Proposal for new coil design the CBM magnet

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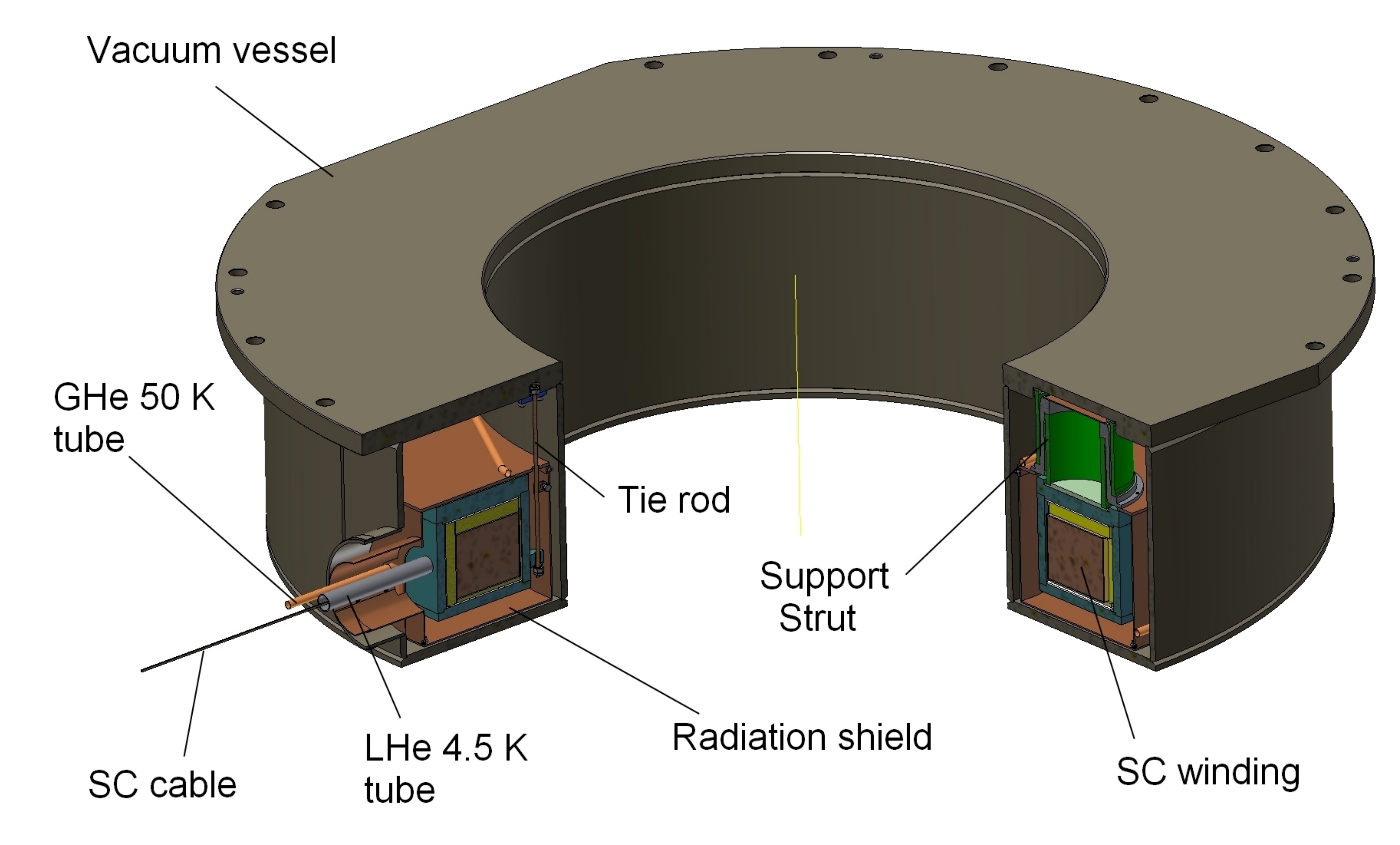
Coil design – current design



Coil design – current design

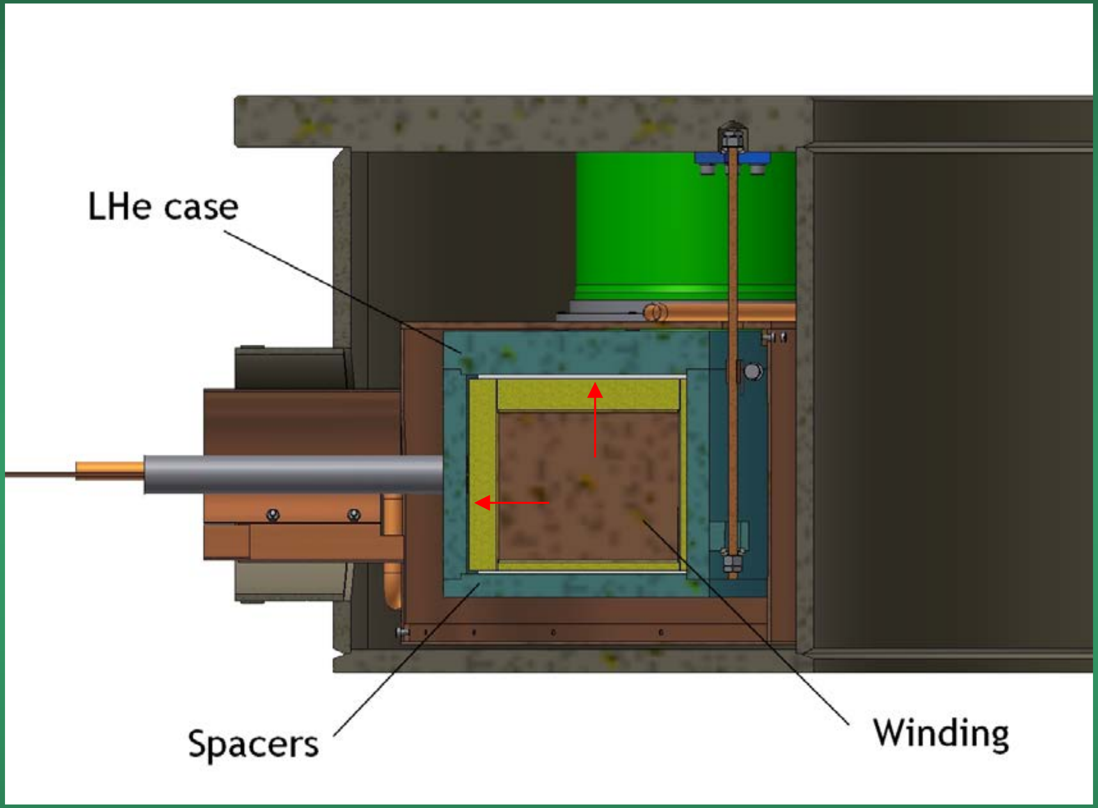
In the current design we have the following:

-the coil is immersed in helium bath, but the cooling is not optimal due to large thickness of insulation (G-10)

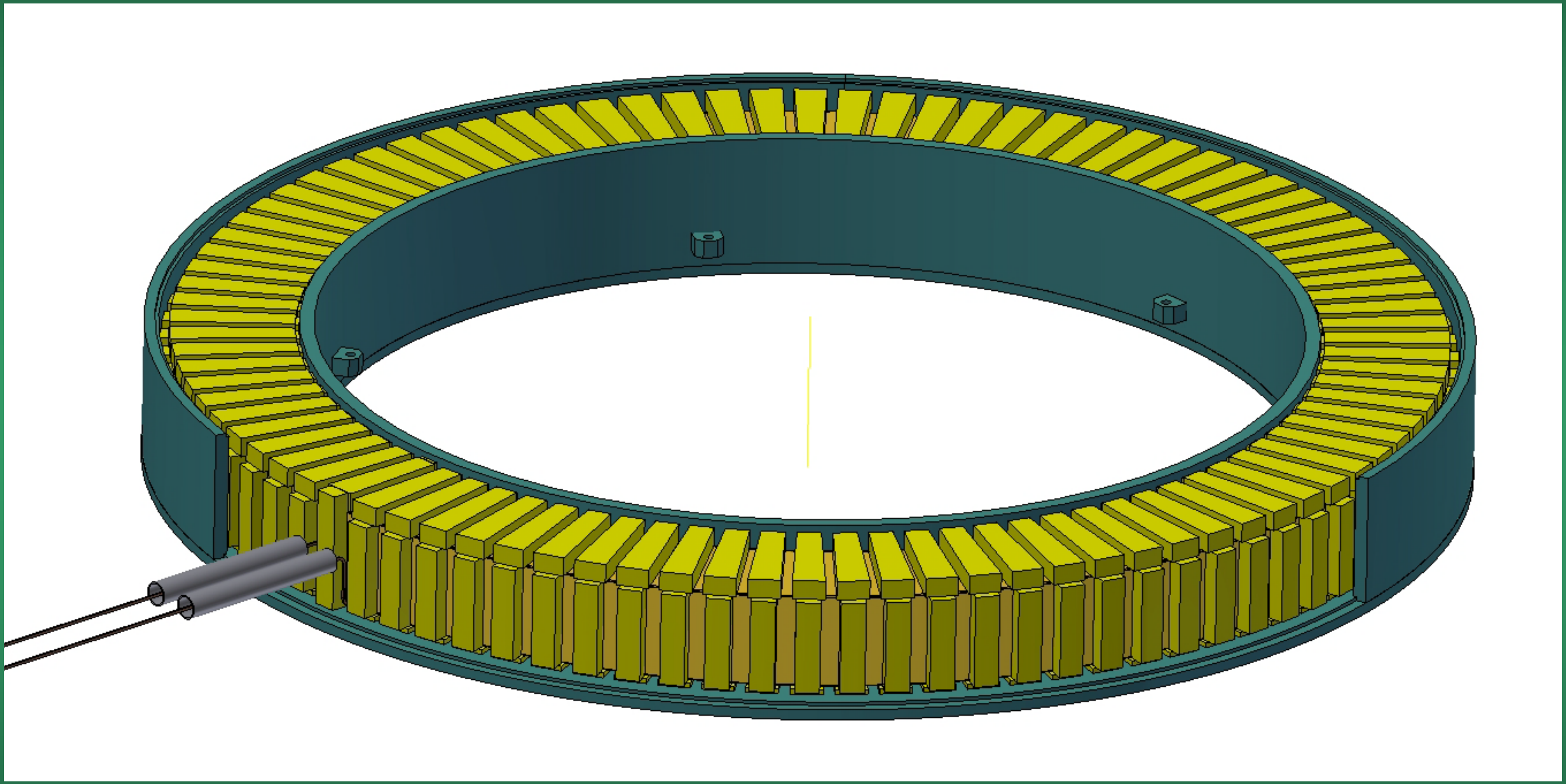
- the LHe case is not heated during a quench for the same reason

- G-10 spacers of 27 mm thickness are needed only for welding purpose

- they are not working for banding purpose due to low Young modulus value



Cold mass



New design of the coil - proposal

In the new design we have:

-much better cooling in stages of the magnet operation including quench behavior, quench recovery and cooling down of the magnet

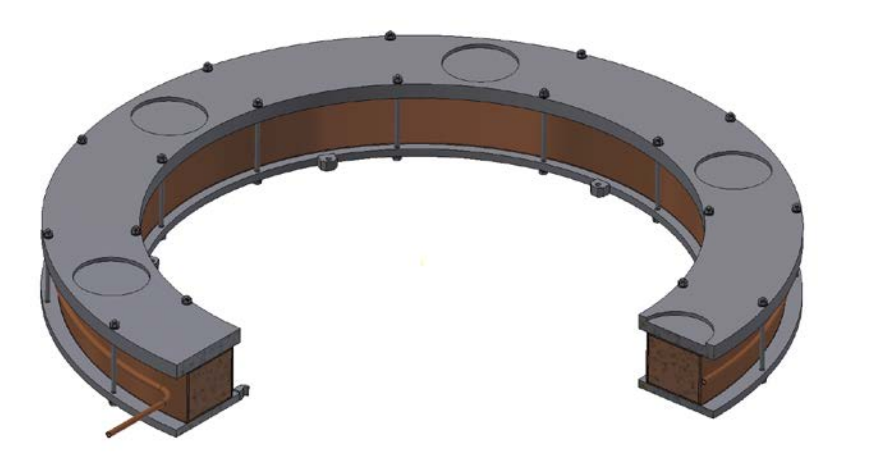
-assembling is simplified

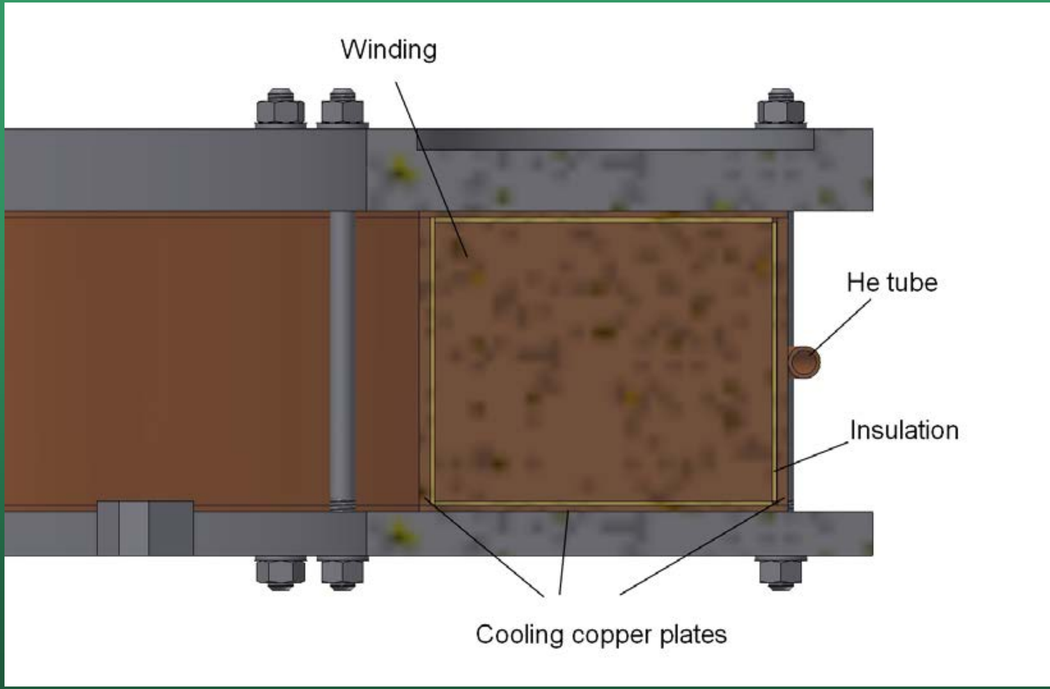
- external stainless steel (or titanium) wall may be inserted between the coil and the bolts

- high pressure rising after a quench is not a problem here

This is preliminary design!

External bolt will be much more.





Cooling tube

At inner diameter of 15 mm we have ~ 0.24 m^2 of cooling area. At 7 W of heat power it will be

q = 30 W/m^2 - very low heat flux, see Fig on left

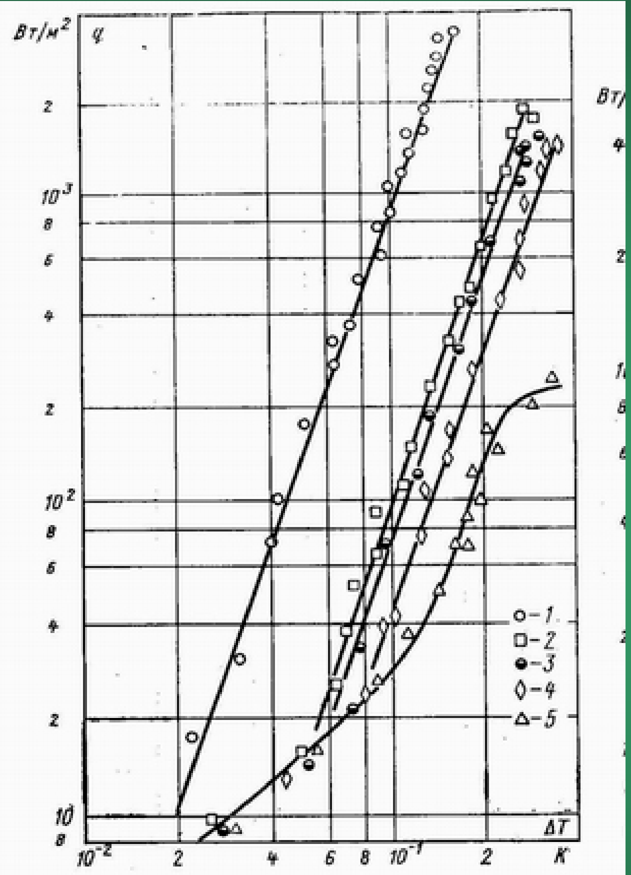


Рис. 1-26. Влияние теплофизических свойств материала поверхности нагрева на интенсивность теплоотдачи при пузырьковом кипении гелия в большом объеме (торец стержня $d=8$ мм, $R_z=5\div10$ мкм, горизонтальная ориентация, $p=1\cdot10^5$ Па, теплофизические свойства металлов см. в табл. 1-4).

Данные авторов: 1 — медь; 2 — бронза; 3 — никель; 4 — латунь; 5 — нержавеющая сталь.