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Electro-optical spectral interferometry longitudinal profile monitor design updates and performance on CLARA

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Electro-optic (EO) diagnostics offer non-destructive methods to resolve the longitudinal charge profile of highly relativistic bunches without the need for complex calibrations or ambiguous phase recovery techniques. The most commonly used technique, EO spectral decoding, is favoured for its simplicity, reliability, and straightforward output interpretation. However, its resolution is constrained by the geometric mean of the transform-limited and stretched probe laser durations. At the CLARA accelerator at Daresbury Laboratory, we have demonstrated an EO system utilizing common-path spectral interferometry (EOSI), which overcomes this limitation, by adding a single optical element to an EO spectral decoding system. This system successfully measured 35 MeV/c bunches with charges ranging from 150 pC to 2 pC and compressions from several picoseconds to approximately 300 fs RMS. Here, we discuss the technique with a focus on its current limitations and proposed improvements for an implementation on the upgraded 250 MeV CLARA beam.

Footnotes

Funding Agency

I have read and accept the Conference Policies

Yes

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