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High current DC gun for low energy RHIC cooler project

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Electron cooling of ion beams employing RF-accelerated electron bunches was successfully used for the RHIC physics program in 2020 and 2021. Electron cooler LEReC uses a high-voltage photoemission electron gun with stringent requirements for beam current, beam quality, and stability. The electron gun has a photocathode with a high-power fiber laser, and a novel cathode production, transport, and exchange system. It has been demonstrated that the high-voltage photoemission gun can continually produce a high-current electron beam with a beam quality suitable for electron cooling. We describe the operational experience with the LEReC dc photoemission gun in RHIC and discuss the important aspects needed to achieve the required beam current, beam quality, and stability. We also present recent gun tests in which stable operation at 50 mA CW beam current was established, as well as future plans.

Footnotes

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North America

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