



Contribution ID: 377

Type: **Poster**

Emitted electron beams from velvet cathodes

Wednesday, 21 June 2017 13:30 (1h 30m)

Velvet cathodes are widely used in field-emission electron diodes, in particular in induction accelerators used for flash X-ray radiography. The emission from velvet could be different from pulse to pulse in multi-pulse operation. As a consequence, we are revisiting the beam homogeneity and the emittance of the electron beam produced by velvet cathodes.

First, we used a single-pulse diode connected to a 100 ns, 400 kV, 1-4 kA Blumlein generator. Various cathode-anode configurations were tested and we present here the analysis of the emitted beam along with numerical simulations performed both with MAGIC2D and CST-PS3D. The Cerenkov emission produced by the beam in a fused silica target is observed with fast cameras. A Pepper pot was installed in order to measure the emittance whose value is compared to the predictions of PIC simulations. Planned studies with the M12 double pulse injector prototype will be discussed.

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Session Classification: Poster session III - Particle Beam and Accelerator Technologies

Track Classification: Particle Beam and Accelerator Technologies