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Development of high-power electron gun and collector for the new antiproton decelerator electron cooler

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The electron cooler of the Antiproton Decelerator (AD) at CERN was initially developed for the Initial Cooling Experiment in 1979. It was subsequently adapted for use at LEAR and is currently employed in the AD. However, certain components of the cooler are now more than 40 years old and lack spare parts. To ensure the reliable operation of the AD, a new electron cooler is under development.

This presentation focuses on the development of the new electron gun and collector that will provide the 2.4 A / 27 keV electron beam. The process involves choosing the gun/collector design, informed by electron-beam simulations, which aim to achieve the lowest transverse temperature of the electron beam within the cooling section and the highest collection efficiency of the collector. Subsequently, the gun and collector undergo meticulous testing and characterization on a dedicated test bench. The design undergoes iterative refinement to address issues related to high voltage sparks, vacuum pressure, and electron losses.

Distinguishing features of the new cooler that make it more reliable compared to its predecessor will also be discussed.

Footnotes

Funding Agency

Paper preparation format

LaTeX

Region represented

Europe

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