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4P02 - Particle-in-cell modeling of the Saturn accelerator vacuum section

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X-ray and particle beam source designs at the Saturn accelerator would greatly benefit from a better understanding of the power flow in the center vacuum section. The Chicago particle-in-cell (PIC) code has been used to create a model of the insulator stack-MITL-diode system to attempt to match simulations to experimental B-dot current data. The stack voltage waveforms for the different MITL (magnetically-insulated transmission line) levels were first simulated using the Bertha circuit code, which was tuned to match experimental machine diagnostics, and these waveforms were used to drive the PIC simulation. One parameter of interest that is difficult to measure experimentally is the diode voltage. The simulation gives plausible results that correlate to indirect measurements of the voltage made via examining the end-point energy of x-ray spectral unfolds.

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