Contribution ID: **1138** Type: **Invited**

EXPERIMENTAL CHARACTERIZATION OF A W-BAND PHOTONIC INTERACTION KLYSTRON

Friday 28 June 2019 10:45 (30 minutes)

Experimental results are presented for the design, development, and test of a 94 GHz, extended interaction klystron (EIK) amplifier, utilizing a photonic slow-wave circuit. The EIK features uncharacteristically large physical dimensions, such as an oversized electron beam tunnel, directly contrasting conventional frequency scaling laws of vacuum electron devices. The circuit was fabricated entirely through direct machining. The microwave circuit is inspected using a three-dimensional laser-optical scanning apparatus, where it was observed that machining tolerances better than ˜13 μm were achieved. Microwave cold tests also indicate successful fabrication of the circuit, with all cavity resonant frequencies measuring within a ˜400 MHz range. In 5 ⊠s pulsed operation, the EIK demonstrated zero drive stability, over 26 dB of small-signal gain, and up to 10 W of output power, limited by the power of the input source. The W-Band design is very promising for scaling to frequencies in the hundreds of GHz range.

- This material is based upon work supported by the Defense Advanced Research Projects Agency (DARPA) and Space and Naval Warfare Systems Center Pacific (SSC Pacific) under Contract No. N66001-16-C-4039.

Authors: STEPHENS, Jacob (Massachusetts Institute of Technology); ROSENZWEIG, Guy (Massachusetts Institute of Technology); Dr TUCEK, John (Northrop-Grumman Systems Corp.); BASTEN, Mark (Northrop-Grumman Systems Corp.); Dr KREISCHER, Kenneth (Northrop-Grumman Systems Corp.); Mr SHAPIRO, Michael (Massachusetts Institute of Technology); TEMKIN, Richard (Massachusetts Institute of Technology)

Presenter: STEPHENS, Jacob (Massachusetts Institute of Technology)

Session Classification: 2.2 Fast-Wave Devices and 2.4 Vacuum Microelectronics and THz Devices

Track Classification: 2.4 Vacuum Microelectronics and THz Devices