

MEG実験用液体Xe scintillation detector の 40MeV γ 線を用いた性能評価II

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森俊則、八島純^D、山口敦史^B、山下了、
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The current status and schedule of MEG experiment

Outline

- ◆ Development of MEG Experiment Detectors
 - * Gamma beam test @PSI
 - * Liq. Xe Calorimeter
 - Filler study for the Liq. Xe calorimeter
 - * COBRA Magnet
- ◆ Schedule of MEG experiment
- ◆ Summary

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Development of MEG Detectors

Gamma beam test @ PSI

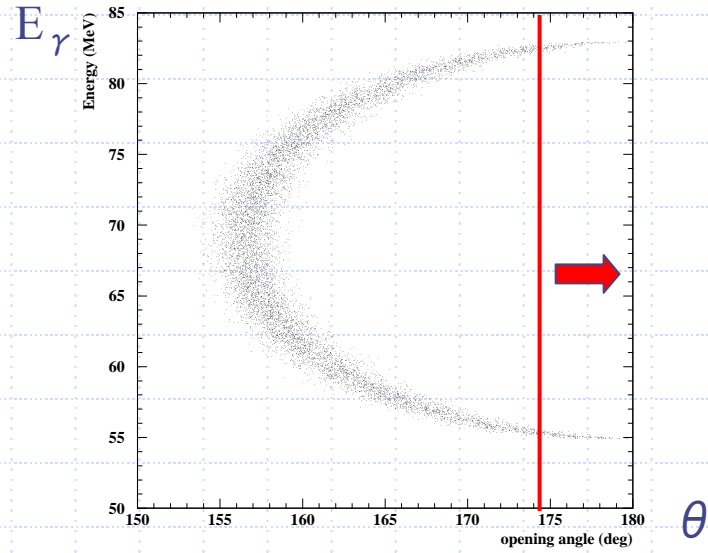
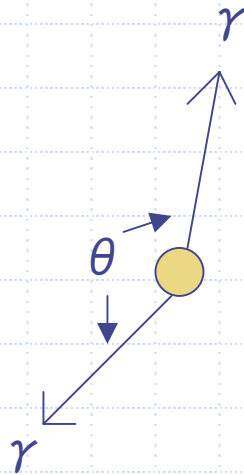
$$* \pi^- p \rightarrow \pi^0 n$$

$$\pi^0(28\text{MeV}/c) \rightarrow \gamma \gamma$$

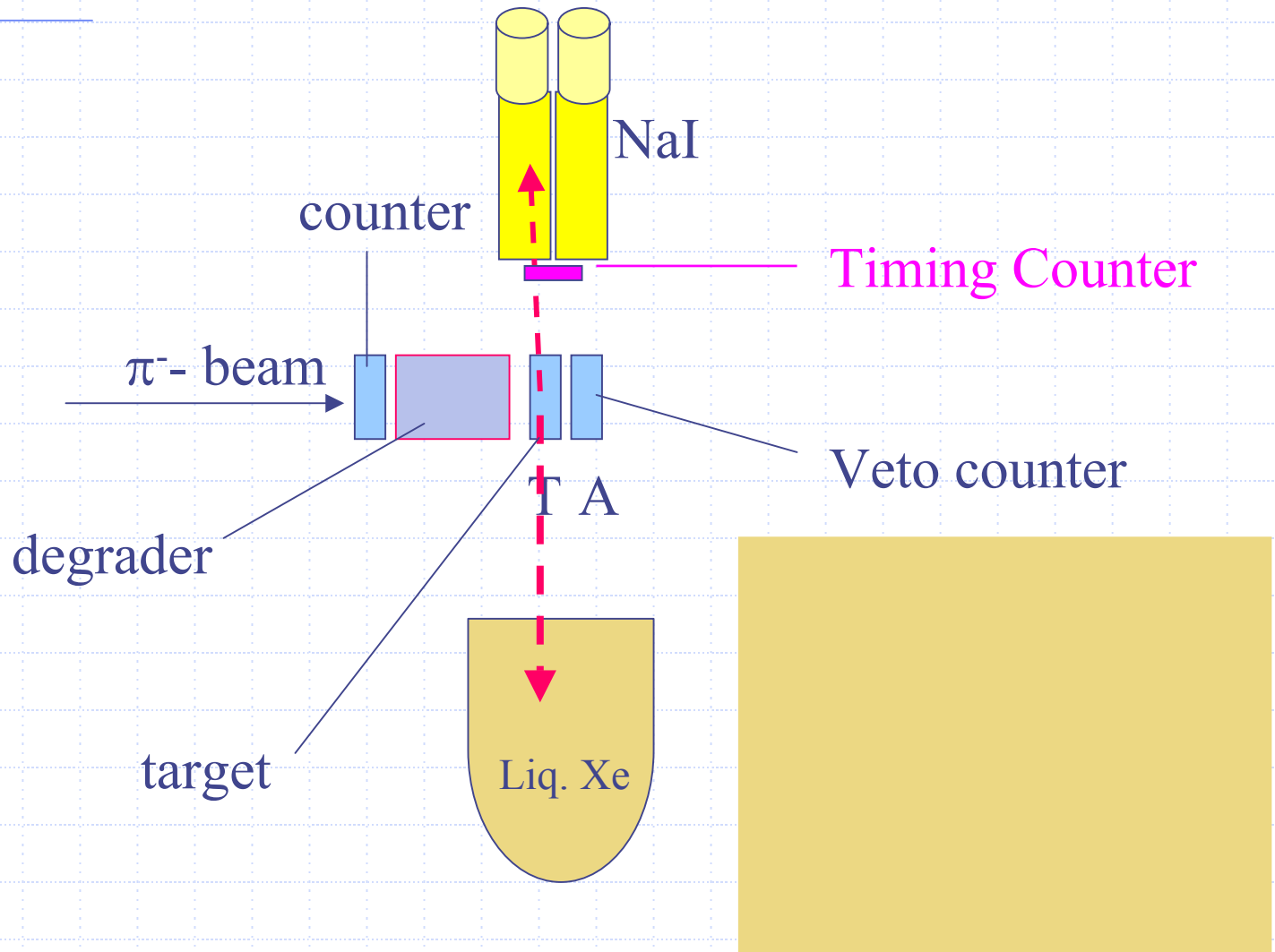
$$* \pi^- p \rightarrow n \gamma$$

$$E(\gamma) = 129\text{MeV}$$

kinematics



Experimental Setup



Experimental Setup Cont'd

◆ Target Liq. H₂ target

Target cell: 41mm dia. 103mm length

◆ NaI

64bars NaI (assembled to form an
8 × 8 array)

63.5 × 63.5 × 406 mm³

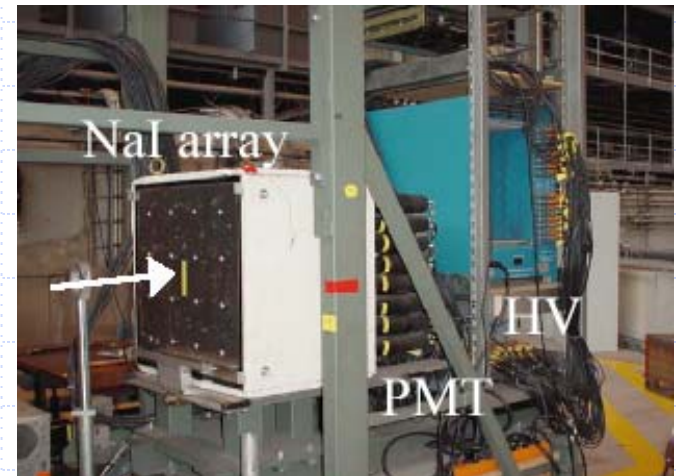
Position resolution (radial) : $\sigma r=4.8$ cm

◆ Timing Counter @100MeV

Installed in front of NaI detector

2 plastic scintillators overlapped (5 × 5cm²)

Lead plate (6mm thick)

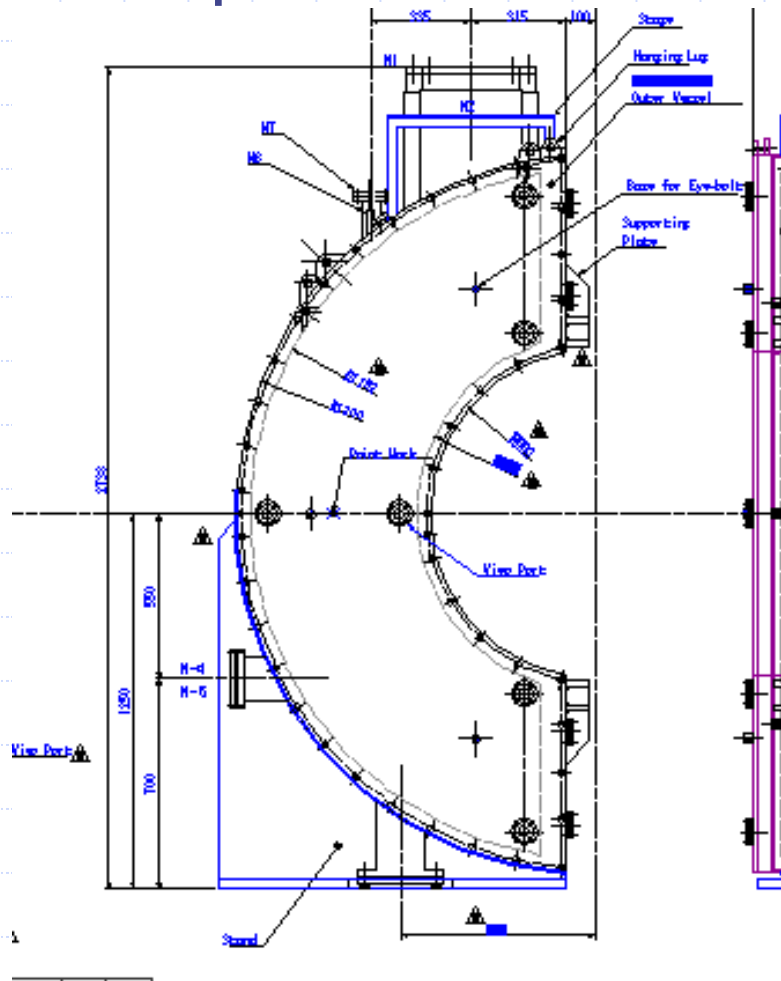


Prospects

- ◆ γ beam from $\pi^0 \rightarrow 2\gamma$ will be used to calibrate the Liq. Xe calorimeter in MEG experiment @ piE5, PSI
- ◆ Resolution required in MEG experiment
- ◆ Beam Time : Sep. 24th to Dec. 10th

MEG experiment detectors

◆ Liq. Xe calorimeter



Design of liq.Xe calorimeter has almost completed.

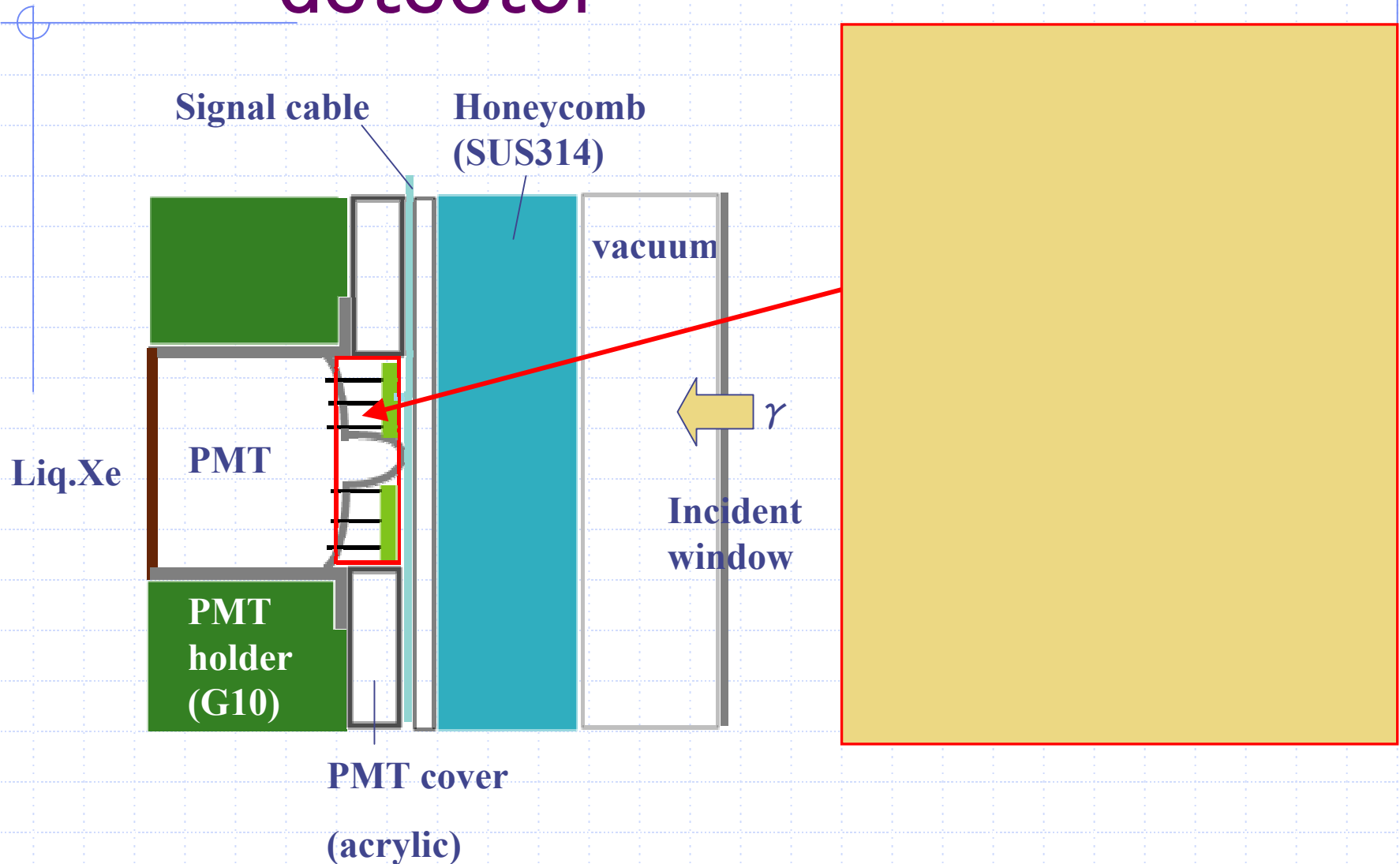
The start of the construction:
2004

Subjects to be solved:

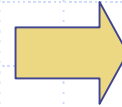
Stress, Deformation,

Heat Load, **Need of filler**

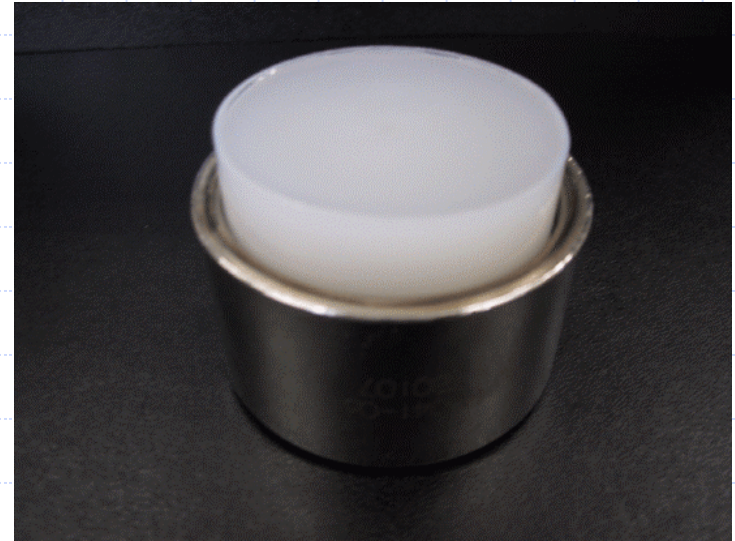
Filler study for the Liq.Xe detector



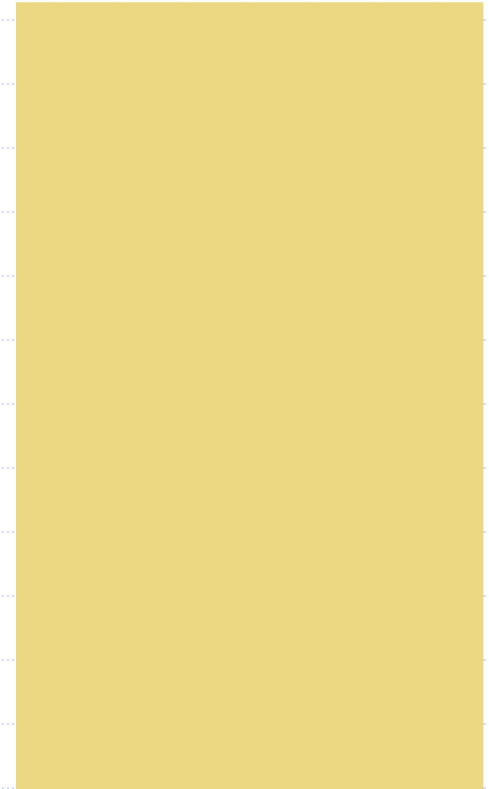
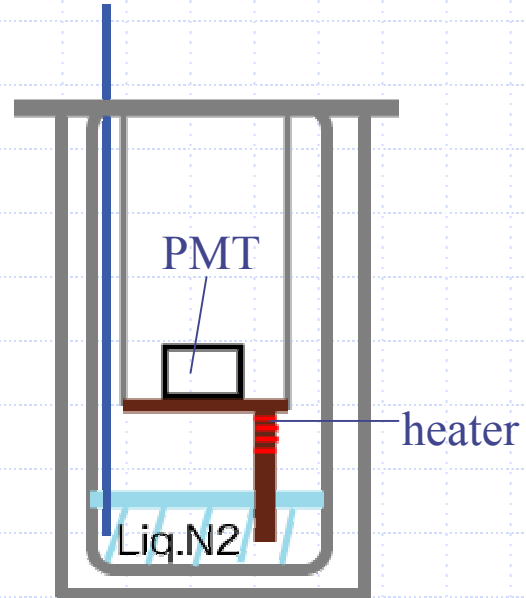
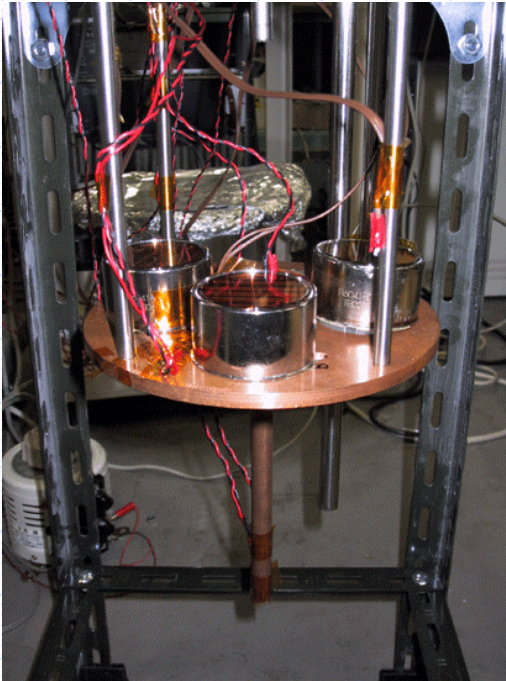
Filler study



Filler is attached directly to the PMT.



Cooling Test

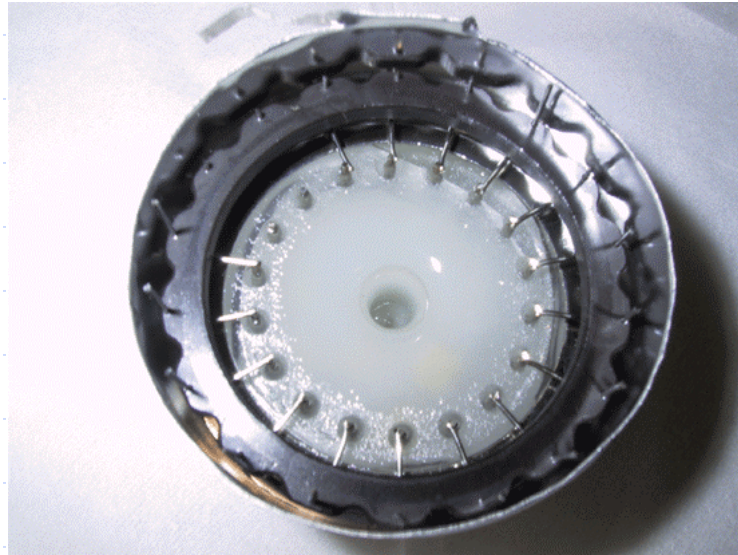


Now studying...



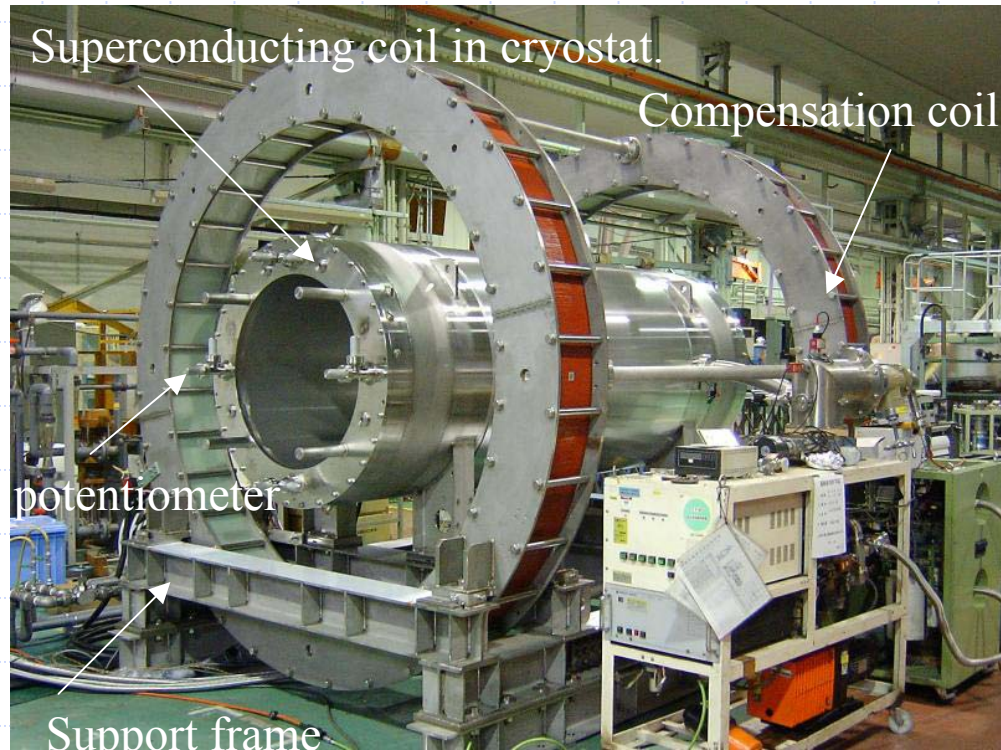
The difference between the thermal expansion rate of epoxy resin and of SUS.

➔ Stress on the PMT cover



COBRA Magnet

Construction finished!



COBRA Magnet: Solenoid magnet for positron spectrometer

Gradient field for high rate events

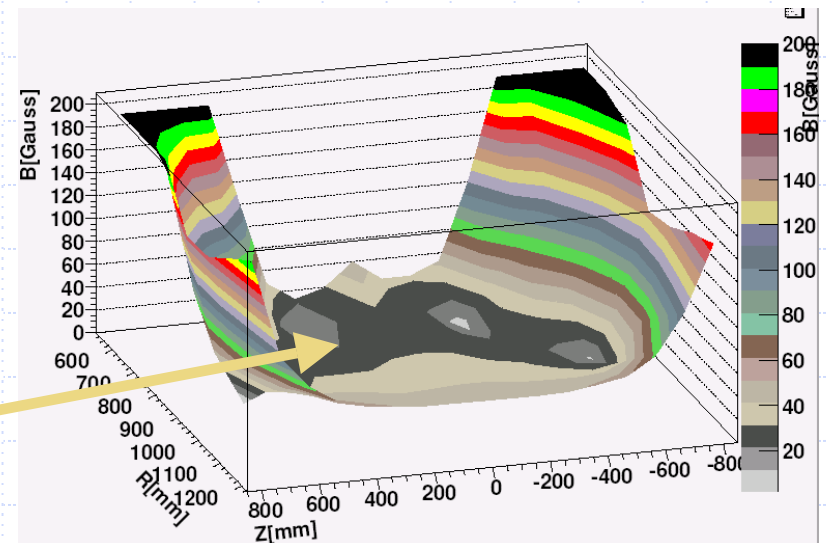
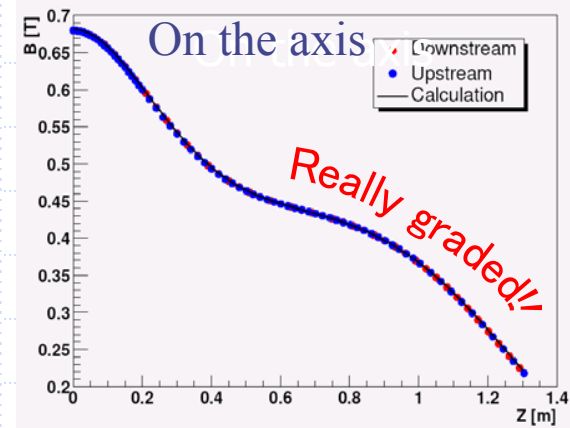
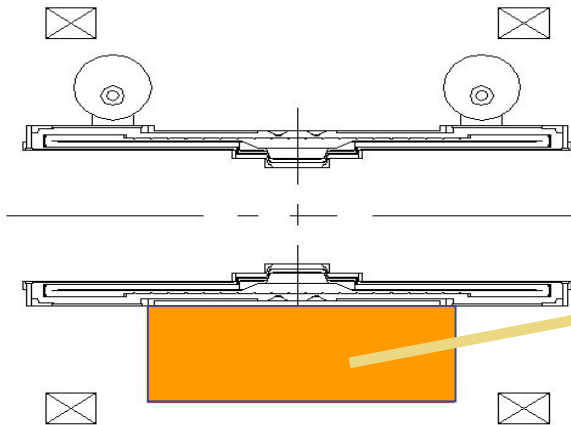
Final Excitation Test completed.

* Magnetic field inside the SC was measured.

→ Good Agreement with the calculation!

* Fringe field around the photon detector region was measured.

→ Suppressed by compensation coils.



The Schedule of MEG experiment

Photon detector : Large prototype @PSI → background estimation

The construction start in 2004.

COBRA magnet : Shipping to PSI on Sep. 26th

Installation & Engineering runs in piE5

Beam line : Ready by the spring of 2004

Positron tracker : The construction start in 2004.

Electronics & DAQ system : Start assembling in 2004.

Summary

- ◆ Beam test using monochromatic gamma beam starts on Oct. 2nd.
- ◆ The design of the photon detector has almost completed and now studying details. (Filler problems and so on)
- ◆ The construction of COBRA Magnet has finished. (Good performance!)
- ◆ Engineering runs will start in 2005, and MEG experiment at the beginning of 2006.