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Mechanical design of a flexible bunch compressor for SHINE linac

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The SHINE linear accelerator is designed to enhance the electron beam peak current to 1.5 kA at 100 pC through a two-stage bunch length compression process. The magnetic compression support platform (movable chicane) functions as a specialized electromechanically-controlled structure in the linear accelerator tunnel, serving to house critical components including fixed magnetic compression section magnets, vacuum systems, and beam diagnostics. The magnetic bunch compressor (BC) vacuum chamber consists of two side arms and a central section connected by flexible vacuum bellows. The central section, equipped with two middle dipoles on a movable frame, can shift vertically using servomotors (micrometer-scale control). This design allows adjusting the beam path from 0 mm to 328 mm displacement, equivalent to bending angles of 0° to 5°. These platforms are strategically implemented at both BC1 and BC2 positions within the linear accelerator lattice.

Footnotes

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