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Photoinjector beam halo formation due to a secondary picosecond time-delayed laser pulse

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Beam halo formation is a significant challenge for high-intensity accelerators, as it can lead to performance degradation and radiation safety risks. This study investigates the formation and mitigation of beam halos caused by a picosecond time-delayed laser pulse, which generates a secondary electron bunch in the same RF bucket as the main bunch. The energy difference between the two bunches creates a defocusing effect, leading to the halo generation. Experimental validation of RF-Track simulations was conducted at the AWAKE Run 2c test injector (ARTI). The research outlines methods for identifying, analyzing, and mitigating laser-driven beam halo formation, contributing to more effective control of beam halos in accelerator operations.

Footnotes

Paper preparation format

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Europe

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