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Progress towards longitudinal bunch profile monitor at the Argonne Wakefield Accelerator employing phase diversity electro-optic sampling

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Precise measurement of an electron bunch's longitudinal profile is critical for wakefield accelerators as shaped electron bunches can improve transformer ratios in collinear wakefield acceleration. Electro-Optic sampling of terahertz (THz) radiation from the bunch is one of the most attractive approaches to provide a view into the structure of a relativistic electron bunch due to its non-destructive nature. Recent developments in spectral encoding methods have shown that Phase Diversity Electro-Optic Sampling (DEOS) can accurately retrieve profiles from both sub-picosecond bunches and those requiring long sampling time windows near the traditional resolution limits. We report the progress on DEOS measurements using coherent transition radiation (CTR), as well as simulations of retrieved THz fields from arbitrary shaped electron bunches using various crystal and probe-laser configurations.

Footnotes

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