



HTS insert magnet design regarding Stack Cable configuration

Johnny Himbele, Arnaud Badel, Pascal Tixador



UNIVERSITÉ DE
GRENOBLE

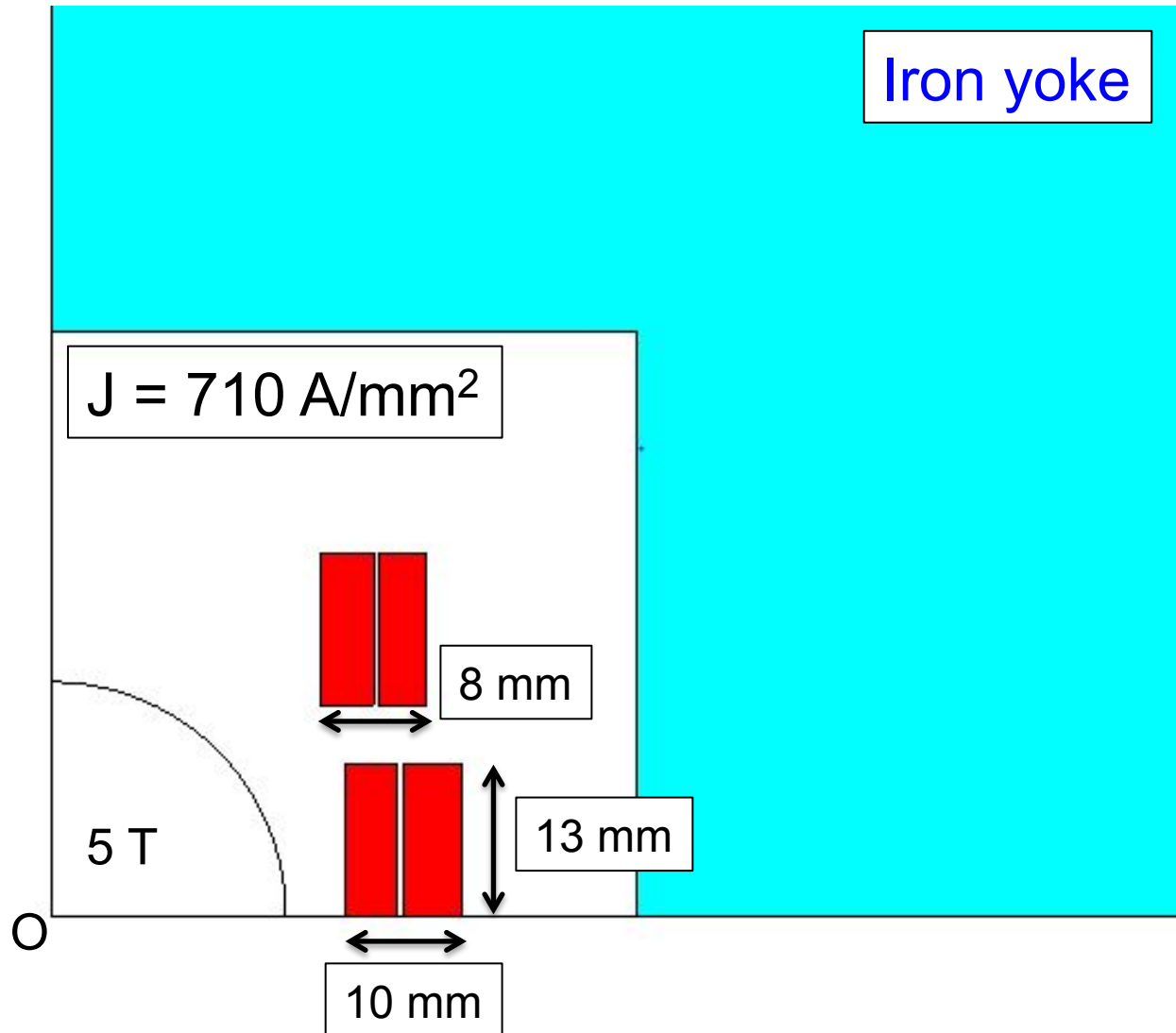
Outline

- Specification
- HTS insert magnet design (1st and 2nd results)
- Next steps

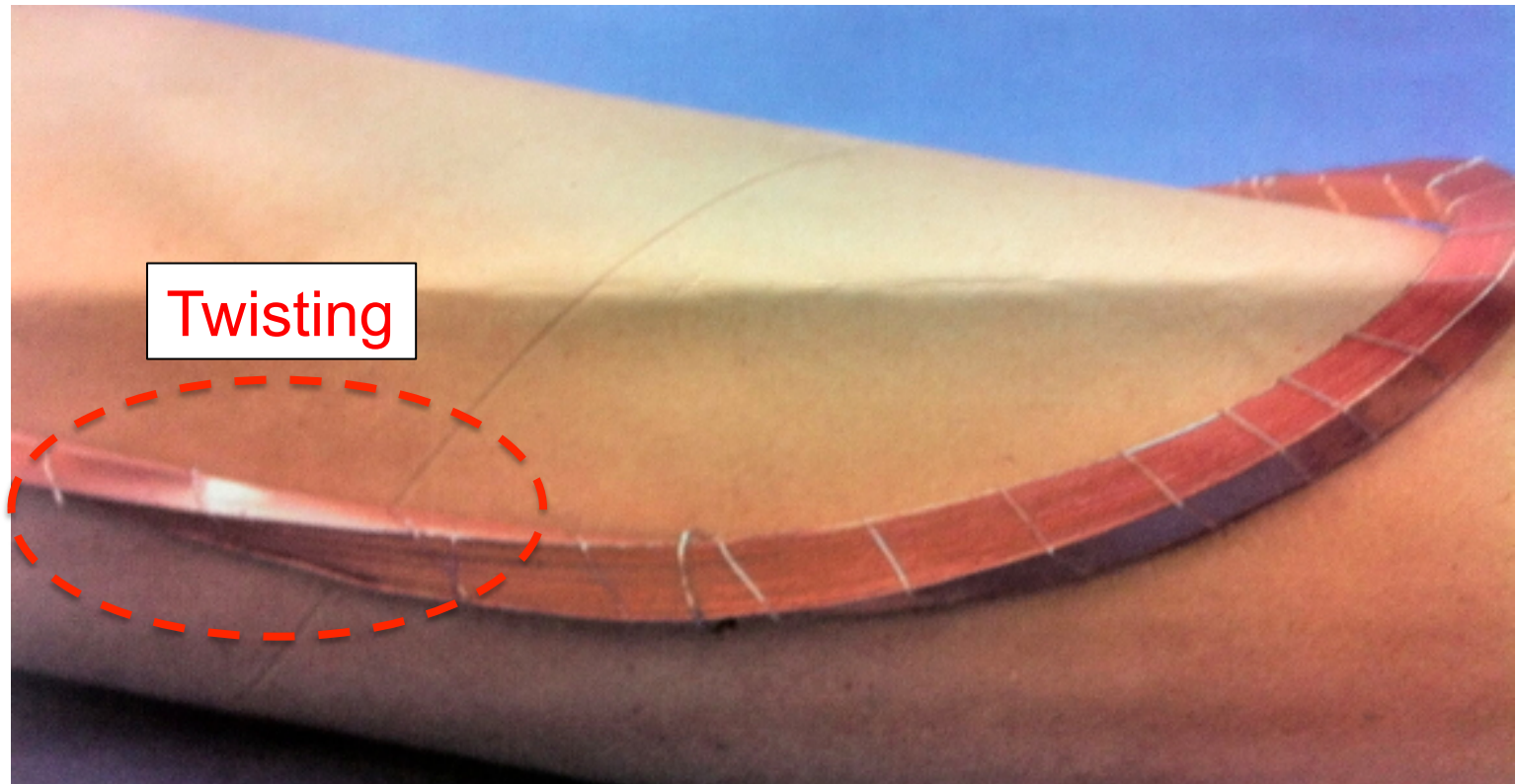
Specification

- Clear bore aperture 40 mm
- Flux density B_1 5 T
- Field quality $5 \cdot 10^{-4} B_1$
- Current density 400 – 600 A/mm² (20 T, 4,2K)
- Mechanical stress 100 MPa
- Operating current 5 – 10 kA
- Cable transposition Twisted stacked & Roebel cable
- Homogeneous current distribution

Preliminary HTS insert magnet design



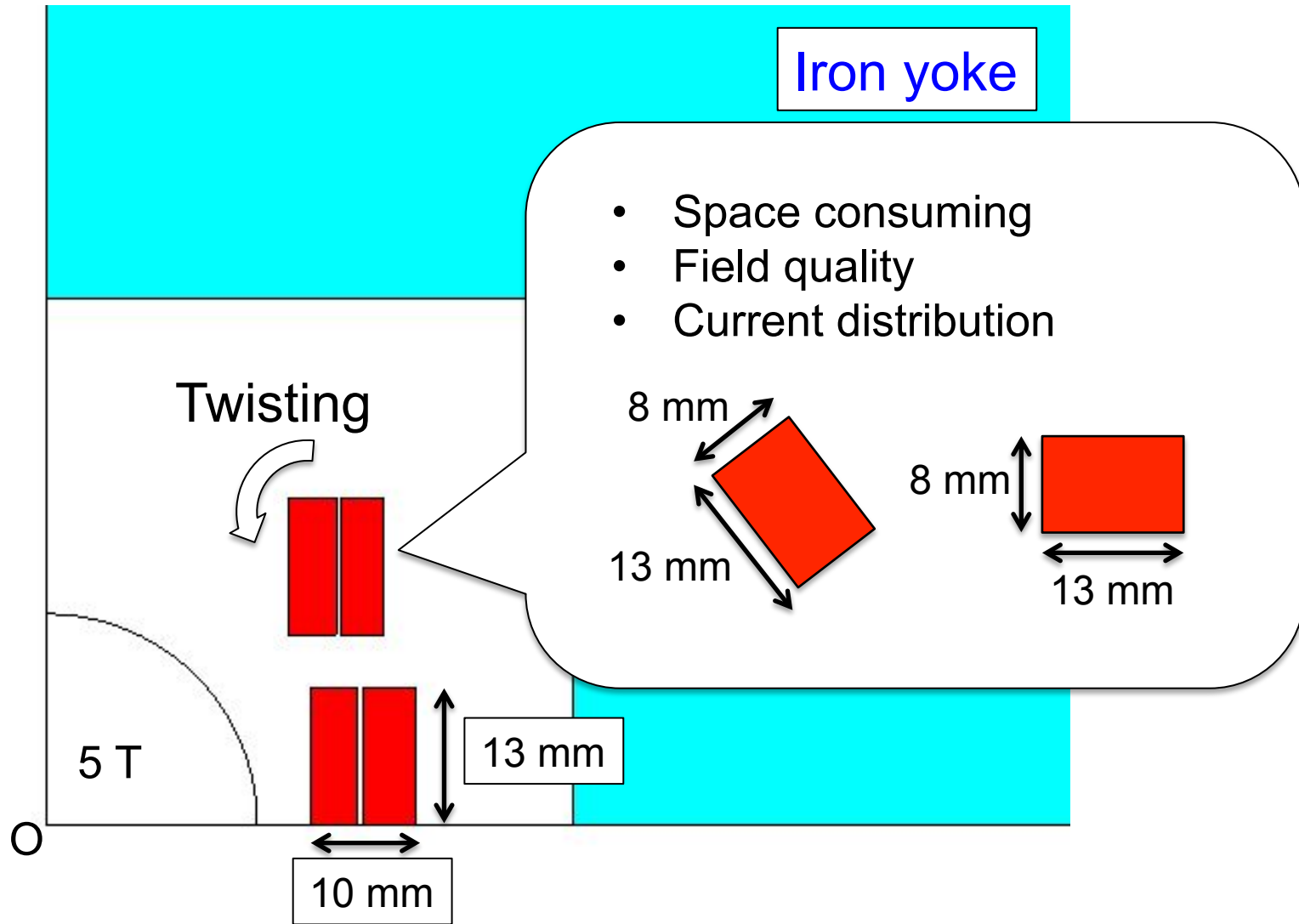
Stack cable



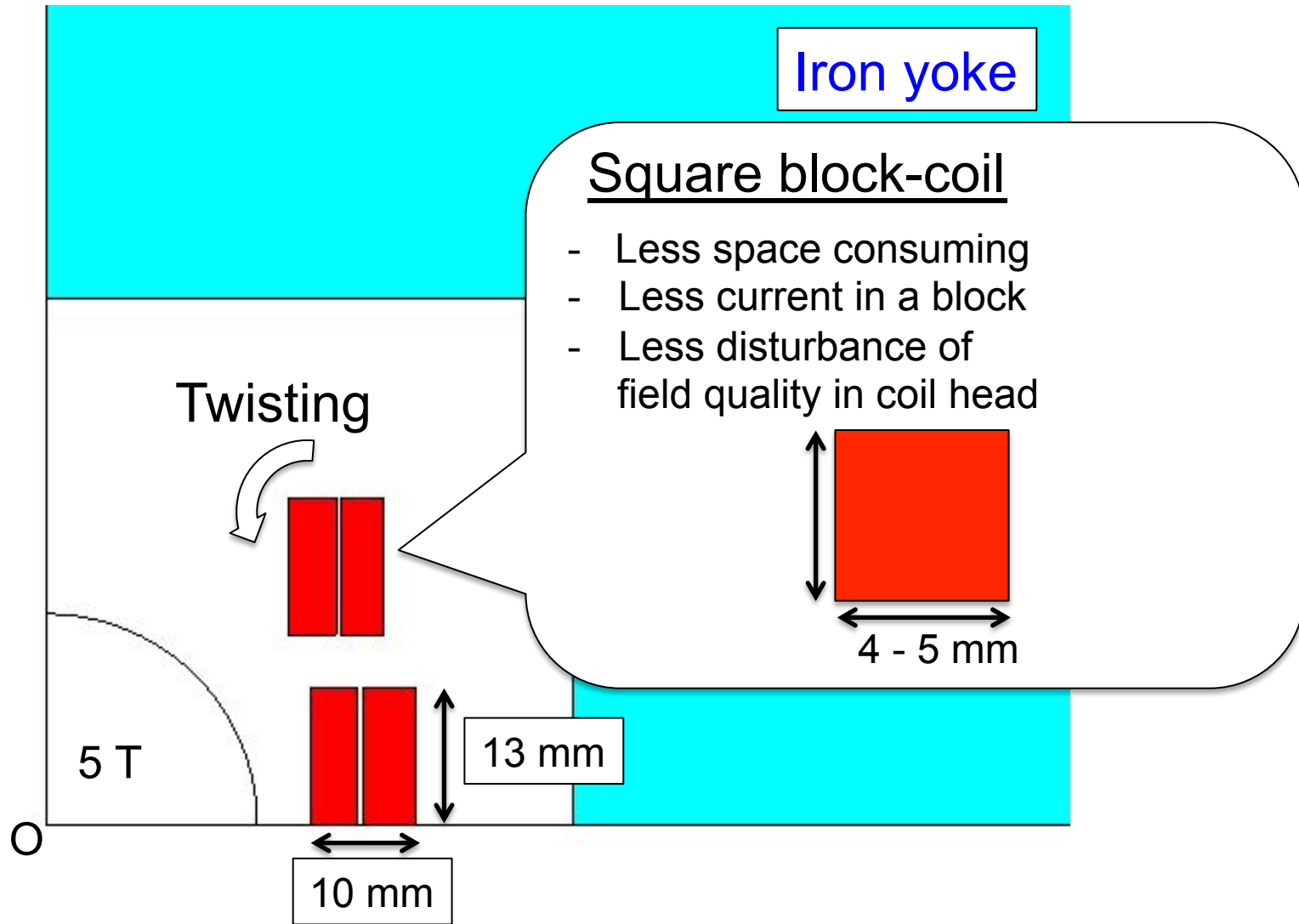
50-tapes of YBCO stack cable for 50mm dipole

M.Takayasu (MIT), IEEE vol.23 No.3 2013

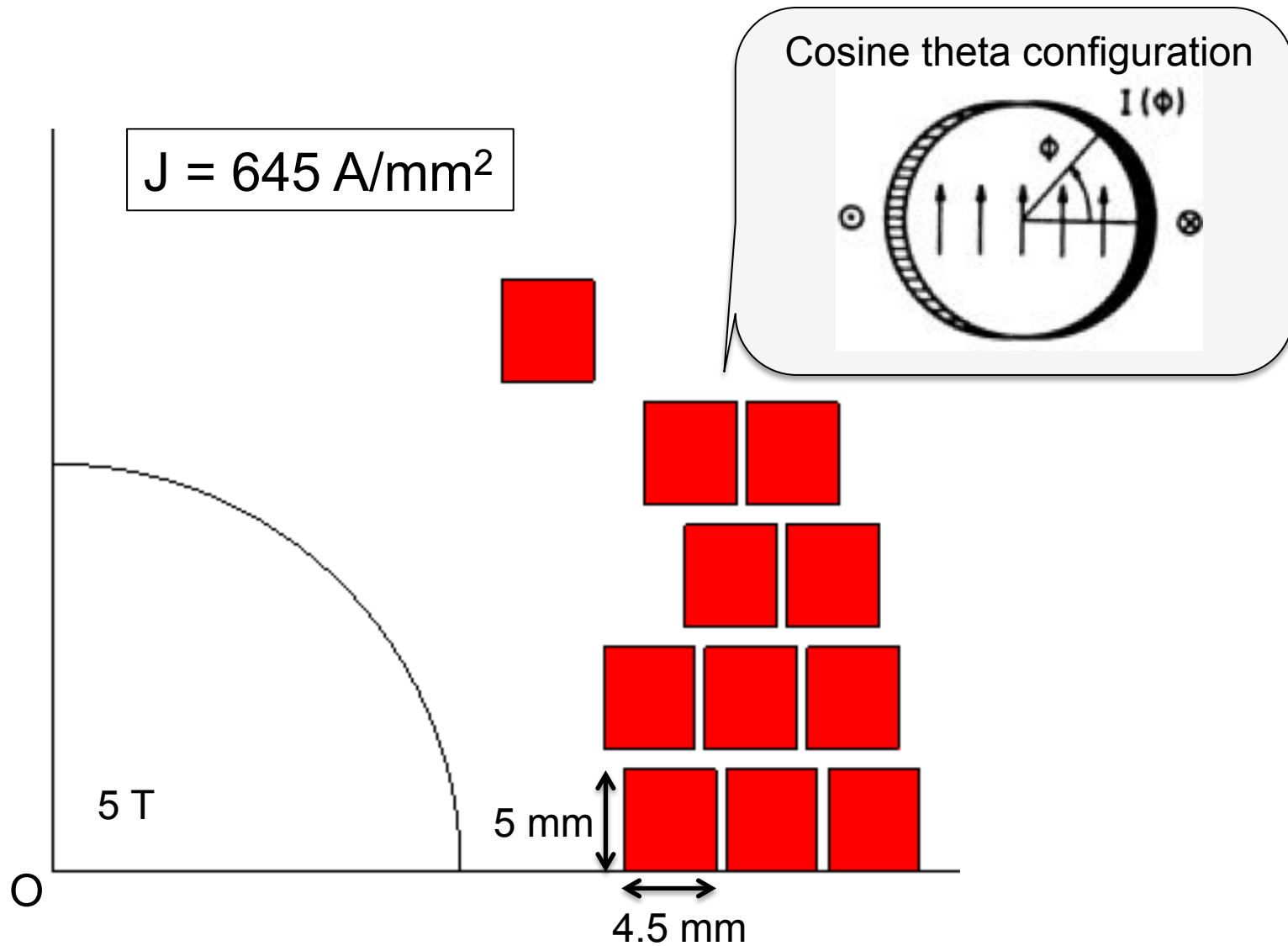
Preliminary HTS insert magnet design



Preliminary HTS insert magnet design



Preliminary HTS insert magnet design



Next steps

FOR BETTER HTS INSERT MAGNET DESIGN

- Magnet design: Block-coil is chose to be an approximate square block-coil whose cable width and thickness are 4 - 5 mm to get small J_e while keeping good field quality at straight line and twisting part. Add iron yoke with square block-coil and find optimized magnet design.
- Detection and protection: Find the reasonable operating current regarding protection scheme and additional materials.