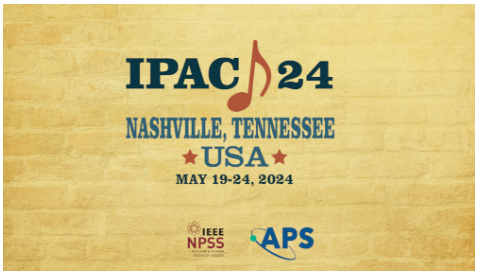

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Simulation study for GeV electron beam generation in LWFA using laser-ablated metal plasma

Monday, 20 May 2024 16:00 (2 hours)

Laser wakefield acceleration (LWFA) has been highlighted in the development of table-top accelerators and compact light sources. However, the stability issues on beam quality and pointing remain unsolved problems. Many groups apply the technique of ionization injection for higher charge with the narrower energy spread into a supersonic gas jet target or a capillary discharge system. The LWFA using a laser-ablated metallic plasma target also involves the ionization effects, not only the ionization injection but also ionization diffraction. The ionization injection may increase the bunch charge at the expense of its peak energy. The strong ionization diffraction generally keeps the optical guiding from being steady at long distances, resulting in a decrease in the accelerating length. At a certain condition, it causes the sudden break of the wake cavity, resulting in a nearly zero-accelerating wakefield. In this condition, the electron bunch may keep its property in the steady state, resulting in lower energy spread. In this paper, we present the simulation study to optimize the generation of a near-GeV electron beam using the metal plasma targets.

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