

JINR experience in SC magnets

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Work on design of superconducting proton and ion synchrotrons is continuing at the Laboratory of High Energy Physics since 1970. Several options of superconducting magnets covering the parameters range of $B = (1.5 - 4.5 \text{ T})$, $dB/dt = (1 - 4 \text{ T/s})$ and pulse repetition rate $f = 0.5 - 5 \text{ Hz}$ were proposed and studied. The 6 AGeV proton and ion synchrotron, Nuclotron, based on a fast cycled superferric magnets was constructed and put into operation in March 1993. The Nuclotron magnetic system is based on several technological now-how that was further accepted for the SIS100 of FAIR project at GSI. We analyze the solutions that have been used and discuss their possible development for application in the FCC, in particular: design of a curved 5-6 T dipoles ramped at least at 1 T/s, consideration of a 1-2 TeV proton bunch extraction schemes, some aspects of a beam transportation to the main ring, work in polarized proton mode etc.

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