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Design and test plans for a 1.3-GHz, 100-kW high-efficiency IOT amplifier

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Recent efforts at SLAC aim at developing high-power accelerators powered by compact, high-efficiency RF sources such as klystrons and Inductive output tubes (IOT). Stellant Systems (formerly L3Harris Electron Devices) has long pioneered the IOT design and recently leveraged its power toward various accelerator applications. In this talk, we show the progress of developing a 1.3 GHz HEIOT in terms of design, and manufacturing. We also show results of 3D space-charge beam dynamics simulation of an L-Band inductive output tube (IOT) RF electron gun using the accelerator code ACE3P as a transformative approach to HEIOT design. Based on the beam optics simulation we have designed an efficient output structure that results in >100 kW of average power with an upward of 80% power efficiency. We have designed the amplifier with special attention to cooling requirement at 100 kW including extensive thermal analysis of the anode, output structure and windows. We also commissioned a solid state driver for testing purposes. In this presentation we will discuss the progress of the amplifier build and the testing plans.

Footnotes

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Primary author: OTHMAN, Mohamed (SLAC National Accelerator Laboratory)

Co-authors: BOYLE, Michael (L-3 Electron Devices); PEQUEUNO, Carlos (SLAC National Accelerator Laboratory); SY, Ann (SLAC National Accelerator Laboratory); SCHULT, Holger (L-3 Electron Devices); WEATHERFORD, Brandon (SLAC National Accelerator Laboratory)

Presenter: OTHMAN, Mohamed (SLAC National Accelerator Laboratory)

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