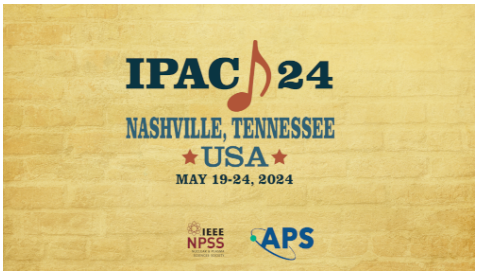

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A compact, ultrafast high-voltage pulser for transverse electromagnetic kickers

Thursday, 23 May 2024 16:00 (2 hours)

A compact, high-voltage (HV) pulser in the nanosecond regime for transverse electromagnetic (TEM) kickers is presented. TEM kickers are electromagnetic deflectors used in particle accelerators to redirect bunches of particles out of their original trajectory into a new path, such as alternate beam paths, detectors, or other instrumentation devices. The circuit proposed in this design consists of two main portions: a gate driver and a HV switch. The gate driver consists of an isolated and high-speed gate driver, powered by an isolated DC/DC converter with dual output voltages. The HV switch portion was simulated in Ansys HFSS and is composed of a SiC MOSFET, LC resonance components, and specialized diodes. When switched, the MOSFET is used to pump a high voltage into the LC circuit and diode stack, and the ultrafast diode turnoff delivers the final HV pulse to the resistor load. Careful layout techniques were implemented for the MOSFET driver to reduce pulse to pulse instability. A 1 MHz repetition rate was the target of our design.

Footnotes

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