ADVANCE PROGRAM

Fifth IEEE International Vacuum Electronics Conference

IVEC 2004

April 27 - 29, 2004

DoubleTree Hotel
Monterey, California, USA

Sponsored by the
IEEE Electron Devices Society

http://ivec2004.org

WELCOME

On behalf of the Program Committee and the EDS Technical Committee on Vacuum Devices, I would like to welcome you to the Fifth IEEE International Vacuum Electronics Conference. IVEC 2004 is dedicated to the field of vacuum electron devices and their applications. The meeting this year, sponsored by the IEEE Electron Devices Society, is being held at the DoubleTree Hotel in the beautiful and historic city of Monterey, California.

The Program Committee has arranged an exciting and interesting program for you. The conference will open Tuesday morning, April 27, with a Plenary Session with speakers presenting the status and achievements of government supported research in the U.S., Europe and Asia. After the break, the Plenary Session will continue with presentations covering several subjects of special interest to the community. On Tuesday afternoon, there will be three parallel sessions of oral papers. On Wednesday, we have organized a mix of both oral and poster presentations. The IVEC reception and banquet will be held on Wednesday night. At the banquet, the IVEC excellence award and a student achievement award will be presented, followed by entertainment featuring actor/comedian Tom Wilson. On Thursday there will be a series of oral sessions to complete the technical portion of the conference.

IVEC has been arranged to enhance the presentation and discussion of useful information to manufacturers, device users, academics, and students. Throughout the meeting and social events, we hope that the participants at the meeting will take this opportunity to renew friendships with colleagues and friends, interact with customers, and meet with students.

The conference website at http://ivec2004.org is a wonderful source of information on the conference, and will continue to serve as a clearinghouse for news and other information after the conference about IVEC including links to past and future IVEC activities.

Finally, I would like to take this time to thank the Committee Members for their help and support, Ralph Nadell of Palisades Convention Management for doing such an excellent job, and all the presenters and contributors to the meeting for their participation. We would like our motto of "System Excellence through Vacuum Electronics" to be a continuing reality, and hope that IVEC 2004 contributes significantly to that goal.

Dan Goebel
General Chairman
IVEC 2004

IVEC 2004 CONFERENCE AND PROGRAM COMMITTEE

General Conference Chair:	Dan M. Goebel, *Jet Propulsion Laboratory* *Pasadena, CA*
Technical Program Chair:	Carol L. Kory *Calabazas Creek Research, Inc.* *and Analex Corporation/NASA GRC* *Cleveland, OH*
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Plenary Sessions:	Baruch Levush *Naval Research Laboratory* *Washington, DC*
Finance:	Richard B. True *L-3 Communications, Electron Devices* *San Carlos, CA*
Publicity:	David R. Whaley *L-3 Communications, Electron Devices* *San Carlos, CA*
Conference Coordinator:	Ralph Nadell *Palisades Convention Management* *New York, NY*

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SRI International, Menlo Park, CA

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Communications and Power Industries, Palo Alto, CA

Philippe Thouvenin
Thales Electron Devices, Velizy, France

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

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 banquet, all refreshment breaks, and a copy of the Book of Abstracts. On-line registration is also available through the IVEC 2004 website http://ivec2004.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 2004)
411 Lafayette Street, Suite 201
New York, NY 10003
fax (212) 460-5460

The deadline for receipt of Advance Registration is April 16, 2004. Requests for refunds must be made in writing and received no later than April 16, 2004. Confirmations will be mailed. However, confirmation of registration can also be made by calling (800) 350-0111 or (212) 460-9700.

	Before April 16	**After April 16**
IEEE Member	$475	$500
Non-Member	$525	$550
Student/Retired/ Life Member	$250	$250

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

Registration Hours

Monday, April 26	4:00 PM – 9:00 PM
Tuesday, April 27	7:00 AM – 5:00 PM
Wednesday, April 28	7:30 AM – 5:00 PM
Thursday, April 29	7:30 AM – 1:30 PM

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

Single Occupancy	$169
Double Occupancy	$189

Hotel reservations may be made directly through the IVEC web site, http//ivec2004.org OR you can complete and mail the enclosed hotel registration card (see centerfold) to the DoubleTree at Fisherman's Wharf OR you can call (831) 649-4511 prior to April 9, 2004. Reservations received after this date will be processed at the conference rate on a space availability 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 degrees.

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.

Reception and Banquet
All conference attendees are invited to attend the Conference reception and banquet to be held on Wednesday evening, April 28th. The reception will start in the DeAnza foyer at 6:00 PM, dinner will be served in the DeAnza Ballroom at 7:00 PM. The evening will conclude with the presentation of the IVEC Award for Excellence in Vacuum Electronics and a program of professional entertainment.

IVEC 2004 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 of persons working in the field of vacuum electronics is eligible for this award, which will be presented each year during the IVEC conference. Anyone in the field may place a colleague in nomination. Selection of the winner will be made by a vote of the members of the EDS Technical Committee on Vacuum Devices. Members of the Technical Committee who are nominees may not vote. 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 they will each receive a plaque and share the $1000.

Messages
Messages for attendees will be posted in the Message Center, located adjacent to the IVEC registration desk. For incoming messages, please call the DoubleTree at Fisherman's Wharf 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.

Website
For additional information on Monterey and IVEC, individuals are encouraged to visit our website at http://ivec2004.org

OTHER MEETINGS AT IVEC

MAGIC Users Group
The MAGIC Users Group will have a meeting on Wednesday, April 28th. The meeting will focus on recent developments in the software with presentation by various users. A working session is planned in the afternoon to discuss problems and development needs. A Tuesday evening reception for the Magic Users Group will be hosted by MRC. For further information, please contact Lars D. Ludeking at magic@mrcwdc.com or visit the web site http://www.mrcwdc.com/Magic/news.html.

MURI Vacuum Electronics Program
A MURI Vacuum Electronics Program Meeting, *"Creating a US University–Industry–DoD Lab Partnership for 21st Century Vacuum Electronics R&D,"* has been scheduled for Wednesday, April 28th, 10:00 AM–12:00 PM in DeAnza I.

PLENARY SESSION

Tuesday, April 27, 2004 / 8:00 am–12:00 pm / De Anza Ballroom

Chair: Carol Kory
CCR/Analex Corp., Cleveland, OH

- ***Introductory Remarks*** **(8:00 AM)**

Dan Goebel
Jet Propulsion Laboratory, Pasadena, CA

PL.1: ***Vacuum Electronics and U.S. Universities*** **(8:10 AM)**

R. Barker
AFOSR, Arlington, VA

PL.2: ***High Power RF Faraday Partnership. Industrial, Academic and Governmental Collaboration in Microwave Technology*** **(8:35 AM)**

D. M. Clunie, S. Bowater
HPRF Faraday Partnership, Herts, United Kingdom

PL.3: ***University Programs in Vacuum Electronics in Asia*** **(9:00 AM)**

H. S. Uhm
Ajou University, Suwon, Korea

BREAK **(9:25–9:50 AM)**

PL.4: ***Millimeter Wave Vacuum Technology*** **(9:50 AM)**

P. Kolda
CPI, Palo Alto, CA

PL.5: ***The Status of Thermionic Cathodes: Theory and Practice*** **(10:15 AM)**

L. R. Falce
CPI, Palo Alto, CA

R. T. Longo
Consultant

PL.6: ***High Frequency Solid State Devices*** **(10:40 AM)**

R. J. Trew
North Carolina State University, Raleigh, NC

PL.7: ***Radar Systems Trade-Offs — Vacuum Electronics vs. Solid State*** **(11:05 AM)**

V. Gregers-Hansen
Naval Research Laboratory, Washington, DC

PL.8: ***The Continuing Need for Vacuum Electronic Devices to Support Electronic Warfare*** **(11:30 AM)**

F. Klemm
Naval Research Laboratory, Washington, DC

LUNCH

HIGH POWER TWTs

Tuesday, April 27, 2004 / 1:30–3:10 PM / De Anza I

Chair: Philippe Thouvenin
Thales Electron Devices, Velizy Villacoublay, France

1.1: Session Keynote: *Development of High Power Ka-Band and Q-Band Helix-TWTs* (1:30 PM)

C. K. Chong, J. A. Davis, R. H. Le Borgne, M. L. Ramay, R. J. Stolz, R. N. Tamashiro, J. P. Vaszari, X. Zhai
Boeing Electron Dynamic Devices, Inc., Torrance, CA

1.2: *A 500 Watt Coupled-Cavity TWT for Ka-Band Communication* (1:50 PM)

J. R. Legarra, J. Cusick, R. Begum, P. Kolda
Communication and Power Industries, Palo Alto, CA

1.3: *F-Programs TWT Design Upgrades* (2:10 PM)

C. Ar, A. V. Piring, P. Tibbs
Boeing Electron Dynamic Devices, Inc., Torrance, CA

1.4: *Design and Development of a 6.5 kW X-band Inverted Slot-Mode Coupled-Cavity TWT* (2:30 PM)

S. Kamath, S. Karmakar, R. Hemamalini, R. Seshadri, M. Santra, M. Ramaswamy, V. Latha Christie, B. M. Fazlunissa, C. Srinivasacharyulu, L. Kumar
Microwave Tube R&D Centre, Bangalore, India

R. Gennady V
SRPC, ISTOK, Fryazino, Moscow, Russia

1.5: *MM-Wave Source Development at Los Alamos* (2:50 PM)

B. E. Carlsten, S. J. Russell, L. M. Earley
Los Alamos National Laboratory, Los Alamos, NM

J. M. Potter
J.P. Accelerator Works, Los Alamos, NM

P. Ferguson
MDS Company, Oakland, CA

S. Humphries, Jr.
Field Precision, Albuquerque, NM

BREAK (3:10–3:30 PM)

GYROTRON OSCILLATORS

Tuesday, April 27, 2004 / 1:30–3:30 PM / De Anza II

Chair: Kevin Felch
CPI, Palo Alto, CA

2.1: Session Keynote: *Harmonic Results of a 460 GHz Gyrotron* (1:30 PM)

M. K. Hornstein, V. S. Bajaj, R. G. Griffin, I. Mastovsky, M. A. Shapiro, J. R. Sirigiri, R. J. Temkin
MIT, Cambridge, MA

K. E. Kreischer
Northrop Grumman Corporation, Rolling Meadows, IL

2.2: Session Keynote: *Development of Multimegawatt Gyrotron for Fusion Plasma Heating and Current Drive* (1:50 PM)

G. Dammertz, E. Borie, R. Heidinger, S. Illy, K. Koppenburg, M. Kuntze, W. Leonhardt, G. Neffe, B. Piosczyk, T. Rzesnicki, M. Schmid
Research Center Karlsruhe, Eggenstein-Leopoldshafen, Germany

S. Alberti, J. P. Hogge, M. Q. Tran
Centre de Recherche en Physique des Plasmas, Lausanne, Suisse

A. Arnold, M. Thumm
Research Center Karlsruhe, Eggenstein-Leopoldshafen, Germany and Universität Karlsruhe, Karlsruhe, Germany

V. Erckmann, H. Laqua, G. Michel
Max-Planck-Institut für Plasmaphysik, Greifswald, Germany

G. Gantenbein, W. Kasparek, G. Müller
Universität Stuttgart, Germany

R. Magne
CEA/Cadarache, Saint Paul-lez-Durance Cédex, France

E. Giguet, G. Le Cloarec, F. Legrand, Y. Le Goff, C. Lievin
Thales Electron Devices, Vélizy-Villacoublay, France

2.3: *Development of a 1.5 MW Gyrotron at 110 GHz* (2:10 PM)

S. Chu, M. Blank, P. Borchard, S. Cauffman, K. Felch, H. Jory
CPI, Palo Alto, CA

2.4: ***Improvement of the Gyrotron TH 1506B for Tore Supra*** **(2:30 PM)**

R. Magne, F. Bouquey, J. Clary, C. Darbos, M. Jung, R. Lambert, M. Lennholm, D. Roux
Association Euratom-CEA, St Paul-lez-Durance, France

S. Alberti, J. P. Hogge
Association Euratom-Confédération Suisse, France

D. Bariou, F. Legrand, C Liévin
Thales Electron Devices, France

A. Arnold, M. Thumm
Association Euratom-FZK, France

2.5: ***Recent Results for the 1.5-MW 110-GHz Gyrotron Experiment*** **(2:50 PM)**

J. P. Anderson, M. A. Shapiro, R. J. Temkin, I. Mastovsky
MIT, Cambridge, MA

2.6: ***A High Efficiency Quasi-Optical Mode Converter for a 140-GHz 1-MW Gyrotron*** **(3:10 PM)**

X. Yang
Institut Fuer Hochleistungsimplus und Mikrowellentechnik, Karlsruhe, Germany

M. Thumm, A. Arnold
Institut Fuer Hochleistungsimplus und Mikrowellentechnik, Karlsruhe, Germany and Universitaet Karlsruhe, Karlsruhe, Germany

G. Michel
Max-Plank-Institut fuer Plasmaphysik, Griefswald, Germany

F. Pretterebner
DaimlerChrysler, Stuttgart, Germany

D. Wagner
Max-Plank-Institut fuer Plasmaphysik, Garching, Germany

Session 3

WINDOWS

Tuesday, April 27, 2004 / 1:30–3:10 PM / De Anza III

Chair: R. Lawrence Ives
Calabazas Creek Research, Inc., Saratoga, CA

3.1: ***Hermetic Metallization of Aluminum Nitride for RF Windows*** **(1:30 PM)**

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

3.2: ***A Fast Approach to Design Broad-Band Waveguide Windows for High-Power Microwave Tubes*** **(1:50 PM)**

M.-C. Lin
Fu Jen University, Taipei, Taiwan and National Chiao Tung University, Hsinchu, Taiwan, Republic of China

R.-F. Jao and K.-H. Huang
Fu Jen University, Taipei, Taiwan

3.3: ***High Power Aluminum Nitride RF Vacuum Window*** **(2:10 PM)**

R. J. Bartkowski, E. Pekrul, M. F. Kirshner
L-3 Communications, San Carlos, CA

3.4: ***Power Absorption by Surface Films on Microwave Windows*** **(2:30 PM)**

H. L. Bosman, Y.-Y. Lau, R. M. Gilgenbach
University of Michigan, Ann Arbor, MI

3.5: ***High Thermal Conductivity Aluminum Nitride Ceramics for High Power Microwave Windows*** **(2:50 PM)**

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

BREAK **(3:10–3:30 PM)**

TWTs I

Tuesday, April 27, 2004 / 3:30–5:10 PM / De Anza I

Chair: Gun-Sik Park
Seoul National University, Seoul, Korea

4.1: Session Keynote: *Backward Wave Gain due to Nonlinear Interaction with the Fast Space Charge Wave* **(3:30 PM)**

D. Chernin and T. M. Antonsen, Jr.
SAIC, McLean, VA

B. Levush
Naval Research Laboratory, Washington, DC

4.2: *Accurate Band-Edge Modeling of Wideband TWTs* **(3:50 PM)**

D. R. Whaley, C. M. Armstrong, M. L. Barsanti, T. A. Hargreaves, R. B. True, R. Watkins
L-3 Communications, San Carlos, CA

D. Chernin, T. M. Antonsen, Jr.
SAIC, McLean, VA

B. Levush
Naval Research Laboratory, Washington, DC

4.3: *Novel TWT Interaction Circuits for High Frequency Applications* **(4:10 PM)**

C. Kory, L. Ives, M. Read, P. Phillips
Calabazas Creek Research, Inc., Saratoga, CA

J. Booske, S. Bhattacharjee, J. Welter, M. Genack, H. Jiang, D. van der Weide, S. Limbach
University of Wisconsin-Madison, Madison, WI

4.4: *Properties of Helix Slow-Wave Structures* **(4:30 PM)**

R. Carter
Lancaster University, Lancaster, United Kingdom

4.5: *Harmonic Suppression in a Helix TWT using SUNRAY-3D Code* **(4:50 PM)**

A. Srivastava, T. K. Ghosh, V. Srivastava, S. N. Joshi
Central Electronics Engineering Research Institute, Pilani, Rajasthan, India

Session 5

FAST WAVE

Tuesday, April 27, 2004 / 3:30–5:10 PM / De Anza II

Chair: Michael I. Petelin
Institute of Applied Physics, RAS, Nizhny Novgorod, Russia

5.1: ***Operation of a Thermionic Gyro-TWT with a Helical Interaction Waveguide*** **(3:30 PM)**

A. R. Young, A. D. R. Phelps, W. He, C. G. Whyte, A. W. Cross, K. Ronald, C. Robertson, E. G. Rafferty, J. Thomson
University of Strathclyde, Rottenrow, Glasgow, United Kingdom

5.2: ***Third Harmonic Frequency Multiplication of a Two-Stage Tapered Gyro-TWT Amplifier*** **(3:50 PM)**

C. W. Baik, S. G. Jeon, D. H. Kim, G.-S. Park
Seoul National Univeristy, Seoul, Korea

N. Sato, K. Yokoo
Tohoku Univeristy, Sendai, Japan

5.3: ***Development of a Broadband W-Band Gyro-TWT Amplifier*** **(4:10 PM)**

M. Blank, P. Borchard, S. Cauffman, K. Felch
CPI, Palo Alto, CA

5.4: ***Ka-Band ~10 MW Gyro-Devices: an Experiment and a Project*** **(4:30 PM)**

E. Ilyakov, A. Krasnykh, I. Kulagin, S. Kuzikov, V. Lygin, M. Moiseev, M. Petelin, N. Zaitsev
Stanford Linear Accelerator Center, Stanford University, Menlo Park, CA

5.5: ***Demonstration of a 95 GHz, 100 kW, CW Gyrotron Oscillator*** **(4:50 PM)**

K. Felch, M. Blank, P. Borchard, P. Cahalan, S. Cauffman, T. S. Chu, H. Jory
CPI, Palo Alto, CA

BACKWARD WAVE OSCILLATOR

Tuesday, April 27, 2004 / 3:30–5:10 PM / De Anza III

Chair: **Edl Schamiloglu**
University of New Mexico, Albuquerque, NM

6.1: **Session Keynote:** ***Progress in the Theory and Experiments with Pasotrons*** **(3:30 PM)**

G. S. Nusinovich, A. G. Shkvarunets, J. Rodgers, Y. Carmel
University of Maryland, College Park, MD

Y. Bliokh
Technion, Haifa, Israel

D. M. Goebel
JPL, Pasadena, CA

6.2: ***Development of Terahertz Backward Wave Oscillators*** **(3:50 PM)**

L. Ives, C. Kory, M. Read, J. Neilson, M. Caplan, N. Chubun, R. Wilcox, T. Robinson
Calabazas Creek Research, Inc., Saratoga, CA

S. Schwartzkopf, R. Witherspoon
Ron Witherspoon Incorporated, Campbell, CA

6.3: ***Experimental Investigations of Folded-Waveguide TWT Oscillators*** **(4:10 PM)**

S. T. Han, J. K. So, K. H. Jang, Y. M. Shin, S. G. Jeon
Seoul National Univeristy, Seoul, Korea

J. H. Kim, S. S. Chang
Pohang University of Science and Technology, Korea

N. M. Ryskin
Saratov State University, Saratov, Russia

G. S. Park
Seoul National University, Seoul, Korea

6.4: ***Diamond-Based Sub Millimeter Backward Wave Oscillator*** **(4:30 PM)**

J. A. Dayton, Jr., G. T. Mearini
Genvac Aerospace Corp., Cleveland, OH

6.5: ***BWO with an Amplifying Section*** **(4:50 PM)**

Y. N. Pchelnikov
MTS Systems Corporation, Cary, NC

V. A. Solntsev
Moscow State Institute of Electronics and Mathematics, Moscow, Russia

KLYSTRONS I

Wednesday, April 28, 2004 / 8:00–9:40 AM / De Anza I

Chair: **Daryl W. Sprehn**
SLAC, Menlo Park, CA

7.1: **Session Keynote:** ***State-of-the-Art W-Band Extended Interaction Klystron for the CloudSat Program*** **(8:00 AM)**

D. Berry, A. Roitman, B. Steer
Communications & Power Industries Canada Inc., Georgetown, Ontario, Canada

7.2: ***Bandwidth and Group Delay Extention for an X-Band 250 kW CW Klystron for JPL/NASA Deep Space Radar*** **(8:20 AM)**

A. Mizuhara
CPI, Palo Alto, CA

7.3: ***Development of a 2 kW CW K-band Depressed Collector Klystron*** **(8:40 AM)**

E. L. Wright, M. Cecil, L. Cox
CPI, Palo Alto, CA

7.4: ***Development of Two-Beam Feedback Oscillator*** **(9:00 AM)**

Y. M. Shin, S. T. Han, S. G. Jeon, K. H. Jang, J. K. So, G. S. Park
Seoul National Univeristy, Seoul, Korea

7.5: ***Controlling Chaotic Dynamics in a Multiple Cavity Klystron Oscillator Driven by an External Signal*** **(9:20 AM)**

B. S. Dmitriev, D. V. Klokotov, N. M. Ryskin, A. M. Shigaev, Yu. D. Zharkov
Saratov State University, Saratov, Russia

BREAK **(9:40–10:10 AM)**

NOVEL & MM-WAVE TWTs

Wednesday, April 28, 2004 / 8:00–10:00 AM / De Anza II

Chair: Carter M. Armstrong
L-3 Communications EDD, San Carlos, CA

8.1: Session Keynote: *Diamond Studded Traveling Wave Tube* (8:00 AM)

J. A. Dayton, Jr., G. T. Mearini, H. Chen
Genvac Aerospace Corp., Cleveland, OH

C. L. Kory
Consultant

8.2: *Generation of Chaotic Radiation in a Driven TWT Amplifier with Delayed Feedback* (8:20 AM)

C. Marchewka, S. Bhattacharjee, J. H. Booske
University of Wisconsin-Madison, Madison, WI

N. M. Ryskin, V. N. Titov
Saratov State University, Saratov, Russia

8.3: *W-Band MEMS-Based TWT Development* (8:40 AM)

C. Kory, L. Ives, M. Read, G. Miram, J. Neilson, P. Phillips
Calabazas Creek Research, Inc., Saratoga, CA

J. Booske, S. Bhattacharjee, J. Welter, H. Jiang, D. van der Weide, S. Limbach
University of Wisconsin-Madison, Madison, WI

8.4: *Development of Ka/Q-Band 100W Peak Power MMPM* (9:00 AM)

K. Tsutaki, R. Seura, E. Fujiwara, K. Tomikawa
NEC Microwave Tube, Ltd., Sagamihara, Kanagawa, Japan

8.5: *Low Voltage Ka-Band Vacuum Power TWT* (9:20 AM)

J. Kennedy, C. Colombo, R. Watkins
L-3 Communications Electron Devices, San Carlos, CA

8.6: *Development of a 50 Watt Q-Band Mini TWT* (9:40 AM)

J. Taylor, J. Kennedy, C. Marchewka, M. Barsanti, C. Colombo, R. True, R. Watkins
L-3 Communications Electron Devices, San Carlos, CA

POSTER SESSION I

Wednesday, April 28, 2004 / 8:00–11:30 AM / De Anza III

Chair: **Jon Christensen**
Boeing EDD, Torrance, CA

P1.1: ***Measurements of Microwave Electrical Characteristics of Folded Waveguide Circuits***

M. Genack, S. Bhattacharjee, J. H. Booske
University of Wisconsin-Madison, Madison, WI

C. Kory, L. Ives, M. Read
Calabazas Creek Research, Inc., Saratoga, CA

P1.2: ***Waveguide Power Combiner Demonstration for Multiple High Power Millimeter Wave TWTAs***

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

G. G. Lesny
Alphaport

J. L. Glass
Lockheed Martin

P1.3: ***TWT on Goffered Waveguide with Double Modes and Double Kinds Operations***

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

P1.4: ***Improved Noise Characteristics of an X-band Helix-TWT Combined with a Low Noise Solid State Amplifier***

J. H. Joo, M. H. Son, Y. D. Lee, J. J. Choi
Kwangwoon University, Nowon-gu, Seoul, Korea

P1.5: ***Implementing the Principles of Lean Manufacturing at Semicon Associates Samarium Cobalt Magnet Facility***

J. S. Willhite
Semicon Associates, Lexington, KY

P1.6: ***TWT Manufacturing Methods Moving from Development to Production***

J. Cusick, W. Gasta
CPI, Palo Alto, CA

P1.7: ***Material Optimization and Application of Process Controls for "Stringer-Free" 70/30 Copper-Nickel and Monel 404 Alloys***

J. Wellington
CPI, Palo Alto, CA

C. Massing
Williams Advanced Materials

M. Worthington
L-3 Communications

P1.8: ***Statistical Process Control using Key Process Indicators for Vacuum Devices***

W. Gasta
CPI, Palo Alto, CA

P1.9: ***Phase Noise Reduction Techniques of Radar's TWTA***

J. S. Lee, Y. Goren, N. C. Luhmann, Jr.
University of California, Davis, CA and Teledyne Microwave Electronic Components, Rancho Cordova, CA

P1.10: ***Analysis of Ion Back-Flow in an Electron Gun of a C-Band Space-TWT***

R. K. Sharma, A. R. Choudhury, V. V. P. Singh, V. Srivastava, S. N. Joshi
Central Electronics Engineering Research Institute, Pilani, India

B. N. Basu
I. T. B.H.U., Varanasi

P1.11 ***Effect of Inhomogeneity on Backward Wave in a Helix TWT***

S. Ghosh, V. Kiran, F. S. Thangaraj
Bharat Electronics, Jalahalli, Bangalore, India

P1.12: ***HFHPTA's Efficiency Analysis using PSpice Nonlinear Vacuum Tube Model***

S. Kostic
Ericsson Systems Expertise Ltd., Dublin, Ireland

P1.13: ***SINCOHET: Simple Nonlinear Analysis Code for Helix Traveling Wave Tube***

Y. D. Joo, G. S. Park
Seoul National Univeristy, Seoul, Korea

A. K. Sinha
Central Electronics Engineering Research Institute, Pilani, India

P1.14: ***New Analysis of Asymmetric Helix Slow-Wave Structure Used in Helix Traveling Wave Tubes***

Y. D. Joo, G. S. Park
Seoul National Univeristy, Seoul, Korea

A. K. Sinha
Central Electronics Engineering Research Institute, Pilani, India

B. N. Basu
Banaras Hindu University, Varanasi, India

P1.15: ***Photonic Crystal Cavity for Linear Beam Vacuum Device***

S. G. Jeon, Y. M. Shin, J. I. Kim, S. T. Han, K. H. Jang, J. K. So, G. S. Park
Seoul National Univeristy, Seoul, Korea

P1.16: ***Simulations of a 1 MW, 700 MHz Klystron using MAGIC PIC-code***

L. B. Jang, G. W. Choi, S. M. Jang, Y. D. Lee, J. J. Choi
Kwangwoon University, Nowon-Gu, Seoul, Korea

K. O. Lee, K. H. Chung
KAPRA, Chulwon, Korea

P1.17: ***Selfexcitation of Wideband Travelling-Wave Tubes Near "π" Point Under Conditions of Presence the Stopband in System Dispersion***

E. V. Blokhina, A. G. Rozhnev
Saratov State University, Saratov, Russia

P1.18: ***MAGIC 2D Simulation of Nonstationary and Chaotic Processes in a Relativistic Backward Wave Oscillator***

Y. B. Kang, G. S. Park
Seoul National University, Korea

N. M. Ryskin, V. N. Titov
Saratov State University, Saratov, Russia

P1.19: ***Prediction of Cold-Test and Hot-Test Characteristics of a High Efficiency Linear C-band Helix TWT Using HFSS, CTLSS, Christine 1-D/3-D***

R. Begum, M. Chesnut, J. Legarra
CPI, Palo Alto, CA

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

D. P. Chernin, C.-L. Chang
Science Applications International Corp., McLean, VA

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

P1.20: ***2-D Large-Signal Modeling of an S-band CCT Device Using GATOR***

R. Begum, M. Bayless, J. Legarra
CPI, Palo Alto, CA

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

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

B. Levush
Naval Research Laboratory, Washington, DC

P1.21: ***Use of State of the Art Computer-Aided Design Tools at CPI***

R. Begum, J. Atkinson, M. Cattelino, J. Cusick, J. Legarra, B. Stockwell, E. Wright
CPI, Palo Alto, CA

F. Friedlander
Calabazas Creek Research, Inc., Saratoga, CA

P1.22: ***Freespace Boundary Conditions for Poisson's Equation in 2D***

J. Hammel, J. Verboncoeur
UC Berkeley, Berkeley, CA

P1.23: ***3D Self Magnetic Field Calculation in the Finite Element Gun Code MICHELLE***

E. M. Nelson
LANL, Los Alamos, NM

J. J. Petillo
SAIC

B. Levush
NRL, Washington, DC

P1.24: ***A 3D-Analysis of a Slow-Wave-Structure using Tangential Vector Finite Elements***

C. C. Motta
Centro Tecnológico da Marinha em São Paulo, São Paulo, Brazil

P. R. Pascholati
LAL, IFUSP, São Paulo, Brazil

P1.25: ***Large Signal Simulations of Helix TWTs with Varying Beam Tunnel Radius***

C.-L. Chang, D. Chernin
Science Applications International Corp., McLean, VA

B. Levush
NRL, Washington, DC

P1.26: ***New 2.5D Code for Modeling of Nonlinear Multisignal Amplification in a Wideband Helix Traveling Wave Tube***

A. G. Rozhnev, N. M. Ryskin, D. V. Sokolov, D. I. Trubetskov
Saratov State University, Saratov, Russia

A. S. Pobedonostsev, S. A. Rumyantsev, V. B. Khomitch
SPRC Istok, Fryazino, Moscow, Russia

P1.27: ***Application of Modern Image Analysis to Quantify Dispenser Cathode Surface Condition***

M. Wijangco, T. Grant
CPI, Palo Alto, CA

P1.28: ***Secondary Electron Emission Database***

J. E. Yater, A. Shih, C. Hor, B. Levush
Naval Research Laboratory, Washington, DC

P1.29: ***Measurements of Secondary Electron Yield from Materials with Application to Depressed Collectors***

N. Zameroski, T. Svimonishvili, M. Gilmore, J. Gaudet, E. Schamiloglu
University of New Mexico, Albuquerque, NM

P1.30: ***High Voltage Operation of Field Emission Array Cathodes***

L. Ives, G. Miram, M. Read, T. Robinson, P. Phillips
Calabazas Creek Research, Inc., Saratoga, CA

C. Spindt
SRI International

R. Wilcox
Consultant

P1.31: ***Use of Velvet Cathodes for the Generation of Intense Relativistic Electron Beams in Pulse Vacuum Diodes***

R. Verma, A. Shyam, S. Chaturvedi, R. Kumar, D. Lathi, P. Sarkar, V. Chaudhary, R. Shukla, K. Debnath, J. Sonara, K. Shah, B. Adhikary, T. Jigna, J. Piyush
Institute for Plasma Research, Bhat, Gandhinagar, India

P1.32: ***Pressure Field in the Cathode-Anode Region of a High-Power Klystron Amplifier***

F. T. Degasperi
FATEC-SP - CEETEPS - UNESP, São Paulo, Brazil

S. L. L. Verardi
Universidade Estadual Paulista - UNESP, Instituto de Biociências, Letras e Ciências Exatas - IBILCE, São José do Rio Preto, SP, Brazil

C. C. Motta
Centro Tecnológico de Marinha em São Paulo - CTMSP, São Paulo, Brazil

LUNCH **(11:30 AM–1:30 PM)**

MAGNETRONS

Wednesday, April 28, 2004 / 1:30–3:30 PM / De Anza I

Chair: **Greg Schaeffer**
L-3 Communications, Williamsport, PA

9.1: **Session Keynote:** ***Magnetron Microwave Noise Reduction and Magnetic Priming by Azimuthally Varying Axial Magnetic Fields*** **(1:30 PM)**

V. B. Neculaes, R. M. Gilgenbach, Y. Y. Lau, M. C. Jones, W. White, P. Pengvanich, Y. Hidaka, H. Bosman
University of Michigan, Ann Arbor, MI

9.2: ***The Two-Stage Magnetron — A New Multifunctional Microwave Generator*** **(1:50 PM)**

G. I. Churyumov, T. I. Frolova, A. V. Gritsunov
Kharkov National University of Radio Electronics, Kharkov, Ukraine

9.3: ***Nonstationary Behavior in 10-Vane Strapped Magnetron Oscillator*** **(2:10 PM)**

J. I. Kim, J. H. Won, G. S. Park
Seoul National Univeristy, Seoul, Korea

H. J. Ha, J. C. Shon
Samsung Electronics, Suwon, Korea

9.4: ***Development of a 300 kW CW L-Band Industrial Heating Magnetron*** **(2:30 PM)**

A. P. Wynn, D. E. Blank, P. S. Campbell, R. R. Lentz
California Tube Laboratory, Watsonville, CA

W. T. Main
Consultant, Accuray Inc.

S. G. Tantawi
Consultant, Stanford Linear Accelerator Center

K. G. Kato, H. K. Beutel, K. W. Brown, D. D. Crouch, G. K. Jones, R. B. McDonald
Raytheon Company Advanced Electromagnetic Technologies Center, Rancho Cucamonga, CA

9.5: ***Highly Tunable High Average Power UHF Magnetron*** **(2:50 PM)**

R. S. Smith III, L. D. Ludeking, D. Hobbs, T. Gray
Mission Research Corporation, Newington, VA

T. Wynn, R. Lentz
California Tube Laboratory

9.6: ***Simulation of Rapid Startup in Microwave Magnetrons with Azimuthally-Varying Axial Magnetic Fields*** **(3:10 PM)**

M. C. Jones, V. B. Neculaes, W. White, Y. Y. Lau, R. M. Gilgenbach, P. Pengvanich, Y. Hidaka, H. Bosman
University of Michigan, Ann Arbor, MI

NOISE & DISTORTION MITIGATION

Wednesday, April 28, 2004 / 1:30–3:30 PM / De Anza II

Chair: Dave Abe
Naval Research Laboratory, Washington, DC

10.1 Session Keynote: *Linearizability of Traveling-Wave Tube Amplifiers Using Predistortion Techniques* **(1:30 PM)**

J. Qiu, D. 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
Mission Research Corp., Newington, VA

10.2: *Linearized TWTAs for Satellite Application* **(1:50 PM)**

D. S. Komm, R. Liou, J. W. Pyter
Boeing Electron Dynamics Devices, Inc., Torrance, CA

10.3: *Feedforward and Predistortion Linearizers on an X-Band Helix TWT* **(2:10 PM)**

J. H. Joo, M. H. Son, Y. D. Lee, J. J. Choi
Kwangwoon University, Seoul, Korea

10.4: *A Modal Description of Intermodulation Injection in a Klystron* **(2:30 PM)**

J. G. Wöhlbier
Los Alamos National Laboratory, Los Alamos, NM

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

10.5: *Sensitivity of Harmonic Injection and Its Spatial Evolution for Nonlinear Distortion Suppression in a TWT* **(2:50 PM)**

A. Singh, J. E. Scharer, J. G. Wöhlbier, J. H. Booske
University of Wisconsin, Madison, WI

10.6: *Improved Technique to Measure Phase and Noise of Pulsed TWTs* **(3:10 PM)**

K. B. Mitsdarffer
Naval Surface Warfare Center Crane, Crane, IN

L. R. Hoover, D. Thelen
Technology Service Corp., Bloomington, IN

POSTER SESSION II

Wednesday, April 28, 2004 / 1:30–5:00 PM / De Anza III

Chair: Vern Heinen
Northrop Grumman, Rolling Meadows, IL

P2.1: ***Output Analysis of a Coaxial Virtual Cathode Oscillator***

M.-C. Lin
Fu Jen University, Taipei, Taiwan and National Chiao Tung University, Hsinchu, Taiwan, ROC

P2.2: ***A Gridded Monotron of High Efficiency***

J. J. Barroso
National Institute for Space Research - INPE, São José dos Campos, S.P., Brazil

P2.3: ***Excitation of Periodic Waveguides by Intensive Electron Beams***

V. A. Solntsev
Moscow State Institute of Electronics and Mathematics, Moscow, Russia

P2.4: ***Co-Axial 2D Bragg Structures for a High-Power Free Electron Maser***

I. V. Konoplev, A. W. Cross, A. D. R. Phelps, K. Ronald, P. McGrane
University of Strathclyde, Glasgow, United Kingdom

P2.5: ***Gyroklinotron's Efficiency***

A. A. Kurayev, A. K. Sinitsyn
Byelarusian State University of Informatics and Radioelectronics, Minsk, Byelarus

P2.6: ***Cusp Gun Ka-Band Second-Harmonic TE_{21} Gyro-TWT Amplifier***

S. B. Harriet
University of California Davis, Davis, CA and Naval Surface Warfare Center, Crane, IN

D. B. McDermott, N. C. Luhmann, Jr.
University of California Davis, Davis, CA

P2.7: ***Self-Modulation Instability in a Free Electron Laser Amplifier with Electromagnetic Pumping***

T. V. Dmitrieva, N. M. Ryskin
Saratov State University, Saratov, Russia

P2.8: ***Design of a Ka-Band Second Harmonic Gyroklystron Amplifier***

X.-F. Liang, P.-K. Liu, S.-C. Zhang, Y.-G. Ding
Chinese Academy of Sciences, Beijing, China

P2.9: ***Design of a 140 GHz, 100 W Gyroklystron Amplifier***

C. D. Joye, M. A. Shapiro, J. R. Sirigiri, R. J. Temkin
MIT Plasma Science and Fusion Center, Cambridge, MA

P2.10: ***Ka-band Klystron with Permanent Magnets Focusing System***

L. Lei
Legentech Incorporation, Fremont, CA

P2.11: ***Towards Estimation of the Effects of Misalignment of Electron Beam Injected into a High Power Gyrotron with Depressed Collector***

A. Singh, V. L. Granatstein
University of Maryland, College Park, MD

P2.12: ***Some Design Data for the Second Harmonic, 1-MW, 15-GHz Gyrotron for Plasma Heating at the NSTX Tokamak***

M. Yeddulla, G. S. Nusinovich, T. M. Antonsen, Jr.
University of Maryland, College Park, MD

P2.13: ***Gyro-BWO Experiment using a Helical Interaction Waveguide***

W. He, A. W. Cross, C. G. Whyte, A. R. Young, A. D. R. Phelps, K. Ronald, E. G. Rafferty, J. Thomson, C. W. Robertson, D. C. Speirs
University of Strathclyde, Glasgow, United Kingdom

S. V. Samsonov, V. L. Bratman, G. G. Denisov
Russian Academy of Sciences, Nizhny Novgorod, Russia

P2.14: ***Influence of Ion Effects on Relativistic Field-Emission-Limited Diodes***

M.-C. Lin
Fu Jen University, Taipei, Taiwan, ROC and National Chiao Tung University, Hsinchu, Taiwan, ROC

P2.15: ***Theoretical Investigation of Coherent Radiation Sources Based on Cerenkov and Transition Radiation***

J. Gao, P. D. Coleman
University of Illinois, Urbana-Champaign, Champaign, IL

P2.16: ***Progress on a Gridded Electron Gun for a Sheet Beam Klystron***

M. E. Read, G. Miram, R. L. Ives
Calabazas Creek Research, Inc., Saratoga, CA

P2.17: ***Self-Excitation Conditions in Overmoded Klystrons***

G. S. Nusinovich, M. E. Read, L. Song, R. L. Ives
Calabazas Creek Research, Inc., Saratoga, CA

P2.18: ***Progress on Development of a 19 kW CW, L-Band Klystron for CEBAF***

M. E. Read, A. Mizuhara, G. Miram, L. Song, R. L. Ives
Calabazas Creek Research, Inc., Saratoga, CA

P2.19: ***Effects of a Finite Axial Magnetic Field on the Beam Loading on a Cavity***

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

P2.20: ***Non-Monochromatic Fields in a Dispersive Electrodynamic Line. I. The Discrete Approximation***

A. V. Gritsunov
Kharkov National University of Radioelectronics, Kharkov, Ukraine

P2.21: ***Non-Monochromatic Fields in a Dispersive Electrodynamic Line. II. The Continuous Approximation***

A. V. Gritsunov
Kharkov National University of Radioelectronics, Kharkov, Ukraine

P2.22: ***The Flow Forming Potential in Unconventional Magnetrons***

O. P. Kulagin, V. D. Yeryomka
National Academy of Sciences of Ukraine, Kharkov, Ukraine

P2.23: ***The Electrostatic Potential Distribution of Crossed-Field Systems***

O. M. Nikitenko, M. V. Volovenko
Kharkov National University of Radioelectronics, Kharkov, Ukraine

P2.24: ***Peer-Peer Phase-Locking of Two L-Band Industrial Heating Magnetrons***

K. G. Kato, K. W. Brown, D. D. Crouch, G. K. Jones, R. B. McDonald
Raytheon Company Advanced Electromagnetic Technologies Center, Rancho Cucamonga, CA

A. P. Wynn, D. E. Blank, P. S. Campbell, R. R. Lentz
California Tube Laboratory, Watsonville, CA

R. J. Meredith
Consultant, Rutland Electronic Tubes

P2.25: ***Analysis of Mode Competition in Magnetrons***

G. I. Churyumov, T. I. Frolova, A. V. Gritsunov, O. M. Nikitenko, V. A. Prokopchik
Kharkov National University of Radioelectronics, Kharkov, Ukraine

P2.26: ***Improved Magnetron Injection Guns for High Power RF Applications***

L. Ives, G. Miram, M. Read, M. Mizuhara, R. Wilcox, T. Robinson
Calabazas Creek Research, Inc., Saratoga, CA

P. Borchard, L. Falce
Consultants

K. Gunther
HeatWave Laboratories, Inc.

P2.27: ***Experimental Research of Triode with Virtual Cathode Radiation Field***

A. G. Zherlitsyn, G. V. Melnikov, P. Y. Isakov
Tomsk Polytechnic University, Tomsk, Russia

P2.28: ***BMS 3D-Code for Modeling of Cold-Cathode Crossed Field Guns***

G. I. Churyumov, Y. L. Starchevskiy
Kharkov National University of Radioelectronics, Kharkov, Ukraine

A. N. Dovbnya, N. G. Reshetnyak, V. V. Zakutin
National Science Center "Kharkov Institute of Physics and Technology", Kharkov, Ukraine

O. G. Lebedev
Kharkov Air Force Institute

P2.29: ***Cusp Gun Driven Peniotron***

L. J. Dressman
University of California, Davis, Davis, CA and Naval Surface Warfare Center, Crane, IN

D. B. McDermott, Y. Hirata, N. C. Luhmann, Jr.
University of California, Davis, Davis, CA

D. A. Gallagher
Northrop Grumman Corp., Rolling Meadows, IL

T. A. Spencer
Air Force Research Laboratory, Albuquerque, NM

P2.30: ***Grid Control for Electron Guns***

B. Stockwell, G. Miram, M. Cattelino
CPI, Palo Alto, CA

P2.31: ***Experimental Measurements and Field Modeling for W-band Window***

L. Earley
Los Alamos National Laboratory, Los Alamos, NM

P. Ferguson
MDS Co., Oakland, CA

E. Smirnova
MIT, Cambridge, MA

P2.32: ***Coaxial Cold-Cathode Magnetron***

V. D. Yeryomka
National Academy of Sciences of Ukraine, Kharkov, Ukraine

V. P. Dzyuba
Special Design Office "Spectr", Kyev, Ukraine

P2.33: ***Multiple-Beam Free Electron Masers with Distributed Bremsstrahlung***

V. D. Yeryomka
National Academy of Sciences of Ukraine, Kharkov, Ukraine

VACUUM MICROELECTRONICS

Thursday, April 29, 2004 / 8:00–10:00 AM / De Anza I

Chair: Chris Holland
SRI International, Menlo Park, CA

11.1: ***Cold Electron Emission Process in CVD Diamond Films*** **(8:00 AM)**

J. E. Yater, A. Shih, J. E. Butler, P. E. Pehrsson
Naval Research Laboratory, Washington, DC

11.2: ***X-Ray Tubes Incorporating Carbon Nanotube Cathodes*** **(8:20 AM)**

R. J. Espinosa
Microwave Power Technology, Campbell, CA

C. McKenzie, M. Munson, S. Snyder
Oxford Instruments

P. Sarrazin, D. Blake, L. Delzeit
NASA Ames Research Center

11.3: ***CNT Electron Source with a Uniform Emission Distribution*** **(8:40 AM)**

S. Nakata, T. Sawada, M. Fujikawa, K. Nishimura, F. Abe, A. Hosono, N. Hashimoto, S. Kawamoto, S. Watanabe, T. Yamamuro, Z. Shen, S. Horibata, S. Okuda
Mitsubishi Electric Corp., Amagasaki, Hyogo, Japan

K. Oono, Y. Hirokado
Mitsubishi Electric Corp., Nagaokakyo City, Kyoto, Japan

11.4: ***MEMS Electrostatic Ion Propulsion*** **(9:00 AM)**

P. R. Schwoebel, C. E. Holland, C. A. Spindt, V. Aguero
SRI International, Menlo Park, CA

11.5: ***MEMS—Microfabricated Components for Millimeter-Wave and THz TWTs*** **(9:20 AM)**

J. Welter, J. Booske, H. Jiang, S. Bhattacharjee, S. Limbach, D. van der Weide, N. Zhang, J. Scharer
University of Wisconsin-Madison, Madison, WI

C. Kory, L. Ives, M. Read
Calabazas Creek Research, Inc., Saratoga, CA

11.6: ***On the Application of Field Effect Cathode for Direct Conversion of Microwave Power to DC*** **(9:40 AM)**

A. V. Galdetskiy
SRI 'Istok', Fryazino, Russia

BREAK **(10:00–10:10 AM)**

SPACE TWTS

Thursday, April 29, 2004 / 8:00–10:00 AM / De Anza II

Chair: **Pierre Waller**
European Space Agency, Noordwijk, Netherlands

12.1: **Session Keynote:** ***High-Power, High-Efficiency 32 GHz Space-Qualified Traveling Wave Tube*** **(8:00 AM)**

N. R. Robbins, H. C. Limburg, D. R. Dibb, R. T. Benton, J. T. Burdette, W. L. Menninger, X. Zhai
Boeing Electron Dynamic Devices, Inc., Torrance, CA

12.2: ***TWT versus SSPA: A Comparison of On-Orbit Reliability Data*** **(8:20 AM)**

J. M. Weekley, B. J. Mangus
Boeing Corp., Los Angeles, CA

12.3: ***Space Qualified Low/High Power Radar TWTs*** **(8:40 AM)**

M. Brück, G. Fischer, W. Gerum, H.-P. Rothacker
Thales Electron Devices GmbH, Ulm, Germany

D. Henry
Thales Electron Devices GmbH, Vélizy, France

12.4: ***Seventy Percent Efficient Ku-Band and C-Band Traveling Wave Tubes for Satellite Communications*** **(9:00 AM)**

R. T. Benton, M. Choi, J. R. Feicht, U. R. Hallsten, H. C. Limburg, K. P. Mallon, W. L. McGeary, W. L. Menninger, X. Zhai
Boeing Electron Dynamic Devices, Inc., Torrance, CA

12.5: ***Multiport Power Amplifier: A Flexible Architecture for Multi-Channel Amplification on Board Satellites*** **(9:20 AM)**

F. André
Thales Electron Devices, Velizy, France

12.6: ***L-Band Traveling Wave Tubes Amplifiers for Navigation Satellites*** **(9:40 AM)**

P. Ehret, H. Vogt, A. Peters, E. Bosch
Thales Electron Devices, Ulm, Germany

BREAK **(10:00–10:10 AM)**

POWER SUPPLIES

Thursday, April 29, 2004 / 8:00–9:20 AM / De Anza III

Chair: Tom Ninnis
L-3 Communications ED, San Carlos, CA

13.1: ***Crowbar Replacement Through Solid State Opening Switches*** **(8:00 AM)**

M. A. Kempkes, J. A. Casey, I. Roth, T. Hawkey, M. P. J. Gaudreau
Diversified Technologies, Inc., Bedford, MA

13.2: ***Capabilities, Performance, and Future Possibilities of High Frequency Polyphase Resonant Converters*** **(8:20 AM)**

W. A. Reass, D. M. Baca, J. T. Bradley III, T. L. Hardek, S. I. Kwon, M. T. Lynch, D. E. Rees
Los Alamos National Laboratory, Los Alamos, NM

13.3: ***Three-Phase Resonant DC Converter for TWTs*** **(8:40 AM)**

G. Drummond
Colorado Power Electronics, Inc., Fort Collins, CO

13.4: ***Solid-State Radar Transmitter Upgrades*** **(9:00 AM)**

M. A. Kempkes, P. D. Brown, J. A. Casey, M. P. J. Gaudreau
Diversified Technologies, Inc., Bedford, MA

BREAK

MULTI-BEAM DEVICES I

Thursday, April 29, 2004 / 10:10 AM–11:50 AM / De Anza I

Chair: Baruch Levush
Naval Research Laboratory, Washington, DC

14.1: ***High-Power S-Band Fundamental-Mode Eight-Beam Klystron and Gun Design*** **(10:10 AM)**

K. T. Nguyen
Beam-Wave Research, Inc., Silver Spring, MD

D. K. Abe, B. Levush
NRL

D. E. Pershing
MRC

E. L. Wright, M. Cusick, M. Cattelino
CPI, Palo Alto, CA

14.2: ***Operation of a 1.3 GHz, 10 MW Multiple Beam Klystron*** **(10:30 AM)**

A. Balkcum, E. Wright, H. Bohlen, M. Cattelino, L. Cox, M. Cusick, S. Forrest, F. Friedlander, A. Staprans, L. Zitelli
CPI, Palo Alto, CA

K. Eppley
Science Applications International Corp., Boston, MA

14.3: ***S Band Multi-Beam Klystron with Bandwidth of 10%*** **(10:50 AM)**

Y. Ding
Institute of Electronics, Chinese Academy of Sciences, Beijing, China

14.4: ***Construction and Test of a Confined Flow Multiple Beam Gun for a 50 MW Klystron*** **(11:10 AM)**

L. Ives, G. Miram, D. Marsden, M. Mizuhara, T. Robinson, J. Guevara
Calabazas Creek Research, Inc., Saratoga, CA

A. Krasnykh, V. Ivanov
Consultants

14.5: ***Development of an X-band 50 MW Multiple Beam Klystron*** **(11:30 AM)**

L. Song, P. Ferguson, R. L. Ives, G. Miram, D. Marsden, M. Mizuhara, J. Neilson
Calabazas Creek Research, Inc., Saratoga, CA

LUNCH

TWTS II

Thursday, April 29, 2004 / 10:10–11:50 AM / De Anza II

Chair: Guenter Kornfeld
Thales Electronic Devices, Ulm, Germany

15.1: ***Vacuum Electronics Development at Northrop Grumman*** **(10:10 AM)**

V. O. Heinen, K. E. Kreischer, M. A. Basten, D. A. Gallagher, J. C. Tucek, F. Scafuri, D. R. Whaley
Northrop Grumman Corp., Rolling Meadows, IL

15.2: ***High Power Mini-TWT Development at L-3 Communications*** **(10:30 AM)**

R. F. Watkins
L-3 Communications, Electron Devices, San Carlos, CA

15.3: ***High Efficiency Linear C-Band Helix Traveling Wave Tube*** **(10:50 AM)**

M. Chesnut
CPI, Palo Alto, CA

15.4: ***High Power Mini TWTs Development*** **(11:10 AM)**

F. Yang, L. Roeder, C. Villa
CPI, Palo Alto, CA

15.5: ***Ku-Band MPM Booster Helix TWT Design and Validation*** **(11:30 AM)**

T. A. Hargreaves, C. M. Armstrong, R. B. True, R. Watkins, M. L. Barsanti, A. Schram
L-3 Communications, Electron Devices, San Carlos, CA

LUNCH

CATHODES

Thursday, April 29, 2004 / 10:10 AM–12:10 PM / De Anza III

Chair: **Robert T. Longo**
Boeing Electron Dynamics Devices, Inc., Torrance, CA

16.1: ***Chemistry and Surface Physics Phenomena Involved in the Activation of Impregnated Tungsten Dispenser Cathodes*** **(10:10 AM)**

L. R. Falce, L. Garbini
CPI, Palo Alto, CA

16.2: ***The Effects of Chemical Cleaning on Impregnant Removal as a Function of Impregnant Type*** **(10:30 AM)**

J. J. Farrell, S. Conkwright, J. O. Tarter
Semicon Associates, Lexington, KY

16.3: ***Sources of Temperature Variance in Dispenser Cathodes*** **(10:50 AM)**

S. Roberts
Semicon Associates, Lexington, KY

16.4: ***Selection of Dispenser Cathode Impregnant Types*** **(11:10 AM)**

J. O. Tarter, J. J. Farrell
Semicon Associates, Lexington, KY

16.5: ***Emission Spread in Temperature Limited Thermionic Cathodes*** **(11:30 AM)**

G. Miram, L. Ives, M. Read, R. Wilcox
Calabazas Creek Research, Inc., Saratoga, CA

B. Stockwell
CPI, Palo Alto, CA

16.6: ***Impact of Dispenser Cathode Thickness on Useful Operating Life*** **(11:50 AM)**

T. J. Grant, L. R. Falce
CPI, Palo Alto, CA

LUNCH

MULTI-BEAM DEVICES II

Thursday, April 29, 2004 / 1:30–3:10 PM / De Anza I

Chair: **Yaugen Ding**
Institute of Electronics, Chinese Academy of Sciences, Beijing, Peoples Republic of China

17.1: ***Progress on a Multi-Beam Klystron for Accelerator Applications*** **(1:30 PM)**

C. B. Wilsen, M. F. Kirshner, R. J. Bartkowski, R. J. Hansen, L. Turek, T. A. Hargreaves, R. B. True
L-3 Communications Electron Devices, San Carlos, CA

17.2: ***The Results of the Complex Investigation and Optimization of the Transmitting Modules, Using the Miniature Multibeam Klystrons and TWTs*** **(1:50 PM)**

A. N. Korolev, S. A. Zaitsev, A. S. Pobedonostsev, S. A. Rumjantsev, V. M. Torbik, A. D. Zakurdayev, B. V. Sazonov
FSUE RPC Istok, Fryazino, Russia

17.3: ***Development of a Megawatt-Class Multi-Beam Inductive Output Tube*** **(2:10 PM)**

C. L. Wheeland, M. A. Boyle, M. F. Kirshner, C. B. Wilsen
L-3 Communications Electron Devices, Williamsport, PA

17.4: ***An Improved Concept for a Higher-Order Mode IOT*** **(2:30 PM)**

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

17.5: ***A 6.7 GHz, TM_{040} Triple-Beam Monotron*** **(2:50 PM)**

J. J. Barroso
National Institute for Space Research - INPE, São José dos Campos, SP, Brazil

BREAK

CODE DEVELOPMENT

Thursday, April 29, 2004 / 1:30–3:30 PM / De Anza II

Chair: David S. Komm
Boeing Electron Dynamics Devices, Inc., Torrance, CA

18.1: Session Keynote: *TESLA: Large Signal Simulation Code for Klystrons* (1:30 PM)

A. N. Vlasov, D. P. Chernin
Science Applications International Corp., McLean, VA

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

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

18.2: *Operation and Performance of a 3D Finite Element Charged Particle Code with Adaptive Meshing* (1:50 PM)

L. Ives, T. Bui, W. Vogler
Calabazas Creek Research, Inc., Saratoga, CA

A. Bauer, M. Shephard
Rensselear Polytechnic Institute, Albany, NY

M. Beall
Simmetrix, Inc.

18.3: *An Improved Magnetic Field Simulator—MAGFLD* (2:10 PM)

T. K. Ghosh, V. Yadav, Y. Joshi, R. Gupta, A. Srivastava, R. Vishwanath, S. N. Joshi
Central Electronics Engineering Research Institute, Pilani, India

R. G. Carter
Lancaster University, Lancaster, United Kingdom

18.4: *Electromagnetic Analysis by Finite Elements of Electron Guns for Traveling Wave Tubes* (2:30 PM)

S. Coco, S. Corsaro, A. Laudani, G. Pollicino
Università di Catania, Catania, Italy

R. Dionisio, R. Martorana
Galileo Avionca, Palermo, Italy

18.5: ***Recent Advances in the MICHELLE 2D/3D Electron Gun and Collector Modeling Code*** **(2:50 PM)**

J. Petillo, K. Eppley, D. Panagos
Science Applications International Corp., Burlington, MA

E. Nelson
LANL

N. Dionne
Raytheon

J. DeFord, B. Held, L. Chernyakova,
STAR

J. Burdette, X. Zhai
Boeing

M. Cattelino
CPI, Palo Alto, CA

K. Nguyen
BW Research

B. Levush
NRL

18.6: ***Fast Simulation of Electromagnetic Slow-Wave Structures*** **(3:10 PM)**

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

A. N. Vlasov
Science Applications International Corp., McLean, VA

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

ELECTRON GUNS

Thursday, April 29, 2004 / 1:30–3:10 PM / De Anza III

Chair: George Miram
Calabazas Creek Research, Inc., Saratoga, CA

19.1: Session Keynote: *Gun Life Improvement Program* **(1:30 PM)**

J. Atkinson, T. Grant, B. Stockwell
CPI, Palo Alto, CA

B. Levush
Naval Research Laboratory, Washington, DC

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

J. Petillo, K. Eppley
Science Applications International Corp., Burlington, MA

19.2: Session Keynote: *Dispenser Cathode High Power Gridded Klystron Gun* **(1:50 PM)**

R. B. True, M. F. Kirshner, L. Turek, G. R. Good, R. J. Hansen, R. J. Bartkowski
L-3 Communications Electron Devices, San Carlos, CA

T. M. Bemis
L-3 Communications Electron Devices, Williamsport, PA

19.3: *Improvement of the VKU-7785E1 Klystron Power Amplifier Electron Gun* **(2:10 PM)**

A. Shabazian, B. Stockwell
CPI, Palo Alto, CA

19.4: *Design of Space-Charge-Limited Magnetron Injection Guns* **(2:30 PM)**

W. Lawson, H. Raghunathan
University of Maryland, College Park, MD

19.5: *Development Status of Electron Guns for Excimer Light Sources in the Vacuum Ultra Violet* **(2:50 PM)**

G. Kornfeld, N. Koch, R. Steinhuebl
Thales Electronic Devices GmbH, Ulm, Germany

BREAK

KLYSTRONS II

Thursday, April 29, 2004 / 3:30–4:50 PM / De Anza I

Chair: Ed Wright
CPI, Palo Alto, CA

20.1: Session Keynote: *IOTs Step into L-Band: 20 kW CW at 1.3 GHz* (3:30 PM)

Y. Li, H. Bohlen, E. Davies, P. Krzeminski, B. Tornoe
CPI, San Carlos, CA

20.2: *High Power CW Klystron for Fusion Experiments* (3:50 PM)

A. Beunas, F. Peauger, P. Thouvenin
Thales Electron Devices, Velizy, France

B. Beaumont, L. Delpech, F. Kazarian, B. Saoutic
Association EURATOM-CEA, CEA/DSM/DRFC CEA-Cadarache, Saint Paul Lez Durance Cedex, France

20.3: *Production Status of 805-MHz, 550 kW Pulsed Klystrons for the Spallation Neutron Source* (4:10 PM)

S. Lenci, E. Eisen
CPI, Palo Alto, CA

D. Rees
Los Alamos National Laboratory, Los Alamos, NM

20.4: *Production and Reliability of the VKU-8891M Series DBS-MSDC Klystron* (4:30 PM)

T. Habermann, E. Wright
CPI, Palo Alto, CA

CODE APPLICATIONS

Thursday, April 29, 2004 / 3:30–5:30 PM / De Anza II

Chair: David P. Chernin
SAIC, McLean, VA

21.1: ***Spurious Reflection of Space Charge Waves in Traveling Wave Structures*** **(3:30 PM)**

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

D. P. Chernin
Science Applications International Corp., McLean, VA

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

21.2: ***2-D Large-Signal Modeling of VKP-8291A using TESLA*** **(3:50 PM)**

R. Begum, E. Eisen, B. Stockwell
CPI, Palo Alto, CA

A. N. Vlasov
Science Applications International Corp., McLean, VA

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

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

21.3: ***MAGY Simulations of 1.5 MW, 110 GHz MIT Gyrotron with Non-Uniform Electron Emission*** **(4:10 PM)**

E. M. Choi, J. P. Anderson, J. R. Sirigiri, M. A. Shapiro, R. J. Temkin
MIT Plasma Science and Fusion Center, Cambridge, MA

A. N. Vlasov
Science Applications International Corp., McLean, VA

21.4: ***Application of the MEBS' SOURCE Software Package to High Voltage Electron Gun Design*** **(4:30 PM)**

E. Munro, X. Zhu, J. Rouse
MEBS, Ltd., London, England

V. Katsap
NuFlare Technology, Hopewell Junction, NY

21.5: ***3D Analysis of Helical Slow-Wave Structures for Space TWTs: Critical Comparison of Ansoft HFSS and CST Microwave Studio*** **(4:50 PM)**

M. Aloisio, P. Waller
ESA/ESTEC, Noordwijk, Netherlands

21.6: ***MAGIC Code Development for Klystron Applications at the Klystron Department at SLAC*** **(5:10 PM)**

D. Sprehn, M. Neubauer, G. Scheitrum, B. Steele
Stanford Linear Accelerator Center, Stanford, CA

MATERIALS & CATHODES

Thursday, April 29, 2004 / 3:30–5:10 PM / De Anza III

Chair: James O. Tarter
Semicon Associates, Lexington, KY

22.1: ***A Study of the Inter-diffusion of Tungsten and Osmium Ruthenium in M-cathodes and the Effects on Performance and Life*** **(3:30 PM)**

L. R. Falce
CPI, Palo Alto, CA

22.2: ***Modeling and Optimization of Turning Operations for Controlled Surface Quality Requirements in Porous Tungsten*** **(3:50 PM)**

S. Chen, D. Head, I. S. Jawahir
University of Kentucky, Lexington, KY

M. Effgen
Semicon Associates, Lexington, KY

22.3: ***Studying the Effects of Different Magnetic Pole Variations in Processing SmCo Magnets to Optimize the Performance of a Traveling Wave Tube*** **(4:10 PM)**

J. S. Willhite
Semicon Associates, Lexington, KY

M. Chestnut
CPI, Palo Alto, CA

22.4: ***Thermal Stability and Performance Data for Sm-Co 2:17 High Temperature Magnets on PPM Focusing Structures*** **(4:30 PM)**

M. Walmer
Electron Energy Corporation, Landisville, PA

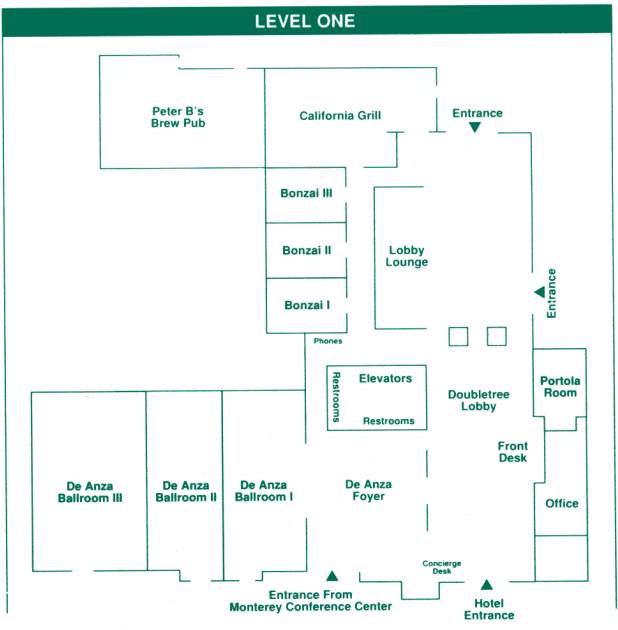
C. H. Chen, S. Liu
University of Dayton, Dayton, OH

22.5: ***High Performance Sm-Co Permanent Magnets Designed for Microwave Devices*** **(4:50 PM)**

S. K. Xia, T. Zhai
University of Kentucky, Lexington, KY

M. P. Effgen, J. Willhite
Semicon Associates, Lexington, KY

Monterey DoubleTree Hotel



Fifth IEEE International Vacuum Electronics Conference, DoubleTree Hotel, Monterey, CA, April 27-29, 2004
Program at a Glance

	Tuesday, April 27			Wednesday, April 28			Thursday, April 29		
	De Anza Ballroom			De Anza I	De Anza II	De Anza III	De Anza I	De Anza II	De Anza III
8:00-9:50	PLENARY SESSION			Session 7 Klystrons I	Session 8 Novel & mm-Wave TWTs	Poster 1	Session 11 Vacuum Micro-electronics	Session 12 Space TWTs	Session 13 Power Supplies
Break									
10:10-12:10	PLENARY SESSION						Session 14 Multi-Beam Devices I	Session 15 TWTs II	Session 16 Cathodes
Lunch	De Anza I	De Anza II	De Anza III						
1:30-3:10	Session 1 High Power TWTs	Session 2 Gyrotron Oscillators	Session 3 Windows	Session 9 Magnetrons	Session 10 Noise & Distortion Mitigation	Poster 2	Session 17 Multi-Beam Devices II	Session 18 Code Development	Session 19 Electron Guns
Break									
3:30-5:10	Session 4 TWTs I	Session 5 Fast Wave	Session 6 Backward Wave Oscillator				Session 20 Klystrons II	Session 21 Code Applications	Session 22 Materials & Cathodes
6:00-10:00				RECEPTION 6:00 PM BANQUET 7:00 PM					

Fifth IEEE International Vacuum Electronics Conference
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ADVANCE PROGRAM

IVEC 2004