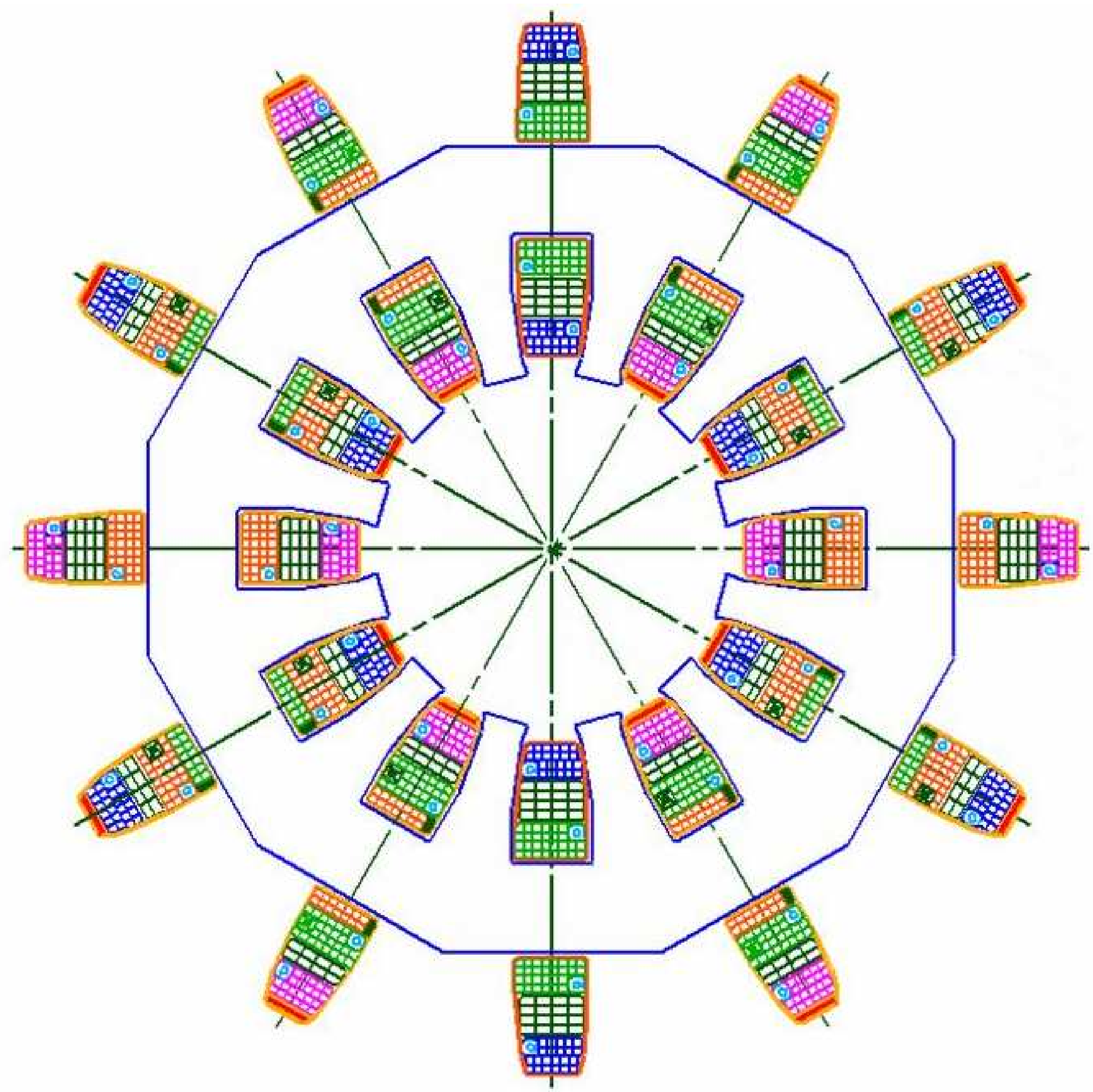
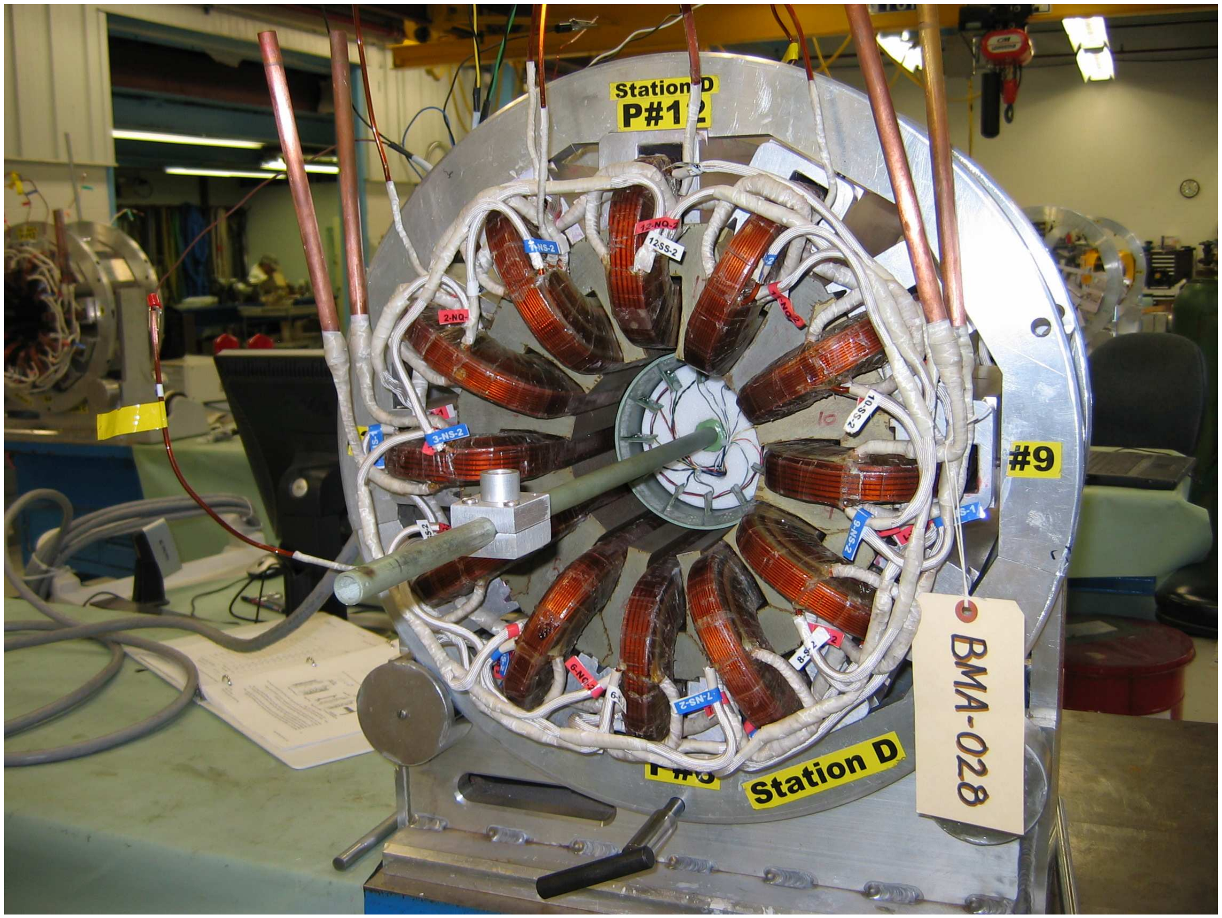
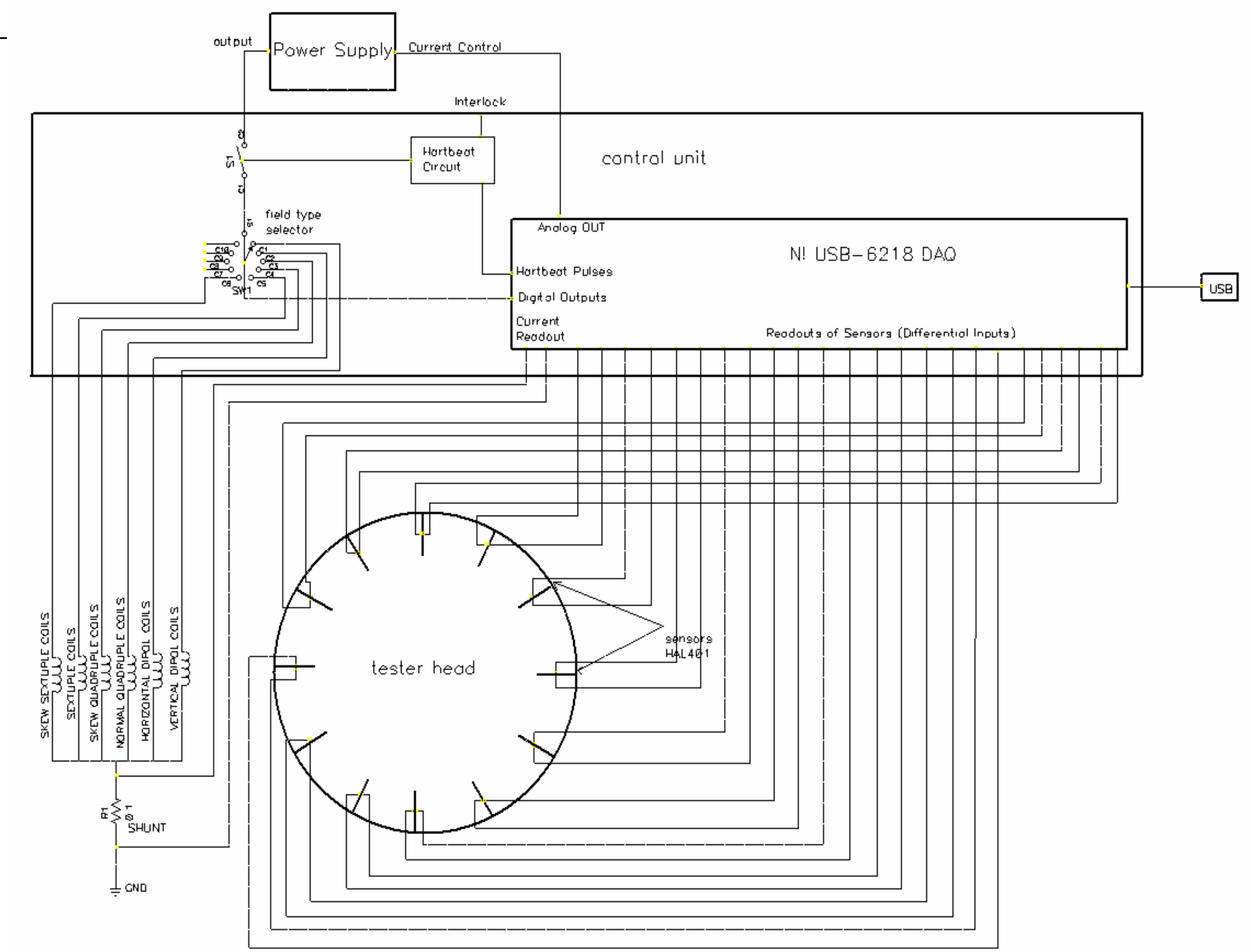
# Corrector Cross Section



# Probe Mounted in the Magnet

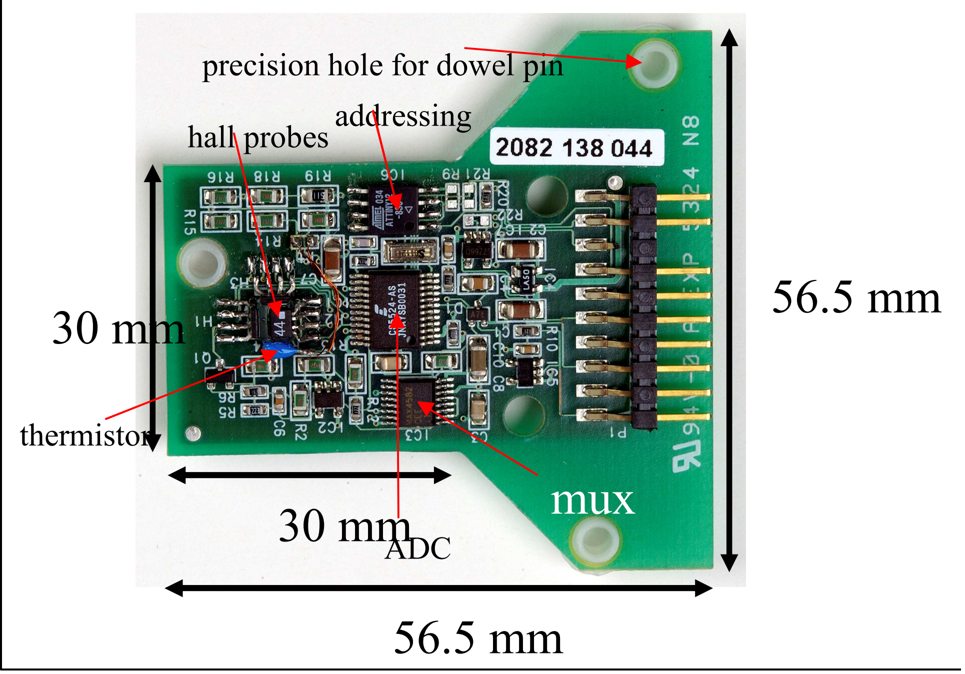


# System Diagram



# B-sensor card

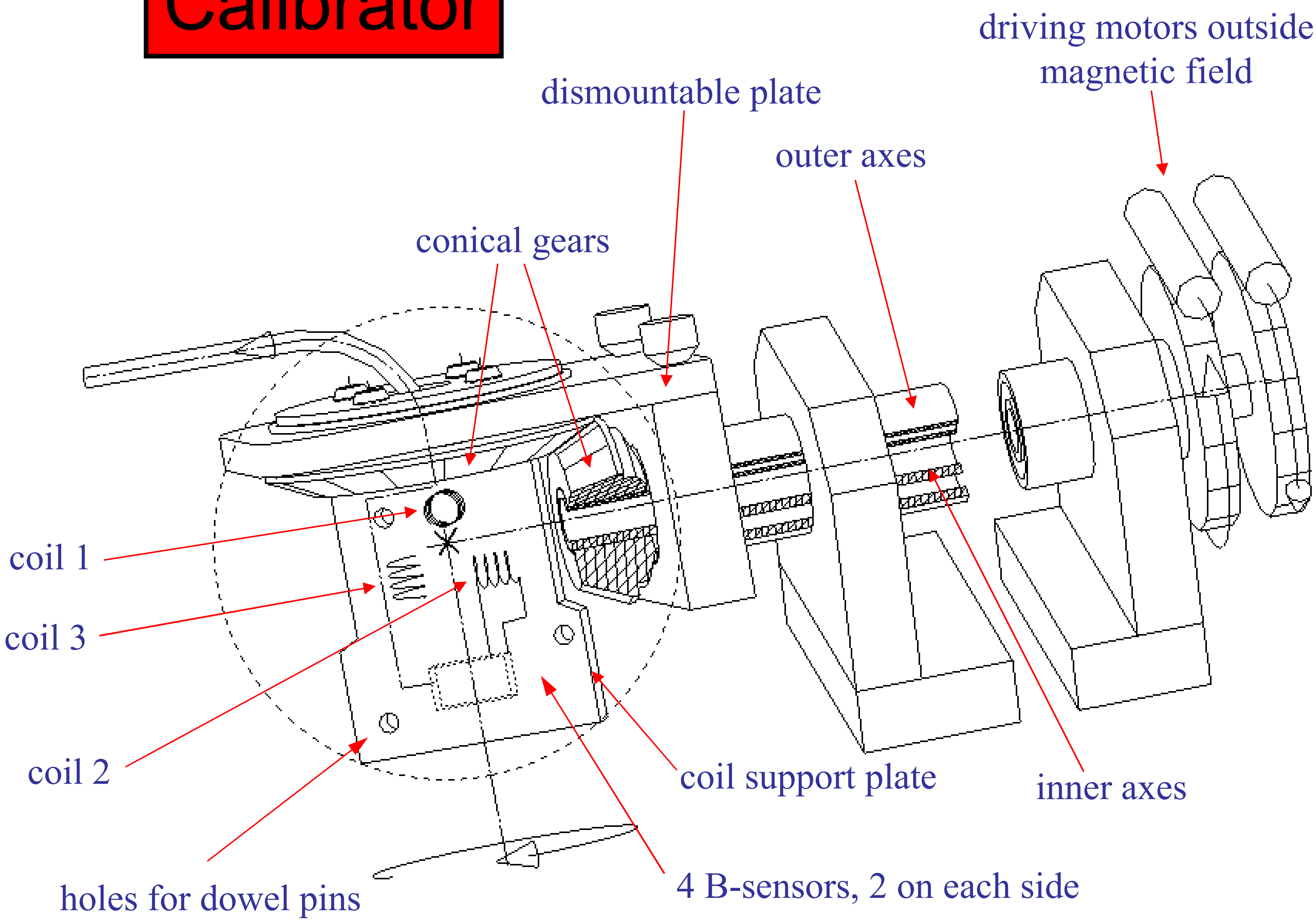
- Small card containing all analog electronics $\Rightarrow$ electronics in same field as Hall probes, calibrated together
- 3x Siemens KSY44 glued on glass cube
- Hall current 230 μA $\Rightarrow$ small heat dissipation
  ( $I_{nom}$ = 5mA )
- ADC: 24-bits delta-sigma modulator
- Thermistor connected to cube, no thermostat
- Calibration circuit for thermistor




- Precision holes to fit on calibrator's and experiment's dowel pins
- Addressable: 254 cards on one serial bus, broadcast address

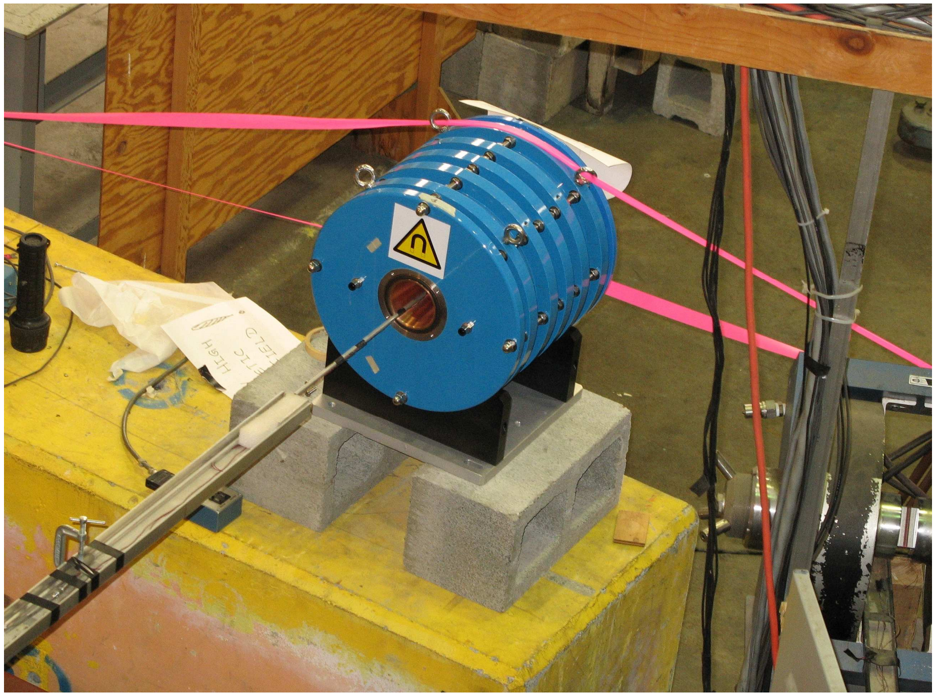
B-sensor development in collaboration with the Dutch scientific institute NIKHEF for the ATLAS detector at the CERN-LHC collider.
H. van ES, J. Kuijt, H. Boterenbrood

# Calibrator




**Long and heavy axes => damping of vibrations**

# Supernanogan – New Permanent Magnet ECR Ion Source for OLIS (Offline Ion Source) for ISAC (Isotope Separation and Acceleration).

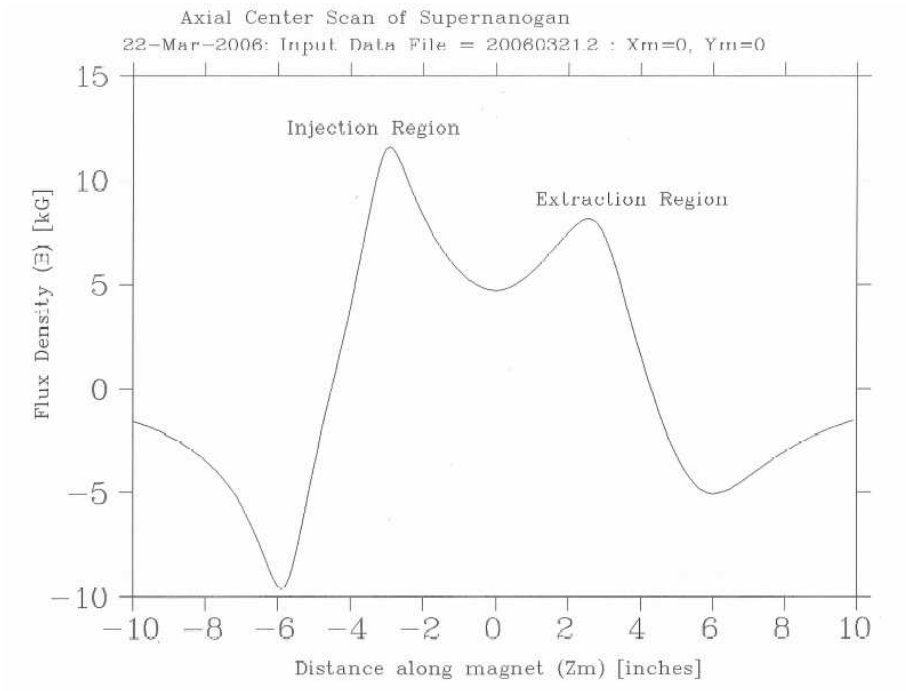


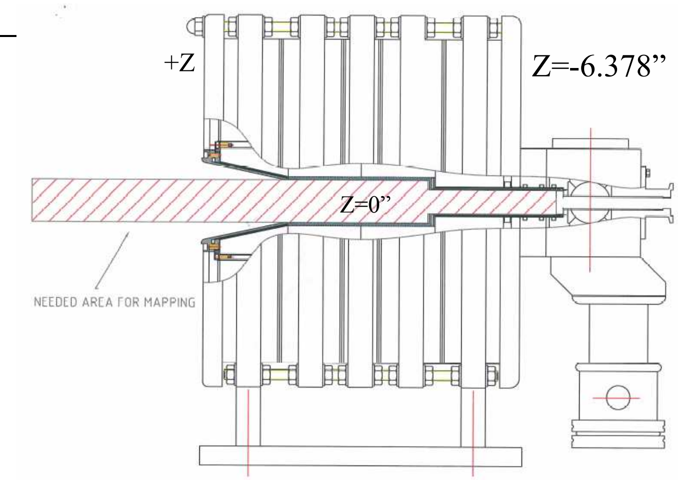
[5]

[5]

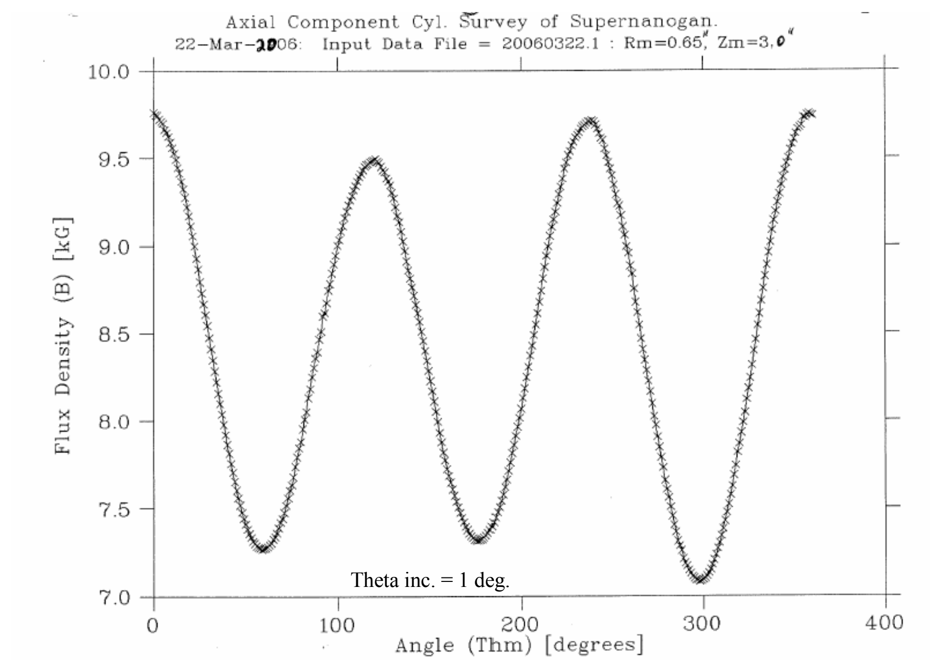
Manufactured by:
Pantechnik, Caen, France

# Axial B Component Meas. Of Supernanogan.




[4]




-Axial Peak B = 11.6 kG at the injection region.

-Axial Peak B = 8.1 kG at the extraction region.

# Focusing Solenoids for HINS

## (High Intensity Neutrino Source)

Project to build the front end ($\beta$<1) of a high intensity (40mA) $H^-$ linac (Meson area)

Magnet considerations began ~spring 2005

Magnet Designs Constrained by

Available Slot Length, Field Integral

Low B-Field on nearby RF cavities (<1 $\mu$T)

~5 T( +30% ) Sc Solenoids w/ Bucking Coils

solution for several RF sections (DTL, SS-1, 2)

r ~25 mm, L~120 mm

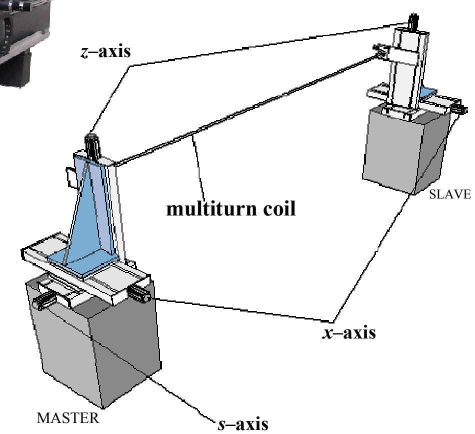
(Variations on the requirements, design details)

*New:* Embed {H,V} Dipole Steering Corrector Coils

# Magnetic Measurements

## Measurement benches

1. Hall probe bench
   - Previously existing system
2. Flipping coil bench
   - Purchased from ESRF
3. Helmholtz coils
   - Purchased from Elettra
4. Fixed stretched wire
   - Designed and built in-house




# 3D Hall probe

## F.W. Bell Hall sensors

**Model GH-700**

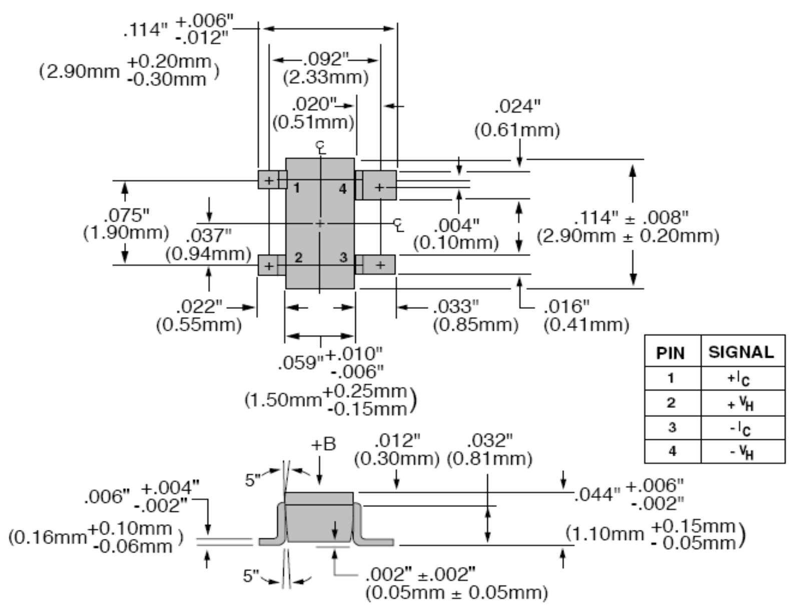
Gallium Arsenide

Nominal current: $I_{nom}$ =5 mA

Magnetic Sensitivity ~ 1 V/Tesla

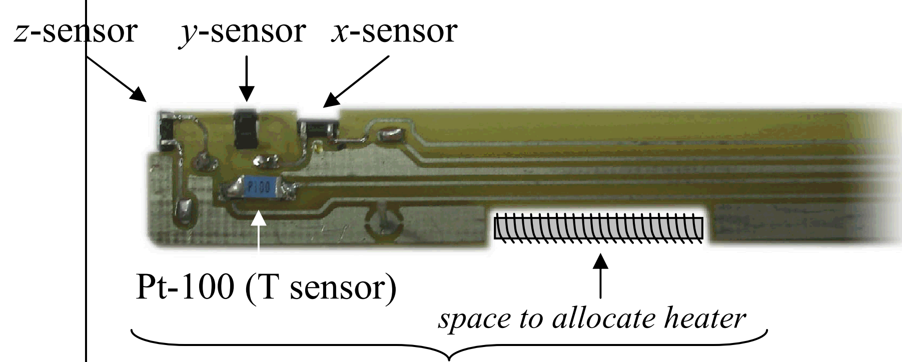
Max. linearity error (±1 Tesla): ±2%

Temperature coefficient: -0.07%/ºC




| PIN | SIGNAL |
|---|---|
| 1 | $+I_C$ |
| 2 | $+V_H$ |
| 3 | $-I_C$ |
| 4 | $-V_H$ |

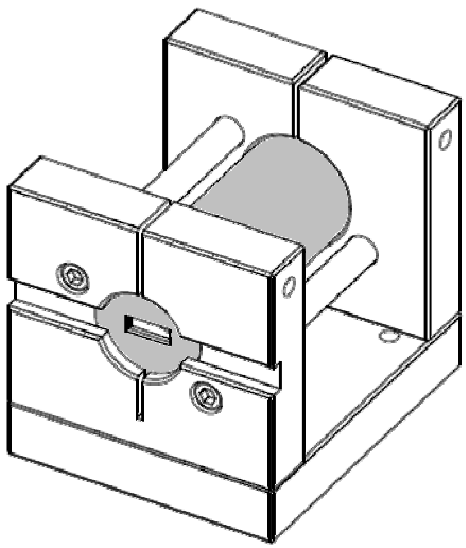
*Detail of Hall probe circuit board:*

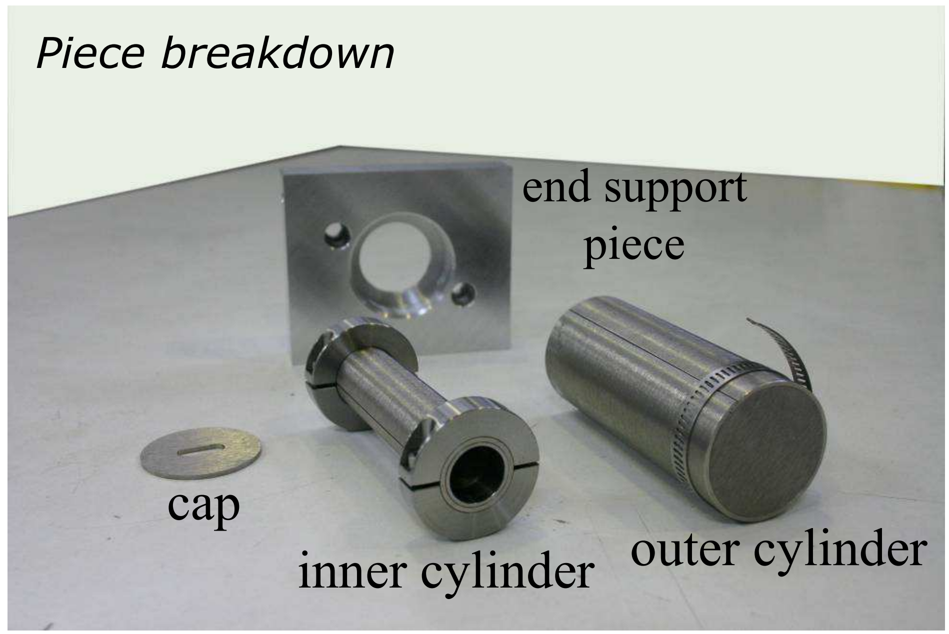



the temperature sensor and the manganine heater, in combination with a PID controller (*Eurotherm 3508*) allow to control the temperature of the probe within ±0.05ºC

# Determination of offsets

A double layer $\mu$-metal chamber has been designed and constructed in order to measure the offsets of Hall sensors






Selected material:

80%Ni-Fe $\mu$-metal from ***Amuneal Manufacturing Corp.*** in the form of 0.062''=1.575 mm thickness sheets

# Relative position between Hall sensors

Measurement of a magnetic field with strong gradients in all three directions —all $(@B_i/@x_j)\neq 0$— within a given volume (15 £ 15 £ 15 $mm^3$) and optimization of $\pm x_b$, $\pm y_b$, $\pm z_b$, $\pm x_c$, $\pm y_c$ and $\pm z_c$ in order to minimize “Maxwellness” (»):

Correction of distances between sensors:

Sensor (b)

❍ ±x♌🖬 ☎ 🗀🗀🖰§ 🗀🗁🕽❍ ❍

❍ ±y♌🖬 ☎ 🗀🗐§ 🗀🗁🕽❍ ❍

❍ ±z♌🖬 ☎ 🗀🗐§ 🗀🗄 🕽❍ ❍

Sensor (c)

❍ ±x♍🖬 ☎🖃🗀🗎🖰§ 🗀🗄 🕽❍ ❍

❍ ±y♍🖬 ☎🖃🗀🗎 § 🗀🗄 🕽❍ ❍

❍ ±z♍🖬 ☎🖃🗀🗄 § 🗀🗄 🕽❍ ❍

After optimization, “Maxwellness” reduced from ~ 1 Gauss/mm down to 0.1 Gauss/mm

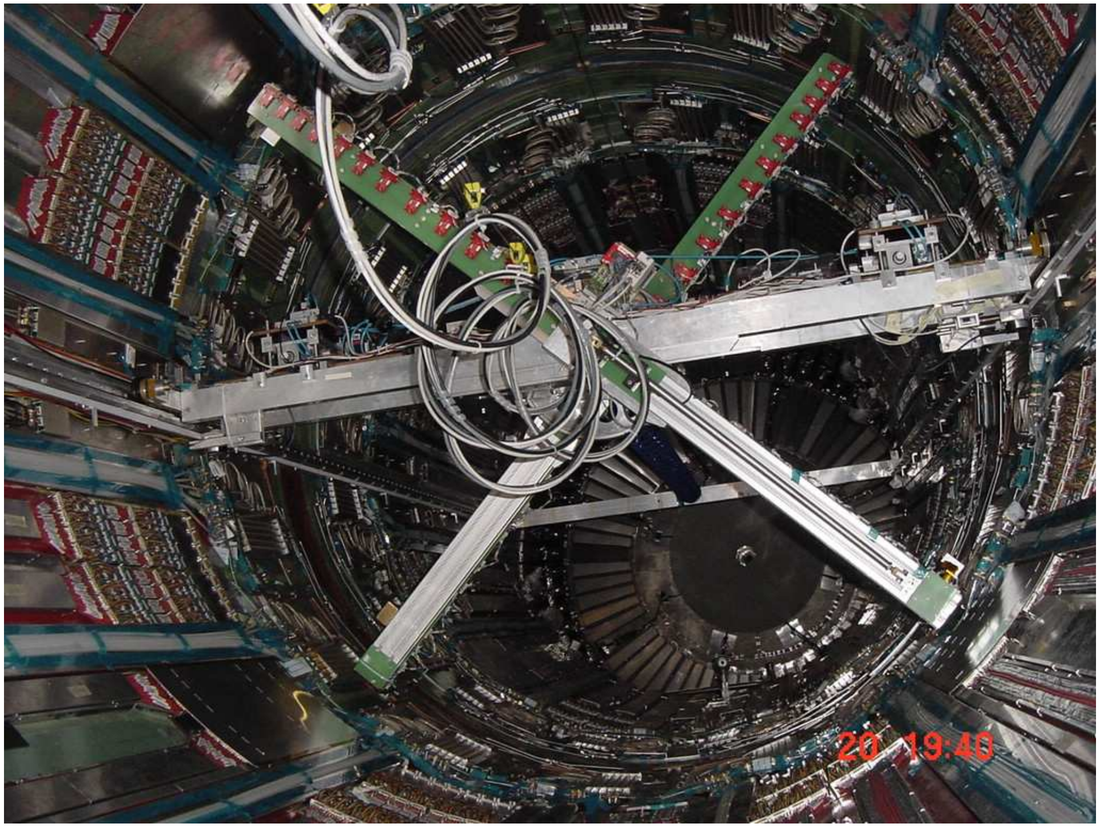
Relative position of Hall sensors determined with an accuracy of ~50—100 μm

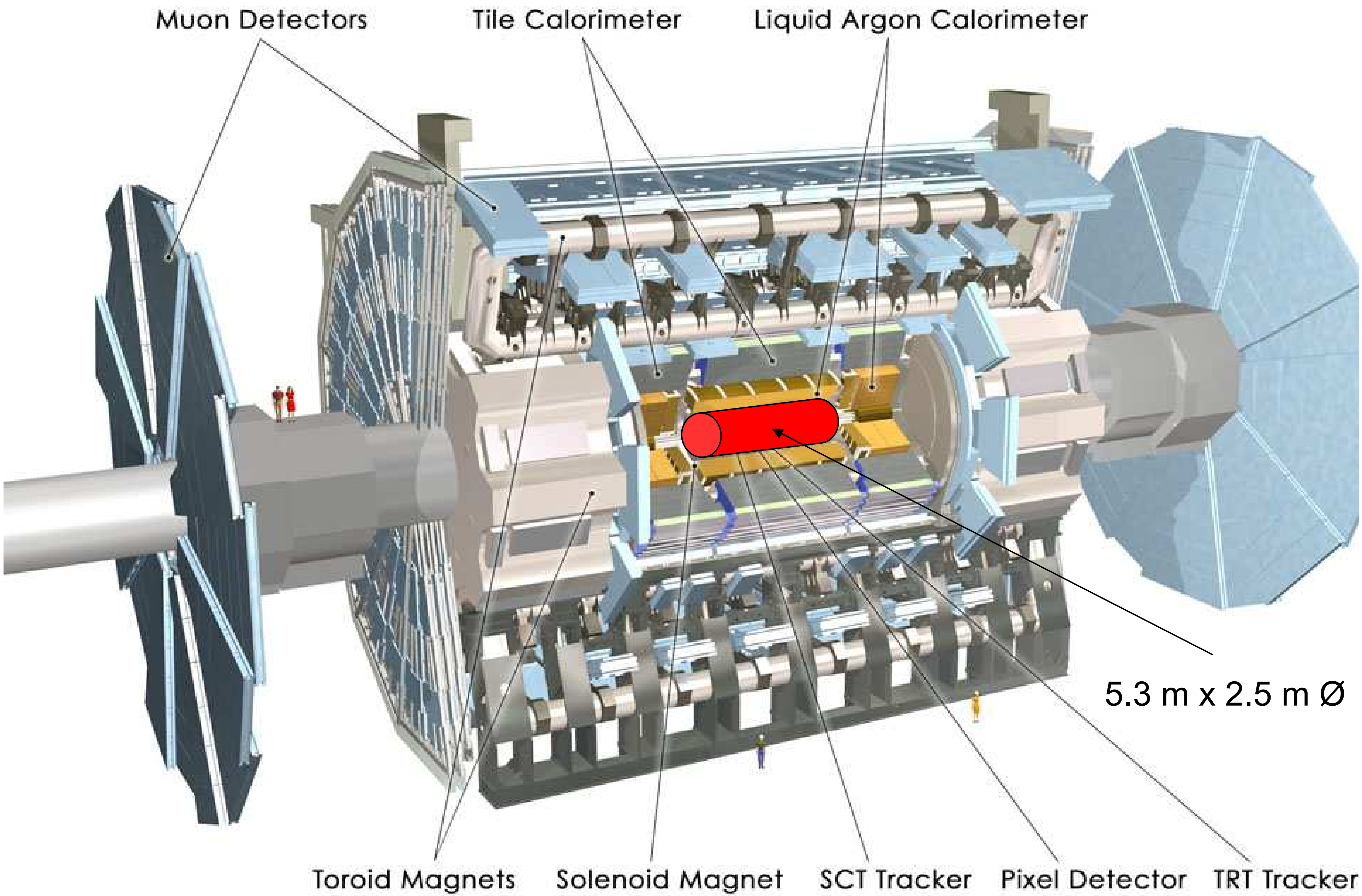
# The ATLAS pneumatic solenoid mapper

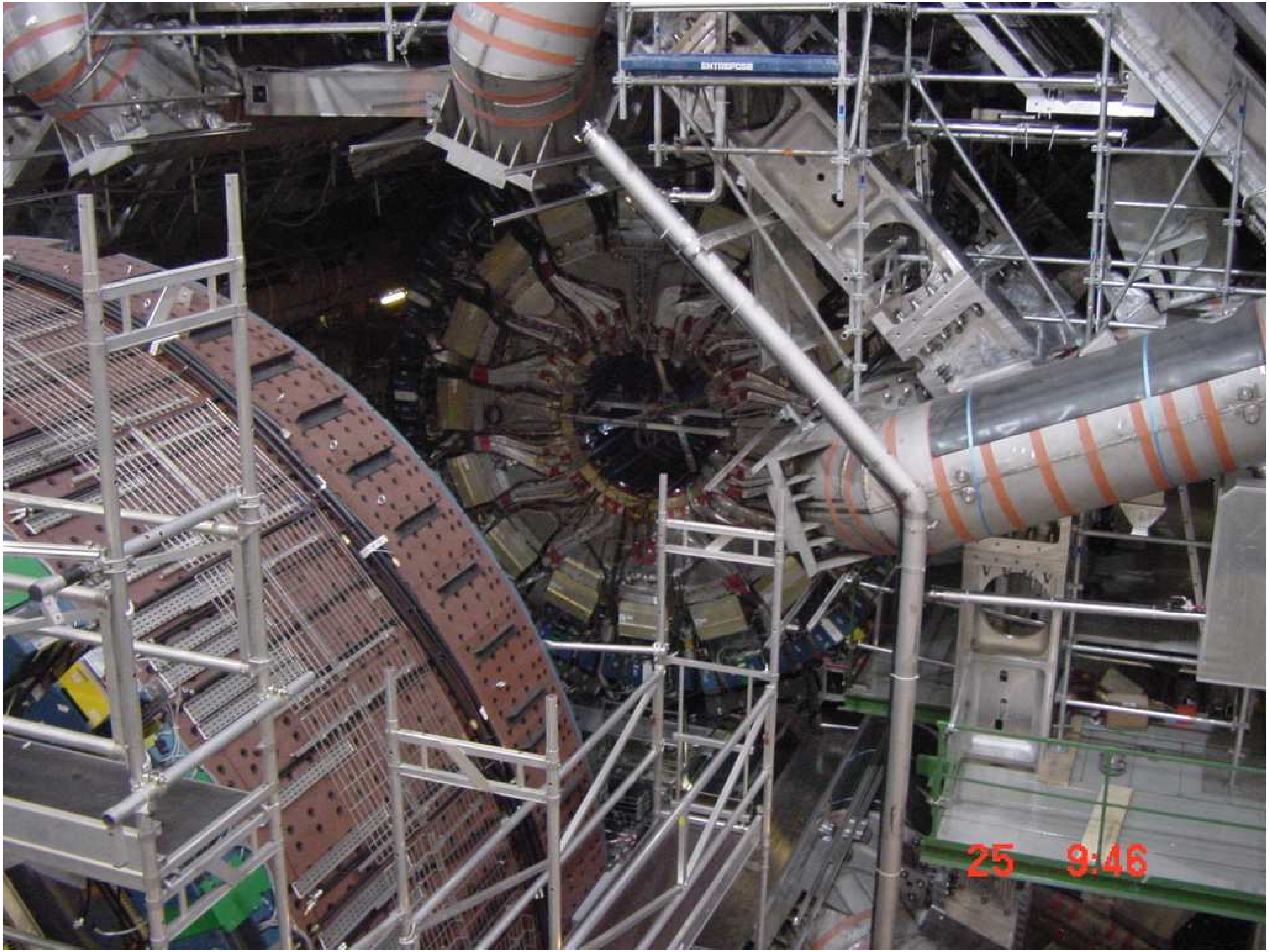
**IMMW15 FNAL USA**
AUGUST 21-24, 2007

F. Bergsma, P.A. Giudici, A. Kehrli, X. Pons   CERN/PH-DT1

- Pneumatic motor
- Gear system
- Operation in magnetic field
- Control
- Performance




Muon Detectors
Tile Calorimeter
Liquid Argon Calorimeter
5.3 m x 2.5 m Ø
Toroid Magnets
Solenoid Magnet
SCT Tracker
Pixel Detector
TRT Tracker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