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Numerical Simulations of Electron Beam Neutralization by Backstreaming Ions in LIA

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This work presents numerical modeling of interaction between intense electron beam and target plasma in LIA accelerator. Well-focused electron beam hit tantalum target that causes producing of high-density target plasma. This plasma consists of electrons and ions of tantalum and different contaminations adsorbed on the target surface [1]. Because of negative potential of the electron beam, ions from target plasma forms upstreaming flow. Interaction between electron beam and ions causes disrupting effect on beam's focusing. We used particle-in-cell code KARAT [2]. For modeling we used the next parameters: electron beam energy 2 MeV, current 2 kA, beam radius 5 cm, focusing length 10 cm.

[1] Hai-jun Yu, et. al. Numerical simulations and experiments of beam-target interaction for multipulse bremsstrahlung converter applications// PHYSICAL REVIEW SPECIAL TOPICS - ACCELERATORS AND BEAMS, 15, 060401 (2012).
[2] V. P. Tarakanov, User's Manual for Code KARAT// Berkley Research Associates, Springfield, VA (1992).

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