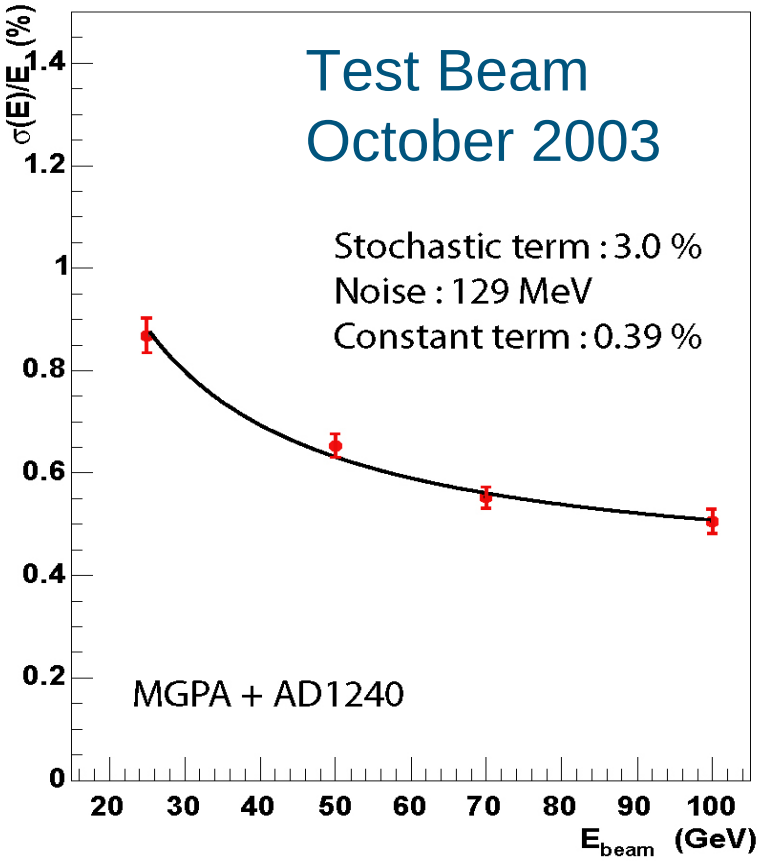
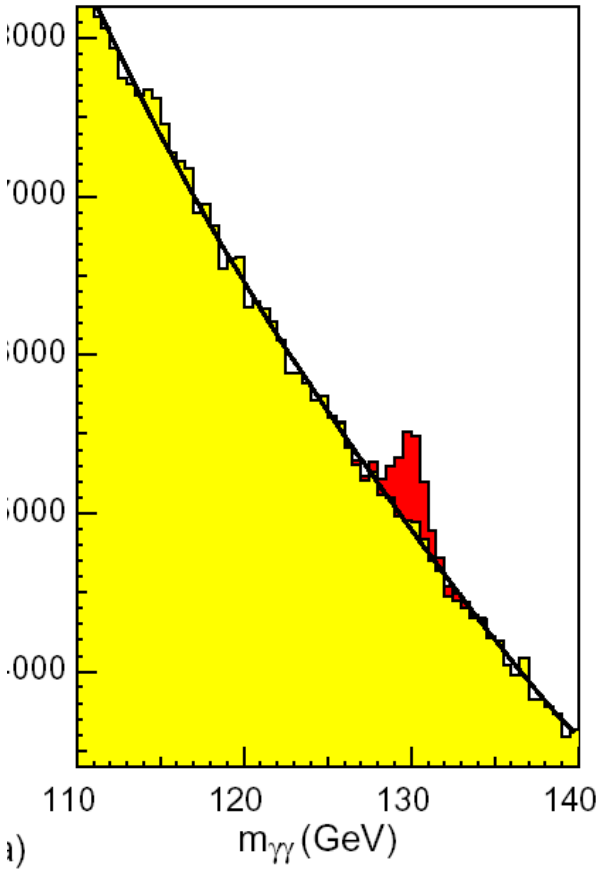
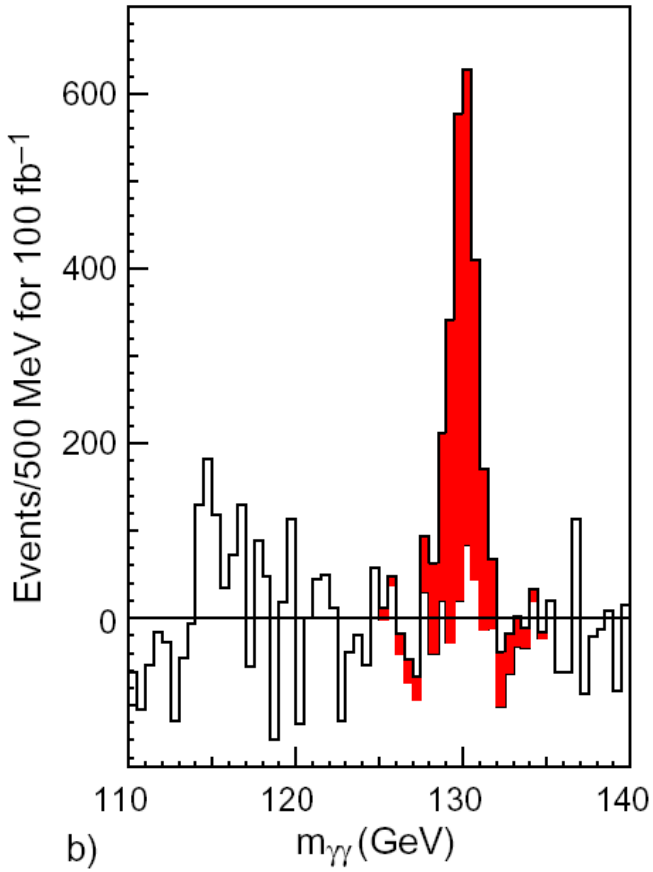
PbWO4 Crystals: Energy Resolution

$H \rightarrow \gamma\gamma$ Simulation (100 fb^{-1})





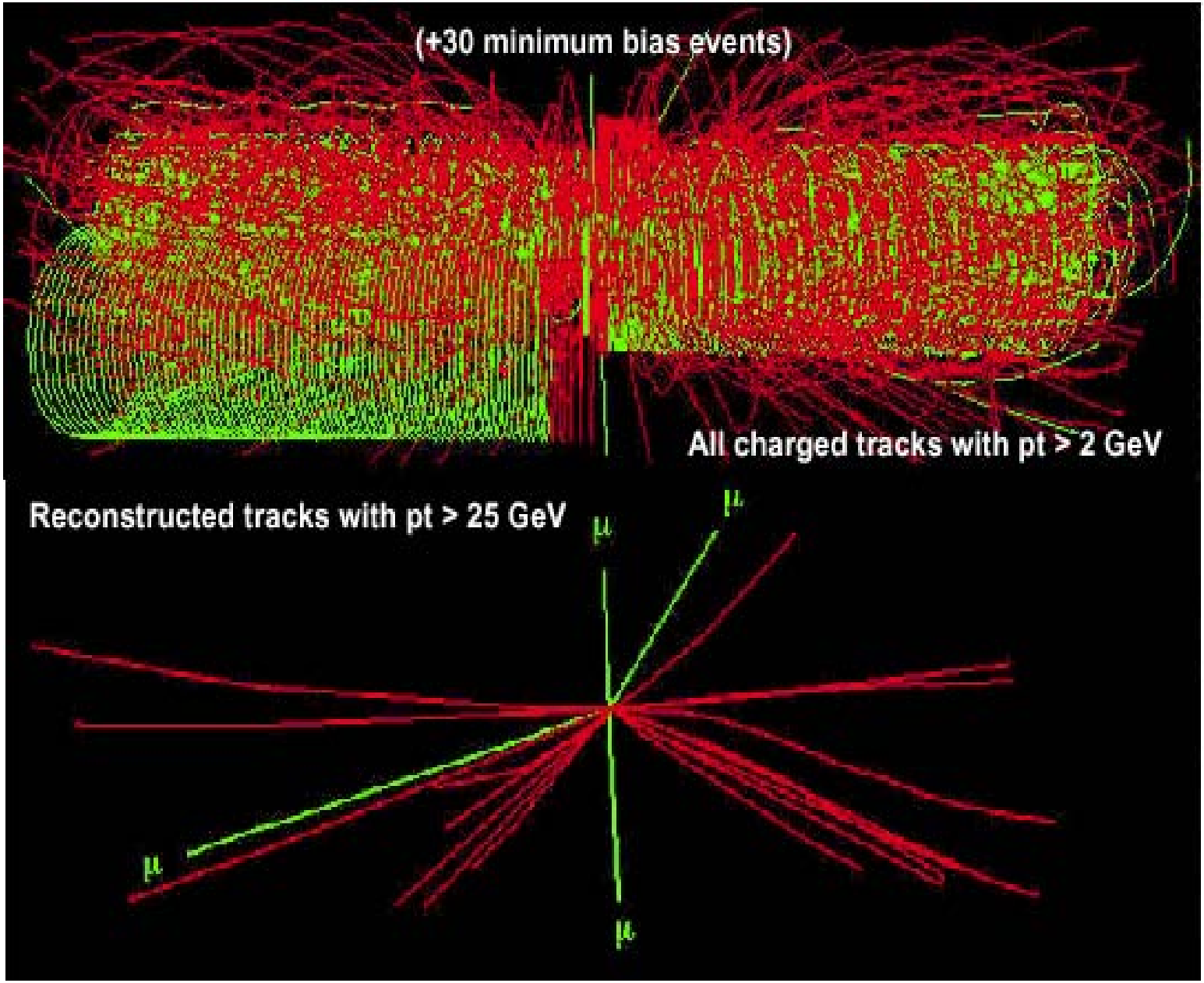


$$\frac{\sigma}{E} = \frac{3\%}{\sqrt{E}} \oplus 0.39\% \oplus \frac{129\,MeV}{E}$$

$\sigma_m/m = 0.5\,[\sigma_{E1}/E_1 \oplus \sigma_{E2}/E_2 \oplus \cot(\theta/2)\Delta\theta]$

Target for the intercalibration < 0.5%

The Tracking Problem

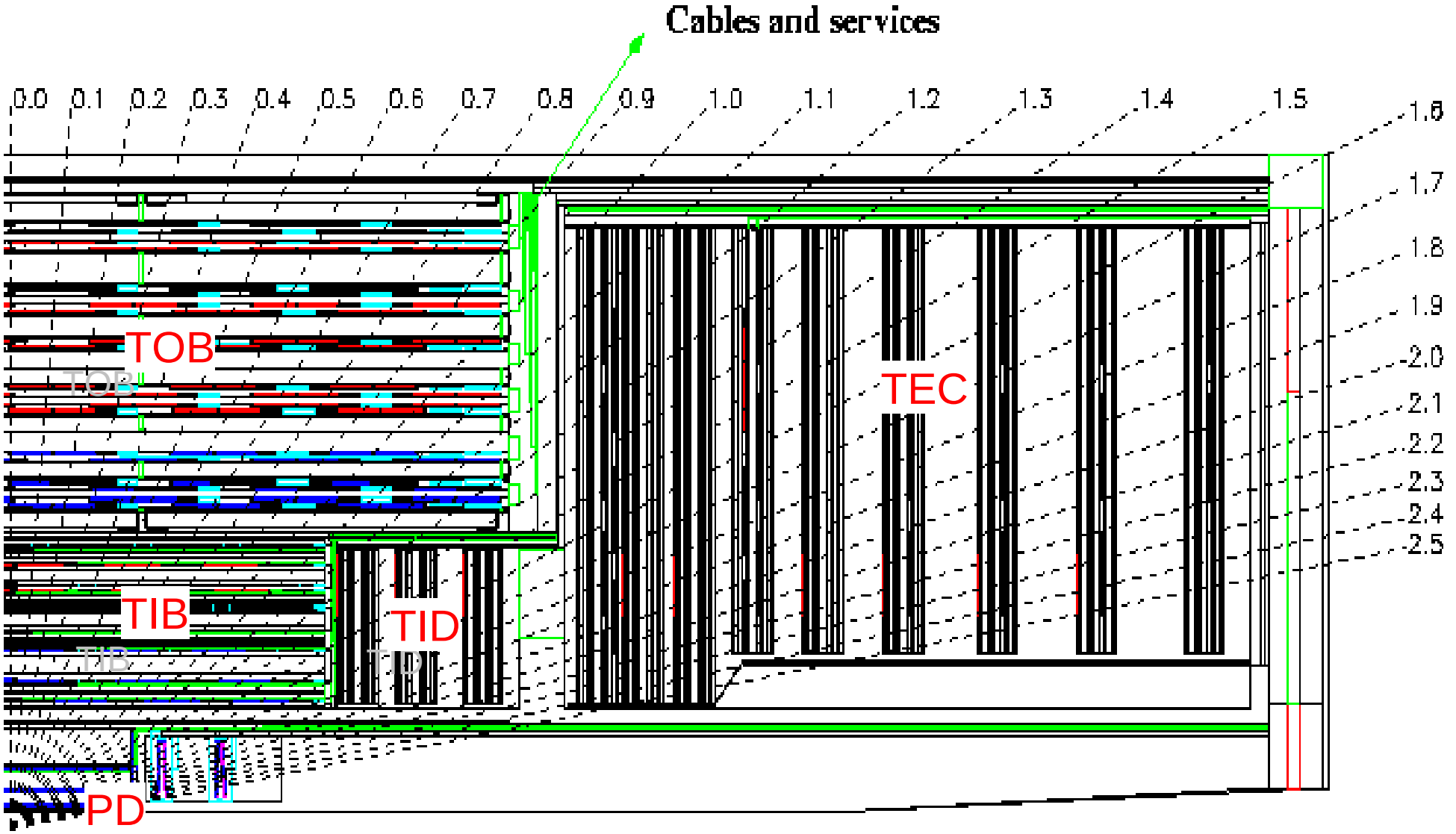


At 10^{34} one crossing every 25 ns.

30 Min Bias events superimposed per crossing

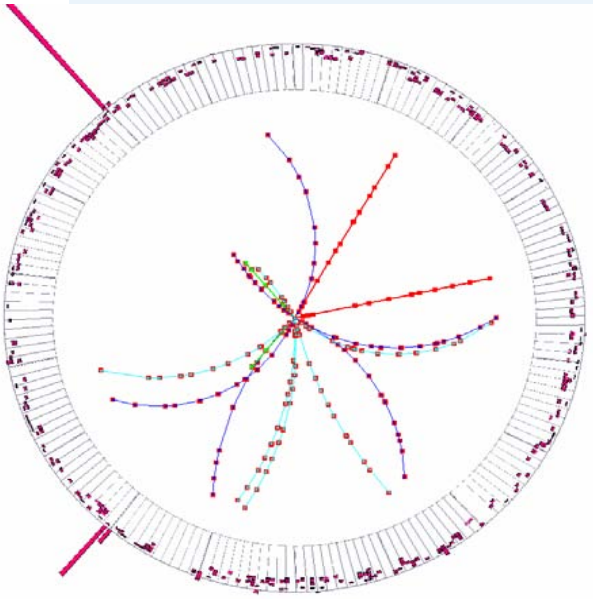
Is Tracking possible at high luminosity?

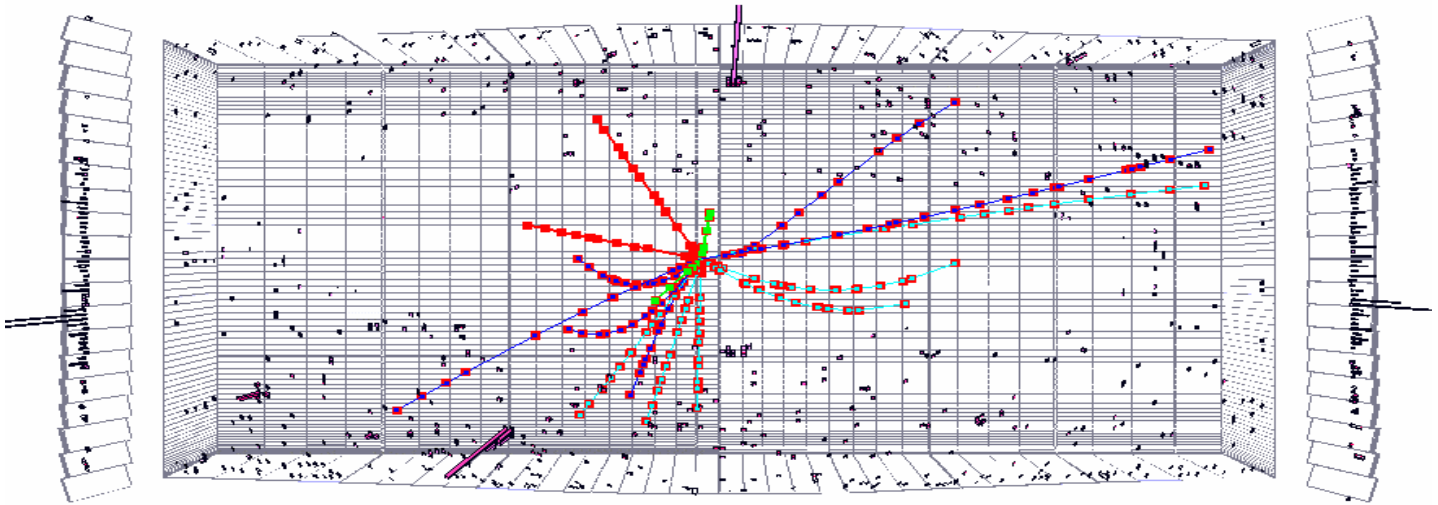
Inner Tracker

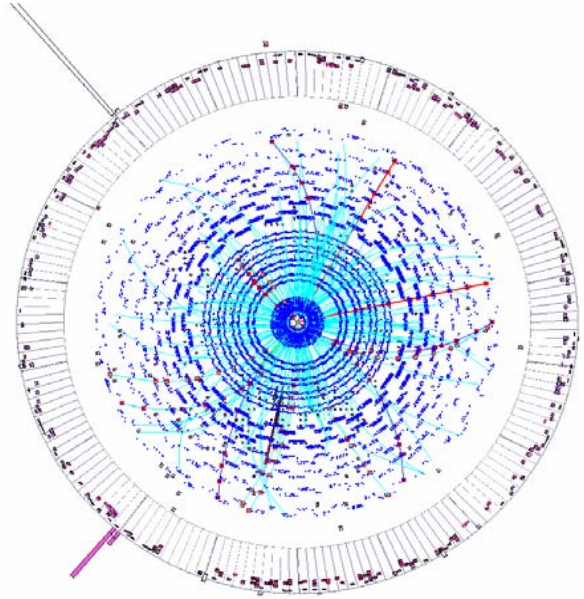


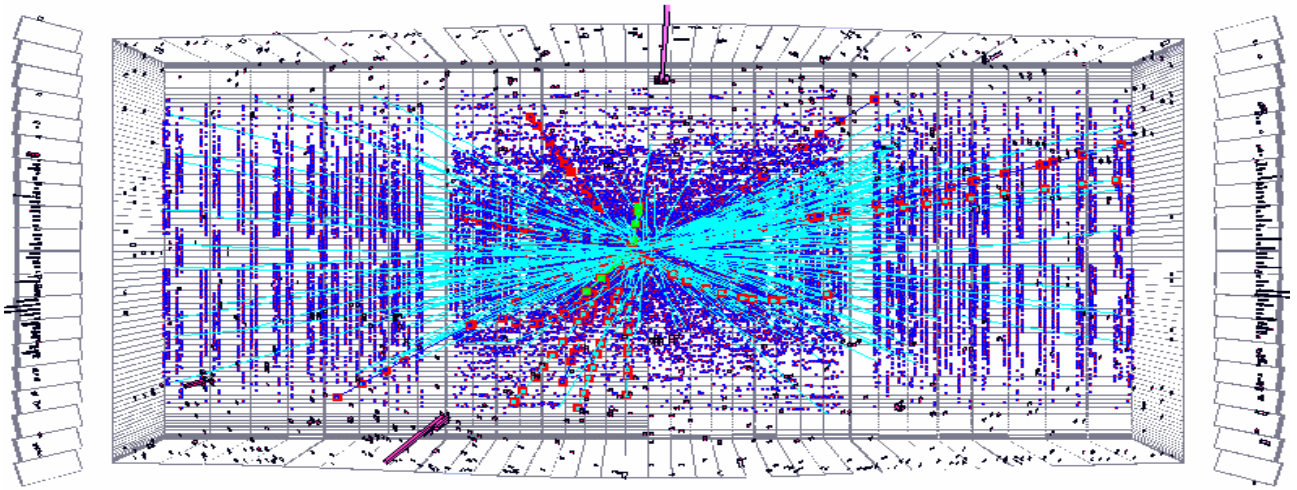
Full Silicon Tracker

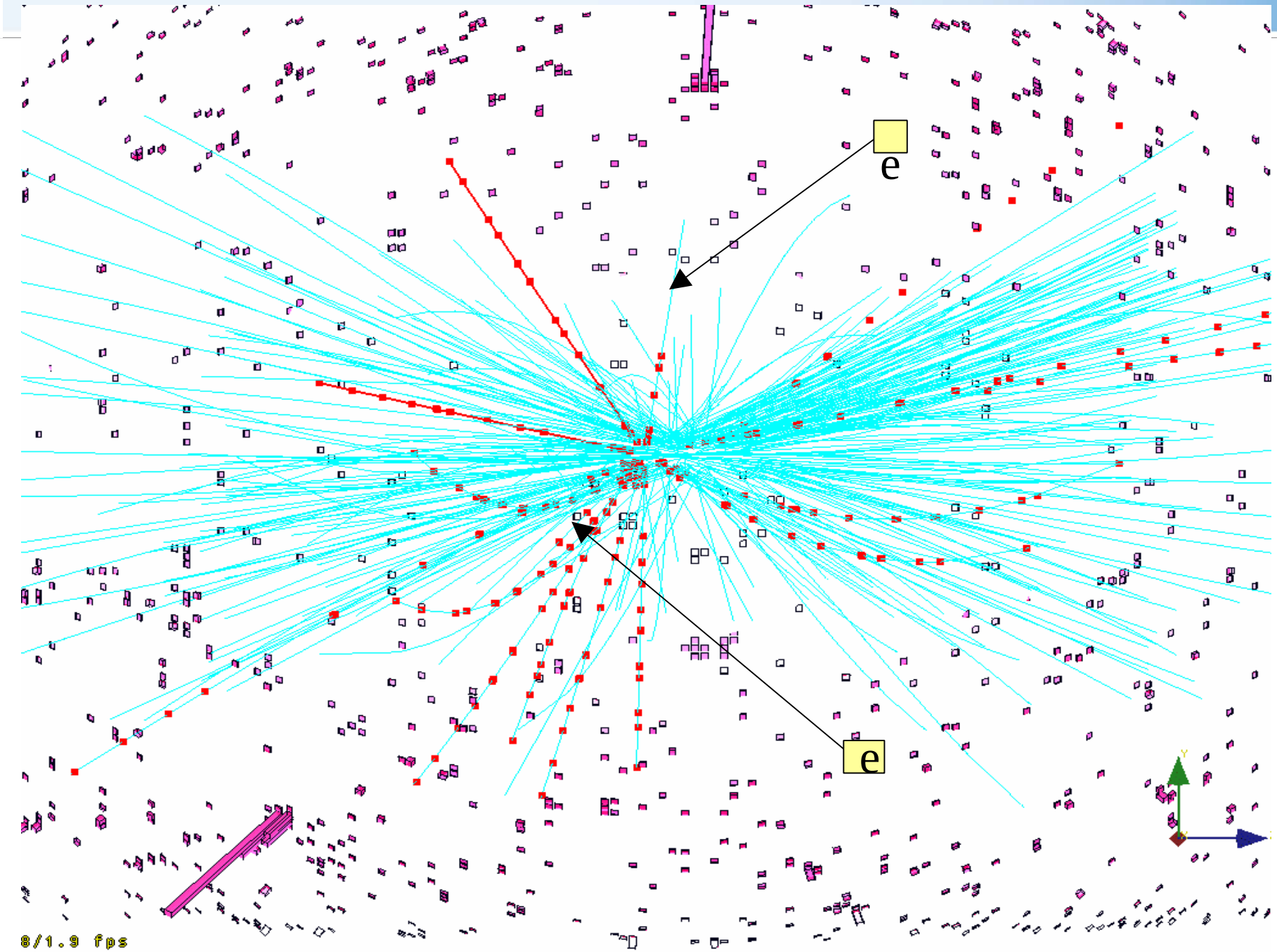
210 m^2 of silicon sensors, 10^7 strips, 6.7 10^7 pixels



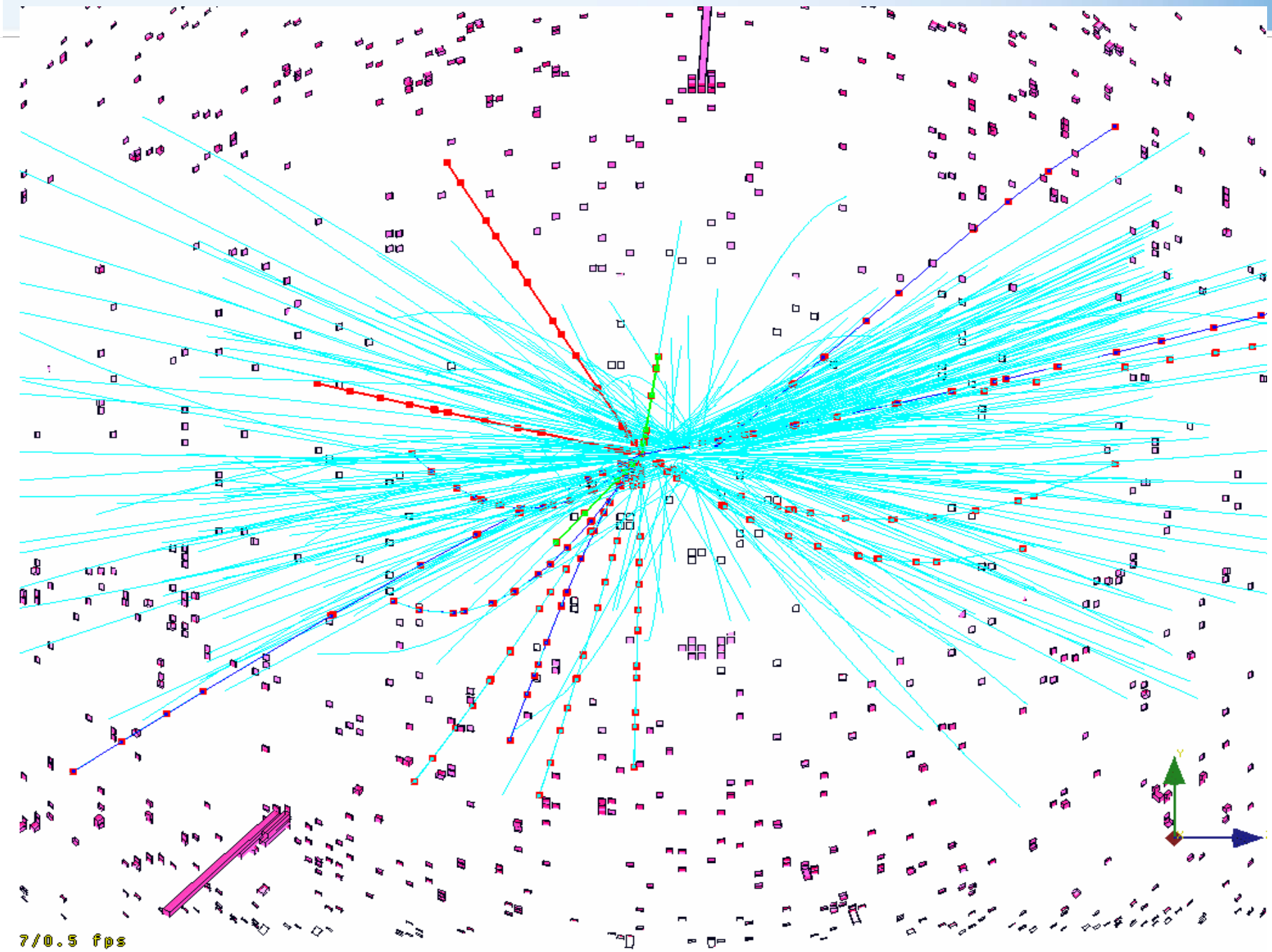








Reconstructed tracks: muons – red, electrons are reconstructed but not associated with sim tracks since all the rest – cyan (both signal and pile up), sim hits from signal event (red)



Overlap with signal event. Reconstructed tracks: muons – red, all the rest – cyan (both signal and pile up), sim hits from signal event (red)

LHC: QRL Problems

- Conflicts between main contractor and installation subcontractor have caused many delays and finally CERN was informed of a change of subcontractor in January. Overall delay is now 8 months.
- The contractor has produced a new planning to recover the delays but this compresses the time for installation and testing.
- A new installation planning is being optimised to recover the delays. This is based on installation of 3 octants simultaneously.

LHC Official Schedule

- Equipment production is now proceeding at the required rate.
- Installation delays will be recuperated by more parallel activity.
- The LHC ring will be closed by the end of 2006 in order to be ready to start commissioning in spring 2007.
- First collisions in summer 2007.

Overall LHC schedule is under review

- Several months delay for QRL installation and interconnection
- Trying to recover as much as possible of this

- Installation of sectors in parallel (up to 3, needs more manpower)
  - Order 7-8 8-1 2-3 4-5 3-4 5-6 6-7 1-2

- Hardware commissioning of sectors in parallel (needs more manpower)
  - Order 7-8 8-1 3-4 4-5 5-6 6-7 1-2 2-3
  - **End of hardware commissioning = T_0 for operations**

- Machine checkout (getting ready for beam)
  - Do as much as possible before T_0 (resources)
  - Be as fast as possible after T_0 (working 24/7)

- Beam commissioning strategy
  - Go for first collisions with single or large-spaced bunches

Summary of operations startup activity
Roger Bailey (Operation Group)

1	Machine checkout in parallel with hardware commissioning until T_0	3 months
2	Safety systems, vacuum, equipment on, first beam	1 month
3	Machine checkout continues interleaved with beam commissioning, first collisions	3 months
4	Pilot runs for experiments interleaved with beam commissioning	1 month

Coil Module Construction

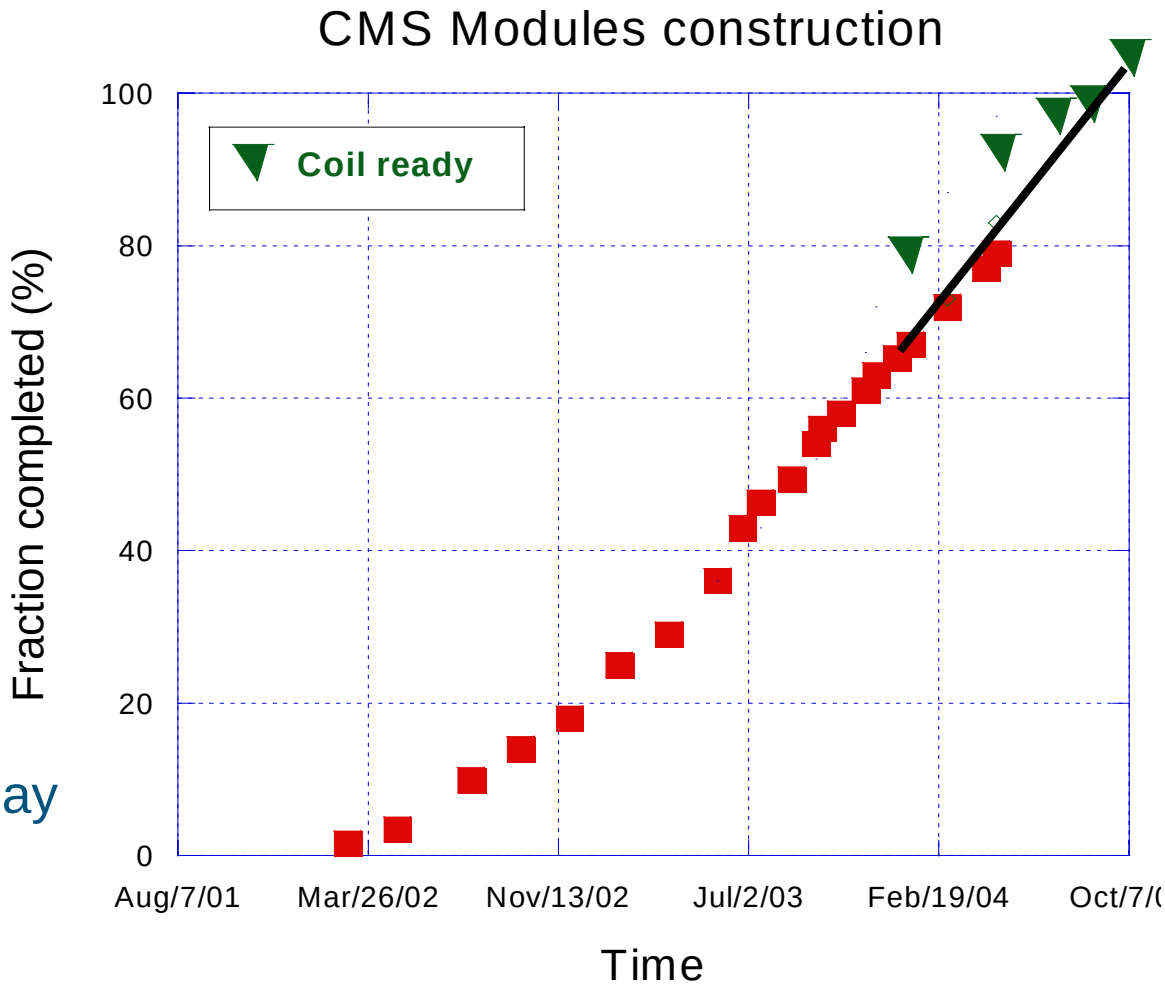
Module	Status
CB-2	100%
CB-1	100%
CB0	91%
CB+1	61%
CB+2	39%
Total	**79 %**

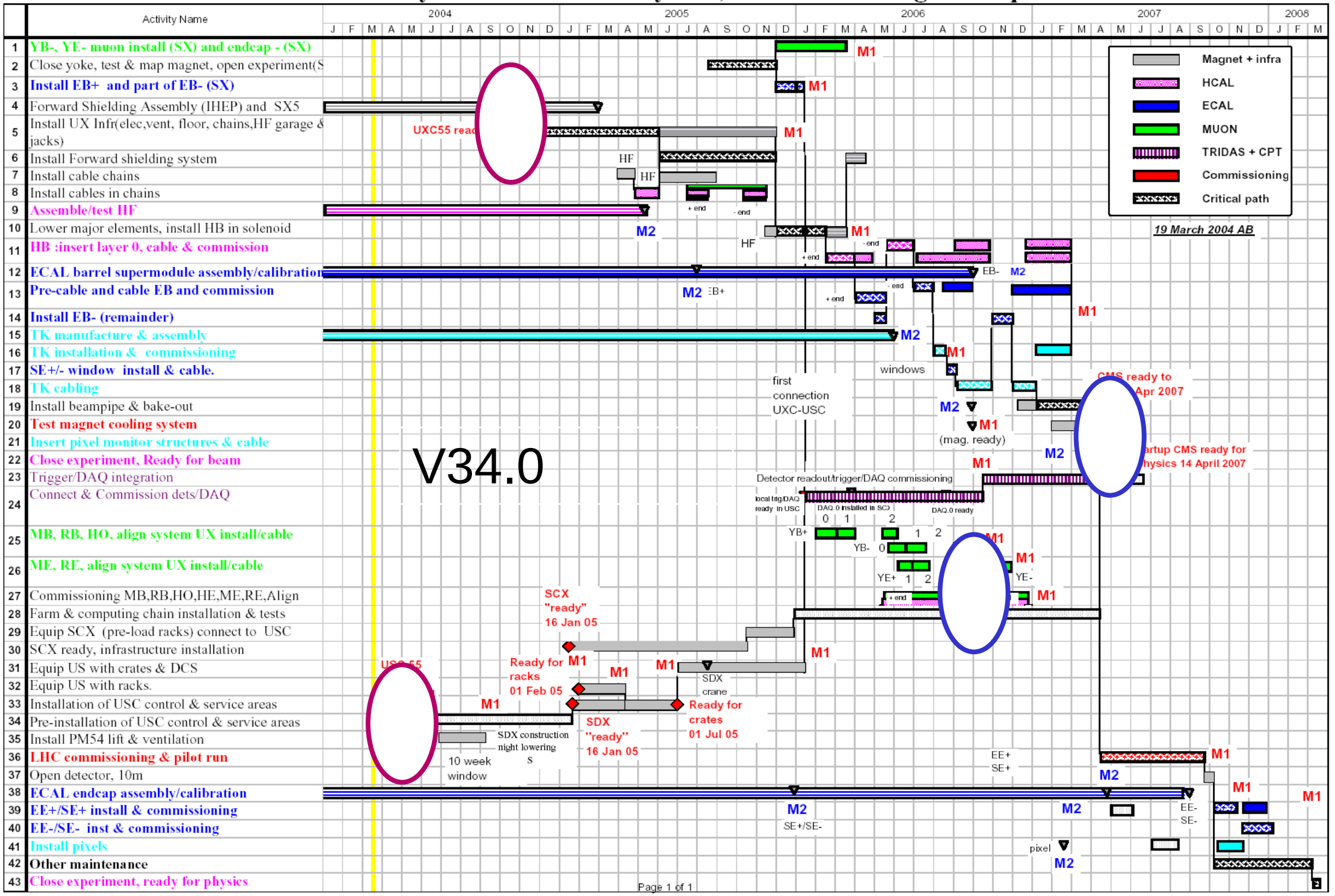
CB-1 to be sent to CERN during May

CB0 in September to CERN

CB+1 Impregnated during July

CB+2 Ready in October




Activity Name
2004
2005
2006
2007
2008
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M
1 YB-, YE- muon install (SX) and endcap - (SX)
2 Close yoke, test & map magnet, open experiment(S
3 Install EB+ and part of EB- (SX)
4 Forward Shielding Assembly (IHEP) and SX5
5 Install UX Infr(elec,vent, floor, chains,HF garage & jacks)
6 Install Forward shielding system
7 Install cable chains
8 Install cables in chains
9 Assemble/test HF
10 Lower major elements, install HB in solenoid
11 HB :insert layer 0, cable & commission
12 ECAL barrel supermodule assembly/calibration
13 Pre-cable and cable EB and commission
14 Install EB- (remainder)
15 TK manufacture & assembly
16 TK installation & commissioning
17 SE+/- window install & cable.
18 TK cabling
19 Install beampipe & bake-out
20 Test magnet cooling system
21 Insert pixel monitor structures & cable
22 Close experiment, Ready for beam
23 Trigger/DAQ integration
24 Connect & Commission dets/DAQ
25 MB, RB, HO, align system UX install/cable
26 ME, RE, align system UX install/cable
27 Commissioning MB,RB,HO,HE,ME,RE,Align
28 Farm & computing chain installation & tests
29 Equip SCX (pre-load racks) connect to USC
30 SCX ready, infrastructure installation
31 Equip US with crates & DCS
32 Equip US with racks.
33 Installation of USC control & service areas
34 Pre-installation of USC control & service areas
35 Install PM54 lift & ventilation
36 LHC commissioning & pilot run
37 Open detector, 10m
38 ECAL endcap assembly/calibration
39 EE+/SE+ install & commissioning
40 EE-/SE- inst & commissioning
41 Install pixels
42 Other maintenance
43 Close experiment, ready for physics
Magnet + infra
HCAL
ECAL
MUON
TRIDAS + CPT
Commissioning
Critical path
19 March 2004 AB
V34.0
UXC55 read
HF
+ end
- end
M1
M2
EB-
EB+
windows
first connection UXC-USC
(mag. ready)
CMS ready to Apr 2007
startup CMS ready for physics 14 April 2007
Detector readout/trigger/DAQ commissioning
local trig/DAQ ready in USC
DAQ.0 installed in SCX
DAQ.0 ready
YB+
YB-
YE+
YE-
SCX "ready" 16 Jan 05
Ready for racks 01 Feb 05
SDX crane
Ready for crates 01 Jul 05
SDX "ready" 16 Jan 05
SDX construction night lowering
10 week window
EE+
SE+
EE-
SE-
SE+/SE-
pixel
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