News from the JINR / GSI test facility

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JINR / GSI Magnet Test Facility

scope:

- testing of superconducting magnets for NICA project:
  - 40 booster dipoles
  - 48 booster quadrupoles
  - 80 + 8 collider dipoles
  - 86 + 12 collider quadrupoles

- testing quadrupole units for SIS100 synchrotron:
  - 166 + 3 main quadrupole magnets in combination with:
    - sextupole magnets
    - steering magnets
    - multipole correctors
    - gt-jump quadrupoles
Fast ramping magnets for NICA and for SIS100

Nuclotron cable
\[ I_{\text{nom}} = 10.5 \text{ kA} \]

cooling tube
\[ D_i = 4.7 \text{ mm} \]
Fast ramping magnets for NICA and for SIS100
Testing hall

Assembling section
Warm magnetic test section
Vacuum test section
Magnet assembling
Cryogenic test section
Testing hall
Testing hall

- 3 x 100 W satellite refrigerators
- 6 feed boxes with 18 kA current leads
- 2 power converters 15 kA 25 V
- “cold“ magnetic measurement systems
Test program:

- warm tests: magnetic measurements, electrical tests, leak tests
- cool down (about 50 – 70 hrs)
- check of instrumentation (sensors, v-taps), HV tests, leak tests
- training of the main quadrupole and correctors
- magnetic field measurements
- ramping reference cycles, dynamic heat losses, pressure drop
- warming up and warm tests
Testing cryostat
Magnetic field measurements

field integral, harmonics, position of axis

cold rotating coil probe

main quadrupole
chromaticity sextupole
steerer
nested multipole corrector

3 PCB: 5 coils $\times$ 480 $\times$ 13 mm$^2$
for the main quadrupole

2 PCB: 5 coils $\times$ 726 $\times$ 13 mm$^2$
for correctors
Hydraulic adjustment

\[ P_{in} = 1.5 - 1.8 \text{ bar} \]
\[ T_{in} = 4.5 \text{ K (sub-cooled)} \]
\[ P_{out} = 1.25 \text{ bar, two-phase} \]

Heat load:
static: \( < 5 \text{ W} \)
dynamic: \( \text{up to 20 W} \)
Summary and outlook

• A facility for testing superconducting magnets for FAIR and for NICA has been put into operation in 2017

• Testing of magnets for the NICA booster is completed, testing of collider magnets has started

• two pre-series quadrupole units for SIS100 have been tested

• testing of series quadrupole units will start in July 2019