Experimental Collaboration : BELLE

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- *BINP*

[redacted]

Poland

- Kracow

India

- Utkal

~150

BELLE

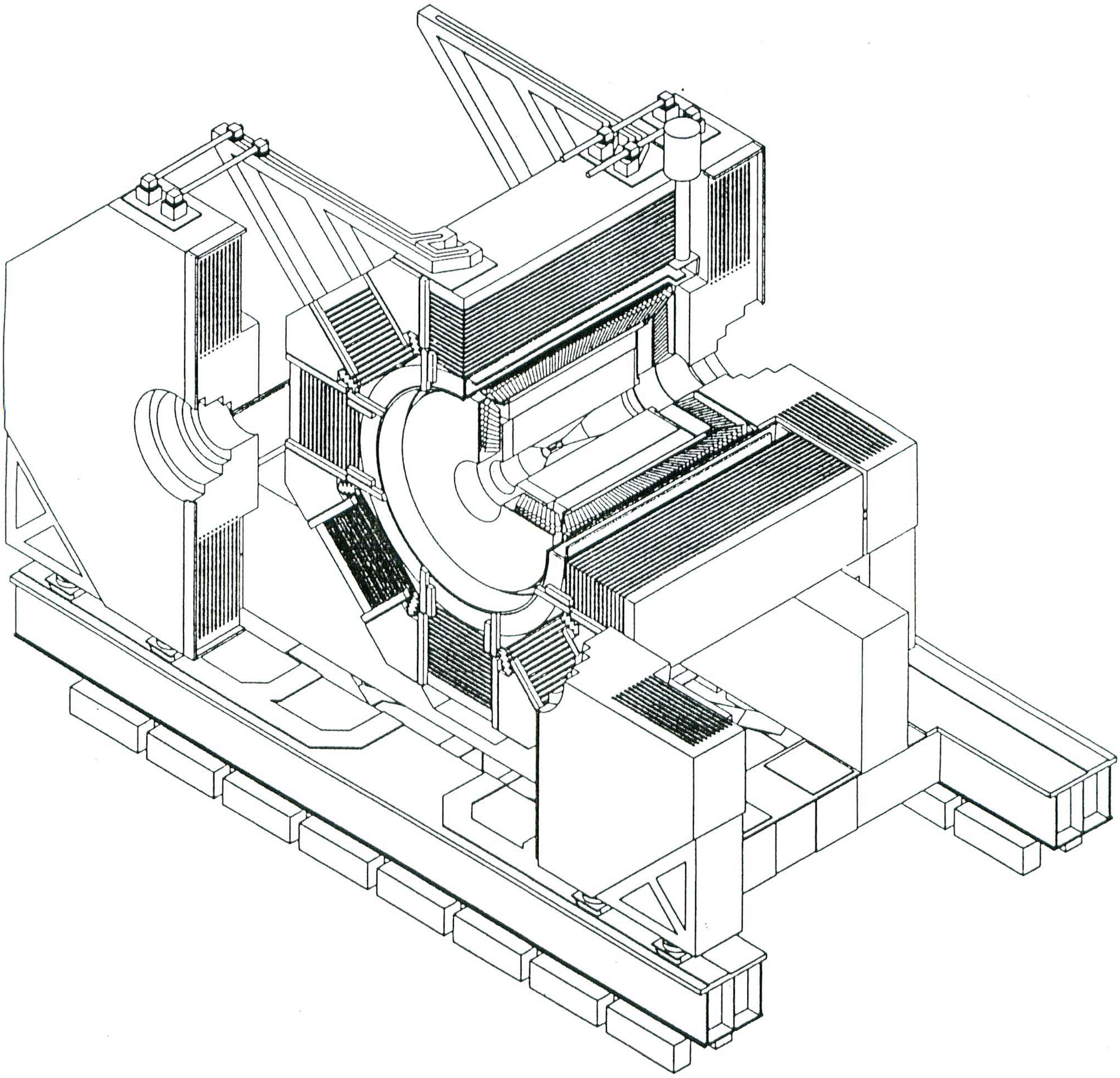
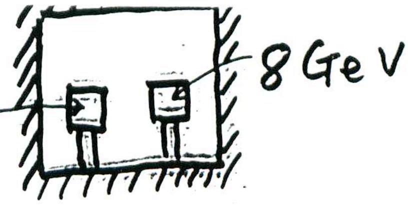


Figure 1.9: Iron Structures of the BELLE detector.

Double Rings



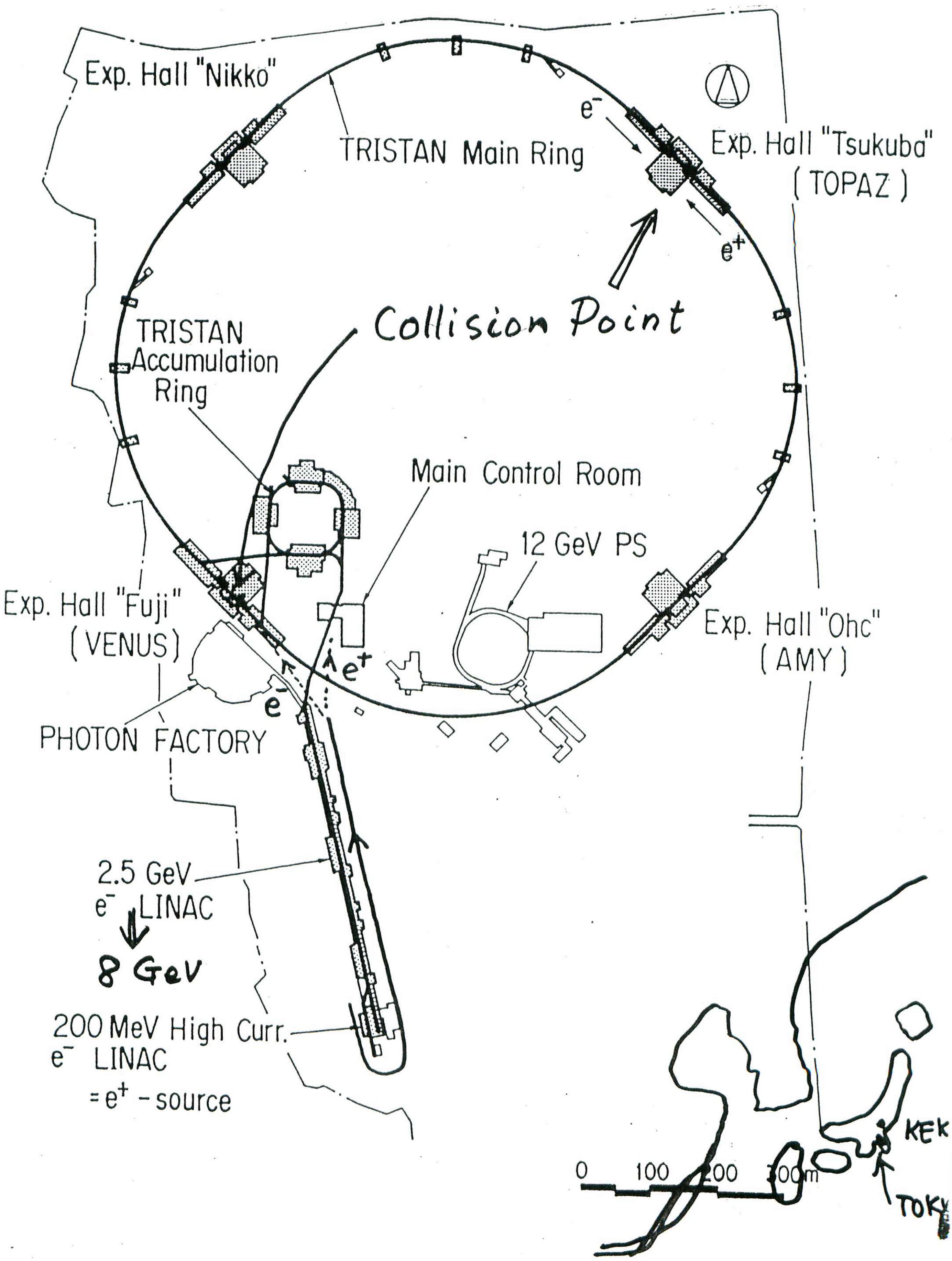


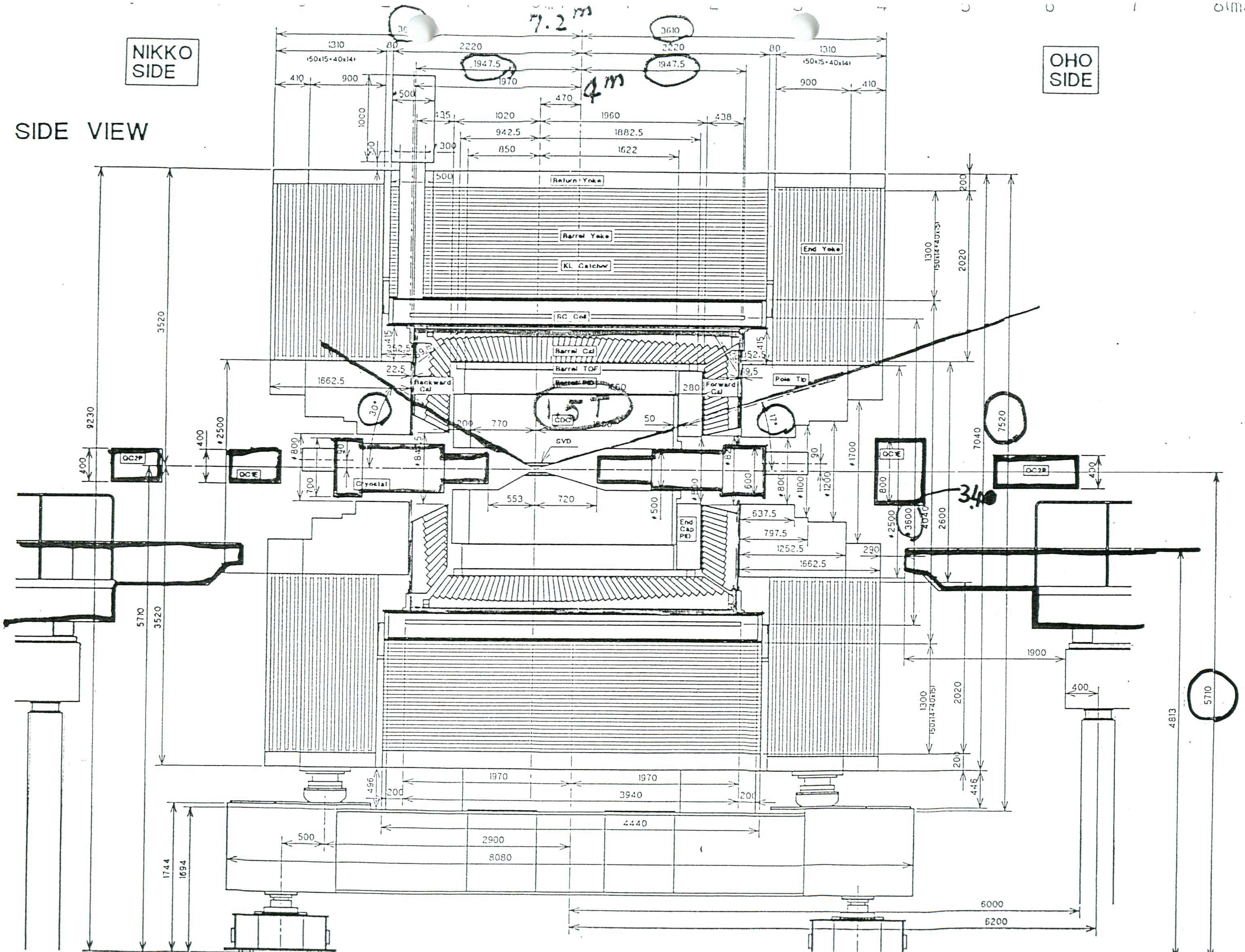
Table 1.1: Performance parameters of the BELLE detector.

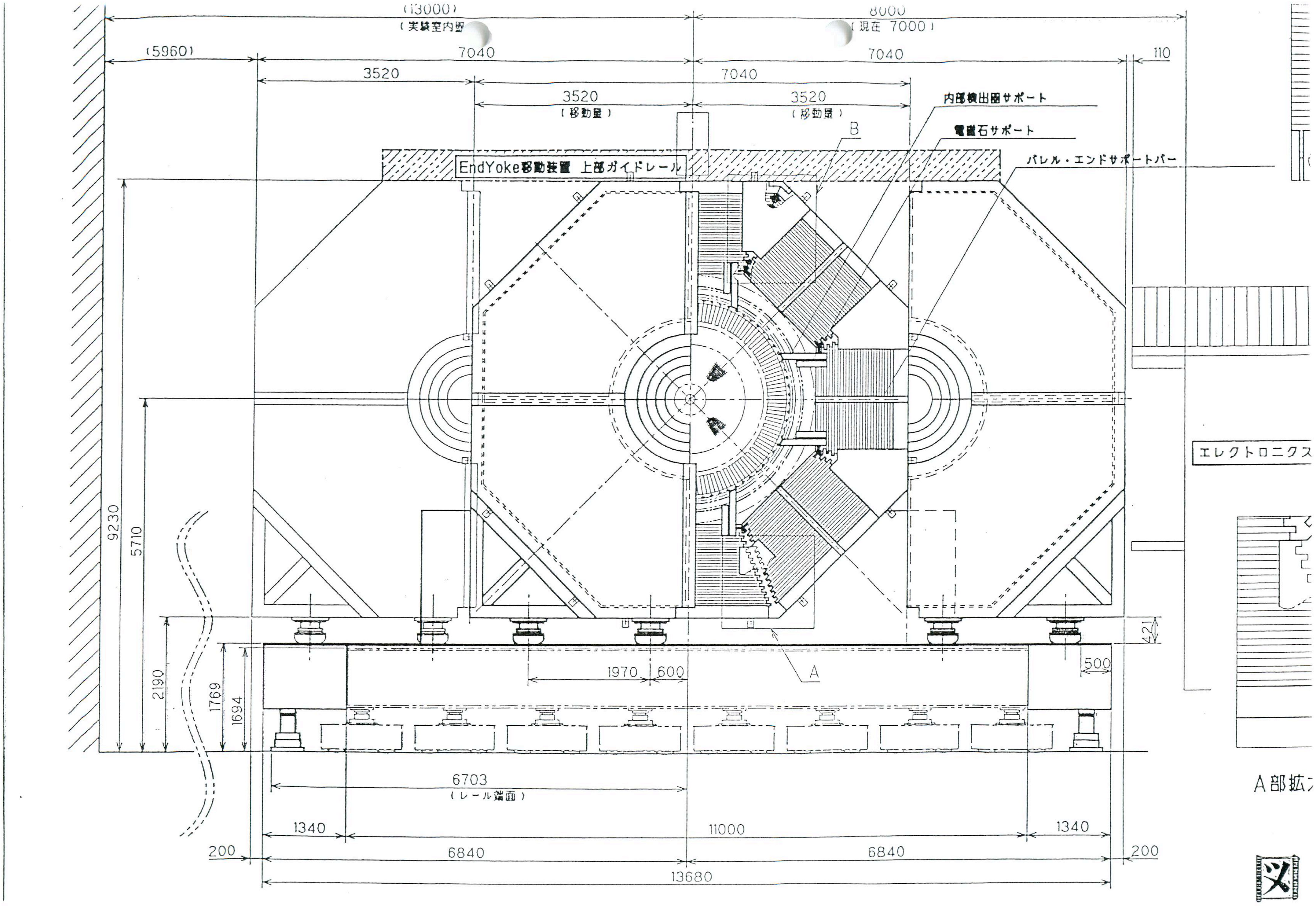
Detector	Type	Configuration	Readout	Performance
Beam pipe	Berylium double-wall	Cylindrical, r=2.3 cm 0.5mm Be/2mm He/0.5mm Be		Helium gas cooled
SVD	Double Sided Si Strip	300 μm-thick, 4 layers r = 2.7 - 5.8 cm Length = 22 - 34 cm	ϕ: 45.1K z: 45.1 K	$\sigma_{r\phi} \leq 10\mu$m σ_z=7-40μm $\sigma_{\Delta z} \sim 80\ \mu$m
CDC	Small Cell Drift Chamber	Anode: 52 layers Cathode: 3 layers r = 8.5 - 90 cm $-77 \leq z \leq 160$ cm	A: 8.4 K C: 1.5 K	$\sigma_{r\phi} = 130\ \mu$m $\sigma_z = 200 \sim 1400\mu$m σ_{p_t}/p_t =0.3%$\sqrt{p_t^2+1}$ $\sigma_{dE/dx}$ = 6%
PID option 1	$n \simeq 1.01$ Silica Aerogel	~12x12x12 cm^3 blocks 960 barrel/268 endcap FM-PMT readout	2188	$N_{p.e.} \geq 6$ K/π 1.2<p<3.5GeV/c
PID option 2	DIRC	176 $2 \times 4 \times 500$ cm^3 quartz PMT readout	~7K	optimized K/π for $B \to \pi\pi$
TOF	Scintillator	128 ϕ segmentation r = 120 cm, 3 m-long	128$\times$2	σ_t = 100 ps K/π up to 1.2GeV/c
ECL	CsI	Towered structure $\sim$ 5.5x5.5x30 cm^3 crystals Barrel: r = 125 - 162 cm Endcap: z = -102 and +196 cm	6624 1216(f) 1040(b)	σ_E/E= 0.67%/$\sqrt{E}\oplus$1.8% σ_{pos}=0.5 cm/$\sqrt{E}$ E in GeV
MAGNET	super conducting	inn.rad. = 170 cm		B = 1.5 T
KLM	Resistive Plate c.	14layers(5cm Fe+4cm gap) two RPCs in each gap θ and ϕ strips	θ:16 K ϕ:16 K	$\Delta\phi$=$\Delta\theta$=30mr for K_L σ_t=1ns 1% hadron fakes

Responsiblity Sharing

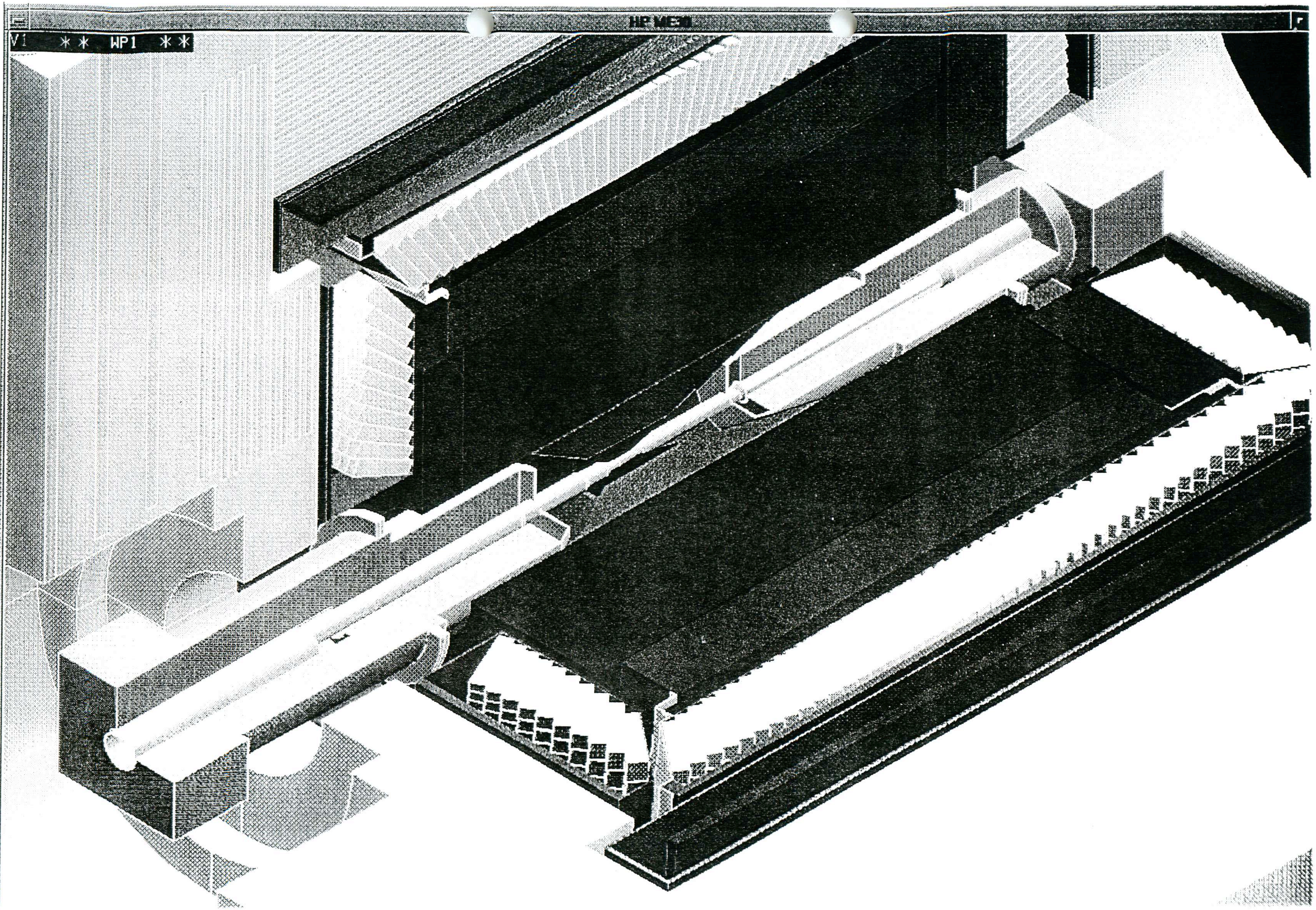
Beam Pipe & Masks	KEK
SVD	KEK, Niigata, Osaka, Tokyo MU, ~~SEPT~~, Kracow /6
PDC & CDC	Fukui, KEK, Nagoya Tokyo AT
Aerogel : Barrel ~~RICH~~ ? : Endcap	Chiba, Chuo, KEK, Saga, Princeton, Taiwan, Toho
TOF	Hawaii, Hiroshima IT, KEK, Okayama, Tokyo
CAL	Beijing, Hefei, KEK, Korea U, Novosibirsk, Nara, SNU, TIT, Utkal
Magnet	KEK
KLC & Muon	Osaka CU, Tohoku, Tohoku-Gakuin, Tsukuba, VPI
Trigger & DA	KEK, Nagoya, TIT
Off-line Analysis	Hawaii, KEK, Nagoya, Nara
Structure & Assembly	KEK

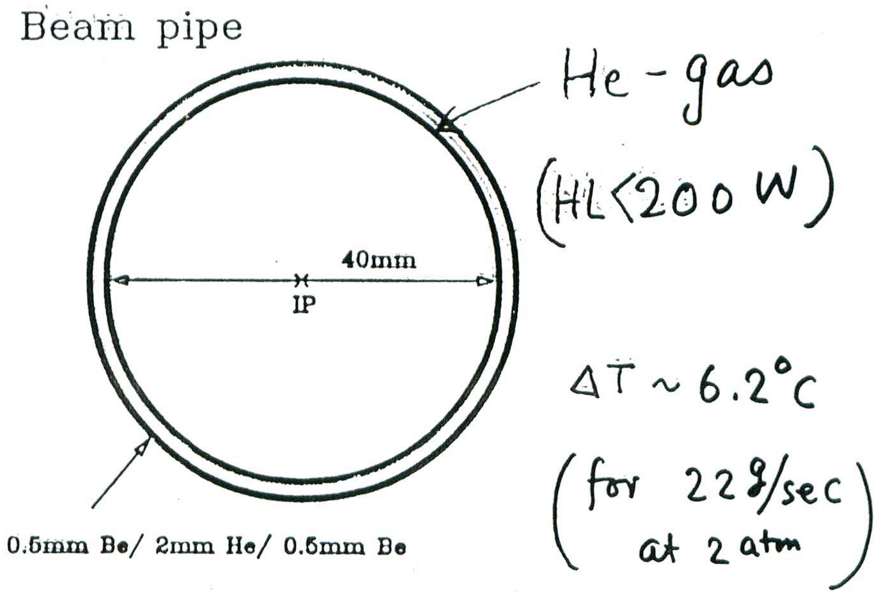
SIDE VIEW


NIKKO SIDE
OHO SIDE
Return Yoke
Barrel Yoke
KL Catcher
SC Coil
Barrel CsI
Barrel TOF
Forward CsI
Backward CsI
End Yoke
Pole Tip
End Cap PID
CDC
SVD
Cryostat
QC2P
QC1E
QC2B
7.2 m
4 m
1.5 T



(13000)
(実験室内形)
8000
(現在 7000)
(5960)
7040
7040
110
3520
7040
3520
(移動量)
3520
(移動量)
内部検出器サポート
B
電磁石サポート
EndYoke移動装置 上部ガイドレール
バレル・エンドサポートバー
エレクトロニクス
9230
5710
2190
1769
1694
1970
600
A
421
500
6703
(レール端面)
1340
11000
1340
200
6840
6840
200
13680
A部拡大


HP ME30
V1 ** WP1 **



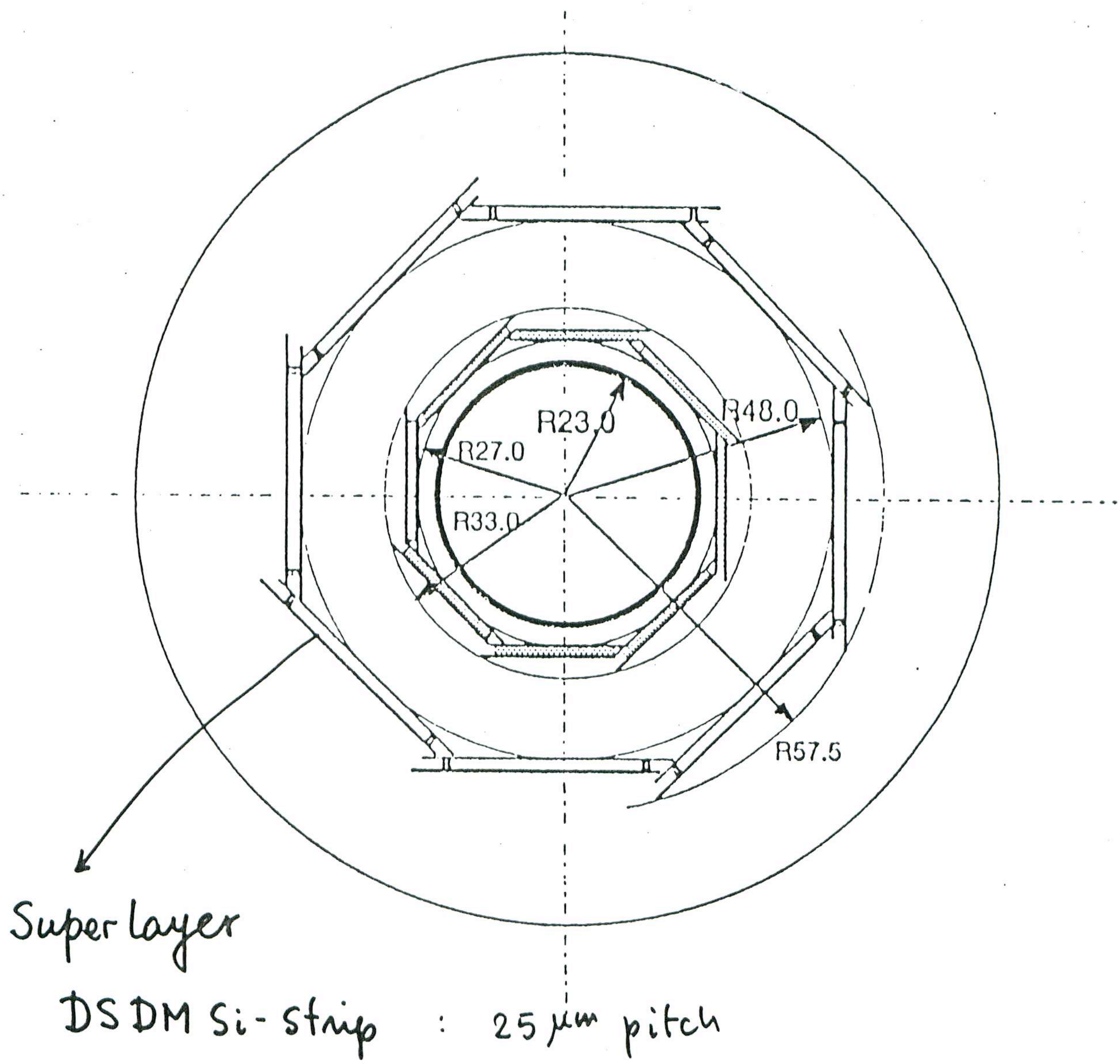
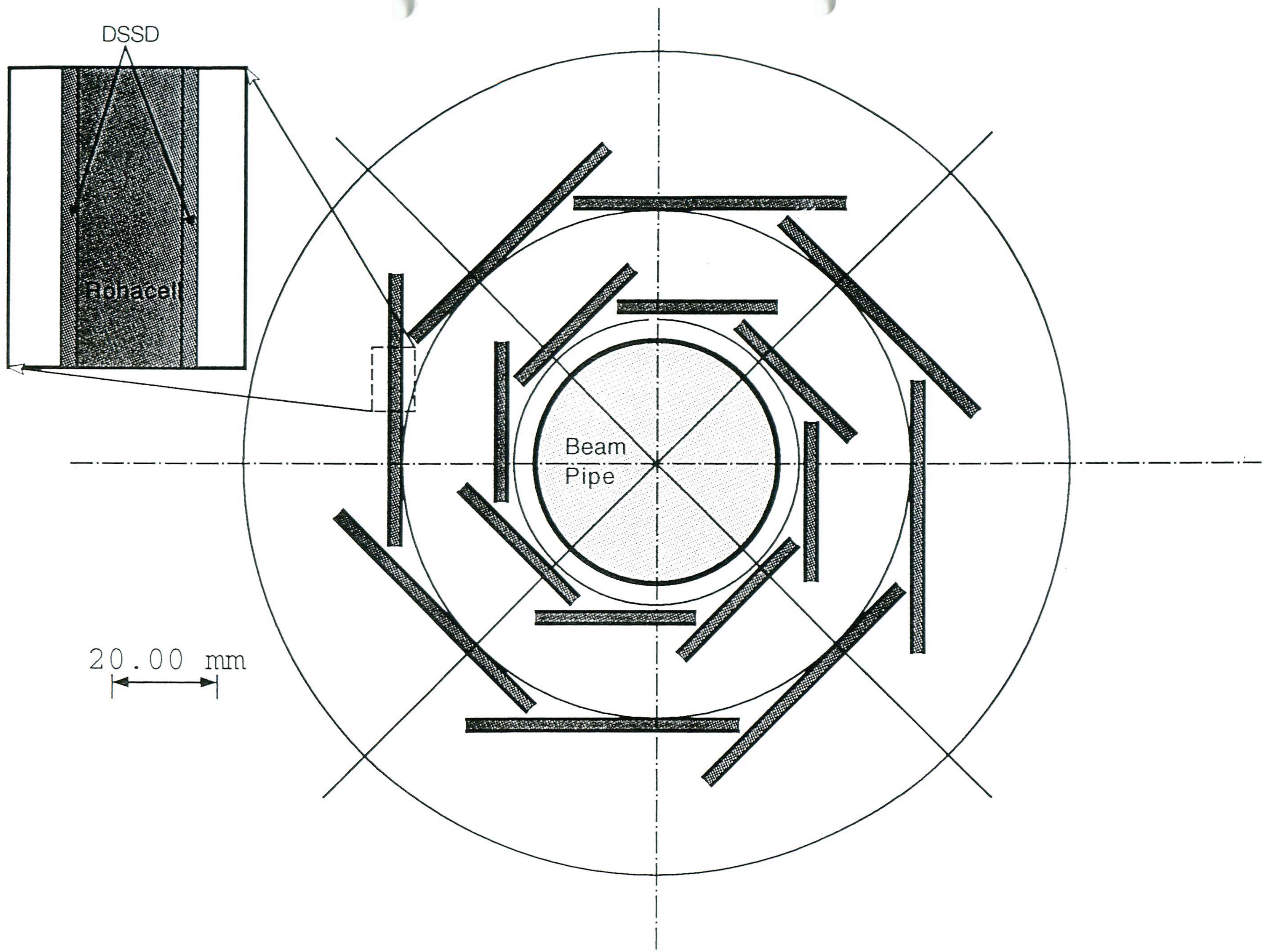


Figure 3.1: The SVD cross section.


DSSD
Rohacell
Beam
Pipe
20.00 mm

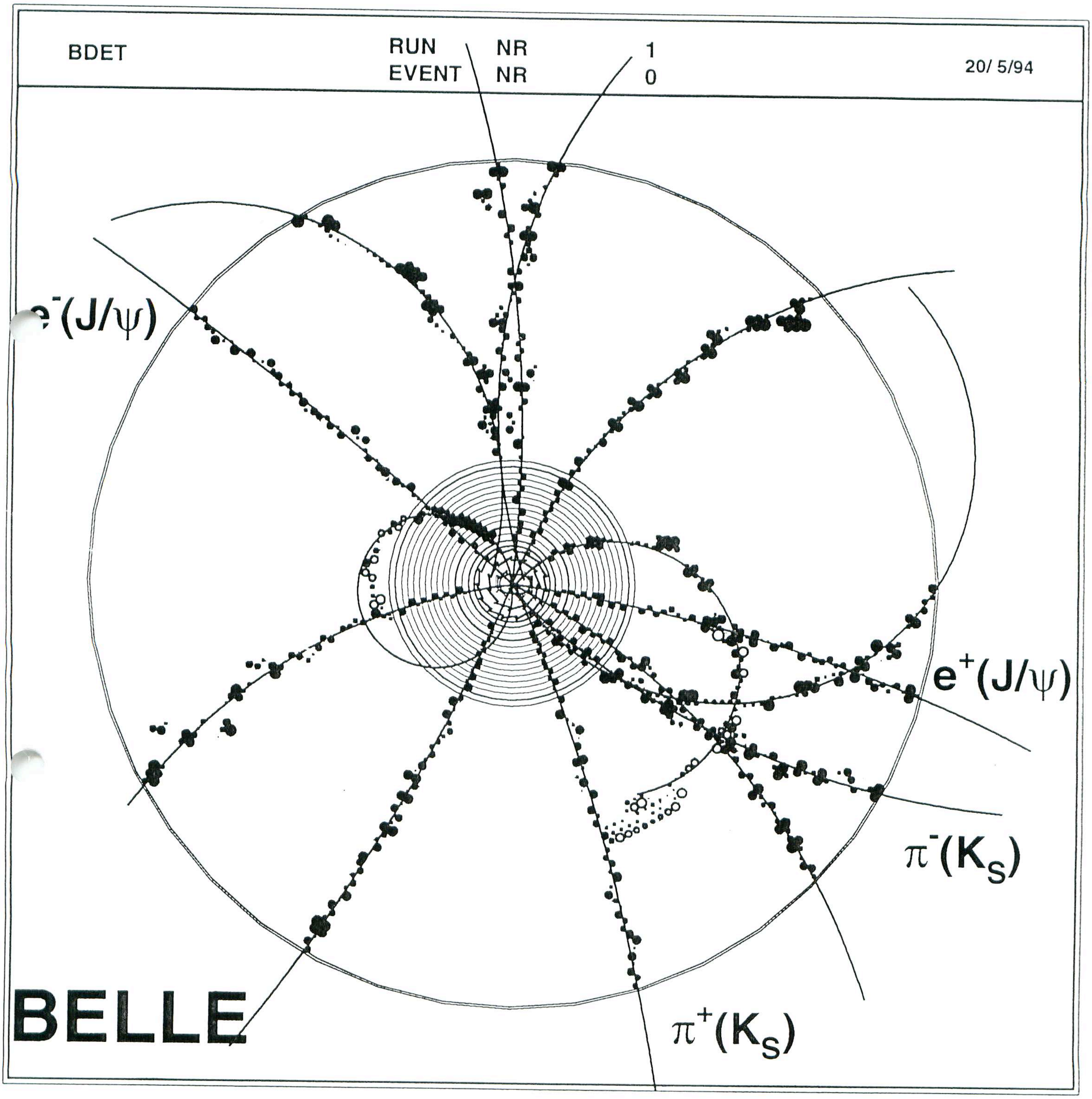

BDET
RUN NR 1
EVENT NR 0
20/ 5/94
e-(J/ψ)
e+(J/ψ)
π-(KS)
π+(KS)
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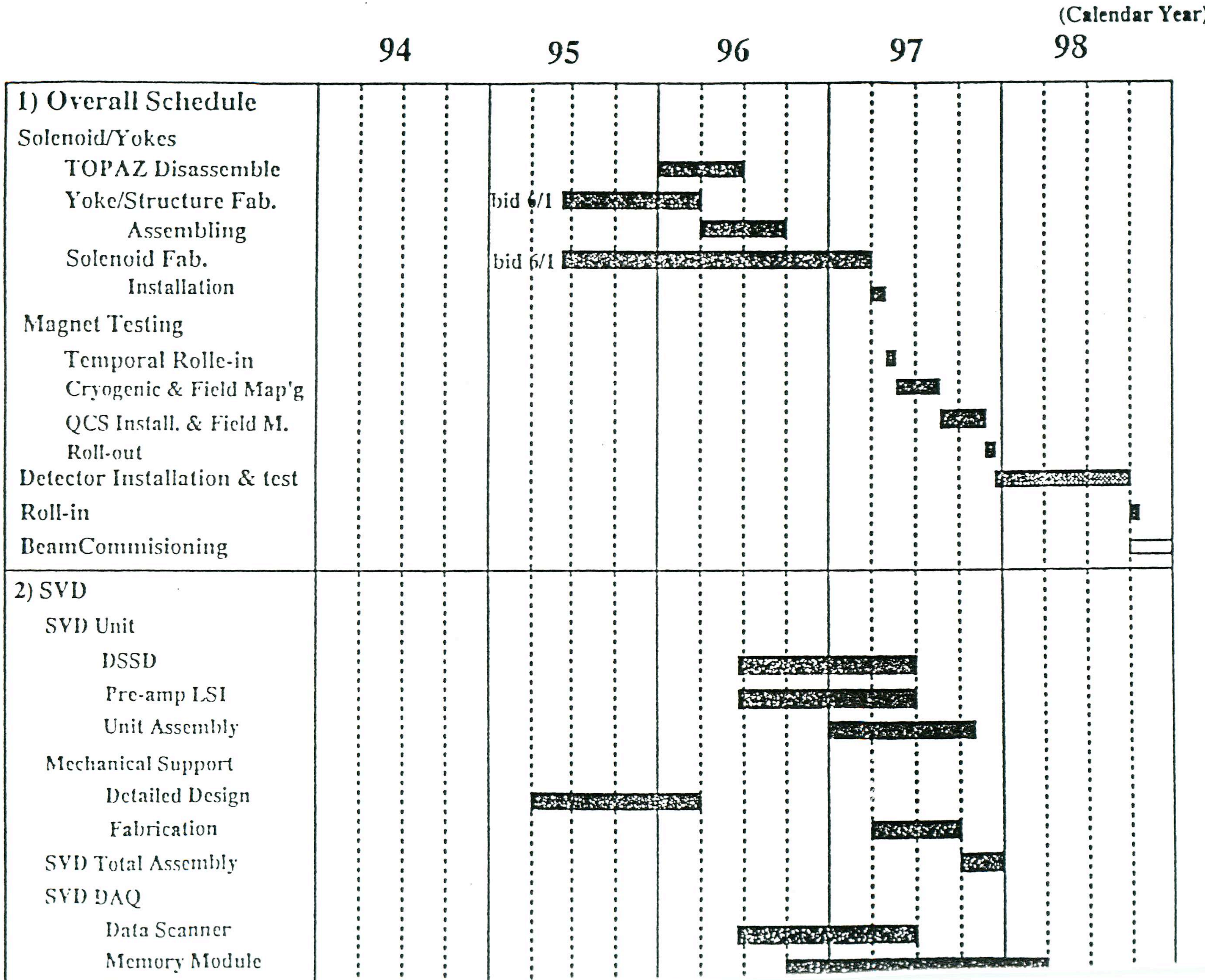
Figure 12.1 BELLE Construction Schedule



Issues of Detector design coupled to that of Accelerator

1) How to accomodate (Beam pipe, Beam Masks,) Comp. Solenoid and QCS ?

2) The leakage field from Comp. Solenoid and QCS : tolerable ?

3) Do we have an (easy) acess to the inner detector ?

4) The radiation doses : acceptable?
   Beam loss mechanism : known?

5) How large is the heat load to the IR beam pipe?

6) Detector has to be in the beam at the beam commisioning ?

7) $\Delta E/E < 10^{-3}$

8)