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Jet pump for liquid helium circulation through the fast cycling superconducting magnets of Nuclotron

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Nuclotron is the first fast cycling superconducting synchrotron intended for the acceleration of high-energy nuclei and heavy ions. Its cryogenic system includes two helium refrigerators with a total capacity of 4000 W at 4.5 K. The 251.5 m long accelerator ring consists of 144 superconducting dipole and quadrupole magnets. The magnets connected in parallel are refrigerated by a two-phase flow of boiling helium.

In order to increase liquid helium flow directed to the superconducting magnets, jet pumps are used. We explain theoretical and experimental results that allow one to determinate main technical specifications and optimal geometric dimensions of the jet pumps. The experience of using this device and corresponding flow diagrams are described.

Primary authors: NIKIFOROV, Dmitry (Russia, Joint Institute for Nuclear Research); Mrs MITROFANOVA, Julia (Joint Institute for Nuclear Research); EMELIANOV, Nikita (Joint Institute for Nuclear Research); Prof. AGAPOV, Nikolay (Joint Institute for Nuclear Research)

Presenter: EMELIANOV, Nikita (Joint Institute for Nuclear Research)

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