 7: Online – not needed
 - ◆ **3. Executive Summary**
 - ◆ **4. Detailed Reports of the Working Groups**
 - ◆ **5. References**
 - ◆ **6. Spokes Charge to the SC-IPC**
 - ◆ **7. Descriptions of the Upgrades**



Overview of Executive Summary

- **Executive Summary of the Executive Summary**
 - ◆ Upgrade Hardware (esp rescoped L1CTT, L1Cal Test Area) in “better shape” than software
 - ◆ Hardware “Dates of Completion” taken as input parameters to schedule; Plan indicates L1CalTrig can be installed in time-shadow of Layer Zero (both installation durations mean recorded luminosity is zero)
 - ◆ Effort schedules do not identify which persons will come from Upgrade Project, which are already scheduled to work (e.g. via MOU), and which must be newly recruited
 - ◆ Layer Zero and L1Cal Trig can be installed in 10-week TeVatron Shutdown
 - ◆ First L1Cal Triggers to TFW at week 8; week 12 first global data-taking; week 20 ready for physics



Overview of Executive Summary

- Executive Summary of the Executive Summary (cont)
 - ◆ L1CTT functional at week 12, L1CalTrak at week 13; both doing physics at week 21
 - ◆ Layer Zero data to DAQ at week 11, fully certified for physics at week 17; generates no luminosity cost even if delayed
 - ◆ L2STT fully integrated at week 21
 - ◆ During penultimate last 2 weeks, luminosity cost 50% due to special runs
 - ◆ During ultimate last 2 weeks, luminosity cost 25% due to special runs
 - ◆ Luminosity Cost 122 pb⁻¹
 - ◆ Effort: 465 Physicist-weeks over 21 weeks



Overall Installation Timeline

Upgrade Physicist Effort and Luminosity Cost Timeline

Task Name	Wk1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16	Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Totals					
Tevatron Shutdown	[Red bar]										[Red bar]																
Upgrade Activity	Install Hardware							Technical Commissioning					Physics Commission														
Layer Zero Silicon	[Blue bar]							[Red bar]					[Green bar]														
L1 Cal Trig	[Blue bar]							[Red bar]					[Green bar]														
L1 CTT	[Blue bar]		[Red bar]									[Green bar]															
L1 CalTrack											[Red bar]		[Green bar]														
L2 Beta	[Blue bar]		[Red bar]													[Green bar]											
L2 STT	[Blue bar]												[Red bar]					[Green bar]									
Trigger List											[Blue bar]										[Green bar]						
Integrated Luminosity*	0	0	0	0	0	0	0	0	0	0	8	18	30	43	58	75	92	111	131	151	172						
RunIb Upgrade Cost	0	0	0	0	0	0	0	0	0	0	8	18	30	43	58	75	92	102	112	117	122						
Fermilab Physicists	3	6	2	5	5	5	2	1	1	3	1	1	0	0	0	0	0	0	0	0	0	0	33				
University Physicists	1	5	5	7	5	5	4	4	3	3	3	6	5	5	5	5	2	2	2	2	2	2	82				
Physicists	14	14	10	6	6	12	20	20	16	16	12	16	15	15	18	23	23	25	31	19	19	350					
Total	18	25	17	17	16	22	26	25	20	22	16	23	20	20	23	28	25	27	33	21	21	465					
* J. Spaulding, BD, 8/04 Design, 10wk shutdown																											



Overview of Executive Summary

- Executive Summary of the Executive Summary (cont)
 - ◆ Infrastructure (i.e. pre 2005) effort: 140 PM
 - ◆ Layer Zero Offline Software: 25
 - ◆ L1Cal Precommissioning: 23
 - ◆ L1CTT/L1CalTrak software & Precommissioning: 21
 - ◆ Trigsim software: 69
 - ◆ These are INCREMENTAL to the Upgrade Project



Overview of Executive Summary

- L1Cal Trig – Hardware DOC July 1, 2005
 - ◆ “The SC-IPC recommends that the collaboration identify a position (or 2) which will be responsible for the oversight and coordination of the L1CalTrig precommissioning effort (hardware & software)...”
 - ◆ “The SC-IPC recommends that shifts taken at the test area be managed as D0 shifts...”
 - ◆ TFW off only 1--2 days at beginning
 - ◆ Global data-taking resumes at week 13
 - ◆ Physics data-taking resumes at week 20
 - ◆ Full-system precommissioning on sidewalk may pace shutdown schedule...



L1 Cal Trig

L1 Cal Trig Installation to Physics Timeline

Task Name	Before	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16	Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Total MW	
Preinstallation	→																							
Precommission at DAB Test Area	→																							
Tevatron Shutdown for Layer Zero Installation		[Red bar]																						
Install Hardware		[Blue bar]																						
Remove old Racks from MCH1		[Blue bar]																						
Redress BLS cables			[Blue bar]	[Blue bar]																				
Install new Racks in MCH1				[Blue bar]	[Blue bar]																			
Connect Rack Services						[Blue bar]																		
Connect BLS & Intermediate Cables							[Blue bar]																	
L1 Cal Trig Hardware Installed								[Red dot]																
Technical Commissioning									[Red bar]	[Red bar]	[Red bar]	[Red bar]												
Operate full System								[Blue bar]																
Verify Cabling								[Blue bar]																
Check L1, L2, L3 data								[Blue bar]	[Blue bar]	[Blue bar]	[Blue bar]													
Calibrate Trigger Towers (TT)								[Blue bar]	[Blue bar]	[Blue bar]	[Blue bar]													
Compare TT and Precision Readout								[Blue bar]	[Blue bar]	[Blue bar]	[Blue bar]													
Develop final ADF Coefficients								[Blue bar]	[Blue bar]	[Blue bar]	[Blue bar]													
Study Debug Triggers								[Blue bar]	[Blue bar]	[Blue bar]	[Blue bar]													
Technical Commissioning Complete												[Red dot]												
Physics Commissioning													[Green bar]											
Final Tune of ADF Coefficients for TT Response													[Blue bar]											
Final Checks of Certification of L1 Cal Trigger													[Blue bar]											
Noise Studies													[Blue bar]											
Verify Trigger Rates, Efficiencies, Purities													[Blue bar]											
L1 Cal Trig Ready for High Luminosity Physics																						[Red dot]		
Fermilab Physicists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fermilab Technicians	0	7	8	3	3	4	6	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35
University Physicists	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Physicists	4	4	4	4	0	0	6	6	6	6	6	3	5	7	7	10	10	10	12	12	0	0	0	118
Total Physicists	4	4	4	4	0	0	7	6	6	6	6	3	5	7	7	10	10	10	12	12	0	0	0	120



Overview of Executive Summary

- L1CTT & L1CalTrack – Hardware DOC May 23, 2005
 - ◆ L1CalTrak substantially installed & precommissioned before shutdown
 - ◆ L1CTT substantially precommissioned before shutdown so technical commissioning complete at week 12
 - ◆ L1CalTrak physics commissioning resumes when L1CalTrig and L1 CTT ready (week 14)
 - ◆ Both systems ready for physics at week 21



L1CTT & L1CalTrack

L1 CTT & L1CalTrack Installation to Physics Timeline

Task Name	Before	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16	Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Total MW		
Tevatron Shutdown for Layer Zero Installation		[Red bar from Wk 1 to Wk 21]																							
Install CTT Hardware		[Blue bar]																							
Remove old CTT Crates on Platform		[Blue bar]																							
Install CTT Crates, Recable, Load DFEA's			[Blue bar]																						
L1 CTT Hardware Installed					[Red dot]																				
Install CTM Hardware	[Blue arrow]	[Red dot]																							
CTM Hardware Installed	[Blue arrow]	[Red dot]																							
Develop CTM Online software	[Blue arrow]																								
L1CTT Technical Commissioning					[Red bar from Wk 5 to Wk 12]																				
Debug CTT Inputs				[Blue bar]																					
Verify CTT Outputs								[Blue bar]																	
L1CTT Technical Commissioning Complete													[Red dot]												
L1 Cal Trig Available									[Red dot]																
L1CalTrack Technical Commissioning													[Red bar from Wk 12 to Wk 14]												
Modify L1 Latency		[Blue bar]																							
Debug Timing (BOT, triggers to TFW)	[Blue arrow]	[Blue bar]																							
Establish L2, L3 Readout	[Blue arrow]																								
Test PDT and SFE mods	[Blue arrow]																								
Debug CTM decisions at TFW		[Blue bar]																							
Debug CTM Inputs (CTT, L1 Cal)									[Blue bar]																
L1Cal-only vs L1Cal; L1Ctt-only vs L1CTT rates													[Blue bar]												
Establish Triggers (BOT, Cal, CFT)													[Blue bar]												
L1CalTrack Technical Commissioning Complete															[Red dot]										
CTM/CTT Physics Commissioning													[Green bar from Wk 12 to Wk 21]												
Measure rates, efficiencies, purities (CTM vs L1Cal, CTM vs L1CTT)													[Blue bar]												
Study CTT Triggers in detail													[Blue bar]												
L1 CTT and L1CalTrack Ready for Physics																							[Red dot]		
Fermilab Physicists	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	10	
University Physicists	0	0	4	4	4	4	4	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	57	
Physicists	2	1	1	0	0	0	0	0	0	0	0	2	4	4	4	4	4	4	4	4	4	4	4	44	
Total Physicists	2	1	5	4	5	5	5	5	5	4	4	6	8	6	6	6	6	6	6	6	6	6	6	111	

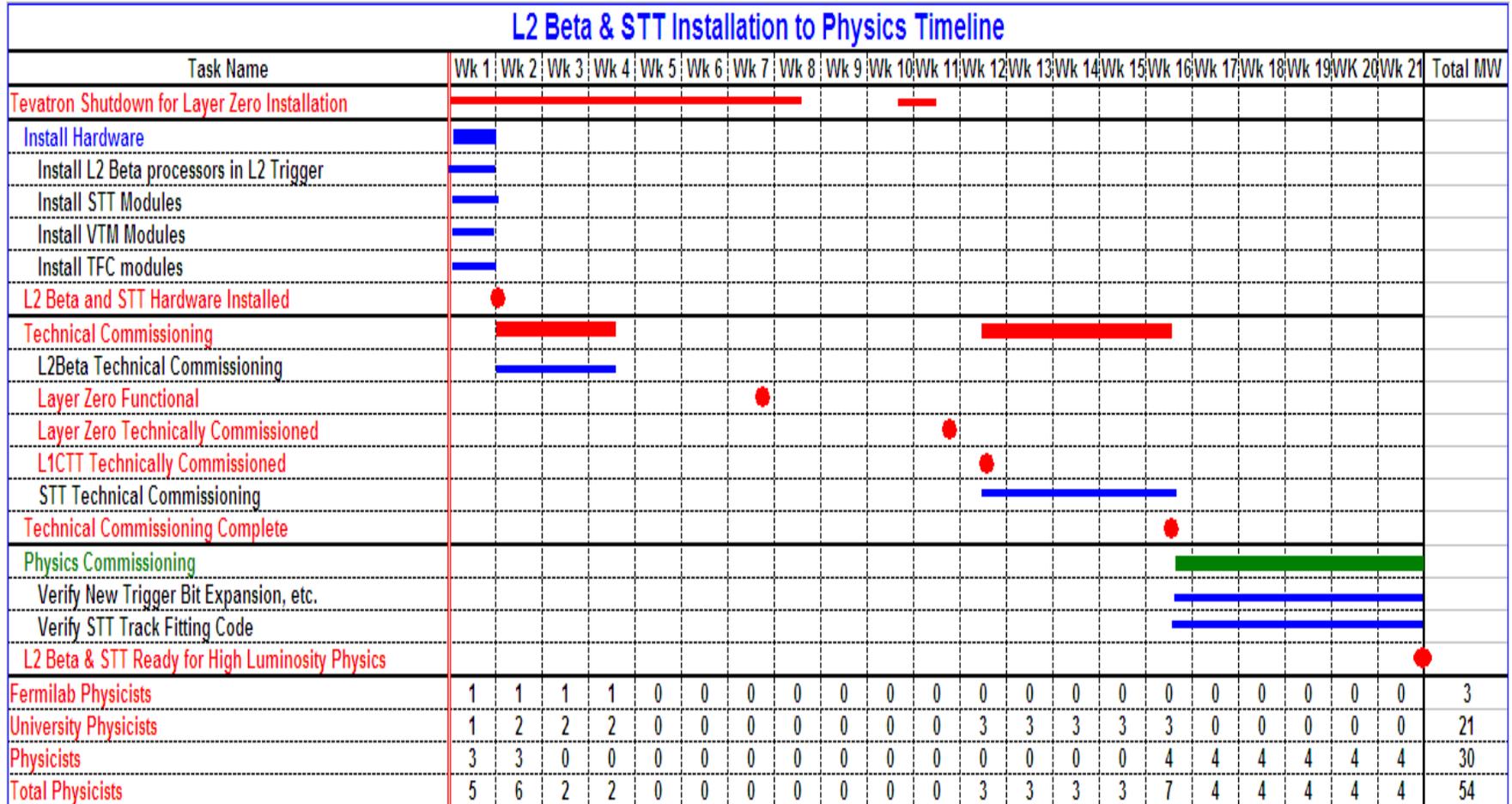


Overview of Executive Summary

- **L2Beta & STT – Hardware DOC March 24, 2005**
 - ◆ **L2Beta Processors installed “adiabatically” before shutdown**
 - ◆ L2 Bit Expansion also preinstalled
 - ◆ L1CalTrig data format change installed as L1CalTrig becomes operational
 - ◆ **Splitters and fibers for STT preinstalled in MCH before shutdown**
 - ◆ New hardware installed at beginning of shutdown
 - ◆ Data flow from Layer Zero, L1CTT initiates commissioning
 - ◆ **Both systems fully physics-ready at week 21**



L2Beta & STT



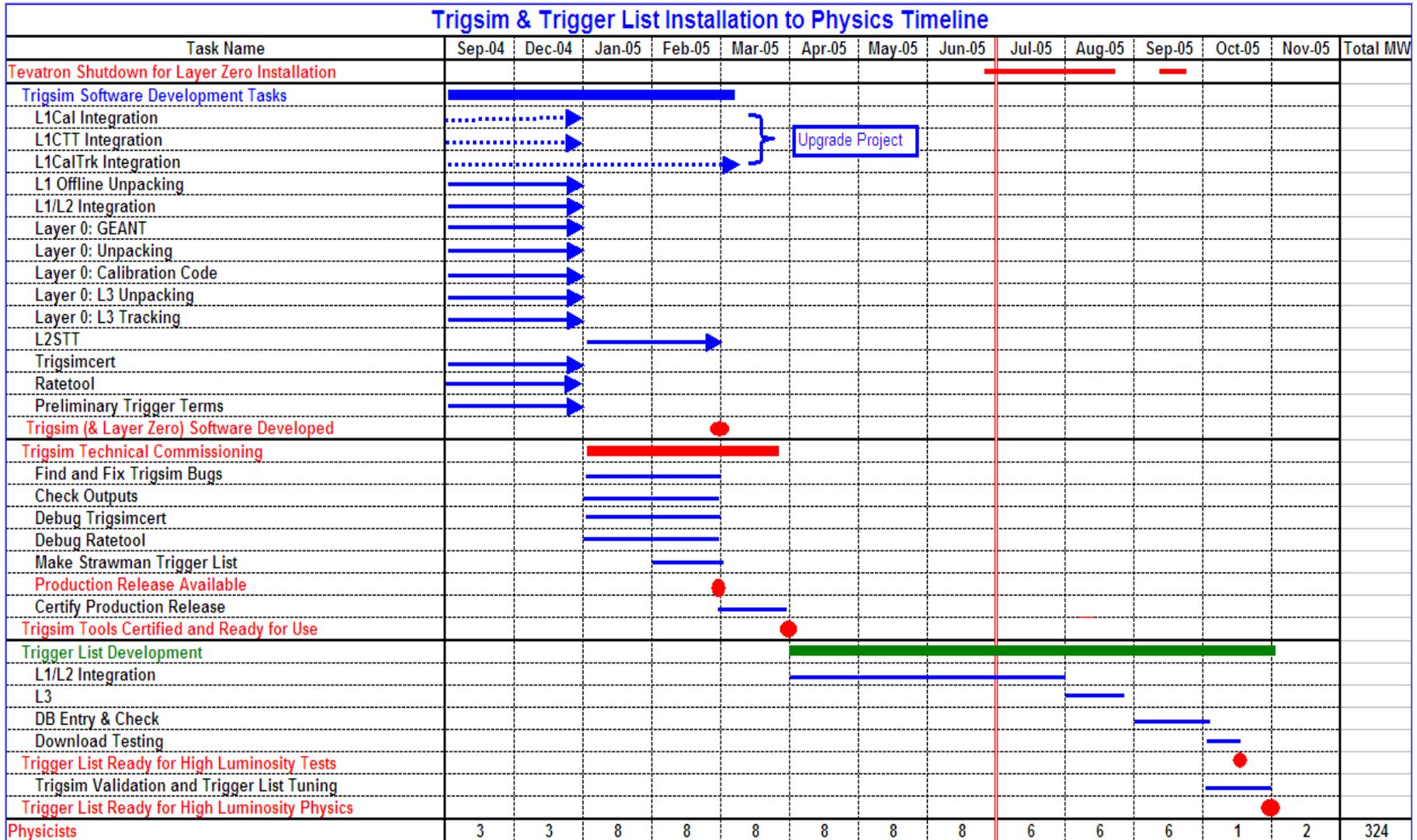


Overview of Executive Summary

- **Trigsim & Trigger List – DOC Nov 1, 2005**
 - ◆ **DOC driven by assumed 2005 Shutdown date**
 - ◆ **Schedule “worked back” from that date**
 - ◆ **Upgrade Project lays critical foundation for Upgrade Integration, “strawman” trigger list**
 - ◆ **“Not a moment to lose”**
 - ◆ **“The SC-IPC recommends that the collaboration identify a position which will be responsible for the integration of the Run II b trigger effort in the overall D0 trigger strategy...”**



Trigsim & Trigger List





Overview of Executive Summary

- Layer Zero – Hardware DOC July 21, 2005
 - ◆ “The SC-IPC recommends that the collaboration identify a position which will be responsible for the oversight and coordination of the Layer Zero software effort...”
 - ◆ Access to Detector Requires 8—10 weeks
 - ◆ Technical commissioning complete at week 12
 - ◆ Physics commissioning complete at week 16
 - ◆ Not needed for physics resumption, so no luminosity cost if physics commissioning delayed



Layer Zero

WG 5: Layer Zero Silicon Installation to Physics Timeline

Task Name	Before	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16	Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Total MW	
Preinstallation	→																							
Hardware Infrastructure	→																							
Online Software	→																							
Offline Software	→																							
Tevatron Shutdown for Layer Zero Installation		[Red bar from Wk 1 to Wk 10]										[Red bar from Wk 11 to Wk 12]												
Install Hardware		[Blue bar from Wk 1 to Wk 7]																						
Open Detector, Install Scaffolds, Disconnect Tev Beampipes		[Blue bar from Wk 1 to Wk 2]																						
Warm silicon, Remove EC beampipes, H Disks		[Blue bar from Wk 1 to Wk 3]																						
Install Layer Zero Mounts		[Blue bar from Wk 2 to Wk 3]																						
L0 Ready at SiDet					[Red dot at Wk 4]																			
Install Layer Zero, Connect Be Pipe					[Blue bar from Wk 4 to Wk 5]																			
Cable Silicon, Install H Disks, Install Cooling						[Blue bar from Wk 5 to Wk 6]																		
Reconnect Tev Beampipes & Leak Check, Cooldown Si							[Blue bar from Wk 6 to Wk 7]																	
L0 Silicon Installed								[Red dot at Wk 7]																
Technical Commissioning										[Red bar from Wk 8 to Wk 12]														
Demonstrate Full Operability of all channels									[Blue bar from Wk 8 to Wk 9]															
Verify Functionality of all SMT Software										[Blue bar from Wk 9 to Wk 13]														
Close Detector											[Blue bar from Wk 10 to Wk 11]													
Technical Commissioning Complete												[Red dot at Wk 11]												
Physics Commissioning													[Green bar from Wk 12 to Wk 18]											
Timing Studies													[Blue bar from Wk 12 to Wk 13]											
Noise Studies													[Blue bar from Wk 12 to Wk 15]											
Alignment													[Blue bar from Wk 15 to Wk 19]											
Clustering Studies													[Blue bar from Wk 17 to Wk 21]											
Tracking Studies													[Blue bar from Wk 17 to Wk 21]											
Physics Objects (Neutral Vee's, etc)													[Blue bar from Wk 17 to Wk 21]											
L0 Silicon Ready for High Luminosity Physics																		[Red dot at Wk 17]						
Fermilab Physicists	1	2	4	1	3	4	4	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	20	
University Physicists	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
Physicists	3	0	0	0	0	0	0	8	8	4	4	6	6	3	3	3	3	3	3	9	9	9	81	
Total Physicists	4	2	4	1	4	5	4	9	8	4	6	6	6	3	3	3	3	3	3	9	9	9	103	
Technicians	0	4	4	6	5	8	6	5	0	0	4	4	0	0	0	0	0	0	0	0	0	0	46	