



Run IIb

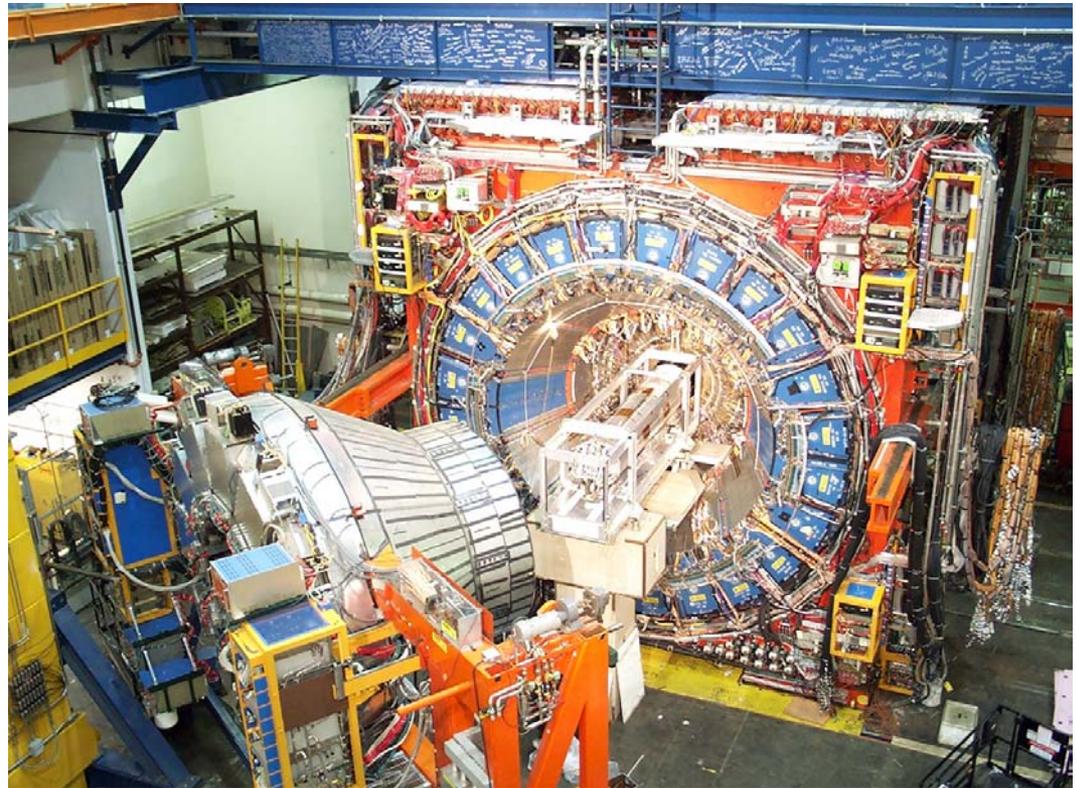
Installation and Infrastructure

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Outline

- **Overview of Subproject**
- **Work Plan**
 - Work Breakdown Struct.
 - Description
- **Resources**
 - Cost Estimate
 - Sources of Funding
 - Labor Estimates
- **Schedule**
 - Milestones
 - Critical Path
- **Summary**





Subproject Overview

This project covers:

- The integration of the various detectors and subsystems, as well as their installation into the experiment.
- The support systems for operation (AC power, flammable gas, HVAC, chilled fluids) are all covered here as well.
- Collision Hall modifications



Work Breakdown Structure

- **2.1.1 Project Management Resources**
- **2.1.2 Roll Out from Run IIa**
- **2.1.3 Assembly Hall Work**
 - 2.1.3.1 Install New Cables
 - 2.1.3.2 Upgrade Silicon Controls and Interlocks
 - 2.1.3.3 Collision Hall Modifications
 - 2.1.3.4 Remove SVXII/ISL from central detector
 - 2.1.3.5 Preradiator Installation
 - 2.1.3.6 EM Calorimeter Timing
 - 2.1.3.7 TDC Replacement
 - 2.1.3.8 Install SVXIIb/ISL inside central detector
- **2.1.4 Roll In for Run IIb**
 - 2.1.4.1 Detector Roll-In
 - 2.1.4.2 Connect utilities/infrastructure
 - 2.1.4.3 Complete silicon installation
 - 2.1.4.4 Test Solenoid



Project Description

- 2.1.2 Roll Out from Run IIA
 - Movement of the central detector from the collision hall to the assembly hall where there is sufficient room to install silicon
- 2.1.3.1 Install New Cables
 - New detectors require a change in the cable plant. Old cables are removed and new ones are labeled, bundled, and installed
- 2.1.3.2 Upgrade Silicon Controls and Interlocks
 - Modernize controls to use a safety rated PLC
 - System would then use same technology that all other process systems use on CDF.
- 2.1.3.3 Collision Hall modifications
 - Modify “cryo” platform for better access
 - Install platforms to access silicon electronics



Project Description

- 2.1.3.4 Remove SVXII/ISL from detector
 - Silicon Detector is removed from COT and transportation to the Sci Det Facility
 - Modify Cable Plant
 - Install Junction Port Cards/infrastructure
- 2.1.3.5 Preradiator Installation
 - Removal of current system and its infrastructure
 - Install the new system and associated hardware
- 2.1.3.6 EM Calorimeter Timing
 - Install local cabling as well as cabling from CH to counting houses
- 2.1.3.8 Install SVXIIb/ISL into Central Detector
 - Setup of installation hardware and detector installation



Project Description

- 2.1.3.7 TDC Replacement
 - Removal of old electronics, installation and testing of new hardware
- 2.1.4.1 Roll Central Detector into Collision hall
 - Includes all rigging tasks required to roll in the central detector, muon systems, and 1200 ton door
- 2.1.4.2 Connect detector utilities
 - Connect cryo, gas, water, AC power, SUVA, silicon cooling
 - Checkout of all interlocks
 - Certification of safety systems
- 2.1.4.3 Complete silicon installation
 - Involves final cabling of detector, connection of all interlock, gas, and cooling systems,
 - Also includes interlock checkout, turn-on of cooling and electrical power



Project Description

- 2.1.4.4 Test Solenoid
 - cryo plant turn-on, solenoid cooldown, interlock checkout, power supply checkout, and initial powering
- 2.1.1 Project Management Resources
 - Contains general drafting resources, documentation, and resources to write JHA's, safety reviews, ORC's, etc



Total Cost to Install

	<u>Cost</u>	<u>Contingency</u>
<u>Equipment</u>	\$80k	\$24k
<u>Labor</u>	\$688k	\$478k
<u>Total</u>	\$768k	\$502k

In FY06 \$\$\$, (indirect costs included)

Contingency done at the task level



Cost Drivers

- Labor is obviously the largest cost for installation. Engineering and technician needs are quite high – though very well defined in terms of scope.
- Most of the tasks listed were done on Run IIA so the estimates are based upon experience



The Group

- CDF currently has a small group of technicians that it is using to operate the experiment.
 - 1 Project Engineer
 - 2 group leaders
 - 8 mechanical technicians
 - 3 electrical technicians
- This group as it stands is too small to complete the upgrade in the 7 month window.
- This group also lacks requisite rigging skills



Labor Estimate

Summary of Resource Loaded Schedule

	Startup	Peak	Avg FTE
Physicist	2	4	2
Post Doc	2	20	5
Mech Eng.	2	5	3
Designer	2	1	0.5
Tech Supv.	3	4	2.5
Technician	20	27	17

Numbers based a time period of a week

Avg FTE – averaged over ~6 month project duration



Installation Schedule

- Schedule based on Run IIa experience (engineering run and physics run)
- Considerable detail has been incorporated into the schedule – a summary will be shown here for brevity
- Assume 5 day work week, one shift/day.

Activity	Duration (weeks)	Contingency
Roll Out	4	20%
SVX II/ISL Extraction	3	25%
Silicon at Sci. Det.	8	100%
SVX IIb/ISL Installation	3	25%
Roll In	4	20%
SVX IIb/ISL “hook-up”	12	50%
Total	34	50%



Installation Notes

- Detector only in the Assembly Hall for 14 weeks
 - It is inside that 14 week window that most of the additional upgrades have to complete their work
- Silicon Checkout is done in the Collision Hall
 - As soon as the silicon detector is installed – we “roll”.
- Collision hall capable of being “secured” after the 23rd week of the shutdown
- Solenoid will not be powered until silicon work is complete and end-plugs are closed



Those “14” weeks!

Jobs that must be completed in the Assembly Hall

Activity	Duration(weeks)	“Slack”
Cable Carrier	4	250%
Pre radiator	12	20%
Silicon Install	14	0%
EM Timing	8	75%
TDC Replacement	8	75%
Collision Hall Mods	4	250%
Silicon Interlocks*	16	5wks

* Only part of task requires AH work, must be ready once detector in CH



Milestones

Task	Date Completed	Delta (WRT Silicon complete)
Drop Interlocks, Access to Collision Hall	3/04/05	-7
Central Detector Ready to Roll Out	4/06/05	-2
Order Silicon Interlock Hardware	3/31/05	-3
Silicon Detector Req'd. at Sci Det	4/21/05	----
Silicon Detector Ready for Installation	6/21/05	+8
Central Detector Ready to Roll In	7/13/05	+11
Central Detector Moved	7/19/05	+12
Silicon Ready to be powered	8/1/05	+14
Ready for Collisions	10/24/05	+26



Critical Path

- This is an ambitious upgrade schedule. We are trying to get a lot done in a short amount of time all in the same location.
- The Silicon detector drives the schedule.
 - Collision hall interlocks are broken based upon when the Silicon group would be ready to replace SVXII with SVXIIb inside the ISL
 - Ready for collisions date is determined by the slowest of
 - Preradiator Installation
 - SVXIIb/ISL Installation
- Final Detector Installation takes 5 weeks
 - There are 12 weeks allotted for cabling silicon and checkout.



Summary

- The installation and Infrastructure project will coordinate the integration of the detector systems in to the experiment
- The actual moves required to get the detector in and out of the collision hall is well understood. Time and resources are well grounded in what was done for Run 2a.
- Ditto for the physical removal/installation of the silicon
- The amount of time the silicon detector remains at Sci-Det drives the CDF detector installation schedule.
- The amount of time required to connect the silicon(+ISL) will drive the “ready for collisions” date.