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Compact Electron Buncher with Tunable Permanent Magnet Focusing

Wednesday 13 August 2025 16:00 (2 hours)

We present a compact electron buncher that uses a permanent magnet setup for beam focusing. The buncher modulates the input direct-current beam into 5.7-GHz bunch train. The buncher consists of two radiofrequency (RF) cavities. Immediately downstream of each RF cavity, there is an electrostatic potential depression (EPD) section. An EPD section in an electrically insulated beam pipe biased with a negative high voltage. The EPD method remarkably shortens the buncher structure by rapidly forming the bunch train. Each of the RF cavities and the EPD sections uses an individual set of rectangular permanent magnets, arranged in a circular array, which provide a solenoid-like focusing field. The polarity of the magnets is configured to form an alternating on-axis magnetic field orientation for minimizing the total weight. Coarse adjustment of the magnetic field is achieved by adding or removing permanent magnet rectangles. For fine adjustments, the rectangles are moved evenly in the radial direction. We show simulation results of the buncher performance and the tunable magnetic focusing. Initial experimental results are also reported.

Please consider my poster for contributed oral presentation

Yes

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

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I have read and accept the Privacy Policy Statement

Yes

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