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Simulations of simultaneous measurement of GHz bunches using a fast kicker

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High quality electron bunch trains enable investigations in scientific frontiers with high resolution and efficiency and are earnestly desired by various accelerator facilities, including inverse Compton scattering (ICS), high energy computed tomography, and free electron lasers. An average beam flux can be greatly increased by using the bunch train mode. A bunch train with an average current of 1 A is required in the future steady-state microbunching light source with a bunch spacing of 350 ps (2856 MHz). It is essential to measure each bunch in a bunch train and ensure that each bunch has roughly the same quality. Thus, we proposed utilizing a fast kicker to measure different bunches simultaneously. Different bunches get varying deflection angles by utilizing the kicker's rapidly rising edge, and eventually, different bunches can be measured simultaneously. The measuring methods of real space bunches profile, bunch energy, longitudinal phase space, and its corresponding simulation results are presented.

Footnotes

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