2022 23rd International Vacuum Electronics Conference (IVEC 2022)

Monterey, California, USA
25-29 April 2022

IEEE Catalog Number: CFP22VAM-POD
ISBN: 978-1-6654-4326-5

Copyright © 2022 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number: CFP22VAM-POD
ISBN (Print-On-Demand): 978-1-6654-4326-5
ISBN (Online): 978-1-6654-4325-8

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

Session 2: Power Supplies & Components I: Power Supplies and Windows

Larry Sadwick *(Innosys)*

Session 3: Klystron / IOT

Aaron Jensen *(Leidos)*

Session 4: Microfabricated MMW Sources

James Dayton *(I6ZSL0)*

Session 5: Gyrotron Amplifiers

Monica Blank *(CPI)*

Session 6: Scandate and Dispenser Cathodes

Daniel Busbaher *(3M)*

Mujan N. Seif *(University of Kentucky)*
Matthew J. Beck *(University of Kentucky)*
Bernard K. Vancil *(E Beam, Inc.)*

6-5: ***Paper Unavailable*: Y2O3 -W Matrix Dispenser Cathodes with Activator Addition** (Page NA)
Jinshu Wang *(Beijing University of Technology)*

Session 7: Modeling I - Devices

Peng Zhang *(Michigan State University)*

7-1: **Effects of Magnetic Field on Stability and Attainable Power of VE Amplifiers** **(Page 63)**
Vadim Jabotinski *(Leidos)*
Igor A. Chernyavskiy *(Naval Research Laboratory)*
Alexander N. Vlasov *(Naval Research Laboratory)*

7-2: **Eigenmode Solution for Beam-Loaded Slow-Wave Structures Based on Particle-In-Cell Simulations** **(Page 65)**
Tarek Mealy *(University of California, Irvine)*
Filippo Capolino *(University of California, Irvine)*

7-3: **Comprehensive and Increasingly Accurate Stability Study of the Experimental W-Band TWT with Code TESLA-Z Stability Framework** **(Page N/A)**
Igor A. Chernyavskiy *(US Naval Research Laboratory)*
Alan M. Cook *(US Naval Research Laboratory)*
John C. Rodgers *(US Naval Research Laboratory)*

7-4: **Impact of Asymmetric Beam Shapes on the Body Current and BWO Margin in Helix TWTs** **(Page 69)**
Philip Birtel *(Thales Deutschland GmbH)*
Moritz Hägermann *(Hamburg University of Technology)*
Arne Jacob *(Hamburg University of Technology)*

7-5: **Characterization of Reflected RF Power in a Misaligned Ka-Band Serpentine Waveguide TWT** **(Page 71)**
Kyle F. Kuhn *(University of Maryland, College Park)*
Thomas Antonsen *(University of Maryland, College Park)*
Brian Beaudoin *(University of Maryland, College Park)*
Philipp Borchard *(Dymenso LLC)*
Joseph Hoh *(Dymenso LLC)*
John Petillo *(Leidos Corporation)*
Aaron Jensen *(Leidos Corporation)*

7-6: **Beam Dynamics Modeling of an Electron Gun for an L-Band High-Efficiency IOT** **(Page 73)**
Mohamed A. K. Othman *(SLAC National Accelerator Laboratory)*
Brad Shirly *(SLAC National Accelerator Laboratory)*
Ann Sy *(SLAC National Accelerator Laboratory)*
Erik Jongewaard *(SLAC National Accelerator Laboratory)*
Brandon Weatherford *(SLAC National Accelerator Laboratory)*
Michael Boyle *(Stellant Systems)*
Holger Schult *(Stellant Systems)*

Session 8: HPM - Devices

David Abe *(DARPA)*
Dev Palmer *(Defense Advanced Research Projects Agency)*

8-1: **Generation of 565 MW of X-Band Power for Structure-Based Wakefield Acceleration Using a Metamaterial-Based Power Extractor** **(Page 75)**
Julian Picard *(Massachusetts Institute of Technology)*
Xueying Lu *(Northern Illinois University & Argonne National Laboratory)*
Manoel Conde *(Argonne National Laboratory)*
Scott Doran *(Argonne National Laboratory)*
Gwanghui Ha *(Argonne National Laboratory)*
Chunguang Jing *(Euclid Techlabs & Argonne National Laboratory)*
Ivan Mastovsky *(Massachusetts Institute of Technology)*
John G. Power *(Argonne National Laboratory)*
Jiahang Shao *(Argonne National Laboratory)*
Michael A. Shapiro *(Massachusetts Institute of Technology)*
Richard J. Temkin *(Massachusetts Institute of Technology)*
Eric E. Wisniewski *(Argonne National Laboratory)*

8-2: **Recent Advances on Magnetically Insulated Line Oscillator (MILO)** **(Page 77)**
Drew A. Packard *(General Atomics)*
Y. Y. Lau *(University of Michigan)*
Emma N. Guerin *(University of Michigan)*
Chris J. Swenson *(University of Michigan)*
Stephen V. Langellotti *(University of Michigan)*
Abhijit Jassem *(University of Michigan)*

Session 9: Cathodes II: Characterization

Ryan Jacobs *(University of Wisconsin)*

Session 11: Modeling - Emission

John Petillo *(Leidos)*

Session 12: V/W-band TWT

Diana Gamzina *(Stanford University)*

12-6: Regime of Traveling-Wave Amplification in an Oversized Circuit with Nonuniform Grating (Page 500)
Sergey S. Ponomarenko *(O. Ya. Usikov Institute for Radiophysics and Electronics, NASU)*
Yurii S. Kovshov *(O. Ya. Usikov Institute for Radiophysics and Electronics, NASU)*
Sergey A. Kishko *(O. Ya. Usikov Institute for Radiophysics and Electronics, NASU)*
Alexandr A. Likhachev *(O. Ya. Usikov Institute for Radiophysics and Electronics, NASU)*
Eduard M. Khutoryan *(O. Ya. Usikov Institute for Radiophysics and Electronics, NASU)*
Alexandr F. Zabrodskiy *(O. Ya. Usikov Institute for Radiophysics and Electronics, NASU)*
Sergey A. Vlasenko *(O. Ya. Usikov Institute for Radiophysics and Electronics, NASU)*
Victoriia V. Stoyanova *(O. Ya. Usikov Institute for Radiophysics and Electronics, NASU)*
Alexei N. Kuleshov *(O. Ya. Usikov Institute for Radiophysics and Electronics, NASU)*

Session 13: Gyrotron Oscillators

Philipp Borchard

13-1: Progress on TH1509U 170GHZ 1MW European Gyrotron Program (Page 118)
Alberto Leggieri *(THALES)*
Ferran Albajar *(Fusion For Energy)*
Stefano Alberti *(Swiss Plasma Center)*
Andrea Allio *(Politecnico di Torino)*
Kostantinos A. Avramidis *(Karlsruhe Institute of Technology)*
David Bariou *(THALES)*
William Bin *(National Research Council)*
Alex Bruschi *(National Research Council)*
Ioannis Chelis *(National and Kapodistrian University)*
Rosa Difonzo *(Politecnico di Torino)*
Francesco Fanale *(National Research Council)*
Gerd Gantenbein *(Karlsruhe Institute of Technology)*
Tim Goodman *(Swiss Plasma Center EPFL)*
Jean-Philippe Hogge *(Swiss Plasma Center EPFL)*
Stefan Illy *(Karlsruhe Institute of Technology)*
Zisis Ioannidis *(National and Kapodistrian University)*
John Jelonnek *(Karlsruhe Institute of Technology)*
Jianbo Jin *(Karlsruhe Institute of Technology)*
George Latsas *(National and Kapodistrian University)*
François François *(THALES)*
Gerald Lietaer *(THALES)*
Christophe Lievin *(THALES)*
Rodolphe Marchesin *(THALES)*
Tomasz Rzesnicki *(Karlsruhe Institute of Technology)*
Francisco Sanchez *(Fusion For Energy)*
Laura Savoldi *(Politecnico di Torino)*
Sebastian Stanculovic *(Karlsruhe Institute of Technology)*
Ioannis Tigelis *(National and Kapodistrian University)*
Humberto Torreblanca *(Swiss Plasma Center EPFL)*
Manfred Thumm *(Karlsruhe Institute of Technology)*

13-2: Tunable Multi-Mirror Gyrotron for Direct Positronium Measurements (Page 120)
Vladislav Zaslavsky *(Insitute of Applied Physics RAS)*
Mikhail Glyavin *(Insitute of Applied Physics RAS)*
Irina Zotova *(Insitute of Applied Physics RAS)*

13-3: Stepped Sub-THz Gyrotron Cavity with Improved Output Mode Purity (Page 122)
Dietmar Wagner *(Max-Planck-Institute for Plasma Physics)*
Manfred Thumm *(Karlsruhe Institute of Technology)*

13-4: Design of a Two-Stage Depressed Collector for Continuous Wave Operation of MW-Class Gyrotrons (Page N/A)
Benjamin Ell *(Karlsruhe Institute of Technology (KIT-IHM))*
Chuanren Wu *(Karlsruhe Institute of Technology (KIT-IHM))*
Gerd Gantenbein *(Karlsruhe Institute of Technology (KIT-IHM))*
Stefan Illy *(Karlsruhe Institute of Technology (KIT-IHM))*
Ioannis Gr. Pagonakis *(Karlsruhe Institute of Technology (KIT-IHM))*
Tomasz Rzesnicki *(Karlsruhe Institute of Technology (KIT-IHM))*
Sebastian Stanculovic *(Karlsruhe Institute of Technology (KIT-IHM))*
Manfred Thumm *(Karlsruhe Institute of Technology (KIT-IHM))*
Jörg Weggen *(Karlsruhe Institute of Technology (KIT-IHM))*
John Jelonnek *(Karlsruhe Institute of Technology (KIT-IHM))*

13-5: *Paper Unavailable*: Fabrication of 110GHz, 1MW Gyrotron with Direct Coupled Output (Page NA)
Robert Lawrence Ives *(Calabazas Creek Research, Inc.)*
David Marsden *(Calabazas Creek Research, Inc.)*
George Collins *(Calabazas Creek Research, Inc.)*
Jeffrey Neilson *(Lexam Research)*

Session 16: Modeling - Methods

Eric Nelson *(Los Alamos National Laboratory)*

Session 17: Electron Gun Development

John Petillo *(Leidos)*

Session 18: TWT

Rich Kowalczyk *(Multibeam)*

Session 19: Magnetrons and Fast-Wave Components

Nicholas Jordan *(University of Michigan)*

Session 20: Microfabricated THz Regime Sources

Alan Cook *(NRL)*

Session 21: Multipactor

Dev Palmer *(Defense Advanced Research Projects Agency)*

Session 22: Space TWT

Lawrence Ives *(CCR)*

Poster Session 1

1: TWT/Linear Beam

2: Gyrotrons and Magnetrons Posters

3: HPM - Posters

Poster Session 2

4: TWT - Posters

Hexin Wang *(University of Electronic Science and Technology of China)*
Shaomeng Wang *(University of Electronic Science and Technology of China)*
Zhanliang Wang *(University of Electronic Science and Technology of China)*
Zhigang Lu *(University of Electronic Science and Technology of China)*
Huarong Gong *(University of Electronic Science and Technology of China)*
Zhaoyun Duan *(University of Electronic Science and Technology of China)*
Yubin Gong *(University of Electronic Science and Technology of China)*

P4-4: A Novel Coplanar Double V-Shaped Slow-Wave Structure for E-Band Backward-Wave Oscillator (Page 314)
Yuxin Wang *(University of Electronic Science and Technology of China)*
Yang Dong *(University of Electronic Science and Technology of China)*
Duo Xu *(University of Electronic Science and Technology of China)*
Jingyu Guo *(University of Electronic Science and Technology of China)*
Shaomeng Wang *(University of Electronic Science and Technology of China)*
Zhanliang Wang *(University of Electronic Science and Technology of China)*
Zhigang Lu *(University of Electronic Science and Technology of China)*
Huarong Gong *(University of Electronic Science and Technology of China)*
Zhaoyun Duan *(University of Electronic Science and Technology of China)*
Yubin Gong *(University of Electronic Science and Technology of China)*

P4-5: A 71-76GHz TWTA for Wireless Communication (Page 316)
Shishuo Liu *(Beijing Vacuum Electronics Research Institute)*
Qingmei Xie *(Beijing Vacuum Electronics Research Institute)*
Zhaofei Chen *(Beijing Vacuum Electronics Research Institute)*
Yujuan Wu *(Beijing Vacuum Electronics Research Institute)*
Yinxing Chen *(Beijing Vacuum Electronics Research Institute)*
Zhangxiong Zi *(Beijing Vacuum Electronics Research Institute)*
Jun Cai *(Beijing Vacuum Electronics Research Institute)*
Jinjun Feng *(Beijing Vacuum Electronics Research Institute)*

P4-6: Design, Simulation, and Test of a 1.7kW W-Band Sheet Beam Staggered Double-Grating TWT (Page NA)
Yu Fan *(Aerospace Information Research Institute, Chinese Academy of Sciences)*

P4-7: 3D PIC Simulation of High-Power Traveling-Wave Tube with Multiple-Tunnel Meander-Line Slow-Wave Structure (Page 318)
Roman A. Torgashov *(Saratov Branch Kotelnikov Institute of Radioengineering and Electronics RAS & Saratov State University)*
Nikita M. Ryskin *(Saratov Branch Kotelnikov Institute of Radioengineering and Electronics RAS & Saratov State University)*
Andrey G. Rozhnev *(Saratov Branch Kotelnikov Institute of Radioengineering and Electronics RAS & Saratov State University)*

P4-8: Simulation of W-Band Folded Waveguide Traveling-Wave Tube with Improved Gain Flatness (Page 320)
Luqi Zhang *(Institute of Applied Electronics China Academy of Engineer Physics)*
Yi Jiang *(Institute of Applied Electronics China Academy of Engineer Physics)*
Rui Song *(Institute of Applied Electronics China Academy of Engineer Physics)*
Wenqiang Lei *(Institute of Applied Electronics China Academy of Engineer Physics)*
Peng Hu *(Institute of Applied Electronics China Academy of Engineer Physics)*
Mawu Ma *(Institute of Applied Electronics China Academy of Engineer Physics)*

P4-9: Preliminary Design of an 8-38GHz Helix x TWT (Page 322)
Wei Li *(University of Electronic Science and Technology of China)*
Lingna Yue *(University of Electronic Science and Technology of China)*
Wenbo Shan *(University of Electronic Science and Technology of China)*
Lewei Xu *(University of Electronic Science and Technology of China)*
Jin Xu *(University of Electronic Science and Technology of China)*
Hairong Yin *(University of Electronic Science and Technology of China)*
Guoqing Zhao *(University of Electronic Science and Technology of China)*
Yanyu Wei *(University of Electronic Science and Technology of China)*
Wenxiang Wang *(University of Electronic Science and Technology of China)*

P4-10: Development of a 50 Watts Ultra-Broadband TWT (Page 324)
Jianyong Kou *(Beijing Vacuum Electronics Research Institute)*
Baoliang Hao *(Beijing Vacuum Electronics Research Institute)*
Xiaojun Meng *(Beijing Vacuum Electronics Research Institute)*
Jianling Cui *(Beijing Vacuum Electronics Research Institute)*
Jun lv *(Beijing Vacuum Electronics Research Institute)*
Weihong Ren *(Beijing Vacuum Electronics Research Institute)*
Tianying Chang *(Beijing Vacuum Electronics Research Institute)*
Yixue Wei *(Beijing Vacuum Electronics Research Institute)*

Hongzhi Zhang *(Beijing Vacuum Electronics Research Institute)*
Jinjun Feng *(Beijing Vacuum Electronics Research Institute)*

P4-11: A Novel Cold Characteristics Simulation for Wide-band Helix TWTs (Page 326)
Suresh Kumar *(Bharat Electronics Limited)*
Mukesh Kumar Alaria *(CSIR-CEERI)*
Sanjay Kumar Ghosh *(CSIR-CEERI)*

P4-12: Protecting Dielectric SWS Channel from Charging (Page 328)
Yuriy Nikitich Pchelnikov *(Retired)*

P4-13: Planar Helix Slow-Wave Structure for K-Band Traveling-Wave Tube (Page 330)
Giacomo Ulisse *(Goethe University Frankfurt)*
Viktor Krozer *(Goethe University Frankfurt)*
Roman A. Torgashov *(Saratov Branch, Kotelnikov Institute of Radioengeneering and Electronics RAS & Saratov State University)*
Nikita M. Ryskin *(Saratov Branch, Kotelnikov Institute of Radioengeneering and Electronics RAS & Saratov State University)*

P4-14: The new precision bead-pull bench at Thales (Page 332)
Fred Oulefki *(Thales AVS/MIS)*
Frédéric André *(Thales AVS/MIS)*

P4-15: Paper Unavailable: Reliability Status of Domestic Space TWTA Analysis and Promotion in China (Page NA)
Ning Xiao Wang *(Aerospace Information Research Institute, Chinese Academy of Sciences)*
Bao Xiao Su *(Aerospace Information Research Institute, Chinese Academy of Sciences)*

P4-16: Design of a 250W Ku-band High Efficiency Space TWT (Page 334)
Wenkai Deng *(University of Electronic Science and Technology of China)*
Xinwen Shang *(Aerospace Information Research Institute)*
Yulu Hu *(University of Electronic Science and Technology of China)*
Xiaobing Wang *(University of Electronic Science and Technology of China)*
Shilong Zhu *(University of Electronic Science and Technology of China)*
Quan Hu *(University of Electronic Science and Technology of China)*
Xiaofang Zhu *(University of Electronic Science and Technology of China)*
Luanfeng Gao *(University of Electronic Science and Technology of China)*
Tao Huang *(University of Electronic Science and Technology of China)*
Bin Li *(University of Electronic Science and Technology of China)*
Zhonghai Yang *(University of Electronic Science and Technology of China)*

P4-17: Design of Dynamic Variable Power with High Efficiency and Reliability for Ku-Band TWT (Page 336)
Xinwen Shang *(Aerospace Information Research Institute, Chinese Academy of Sciences)*
Weibo Huang *(China Academy of Space Technology (Xi'an))*
Hongxia Yi *(Aerospace Information Research Institute, Chinese Academy of Sciences)*
Feng Jin *(Aerospace Information Research Institute, Chinese Academy of Sciences)*
Liu Xiao *(Aerospace Information Research Institute, Chinese Academy of Sciences)*
Zicheng Wang *(Aerospace Information Research Institute, Chinese Academy of Sciences)*

P4-18: Development of Components of Multi-beam based E-band TWT (Page 338)
Hong Eun Choi *(Ulsan National Institute of Science and Technology (UNIST))*
Wonjin Choi *(Ulsan National Institute of Science and Technology (UNIST))*
EunMi Choi *(Ulsan National Institute of Science and Technology (UNIST))*

P4-19: Realization Method of Permanent Magnet Focusing System for Improving Electron Injection Flow Rate in High-Frequency Traveling-Wave Tube (Page 340)
Shaofei Liu *(University of Electronic Science and Technology of China)*
Li Qiu *(Beijing Vacuum Electronics Research Institute)*
Quan Hu *(University of Electronic Science and Technology of China)*
Xiaofang Zhu *(University of Electronic Science and Technology of China)*
Xiaolin Jin *(University of Electronic Science and Technology of China)*
YuLu Hu *(University of Electronic Science and Technology of China)*
Tao Huang *(University of Electronic Science and Technology of China)*
Li Xu *(University of Electronic Science and Technology of China)*
Bin Li *(University of Electronic Science and Technology of China)*
Zhonghai Yang *(University of Electronic Science and Technology of China)*

P4-20: *Paper Unavailable*: Increasing the Output Power of Helix TWTs (Page NA)
Yuriy Nikitich Pchelnikov *(Retired)*

P4-21: An Application of Metasurface in U-shape Meander-line Slow Wave Structure (Page 342)
Zhouqijun Li *(Aerospace Information Research Institute (Chinese Academy of Sciences) & University of Chinese Academy of Sciences)*
Zheng Wen *(Aerospace Information Research Institute (Chinese Academy of Sciences) & University of Chinese Academy of Sciences)*

5: Microfabrication/THz (Poster)

6: Klystron / IOT Posters

Poster Session 3

7: Power Supplies, Windows, Components, and Other - Posters

8: Modeling - Posters

Session 31: Plenary