

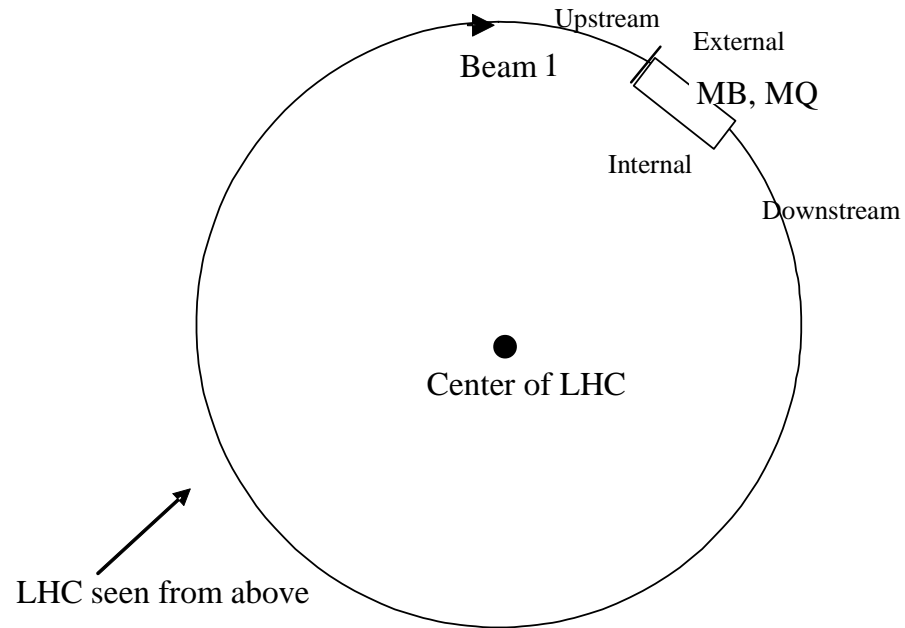
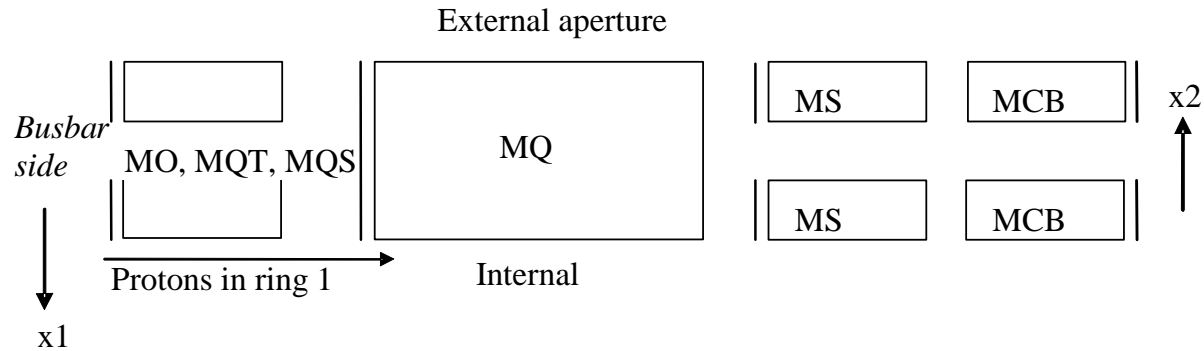


MSCB magnetic axis displacement in SSS problem

R. Wolf for the AT-MEL-MC team



Corrector location in SSS





Correctors of the SSS



◆ **MSCB**

Magnet Assembly	External Aperture		Internal Aperture	
MSCBA	B1	B3	A1	B3
MSCBB	A1	B3	B1	B3
MSCBC	B1	A3	A1	B3
MSCBD	A1	B3	B1	A3



◆ **MQT/MQS/MO**



MSCB magnet (assembly)





Responsibles & Tolerances

Corrector magnet section technical responsables.

Mikko Karppinen	<i>MSCB</i> , MCBC, MCBY, MQTL, MCBX, MQSX, MCSOX, MCDO (Tesla)
Giuseppe Mugnai	<i>MO, MQT, MQS</i> , MCS (India & Antec), MCDO (India)
Vittorio Remondino	Quality analysis => magnetic measurements at the corrector manufacturers
Jacky Mazet	Chief of the corrector lab. MQTL fabrication, reception, busbar mounting MO, MQT/S.
Rob Wolf	Superconducting Strands.

Mechanical Tolerances on the MSCB

- Adding up of tolerances could explain 0.2 - 0.3 mm shift only.
- Larger values only by very unlikely event: forgetting the module suspension keys.



Magnetic axis displacement

Magnetic axis displacement

1. determined from feeddown $b_{N-1} = (N-1) \frac{\delta_{fd}}{R_r}$
2. Two possibilities why a displacement δx_0 of the cold bore tube could be correlated to a displacement of the magnetic axis δ_{fd} of the magnet around it:

a. The tube is magnetic.

$$\frac{\delta_{fd}}{\delta x_0} \approx -\frac{1}{2} (\mu_r - 1)^2 \frac{w}{r_m} \quad N > 1. \quad \text{gives } 0.03 \text{ for } \mu_r = 2$$

b. Eddy currents in the tube (the measurement system works at 30 Hz).

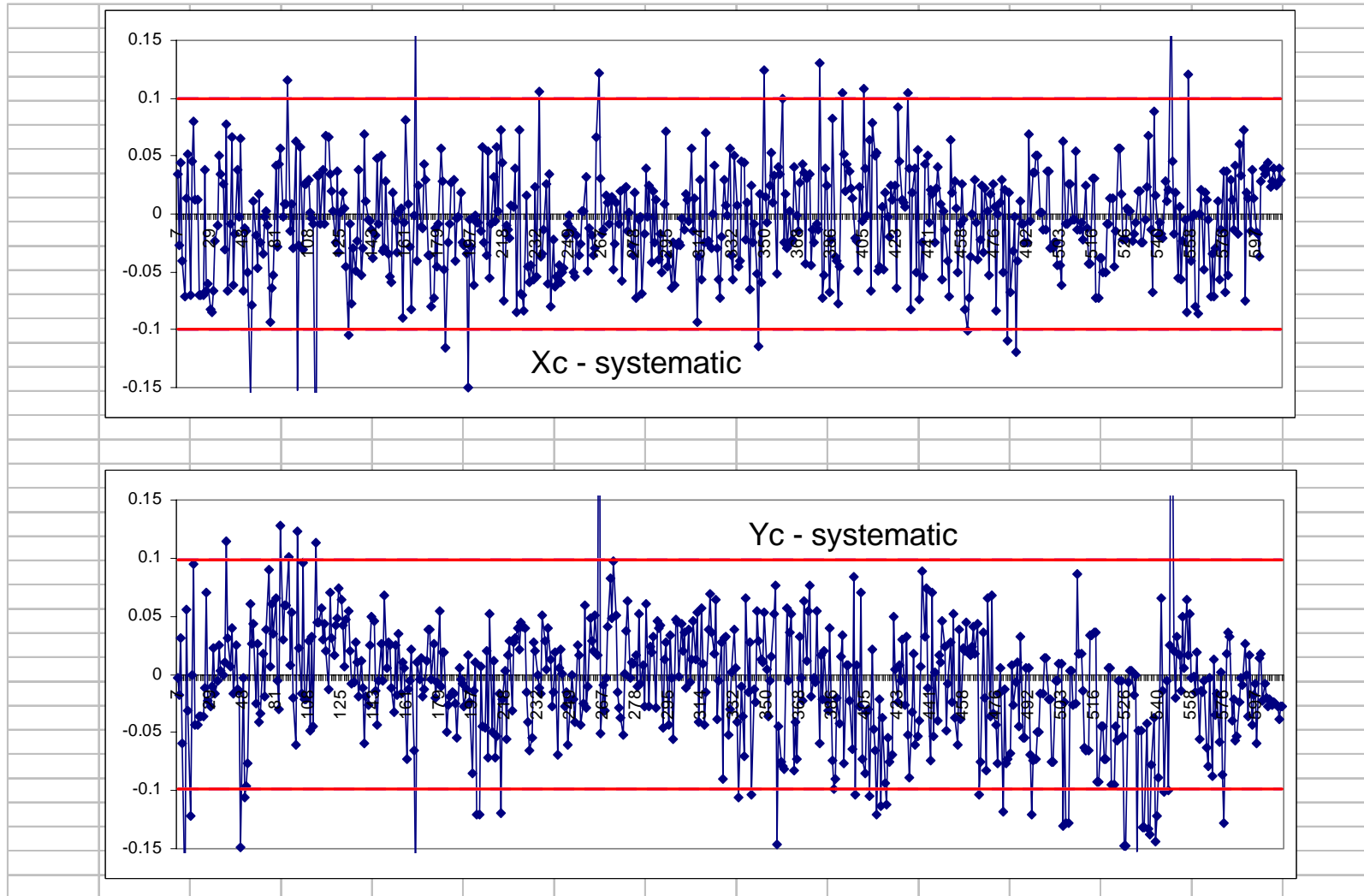
$$\frac{\delta_{fd}}{\delta x_0} \approx -\frac{\mu_0}{2(N-1)} \frac{\omega}{\rho} r_m w \quad N > 1 \quad \frac{\delta_{fd}}{\delta x_0} = 0.007 \text{ for stainless steel.}$$

Parameters:

Parameter	Description	Unit(SI)
N	multipole order of the main field	
R_r	reference radius = 0.017 m	m
r_m	mean radius of (thin) chamber	m
w	thickness of chamber.	m
μ_0	permeability of the vacuum, $4\pi * 10^{-7}$	Tm/A
μ_r	relative permeability	$\Omega^{-1} \text{ m}^{-1}$
ρ	electrical resistivity	Ωm
ω	frequency * 2π	s^{-1}

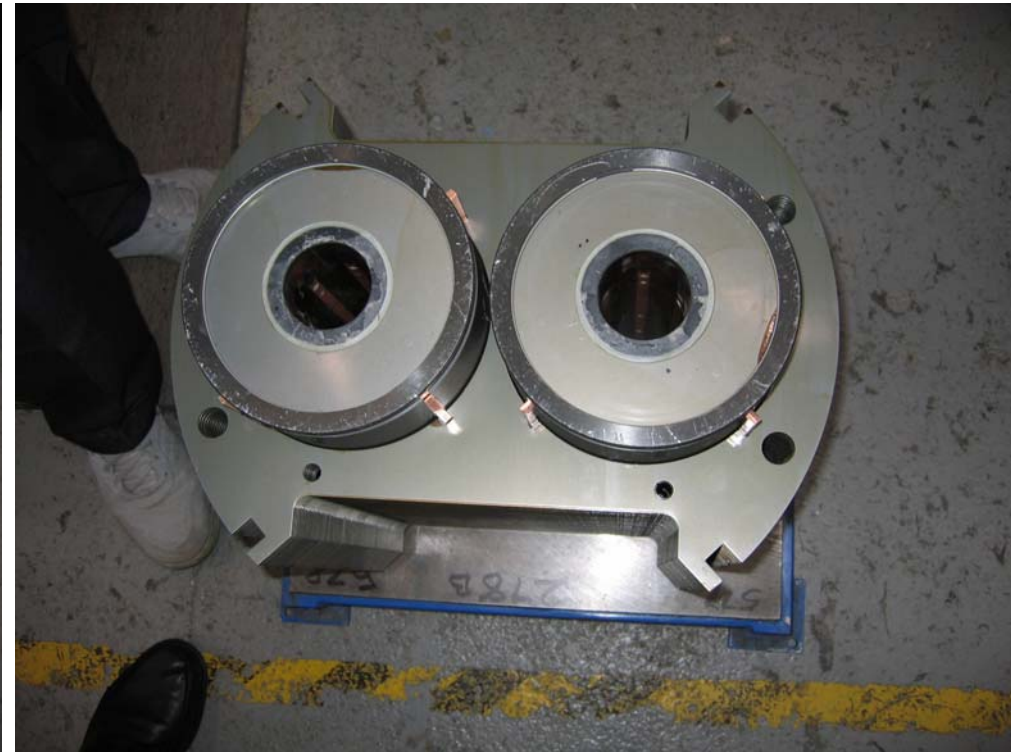
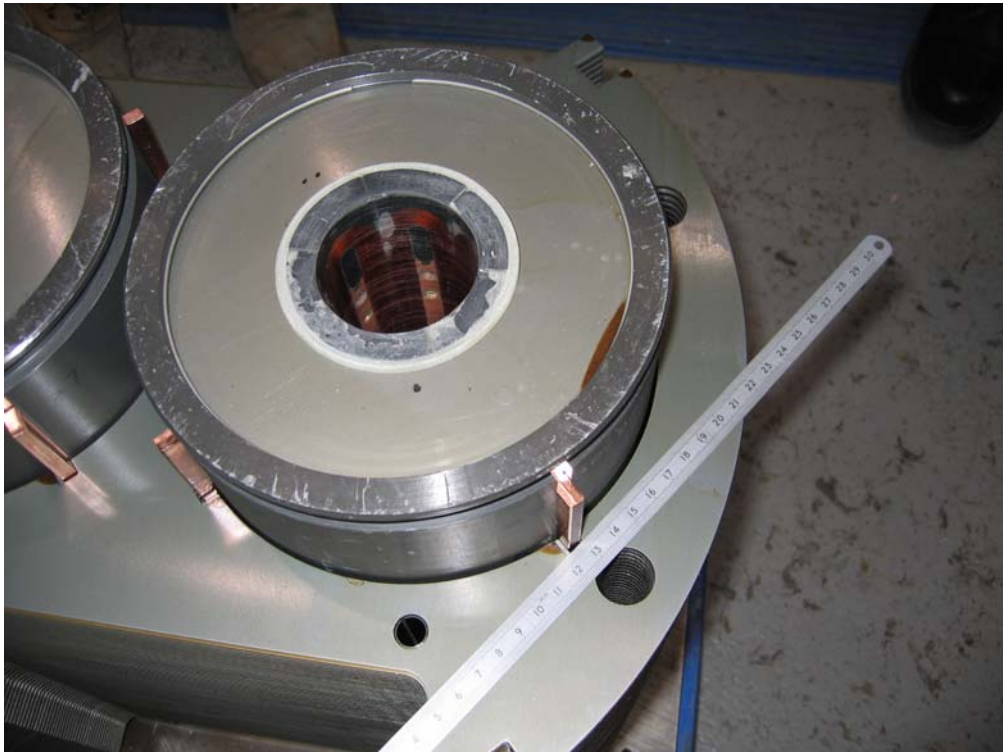


Coil magnetic center displacement in the module





Assembly Stacking (MS) of MSCB





Rotating the cold bore tube inside an MQM coldmass with MCBC corrector

