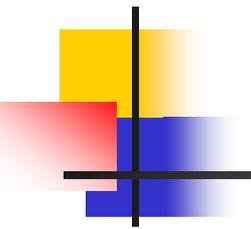


16 T dipole in common coil configuration

J. Munilla, A. Fernandez, F. Toral - CIEMAT

17/10/2018 - KIT



Status of Common Coil option

Two different conceptual options are at this time being considered:

- **Closed support**, based on a constrained “classical” solution for accelerator magnets regarding prestress levels.
- Open support, based on a more “innovative” solution for small stresses but higher displacements of the coil
- Detailed studies on field quality and friction effects would be needed for a final decision

For comparing common coil to the other options, as in CDR, **a baseline was selected**. These are the parameters for the baseline Common-coil compared to the other baseline options:

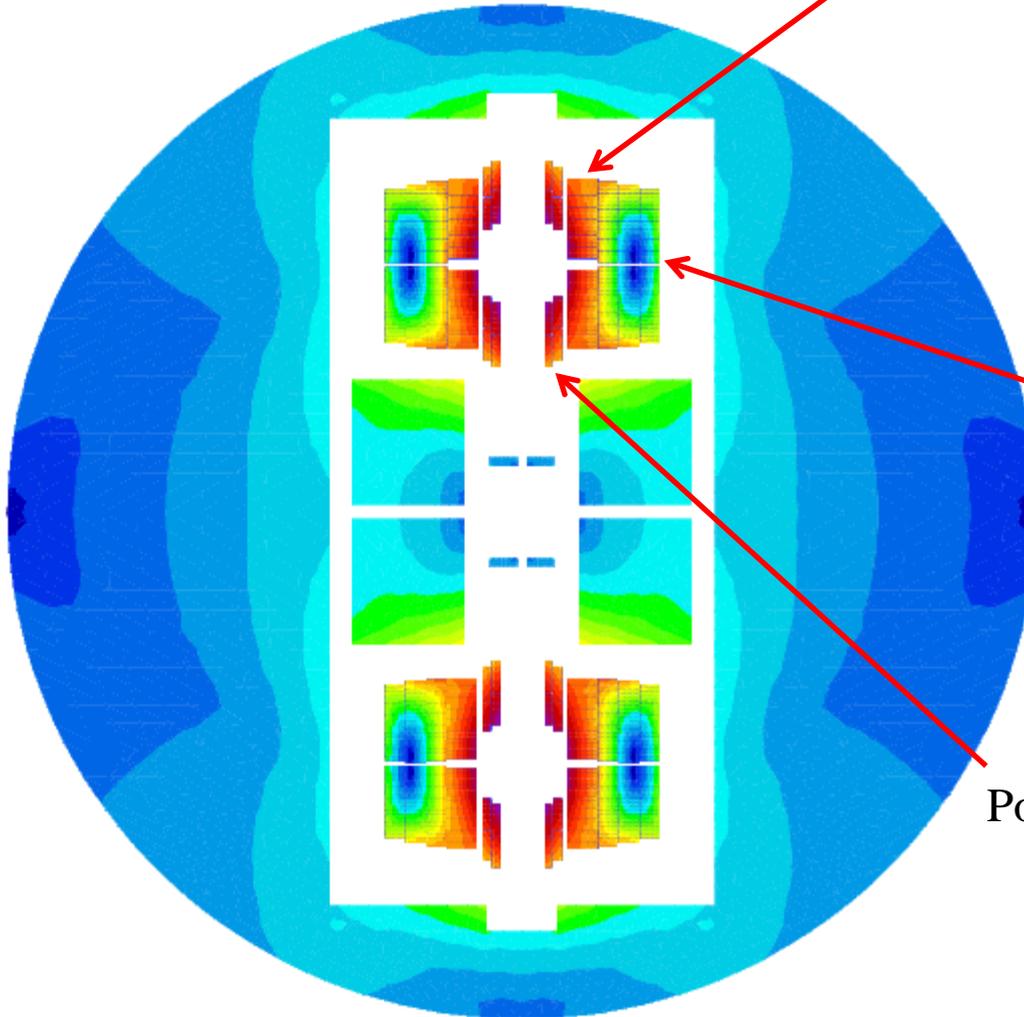
	<i>Block</i>	<i>Costheta</i>	<i>CCT</i>	<i>Common Coil</i>
<i>Nominal current</i>	10176 A	11441 A	18135 A	15880 A
<i>Total inductance per meter</i>	47.8 mH/m	38.1 mH/m	18.2 mH/m	25.7 mH/m
<i>Outer yoke diameter</i>	616 mm	660 mm	750 mm	650 mm
<i>B_{peak} HF cable</i>	16.73 T	16.3976 T	16.35 T	16.57 T
<i>Total surface of strands</i>	137.9 cm ²	133 cm ²	169.9 cm ²	166.8 cm ²

Common Coil: 3 cables, 2 wires

|B| (T)



ROXIE_{10.2}



Main Coil

40 cables

HF Wire - 1 Cu:Sc

28 strands

40 cables

LF Wire - 2,6 Cu:Sc

18 strands

Secondary Coil

76 cables

LF Wire - 2,6 Cu:Sc

x18 strands

Pole Coils:

16 cables

HF wire - 1 Cu:Sc

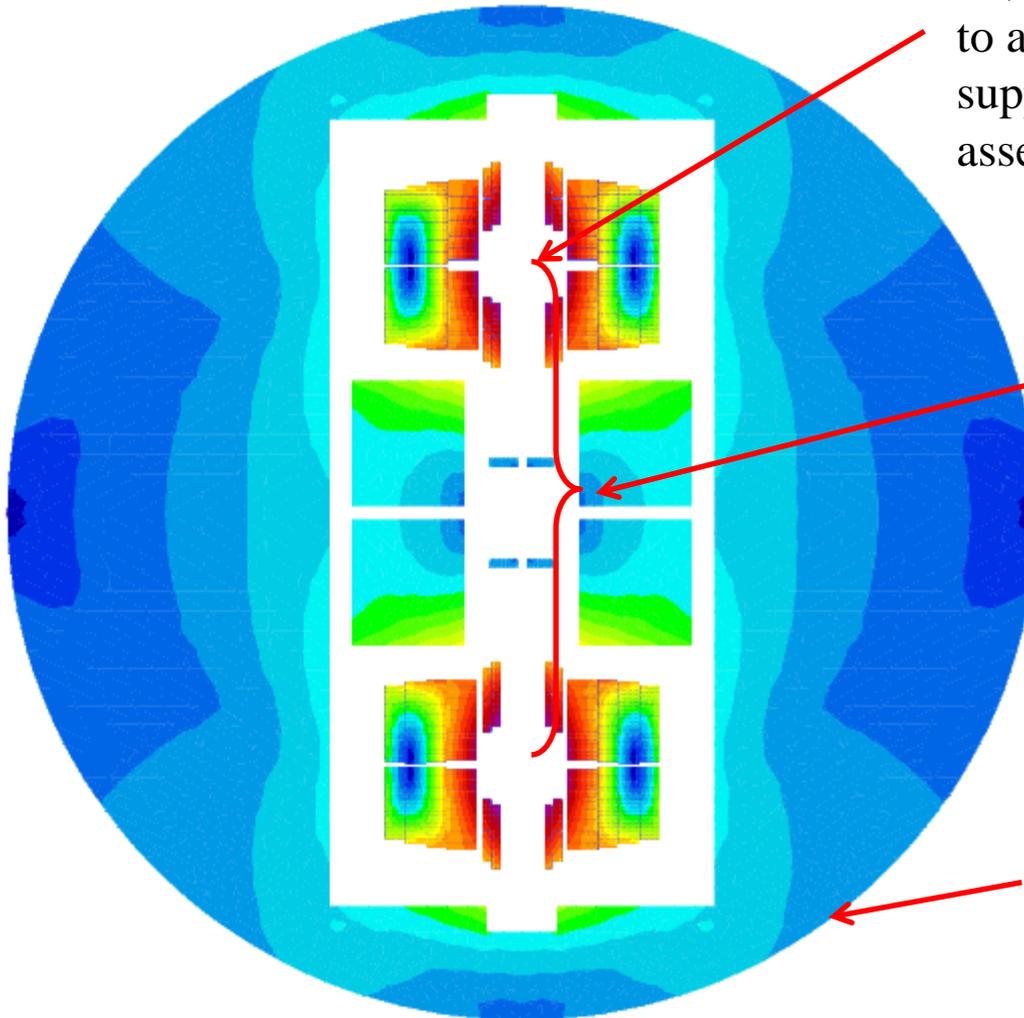
x30 strands

Common Coil: 3 cables, 2 wires

|B| (T)



ROXIE_{10.2}



27,5 mm radial aperture to accommodate inner support for assembly/cold preloads

320 mm Intra-beam distance

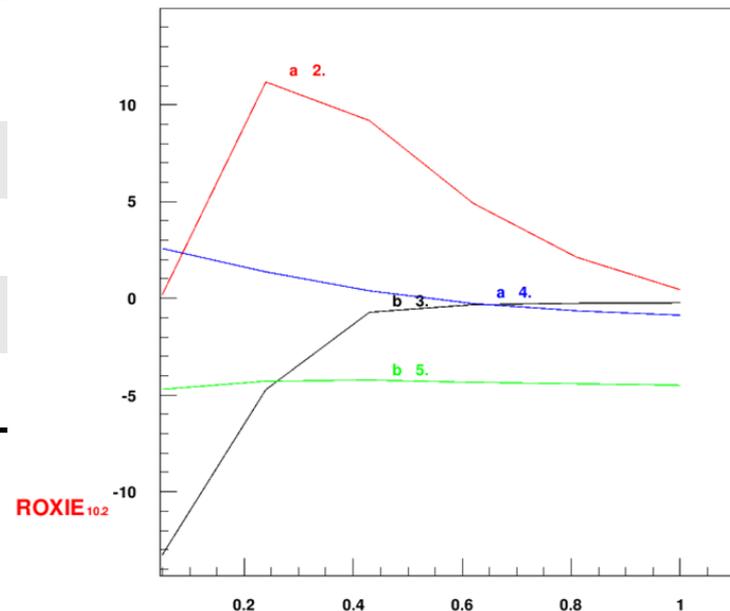
650 mm iron yoke diameter

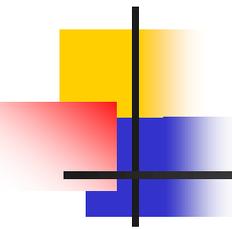
Common Coil: 3 cables, 2 wires

V1h2_helhc_p1	
Nominal Current (A)	15880
Intra-beam dist. (mm)	320
Aperture (mm)	27,5
Iron yoke diam. (mm)	650
HF wire	40c(x28s)+16c(x30s) – 1 Cu:Sc
LF wire	(40c+76c)(18s) – 2,6 Cu:Sc
Total weight (ton)	9502
Stored energy (MJ/m)	3,24
Sum_ fx (MN/m)	14,47
Sum_ fy (MN/m)	0,3

V1h2_helhc_p1	
b3	-0,2
b5	-4,5
b7	1,6
b9	-2,3
a2	0,4
a4	-0,9
a6	-0,9
a8	-0,3

GRAPH NO: 1. 2. 3. 4.





Common Coil update

A collaboration with Marco Prioli and Michal Maciejewski made possible to:

- Crosscheck Ansys (Maxwell) and Comsol results for transferring magnetic forces to structural simulations (less than 0,2% deviation as peak value)
- This will be useful for stress analysis during quench and benchmarking.

Due to a coincidence of several projects and reduction of manpower, along this last year just a very small amount of work could be done on EuroCirCol Common Coil at Ciemat.

Lately, Teresa and Alejandro have (re)joined the group and activities on this project will be able to continue

Preliminary mechanical study for this new magnetic design has just started. First results are quite good, as expected from the greater clearance for a better inner support.