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Numerical study of a 1 MV Linear Transformer Driver

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A numerical model using both electromagnetic and Monte-Carlo simulations is used to investigate the performances of a 1 MV LTD pulsed high-power accelerator [1]. Particle-In-Cell calculations were employed to examine the beam dynamics throughout the Magnetically Insulated Transmission Line which governs the coupling between the generator and the electron diode. Based on the information provided by the study of the beam dynamics, and using Monte-Carlo methods, the main properties of the resulting X-radiation were predicted. Good agreement was found between these simulations and experimental results [2]. This work provides a detailed understanding of mechanisms affecting the performances of this type of high current, high-voltage pulsed accelerator.

[1] M. Ribière et al, "Contribution of electromagnetic perturbation to the transient response of an electronic circuit exposed to a high multi-MeV X-ray flux", *Trans. Nucl. Sci.* 62, 1383 (2015)

[2] R. Maisonnny et al, "Investigating the performances of a 1 MV high pulsed power linear transformer driver: from beam dynamics to x radiation", *Phys. Rev. Accel. Beams* 19, 120401 (2016).

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