Session 14. D/G-band TWTs

April 30 (Tuesday) / 13:30 ~ 15:10 / Room 2

Session Chair: Nikita Ryskin (Institute of Applied Physics, Russian Academy of Sciences, Russia)

13:30 ~ 13:50

14.1 / [Keynote] System Development and Perfomance Evaluation of a 0.272 THz Pulsed Folded Waveguide Traveling Wave Tube Oscillator

Ingeun Lee (Ulsan National Institute of Science and Technology, Korea), Wonjin Choi (Ulsan National Institute of Science and Technology, Korea), Ashwini Sawant (Ulsan National Institute of Science and Technology, Korea), Mun Seok Choe (Ulsan National Institute of Science and Technology, Korea), Jinwoo Shin (Agency of Defese Development, Korea), EunMi Choi (Ulsan National Institute of Science and Technology, Korea)

We present recent experimental results of a 0.272 THz energy-recirculating folded-waveguide traveling wave tube oscillator, developed in Ulsan National Institute of Science and Technology (UNIST), South Korea. Main components of the device were designed, fabricated, and evaluated individually. The 11 kV and 92 mA electron-beam from the scandate cathode is guided by a solenoidal magnet system and the electron transmission rate is monitored. The generated signal from the device is analyzed by a developed plasmonic THz detector and a heterodyne system. The details will be provided in the paper.

13:50 ~ 14:10

14.2 / Design of D-band Double Corrugated Waveguide TWT for Wireless Communications

Rupa Basu (Lancaster University, UK), Laxma R. Billa (Lancaster University, UK), Jeevan M. Rao (Lancaster University, UK), Rosa Letizia (Lancaster University, UK), Claudio Paoloni (Lancaster University, UK)

The European Commission Horizon 2020 ULTRAWAVE, “Ultra capacity wireless layer beyond 100 GHz based on millimeter wave Traveling Wave Tubes”, aims to exploit portions of two frequency bands in the millimetre wave spectrum, the D-band (141 -148.5 GHz) and the G-band (275 - 305 GHz) for creating a very high capacity layer. Due to the high atmosphere and rain attenuation, high transmission power is needed to provide a useful transmission range. Traveling Wave Tubes are the only devices that can provide the multi-Watt transmission power above 100 GHz. In this paper, the design of the Double Corrugated Waveguide (DCW), as slow wave structure, for a novel D-band TWT, for wireless communications, will be described.

14:10 ~ 14:30

14.3 / The Electron Optical System for 0.34-THz Folded Waveguide Traveling Wave Tube

Peng Hu (China Academy of Engineering Physics, China), Wenqiang Lei (China Academy of Engineering Physics, China), Yi Jiang (China Academy of Engineering Physics, China), Yinhu Huang (China Academy of Engineering Physics, China), Rui Song (China Academy of Engineering Physics, China), Hongbin Chen (China Academy of Engineering Physics, China)

The electron optical system (EOS) for a 0.34-THz folded waveguide traveling wave tube is designed and tested, the electron gun of this EOS is a pierce triode electron gun, the focusing magnetic system is a periodic permanent magnet (PPM) system. In the test of beam transmission tube, the emission current achieves 24.5 mA, the transmission ratio achieves 92%, and the duty cycles achieve 50% with forced cooling.

14:30 ~ 14:50

14.4 / Studies on sub-THz Sheet-Beam TWT with Staggered Grating Slow-Wave Structure

Anton A. Burtsev (RPE "Almaz" Saratov, Russia), Igor Navrotsky (RPE "Almaz" Saratov, Russia), Nikita M. Ryskin (V.A. Kotel'nikov Institute of Radio Engineering and Electronics RAS Saratov, Russia), Aleksei V. Danilushkin (RPE "Almaz" Saratov, Russia), Andrey E. Ploskih (Saratov State University, Russia), Vladimir N. Titov (Saint Petersburg Electrotechnical University, Russia)

Design and simulation of a sub-THz traveling-wave tube amplifier with a grating slow-wave structure (SWS) is discussed. A Pierce-type electron gun with a converging sheet electron beam emitted from a cylindrical curved cathode is designed. Beam focusing by the uniform and reversal magnetic field is compared. The results of gain and output power calculations are presented.

14:50 ~ 15:10

14.5 / Design and Analysis of a High-gain High-power cascaded 220GHz FWGTWT

Xiaochuan Zou (Chinese Academy of Science, China), Qianzhong Xue (Chinese Academy of Science, China), Xuewei Wang (Chinese Academy of Science, China)

A high-gain high-power cascaded foldedwaveguide (FWG) traveling-wave tube (TWT) is designed. By analyzing dispersion and coupling impedance, some main structural dimensions are determined. An external attenuator with sever is designed to suppress reflection and how to load it is also discussed. The slow-wave structure and the focusing system of the electron optics system are optimized. Finally, the output power may reach 100.8W at 220GHz within a practical focusing magnetic field of 0.517T. The gain is 32.3dB. And the -3dB bandwidth is about 8GHz.