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# Design concept for THz-driven electron streaking with ultrahigh resolution

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We propose a new concept for a femto- to sub-femtosecond resolution electron streaking detector. It is based on a split ring resonator (SRR), which is loaded by a single cycle THz pulse. The methodology relies on a resonant THz sub-wavelength structure irradiated with an intense single cycle THz pulse. The deflecting electrodes and the RF streaking field of a standard streaking device are replaced by a SRR and the electric near-field in its gap, respectively. The electron bunch passing through the SRR's gap experiences a transverse momentum with sign and magnitude depending on the longitudinal bunch position. Thus, the longitudinal bunch density is mapped onto the transverse axis and can be easily measured with a spatially resolving electron detector. THz-driven streaking should be well adapted to measure ultrashort electron bunches, even on a single-shot basis. A first proof-of-principle experiment will be performed at the FLUTE accelerator test facility at KIT, Germany.

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