

# A Test Facility for R/D Programs on Superconducting Accelerator Magnets at CERN

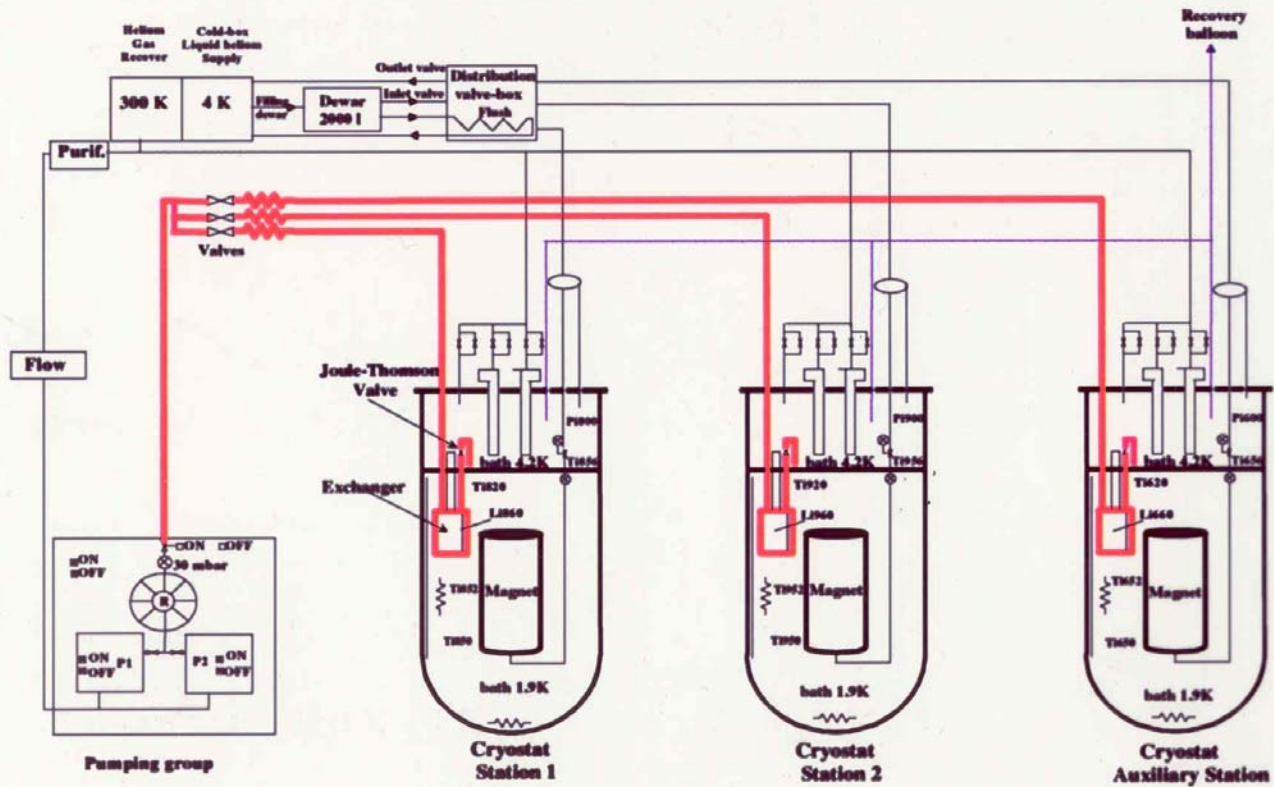
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**Vertical Cryostat  
(Claudet Bath)**

# Layout of the Vertical Test Facility (Cryogenics)

2 g/s LHe



## Test equipment (1) Cryostats

<b>Cryostat</b>		<b>Siegtal</b>	<b>S_L</b>	<b>Aux</b>
Useful height	[mm]	1498	3800	2300
Useful diameter	[mm]	800	600	300
Current leads	(18 kA)	-	2	-
Current leads	(2 kA)	2	2	4
Current leads	(800 A)	-	1	-
Current leads	(100 A)	4	-	-
Cool-down time	300 K - 4 K	20 hrs	30 hrs	12 hrs
Cool-down time	4 K - 1.9 K	7 hrs	10 hrs	3 hrs

# Test equipment (2)

## Power supplies

<b>Nr</b>	<b>Maximum current</b>	<b>Maximum voltage</b>	<b>Accuracy</b>	<b>Ripple output voltage</b>
1	20 kA	20 V	10 ppm	200 mV pp
1	$\pm 2$ kA	$\pm 10$ V	10 ppm	150 mV pp
2	$\pm 600$ A	$\pm 12$ V	10 ppm	4 mV pp

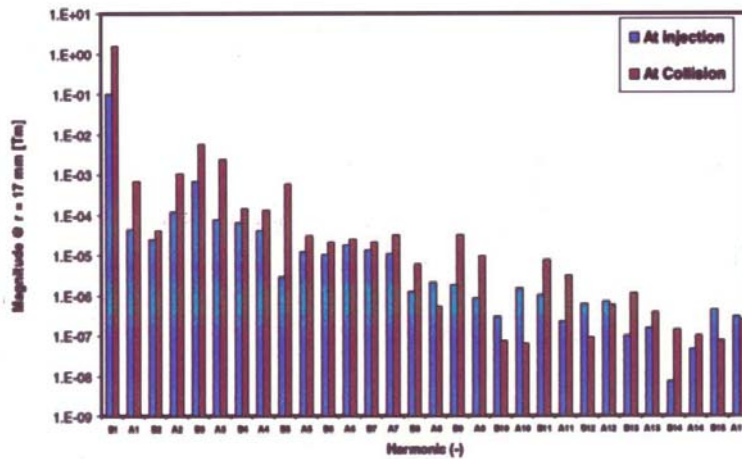
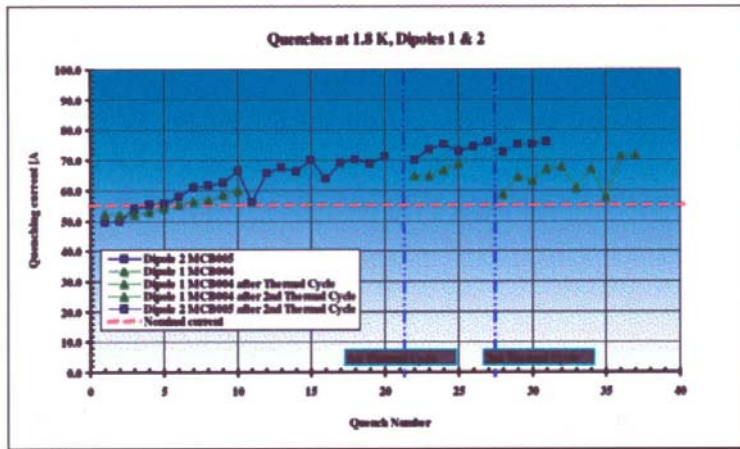
## Test equipment (3)

- 3 digital recorders for quench studies
- Various quench antennas and MM shafts
- 2 cold magnetic measurement systems
- 1 mobile rack for warm magnetic measurements
- 1 mobile rack for AC transfer Functions

2 tests in parallel are normally performed,  
constraints come as well from cryogenics and  
power supplies.



# What do we measure?

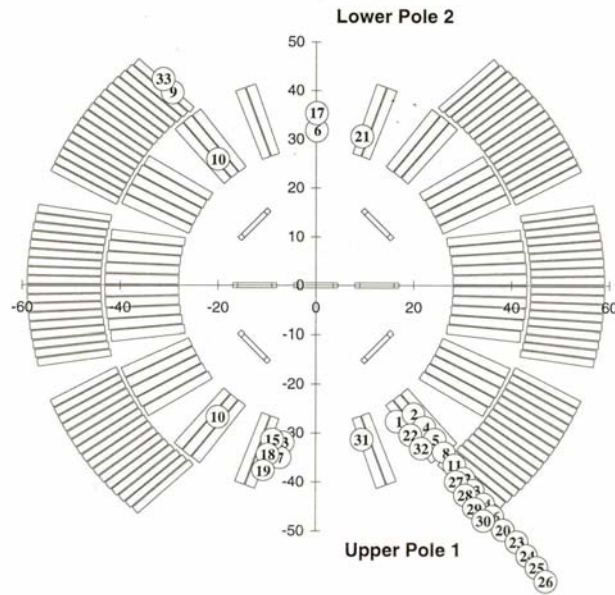


- Training curves at 4.4 K and 1.9 K
- Magnetic Field quality
- AC Transfer Function
- Splices resistance
- RRR
- Insulation, leak current

LHC-MTA/F.R.

### MBSMS17.V1

Training Quenches at 1.8K - First Thermal cycle



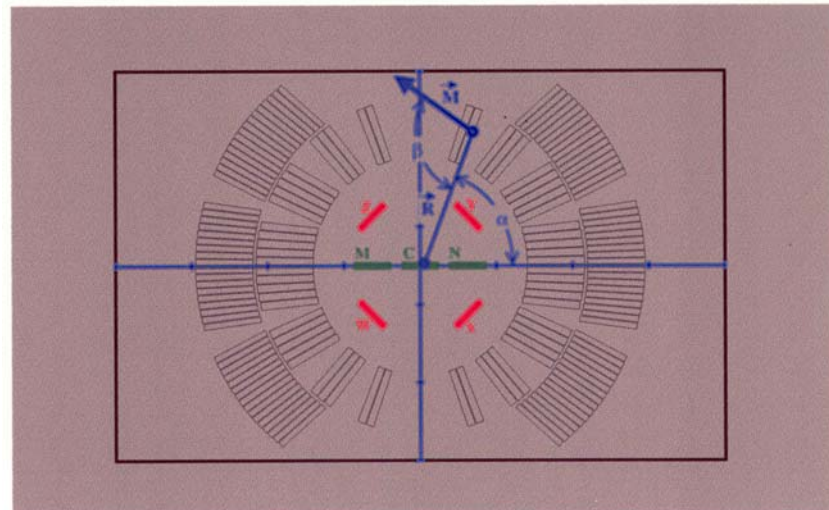




**LHC - MTA**

**Quench Antenna**

Quench Location in Magnet  
2D Cross-section by  
“Inverse Problem Method”



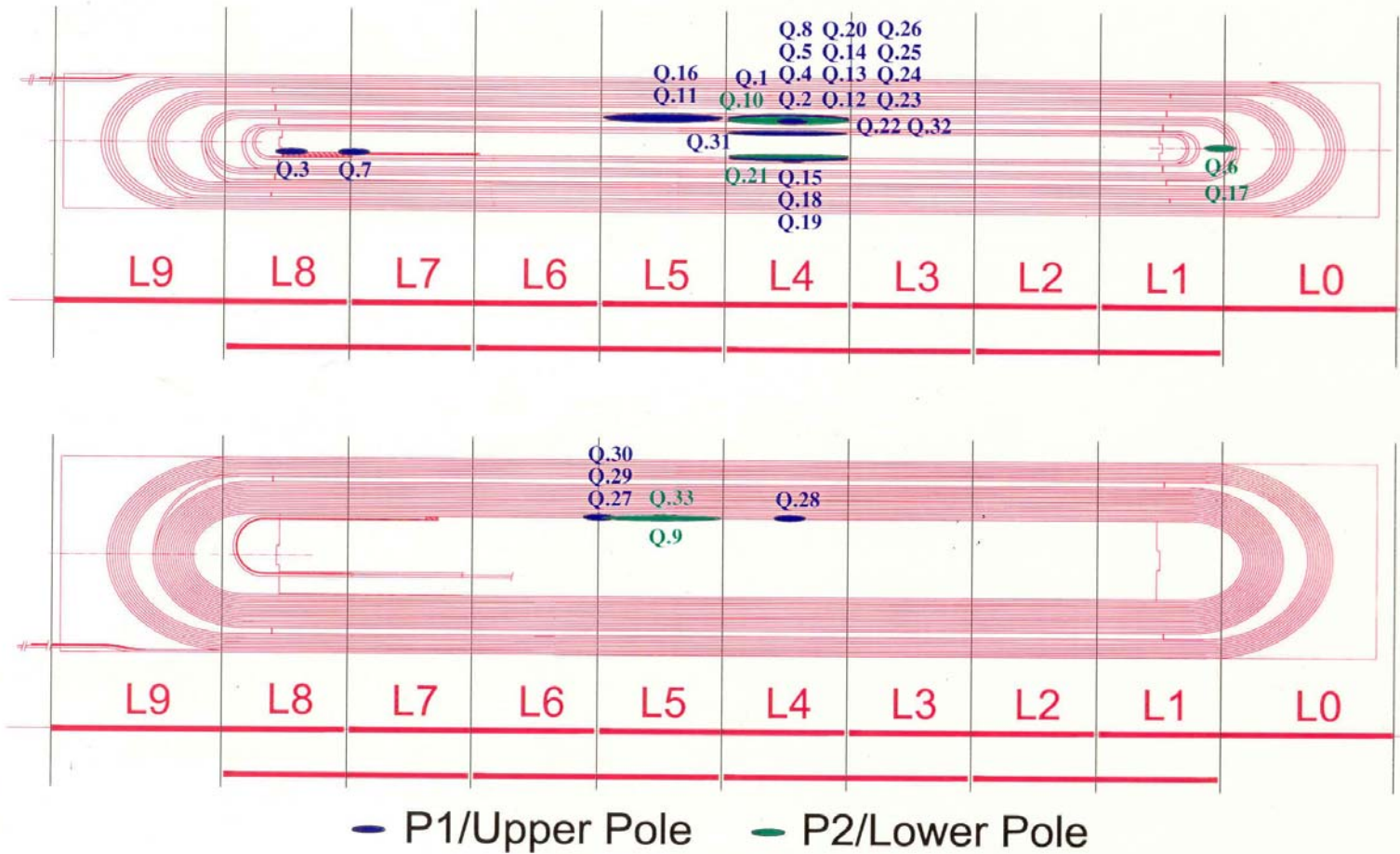
**Unknown:**

Magn. Moment Strength - **M**,  
Radial position - **R**,  
Azimuthal Position -  $\alpha$ ,  
Magn. Moment Direction -  $\beta$ .

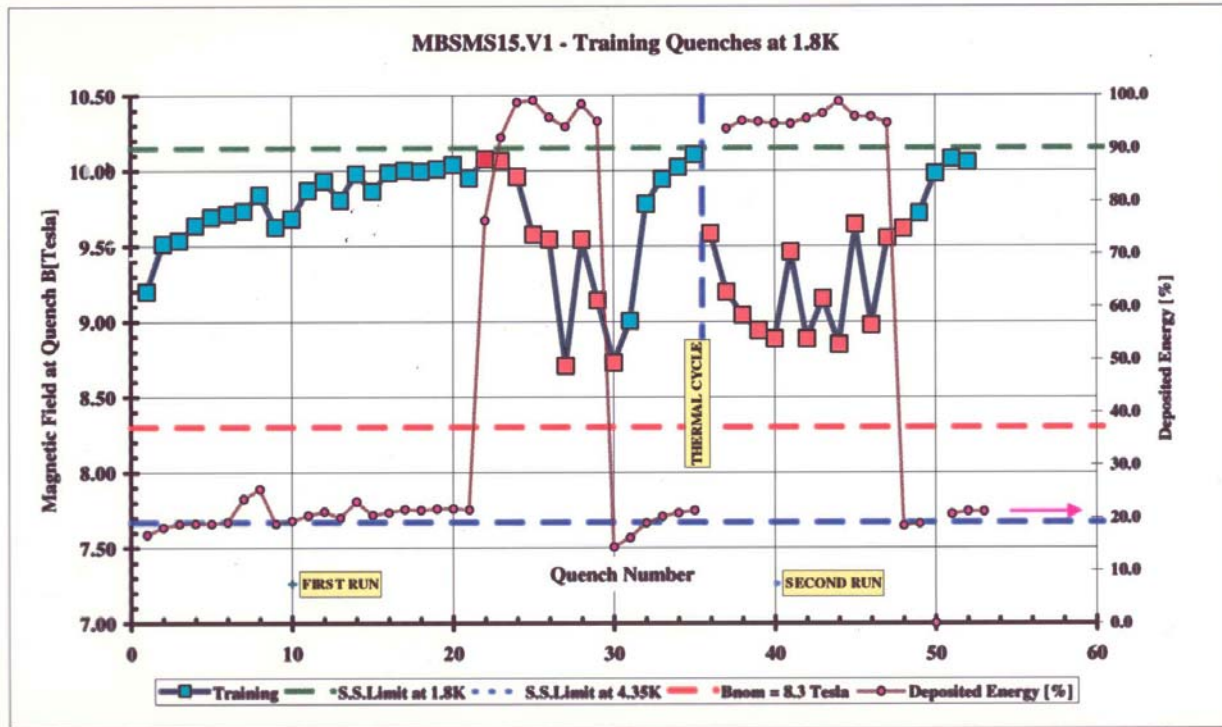
**Measured Signals:**

**Z - X,**  
**W - Y,**  
**M - C,**  
**M - N.**

MBSMS17.V1 - First Thermal cycle: Quenches at 1.8K



# Quench detraining effect - Example



# Magnet Quench - Temperature Profiles

