BMu Installation Schedule

CMS week

June 20th 2006

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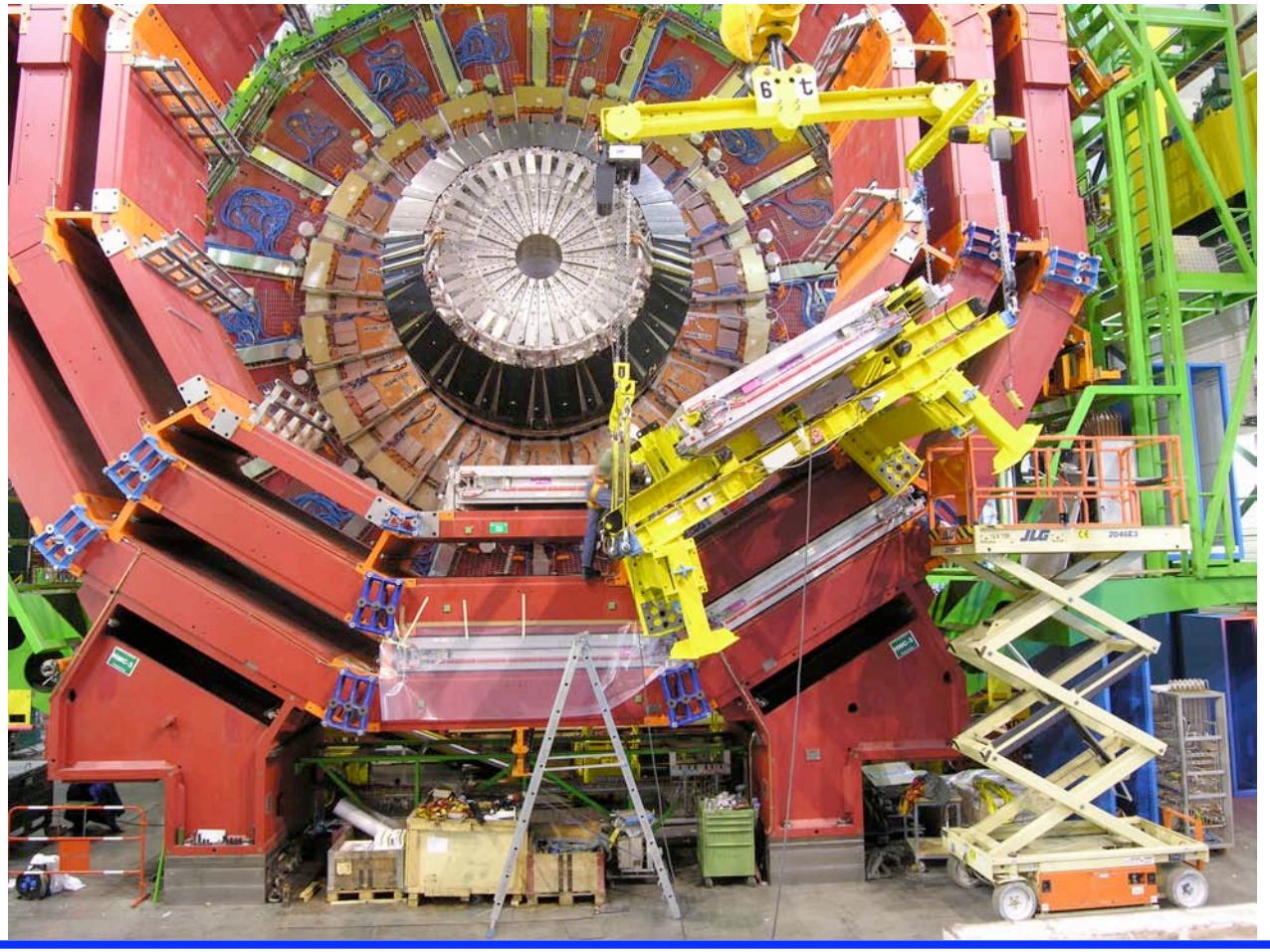
➢The delay in the MTCC schedule provided an access window from May 17th to 25th to:

- extract repair and reinstall MB3 S06 in YB0. There was a short in the threshold control for the Theta SL. The front-end cover was replaced.
- install the chambers for YB0 S04, S05. YB0 installation is now completed apart for the 2 feet chambers.
- install 2 MB4/4 on YB-1
- install the feet chambers in YB-1 (they were commissioned using the final cables)

➢ The number of installed chambers is now 146

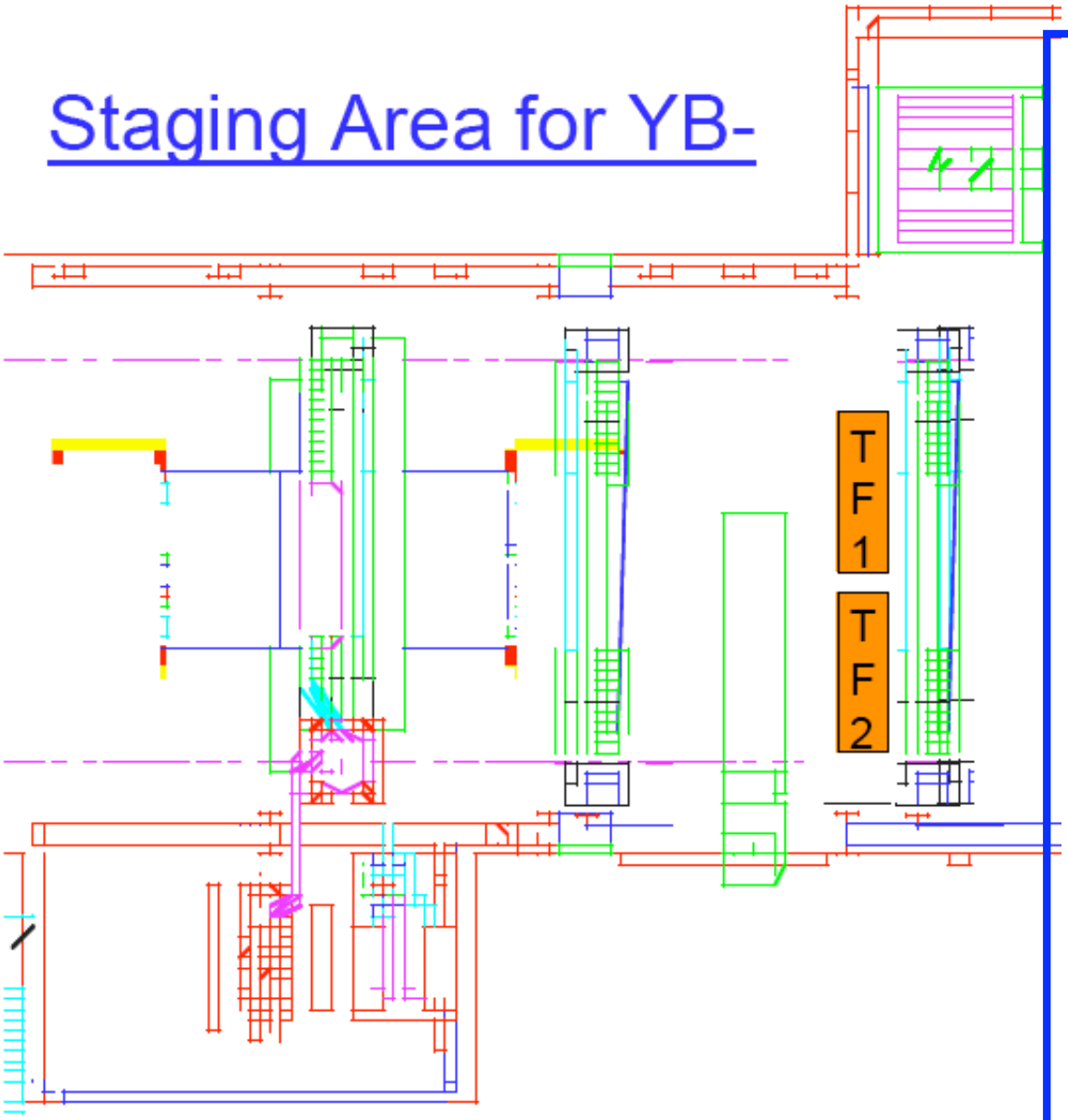
➢ The chambers in YB0 S04/S05 have been connected to the HV PP, LV PC, gas and cooling and are ready for commissioning

Installation Tooling Upgrade



- 14 additional interface pads for attaching the installation cradle, sufficient for an entire wheel
- Buffer of 34 “ready to install” chambers available before installation, limited by support pieces, and 5 transport frames (up from 28 and 4 in February, recovered from Torino site)
- Additional electric winch (replaces mechanical hoist) and radio controls
- 2 dedicated balance beams for UX installation

Staging Area for YB-



YB-1 installed from front-end side (usual way)

YB-2 installed from HV side

Move YB-1 and YB-2 at the sides of SX Z- main entry leaving enough space for staging and test area (>10m clearance between wheels)

Best sequence to decouple test and installation:

- One chamber on the cradle ready for installation
- One chamber already tested on the movable table
- one chamber on concrete blocks under test:

RPC: HV, Overpressure

DT: HV, MiniCrate BSR

- 2 transport frames at SX5

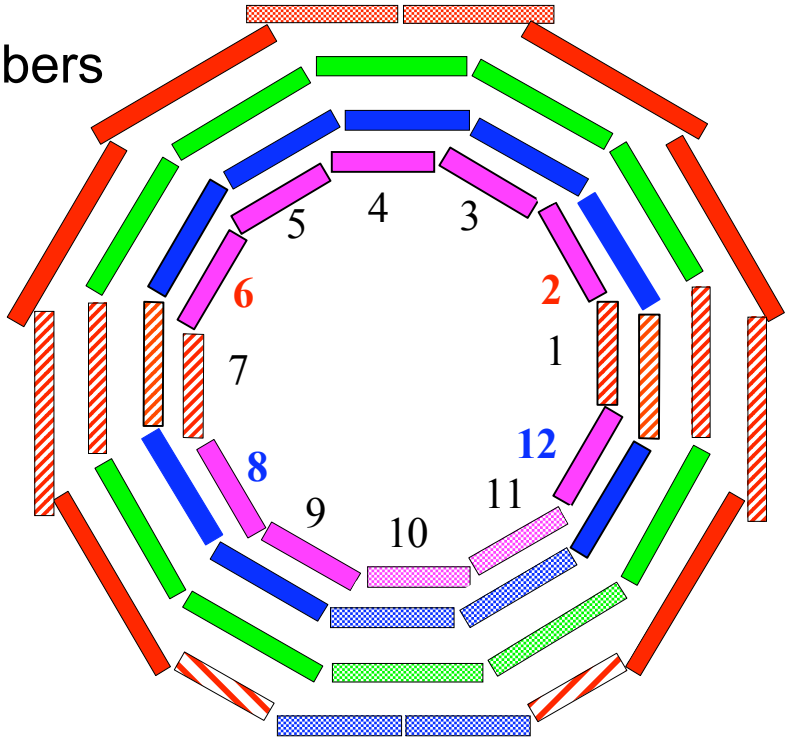
- Pre-installation tests require > 1 hour (~ same as for installation)
- Leave two chambers tested for morning shift
- One chamber under test during installation

➡ plan for an installation rate of 18 chambers/week

Preferred Installation Sequence

- YB-1: 8MB3, 8MB2, 8MB1 => 24 Chambers
- Large MB4 (Torino): YB-1 S05, S06; YB-2 S02, S05; YB-1 S03;
  YB-2 S06, S08, S12 => 8 Chambers
- YB-2: 8MB3, 8MB2, 8MB1 2 MB4/4 => 26 Chambers
- YB0 feet (under the cryostat !): 2Chambers
- UX YB+2, YB+1: 16 Chambers
- UX YB0: 8 Chambers
- YB-1 feet: 2 Chambers
- YB-2 feet: 2 Chambers
- UX YB-1, YB-2: 16 Chambers

→ Grand Total of 104 Chambers

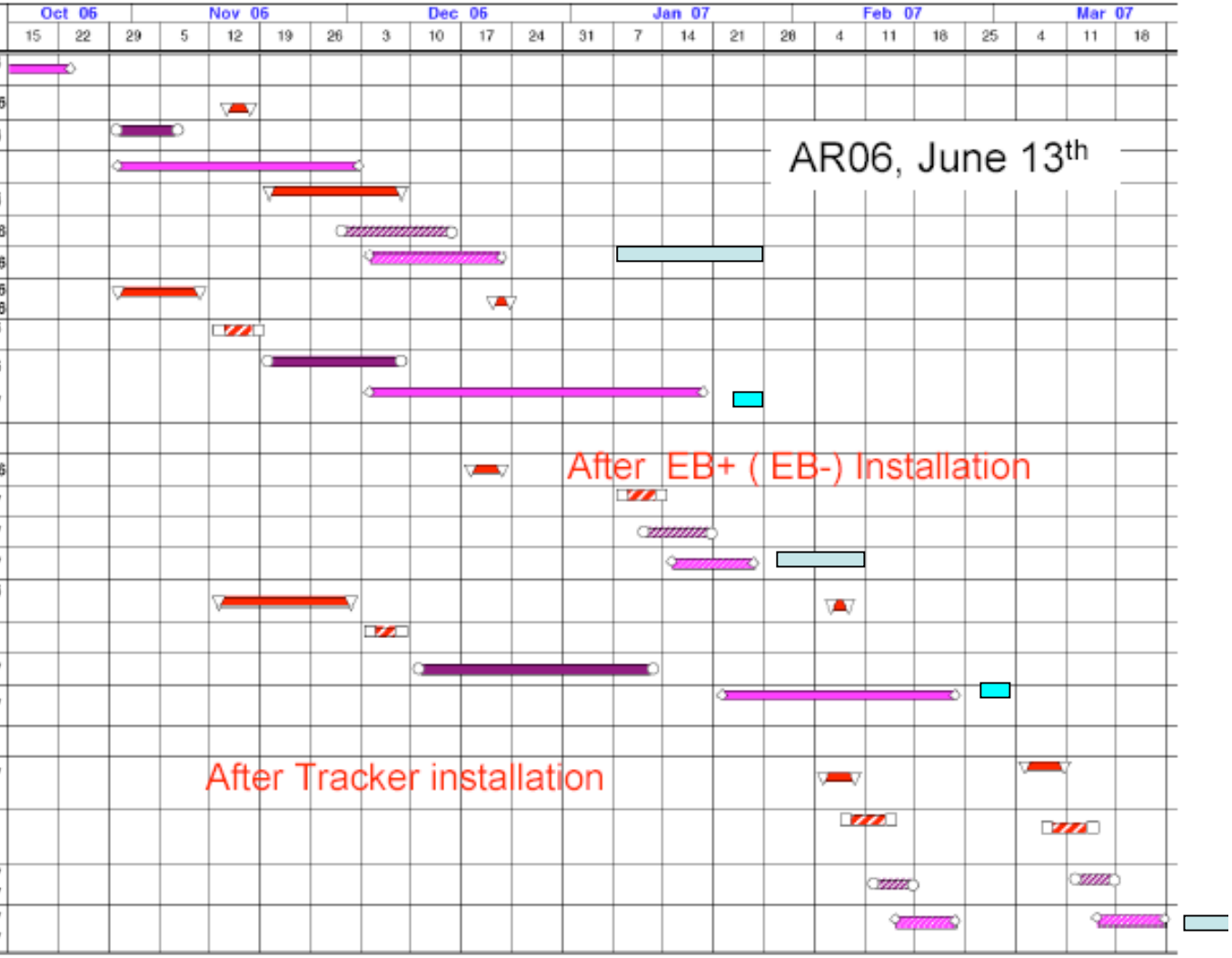


This sequence minimizes the number of cradle configurations

The large (MB4) cradle is free for UX installation early on

Installation Schedule (Bmu-centric Draft)

Activity Name	Start Date	Finish Date
YB Opens	7/7/06	10/23/06
YB0 Install 2 MB4/9-11	11/14/06	11/17/06
YB-0 Commissioning S04,S05	10/30/06	11/7/06
YB-0, YB+0 Cabling in parallel	10/30/06	12/2/06
UX YB+2, YB+1 Sectors 1,7 (16 Chambers)	11/20/06	12/8/06
UX YB+ 2,+1 Functionality Test	11/30/06	12/15/06
UX YB+2 , +1 Cabling	12/4/06	12/22/06
YB-1 Installation , 8 sectors (27 +2 chambers)	10/30/06 12/21/06	11/10/06 12/23/06
YB-1 Connections HV, LV, Cooling	11/13/06	11/18/06
YB-1 Commissioning	11/20/06	12/8/06
YB-1 Cabling	12/4/06	1/19/07
UX5 YB0 Installation and Cabling		
UX YB0 Sectors 1,7 (8 Chambers)	12/18/06	12/22/06
UX YB0 Connections HV, LV, Cooling	1/8/07	1/13/07
UX YB0 Functionality Test	1/11/07	1/20/07
UX YB0 Cabling	1/15/07	1/26/07
YB-2 Installation , 8 sectors (31 +2)	11/13/06 2/6/07	12/1/06 2/8/07
	12/4/06	12/8/06
YB-2 Commissioning	12/11/06	1/12/07
YB-2 Cabling	1/22/07	2/23/07
UX5 YB-1,YB-2 Installation and Cabling		
UX YB-1, YB-2 Sectors 1,7 (16 Chambers)	3/5/07 2/5/07	3/10/07 2/9/07
	2/8/07 3/8/07	2/14/07 3/14/07
UX YB-1, YB-2 Functionality Test	3/12/07 2/12/07	3/17/07 2/17/07
UX YB-1, YB-2 Cabling	3/15/07 2/15/07	3/24/07 2/23/07

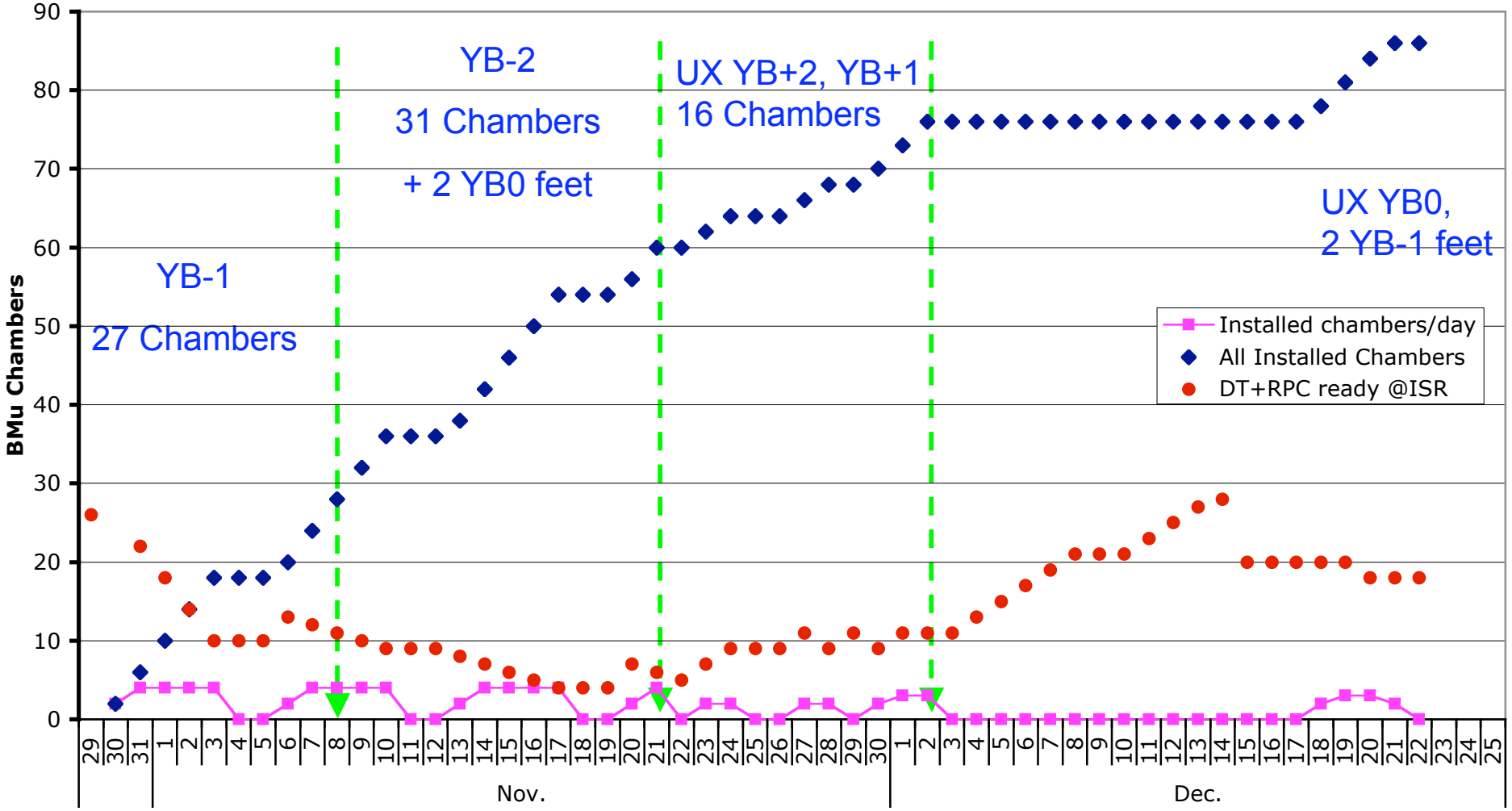


- Cabling (and commissioning) defines the "ready for lowering" date of YB0, YB-1, YB-2
- SX, UX cabling are almost decoupled since S01, S07 cables are already in place

UX: SU of sectors 1,7. Installation of MABs, PG MABs

SX: SU of new installed sectors

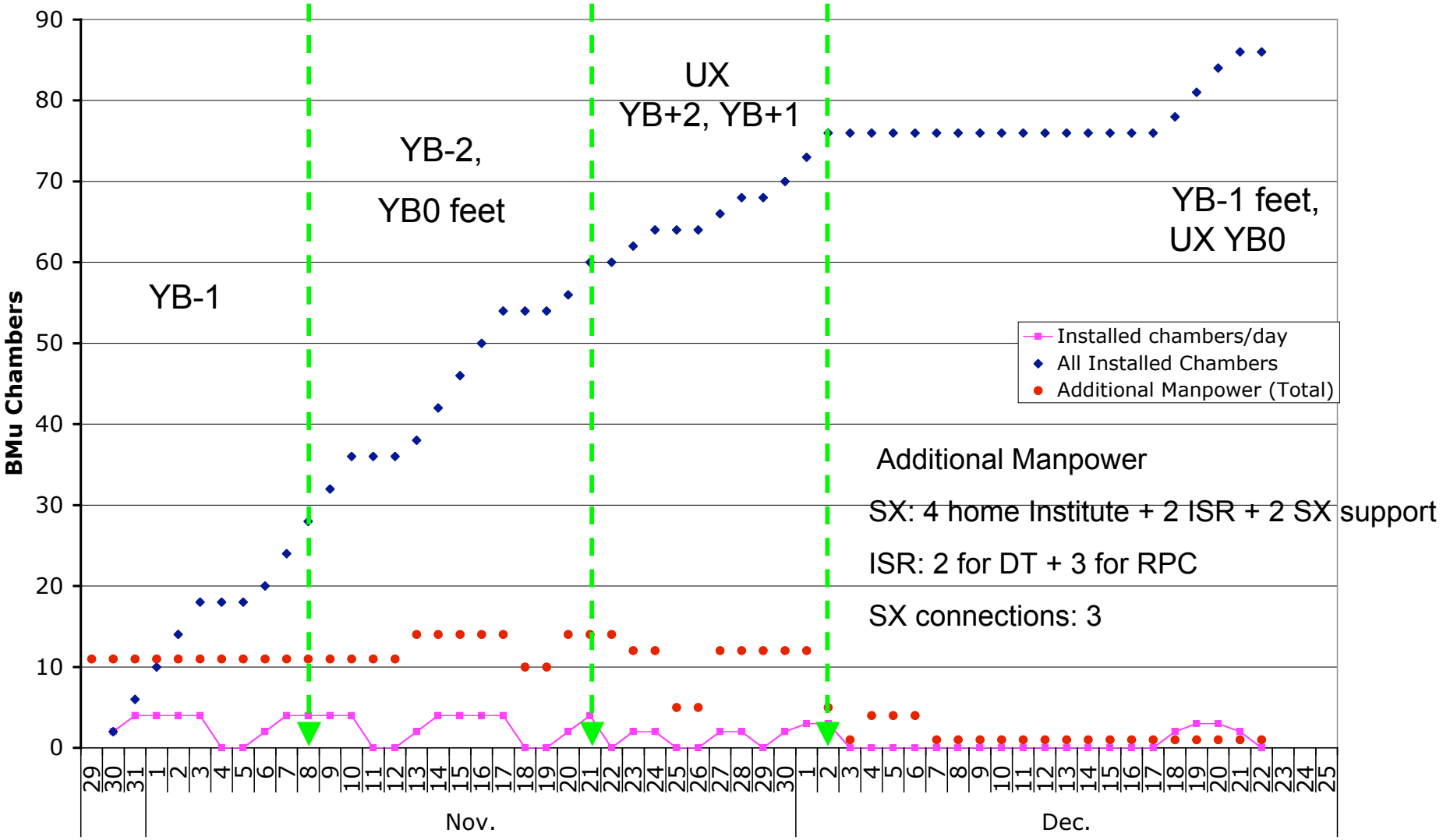
BMu Installation after Magnet Test



- DT+RPC coupling must proceed at 3 chambers/day in order to match the installation rate during the first 3 weeks
- UX installation rate of 2 chambers/day assumed for YB+2 and of 3 for YB+1

Manpower Requirements

BMu Installation after Magnet Test



Comments and Caveats

- It is assumed that the detector opens from the z- side and we have access to YB-1 for preparatory work (mounting interface pads..) before the installation cycle begins
- The installation schedule is based on 12 hours shifts (7am to 7pm) with full access to crane, crane driver, 2 cherry pickers and one lifting platform
- It is not possible to install CSC and BMu chambers at the same time due to proximity limitations on the cranes (we suffered from this in February)
- The installation team consists of Sandro +7 technicians,1 supervisor (Massimo/ Adamantonio) and 2 physicists (1RPC, 1DT) for pre-installation tests
- The ISR team for coupling DT and RPC consists of Jose-Miguel and 2 technicians for DTs and 3 technicians for RPCs + physicists
- The ancillary work on YB-1, YB-2 (supports for HV patch panels, LV patch connectors, flex rails, radial cable trays) is already completed
- YB0 S04, S05 are ready for commissioning, the remaining sectors are ready for cabling

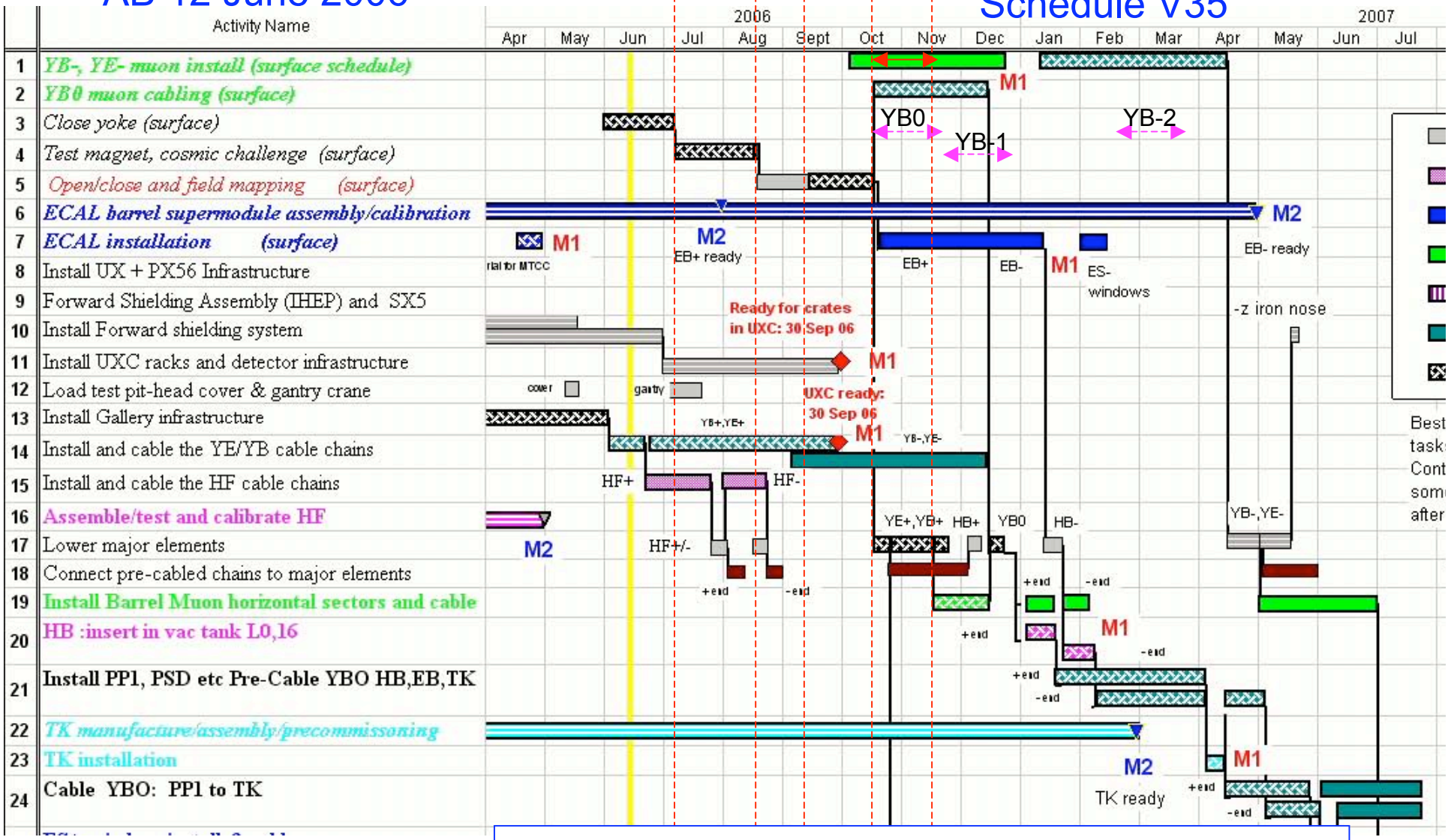
Comments and Caveats

- Pre-commissioning work on installed chambers requires 1-2 weeks for Vincenzo + 1 technician (chamber connections) and Gerd + 1 technician (gas and cooling). YB-1 is the most critical but 10 chambers have already been commissioned.
- Manpower is an obvious bottleneck, we should ask for help (2 technicians) for the installation team
- Commissioning is still a bottleneck. The reliability of the test stands and cables must be improved. Three test stands will be needed after the MT.
- Cabling is a critical item. Five weeks/wheel might be optimistic even with two expert teams (but they may not be available) and off the shelf cables.
- Additional delays in the completion of the MT will jeopardize the schedule that is already affected by the end of the year vacations.

➢ After the AR (June 15th) I received a new Schedule (V35 Draft) from Austin,

AB 12 June 2006

Schedule V35



↔ YB- SX Installation

↔ Cabling

- 6 weeks Train coil and MTCC (Begin, July 7th)
- 4 weeks Extract EB, Tracker, Close
- 3 weeks Field Mapping
- 2 weeks Opening+preparation (End, October 20th)

Comments and Caveats

✓ Not a bad match to V35 up to YB0 UX installation. Beyond that the schedule depends on Tracker and/or EB readiness

➢ Some concerns:

• YB/YE SX5 installation is in the same window but they cannot proceed at the same time. Must be prioritized

• The window for cabling beyond YB0 is in 2007 and competes with YB0 UX cabling (HB, EB, Tracker,..) and YE- SX. As anticipated, cabling teams will be in high demand. Expect conflict with other subsystems.

• YB- will be lowered in mid April at the earliest (this is not due to DT/RPC installation tools as stated in the March 06 CMS plenary) expect big crunch with alignment and other activities if the detector is to be closed by August 31st

Summary

- The most challenging part of the installation (YB0 under the cryostat) is done
- YB0 commissioning is 8/10 completed
- The proposed installation plan concentrates the bulk of SX5 installation in ~4 weeks. Thus leaving more time for commissioning and cabling and minimizing interferences with other sub-detectors
- Manpower is critical both for installation and DT/RPC coupling
- Access to a crane, cherry-pickers and lifting platform is of paramount importance. We depends on a crane for every operation!
- In past installation periods, most of the time loss was due to crane sharing and/or problems
- The next hurdle is the work to be done in UX5!