

Abstract

Intense Charged Particle Beam Physics and Applications

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The development of intense, short pulse ($<100\text{ns}$), high current ($>10\text{kA}$), high power ($>1\text{ TW}$) 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.

Biographical Summary

Bryan V. Oliver is a theoretical plasma and beam physicist (Ph.D. Cornell University, '94). Presently he is a Deputy Director in the Radiation and Electrical Sciences Center at Sandia National Laboratories, New Mexico where he leads the Radiation Effects Sciences and Applications Group. His primary areas of expertise are in theory and simulation of intense electron and ion beam generation and propagation, MHD and electron Hall MHD (EHMHD), Z-pinches, X-ray radiography, Radiation Effects and intense Electromagnetic Pulse (EMP). He is a Fellow of the IEEE.