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Beam dynamics research for high-repetition-rate infrared FEL linac

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The paper introduces the design and optimization of a high-repetition-rate infrared terahertz free-electron laser (IR-THz FEL) device, which leverages optical resonator-based FEL technology to achieve a higher mean power output through increased pulse frequency. This IR-THz FEL is designed around a photocathode RF gun and is further accelerated by a superconducting RF accelerator. The research involves comprehensive beam dynamics simulations of the injector, accelerator, and bunch compressor, performed utilizing the ASTRA and CSRTrack codes. The simulations take into account various collective effects, including space charge, coherent synchrotron radiation (CSR), and longitudinal cavity wake field impacts. Employing optimized microwave parameters within these calculations has yielded a flat-top current distribution characterized by excellent symmetry and a peak current of 100 A.

Footnotes

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Region represented

Asia

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