Wiggler cryogenic systems review and proposals

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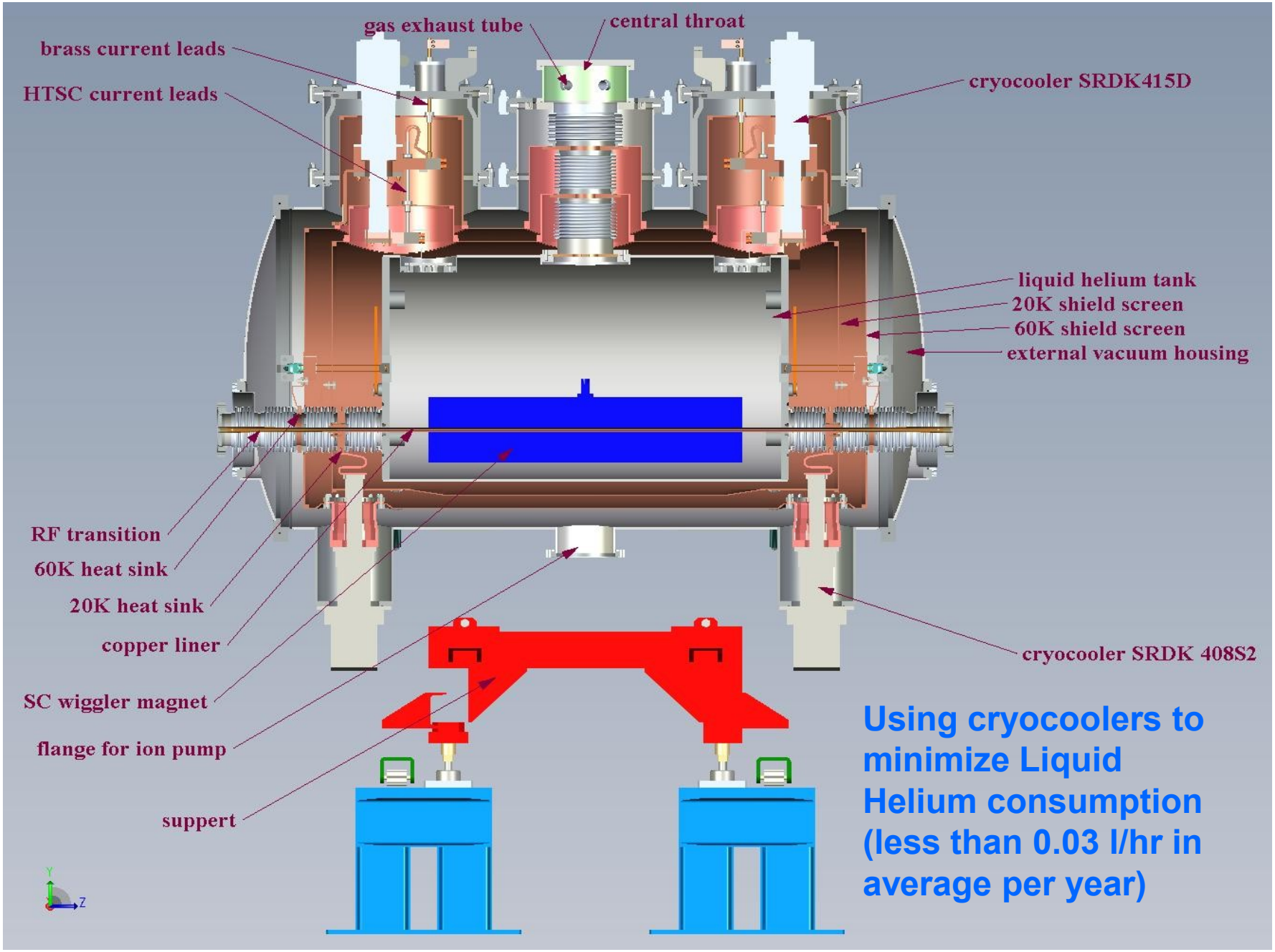
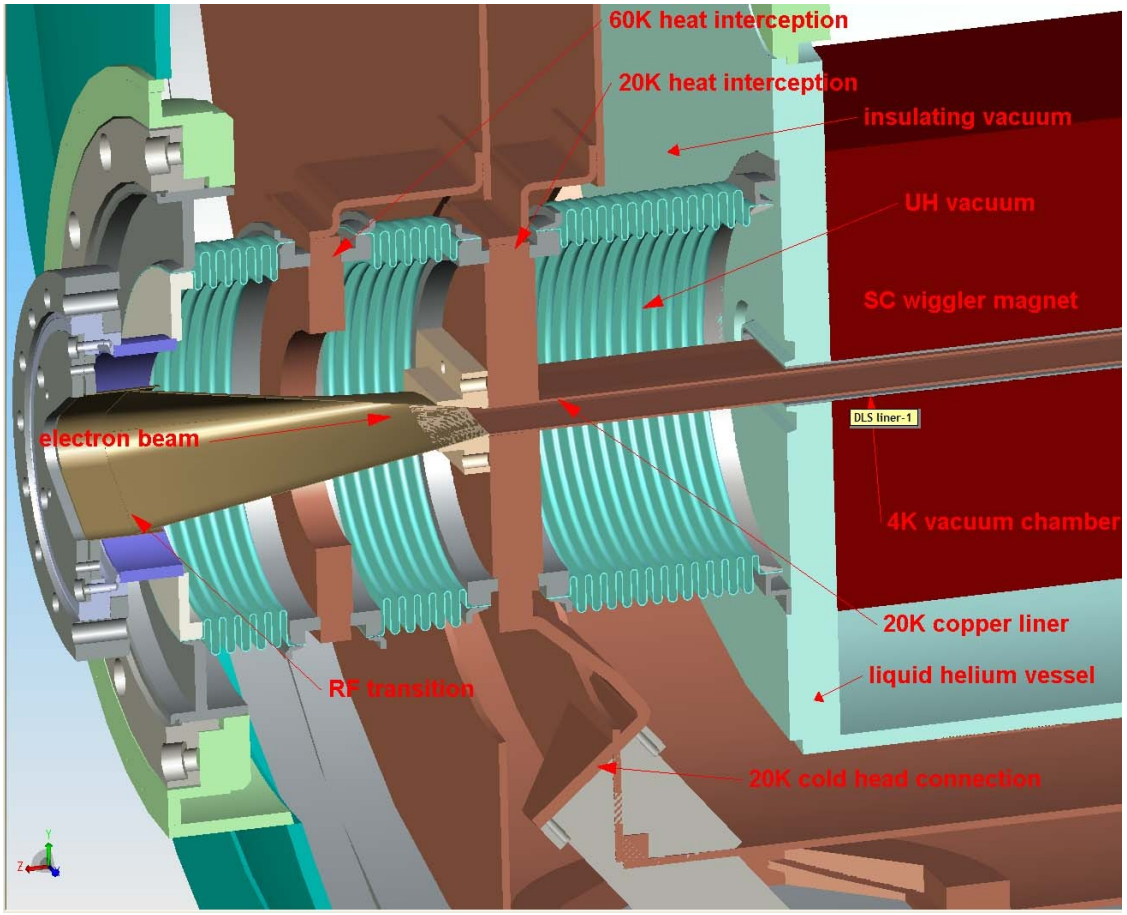

gas exhaust tube
central throat
brass current leads
HTSC current leads
cryocooler SRDK415D
liquid helium tank
20K shield screen
60K shield screen
external vacuum housing
RF transition
60K heat sink
20K heat sink
copper liner
SC wiggler magnet
flange for ion pump
suppert
cryocooler SRDK 408S2
Using cryocoolers to minimize Liquid Helium consumption (less than 0.03 l/hr in average per year)

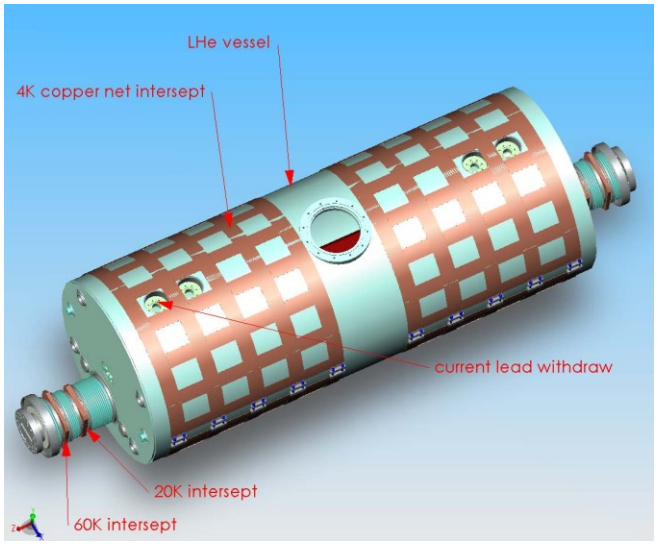
Vacuum chamber and copper liner

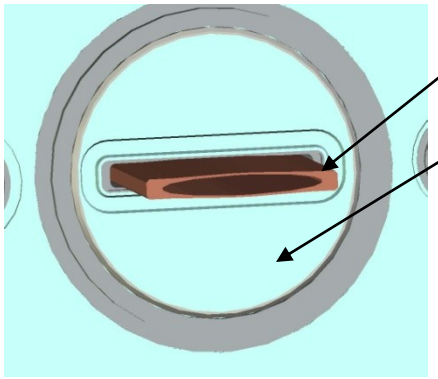
Insulating vacuum is separated from UH vacuum of a storage ring and keep at vacuum level 10^{-6} – 10^{-7}Torr by 300l/s ion pump

Beam vacuum chamber system



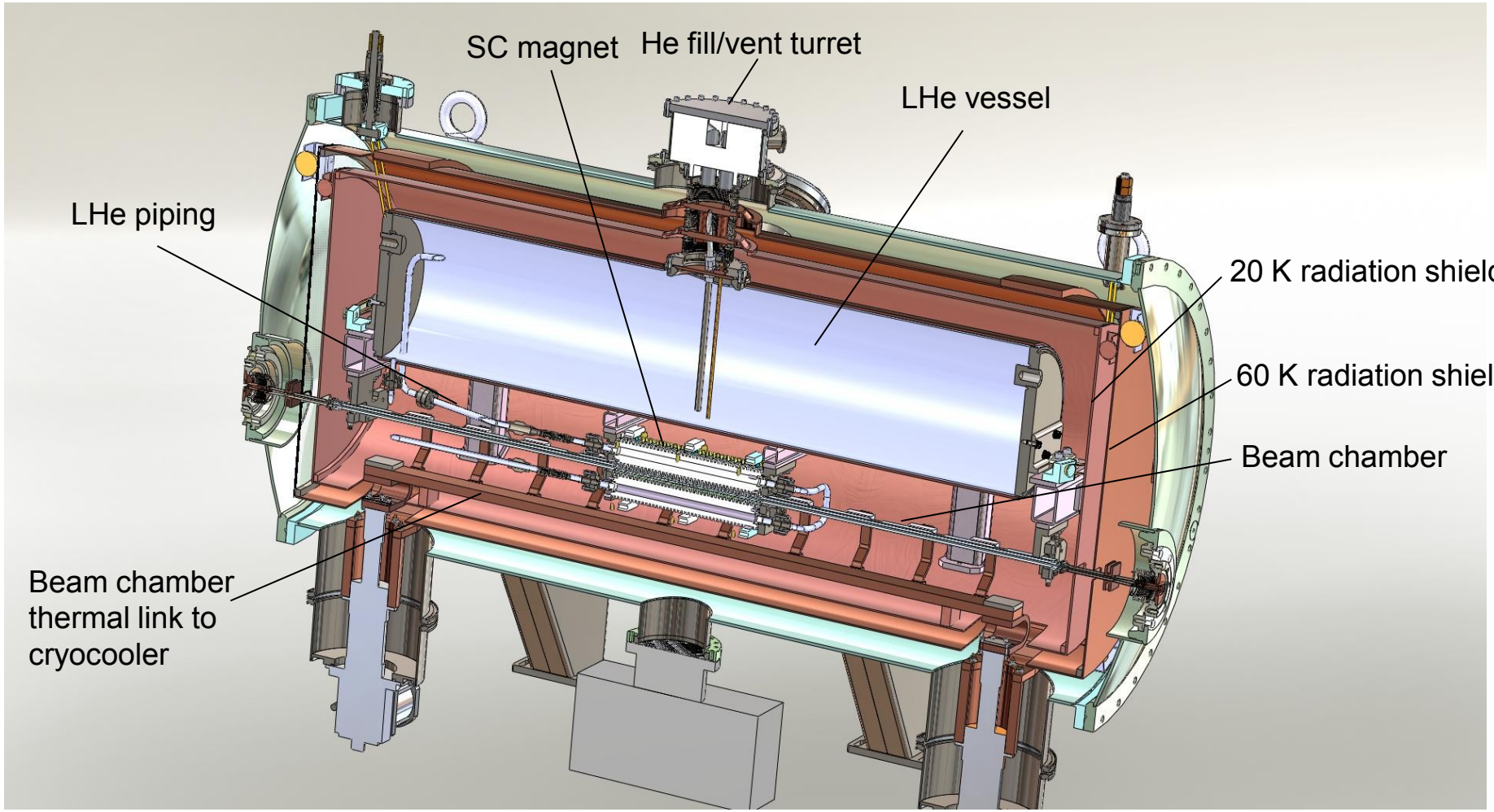
Liquid helium vessel with vacuum chamber fittings





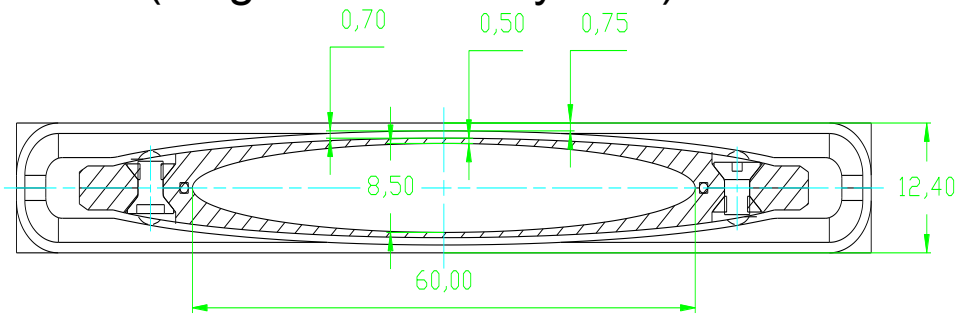
Using copper liner to protect liquid helium vessel from beam heating up to 20 Watt

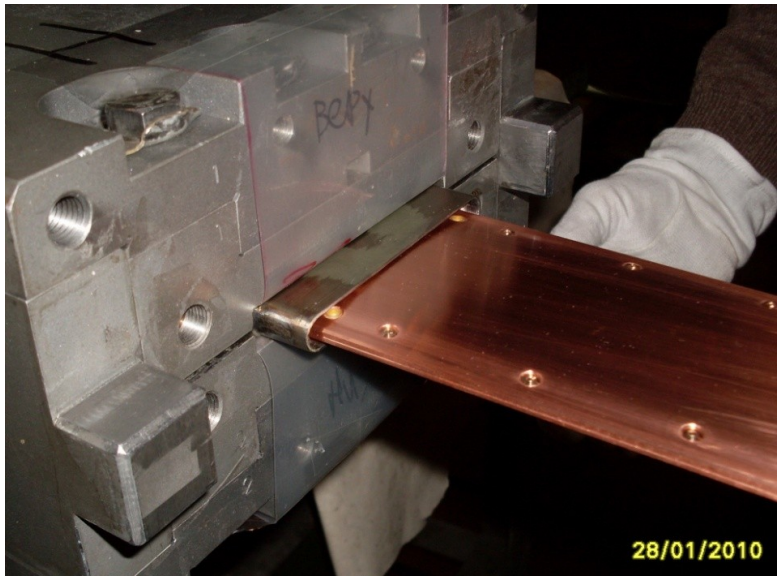
Cryogenic System of indirect cooling of magnet



Pole gap g and electron beam vertical aperture

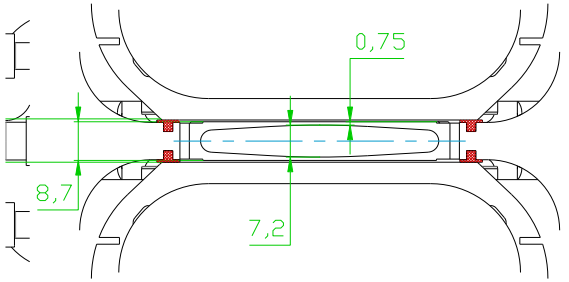
Direct cooling magnet with liquid helium (magnet in bath cryostat)

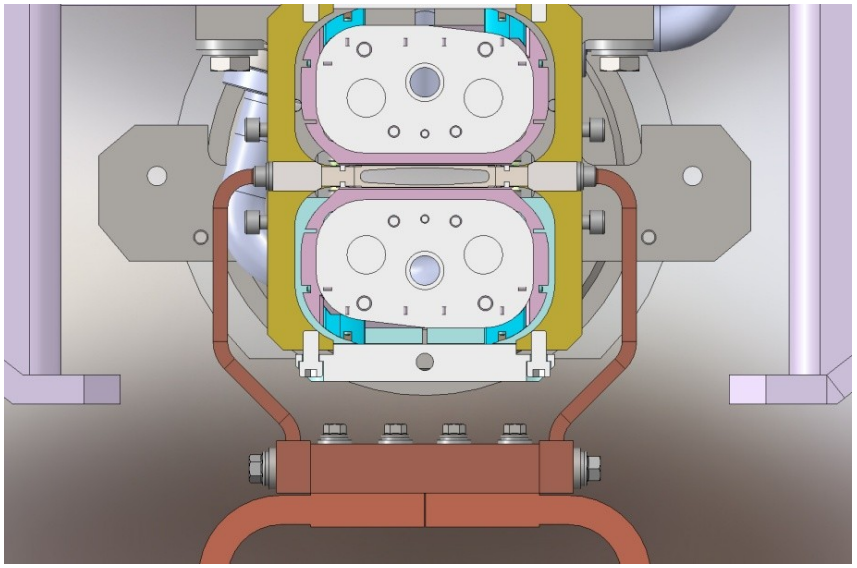




Pole gap= V aperture + 4 mm

Indirect cooling magnet
Magnet in insulating vacuum





Pole gap = V aperture + 1.5 mm

Main advantages of the flowing cryostat

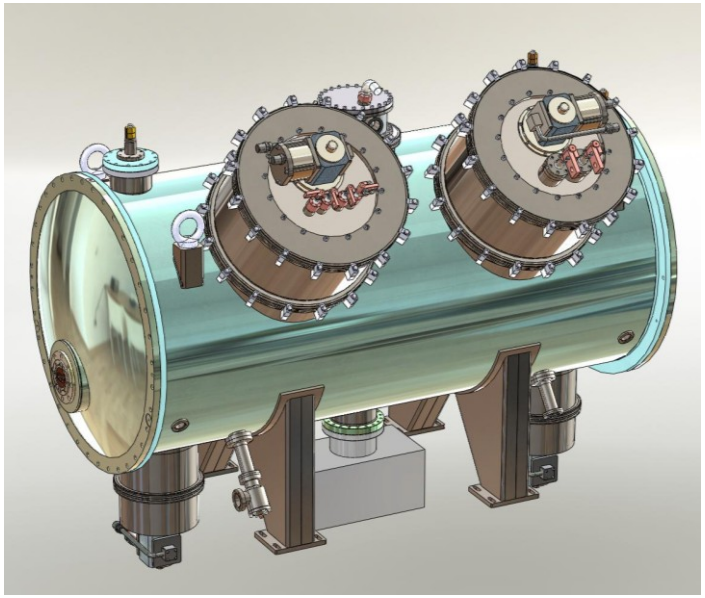
- Lager beam chamber gap
- Possibility to change magnetic parts
- Easy adaptation this approach for multiwiggler section for CLIC-DR

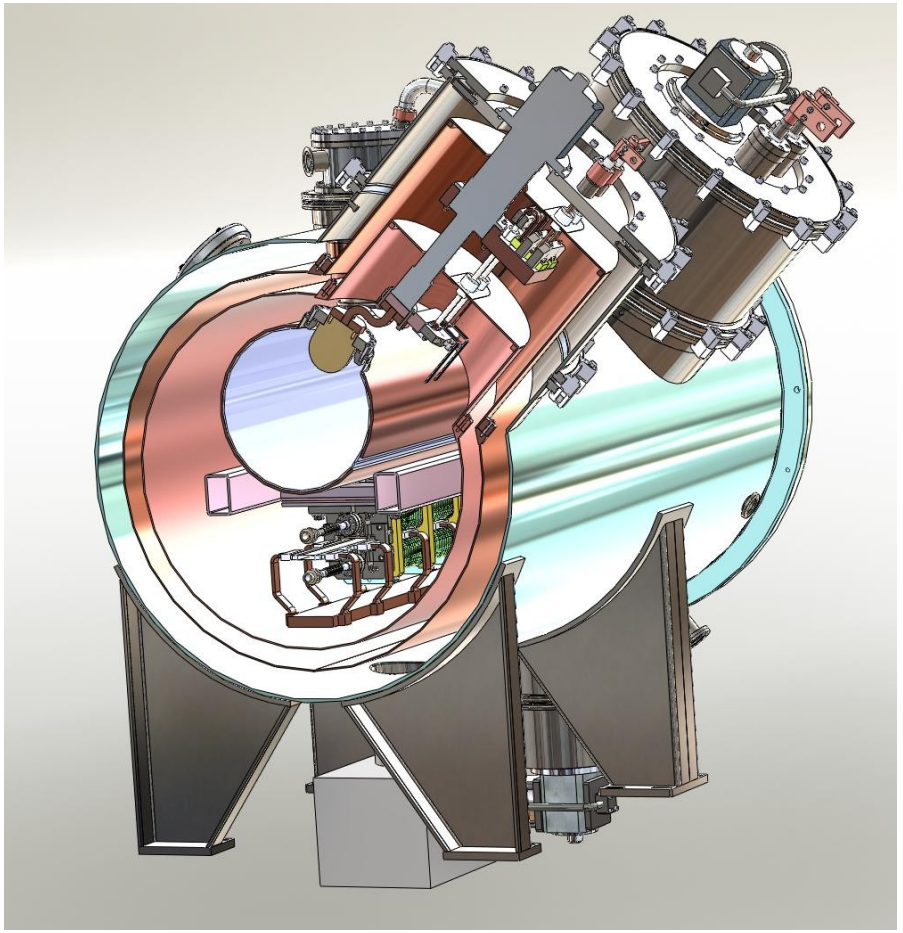
Undulator for APS

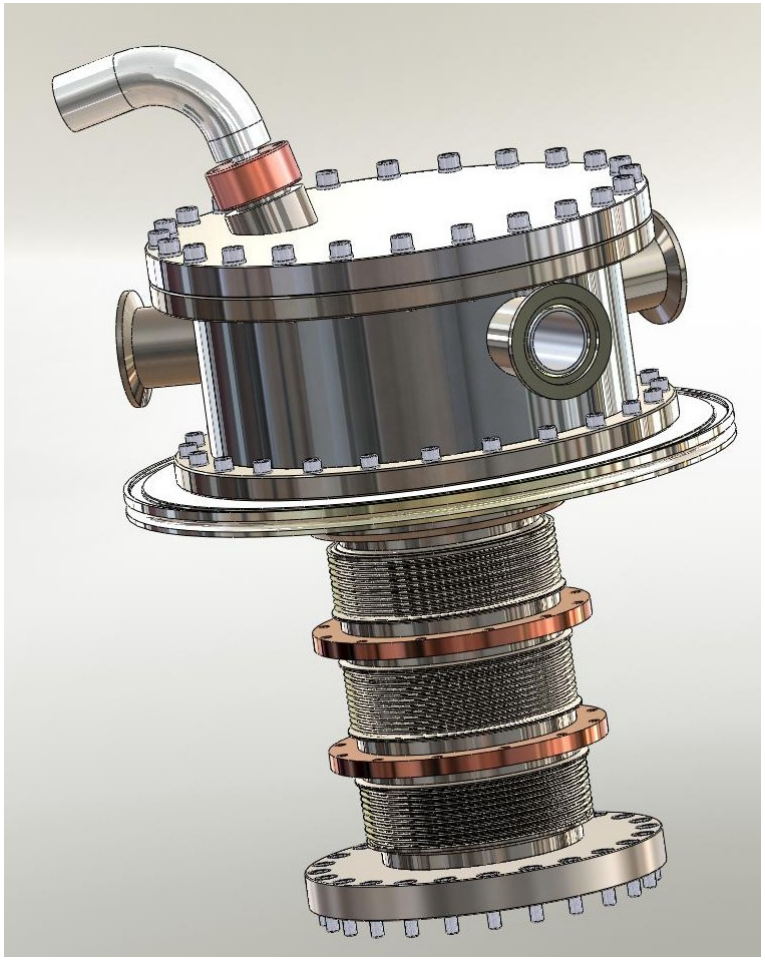
Vertical racetrack undulator

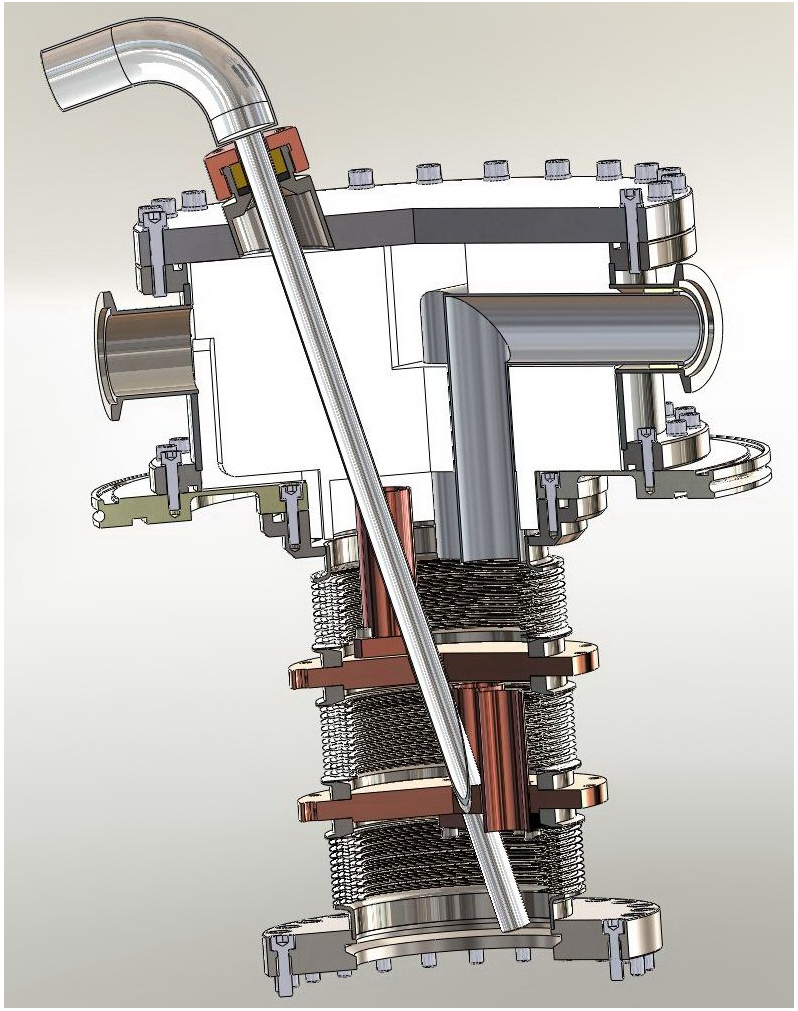
Main parameters

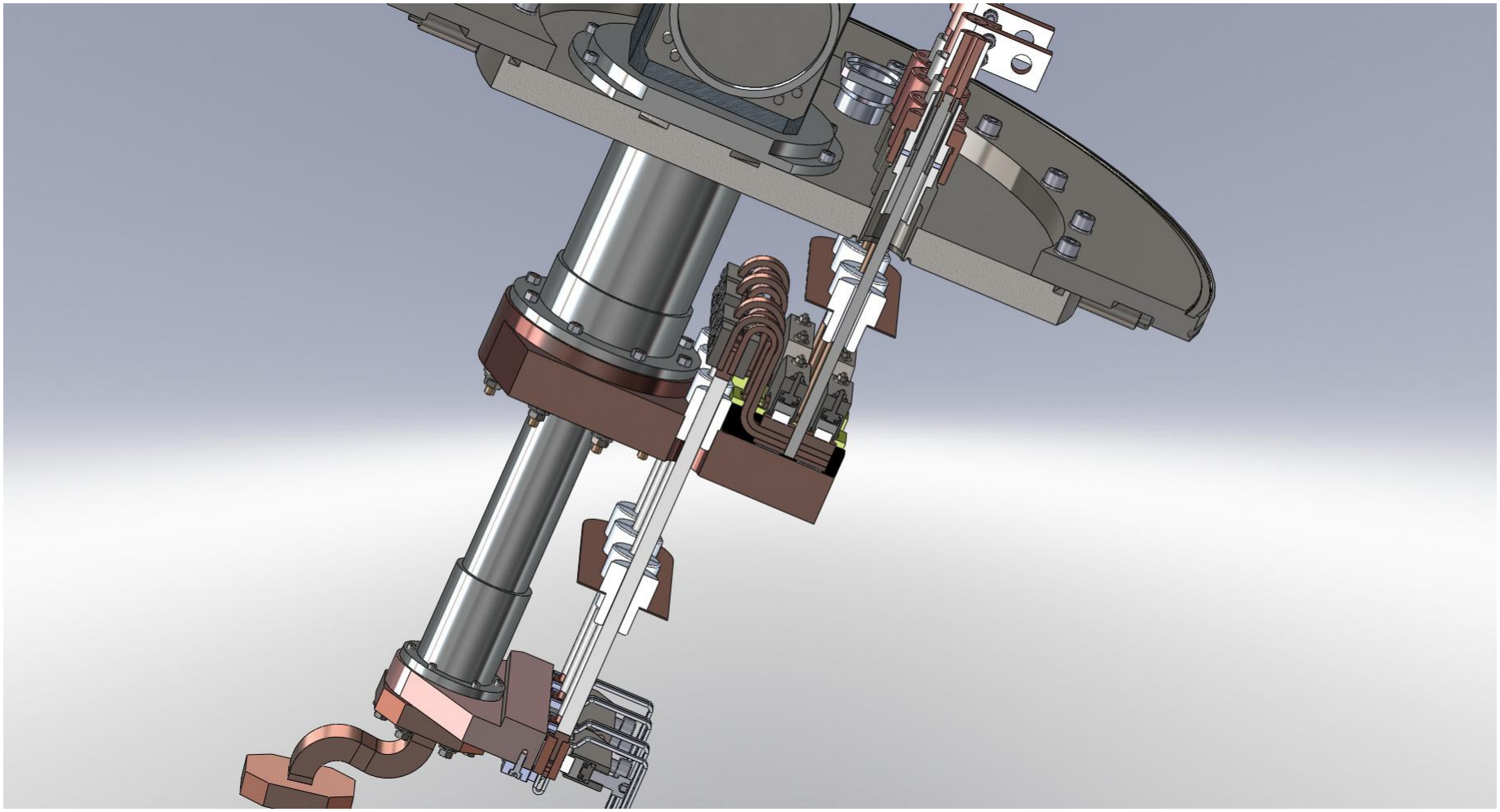
Period	1.6 cm
Peak field	0.7 T
Gap	9.5 mm
Length	2 m



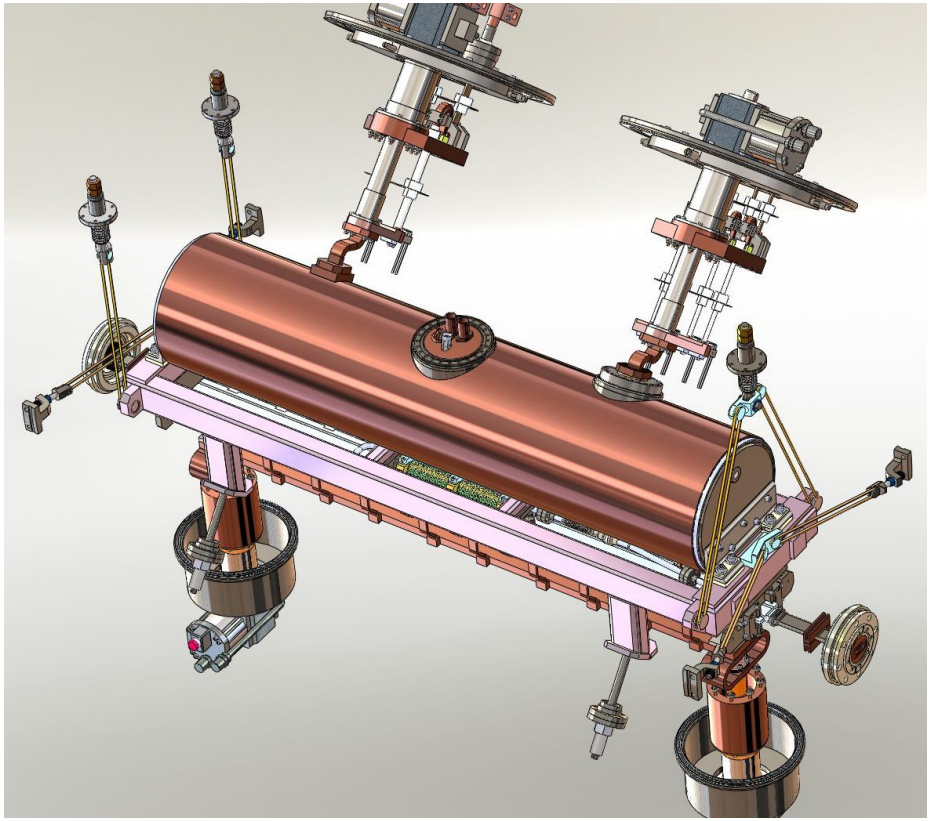


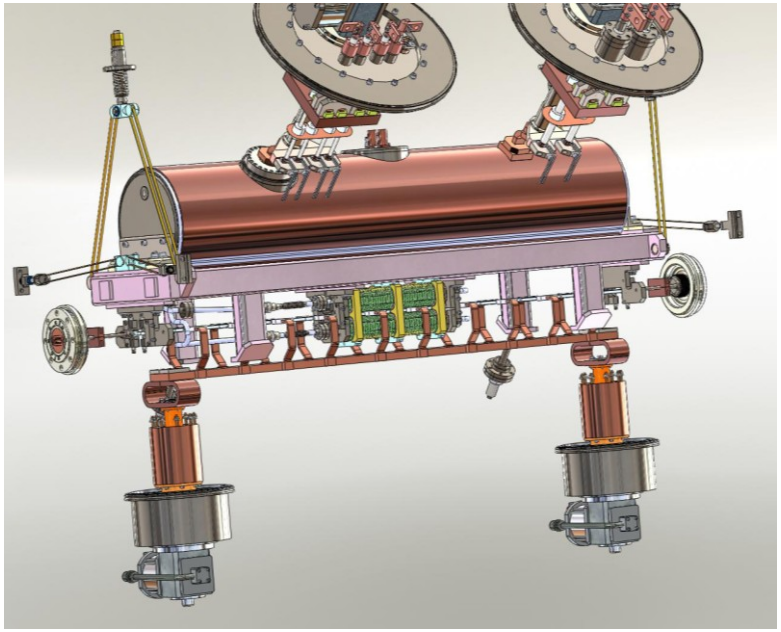


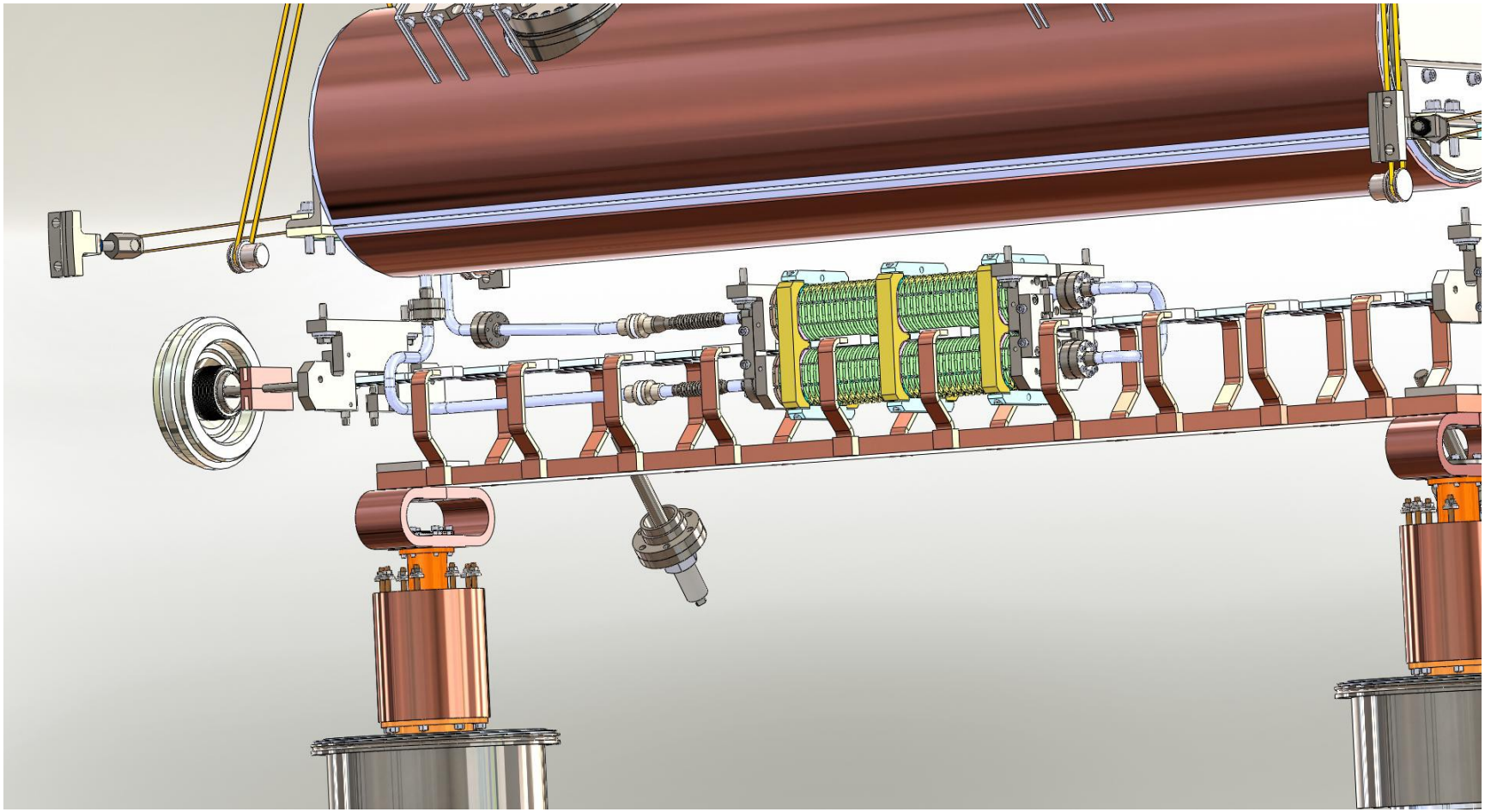


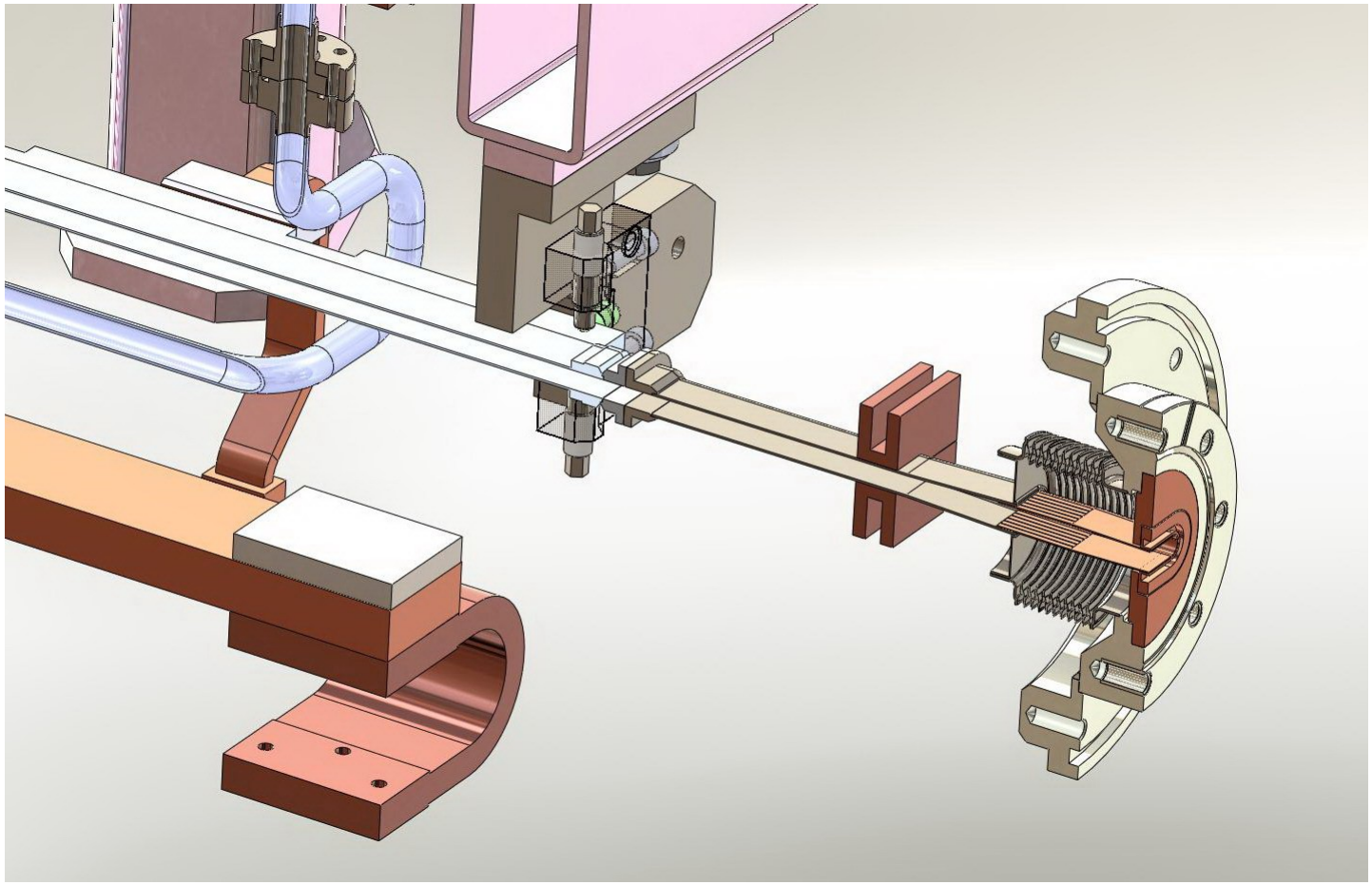


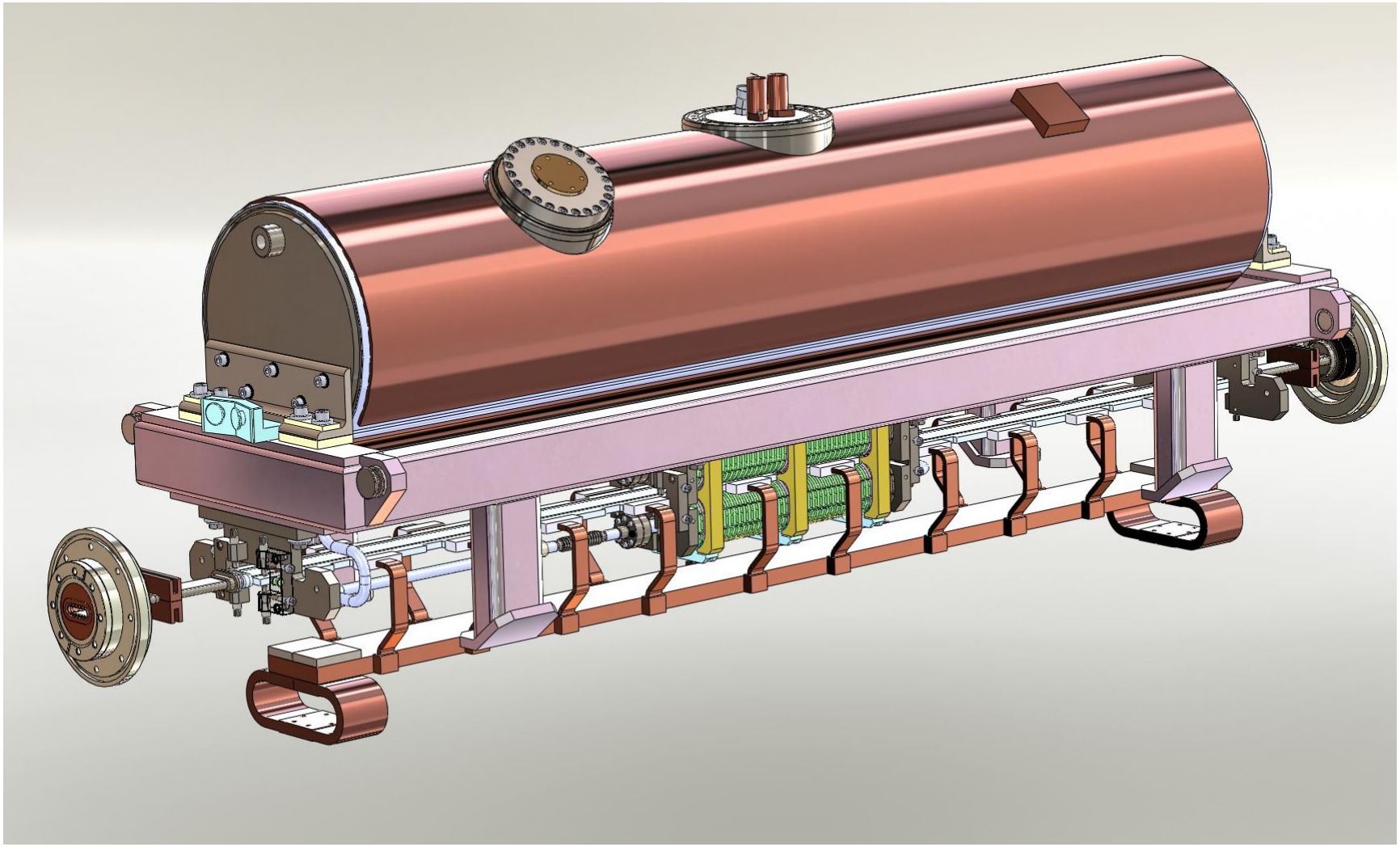
•Current leads heat in-leak interception in vacuum using cryocoolers

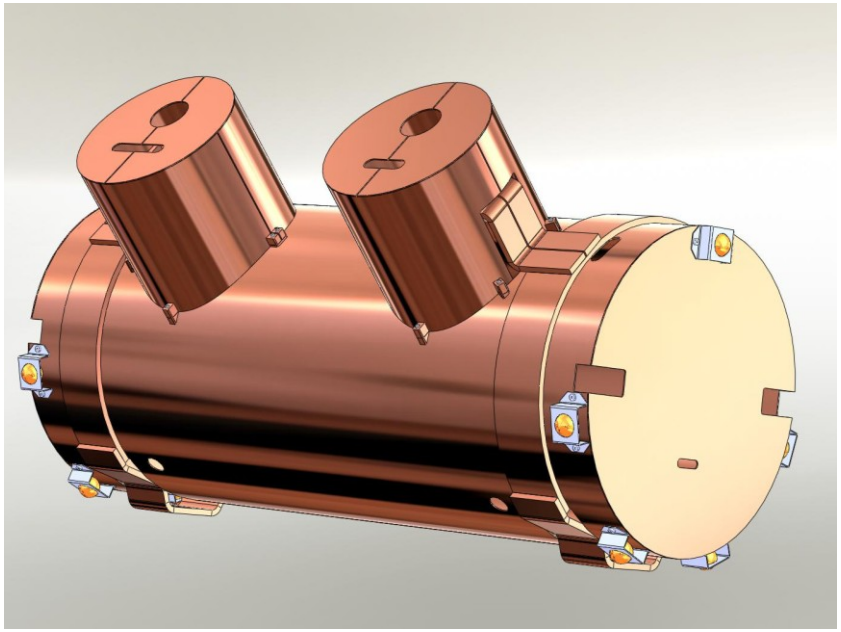


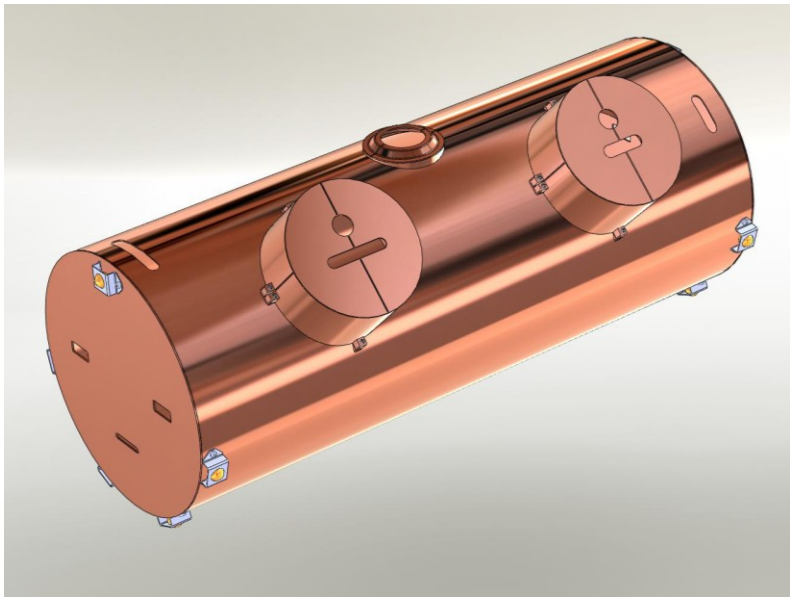












- Cryostat fabrication cost 200-250 kSF
- Cryocoolers 180-190 kSF

BINP can propose solution for cryostat for CLIC cryogenic plant