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High-efficiency acceleration of an electron beam in a plasma wakefield accelerator.

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With the size and cost of high energy physics machines rapidly approaching the logistical limits of feasibility, a fundamentally new method for accelerating particles up to very high energies will be required if we wish to continue to push at the boundaries of the energy frontier. Two key factors tend to dominate the estimated cost of future collider designs: the overall size of the machine, and the power consumption. Plasma wakefield acceleration is a forefront electron and positron acceleration technology that addresses both of these factors simultaneously by providing extremely high accelerating gradients and a high energy transfer efficiency from the accelerator to the beam. In this talk, I will present results from SLAC National Accelerator Laboratory's Facility for Advanced Accelerator Experimental Tests (FACET), where the acceleration of a bunch of electrons in a high gradient, high efficiency plasma wakefield accelerator driven by a high peak-current electron beam has been demonstrated for the first time.

Oral or Poster Presentation

Oral

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Session Classification: Accelerators, Detectors, Computing