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PERFORMANCE ESTIMATES FOR A COMPACT THZ FEL

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Free-electron lasers in the terahertz region that produce high peak and average power require small diameter, low-emittance, high voltage electron beams. This paper presents a 1.5-2 MV, 100-200 A thermionic cathode e-beam source for compact megawatt range peak power, multi-kilowatt average power, high repetition rate THz FELs. The beam generation system includes a high-quality Pierce gun followed by a four-stage acceleration section followed by a magnetic beam compression lens. A specific design for a 1.0 THz FEL is presented. The injector possesses various power supply switching advantages and the paper also includes remarks on very high-voltage multi-stage depressed collectors for overall efficiency enhancement. Performance estimates are included throughout the paper.

Footnotes

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Author: Dr TRUE, Richard

Co-authors: FREUND, Henry (University of New Mexico); Dr FAZIO, Michael; Dr O'SHEA, Patrick

Presenter: FREUND, Henry (University of New Mexico)

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