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Electron and stochastic beam cooling for intensive heavy ion beams at NICA complex: experiments and plans

The Nuclotron-based Ion Collider fAcility (NICA) is under mounting in JINR. The Collider first beam tests are planned for the second half of 2025. The goal of the NICA project is to provide colliding beams for studies of collisions of heavy fully stripped ions at energies up to 4.5 GeV/u. The NICA accelerator facility consists of following accelerators: the new acting heavy ion linac HILAC at energy 3.2 MeV/u, new acting superconducting Booster synchrotron at energy up 600 MeV/u, acting superconducting synchrotron Nuclotron at gold ion energy 3.9 GeV/u and mounted two Collider storage rings with two interaction points. There are two electron cooling systems –one in the Booster synchrotron having 60 keV maximum electron energy, another one in the Collider having two electron beams with maximum electron energy 2.5 MeV and two stochastic cooling systems. The status of acceleration complex NICA with its cooling systems is presented. The paper reports the results of experimental studies of electron cooling in Booster carried out during commissioning of the injection complex of NICA. Further plans of electron and stochastic cooling developments and usage are described as well.

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