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Progress on pulsed electron beams for radiation effects characterization of electronics

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Ultrafast high-energy pulsed electron beams can provide deep penetration and variable linear energy transfers by controlling the characteristics of the electron bunch, both of which currently oversubscribed heavy ion facilities cannot provide. Early experiments at the UCLA PEGASUS beamline (~ 3 MeV) with ~ 1 ps electron bunches and a $50 \mu\text{m}$ spot size yielded charge collection transients that were not correlated well with standard heavy-ion data. Sub-micron focusing of the beam would allow for the electron bunch to mimic ion tracks by saturating the charge collection in a small cross-sectional area while simultaneously providing high spatial resolution to allow for the targeted testing of microelectronic components. Using a $10 \mu\text{m}$ collimator and strong lens, current experiments are planned at UCLA to characterize standard photodiodes with smaller spot sizes to achieve stronger correlations with the heavy-ion data.

Footnotes

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North America

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