

Variable polarization self-locked streaking of electrons in time with a pair of corrugated structures

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Corrugated structures have recently been utilized for the time-resolved diagnostics of electron bunches and free-electron-laser (FEL) pulses across several FEL facilities: SwissFEL at PSI and European XFEL at DESY. This approach is simple and cost-effective, based on the self-streaking of electrons with a transverse wakefield enhanced in such structures.

In this work, we optimize the design of a corrugated streaker for the wide range of beam parameters of the CERN Linear Electron Accelerator for Research (CLEAR) at CERN. We report on the fabrication of corrugated plates with various corrugation parameters and their initial installation for in-air measurement at CLEAR. Variable polarization streaking can be achieved either by mechanically rotating the plates or by utilizing two pairs of corrugated streakers. Additionally, we emphasize that when streaking in the vertical (or horizontal) direction with one structure, the undesired quadrupole wakefield can be compensated by the second orthogonally oriented streaker. This allows for a significant improvement in the resolution of the method.

Footnotes

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