

ADVANCE PROGRAM



Seventh IEEE IVEC and Sixth IEEE IVESC

IVEC 2006

April 25 – 27, 2006

**Portola Plaza Hotel
Monterey, California, USA**

***Sponsored by the
IEEE Electron Devices Society***



<http://ivec2006.org>

WELCOME

On behalf of the Program Committee and the EDS Technical Committee on Vacuum Devices, I would like to welcome you to IVEC-IVESC 2006. This joint conference combines the Seventh IEEE International Vacuum Electronics Conference and the Sixth IEEE International Vacuum Electron Sources Conference. The conference is dedicated to the fields of vacuum electronics and electron sources. The meeting this year, sponsored by the IEEE Electron Devices Society, is being held at the Portola Plaza Hotel in the beautiful city of Monterey, California.

I am certain that you will find the program that the Program Committee has put together to be an exciting and rewarding one. The conference will open Tuesday morning, April 25, with a Plenary Session consisting of an excellent group of speakers covering subjects of special interest to the community. This will be followed by two and a half days of technical presentations, both oral and poster. During the conference, the special IVEC Award for Excellence and Student Paper Award will be granted. An IVESC award presentation will also be made. This year's conference banquet will be held at the beautiful Monterey Bay Aquarium on Wednesday evening.

This conference has been arranged to enhance the presentation and discussion of useful information to manufacturers, device users, academics, and students. As the expanded conference attracts a broader group of attendees, it is our hope that an environment will be created which will allow for the broadening of our circles of interaction. During the meeting and social events, please take the time to reacquaint yourself with friends and colleagues, establish new relationships, and interact with the students.

The conference Web site (<http://ivec2006.org>) is a valuable source of information on the conference and will continue to serve as a clearinghouse for news and other IVEC-related information after the conference.

I would like to take this time to thank the Committee Members for their help and support, the presenters and contributors to the meeting for their participation, and finally Ralph Nadell of Palisades Convention Management for doing such an excellent job with the program coordination.

Bob Fickett
General Chairman
IVEC-IVESC 2006

IVEC/IVESC 2006 CONFERENCE COMMITTEE

**General
Conference Chair:** Bob Fickett
*Communications and Power Industries
Palo Alto, CA*

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*Naval Research Laboratory
Washington DC*

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*NASA Glen Research Center
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Menlo Park, CA*

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Pasadena, CA*

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*Teledyne Electronic Technologies
Rancho Cordova, CA*

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*Varian Medical Systems
Mountain View, CA*

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*Calabazas Creek Research, Inc.
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William L. Menninger
*Boeing Electron Dynamic Devices, Inc.
Torrance, CA*

Armand Staprans
*Communications and Power Industries
Palo Alto, CA*

Richard B. True
*L-3 Communications, Electron Devices
San Carlos, CA*

**Conference
Coordinator:** Ralph Nadell
*Palisades Convention Management
New York, NY*

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Naval Research Laboratory, Washington, DC

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Seoul National University, Seoul, Korea

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*Russian Academy of Science – Institute of Applied Physics,
Nizhny Novgorod, Russia*

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SRI International, Menlo Park, CA

Armand Staprans

Communications and Power Industries, Palo Alto, CA

Philippe Thouvenin

Thales Electron Devices, Velizy, France

Pierre Waller

European Space Agency, Noordwijk, The Netherlands

GENERAL INFORMATION

Registration

Advance Registration is not required, but it is strongly encouraged for quick pick-up of registration materials and for your own convenience. The registration fee includes admission to all technical sessions, a single ticket to the Wednesday evening event at the Monterey Bay Aquarium, all refreshment breaks, and a copy of the *Book of Abstracts*. On-line registration is also available through the IVEC 2006 Web site (<http://ivec2006.org>) OR complete the enclosed registration form (see centerfold), include your payment, and mail or fax to the address below. Checks should be made payable to IVEC in U.S. currency drawn on a U.S. bank. Only credit card payment may be faxed.

Palisades Convention Management
Attn: Ralph Nadell (IVEC 2006)
411 Lafayette Street, Suite 201
New York, NY 10003
fax (212) 460-5460

The deadline for receipt of Advance Registration is April 14, 2006. Requests for refunds must be made in writing and received no later than April 14, 2006. Confirmations will be mailed. However, confirmation of registration can also be made by calling (800) 350-0111 or (212) 460-9700.

	Before April 14	After April 14
IEEE Member	\$500	\$525
Non-Member	\$575	\$600
Retired/ Life Member	\$250	\$250
Full-Time Student	\$0	\$0

Registration will take place in the DeAnza Foyer of the Portola Plaza Hotel during the hours listed below.

Registration Hours

Monday, April 24	4:00 pm – 9:00 pm
Tuesday, April 25	7:00 am – 5:00 pm
Wednesday, April 26	7:30 am – 5:00 pm
Thursday, April 27	7:30 am – 1:30 pm

Hotel Accommodations

The meeting will be held at the Portola Plaza Hotel, located at Two Portola Plaza, Monterey, CA 93940; telephone (831) 649-4511. A block of sleeping rooms has been reserved for attendees of the Seventh IEEE International Vacuum Electronics Conference at the Portola Plaza. The special meeting rates are listed below.

Single/Double Occupancy \$179

Hotel reservations may be made directly through the IVEC Web site (<http://ivec2006.org>) OR you can complete and mail the enclosed hotel registration card (see centerfold) to the Portola Plaza Hotel OR you can call (831) 649-4511 prior to April 7, 2006. Reservations received after this date will be processed at the conference rate on a space available basis only. When contacting the hotel, please be sure to mention that you are attending the International Vacuum Electronics Conference.

Airport/Hotel Transportation

The Monterey Peninsula Airport is served by major and regional carriers and offers more than 50 flights a day. There are connecting and direct flights to all major West Coast cities. The Peninsula is also convenient to all three San Francisco Bay airports. San Jose airport is just 1 hour away and both San Francisco and Oakland airports are less than 2 hours by car. Los Angeles is 5 hours away by car.

Climate

Moderate year-round temperatures and a typically dry California climate are two of Monterey's most attractive features. Daytime temperatures rarely exceed the 70s, and sweaters or light jackets are sufficient most evenings. The average temperature is 66°C.

Surrounding Attractions

Monterey, California, is also home to historic Fisherman's Wharf on Cannery Row, the world-famous Monterey Bay Aquarium, and Pebble Beach. Monterey is a seaside community providing a variety of recreational activities including shopping, golf, local wineries, art galleries and museums.

Monterey Bay Aquarium Strolling Dinner

All conference attendees are invited to attend the Conference social event to be held on Wednesday evening, April 26th. at the Monterey Bay Aquarium. The event will start at the Aquarium at 7:00 pm. The Aquarium is walking distance from the hotel, but bus transportation will be provided. Buses will leave the hotel at 6:45 pm.

IVEC 2006 Award for Excellence in Vacuum Electronics

The IVEC award for excellence honors those who have made exceptional contributions to the field of vacuum electronics. Any individual or group working in the field of vacuum electronics is eligible for this award, which will be presented each year during the IVEC conference. Information about the award and the nomination procedure can be found on the conference Web site. Selection of the winner will be made by a vote of the members of the IEEE EDS Technical Committee on Vacuum Devices. Only living persons are eligible for the award. The winner will receive a commemorative plaque and an award of \$1000. If a group nomination is selected for the award, each member will each receive a plaque and equal share the \$1000.

IVESC Awards

Award plaques will be presented to persons deemed to have made significant contributions to the advancement of cathode technology over the year.

MURI Meeting

Starting at 8 am on Friday, April 28th, there will be a review of the Multidisciplinary University Research Initiative (MURI) on Cathodes and RF Breakdown in De Anza I of the Portola Plaza Hotel. This MURI, initiated 2 years ago by the Air Force Office of Scientific Research, investigates fundamental underlying physics required to advance both our understanding and capabilities with regards to electron emission processes inside of microwave vacuum electronic devices. This review, which is open to all conference attendees, will consist of presentations on this theme from all of the university partners:

- University of Wisconsin, Madison (lead institution)
- University of California, Davis (lead institution)
- MIT, Stanford, Texas Tech, UC Berkeley, University of Michigan, University of Nevada (Reno and Las Vegas), University of New Mexico

A nominal registration fee of \$30 will be collected on-site to defray costs associated with the meeting.

Messages

Messages for attendees will be posted in the Message Center, located adjacent to the IVEC registration desk. For incoming messages, please call the Portola Plaza Hotel at (831) 649-4511 and ask to be transferred to the IVEC registration desk.

Conference Contact

Anyone requiring additional information should contact the Conference Coordinator, Ralph Nadell, c/o Palisades Convention Management, 411 Lafayette Street, Suite 201, New York, NY 10003, (212) 460-8090 ext. 203, or Rnadell@pcm411.com. For registration verification, call (800) 350-0111 or (212) 460-9700.

Web site

For additional information on Monterey and IVEC, individuals are encouraged to visit our Web site at <http://ivec2006.org>

PLENARY SESSION

Tuesday, April 25, 2006 / 8:00 am – 12:00 pm / Steinbeck Forum

- **Introductory Remarks** (8:00)
R. Fickett
CPI, Palo Alto, CA

- PL.1: Solid-State and Vacuum Electron Device Radars: Past, Present and Future** (8:10 am)
E. Brookner
Raytheon Co., Sudbury, MA

- PL.2: Next-Generation EW Requirements** (8:40)
F. Klemm
Naval Research Laboratory, Washington, DC

- PL.3: Trends in Satellite Communications Amplifier Applications** (9:05)
T. Shroyer
General Dynamics, San Jose, CA

- PL.4: Vacuum Electron Devices for Applications in “Big Science”** (9:35)
R. Temkin
MIT, Cambridge, MA

- PL.5: Direct Energy Applications for High-Power Vacuum Electronics** (10:00)
K. Hackett
Air Force Research Laboratory, Kirtland AFB, NM

- BREAK** (10:25–10:55)

- PL.6: University Training of Tube Engineers, in the U.S. and Abroad** (10:55)
G. Caryotakis
SLAC, Menlo Park, CA

- PL.7: Priming the Vacuum Electronics Industry for Continued Prosperity in the 21st Century** (11:20)
C. Armstrong
L-3 Communications, San Carlos, CA

- AWARDS CEREMONY** (11:50)
D. Goebel
Jet Propulsion Laboratory, Pasadena, CA

- ANNOUNCEMENTS** (12:10)

- LUNCH** (12:20–1:30)

TWT I

Tuesday, April 25, 2006 / 1:30 – 3:10 pm / De Anza I

Chair: P. Waller
*European Space Agency, Noordwijk,
The Netherlands*

1.1: 70%-Efficient Flight Set Average Ku-Band Traveling-Wave Tubes for Satellite Communications (1:30)

W. Menninger, S. T. Blunk, W. L. McGeary
*L-3 Communications Electron Technologies, Inc.,
Torrance, CA*

1.2: New 750-W DBS Band and 250-W Ka-Band TWTs (1:50)

**P. Thouvenin, A. Gallien, R. Hallay, P.-F. Alleaume,
R. Siret**
Thales Electron Devices, Velizy Villacoublay, France

1.3: Ka-Band Space TWT Amplifiers (2:10)

N. Robbins, W. L. Menninger, D. R. Dibb, D. E. Lewis
*L-3 Communications Electron Technologies, Inc.,
Torrance, CA*

1.4: Linearity of the Transverse Field Interaction in a Traveling Wave Tube (2:30)

D. Chernin, Y. Pchelnikov
SAIC, McLean, VA

T. M. Antonsen, Jr.
University of Maryland, and SAIC

B. Levush, S. J. Cooke
Naval Research Laboratory, Washington, DC

W. Manheimer
Sachs-Freeman Associates

1.5: Space Applications for L-Band TWT (2:50)

P. Ehret, T. Monsees, E. Bosch, W. Gerum
Thales Electron Devices, Ulm, Germany

WINDOWS AND DIELECTRICS

Tuesday, April 25, 2006 / 1:30 – 3:10 pm / De Anza II

Chair: G. Gantenbein
*Forschungszentrum Karlsruhe, Karlsruhe,
Germany*

- 2.1: Session Keynote: Transition of Window Breakdown from the Vacuum Multipactor Discharge to the Collisional RF Plasm (1:30)**

H. C. Kim, J. P. Verboncoeur
University of California at Berkeley, Berkeley, CA

G. F. Edmiston, A. A. Neuber
Texas Tech University, Luboch, TX

Y. Y. Lau, R. M. Gilgenbach
University of Michigan – Ann Arbor, Ann Arbor, MI

- 2.2: High-Power Aluminum Nitride RF Vacuum Window (1:50)**

**R. Kowalczyk, M. F. Kirshner, C. B. Wilsen,
L. Turek**
L-3 Communications Electron Devices, San Carlos, CA

- 2.3: High-Thermal-Conductivity Aluminum Nitride for High-Power Microwave Windows: An Update (2:10)**

E. Savrun, V. Nguyen
Sienna Technologies, Inc., Woodinville, WA

- 2.4: Broadband Microwave and W-Band Characterization of BeO-SiC and AlN-Based Lossy Dielectric Composites for Vacuum Electronics (2:30)**

J. Calame, D. Lobas, D. K. Abe
Naval Research Laboratory, Washington, DC

M. Garven, R. El Myers, F. Wood
ATK-Mission Research, Newington, VA

- 2.5: Analysis of the Complex Dielectric Permittivity Behavior of Composites Based on Al₂O₃/AlN and Precursor-Derived SiC in the 1–18-MHz Frequency Range (2:50)**

J. Battat, J. P. Calame
Naval Research Laboratory, Washington, DC

GUN DESIGN I

Tuesday, April 25, 2006 / 1:30 – 3:10 pm / De Anza III

Chair: J. Petillo
SAIC, Burlington, MA

3.1: Session Keynote: Electron-Gun Thermal Design, Analysis, an Experimental Validation (1:30)

**L. Behnke, K. L. Montgomery, D. R. Whaley,
R. B. True**
L-3 Communications Electron Devices, San Carlos, CA

3.2: W-Band Sheet-Beam Klystron Gun Design Using MICHELLE (1:50)

A. Burke, G. Scheitrum, B. Phillips
SLAC, Menlo Park, CA

3.3: Off-Axis Gridded Gun for Multi-Beam Applications (2:10)

**C. Wilsen, M. F. Kirshner, R. D. Kowalczyk,
D. R. Whaley, R. B. True, R. J. Hansen, L. Turek**
L-3 Communications Electron Devices, San Carlos, CA

3.4: Design and Evaluation of Electron Gun and Beam Focusing for Ku-Band 140-W Space TWT (2:30)

**R. K. Sharma, V. Srivastava, A. R. Choudhury,
A. Bera, S. N. Joshi**
Central Electronics Engineering Research Institute (CEERI), Pilani, India

T. K. Ghosh
E2V Technology, U.K.

V. Kiran
Bharat Electronics, Ltd., Bangalore, India

3.5: Beam Generation and Transport for a THz TWT (2:50)

M. Read, C. Cory, G. Miram, L. Ives
Calabazas Creek Research, Plainfield, VT

J. Booske
University of Wisconsin – Madison, Madison, WI

SCANDATES

Tuesday, April 25, 2006 / 1:30 – 2:50 pm / Ironwood

Chair: E. Wintucky

NASA Glenn Research Center, Cleveland, OH

4.1: Session Keynote: Recent Developments in Scandia-Doped Dispenser Cathodes (1:30)

J. Li, H. Wang, Y. Gao, Z. Yu, Q. Chen, H. Yuan, K. Pan, K. Zhang

Beijing Vacuum Electronics Research Institute, Beijing, Peoples Republic of China

J. Wang, Y. Wang, W. Liu

Beijing Polytechnic University, Beijing, Peoples Republic of China

4.2: Development of High-Current-Density Cathodes with Scandia-Doped Tungsten Powders (1:50)

Y. Wang, J. Wang

Beijing University of Technology, Beijing, Peoples Republic of China

4.3: Investigation of Cathodes with Scandia and Rare-Earth Oxide Co-Doped Matrices (2:10)

J. Wang, T. Gao, W. Liu, Y. Wang

Beijing University of Technology, Beijing, Peoples Republic of China

4.4: Characterization of W-Ir Mixed-Metal Matrix Scandate Cathode (2:30)

M. Ravi, P. D. Devi, K. Santosh Kumar, K. S. Bhat

Microwave Tube Research & Development Centre, Bangalore, India

SPACE COMMUNICATIONS AND LINEARIZATION

Tuesday, April 25, 2006 / 3:30 – 5:30 pm / De Anza I

Chair: W. L. Menninger
*L-3 Communications Electron Technologies, Inc,
Torrance, CA*

- 5.1: Session Keynote: Evolution of Space TWT Requirements and Specifications for Modern Communications Satellites (3:30)**

M. Aloisio, E. Casini, A. Ginesi, P. Waller
*European Space Agency ESA/ESTEC, Noordwijk,
Netherlands*

- 5.2: Follow-Up Reliability Study of Boeing In-Orbit TWTAs versus SSPAs (3:50)**

E. Nicol, M. K. DePano, W. J. Mangus
Boeing Satellite Development Center, El Segundo, CA

- 5.3: High-Power Combining of Ka-Band TWTs for Deep-Space Communications (4:10)**

E. Wintucky, R. N. Simons, K. R. Vaden
NASA Glenn Research Center, Cleveland, OH

G. G. Lesny
Alphaport, Inc.

J. L. Glass
Zin Technologies, Inc.

- 5.4: Wideband Linear and Nonlinear Distortion Mitigation of a Mismatched Ka-Band Coupled-Cavity Traveling-Wave-Tube (4:30)**

J. Qiu, D. K. Abe, B. G. Danly, B. Levush
Naval Research Laboratory, Washington, DC

T. M. Antonsen, Jr.
*University of Maryland – College Park, MD
and
Science Applications International Corp., McLean, VA*

R. Myers
ATK Mission Research Corp., Newington, VA

- 5.5: The 20-Minute Effect: An Anomalous TWT Anode Discharge Phenomenon (4:50)**

H. Wolkstein, J. Beck
Lockheed Martin, Newtown, PA

- 5.6: Pulsed-Mode TWT Phase Noise Reduction by Direct Sampled Voltage Ripple from Power Supply (5:10)**

J. S. Lee
Meggitt Safety Systems, Inc., Simi Valley, CA

Y. Goren
*Teledyne Electronic Technologies-MEC,
Rancho Cordova, CA*

KLYSTRONS

Tuesday, April 25, 2006 / 3:30 – 5:30 pm / De Anza II

Chair: M. Kirshner

L-3 Communications, San Carlos, CA

- 6.1: Compact High-Power Ka-Band Extended Interaction Klystron for Terrestrial and Space Applications (3:30)**

D. Berry, A. Roitman, D. Sweeney, P. Mathieson, B. Steer

CPI Canada Inc., Georgetown, Ontario, Canada

- 6.2: PPM-Focused Ku-Band Pulsed EIK (3:50)**

A. Durand

Thales Electron Devices, Velizy-Villacoublay, France

- 6.3: Test Results for an 19-kW 1497-MHz Klystron for Accelerators (4:10)**

M. Read, A. Mizuhara, M. Mizuhara, G. Collins, G. Miram, L. Song, L. Zitelli, L. Ives

Calabazas Creek Research, Plainfield, VT

- 6.4: 500-MHz 800-kW CW Klystron for Synchrotron (4:30)**

R. Marchesin, A. Beunas

Thales Electron Devices, Velizy, France

- 6.5: Using Large-Signal Code TESLA for Wide-Band Klystron Simulations (4:50)**

A. Vlasov, I. A. Chernyavskiy

Science Applications International Corp., College Park, MD

T. M. Antonsen, Jr.

University of Maryland – College Park, College Park, MD

D. E. Pershing

Mission Research Corp., Newington, VA

K. T. Nguyen

Beam Wave Research, Inc., Silver Spring, MD

S. J. Cooke and B. Levush

Naval Research Laboratory, Washinton, DC

- 6.6: Investigation of Possible Multipactor Discharge in a Klystron Input Cavity (5:10)**

R. Carter, C. Hill

Lancaster University, Lancaster, Lancashire, U.K.

GUN/COLLECTOR DESIGN

Tuesday, April 25, 2006 / 3:30 – 5:10 pm / De Anza III

Chair: R. B. True

*L-3 Communications Electron Device Division,
San Carlos, CA*

**7.1: Session Keynote: Application of the Finite-Element
MICHELLE Beam Optics Code to RF Gun (3:30)
Modeling**

J. Petillo

SAIC, Burlington, MA

K. Jensen, B. Levush

Naval Research Laboratory, Washington, DC

E. Nelson

Los Alamos National Laboratories, Los Alamos, NM

J. DeFord

*Simulation Technology & Applied Research, Inc.,
Mequon, WI*

7.2: MICHELLE Code Usage and Validation at CPI (3:50)

J. Atkinson

CPI, Palo Alto, CA

B. Levush

Naval Research Laboratory, Washington, DC

J. Petillo

Science Applications International Corp., Burlington, MA

**7.3: Optimization of Multistage Collectors Using the
MICHELLE Code within the Analyst Modelling
Framework (4:10)**

J. DeFord, B. Held, L. Chernyakova

*Simulation Technology & Applied Research, Inc.,
Mequon, WI*

J. Petillo

SAIC, Burlington, MA

B. Levush

Naval Research Laboratory, Washington, DC

**7.4: Computerized Electron-Gun Design Using the 3-D
Beam Optics Code BOA (4:30)**

R. Lawrence Ives, T. Bui, D. Marsden

Calabazas Creek Research, Inc., Saratoga, CA

J. David, H. Tran

North Carolina State University, Raleigh, NC

**7.5: The Multiple-Beam Electron-Gun Computer
Simulations (4:50)**

S. Kozlov, V. M. Pikunov, A. N. Sandalov

M. V. Lomonosov Moscow State University, Moscow, Russia

EMISSION FUNDAMENTALS

Tuesday, April 25, 2006 / 3:30 – 5:30 pm / Ironwood

Chair: M. C. Green

Varian Medical Systems, Mountain View, CA

- 8.1: *Workfunction of Cathode-Emitter Materials Obtained by Ab-Initio Quantum-Mechanical Modeling* (3:30)**

**V. Vlahos, E. F. Holby, A. K. Berta, D. D. Morgan,
J. H. Booske**

University of Wisconsin-Madison, Madison, WI

- 8.2: *Theoretical Study of Triple-Junction Electron Emission for a New Type of Cold Cathode* (3:50)**

M. Chung, H. K. Bae

University of Ulsan, Ulsan, Korea

P. H. Cutler, N. M. Miskovsky

The Pennsylvania State University, University Park, PA

- 8.3: *A General Electron-Emission Equation Coupling Thermal and Field Effects* (4:10)**

K. Jensen

Naval Research Laboratory, Washington, DC

M. Cahay

University of Cincinnati, Cincinnati, OH

- 8.4: *Transition from Fowler-Nordheim Field Emission to Space-Charge-Limited Current Density in the Relativistic and Quantum Limits* (4:30)**

Y. Feng, J. P. Verboncoeur

University of California – Berkeley, Berkeley, CA

Y. Y. Lau

University of Michigan – Ann Arbor, Ann Arbor, MI

- 8.5: *A Study of Macroscopic Emission Non-Uniformity in Thermionic Cathodes Due to Profilometry Variation* (4:50)**

K. Jensen

Naval Research Laboratory, Washington, DC

Y. Y. Lau

University of Michigan – Ann Arbor, Ann Arbor, MI

- 8.6: *Space-Charge Effects on Thermionic Emission: The Knee of the Transition from TL to FSCL Operation* (5:10)**

C.-Y. Chang, P.-S. Lu, K.-H. Huang, M.-C. Lin

Fu Jen University, Taipei, Taiwan

POSTER SESSION I

Tuesday, April 25, 2006 / 7:00 – 9:00 pm / De Anza III

Chair: D. Abe

Naval Research Laboratory, Washington, DC

P1.1: *Klystron: Generator of Chaotic Radioimpulses*

**B. Dmitriev, Y. D. Zharkov, V. N. Skorokhodov,
A. A. Biryukov**

Saratov State University, Saratov, Russia

P1.2: *The Rigorous Excitation Equations for the Arbitrary-Irregular Waveguides with Finite Conduction of the Wall*

A. A. Kurayev, A. K. Sinitsyn

*Belarusian State University of Informatics and
Radioelectronics, Minsk, Belarus*

P1.3: *The Charged-Particle Motion Under Electrostatic Space-Periodic Field in Crossed-Field Systems*

O. M. Nikitenko, M. V. Volovenko

*Kharkiv National University of Radioelectronics,
Kharkiv, Ukraine*

P1.4: *Limiting Currents in Magnetically Focused Intense Relativistic Beams Filled with Background Plasm*

L. Jianqing, M. Yuanlong

*University of Electronic Science and Technology of China,
Chengdu, Peoples Republic of China*

P1.5: *Microminiaturization of Passive Elements with Distributed Parameters*

Y. Pchelnikov

SloWaveS, Inc., Cary, NC

P1.6: *Sheet-Beam Electron-Gun Design for Millimeter-Wave and Sub-Millimeter-Wave Vacuum Electronic Sources*

B. Danly, J. X. Qiu, J. Petillo, B. Levush

Naval Research Laboratory, Washington, DC

P1.7: *Application of CAD Simulation Technology in Microwave Tube Research and Fabrication*

Z. J. Zhu, B. Jia, Z. Luo

*University of Electronic Sci and Tech. of Science,
Chengdu, Peoples Republic of China*

P1.8: *Numerical Determination of Interaction Impedance on Birdsall Slow-Wave Structures*

C. Motta

*Centro Tecnológico Da Marinha Em Sao Paulo,
Sao Paulo, Brazil*

D. T. Lopes

Instituto de Pesquisas Energéticas e Nucleares, Brazil

- P1.9: Propagation of Short Radio Pulses through Delay Line of a Cold TWT**
A. Gritsunov, N. V. Skachkova
Kharkiv National University of Radio Electronics, Kharkiv, Ukraine
- P1.10: Optimized Relativistic TWT and BWO on Corrugated Waveguides with Groove-Modulator**
A. A. Kurayev, A. K. Sinitsyn
Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus
- P1.11: Characterization of Commonly Used Cold Cathodes in Explosive Emission Diodes**
R. Verma, A. Shyam, S. Chaturvedi, D. Lathi, V. Chaudhary, R. Shukla, S. Sharma, J. Sonara, K. Shah, B. Adhikary, R. Mehida, T. Bhavsar, C. Mehta
Institute for Plasma Research, Bhat, Gandhinagar, India
- P1.12: Rapid Startup in Magnetrons using the Transparent Cathode**
H. Bosman, S. Prasad, M. Fuks, E. Schamiloglu
University of New Mexico, Albuquerque, NM
- P1.13: Secondary Electron Emission from REO-Mo Metal Cermet Cathode**
W. Liu, J. Wang, M. Zhou
Beijing University of Technology, Beijing, Peoples Republic of China
- P1.14: Lumen Efficiency of Cold-Cathode Fluorescent-Lamp (CCFL) Improvement with MgO-Coated Cathode**
L. Wei, X. Zhang, D. den Engelsen
Southeast University, Nanjing, Peoples Republic of China
K. Raper
LG.Philips Displays, Blackburn, Lancashire, U.K.
- P1.15: A New Structure to Improve the Luminance Efficiency of an FED**
L. Wei, L. Chen, Z. Xiaobing, Z. Hongping
Southeast University, Nanjing, Peoples Republic of China
G. Yang
Huadong Electronics Optoelectronics Science & Technology Co., Ltd., Nanjing, China
- P1.16: An Analysis Tool for Preliminary Heater Design**
J. Paff
Spectra-Mat, Inc., Watsonville, CA
- P1.17: Study of Novel Helical Slow-Wave Circuits for Millimeter-Wave TWTs**
B. Li, Z. X. Fang, Y. Z. Hai, L. Li, Z. B. Qing, Y. L. Ming
University of Electronic Science and Technology of China, Chengdu, Peoples Republic of China

- P1.18: *Thermal Analysis of Novel Helix TWTs***
L. M. Yao, Z. H. Yang, B. Li, L. Liao, B. Q. Zeng, X. F. Zhu
University of Electronics Science and Technology of China, Chengdu, Peoples Republic of China
- P1.19: *Design, Simulation, and Scale-Model Cold Test of a Sever for the Los Alamos 94-Hz TWT RF Structure***
L. Earley, E. Smirnova, B. Carlsten
Los Alamos National Laboratory, Los Alamos, NM
J. Godin
University of California – San Diego, La Jolla, CA
- P1.20: *Sheet Beam Development for mm-Wave Microwave Tubes at Los Alamos National Laboratory***
S. Russell, K. A. Bishofberger, R. W. Brown, B. E. Carlsten, L. M. Earley, W. B. Haynes, H. C. Kirbie, F. L. Krawczyk, F. P. Romero, F. E. Sigler, E. I. Smirnova, R. M. Wheat Jr., Z.-F. Wang
Los Alamos National Laboratory, Los Alamos, NM
S. Humphries, Jr.
Field Precision, Albuquerque, NM
P. Ferguson
MDS Co., Oakland, CA
- P1.21: *Extraction of Lumped Circuit Parameters of Coupled-Cavity Structures by Using 3-D Finite Element Method***
W.-C. Lin, Y.-H. Liao, W.-C. Keng, K.-L. Peng, S.-J. Tzun, M.-C. Lin
Fu Jen University, Taipei, Taiwan
- P1.22: *Analysis of Helix Slow-Wave Structure for Space TWT Using Ansoft HFSS***
M. Alaria, A. K. Sinha, V. Srivastava
CEERI, Pilani, India
- P1.23: *Design and Simulation of Inductively Loaded Inter-Digital SWS***
V. L. Christie, L. Kumar
Microwave Tube Research & Development Centre, Jalahalli, Bangalore, India
N. Blakrishnan
Indian Institute of Science, Bangalore, India
- P1.24: *Interaction Impedance Measurements in Slow-Wave Structures via Nonresonant Perturbation Method***
C. Motta
Centro Tecnológico Da Marinha Em Sao Paulo, Sao Paulo, Brazil
D. T. Lopes
Instituto de Pesquisas Energéticas e Nucleares, Brazil

- P1.25: *A Novel Dispersion Measurement Technique for Helix SWS***
P. Raja Ramana Rao, R. Seshardri, S. K. Datta
*Microwave Tube Research & Development Centre,
Jalahalli Post, Bangalore, India*
- P1.26: *Design and Development of Electron Gun and PPM Focusing for Vacuum Power Booster TWT of Broad-Band MPM***
**R. K. Sharma, S. M. Sharma, A. R. Choudhury,
R. K. Gupta**
*Central Electronics Engineering Research Institute
(CEERI), Pilani, India*
T. K. Ghosh
E2V Technology, U.K.
- P1.27: *Effect of the Magnetic Field of PPM Stack on Electron Beam in the Gun and Transit Area***
F. Jinjun, L. Xiu
*Vacuum Electronics Research Institute, Beijing,
Peoples Republic of China*
- P1.28: *Influence of Attenuator on the Performance of the Helix TWTs***
Z. Duan, Y. Gong, W. Wan, Y. Wei
*University of Electronic Science & Technology of China,
Chengdu, Sichuan, Peoples Republic of China*
B. N. Basu
College of Engineering and Technology, Moradabad, India
- P1.29: *On-Board Performance Enhancement of a Satellite Communication TWT***
**S. K. Ghosh, S. Prakash, K. S. Prasad, P. V. Bhaskar,
R. R. Singh, V. Kiran**
Bharat Electronics, Jalahalli, Bangalore, India
- P1.30: *Development of an X-Band Antenna-Amplifier: Numerical Simulations and Plasma-Related Investigations***
**A. S. Shlapakovski, I. Vintizenko, V. Matvienko,
A. Mashchenko**
Tomsk Polytechnic University, Tomsk, Russia
W. Jiang
Nagaoka University of Technology, Nagaoka, Japan
E. Schamiloglu
University of New Mexico, Albuquerque, NM
- P1.31: *Powerful TWT High-Perveance Electron Gun with Low-Voltage Girdles Zero-Minus Control and High Beam Compression***
**A. Konnov, A. V. Arkhipov, O. Y. Maslennikov,
S. P. Morev**
FSUE R&P Corp. (Toriy), Moscow, Russia

- P1.32: *The Forming Peculiarities of Intensive Electron Beams of the Millimeter-Wave Radiations Sources***
Y. G. Gamaunov, A. I. Toreev, E. V. Patrusheva
Saratov State University, Saratov, Russia
- P1.33: *A Correction Method for Analysis of Inhomogenously-Loaded Helical Slow-Wave Structures***
L. Bin, Z. XiaoFang, Y. ZhongHai, L. Li
University of Electronic Science and Technology of China, Chengdu, Peoples Republic of China
- P1.34: *Relativistic Folded Waveguide BWO***
A. A. Kurayev, A. V. Aksenchyk, A. V. Kiyko
Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus
- P1.35: *On Statistical Description of Nonstationary Emission Processes***
V. Anikin
Saratov State University, Saratov, Russia
- P1.36: *Terahertz Smith-Purcell Radiation from Surface Plasmon Wave in One-Dimensional Photonic Crystal Structure Using Counter-Streaming Electron Beams***
Y. M. Shin, J. K. So, K. H. Jang, J. H. Won, A. Srivastava, G. S. Park
Seoul National University, Seoul, Korea

TWT II

Wednesday, April 26, 2006 / 8:30 – 10:30 am / De Anza I

Chair: P. Thouvenin

*Thales Electron Devices, Velizy Villacoublay,
France*

9.1: Session Keynote: A 1-kW Microwave Power Module for Pulsed Radar (8:30)

**T. Hargreaves, A. Perle, R. B. True, G. Good,
C. M. Armstrong, T. Schoemehl, G. Tucker, R. Duggal**
L-3 Communications Electron Devices, San Carlos, CA

9.2: Development of 400-W CW Ka-Band Communications Helix TWT and a 1-kW Peak-Power Ka-Band Radar Helix TWT (8:50)

**C. Chong, J. A. Davis, J. Forster, R. H. Le Borgne,
M. L. Ramay, R. J. Stolz, R. N. Tamashiro**
L-3 Communications Electron Devices, San Carlos, CA

9.3: Development of a I–J-Band High-Power Mini TWT (9:10)

F. Yang, L. Roeder, B. Stockwell
CPI, Inc., Palo Alto, CA

9.4: Experimental Investigation of a Novel Circuit for Millimeter-Wave TWTs (9:30)

A. Theiss, C. J. Meadows, R. B. True
L-3 Communications Electron Devices, San Carlos, CA

9.5: High-Power CW BeO Block Brazed Copper Helix TWT (9:50)

J. S. Lee
Meggitt Safety Systems, Inc., Simi Valley, CA

C. Everleigh
Pendulum Electromagnetics, Inc., Raleigh, NC

9.6: Fabrication and Experiments on a 6–18-GHz, Vane Helix TWT Amplifier (10:10)

J. J. Choi, W. B. Seo, H. J. Kim, J. H. Joo
Kwangwoon University, Nowon-gu, Seoul, Korea

J. H. So
Agency for Defense Development, Daejeon, Korea

THz

Wednesday, April 26, 2006 / 8:30 – 10:30 am / De Anza II

Chair: W. D. Palmer
U.S. Army Research Office, Durham, NC

10.1: *Experimental Investigation on High-Order-Mode Photonic Crystal Reflex Klystron Using Spindt-Type Cathodes* (8:30)

**G.-S. Park, K. H. Jang, S. G. Jeong, J. H. Won,
J. K. So, Y. M. Shin**
Seoul National Univeristy, Seoul, Korea

10.2: *Extended Interaction Klystrons for Submillimeter Applications* (8:50)

B. Steer, D. Berry, P. Horoyski, A. Roitman
CPI Canada Inc., Georgetown, Ontario, Canada

10.3: *Transportable High-Power THz Source* (9:10)

H. Bluem, A. M. M. Todd
Advanced Energy Systems, Princeton, NJ

R. H. Jackson
Jacson Scientific Consulting

H. P. Freund
SAIC, Burlington, MA

10.4: *Study on the Generation of THz Waves in a Vacuum Electronic Device* (9:30)

M.-C. Lin, P.-S. Lu, K.-H. Huang
Fu Jen University, Taipei, Taiwan

10.5: *Simulation of a THz Vacuum Triode Using Carbon-Nanotube Emitter* (9:50)

C. Paoloni, E. Petrolati, A. Di Carlo
University of Roma, Roma, Italy

10.6: *A Millimeter-Wave Two-Stage Orbotron* (10:10)

V. Yeryomka
*National Academy of Sciences of Ukraine, Kharkiv,
Ukraine*

A. V. Gurevich, A. K. Sinitsyn
*National Academy of Sciences of Ukraine, Kharkiv,
Ukraine*

THERMIONIC SOURCES

Wednesday, April 26, 2006 / 8:30 – 10:30 am / Ironwood

Chair: J. E. Yater

Naval Research Laboratory, Washington, DC

- 11.1: Session Keynote: Development of a (100)-Oriented Hafnium Carbide Thermionic Electron Source with Built-in Heater and Guard Ring (8:30)**

W. Mackie, K. J. Kagarice, C. L. Fast

Applied Physics Technologies, Inc., McMinnville, OR

- 11.2: Effect of Nanocrystalline Structure on Work Function of Tungsten (8:50)**

R. Z. Bakhtizin, Y. M. Yumaguzin

Bashkir State University, Ufa, Russia

R. R. Mulyukov

Russian Academy of Sciences, Ufa, Russia

- 11.3: Controlled Porosity Cathodes Using Sintered Tungsten Wires (9:10)**

R. L. Ives, G. Miram

Calabazas Creek Research, Inc., Saratoga, CA

L. Falce, P. Borchard, R. Wilcox

Consultants

S. Schwartzkopf, R. Witherspoon

Ron Witherspoon, Inc.

K. Gunther

HeatWave Laboratories, Inc.

- 11.4: A Method of Predicting Dispenser Cathode Performance by the Measurement of Barium Flux (9:30)**

N. Sun, L. Garbini, L. Falce

CPI, Palo Alto, CA

- 11.5: LaB₆-Based Gun Brightness vs. Cathode Life (9:50)**

V. Katsap

NuFlare Technology, Hopewell Junction, NY

- 11.6: Cathode-Emission Characterization Improvement (10:10)**

R. Dawson, W. G. Tighe

L-3 Communications Electron Technologies, Inc., Torrance, CA

POSTER SESSION II

Wednesday, April 26, 2006 / 8:00 – 11:30 am / De Anza III

Co-Chairs: T. Hargreaves and D. Whaley
L-3 Communications, San Carlos, CA

P2.1: *Current Development Programs for the Satcom Ka-Band EIK*

R. Dobbs, M. Hyttinen, A. Roitman
*Communications & Power Industries Canada, Inc.,
Georgetown, Ontario, Canada*

P2.2: *Preliminary Modeling and Simulation Results of a Megawatt HOM-IOT*

E. Wright, H. Bohlen
CPI, Palo Alto, CA

P2.3: *Design of a 200-MW L-Band Annular Beam Klystron*

M. Read, P. Ferguson, L. Ives, L. Song
Calabazas Creek Research, Plainfield, VT

B. Carlsten, M. Fazio
Los Alamos National Laboratory, Los Alamos, NM

P2.4: *Large-Signal Klystron Simulation*

**R. Kowalczyk, C. F. Malcolm III, M. F. Kirshner,
C. B. Wilsen**
L-3 Communications Electron Devices, San Carlos, CA

P2.5: *TESLA Code Modeling of a 1.3-GHz 10-MW Multiple Beam Klystron*

R. Begum, A. Balkcum
Communications and Power Industries, Palo Alto, CA

I. Chernyavskiy, A. Vlasov
SAIC, McLean, VA

S. Cooke, B. Levush
Naval Research Laboratory, Washington, DC

P2.6: *Analysis and Simulation of Multi-Beam Interaction*

W. Shuzhong, D. Yaogen, W. Yong
*The Chinese Academy of Sciences, Beijing,
Peoples Republic of China*

P2.7: *Estimation of Cold Characteristics for Fundamental-Mode MBK Cavities*

K. Nguyen
Beam-Wave Research, Bethesda, MD

D. K. Abe, B. Levush
Naval Research Laboratory, Washington, DC

D. E. Pershing
ATK Mission Research

- P2.8: *Shunt Impedance of the MBK Cavities***
A. Sandalov, K. A. Zaytsev
Moscow State University, Moscow, Russia
- Y. Ding, B. Shen**
*Institute of Electronics, CAS, Beijing,
Peoples Republic of China*
- P2.9: *Tuning Characteristics of Reentrant Klystron Cavities***
J. Barroso, J. Leite Neto
*National Institute for Space Research, Sao Jose De
Campos, S.P., Brazil*
- P2.10: *Comparisons Between Fundamental and Higher-Order TM Modes in Microwave Cylindrical and Coaxial Cavity of Klystron***
Y.-h. Dong, D. Yaogen, S. Bin, X. Liu
*Chinese Academy of Sciences, Beijing, Peoples
Republic of China*
- P2.11: *Installation Getter Vacuum Pump in Cathode–Anode Region of a High-Power Klystron Amplifier: Propose and Feasibly***
F. Degasperri
*Faculdade De Tecnologia De Sao Paulo, Sao Paulo,
Brazil*
- S. L. L. Verardi**
*Escola Politécnica da Universidade de Sao Paulo,
Sao Paulo, Brazil*
- C. C. Motta**
*Centro Tecnológico da Marinha em Sao Paulo,
Sao Paulo, Brazil*
- P2.12: *U.S. Army Beam-Power-Tetrode-Based Broadband Resonant Coaxial Cavity High-Power-Amplifier System***
D. Elkins
Redstone Technical Testing Center, Redstone Arsenal, AL
- R. Heckman**
BURLE Industries, Inc., Lancaster, PA
- P2.13: *Small-Sized High-Voltage Vacuum Triode GMI 30/25***
**O. Y. Maslennikov, K. V. Stanislavchik, I. A. Guzilov,
S. V. Lamonov**
SSPE 'Toriy', Moscow, Russia
- P2.14: *Design of an Inverted TM₀₁₁ Mode Cavity Locked HPM Magnetron***
M. Tracy
Communications & Power Industries, Inc., Beverly, MA
- P2.15: *Design of a 600–120-kW Peak-Power 50%-Duty L-Band Magnetron***
**J. Robinson, B. Guss, W. Dumphy, M. Doherty,
T. Treado**
CPI, Inc., Beverly, MA

- P2.16: *Simulation of a Lock Mode in a Two-Stage Magnetron***
G. Churyumov, T. I. Frolova, K. M. Basrawi
*Kharkov National University of Radio Electronics,
Kharkov, Ukraine*
- P2.17: *Replacing the SPY-1A SFD261MT CFA with a SPY-1B/D SFD262 CFA-Type Circuit***
W. Guss, M. L. Tracy, J. Deveau
CPI, Beverly, MA
- P2.18: *On-Line Data-Acquisition System to Minimize CFA Processing Time***
W. Guss, L. Dragun, M. L. Tracy, J. Deveau, T. Treado
CPI, Beverly, MA
- P2.19: *The Outgassing Characteristics of CNT and ZnO Cathodes***
L. Wei, Y. Cui, X. Zhang, J. Wang, Y. Di, F. Mao
Southeast University, Nanjing, Peoples Republic of China
Y. Wang
San Le Group, Ltd., Nanjing, China
C. Huang
Guoguang Electric Co., Ltd., Chengdu, China
- P2.20: *Outgassing of FED under Operation***
W. Lei, J. Wang, X. Zhnag, Y. Cui, Y. Di, F. Mao
Southeast University, Nanjing, Peoples Republic of China
C. Huang
Guoguang Electric Co., Ltd., Chengdu, China
Y. Wang
Electron Device Institute, San Le Group Ltd., Nanjing, China
- P2.21: *Growth of Layer-by-Layer Aligned Carbon Nanotubes***
B. Zeng, Y. Zhao, Y. Zhao, H. Ouyang, Z.h. Yang
*University of Electronic Science & Technology of China,
Chengdu, Peoples Republic of China*
- P2.22: *Effects of Synthesis Process on Aluminate Emitters Thermionic Properties***
C. Motta, C. Giovedi
*Centro Tecnológico Da Marinha Em Sao Paulo,
Sao Paulo, Brazil*
C. Higashi
*Instituto de Pesquisas Energéticas e Nucleares,
Sao Paulo, Brazil*

- P2.23: *The Effects of Osmium Coating and Chemical Cleaning on SEM Images of Dispenser Cathode Surface Porosity***
J. Tarter, S. Roberts
Semicon Associates, Lexington, KY
- P2.24: *High-Current-Density Cathode Evaluation***
C. Wilsen, M. F. Kirshner, R. D. Kowalczyk
L-3 Communications Electron Devices, San Carlos, CA
- P2.25: *Modeling of Cusp Gun for a Gyro-TWT***
A. Young, W. He, D. H. Rowlands, E. G. Rafferty,
C. G. Whyte, K. Ronald, A. W. Cross, A. D. R. Phelps
University of Strathclyde, Glasgow, U.K.
- P2.26: *Study on Ballistic Bunching in Frequency Multiplying Distributed Interaction Gyroklystron Amplifier***
G.-S. Park, J. H. Won, C. W. Baik, J. I. Kim, Y. D. Joo
Seoul National Univeristy, Seoul, Korea
- P2.27: *Preliminary Design of a Ka-Band Three-Stage Harmonic Multiplying Gyrotron Traveling-Wave Amplifier***
C.-Q. Jiao, J.-R. Luo
*Chinese Academy of Sciences, Beijing,
Peoples Republic of China*
- P2.28: *W-Band Single-Anode MIG for Gyro-TWT***
R.-J. Yin, P.-K. Liu, G.-J. Lai
*Chinese Academy of Science, Beijing,
Peoples Republic of China*
- P2.29: *Simulation and Experiment of a New Type of Complex Cavity for Gyrotron Applications***
J. Luo, W. Guo, M. Zhu
*Chinese Academy of Science, Beijing,
Peoples Republic of China*
- P2.30: *Electromagnetic Field Distribution in Matched Intervals of Periodically Irregular Waveguides for Gyrotrons***
A. A. Kurayev, S. I. Yaramionak
*Byelorussian State University of Informatics and
Radioelectronics, Minsk, Belarus*
- P2.31: *Second-Harmonic Axis-Encircling Electron-Beam Gyro-TWT Amplifier***
S. Harriet, D. B. McDermott, N. C. Luhmann, Jr.
University of California – Davis, Davis, CA
- P2.32: *UCD Ka-Band Harmonic Peniotron Status***
L. Dressman, D. B. McDermott, N. C. Luhmann, Jr.
University of California – Davis, Davis, CA

P2.33: *Design of a 16-GHz TE01 Gyrotron Traveling-Wave Amplifier*

G.-J. Lai, P.-K. Liu, Y.-F. Jia, R.-J. Yin
*Chinese Academy of Sciences, Beijing,
Peoples Republic of China*

P2.34: *Microwave Source with Goffered Cavity*

S. V. Kolosov, A. A. Kurayev, A. A. Lavrenov
Belarus State University, Minsk, Belarus

P2.35: *Time-Dependent Simulation of Free-Electron Lasers*

H. Freund
Science Applications International Corp., McLean, VA

P2.36: *The Simplest Ubitron in Crossed Fields*

E. Schamiloglu, M. Fuks
University of New Mexico, Albuquerque, NM

TWT SIMULATION / ENVIRONMENT

Wednesday, April 26, 2006 / 1:30 – 3:30 pm / De Anza I

Chair: D. P. Chernin
SAIC, McLean, VA

12.1: Session Keynote: Robust Design Algorithm for High-Frequency TWT Slow-Wave Circuits (1:30)

J. Wilson
NASA Glenn Research Center, Cleveland, OH

C. T. Chevalier
Analex Corp., Cleveland, OH

12.2: The Determination of Tape Helix Cold Test Parameters Using Fourier and Convolution Techniques (1:50)

V. Cun
Communications & Power Industries, Palo Alto, CA

12.3: The Field Marshal Electromagnetic Simulation Environment (2:10)

R. Jackson, M. McLay
Calabazas Creek Research, Inc., Grayson, GA

R. P. Joshi
Old Dominion University, Norfolk, VA

12.4: Analysis with Code Dev. 5.0 of Output Characteristics of Coupled-Cavity TWT with Below-Cutoff Sections and Direct and Inverse Band Sequence (2:30)

A. Konnov, A. V. Malykhin, V. V. Petenkova
FSUE R&P Corp. (Toriy), Moscow, Russia

G. V. Ruvinskiy, T. I. Chernobay, D. S. Scherbakov
FSUE R&P Corp. "Istok," Moscow, Russia

12.5: Recent Developments to TWTCAD Integrated Framework (2:50)

B. Li, Y. Z. Hai, L. JianQing, Z. XiaoFang, H. Tao, H. Quan, L. Li, X. Li, G. Peng, Z. BaoQing, Y. LieMing, H. GuoXian
University of Electronic Science and Technology of China, Chengdu, Peoples Republic of China

12.6: Electron-Beam Transverse Waves and Microwave Electronics (3:10)

V. A. Vanke
Moscow State University, Moscow, Russia

Y. A. Boudzinskiy, S. V. Bykovskiy
SRPC "Istok," Moscow, Russia

MBK

Wednesday, April 26, 2006 / 1:30 – 3:30 pm / De Anza II

Chair: E. Wright
CPI, Palo Alto, CA

13.1: Session Keynote: Comparative Study of Microwave Power Modules (MPM) and Complex Microwave Devices (CMD) Parameters and Their Preferable Application (1:30)

A. S. Kotov, E. A. Gelvich, A. D. Zakurdayev
FSUE RPC "Istok," Fryazino, Russia

13.2: Research Progress on C-Band Broadband Multi-Beam Klystron (1:50)

Y. Ding, Y. Zhu, X. Yin, S. Xiaoxin, B. Shen, M. Yizhen, C. Wang
Institute of Electronics, Chinese Academy of Sciences, Beijing, Peoples Republic of China

13.3: Mode Selectivity in Multiple-Beam Klystrons (2:10)

D. Abe
Naval Research Laboratory, Washington, DC

G. S. Nusinovich
SAIC, McLean, VA

13.4: Bandwidth Extention of an S-Band Fundamental-Mode Eight-Beam Klystron (2:30)

K. Nguyen
Beam-Wave Research, Bethesda, MD

D. E. Pershing
ATK Mission Research

D. K. Abe, B. Levush
Naval Research Laboratory, Washington, DC

13.5: Multi-Beam Klystrons with Reverse Permanent Magnet Focusing System Application in RF Systems of the Compact Electron Accelerators (2:50)

I. Frejdovich, P. V. Nevsky, V. P. Sakharov, M. Yu Vorob'ev
SRPA, Moscow, Russia

Y. N. Gavrish, V. M. Nikolaev
D. V. Efremov Scientific Research Institute of Electrophysical Apparatus, St. Petersburg, Russia

A. S. Alimov, V. I. Shvedunov
Moscow State University, Moscow, Russia

Y. D. Chernousov, I. V. Shelbolaev
SBRAS, Novosibirsk, Russia

H. Yamada, A. Kleyev
Photon Production, Ltd., Kyoto, Japan

13.6: *Electrostatically Focused Multibeam Klystron* (3:10)

B. Vancil, K. Hawken, R. Mueller

E-Beam, Inc., Beaverton, OR

E. G. Wintucky, C. Kory

NASA Glenn Research Center, Cleveland, OH

THERMIONIC TECHNOLOGY

Wednesday, April 26, 2006 / 1:30 – 3:10 pm / Ironwood

Chair: J. Li

*Beijing Vacuum Electronics Research Institute,
Beijing, Peoples Republic of China*

14.1: Reservoir Cathodes: Recent Developments (1:30)

B. Vancil

E-Beam, Inc., Beaverton, OR

E. G. Wintucky

NASA Glenn Research Center, Cleveland, OH

14.2: An Examination of Magnetic Fields from Cathode Heaters (1:50)

J. Paff

Spectra-Mat, Inc., Watsonville, CA

14.3: Hot-Resistance Studies on Tungsten/Rhenium Wire (2:10)

S. Roberts, M. Effgen

Semicon Associates, Lexington, KY

14.4: Space TWT Cathode Manufacturing at L-3 Communications ETI (2:30)

W. Tighe, M. Patterson, J. Venecio

*L-3 Communications Electron Technologies, Inc.,
Torrance, CA*

14.5: Hollow-Cathode Life Issues (2:50)

W. Tighe

L-3 Communications Electron Technologies, Inc., Torrance, CA

POSTER SESSION III

Wednesday, April 26, 2006 / 1:30 – 5:00 pm / De Anza III

Co-Chairs: G. Nusinovich
University of Maryland, College Park, MD

G. Scheitrum
SLAC, Palo Alto, CA

P3.1: Generation of Electromagnetic Oscillations by e-Beam in Open Resonators: 3-D Modeling Results

K. Lukin
Usikov Institute for Radiophysics and Electronics, Kharkov, Ukraine

G. I. Churyumov, Y .L. Starchevskiy
Kharkov National University of Radio Electronics, Kharkiv, Ukraine

P3.2: A New Vacuum Oscillator with Open Resonator

K. Lukin
Usikov Institute for Radiophysics and Electronics, Kharkov, Ukraine

P3.3: A 6.6-GHz Monotron with a Coaxial Bragg Reflector

J. Barroso, J. P. Leite Neto
National Institute for Space Research, Sao Jose De Campos, S.P., Brazil

P3.4: Orbotron-Frequency Multipliers 300–2000 GHz

A. A. Kurayev, A. V. Aksenchyk, A. A. Hrin
Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus

P3.5: A Field-Emission-Based Ka-Band Millimeter-Wave Generator

P.-S. Lu, K.-H. Huang, M.-C. Lin
Fu Jen University, Taipei, Taiwan

P3.6: Investigations on the Radiation from a Modified Grating Structure using a Relativistic Electron Beam

G.-S. Park, J. K. So, Y. M. Shin, K. H. Jang, J. H. Won, A. Srivastava
Seoul National Univeristy, Seoul, Korea

P3.7: Improve the Emission Stability with Large Current from a CNT's Cathode

W. Lei, Y. Di, X. Zhang, K. Chu, Y. Cui, J. Wang
Southeast University, Nanjing, Peoples Republic of China

G. Yang
Huadong Electronics Optoelectronics Science & Technology Co., Ltd., Nanjing, China

- P3.8: *Field Emitters with Low-Turn-On Electric-Field-Based on Carbon Fibres***
W. Lei, Q. Wang, H. Mu, X. Zhang, N. Gu
Southeast University, Nanjing, Peoples Republic of China
C. Huang
GuoGuang Electric Co., Ltd., Chengdu, China
Y. Wang
Cathodal Branch Electron Device Institute San Le Group Ltd. Company, Nanjing, China
- P3.9: *Study of the Charge Deposition on the Insulator Walls in a Field-Emission Display Panel***
L. Wei, X. Zhang, C. Ganglou, Z. Zhu
Southeast University, Nanjing, Peoples Republic of China
G. Yang
Huadong Electronics Optoelectronics & Engineering Co., Ltd., Nanjing, China
- P3.10: *High-Voltage Gun Micro-Arcs and Beam-Energy Variations***
V. Katsap, R. A. Kendall, V. A. Scales, W. W. Yahn
NuFlare Technology, Hopewell Junction, NY
- P3.11: *Optimization of Normally-On Driving Under-gate CNT FED***
X. Zhong, X. Zhang, H. Yin, W. Lei, X. Zhang
Southeast University, Nanjing, Jiangsu, Peoples Republic of China
- P3.12: *A Compact Cathode Performance Test System***
Y. Wang, J. Yang, M. Zhou
Beijing University of Technology, Beijing, Peoples Republic of China
Z. Liang
Changchun University of Science and Technology, Changchun, China
Y. Lu
University of Electronic Science and Technology of China, Chendu, China
- P3.13: *Three-Dimensional PIC Simulations of the Transparent and Eggbeater Cathodes in the Michigan Relativistic Magnetron***
T. Fleming, P. Mardahl, L. Bowers
Air Force Research Laboratory, Kirtland AFB, NM
H. Bosman, S. Prasad, M. Fuks, E. Schamiloglu
University of New Mexico

- P3.14: *Development of 3-D Electromagnetic PIC Simulation Code for Magnetron***
H. Usui, S. Ohashi, K. Tada, T. Mitani, N. Shinohara, H. Matsumoto
Kyoto University, Kyoto, Japan
- P3.15: *3-D Simulation of Millimeter-Wave Cold Secondary Emission Cathode Drift-Orbital Resonance Magnetrons***
V. Yeryomka, M. A. Kopot', V. D. Naumenko, O. P. Kulagin
National Academy of Sciences of Ukraine, Kharkiv, Ukraine
- P3.16: *3-D Simulation of Magnetrons Having a Secondary-Emission Cathode Stimulated by Electrons from a Field Emitter***
V. Yeryomka M. A. Kopot
National Academy of Sciences of Ukraine, Kharkiv, Ukraine
V. P. Dzyuba
Special Design Office "Spectr," Kyiv, Ukraine
- P3.17: *Reduction of Noise in Strapped Magnetron by Electric Priming using Anode Shape Modification***
G.-S. Park, J. I. Kim, J. H. Won
Seoul National Univeristy, Seoul, Korea
- P3.18: *Noise Reduction Effects of an Oven Magnetron with a Cathode Shield***
T. Mitani, N. Shinohara, H. Matsumoto
Kyoto University, Kyoto, Japan
M. Aiga, N. Kuwahara, T. Ishii
Panasonic Semiconductor Discrete Devices Co., Ltd.
- P3.19: *Electromagnetic and 3-D Effects in the Multipactor Discharge on a Dielectric***
H. C. Kim, Y. Chen, J. P. Verboncoeur
University of California at Berkeley, Berkeley, CA
Y. Y. Lau
University of Michigan, Ann Arbor, MI
- P3.20: *Development of a 2-D Multistage Depressed Collector Code for TWT***
L. Bin, H. Tao, Y. ZhongHai, H. Quan, L. Li, X. Li, Z. XiaoFang
University of Electronic Science and Technology of China, Chengdu, Peoples Republic of China
- P3.21: *Resistance Spot Welding of 50Mo-50 Refractory Alloy Foils***
J. Farrell, W. Umstead
Semicon Associates, Lexington, KY
J. Xu, T. Zhai
University of Kentucky, Lexington, KY

- P3.22: *Influence of Periodic Magnetic Field Profiles on the Focusing of Electron Beams***
E. Perigo
*Instituto de Pesquisas Energeticas E Nucleares,
Sao Paulo, Brazil*
- C. C. Motta**
*Centro Tecnologico da Marinha em Sao Paulo,
Sao Paulo, Brazil*
- P3.23: *Off-Axis Magnetic Flux Density of a PPM Focusing System***
E. Perigo
*Instituto de Pesquisas Energeticas E Nucleares,
Sao Paulo, Brazil*
- C. S. Muranaka**
*Globalmag Transdutores Magneticos Industria
e Comercio LTDA*
- C. C. Motta**
*Centro Tecnologico da Marinha em Sao Paulo,
Sao Paulo, Brazil*
- P3.24: *Output Analysis of a Circular Horn Antenna: Higher Order Modes***
T.-L. Lin, S.-J. Tzun, Y. Wan, M.-C. Lin
Fu Jen University, Taipei, Taiwan
- P3.25: *Output Horn Antennas Profile Optimization for Far-Field Radiation Pattern***
A. A. Kurayev, A. K. Sinitsyn
*Byelorussian State University of Informatics and
Radioelectronics, Minsk, Belarus*
- P3.26: *Solid-State Upgrade for the COBRA JUDY S-Band Phased Array Radar***
**M. Kempkes, T. J. Hawkey, M. P. J. Gaudreau,
R. A. Phillips**
Diversified Technologies, Inc., Bedford, MA
- P3.27: *Study on the Impedance Matching of a Coaxial Marx Generator with a Field-Emission Limited Diode***
Y.-Y. Chang, T.-W. Ma, M.-C. Lin
Fu Jen University, Taipei, Taiwan
- P3.28: *Investigation into Carbon-Trigger Vacuum Switches for High-Voltage High-Current Switch Applications***
**K. Bunch, A. Roesler, T. Friedman, C. Walker,
B. Wroblewski**
Sandia National Laboratories, Albuquerque, NM
- T. Baginski**
Auburn University, AL
- P3.29: *Operational Performance and improvements to the RF Power Sources for the Compact Linear Collider Test Facility (CTF3) at CERN***
G. McMonagle
CERN, Meyrin, Geneva, Switzerland

- P3.30: *High-Voltage Breakdown Levels in Various EPC Potting Materials***
D. Komm
NASA-Jet Propulsion Laboratory, Pasadena, CA
- P3.31: *Computer-Aided Design of Ka-Band Waveguide Hybrid Junctions for Power-Combining Architectures in Interplanetary Spacecraft***
K. Vaden, R. N. Simons
NASA Glenn Research Center, Brookpark, OH
- P3.32: *Temperature Profiles in Ceramic Cylinders Produced by Microwave and Millimeter-Wave Heating***
A. Fliflet, S. H. Gold, R. W. Bruce, D. Lewis III
Naval Research Laboratory, Washington, DC
- P3.33: *Microwave Decomposition of Hydrogen Peroxide***
E. Savrun, S. Sawhill
Sienna Technologies, Inc., Woodinville, WA
- P3.34: *Medical Application of Slow-Wave Structures***
Y. Pchelnikov
SloWaveS, Inc., Cary, NC
- P3.35: *The Composite Pyramidal-Rectangular Resonator for Microwave Dryer***
A. A. Kurayev, I. N. Kizhalai, A. K. Sinitsyn, A. V. Scherbakov
Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus
- P3.36: *IOT Development at Electron Devices***
C. Wheeland, M. Kirshner, C. Wilsen, J. Cipolla, C. Malcolm
L-3 Communications Electron Devices, Williamsport, PA
- P3.37: *The Planar Low-Voltage Multibeam Electrovacuum Amplifier of a Millimetric Range Based on the Field-Emission Array***
J. V. Gulyaev, J. F. Zakharchenko, and N. L. Sinitsyn
Russian Academy of Sciences, Saratov, Russia
- P3.38: *Phase Composition and Luminescent Characteristics of $Y_2O_3:Eu$ and $Y_2O_2S:Eu$ Crystals Obtained Using Borate Flux***
A. V. Strel'tsov, G. V. Torgashov, N. I. Sinitsyn, I. G. Torgashov,
Russian Academy of Sciences, Saratov, Russia
Y. V. Gulyaev
Russian Academy of Sciences, Moscow, Russia
V. P. Dmitienko, A. O. Dmitrienko
Saratov State University, Saratov, Russia

TWT III

Thursday, April 27, 2006 / 8:30 – 10:10 am / De Anza I

Chair: D. S. Komm

NASA-Jet Propulsion Laboratory, Pasadena, CA

15.1: Validation Studies for CHRISTINE-CC Using a Ka-Band Coupled-Cavity TWT (8:30)

D. Chernin, D. Dialetis

SAIC, McLean, VA

T. M. Antonsen, Jr.

SAIC and University of Maryland

J. Qiu, B. Levush

Naval Research Laboratory, Washington, DC

J. Legarra

CPI, Palo Alto, CA

15.2: Ka-Band CCTWT Development at L-3 Electron Devices Division (8:50)

J. Welter, K. Montgomery, M. Barsanti, J. Rominger

L-3 Communications Electron Device Division, San Carlos, CA

15.3: Simulation of the BWO Threshold Current in a Helix TWT (9:10)

P. Birtel, A. F. Jacob

Tecnische Universitat Hamburg Harburg, Hamburg Harburg, Germany

J.-F. David, A. Le Clair

Thales Electron Devices, Velizy, France

W. Schwertfeger

Thales Electron Devices, Ulm, Germany

15.4: Recent Advances in Millimeter-Wave Power Modules (MPPMs) (9:30)

J. Taylor, T. Schoemehl, J. Kennedy, C. Colombo, R. True, R. Watkins, T. Hargreaves

L-3 Communications Corp., San Carlos, CA

15.5: Investigation of Characteristics of High-Power Wide-Band Plasma-Filled Traveling-Wave-Tube (9:50)

V. Perevodchikov

Russian Electrotechnical Institute (VEI), Moscow, Russia

GYROTRONS I

Thursday, April 27, 2006 / 8:30 – 10:10 am / De Anza II

Chair: M. Blank
CPI, Palo Alto, CA

16.1: Session Keynote: Recent Results in GYCOM/IAP Development of High-Power Gyrotrons (8:30 AM)

G. Denisov and A. G. Litvak
Russian Academy of Sciences, Nizhny Novgorod, Russia

V. E. Myasnikov and E. M. Tai
GYCOM Ltd., Nizhny Novgorod, Russia

16.2: Improved Beam-Forming Mirror System for a Multi-Frequency Gyrotron at FZK (8:50 AM)

X. Yang, A. Arnold, G. Dammertz, K. Koppenburg, B. Piosczyk, and M. Thumm
Institut fuer Hochleistungsimpuls Und Mikrowellentechnik, Karlsruhe, Germany

D. Wagner
Max Planck Institut fuer Plasmaphysik, Garching, Germany

16.3: Optimal Synthesis of Quasi-Optical Converters for High Power Gyrotrons (9:10 AM)

J. Neilson
Calabazas Creek Research, Inc., Saratoga, CA

16.4: 170 GHz, 2 MW Coaxial Cavity Gyrotron - Test of the RF Output System for the First Industrial Prototype Tube (9:30 AM)

T. Rzesnicki, J. Jin, B. Piosczyk, and M. Thumm
Forschungszentrum Karlsruhe, Karlsruhe, Germany

G. Michel
Max-Planck-Institut fur Plasmaphysik, Greifswald, Germany

D. Wagner
Max-Planck-Institut fur Plasmaphysik, Garching, Germany

16.5: Experimental Study of a High Efficiency 1.5 MW, 110 GHz Gyrotron (9:50 AM)

E. Choi, C. D. Marchewka, M. A. Shapiro, J. R. Sirigiri, and R. J. Temkin
MIT, Cambridge, MA

BWO/MICROFABRICATION

Thursday, April 27, 2006 / 8:30 – 10:10 AM / De Anza III

Chair: C. L. Kory

Calabazas Creek Research, Inc., Westlake, OH

17.1: Experimental Investigation of 95GHz Two-Step LIGA-Fabricated Folded Waveguide Backward Wave Oscillator (8:30 AM)

G.-S. Park, Y. M. Shin, J. K. So, K. H. Jang, J. H. Won, and A. Srivastava

Seoul National Univeristy, Seoul, Korea

J. H. Kim and S. S. Chang

Pohang Accelerator Laboratory, Pohang, Korea

17.2: Generation of Terahertz Regime by Microfabricated Folded Waveguide Traveling Wave Tubes (8:50 AM)

S. Sengele, H. Jiang, J. H. Booske, D. W. van der Weide, S. Limbach, A. Mashal, B. Yang, A. Marconnet, M. He, and P. Larsen

University of Wisconsin-Madison, Madison, WI

17.3: Backward Wave Oscillator Development at 300 and 650 GHz (9:10 AM)

J. Dayton

Genvac AeroSpace Corporation, Cleveland, OH

C. L. Kory

Consultant

G. T. Mearini

Genvac

17.4: Terahertz Backward-Wave Oscillators with Photonic Crystal Waveguides (9:30 AM)

M. Miller, G. O. Vela, R. W. Grow, J. M. Baird, and L. Barnett

University of Utah, Salt Lake City, UT

17.5: Latest Test of a Submillimeter-wave Backward Wave Oscillator (9:50 AM)

R. L. Ives, M. Caplan, C. Kory, M. Read, T. Robinson, R. Wilcox, and J. Nielson

Calabazas Creek Research, Inc., Saratoga, CA

S. Schwartzkopf and R. Witherspoon

Ron Witherspoon, Inc.

PHOTOEMISSION AND SECONDARY EMISSION

Thursday, April 27, 2006 / 8:30 – 10:10 AM / Ironwood

Chair: K. L. Jensen

Naval Research Laboratory, Washington, DC

- 18.1: *Experimental Validation of a Photoemission Model for End-to-End Beam Simulations and Custom Photocathode Designs* (8:30 AM)**

N. Moody, D. W. Feldman, and P. G. O'Shea
IREAP, College Park, MD

K. L. Jensen

Naval Research Laboratory, Washington, DC

- 18.2: *Scanning Photoemission Microscopy of Photo-cathode Surfaces* (8:50 AM)**

J. Shaw, J. Yater, and K. L. Jensen
Naval Research Laboratory, Washington, DC

D. W. Feldman, N. Moody, and P. G. O'Shea
University of Maryland – College Park, College Park, MD

- 18.3: *Photoelectron Emission and Secondary Electron Emission Characteristics of Cesium-doped p-type GaN* (9:10 AM)**

J. Yater, J. L. Shaw, and K. L. Jensen
Naval Research Laboratory, Washington, DC

D. W. Feldman, N. Moody, and P. G. O'Shea
University of Maryland – College Park, College Park, MD

- 18.4: *High-Energy Electron/Solid State Interaction Modeling with MONSEL Software* (9:30 AM)**

V. Katsap
NuFlare Technology, Hopewell Junction, NY

J. Villarrubia
National Institute of Standards and Technology, Gaithersburg, MD

- 18.5: *Diamond Technology for High Current Density Patterned Cathodes* (9:50 AM)**

J. Shaw, J. E. Yater, and J. E. Butler
Naval Research Laboratory, Washington, DC

CODES AND OPTIMIZATION

Thursday, April 27, 2006 / 10:30 – 11:50 AM / De Anza I

Chair: J. Wilson
NASA Glenn Research Center, Cleveland, OH

19.1: Session Keynote: An Improved Treatment of AC Space Charge Fields in Large Signal Simulation Codes (10:30 AM)

D. Chernin, D. Dialetis
SAIC, McLean, VA

T. M. Antonsen, Jr.
University of Maryland and SAIC

B. Levush
Naval Research Laboratory, Washington, DC

19.2: Large-Signal Code TESLA: Improvements in the Implementation and in the Model (10:50 AM)

I. Chernyavskiy and A. Vlasov
SAIC, McLean, VA

T. M. Antonsen, Jr.
University of Maryland – College Park, College Park, MD

S. Cooke and B. Levush
Naval Research Laboratory, Washington, DC

K. Nguyen
Beam-Weave Research, Inc., Silver Spring, MD

19.3: Two-Dimensional, Time-Domain Simulation of Klystrons and Inductive Output Tubes (11:10 AM)

H. Freund and J. P. Verboncoeur
Science Applications International Corporation, McLean, VA

J. Pasour
ATK-Mission Research Corp., Newington, VA

19.4: A Multi-Objective Genetic Algorithm for Optimizing Dispersion and Coupling Impedance in Helix TWTs (11:30 AM)

L. Xiao, Y.-H. Dong, X.-B. Su, and P.-K. Liu
Chinese Academy of Science, Beijing, Peoples Republic of China

SLOW MM-WAVE

Thursday, April 27, 2006 / 10:30 AM – 12:30 PM / De Anza II

Chair: G.-S. Park

Seoul National Univeristy, Seoul, Korea

20.1: Overview of W-Band Traveling Wave Tube Programs (10:30 AM)

C. Kory, L. Ives, M. Read, and P. Phillips

Calabazas Creek Research, Inc., Palo Alto, CA

J. Booske, H. Jiang, D. van der Weide, S.-J. Ho, and S. Sengele

Univeristy of Wisconsin – Madison, Madison, Wi

20.2: Simulation and Measurements of the Los Alamos 94GHz TWT RF Structure (10:50 AM)

L. Earley, F. Krawczyk, E. Smirnova, B. Carlsten,

W. B. Haynes, Z.-F. Wang, and S. Russell

Los Alamos National Laboratory, Los Alamos, NM

20.3: Design Study of a Permanent-Magnet Quadrupole Focusing Lattice for a mm-Wave Traveling Wave Tube (11:10 AM)

R. A. Kishek

University of Maryland, College Park, MD

D. K. Abe and B. Levush

Naval Research Laboratory, Washington, DC

D. Chernin and J. Petillo

SAIC, McLean, VA

20.4: Three Dimension Interaction Investigation of W-Band Folded Waveguide Slow-Wave Structure Using MAFI (11:30 AM)

J. Feng and F. Liao

Beijing Vacuum Electronics Research Institute, Beijing, Peoples Republic of China

J. Cai

Beijing Vacuum Electronics Research Institute and Shandong Univeristy

20.5: Design and Initial Testing of Omniguide Traveling-Wave Tube Structures (11:50 AM)

E. Smirnova, B. Carlsten, and L. Earley

Los Alamos National Laboratory, Los Alamos, NM

20.6: State of the Art and Future Development of Vacuum Electronics in the IRE NAS of Ukaraine (12:10 PM)

K. Lukin, A. Tsvyk, V. Eremka, B. Skrynnik,

V. Korneenkov, and V. Miroshnichenko

IRE NAS of Ukraine, Kharkov, Ukraine

GYRO AMPLIFIERS AND FELs

Thursday, April 27, 2006 / 10:30 AM – 12:30 PM / De Anza III

Chair: K. R. Chu

National Tsing Hua University, Hsinchu, Taiwan

21.1: Session Keynote: Demonstration of a Broadband W-Band Gyro-TWT Amplifier (10:30 AM)

M. Blank, P. Borchard, S. Cauffman, and K. Felch

CPI, Palo Alto, CA

21.2: 140 kW W-Band TE(01) Ultra High Gain Gyro-TWT Amplifier (10:50 AM)

N. Luhmann, L. R. Barnett, W. C. Tsai, and H. L. Hsu

University of California – Davis, Davis, CA

21.3: Broadband Gyro-TWA Simulations and Comparison with Experiment (11:10 AM)

C. Whyte, A. R. Young, E. G. Rafferty, J. Thomson, A. D. R. Phelps, W. He, A. W. Cross, and K. Roland

University of Strathclyde, Glasgow, United Kingdom

21.4: Design of a Wideband 140 GHz, 1 kW Gyro-Amplifier (11:30 AM)

C. Joye, M. A. Shapiro, J. R. Sirigiri, and R. J. Temkin

MIT Plasma Science and Fusion Center, Cambridge, MA

21.5: Study on Photonic Crystal Cavity for Harmonic Multiplying Gyroklystron using Axis-Encircling Electron Beam (11:50 AM)

G.-S. Park, Y. D. Joo, J. H. Won, and J. I. Kim

Seoul National Univeristy, Seoul, Korea

21.6: First Operation of Free-Electron Maser Based on a Combined Two-Mirror Cavity Based on 2D and 1D Bragg Structures (12:10 PM)

A. Cross

University of Strathclyde, Glasgow, Scotland

FIELD EMITTER FABRICATION & CHARACTERIZATION

Thursday, April 27, 2006 / 10:30 AM – 12:10 PM / Ironwood

Chair: J. Shaw

Naval Research Laboratory, Washington, DC

22.1: Session Keynote: High Voltage Compatible Micromachined Vacuum Electronic Devices with Carbon Nanotube Cold Cathodes (10:30 AM)

K. H. Gilchrist, S. Broderick, and J. R. Piascik
RTI International, Research Triangle Park, NC

C. B. Parker, S. Natarajan, S. D. Wolter, and J. T. Glass
Duke University, Durham, NC

C. A. Bower and B. R. Stoner
RTI International and Duke University

22.2: Custom Spindt Cathode for Diamond Based BWO (10:50 AM)

C. Holland and C. Spindt
SRI International, Menlo Park, CA

J. A. Dayton, Jr.
Genvac Aerospace Corporation, Cleveland, OH

22.3: A New Method for Nanometer Scale Imaging of Field Emission Current Distribution (11:10 AM)

M. Sasaki, T. Sato, and M. Saida
University of Tsukuba, Tsukuba, Ibaraki, Japan

M. Nagao and S. Yamamoto
National Institute of Advanced Industrial Science and Technology

22.4: High Current Density Advanced Cold Cathode Experiments (11:30 AM)

J. Scharer, X. He, V. Valhos, and J. Booske
University of Wisconsin – Madison, Madison, WI

N. Jordan and R. Gilgenbach
University of Michigan, Ann Arbor, MI

22.5: Beam Emission Test on Carbon Nanotube Cathode of a Gridded Pierce Gun (11:50 AM)

J. Choi, H. J. Kim, and W. B. Seo
Kwangwoon University, Nowon-gu, Seoul, Korea

J.-H. Han and J.-B. Yoo
Sungkyunkwan University, Korea

SHEET BEAMS

Thursday, April 27, 2006 / 1:30 – 3:10 PM / De Anza I

Chair: J. H. Booske

University of Wisconsin – Madison, Madison, WI

23.1: Session Keynote: W-Band Sheet Beam Klystron Research at SLAC (1:30 PM)

**G. Scheitrum, G. Caryotakis, A. Burke, A. Jensen,
E. Jongewaard, M. Neubauer, and R. Phillips**
SLAC, Menlo Park, CA

23.2: Axial vs Transverse Bunching in Sheet Beam TWTs (1:50 PM)

**T. Antonsen, S. J. Cooke, Y. N. Pchelnikov, and
B. Levush**
Naval Research Laboratory, Washington, DC

23.3: W-Band Sheet-Beam Klystron PCM Focusing Design (2:10 PM)

**A. Burke, G. Scheitrum, B. Phillips, A. Jensen,
K. Rauenbuehler, K. Granlund, and V. Besong**
SLAC, Menlo Park, CA

23.4: A Coupled-Cavity Slow-Wave Structure for Sheet-Beam Devices (2:30 PM)

S. Cooke and B. Levush
Naval Research Laboratory, Washington, DC

T. M. Antonsen, Jr.
SAIC and the University of Maryland

23.5: Sheet Beam Klystron Simulations Using AJDISK (2:50 PM)

**A. Jensen, G. Caryotakis, G. Scheitrum, D. Sprehn,
and B. Steele**
Stanford Linear Accelerator Center, Menlo Park, CA

COMPONENT TECHNOLOGIES

Thursday, April 27, 2006 / 1:30 – 3:10 PM / De Anza II

Chair: J. P. Calame

Naval Research Laboratory, Washington, DC

- 24.1: *Simplified Methodology to Evaluate Effect of Back-scattered Electrons in Gyrotrons with Depressed Collectors* (1:30 PM)**

A. Singh

University of Maryland and IREAP

W. B. Herrmannsfeldt

SLAC, Los Altos, CA

- 24.2: *X-Ray Generation in Energetic Surface Impact for the Particle Simulation Model of Plasmas* (1:50 PM)**

C.-H. Lim and J. P. Verboncoeur

University of California, Berkeley, Berkeley, CA

- 24.3: *The Effect of Non Uniform Permanent Magnet Material on Transverse Fields in Periodic Permanent Magnet Focused Traveling Wave Tubes* (2:10 PM)**

J. Willhite

Semicon Associates, Lexington, KY

L. Falce and M. Chesnut

CPI

- 24.4: *The Relationship Between Reversible Temperature Coefficient of $B(r)$ and the Axial Field Profile of a TWT Magnet Stack* (2:30 PM)**

J. Liu and M. Walmer

Electron Energy Corp, Landisville, PA

- 24.5: *Analysis and Simulation of a $TM(01)$ -Mode Launcher for an Overmoded Waveguide* (2:50 PM)**

M. Sumathy, S. K. Chhotray, and L. Kumar

Microwave Tube Res. & Dev. Centre, Jalahalli, Bangalore, India

GUN DESIGN II

Thursday, April 27, 2006 / 1:30 – 3:10 PM / De Anza III

Chair: T. J. Grant
CPI, Inc., Palo Alto, CA

25.1: *New and Improved Emission Models in the Finite-Element Gun Code MICHELLE* (1:30 PM)

E. Nelson
Los Alamos National Laboratory, Los Alamos, NM

J. Petillo
SAIC, Burlington, MA

K. Jensen
Naval Research Laboratory, Washington, DC

25.2: *A New Gridded Electron Gun Configuration Projected to Operate from Beam Full on to Near Cut-Off with Minimum Change in Beam Shape* (1:50 PM)

B. Smith
Consultant, Lexington, MA

25.3: *An Experimental Study and Modeling of the Field Emission Properties of an Isolated Individual Multi-Walled Carbon Nanotube* (2:10 PM)

C. Nguyen and B. Ribaya
NASA Ames Research Center, Moffett Field, CA

D. Niemann, N. Gunther, and M. Rahman
Santa Clara University, Santa Clara, CA

25.4: *Field Emitter Array Electron Gun for Traveling Wave Tubes* (2:30 PM)

**L. Xinghui, B. Guodong, D. Mingqing, Z. Fuquan,
F. Jinjun, and L. Fujiang**
*Beijing Vacuum Electronics Research Institute, Beijing,
Peoples Republic of China*

25.5: *Numerical Analysis the Performance of Field Emission Display with Secondary Electrons Emission* (2:50 PM)

L. Wei, H. Zhao, and X. Zhang
Southeast University, Nanjing, Peoples Republic of China

G. Yang
*Huadong Electronics Optoelectronics Science &
Technology Co., Ltd., Nanjing, China*

FIELD EMISSION DEVICES

Thursday, April 27, 2006 / 1:30 – 3:10 PM / Ironwood

Chair: R. J. Umstatt
AFOSR/NE, Arlington, VA

26.1 *Field Emission Arrays for Tomographic Medical X-Ray Imaging* (1:30 PM)

P. Schwoebel, C. E. Holland, and C. A. Spindt
SRI International, Menlo Park, CA

26.2: *Small-Sized X-Ray Tube with the Field Electron Emitter on the Base of Carbon Nanotubes* (1:50 PM)

O. Y. Maslennikov, K. V. Stanislavchik, I. A. Guzilov, and S. V. Lamonov
SSPE 'Toriy', Moscow, Russia

Y. V. Gulyaev, K. R. Izrael'yants, A. L. Musatov, and A. B. Ormont
Institute of Radio Engineering and Electronics RAS, Moscow, Russia

N. A. Kiselev
Institute of Crystallography RAS, Moscow, Russia

E. F. Kukovitskiy
Kazan Physical-Technical Institute RAS, Kazan, Russia

26.3: *Gate-Substrated Structure to Improve FED Performance* (2:10 PM)

L. Wei, G. Wei, and Z. Xiaobing
Southeast University, Nanjing, Peoples Republic of China

26.4: *Milliamp-Class Back-Gated Triode Field Emission Devices Based on Free-Standing Two-Dimensional Carbon Nanostructures* (2:30 PM)

B. Holloway, M. Zhu, X. Zhao, J. Wang, S. Wang, and R. Outlaw
College of William & Mary, Williamsburg, VA

T. Tyler, O. Shenderova, M. Ray, J. Dalton, and G. McGuire
International Technology Center, Raleigh, NC

26.5: *Buried-Line Back-Gated Triode Field Emission Devices* (2:50 PM)

T. Tyler, O. Shenderova, M. Ray, J. Dalton, and G. McGuire
International Technology Center, Raleigh, NC

M. Zhu, X. Zhao, J. Wang, S. Wang, R. Outlaw, and B. C. Holloway
College of William & Mary, Williamsburg, VA

NONLINEAR AND CHAOS

Thursday, April 27, 2006 / 3:30 – 5:30 PM / De Anza I

Chair: T. M. Antonsen, Jr.
University of Maryland, College Park, MD

27.1: Session Keynote: Secure Chaos Communications Using Driven Traveling Wave Tube Amplifiers with Delayed Feedback (3:30 PM)

L. Earley, B. Carlsten, and R. Wheat
Los Alamos National Laboratory, Los Alamos, NM

J. Booske
University of Wisconsin – Madison, Madison, WI

P. Larsen
Los Alamos National Laboratory and University of Wisconsin – Madison

27.2: Simulated Impact of Non-Linear Memory Effects on Digital Communications in a Klystron (3:50 PM)

J. Calame and B. Levush
Naval Research Laboratory, Washington, DC

27.3: Investigation of Synchronization and Transition to Chaos in a Driven TWT Delayed Feedback Oscillator (4:10 PM)

N. Ryskin, D. A. Guskov, and V. N. Titov
Saratov State University, Saratov, Russia

P. B. Larsen, J. H. Booske, and S. Sengele
University of Wisconsin – Madison, Madison, WI

C. Marchewka
MIT, Cambridge, MA

S. Bhattacharjee
Indian Institute of Technology, Kanpur, India

27.4: Experimental and Theoretical Study of Chaotic Microwave Oscillations and Pattern Formation in Non-Relativistic Electron Beam with Virtual Cathode (4:30 PM)

A. Hramov, D. I. Trubetskov, E. N. Egorov, R. A. Filatov, Y. A. Kalinin, and A. A. Koronovskii
Saratov State University, Saratov, Russia

27.5: High Dimension Chaotic Attractors in Gyrotron with Non-Fixed Field Structure (4:50 PM)

E. V. Blokhina
Saratov State University, Saratov, Russia

S. P. Kuznetsov
Institute of Radio-Engineering and Electronics of RAS, Saratov, Russia

27.6: Experiment of TWT Chaos Central Frequency Fast- and Continuously-Tuning System (5:10 PM)

J. Feng and Y. Chen
Beijing Vacuum Electronics Research Institute, Beijing, Peoples Republic of China

GYROTRONS II

Thursday, April 27, 2006 / 3:30 – 5:30 PM / De Anza II

Chair: K. Felch

*Communications and Power Industries,
Palo Alto, CA*

28.1: Session Keynote: Status of the 1-MW, 140-GHz, CW Gyrotron for W7-X (3:30 PM)

G. Dammertz, G. Gantenbein, S. Illy, K. Koppenburg, W. Leonhardt, B. Piosczyk, M. Schmid, A. Arnold, M. Thumm, R. Heidinger, and G. Neffe

*Forschungszentrum Karlsruhe, Association
EURATOM-FZK, Karlsruhe, Germany*

S. Alberti, J. P. Hogge, and M. Q. Tran

*Centre de Recherche en Physique des Plasmas,
Association Euratom-Confederation Suisse, Lausanne,
Switzerland*

V. Erckmann, H. Laqua, and G. Michel

*Max-Planck-Institut für Plasmaphysik, Greifswald,
Germany*

E. Giguet, C. Liévin, and F. Legrand

Thales Electron Devices, Vélizy-Villacoublay, France

W. Kasperek

Universität Stuttgart, Stuttgart, Germany

28.2: Observation of Low-Frequency Parasitic Oscillations in a 1.5 MW, 110 GHz Gyrotron (3:50 PM)

C. Marchewka, E. M. Choi, M. A. Shapiro, J. R. Sirigiri, and R. J. Temkin

MIT Plasma Science and Fusion Center, Cambridge, MA

28.3: Operation of a 95 GHz, 100 kW Gyrotron in a High-Tc (BSCCO) Magnet (4:10 PM)

S. Cauffman, M. Blank, P. Calahan, and K. Felch

CPI, Palo Alto, CA

R. W. McGhee and M. Coffey

Cryomagnetics, Inc., Oak Ridge, TN

28.4: Stable Operation of a 0.46 THz Continuous Wave Gyrotron Oscillator (4:30 PM)

S.-T. Han, C. D. Joye, I. Mastovsky, M. A. Shapiro, J. R. Sirigiri, R. J. Temkin, and P. P. Woskov

MIT Plasma Science and Fusion Center, Cambridge, MA

28.5: Phase Sensitivity in Relativistic Gyrotrons (4:50 PM)

G. Nusinovich, O. V. Sinitsyn, R. Ngogang, and V. L. Granatstein

University of Maryland, College Park, MD

28.6: Preliminary Design of a High Power, High Efficiency, Ka-Band Complex Cavity Gyrotron Oscillator (5:10 PM)

F. Wang, J.-R. Luo, and C.-Q. Jiao

*Chinese Academy of Sciences, Beijing,
Peoples Republic of China*

HIGH POWER TRANSMITTER TECHNOLOGIES

Thursday, April 27, 2006 / 3:30 – 5:30 PM / De Anza III

Chair: M. Kempkes
Diversified Technologies, Inc., Bedford, MA

29.1: *The RF System for European XFEL* (3:30 PM)

S. Choroba
Deutsches Elektronen-Synchrotron, Hamburg, Germany

29.2: *Experimental Study on 100MW X-band Relativistic Backward Wave Oscillator* (3:50 PM)

**G.-S. Park, H.-C. Jung, D.-H. Kim, S.-H. Min,
M. Wang, and M.-J. Rhee**
Seoul National Univeristy, Seoul, Korea

J.-H. Kim and S.-Y. Park
*Pohang University of Science and Technology,
Pohang, Korea*

29.3: *A New High-Efficiency Zero-Voltage Zero-Current Switching Topology* (4:10 PM)

S. Weinberg
European Space Agency, Noordwijk, Netherlands

29.4: *W-Band Transmitter Upgrade for the Haystack Ultra Wideband Satellite Imaging Radar (HUSIR)* (4:30 PM)

**M. Kempkes, T. J. Hawkey, M. P. J. Gaudreau, and
R. A. Philips**
Diversified Technologies, Inc., Bedford, MA

29.5: *High Power Microwave Control by Quasi-Optical Gratings* (4:50 PM)

M. Petelin
*Institute of Applied Physics, RAS, Nizhny Novgorod,
Russia*

29.6: *Microwave Pulse Compression Using Helically Corrugated Waveguides* (5:10 PM)

**P. MacInnes, A. Cross, A. D. R. Phelps, W. He,
K. Ronald, A. R. Young, C. G. Whyte, G. Burt, and
I. V. Konoplev**
University of Strathclyde, Glasgow, Scotland

S. V. Samsonov, V. L. Bratman, and C. G. Desinov
Russian Academy of Sciences

MAGNETRONS AND RELATIVISTIC MAGNETRONS

Thursday, April 27, 2006 / 3:30 – 5:30 PM / Ironwood

Chair: R. J. Barker
AFOSR, Arlington, VA

30.1: *Magnetic Priming Experiments on a Relativistic Magnetron* (3:30 PM)

**R. Gilgenbach, B. W. Hoff, Y. Y. Lau, N. M. Jordan,
W. White, M. C. Jones, and V. B. Neculaes**
University of Michigan, Ann Arbor, MI

30.2: *Use of DSP and Fast Feedback for Accurate Phase Control of an Injection Locked Magnetron* (3:50 PM)

I. Tahir, A. Dexter, and R. Carter
Lancaster University, Lancaster, United Kingdom

30.3: *Experimental Investigation of Giga-watt Magnetically Insulated Transmission Line Oscillator (MILO) by Improved Axial Power Extraction* (4:10 PM)

**G.-S. Park, D.-H. Kim, H.-C. Jung, S.-H. Min,
M. Wang, and M.-J. Rhee**
Seoul National Univeristy, Seoul, Korea

30.4: *Effect of the External Coupling of Cavities on the Stability and Output Power of a Relativistic Magnetron* (4:30 PM)

I. Vintizanko, A. Zarevich, and A. Shlapakovski
*Nuclear Physics Institute at Tomsk Polytechnic University,
Tomsk, Russia*

S. Novikov
Tomsk State University, Tomsk, Russia

30.5: *Improvement of the Output Characteristics of a Relativistic Magnetron using a Small Diameter Cathode Surrounded by a Transparent Cathode* (4:50 PM)

E. Schamiloglu, H. Bosman, M. Fuks, and S. Prasad
University of New Mexico, Albuquerque, NM

L. Bowers, T. Fleming, and P. Mardahl
Airforce Research Laboratory, Kirtland Air Force Base, NM

30.6: *Development of a Long Life Ka-Band Inverted Coaxial Magnetron for Use in an Airborne Military Radar System* (5:10 PM)

G. Blanchette, B. Guss, and M. Doherty
CPI, Inc., Beverly, MA