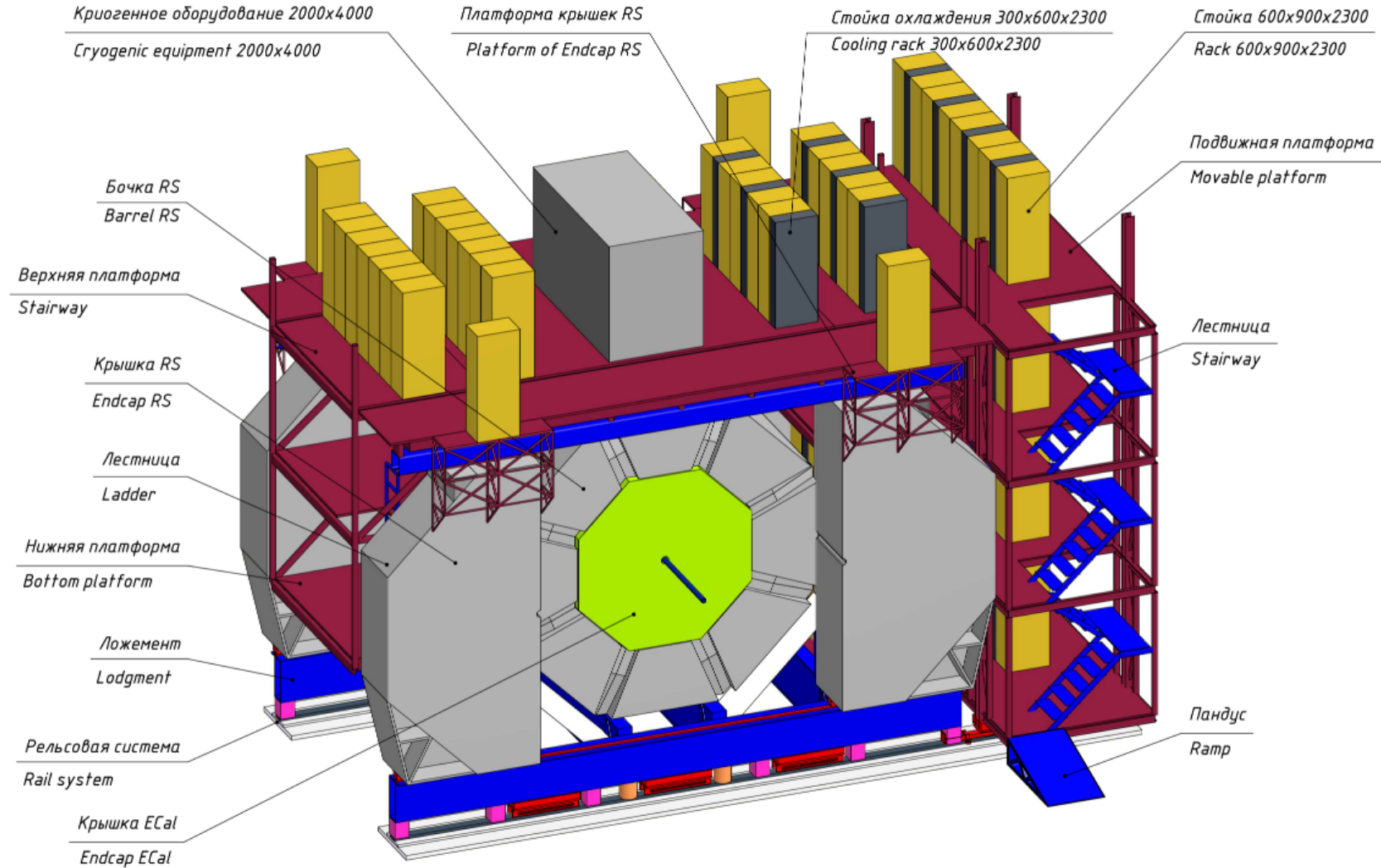


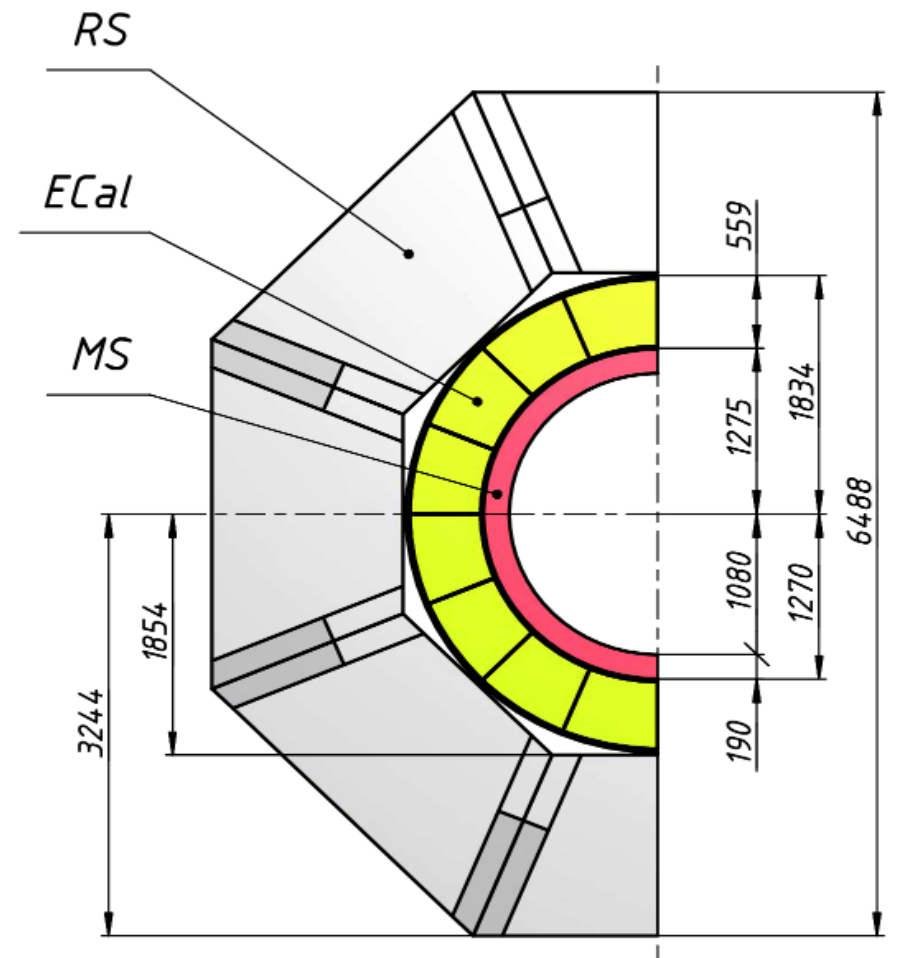
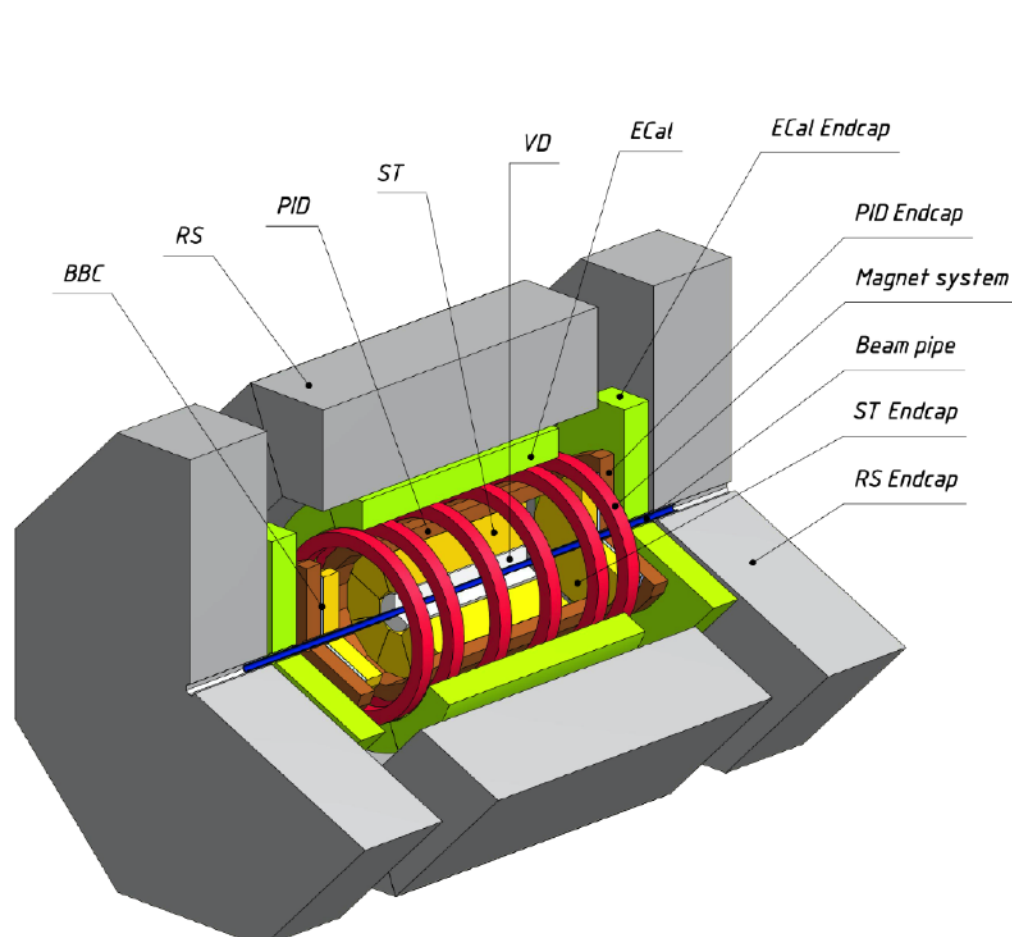


Cryogenic equipment



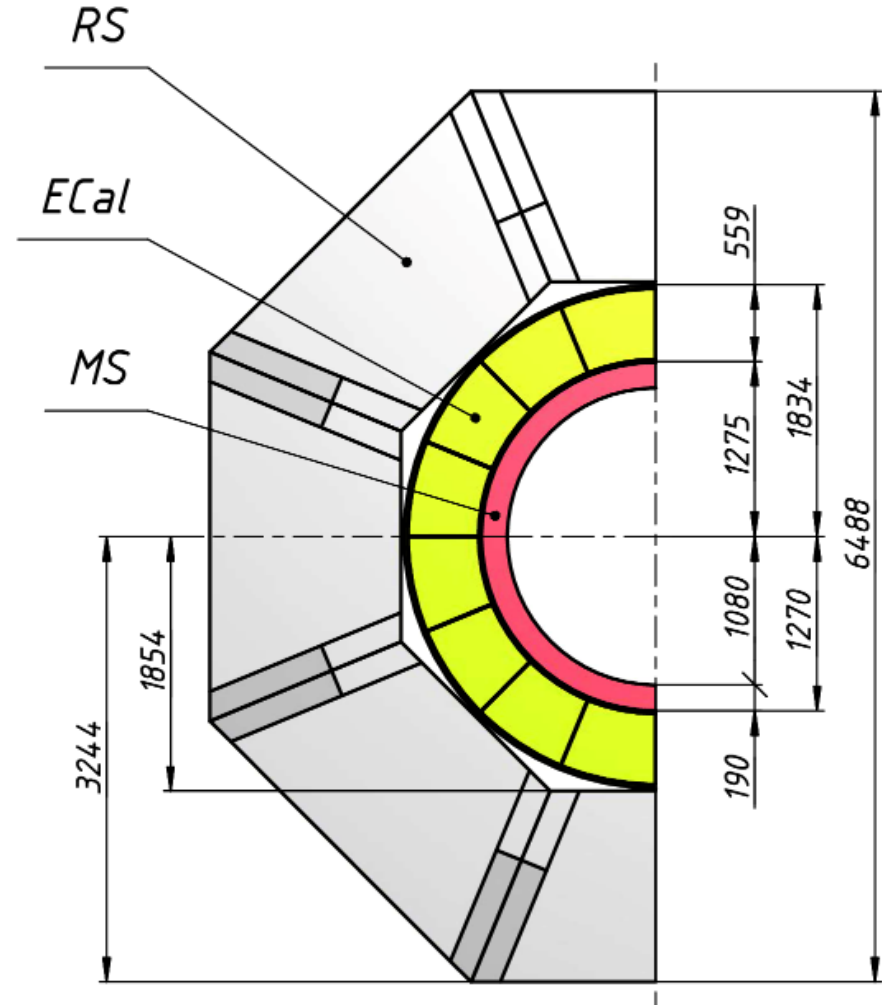
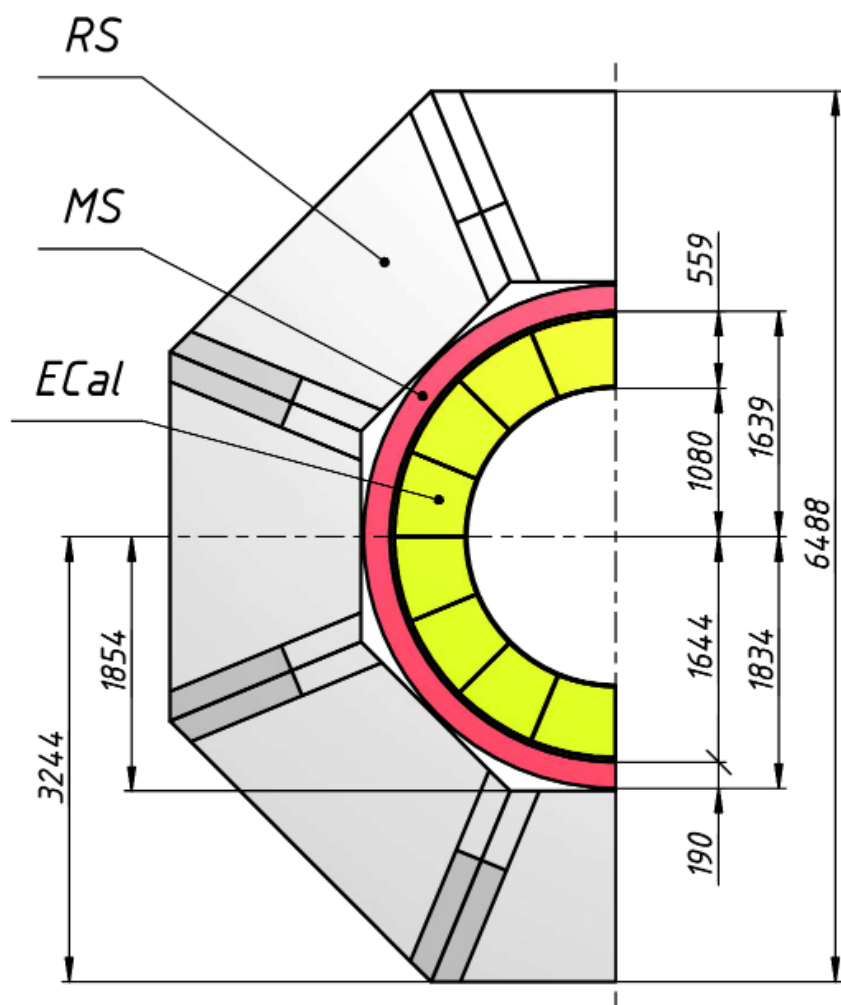


Two concepts for the position of the SC coil (MS)





Two concepts for the position of the SC coil (MS)





Cryogenic test of prototype SC coil

Development of design documentation and ordering of connecting equipment and products for connecting a test cryostat and a prototype SC coil

Choice of SC cable type

Vacuum vessel

Thermal shield

Connections for liquid helium, liquid nitrogen and current circuits

Technological schemes of thermometry and protection

Development of cryogenic program

Determination of the purposes cryogenic research

Ordering and development of measuring equipment

Determination of measurement accuracy

Determination of responsible for directions

Cryogenic system – Dmitry Nikiforov

Protection system and calculation of quenches - ?



Cryogenic system of SPD

Type of cryogenic plant:
helium refrigerator plant,
cooling capacity - 100 W

Development of inside
cryogenic system

Creation of a plan for location of
equipment for cryogenic systems

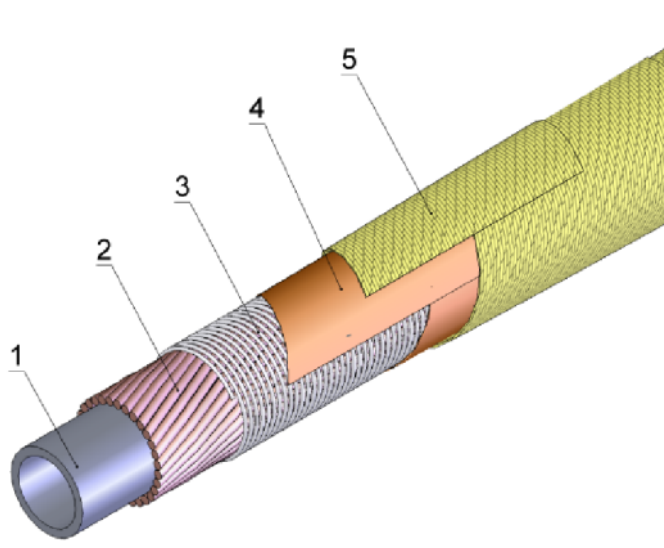
Hydraulic calculation

Development of cryostats
for liquid helium and
nitrogen and current leads

Development of nitrogen
system.



Hollow SC cable («Nuclotron type»)



SC cable: 1 - CuNi tube, 2 - NbTi superconductor, 3 - NiCr wire, 4 - kapton tape, 5 - glass fiber tape impregnated with epoxy compound.



Cryogenic test section

Test bench:

- Three helium satellite refrigerators,
- Six fit boxes,
- Twelve HTS current leads,
- Production capacity of test bench – 12 SC magnets per month.



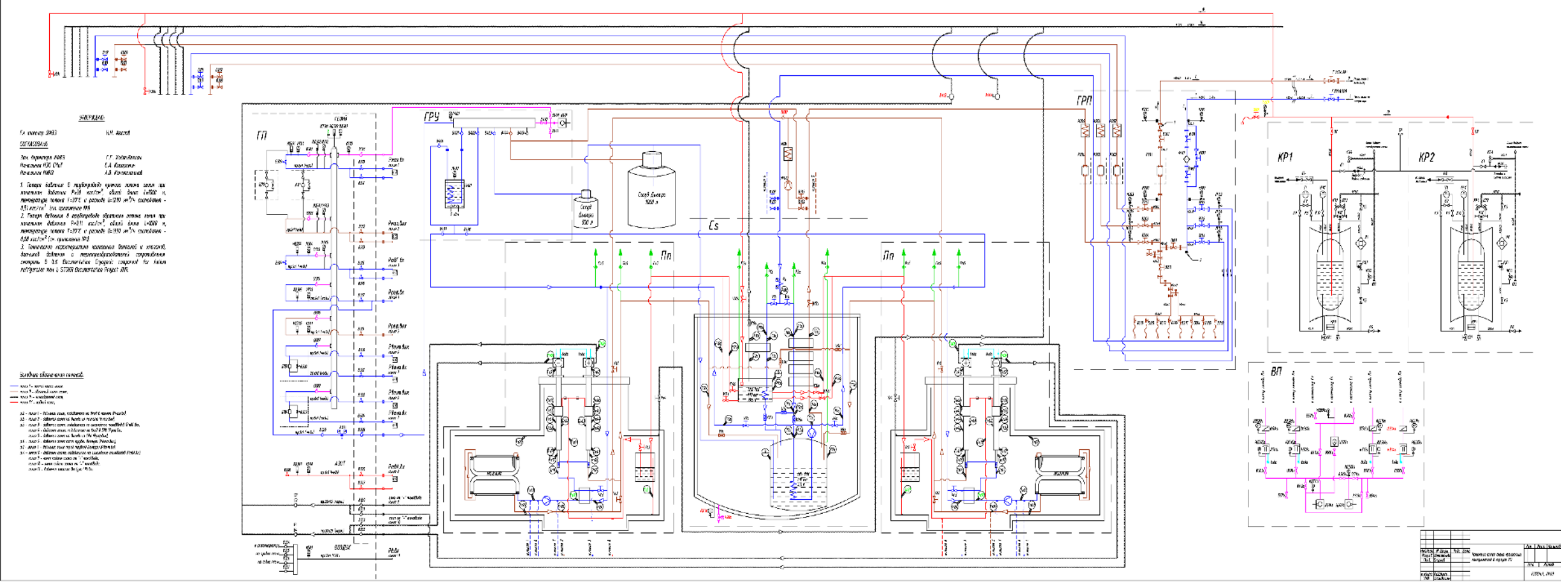


Helium satellite refrigerator





Technological scheme of cryogenic section





Estimated time and costs

Systems	Production time	costs
Cryostat of SC coils and components	9 months	150 000 €
Helium cryogenic system	18 months	2 500 000 €
Nitrogen cryogenic system	18 months	1 000 000 €
Support system	-	250 000 €
	Total	3 900 000 €



Thank for your attention!