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Design of a Low-Power Proof-of-Concept Multi-Stage Amplifier Test Stand to Model and Implement Outphasing Control for the LANSCE 805 MHz Solid-State High-Power RF Amplifier

Wednesday 13 August 2025 16:00 (2 hours)

Los Alamos Neutron Science Center has a project to investigate the feasibility for a replacement radio-frequency (RF) amplifier that is not reliant on vacuum electron tubes, a similar footprint, and equivalent RF functionality. Gallium Nitride (GaN) on Silicon Carbide (SiC) high electron mobility transistors (HEMT) will be used in combined configuration. To maintain existing operational capabilities with these GaN amplifiers, the low-level control system needs to be modified for maximum transistor lifetime. The HEMT operate in a saturated condition, with a constant amplitude drive signal to avoid the high-power dissipation of linear operation with reduced drive. This leaves the phase of the RF inputs as a control mechanism using for outphasing for amplitude modulation for the multistage amplifier. The GaN amplifiers also require a bias sequencing/protection board that is being designed and tested separately. To test and verify the control system, a low power test rack using commercial wideband RF components was built. This model system includes drive control, four 10 W amplifier stages, a final combination chassis, and accelerator timing equipment. The information from this test rack will be used to understand how to efficiently control a multi-stage high-power GaN amplifier to fit the requirements of the LANSCE linac.

Please consider my poster for contributed oral presentation

No

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

- Work supported by LANL LDRD Director's Initiative Program † email address: mikebrown@lanl.gov.

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

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