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Compression of relativistic electron bunch train

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We presented a novel concept of longitudinal bunch train compression capable of manipulating relativistic electron beam in range of hundreds of meters. It has potential to compress electron beam with high ratio, and raise its power to ultrahigh level within compressed duration of nanoseconds. Electron's spiral motion in uniform magnetic field is utilized to fold the hundreds of meters long trajectories into a compact setting. Helix angle of bunches'spiral track are adjusted by a local time-varying magnetic field. Spiral pitch of each bunch gets gradually increased from the leading edge toward trailing edge of the train. After the spiral procedure, interval between bunches is redefined and the compression is realized. The method is explored both analytically and numerically. Compared to microbunching or chicane modulation, this method could compress bunches at distinct larger scales, opening up new possibilities for generation of beam with ultra-large power storage.

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Footnotes

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Yes

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