Study of
SC Quadrupole in Cryomodule

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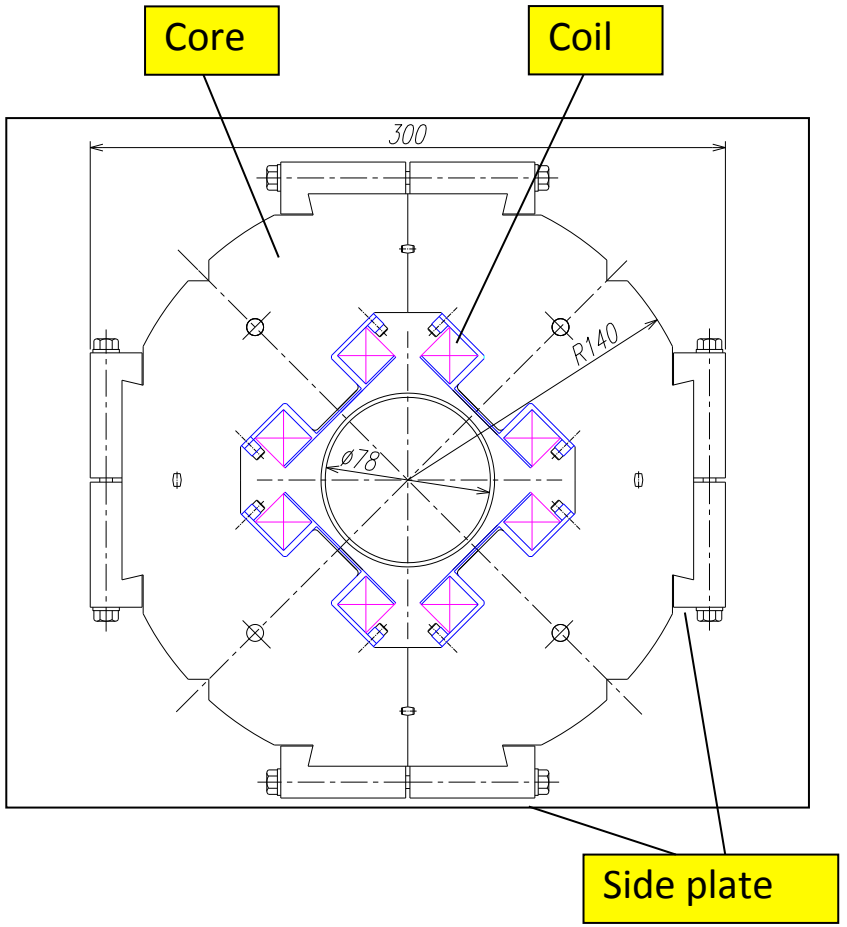
Conduction-Cooled Quadrupoles

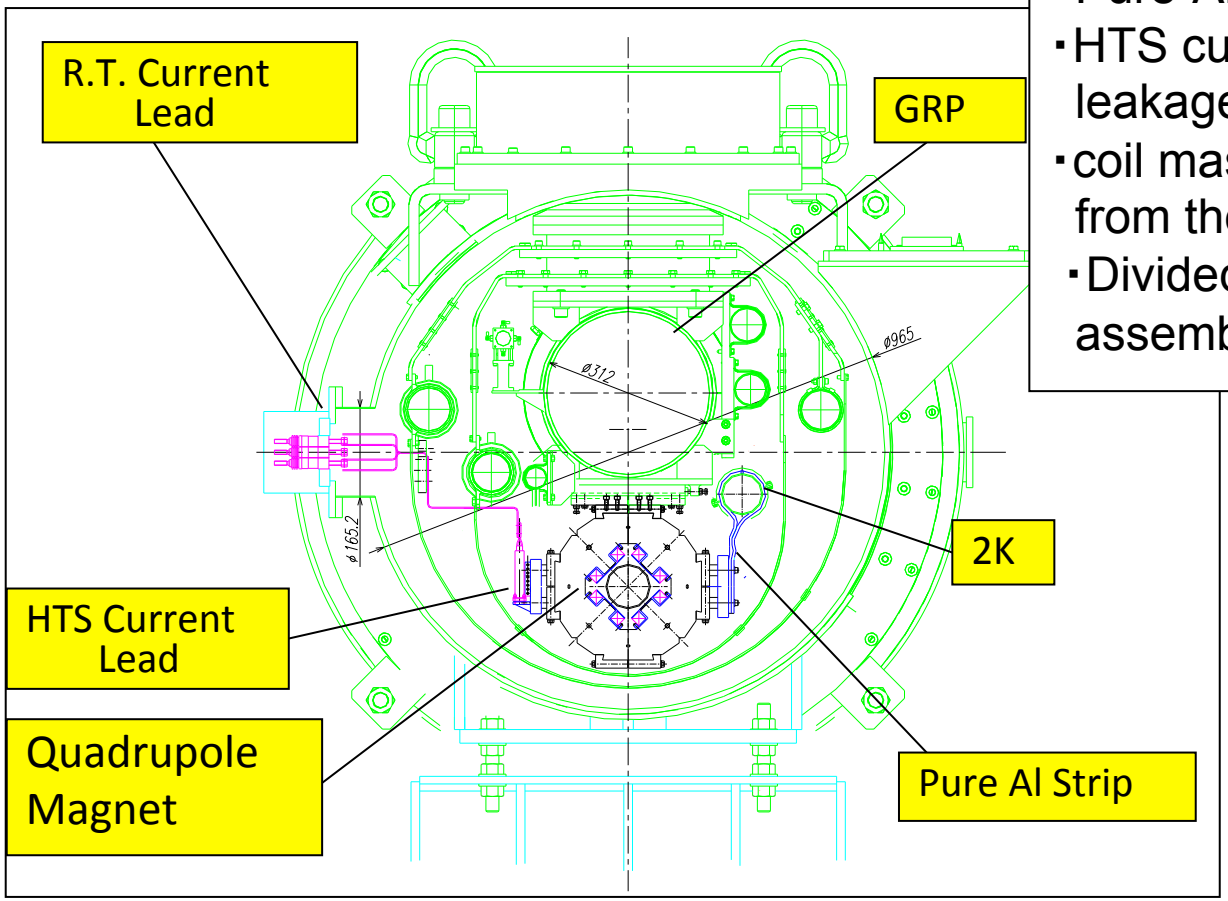
Field Gradient	54T/m
Bore Diameter	ϕ78mm
Magnet Length	660mm
Stored Energy	10 kJ
Operation Temperature	5K
Cooling	Conduction Cooling
Magnet Weight	380kg

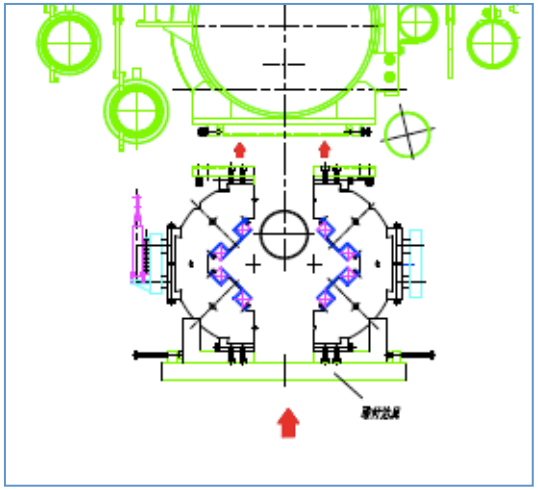


- Magnet itself, originally designed by V. Kasikhin (Fermilab)

Conduction-cooled, Split Quadrupole Magnets

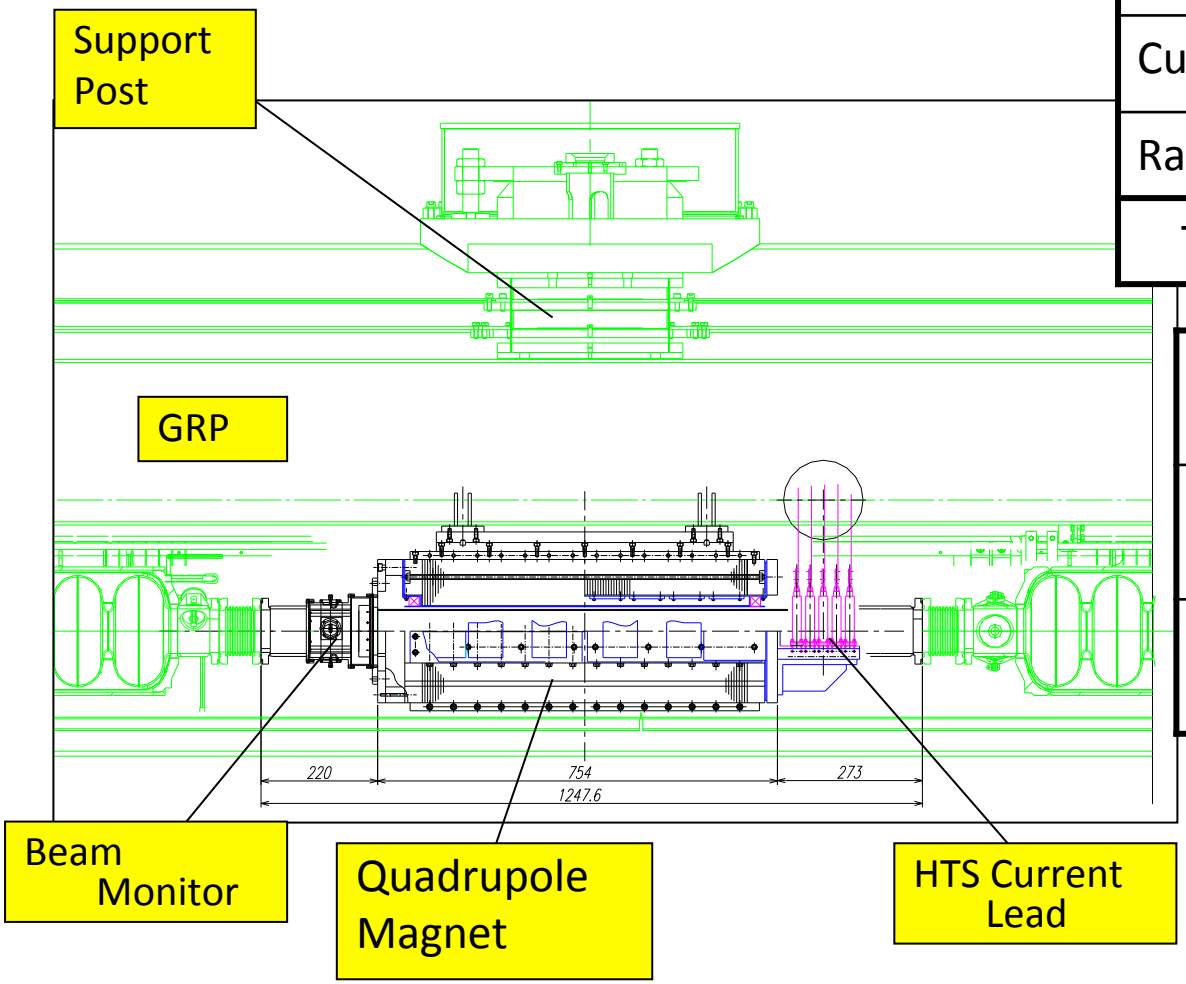
- Thermal conduction cooling by use of Pure-Al strips connected to2K line
- HTS current leads minimize the heat leakage into the cryostats
- coil mass is designed to be supported from the He gas pipe
- Divided coil structure for easy assembling





Coil assembling into the Cryomodule

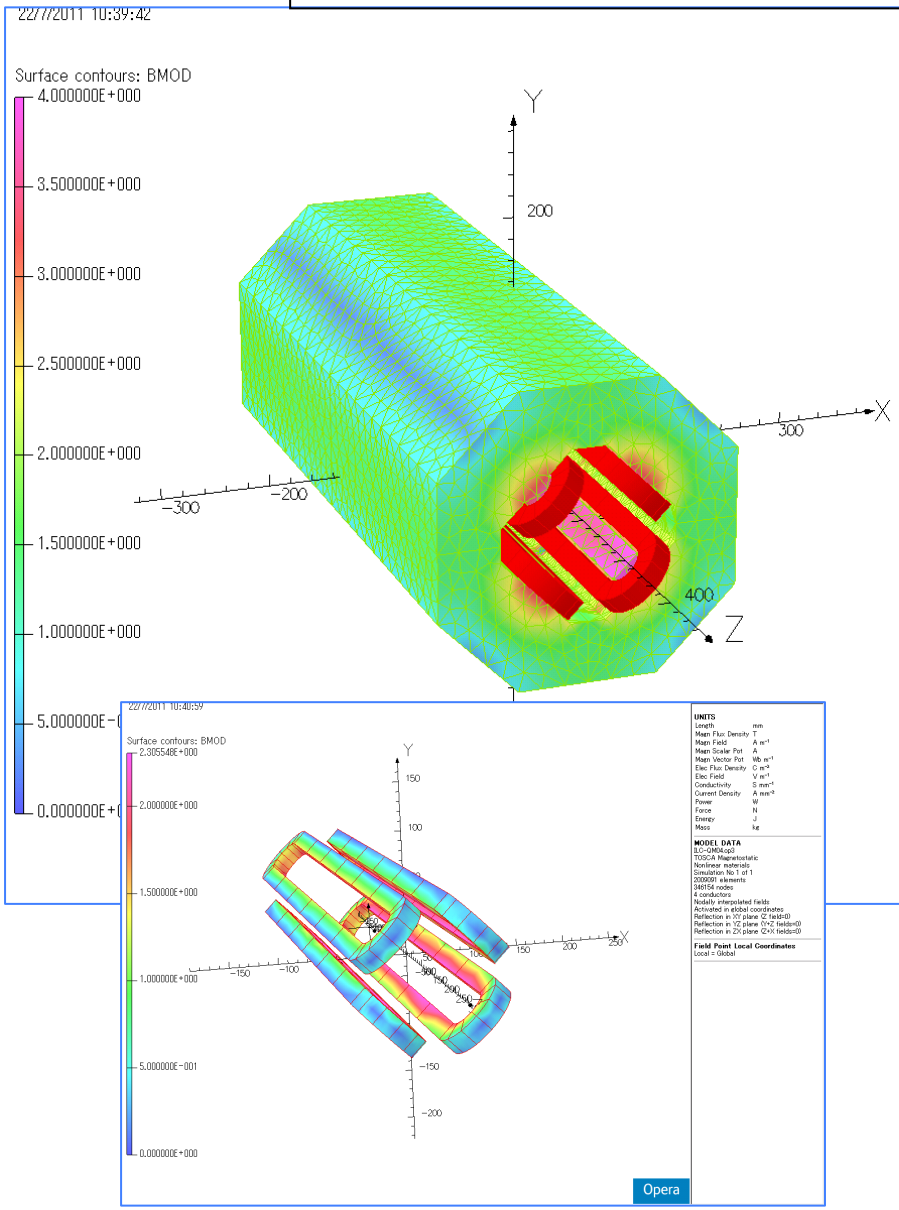
Cryogenics Characteristics in Conduction-cooling Magnet

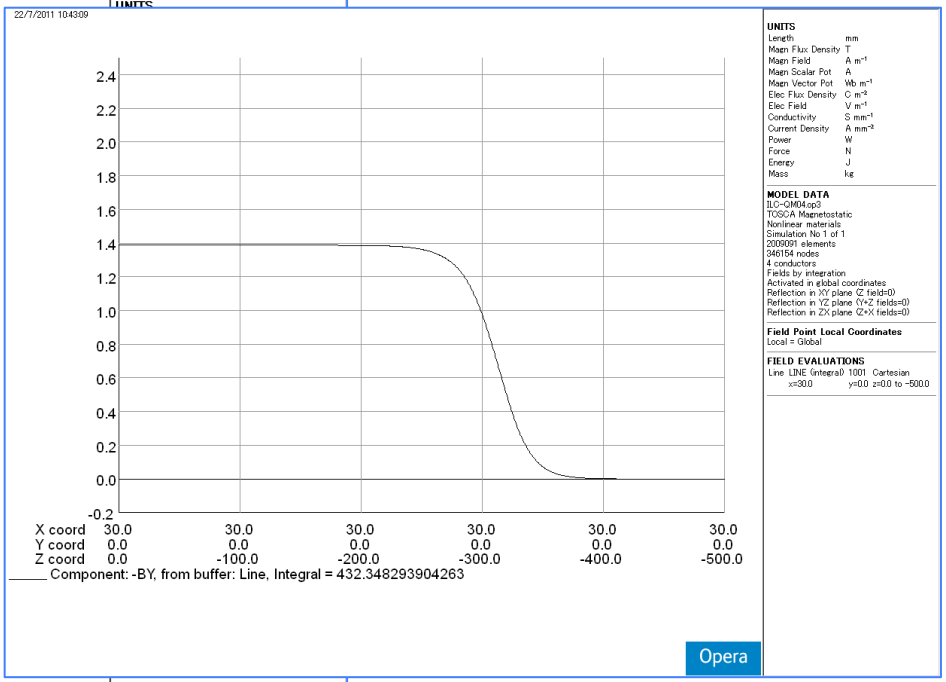


AC losses	0.01W
Current lead losses	0.5W
Radiation heat losses	0.02W
Total	0.53W

Highest coil temperature	2.42K
Coil temperature at the quenching	50K
Cooling time after the quenching	35min.

3D-Magnetic field analysis





3D-field analysis (in calculation)

- field profile
- stray field along the beam line
- conductor maximum field
- field strength in the iron yoke