Abstract

Intense Charged Particle Beam Physics and Applications

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The development of intense, short pulse (<100ns), high current (> 10kA), high power (> 1 TW) particle beams has been an area of research within the United States since the late 1970's. An overview of the generation and propagation of these beams will be presented with a focus on the underlying fundamental physics. In addition, a discussion will be given of the present capabilities and applications of such beams. The emphasis will be on theoretical constructs and the use of simulation to advance understanding and the implications for the various applications. Particular attention will be paid to the collective effects of such beams, including such phenomena as space-charge limiting, magnetic insulation, beam-plasma interaction, self-focusing and instability.