Production schedule and cost estimation of the BINP full-scale prototype wiggler

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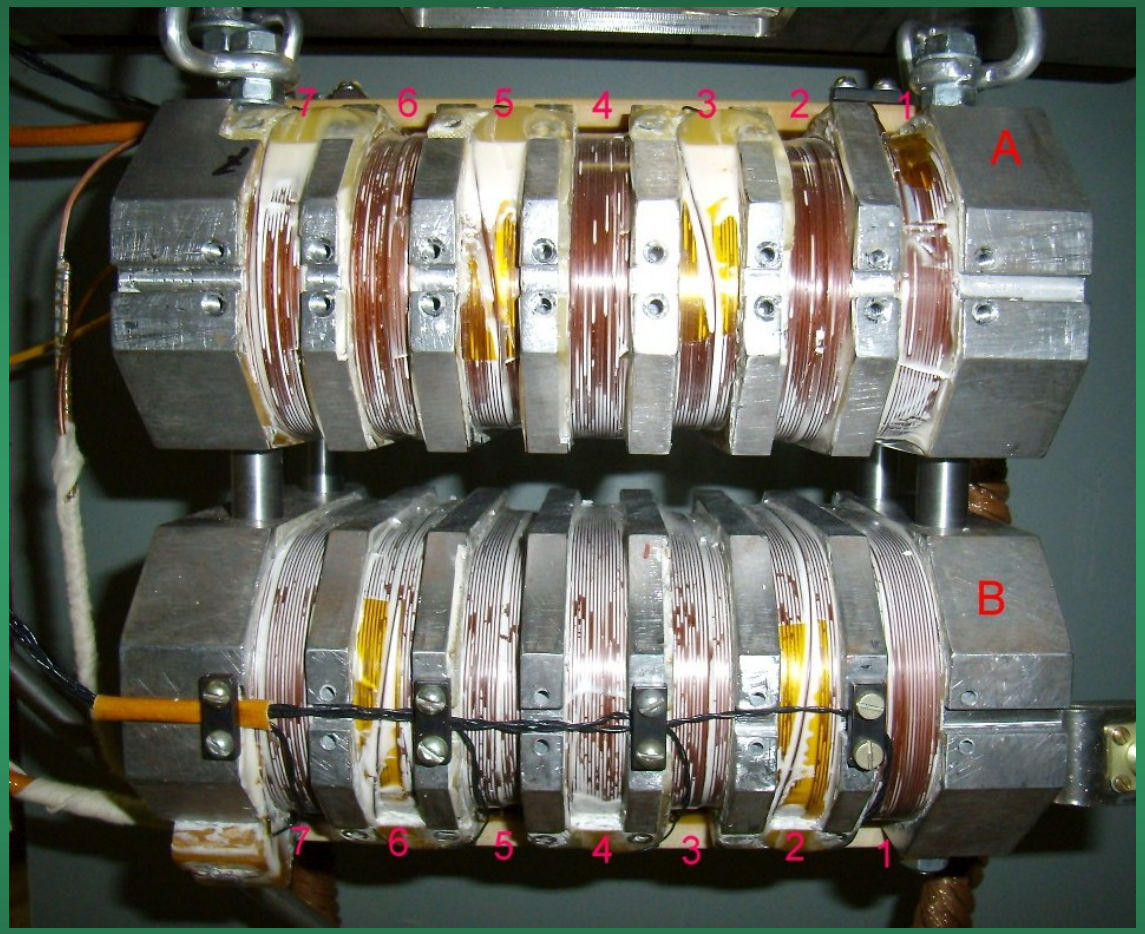
Tested short prototype. Review.

Short prototype of
NbTi wiggler was tested
in August 2010.

Its parameters are:
Period – 50 mm
Gap – 20 mm
Peak magnetic field – 2.5 T
Ratio Iop/Icr – 95%
Number of turns – 341
SC cable with high NbTi/Cu
ratio – 1.5 (0.72 - typically)

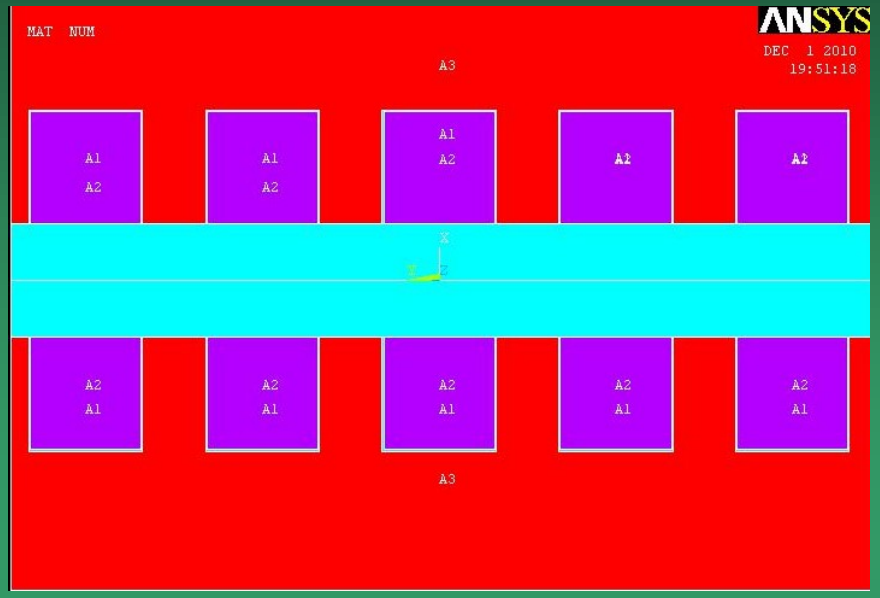


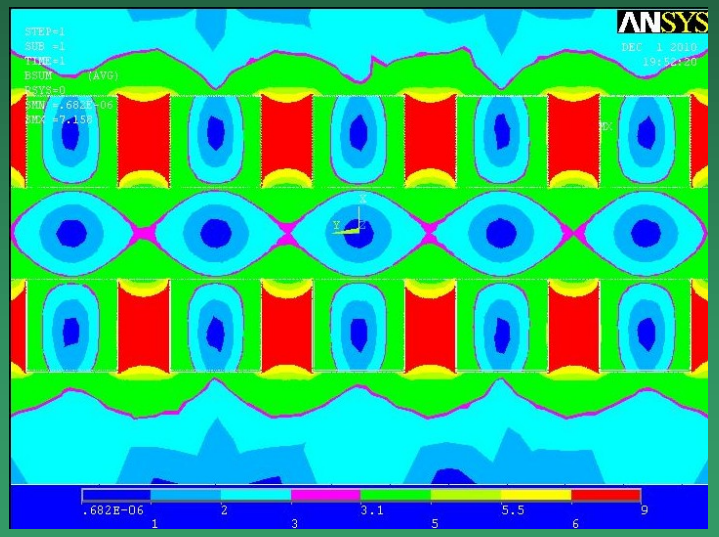
Main parameters of the NbTi ANKA wiggler

- Period – 56 mm
- Total cryostat length – 2.5 m
- Magnet length – 2 m
- Peak magnetic field – 3.0 T
- Pole gap – 18 mm
- Beam aperture – 13 mm
- Ratio Iop/Icr ~ 83%
- Num. of vertical coils in two halves – 142

- Easy disassembling cryostat in two weeks
- Proposed wiggler cooling saves the gap space

Design of the wiggler coils





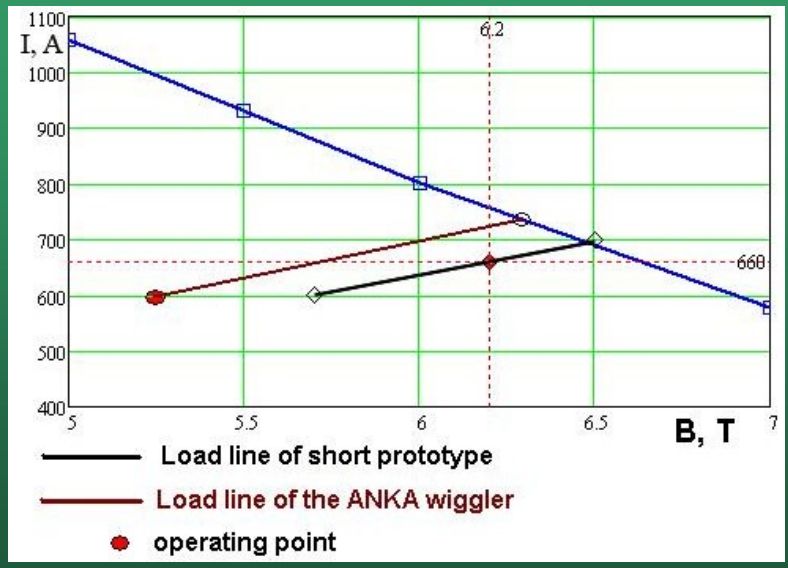
Grove sizes - 18 mm x 18 mm

Number of turns – 333

Number of layers - 18

Current – 600 A

Magnetic field on coils – 5.3 T



Scope of work

1. Magnet system (iron, coils) manufacturing
2. Cryostat manufacturing
3. Wiggler training in LHe cryostat at 4.3. K
4. Tests of the wiggler in the cryostat (60 W on the beam tube?)
5. Magnetic field measurements
6. Assembling and testing the wiggler in ANKA

Schedule

Items	2011												2012											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1. Contract signed																								
2. Manufacturing drawings																								
3. Materials and SC cable																								
4. BINP workshop												cryostat												
5. Winding tools																								
6. Coils winding and impregnating																								
7. Assembling and training																								
8. Cryostat assembling and testing																								
9. Wiggler at ANKA																								
10. Wiggler installed																								

Equipment

- Current leads – HTSC, 1.1 kA - ?
- Power supplies (1.1 kA, ~20 A correction) - ?
- Quench protection electronics - ?
- Magic fingers correction - ?
- Temperature sensors - ?
- Vacuum pumps, gauges - ?

Cost estimation

1. BINP workshop estimation according to calculated hours of work ~ $10/h. Cryostat, magnet ~ 20 000 hours. So, BINP workshop - $200 000
2. Beam tube - $50 000
3. SC cable, (3 euros/m, N. Mezentsev*) - $105 000
4. The total cost of the SC magnet can be estimated according to (**) - $950 000 without cryogenics
5. The final price should be approved by BINP administrators after discussing the scope of work and supplying equipment.

*) Previously, I thought that the cable costs 2 euros/m.

**) M. Green, B. Strauss " ", IEEE Transactions on Applied Superconductivity, 2008

Conclusions

- BINP is ready to start working on the new prototype of the CLIC wiggler which will be installed in ANKA.
- Technical specification should be discussed.
- The preliminary price is stated with an accuracy 20 %.