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Gigaelectronvolt Acceleration of Captured Electrons in a Positron Beam-Driven Plasma Wakefield Accelerator

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Positron acceleration in plasma is a topic of interest for future applications of plasma-based linear colliders. At FACET, we investigated the acceleration of positrons in plasma under a variety of regimes including linear, non-linear, and hollow channel configurations. Over the course of these experiments, we observed the acceleration of plasma electrons captured in a positron beam-driven wake. The positron drive beam conditions were varied to determine the capture threshold of the plasma electrons. Simulations performed using OSIRIS 4.0 are in good agreement with the experiment which allows for a detailed analysis of the capture dynamics.

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