# Conference at a Glance

| Times | Tuesday, May 2 | | | Wednesday, May 3 | | | Thursday, May 4 | | | Times |
|---|---|---|---|---|---|---|---|---|---|---|
| | Monterey Conference Center | | | DoubleTree Hotel | | | DoubleTree Hotel | | | |
| | Steinbeck Forum | | | De Anza I | De Anza II | De Anza III | De Anza I | De Anza II | De Anza III | |
| 8:10-10:30 | Plenary Session | | | Session 7 Cathodes (8:10-10:10) | Session 8 Code Development I (8:10-10:10) | Poster I (8:10-11:30) | Session 11 Code Applications | Session 12 Gyro Amplifiers I | Session 13 Lossy Dielectrics | 8:10-9:50 |
| 10:30-10:50 | BREAK | | | BREAK (10:10-10-30) | | | BREAK | | | 9:50-10:10 |
| 10:50-12:00 | Plenary Cont'd | | | | | | Session 14 Switches & Power Supplies | Session 15 Gyro Amplifiers II | Session 16 Advanced Technology | 10:10-11:50 |
| 12:00-1:30 | LUNCH | | | LUNCH (11:30-1:30) | | | LUNCH | | | 11:50-1:30 |
| 1:30-3:10 | DoubleTree Hotel | | | Session 9 Vacuum Micro-electronics (1:30-3:30) | Session 10 Code Development II (1:30-3:30) | POSTER II (1:30-4:50) | Session 17 Noise I & Intermodulation | Session 18 Gyro Oscillators I | Session 19 High Power & Novel Devices | 1:30-3:10 |
| | De Anza I | De Anza II | De Anza III | | | | | | | |
| | Session 1 Klystrons I | Session 2 Crossed-Field Devices I | Session 3 TWTs I | | | | | | | |
| 3:10-3:30 | BREAK | | | BREAK 3:30-3:50 | BREAK | | BREAK | | | 3:10-3:30 |
| 3:30-5:10 | Session 4 Klystrons II & IOTs | Session 5 Crossed-Field Devices II | Session 6 TWTs II (3:30-5:30) | | | | Session 20 Noise II, Electron Guns, & Magnets | Session 21 Gyro Oscillators II | Session 22 Microwave Power Modules (3:30-5:30) | 3:30-5:10 |
| 7:00 | | | | BANQUET | | | | | | 7:00 |

*ADVANCE PROGRAM*

# International Vacuum Electronics Conference 2000

*sponsored by*
**IEEE Electron Devices Society**

**May 2-4, 2000**

**DoubleTree Hotel**
**Monterey, California**

**www.ewh.ieee.org/soc/eds/ivec**

# 2000 International Vacuum Electronics Conference

| | |
|---|---|
| **General Conference Chair:** | James A. Dayton, Jr.<br>*Hughes Electron Dynamics*<br>Torrance, CA |
| **Technical Program Chair:** | Richard B. True<br>*Litton Systems, Inc.*<br>San Carlos, CA |
| **Finance Chair:** | Robert K. Parker<br>*Naval Research Laboratory*<br>Washington, DC |
| **Local Organizing Chair:** | Jon A. Christensen<br>*Hughes Electron Dynamics*<br>Torrance, CA |
| **Publications Chair:** | W. Devereux Palmer<br>*Microelectronics Center of North Carolina*<br>Durham, NC |
| **Publicity Chair:** | Carol L. Kory<br>*ANALEX/NASA Glenn Research Center*<br>Cleveland, OH |
| **Meeting Arrangements:** | Ralph Nadell<br>*Palisades Institute for Research Services, Inc.*<br>New York, NY |
| **Technical Program Committee Members:** | Ivor Brodie<br>*SRI International*<br>Menlo Park, CA |
| | B.N. Basu<br>*Banaras Hindu University*<br>Varanasi, India |
| | Richard G. Carter<br>*Lancaster University*<br>Lancaster, UK |
| | Jon A. Christensen<br>*Hughes Electron Dynamics*<br>Torrance, CA |
| | Kwo Ray Chu<br>*National Tsing Hua University*<br>Hsinchu, Taiwan, ROC |
| | James A. Dayton, Jr.<br>*Hughes Electron Dynamics*<br>Torrance, CA |
| | Francesco Emma<br>*ESA/ESTEC*<br>Noordwijk, The Netherlands |
| | Georges J. Faillon<br>*Thomson Tubes Electroniques*<br>Velizy, France |
| | Takao Kageyama<br>*NEC Corp.*<br>Kanagawa, Japan |
| | Guenter Kornfeld<br>*TTE GmbH*<br>Ulm, Germany |
| | Carol L. Kory<br>*ANALEX/NASA Glenn Research Center*<br>Cleveland, OH |

# 2000 International Vacuum Electronics Conference

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

Neville C. Luhmann, Jr.
*University of California*
Davis, CA

W. Devereux Palmer
*MCNC*
Durham, NC

Gun-Sik Park
*Seoul National University*
Seoul, Korea

Robert K. Parker
*Naval Research Laboratory*
Washington, DC

Vladimir Savvin
*Moscow State Lomonosov University*
Moscow, Russia

Armand Staprans
*CPI, Inc.*
Palo Alto, CA

Robert B. True
*Litton Systems, Inc.*
San Carlos, CA

## WELCOME

The response to IVEC 2000 is a clear indication of the continuing vitality of the field of vacuum electronics. More than 170 presentations are scheduled for three intensive days of technical interaction in the lovely setting of Monterey, California. Come to IVEC 2000 for an outstanding experience of intellectual stimulation and international fellowship. There has never been anything like this before.

*James A. Dayton, Jr., General Chair*

# 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. To register in advance, 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 Institute for Research Services, Inc.
Attn: Ralph Nadell (IVEC 2000)
411 Lafayette Street, Suite 201
New York, NY 10003
fax 212/460-5460

**The deadline for receipt of Advance Registration is April 21, 2000.** Requests for refunds must be made in writing and received no later than April 21, 2000. Confirmations will be mailed. However, confirmation of registration can also be made by calling 1-800-350-0111 or 212/460-9700.

| | **Before** ***April 21*** | **After** ***April 21*** |
|---|---|---|
| IEEE Member | $350 | $375 |
| Non Member | $400 | $425 |
| Student/Retired/ Life Member | $175 | $175 |

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

| ***Registration Hours:*** | |
|---|---|
| Monday, May 1 | 4:00 pm - 9:00 pm |
| Tuesday, May 2 | 7:00 am - 5:00 pm |
| Wednesday, May 3 | 7:00 am - 4:00 pm |
| Thursday, May 4 | 7:00 am - 12:00 pm |

### Hotel Accommodations

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

| | |
|---|---|
| **Single:** | $160.00 |
| **Double:** | $180.00 |

Complete and mail the enclosed hotel registration card (see centerfold) to the DoubleTree at Fisherman's Warf or call 831/649-4511 prior to **April 1, 2000.** 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 Warf 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, May 3rd, from 7:00 to 10:00 pm.

The reception and banquet will be held in the De Anza Ballroom of the DoubleTree Hotel.

**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 Warf 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 Institute for Research Services, Inc., 411 Lafayette Street, Suite 201, New York, NY 10003, 212/460-8090 ext. 203, or Rnadell@newyork.palisades.org. For registration verification, call 1-800/350-0111 or 212/460-9700.

# PLENARY SESSION

**Tuesday, May 2 / 8:10-12:00 pm / Monterey Convention Center**
**Steinbeck Forum**

***Chair:*** **James A. Dayton, Jr.**
Hughes Electron Dynamics, Torrance, CA

- **Welcoming Remarks** **8:10**
  ***James A. Dayton, Jr.***
  *Hughes Electron Dynamics, Torrance, CA*

## The Status of the Vacuum Electronics Industry

- **USA:** **8:30**
  ***Jon Christensen***
  *Hughes Electron Dynamics, Torrance, CA*
- **Asia:** **8:50**
  ***Takao Kageyama***
  *NEC Corp., Kanagawa, Japan*
- **Europe:** **9:10**
  ***Georges Faillon***
  *Thomson Tubes Electroniques, Velizy, France*

## New Opportunities for the 21st Century

- **Display Tubes:** **9:30**
  ***Ivor Brodie***
  *SRI International, Menlo Park, CA*
- **Terrestrial Communications:** **9:50**
  ***Walter Wood***
  *Xicom Technology, Sunnyvale, CA*
- **Space Communications:** **10:10**
  ***Kevin Mallon***
  *Loral Space Systems, Palo Alto, CA*

**BREAK** ——————————— **(10:30-10:50)**

## PANEL DISCUSSION:
## Training the Next Generation **10:50-12:00**

***Moderator:*** **Neville Luhmann, Jr.**
University of California, Davis, CA

### Panelists

- **Carter Armstrong,** Litton Systems, San Carlos, CA
- **Robert Barker,** Air Force Office of Scientific Research, Bolling AFB, Washington, DC
- **Kwo Ray Chu,** National Tsing Hua University, Hsinchu, Taiwan
- **Michael Petelin,** Institute of Applied Science, Novgorod, Russia

**LUNCH** ——————————— **(12:00-1:30)**

## Session 1

# KLYSTRONS I

**Tuesday, May 2 / 1:30-3:10 pm / De Anza I**

***Chair:*** **Armand Strapans**
CPI, Palo Alto, CA

**1.1:** ***Session Keynote:*** **The Future of Klystrons 1:30**

***G. Caryotakis***
*Stanford Linear Accelerator Center, Menlo Park, CA*

**1.2: Development of a High-Power Klystron for the Spallation Neutron Source 1:50**

***T. A. Hargreaves, M. F. Kirshner, R. J. Hansen, Y. Misaki, R. B. True***
*Litton Electron Devices Division, San Carlos, CA*

***P. J. Tallerico***
*Los Alamos National Laboratory, Los Alamos, NM*

**1.3: Recent Progress in CW and Long-Pulse Klystrons at CPI 2:10**

***S. Lenci, H. Bohlen, E. Eisen, K. Stothers***
*Communications and Power Industries, Inc., Palo Alto, CA*

***D. Rees, P. Tallerico***
*Los Alamos National Laboratory, Los Alamos, NM*

***M. Ebert***
*DESY, Hamburg, Germany*

***R. Kaplan***
*Cornell University, Ithaca, NY*

**1.4: Permanent-Magnet Focused Multi-Stage Depressed Collector Klystron Amplifiers for Satellite Communications 2:30**

***E. L. Wright, R. Begum, B. Stockwell, M. Cecil, E. Cesca, R. Chin, L. Cox***
*Communications and Power Industries, Inc., Palo Alto, CA*

***E. McCune***
*Microwave Power Engineering, San Jose, CA*

**1.5: The Klystrino: A High Power W-Band Amplifier 2:50**

***G. Caryotakis, G. Scheitrum, B. Arfin, A. Haase***
*SLAC, Stanford University, Menlo Park, CA*

***B. G. James, B. Stockwell, P. Borchard***
*Communications and Power Industries, Inc., Palo Alto, CA*

***L. Song, N. Luhmann***
*University of California, Davis, CA*

***Y. Cheng***
*SRCC, Taiwan*

**BREAK (3:10-3:30)**

## Session 2

# CROSSED-FIELD DEVICES I

**Tuesday, May 2 / 1:30-3:10 pm / De Anza II**

***Chair:*** **Joe Dutkowski**
Naval Surface Warfare Center, Crane, IN

**2.1:** ***Session Keynote:*** **Crossed-Field Devices: Where Are We and Options for the Future** **1:30**

***L. Vanzant***
*Naval Surface Warfare Center, Crane, IN*

**2.2:** **Development and Production of the SFD-268 CFA for the Aegis AN/SPY-1D(V) Radar** **1:50**

***S. Einarson***
*Communications and Power Industries, Inc., Beverly, MA*

**2.3:** **The Structure of Noise in Crossed-Field Amplifiers** **2:10**

***A. MacMullen***
*Technology Service Corp., Los Angeles, CA*

**2.4:** **Cold Cathodes for CFAs** **2:30**

***K. F. Ramacher, M. S. Worthington, G. R. MacPhail***
*Litton Systems, Inc., Williamsport, PA*

**2.5:** **A New Way to Reduce Control Electrode Current in DC-Operated CFAs** **2:50**

***M. L. Tracy***
*Communications and Power Industries, Inc., Beverly, MA*

**BREAK** **(3:10-3:30)**

## Session 3

# TWTs I

**Tuesday, May 2 / 1:30-3:10 pm/De Anza III**

***Chair:*** **Guenter Kornfeld**
Thomson Tubes Electroniques, Ulm, Germany

**3.1:** ***Session Keynote:*** **Development of Ultra-Linear TWTs for Telecommunications Applications 1:30**

***D. M. Goebel, R. Liou, W. L. Menninger***
*Hughes Electron Dynamics, Torrance, CA*

**3.2:** **A High-Power TWT for Military SATCOM 1:50**

***O. Fritz, Jr.***
*Communications and Power Industries, Inc., Palo Alto, CA*

**3.3:** **45-GHz TWT: Recent Advancements 2:10**

***D. R. Dibb, R. H. Le Borgne***
*Hughes Electron Dynamics, Torrance, CA*

**3.4:** **94-GHz TWT for Military Radar Applications 2:30**

***W. Gerum, G. Lippert, P. Malzahn, K. Schneider***
*Thomson Tubes Electroniques GmbH, Ulm, Germany*

**3.5:** **Wide-Bandwidth High-Average-Power EIKs Drive New Radar Concepts 2:50**

***B. Steer***
*Communications and Power Industries, Inc., Georgetown, Ontario, Canada*

**BREAK** ——————————— **(3:10-3:30)**

## Session 4

# KLYSTRONS II & IOTs

**Tuesday, May 2 / 3:30-5:10 pm / De Anza I**

***Chair:*** **Georges Faillon**
Thomson Tubes Electroniques, Velizy, France

**4.1: Experience and Application of High-Power RF Sources at the Frascati Laboratory Particle Accelerator DAFNE 3:30**

***R. Boni, A. Gallo, F. Sannibale, M. Vescovi***
*Istituto Nazionale di Fisica Nucleare, Laboratori Nazionali di Frascati, Frascati, Italy*

**4.2: 700-MHz HOM-IOT: Design and First Test Results 3:50**

***H. Bohlen, F. Friedlander, E. Lien, M. Mizuhara, R. Wilcox***
*Communications and Power Industries, Inc., Palo Alto, CA*

***M. Lynch, D. Rees***
*Los Alamos National Laboratory, Los Alamos, NM*

**4.3: Performance Characteristics of an MSDC IOT Amplifier 4:10**

***E. McCune***
*Microwave Power Engineering, San Jose, CA*

***C. Yates, Y. Li***
*CPI Eimac, San Carlos, CA*

**4.4: Ka-Band Klystron Amplifiers for Satellite Communications and Scientific Applications 4:30**

***E. L. Wright, A. Shabazian, M. Cecil***
*Communications and Power Industries, Inc., Palo Alto, CA*

**4.5: An Extended Interaction Oscillator Based on a Complex Resonant Structure 4:50**

***L. Chen, M. H. Tsao, J. W. Wu, F. S. Jeng, K. R. Chu***
*National Tsing Hua University, Hsinchu, Taiwan*

***H. Y. Chen***
*ERSO/ITRI, Hsinchu, Taiwan*

## Session 5

# CROSSED-FIELD DEVICES II

**Tuesday, May 2 / 3:30-5:10 pm / De Anza II**

***Chair:*** **Todd Treado**
CPI, Beverly, MA

**5.1: Three-Dimensional Simulation of Crossed-Field Devices and Amplifiers 3:30**

***L. D. Ludeking, D. N. Smithe, R. Smith***
*Mission Research Corp., Newington, VA*

***C. Chan***
*Northeastern University, Boston, MA*

**5.2: A Time-Domain MTL Model of the AEGIS CFA Circuit for Use in the MASK Simulation Program 3:50**

***M. L. Tracy***
*Communications and Power Industries, Inc., Beverly, MA*

***D. Chernin***
*SAIC, McLean, MA*

**5.3: Transient and Steady-State Phase Similarity of the AEGIS AN/SPY-1 Crossed-Field Amplifier (CFA) as a Function of Duty Cycle 4:10**

***B. Mitsdarffer, W. Slowey***
*Naval Surface Warfare Center, Crane, IN*

***D. Thelen, T. Horne***
*Technology Service Corp., Bloomington, IN*

**5.4: Recent Improvements In Injection Locked Magnetrons 4:30**

***J. Robinson***
*Communications and Power Industries, Inc., Beverly, MA*

**5.5: Computer Modeling on the Electron-Wave Interaction in Combined Magnetron 4:50**

***T. I. Frolova, G. I. Churyumov***
*Kharkov State University of Radio Electronics, Kharkov, Ukraine*

***G. I. Sergeev***
*Istok Co., Fryazino, Russia*

## Session 6

# TWTs II

**Tuesday, May 2 / 3:30-5:30 pm / De Anza III**

***Chair:*** **Carol Kory**
ANALEX/NASA Glenn Research Center,
Cleveland, OH

**6.1: A New Family of MM-Wave TWTs for TELECOM and ECM Applications 3:30**

***P. Thouvenin***
*Thomson Tubes Electroniques, Meudon La Foret, France*

**6.2: Advances in Space TWT Efficiencies 3:50**

***D. S. Komm, R. T. Benton, H. C. Limburg, W. L. Menninger, X. Zhai***
*Hughes Electron Dynamics, Torrance, CA*

**6.3: 60-GHz Space TWT to Address Future Market 4:10**

***G. Kornfeld, E. Bosch, W. Gerum, G. Fleury***
*Thomson Tubes Electroniques, Meudon La Foret, France*

**6.4: Long-Term Gain Stability of TWTs 4:30**

***D. M. Goebel***
*Hughes Electron Dynamics, Torrance, CA*

**6.5: Traditional and Novel Areas of Vacuum Electronics in SRPC "Istok" 4:50**

***A. Korolev, S. Zaitsev, I. Golenitskij, E. Zhary, A. Zakurdayev, M. Lopin, P. Meleshkevich, A. Negirev, A. Pobedonostsev, V. Poognin, V. Homich***
*State Research and Production Corp. "Istok," Fryazino, Russia*

**6.6: Novel Method for Measuring Interaction Impedance in Helix TWT 5:10**

***A. V. Soukhov, S-S. Jung, G-S. Park***
*Seoul National University, Seoul, Korea*

## Session 7

# CATHODES

**Wednesday, May 3 / 8:10-10:10 am / De Anza I**

***Chair:*** **Ivor Brodie**
SRI International, Menlo Park, CA

**7.1: Dispenser Cathode Life Model 8:10**

***R. Longo***
*Hughes EDD, Torrance, CA*

**7.2: A Hot-Cathode Model: Effective Work Function, Lifetime, and Flicker Noise 8:30**

***K. L. Jensen, B. Levush***
*Naval Research Laboratory, Washington, DC*

***Y. Y. Lau***
*University of Michigan, Ann Arbor, MI*

**7.3: Emission Characteristics of Ir-Coated Dispenser Cathode with an Emission-Enhanced Area in the Form of a Fine-Structured Tungsten Layer 8:50**

***H. Miyamoto, M. Arai, T. Sato, H. Tamai, C. Kimura***
*New Japan Radio Co., Ltd., Saitama, Japan*

**7.4: Uniform Thermionic Cathode for High-Emittance SCALPEL Electron-Beam Source 9:10**

***V. Katsap, W. K. Waskiewicz, W. Zhu***
*Lucent Technologies, Murray Hill, NJ*

***P. B. Sewell***
*LAB-6, Woodlawn, Ontario, Canada*

**7.5: Ambient-Temperature Electron-Emitter Device "COEED" 9:30**

***W. Friz***
*MARS Consultants, Fairborn, OH*

***P. Mumford, R. Worley***
*AFRL/SNDM, Wright-Patterson AFB, OH*

**7.6: Applications of Carbon-Film Cold Cathodes in Vacuum Electron Devices 9:50**

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

***H. H. Busta***
*Sarnoff Corp., Princeton, NJ*

**BREAK (10:10-10:30)**

## Session 8

# CODE DEVELOPMENT I

**Wednesday, May 3 / 8:10-10:10 am / De Anza II**

***Chair:*** **William Menninger**
Hughes Electron Dynamics, Torrance, CA

**8.1:** ***Session Keynote:*** **Development of Design Tools for Vacuum Electron Devices** **8:10**

***B. Levush***
*Naval Research Laboratory, Washington, DC*

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

***A. A. Mondelli, D. Chernin, J. Petillo***
*SAIC, McLean, VA*

**8.2:** **The New 3-D Electron Gun and Collector Modeling Tool: MICHELLE** **8:30**

***J. Petillo, P. Blanchard, A. Mondelli, K. Eppley, W. Krueger, T. McClure, D. Panagos***
*SAIC, Burlington, MA*

***B. Levush***
*Naval Research Laboratory, Washington, DC*

***J. Burdette***
*Hughes Electron Dynamics, Torrance, CA*

***M. Cattelino***
*Communications and Power Industries, Inc., Beverly, MA*

***J. DeFord, B. Held***
*STAR, Inc.*

***N. Dionne***
*Raytheon*

***S. Humphries, Jr.***
*Field Precision*

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

***R. True***
*Litton Electron Devices Division, San Carlos, CA*

**8.3:** **Particle Pushing in the Finite-Element Gun Code MICHELLE** **8:50**

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

***K. R. Eppley, J. J. Petillo***
*SAIC, Burlington, MA*

***B. Levush***
*Naval Research Laboratory, Washington, DC*

**8.4: A Design Software Suite for Periodic Permanent-Magnet Stacks** **9:10**

***C-L. Chang, D. Chernin, M. Czarnaski***
*SAIC, McLean, VA*

***M. Baird***
*University of Utah, Salt Lake City, UT*

***R. Harper***
*IND*

***D. G. Holstein***
*Triton ETD, Easton, PA*

***B. Levush***
*Naval Research Laboratory, Washington, DC*

**8.5: CHRISTINE 3-D: A 3-D Multi-Frequency Large-Signal Simulation Code for Helix TWTs** **9:30**

***D. Chernin***
*SAIC, McLean, VA*

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

***B. Levush***
*Naval Research Laboratory, Washington, DC*

***D. Whaley***
*Northrop Grumman Corp., Rolling Meadows, IL*

**8.6: A Phase Velocity Taper Design Algorithm for Optimizing Broadband Power Efficiency in Coupled-Cavity TWTs** **9:50**

***J. D. Wilson***
*NASA Glenn Research Center, Cleveland, OH*

**BREAK** **(10:10-10:30)**

# POSTER SESSION I

**Wednesday, May 3 / 8:10-11:30 am / De Anza III**

**P1.1: Development of an Improved, Production Version 150-MW Peak-Power S-Band Klystron**

***E. Eisen, J. Legarra, E. Wright***
*Communications and Power Industries, Inc., Palo Alto, CA*

**P1.2: Analysis of Electric Fields and Effective Voltage in Single-Gapped Klystron Cavity**

***T. Onodera***
*Kumamoto Institute of Technology, Kumamoto, Japan*

**P1.3: A 30-GHz Second-Harmonic Cusp-Gun Gyro-TWT**

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

***T. H. Chang, K. R. Chu***
*National Tsing Hua University, Hsinchu, Taiwan*

**P1.4: Design of a Heavily Loaded W-Band $TE_{01}$ Gyro-TWT**

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

***A. T. Lin***
*UCLA, Los Angeles, CA*

***T. H. Chang, K. R. Chu***
*National Tsing Hua University, Hsinchu, Taiwan*

**P1.5: Highly Efficient Ka-Band Second-Harmonic Peniotron**

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

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

**P1.6: Traveling-Wave Gyrotron with a Helical Slow-Wave Structure**

***A. A. Kurayev, A. K. Sinitsyn, A. V. Scherbakov***
*Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus*

**P1.7: Development of a 10-MW 91-GHz Gyroklystron**

***J. M. Neilson, R. L. Ives, M. Read***
*Calabazas Creek Research, Inc., Saratoga, CA*

***W. Lawson***
*University of Maryland, College Park, MD*

**P1.8: Status of the High-Power Cusp Gun**

***D. Gallagher, P. Frawley, F. Scafuri***
*Northrop Grumman Corp., Rolling Meadows, IL*

***M. Barsanti, C. Armstrong***
*Litton Electron Devices, San Carlos, CA*

**P1.9: First Operation of a Ka-Band Frequency-Doubling Second-Harmonic Gyro-TWT Amplifier**

***H. Guo, J. Rodgers, J. Zhao, Y. Y. Miao, W. J. Chen, V. L. Granatstein***
*University of Maryland, College Park, MD*

**P1.10: Comparative Analysis of Frequency-Doubling Gyro-TWTs Operating at Different Cyclotron Harmonics**

***W. Chen, G. S. Nusinovich, H. Guo, V. L. Granatstein***
*University of Maryland, College Park, MD*

**P1.11: Experimental Investigation of a 28-GHz Five-Cavity Gyroklystron Amplifier**

***J. J. Choi, S. H. Lee, D. M. Park***
*Kwangwoon University, Seoul, Korea*

***J. G. Yang***
*Korea Basic Science Institute, Taejeon, Korea*

***R. Temkin***
*Massachusetts Institute of Technology, Cambridge, MA*

**P1.12: Simulation of Harmonic-Multiplying Inverted Gyrotwyotron**

***A. T. Lin, C-C. Lin***
*UCLA, Los Angeles, CA*

***H. Guo***
*University of Maryland, College Park, MD*

**P1.13: Off-Axis Cold-Test Probe for W-Band Cavities**

***A. J. Theiss, T. A. Hargreaves***
*Litton Electron Devices, San Carlos, CA*

***S. R. Begum***
*CPI, Palo Alto, CA*

**P1.14: Optimized TWT with Cathode Modulation**

***A. B. Gourinovitch, A. A. Kurayev, T. L. Popkova, A. K. Sinitsyn***
*Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus*

**P1.15: Modeling of Diode Oscillators with Field-Emission Cathodes**

***A. A. Kurayev, D. V. Lukashevich, A. K. Sinitsyn***
*Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus*

**P1.16: Simulation of Nanodimensional Matrix Field-Emission Cathode**

***A. A. Kurayev, D. V. Lukashevich, A. K. Sinitsyn***
*Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus*

**P1.17: Formation of Electron Beams in High-Voltage-Switching Tubes with Electron-Beam Deceleration at Anode**

***V. Perevodchikov, V. Shapenko, P. Stalkov***
*All-Russian Electrotechnical Institute, Moscow, Russia*

**P1.18: W-Band Sixth-Harmonic Slotted Gyrotron**

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

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

***T. A. Spencer***
*Air Force Research Laboratory, Kirtland AFB, NM*

**P1.19: Large-Orbit Gyrotrons and Peniotrons**

***S. V. Kolosov, A. A. Kurayev***
*Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus*

**P1.20: Parameters Optimization of the 10th Cyclotron Harmonic Peniotron Oscillator**

***V. D. Yeremka***
*National Academy of Sciences of the Ukraine, Kharkov, Ukraine*

***A. A. Kurayev, A. K. Sinitsyn, A. V. Scherbakov***
*Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus*

**P1.21: High-Harmonics Quasioptical Gyrodevices with Permanent-Magnet System**

***A. F. Korolev, A. P. Sukhorukov, A. V. Sheludchenkov***
*Moscow State University, Moscow, Russia*

***A. Pulino***
*Science Unlimited, Inc., Rome, Italy*

**P1.22: Relativistic TWT on the First Spatial Harmonic with 85% Efficiency**

***A. B. Gourinovitch, A. A. Kurayev, T. L. Popkova, A. K. Sinitsyn***
*Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus*

**P1.23: Circuit Designs for Microwave Pulse Compression**

***V. A. Avgustinovich, S. N. Artemenko, P. Yu. Chumerin, V. L. Kaminsky, S. A. Novikov, A. I. Ryabchikov, I. I. Vintizenko, Yu. G. Yushkov***
*Tomsk Polytechnic University, Tomsk, Russia*

***A. N. Didenko***
*Russian Academy of Sciences, Moscow, Russia*

**P1.24: Leaked Electrons from Virtual-Cathode Oscillation**

***Y. Seo, E. H. Choi, C. G. Byun, M. C. Choi***
*Kwangwoon University, Seoul, Korea*

**P1.25: Virtual-Cathode Oscillator under Various Cathode Radii with Intense Relativistic Electron Beam**

***E-H. Choi, M. W. Chong, M. C. Choi, Y. Seo, G. S. Cho***
*Kwangwoon University, Seoul, Korea*

***H. Y. Suk***
*UCLA, Los Angeles, CA*

***H. S. Uhm***
*Ajou University, Suwon, Korea*

**P1.26: Optimal Profile of Electrodynamic System of Relativistic TWT with 80% Efficiency**

***A. A. Kurayev, T. L. Popkova, A. K. Sinitsyn, A. B. Zakalyukin***
*Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus*

**P1.27: High-Efficiency Powerful Relativistic Cherenkov's Oscillators with Corrugated Waveguide**

***A. A. Kurayev, T. L. Popkova, A. B. Zakalyukin***
*Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus*

**P1.28: Repetitively Pulsed Relativistic Magnetron**

***I. I. Vintizenko, L. D. Butakov, G. P. Fomenko, E. G. Fourman***
*Tomsk Polytechnic University, Tomsk, Russia*

**P1.29: Study of Virtual-Cathode Oscillators with Feedback**

***S. A. Kitsanov, A. I. Klimov, S. D. Korovin, I. K. Kurkan, O. P. Kutenkov, I. V. Pegel, S. D. Polevin***
*Institute of High Current Electronics, Tomsk, Russia*

***V. P. Tarakanov***
*High Energy Density Research Investigation Center, Moscow, Russia*

***R. Wioland***
*Centre d'Etudes de Gramat, Gramat, France*

***L. Courtois***
*International Technologies for High Pulsed Power, Thegra, France*

**P1.30: Carbon-Fiber Emitter Array**

***L. Li***
*MDC Vacuum Products Corp., Haywood, CA*

***E. Jerby***
*Tel Aviv University, Ramat Aviv, Israel*

**P1.31: High-Power Wide-Bandwidth Plasma-Beam Amplifier**

***V. Perevodchikov, M. Zavialov, A. Shapiro, Ju. Kuznetsov, S. Gusev, P. Borovikov, P. Tyuryukanov, V. Martynov***
*All-Russian Electrotechnical Institute, Moscow, Russia*

**P1.32: Analysis of a Cylindrical Cherenkov Laser via Particle Simulation: Proposal for an Improved 2-D Model**

***T. Shiozawa, A. Hirata, Y. Yuse***
*Osaka University, Osaka, Japan*

**P1.33: Effect of Plasma Inhomogeneity and Electron-Ion Collisions on Growth Characteristics of a Plasma-Filled Cherenkov Laser**

***T. Thumvongskul and T. Shiozawa***
*Osaka University, Osaka, Japan*

**P1.34: Collector Failures on 350-MHz 1.2-MW CW Klystrons for the Accelerator Production of Tritium (APT)**

***D. E. Rees, W. T. Roybal***
*Los Alamos National Laboratory, Los Alamos, NM*

**LUNCH ——————————— (11:30-1:30)**

## Session 9

# VACUUM MICROELECTRONICS

**Wednesday, May 3 / 1:30-3:30 pm / De Anza I**

***Chair:*** **Dev Palmer**
MCNC, Durham, NC

**9.1:** ***Session Keynote:*** **Application of Field-Emitter Arrays to Microwave Power Amplifiers** **1:30**

***D. R. Whaley, B. Gannon, C. R. Smith***
*Northrop Grumman Corp., Rolling Meadows, IL*

***C. A. Spindt***
*SRI International, Menlo Park, CA*

**9.2:** **Electron Gun for Microwave Tubes with Cold Field-Emitting Cathodes** **1:50**

***A. Galdetskiy***
*Istok Co., Fryazino, Russia*

**9.3:** **Industrial Application of Cold Cathodes Based on Field Emission** **2:10**

***V. I. Makhov***
*Litton Systems, Inc., Williamsport, PA*

**9.4:** **Micromachining of Lateral-Field-Emission Devices** **2:30**

***V. Milanovic, D. Teasdale, L. Doherty, S. Parsa, C. Zhang, K. S. J. Pister***
*University of California, Berkeley, CA*

**9.5:** **Current Sensitivity of the Spindt-Type Field Emitter** **2:50**

***C. Xie, Y. Wei, R. Lucero, R. Woodburn***
*Motorola, Inc., Tempe, AZ*

**9.6:** **Field-Emitter Material Investigations for Vacuum Field-Effect Transistors** **3:10**

***J. Li, P. Ostdiek, M. Potter***
*Advanced Vision Technologies, Inc., West Henrietta, NY*

***P. Rack***
*RIT, Rochester, NY*

**BREAK** ——————————— **(3:30-3:50)**

## Session 10

# CODE DEVELOPMENT II

**Wednesday, May 3 / 1:30-3:10 pm / De Anza II**

***Chair:*** **Richard Carter**
Lancaster University, Lancaster, U.K.

**10.1: COCA: A Novel 3-D FE Simulator for the Design of TWT Multistage Collectors 1:30**

***S. Coco, A. Laudani, S. Pulvirenti, M. Sergi***
*Università di Catania, Catania, Italy*

***F. Emma***
*ESA/ESTEC, Noordwijk, The Netherlands*

**10.2: Applications of CTLSS to Cold-Test Designs for Vacuum Electron Devices 1:50**

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

***R. Shtokhamer, A. A. Mondelli***

**10.3: Modeling of Multifrequency Process in Lossy Structures by Using MAGY 2:10**

***A. N. Vlasov***
*SAIC, McLean, VA*

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

***K. T. Nguyen***
*KN Research, Silver Spring, MD*

**10.4: BOA: A Charged-Particle Code with Adaptive Finite-Element Meshing 2:30**

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

***Z. Cendes***
*Ansoft Corp., Pittsburgh, PA*

**10.5: PIC Software for Vacuum Electronic Device Design 2:50**

***J. W. Eastwood, N. J. Brealey, W. Arter, R. A. Bond***
*Culham Science Centre, Abingdon, England*

**BREAK (3:10-3:30)**

# POSTER SESSION II

**Wednesday, May 3 / 1:30-4:30 pm / De Anza III**

**P2.1: Cathode Quality Analysis Using Multivariate Regression Methods for Crossed-Field Amplifiers**

***S. C. Vertucci, S. W. Shpock, M. S. Worthington***
*Litton Systems, Inc., Williamsport, PA*

**P2.2: TWT with Auto-Tuning of Delay**

***A. A. Kurayev, A. A. Navrotsky, A. K. Sinitsyn***
*Byelarus State University of Informatics and Radioelectronics, Minsk, Belarus*

**P2.3: Development Status of Ka-Band Coupled-Cavity TWT Technology for Airborne Radar and SAR Applications**

***J. Legarra, M. Cattelino, P. Kolda, J. Li, B. James, R. Begum***
*Communications and Power Industries, Inc.,, Palo Alto, CA*

**P2.4: Irregular Coupled-Cavity TWT with High Efficiency**

***A. V. Aksenchyk, A. A. Kurayev, A. K. Sinitsyn***
*Belarus State University of Informatics and Radioelectronics, Minsk, Belarus*

**P2.5: A New Interactive Graphic User Interface and Mesh Generator for 3-D TWT Collector Analysis**

***S. Coco, A. Laudani, S. Pulvirenti, M. Sergi***
*Università di Catania, Catania, Italy*

***F. Emma***
*ESA/ESTEC, Noordwijk, The Netherlands*

**P2.6: Analytical Determination of Thermal and Vibrational Performance of Coupled-Cavity TWTs**

***S. Raina, M. Santra***
*Microwave Tube R&D Centre, Bangalore, India*

**P2.7: Computer Optimization and Statistical Tolerancing Analysis of Waveguide Windows**

***J. M. Neilson, R. L. Ives***
*Calabazas Creek Research, Inc., Saratoga, CA*

**P2.8: Calculating Slow-Wave Circuit Parameters with HFSS**

***B. McCowan***
*Communications and Power Industries, Beverly, MA*

**P2.9: Characteristics and Modeling of Secondary Electrons Elastically Scattered from Collector Surfaces**

***K. R. Vaden, I. L. Krainsky***
*NASA Glenn Research Center, Cleveland, OH*

**P2.10: Computation of the Characteristic Impedance for Vane-Loaded Helix**

***B-F. Jia, C-W. Baik, G-S. Park***
*Plasma and Microwave Laboratory, Seoul National University, Seoul, Korea*

**P2.11: Control of Phase Non-Linearities in TWT Amplifiers**

***A. MacMullen***
*Technology Service Corp., Los Angeles, CA*

**P2.12: Theory of Intermodulation in a Klystron**

***Y. Y. Lau, C. Wilsen, R. M. Gilgenbach***
*University of Michigan, Ann Arbor, MI*

***D. Chernin***
*SAIC, McLean, VA*

**P2.13: Advanced Investigations of Traveling-Wave-Tube (TWT) Physics Using a Custom-Modified Experimental Test Device**

***M. M. McNeely, M. C. Converse, M. A. Wirth, J. H. Booske, J. E. Scharer***
*University of Wisconsin, Madison, WI*

***G. Groshart, B. Gannon***
*Northrop Grumman Corp., Rolling Meadows, IL*

***C. M. Armstrong***
*Litton Systems, San Carlos, CA*

**P2.14: Investigations of Nonlinearities and Multitone Response in a Broadband High-Gain Helix Traveling-Wave-Tube Amplifier**

***M. C. Converse, M. M. McNeely, J. H. Booske, J. E. Scharer***
*University of Wisconsin, Madison, WI*

***C. L. Kory***
*Analex Corp./NASA Glenn Research Center, Cleveland, OH*

***D. Zavadil***
*Teledyne Electronic Technologies, Rancho Cordova, CA*

**P2.15: Computation of Fields in Periodic Permanent-Magnet Structures with Undercut Pole Diameters**

***R. Harper***
*Consultant, Concord, MA*

***D. G. Holstein***
*Triton ETD, Easton, PA*

**P2.16: Permanent-Magnet Field Source for a 140-GHz Traveling Wave Tube**

***H. A. Leupold, A. S. Tilak***
*U.S. Army Research Laboratory, West Point, NY*

***E. Potenziani***
*U.S. Army Communications and Electronics Command, Ft. Monmouth, NJ*

**P2.17: 3-D Particle-in-Cell Modeling of a Shadow-Gridded Electron Gun**

***P. Janardhan, S. Kamath, V. L. Christie, L. Kumar***
*Microwave Tube R&D Centre, Bangalore, India*

**P2.18: Development of a Confined-Flow Multiple-Beam Gun**

***L. Ives, G. Miram***
*Calabazas Creek Research, Inc., Saratoga, CA*

**P2.19: Optimisation of Pierce-Type Convergent Electron Gun for Gain and Phase-Matched Miniature Helix TWTs**

***R. K. Sharma, S. M. Sharma, R. K. Gupta, A. K. Sinha, S. N. Joshi***
*CEERI, Pilani, India*

**P2.20: Design and Development of Electron Gun for Space Helix Traveling Wave Tube**

***R. K. Sharma, V. Srivastava, R. S. Raju, S. N. Joshi***
*CEERI, Pilani, India*

***V. Kiran, T. R. K. Janardan***
*Bharat Electronics Ltd., Bangalore, India*

**P2.21: Development of an Advanced Electron Gun for High-Power Radar Applications**

***T. Bui, L. Ives, G. Miram***
*Calabazas Creek Research, Inc., Saratoga, CA*

**P2.22: On the Thermal Analysis of Cathode Structures in Microwave Tubes**

***D. S. Venkatswarlu, A. Sil***
*Institute of Technology, Varanasi, India*

***H. K. Dwivedi***
*CEERI, Pilani, India*

**P2.23: Design and Development of Conical Convergent Pierce Electron Gun for Linear Accelerator**

***T. Tiwari, S. Das, C. S. Nainwad***
*Society of Applied Microwave Electronics Engineering and Research, Mumbai, India*

**P2.24: Applications for Non-Evaporative Getters in Microwave Tubes**

***L. Ives, T. Bui, M. Mizuhara, G. Miram***
*Calabazas Creek Research, Saratoga, CA*

***E. D. Ostroff***
*The MITRE Corp., Bedford, MA*

***A. Kupiszewski***
*Northrop Grumman Corp., Baltimore, MD*

**P2.25: On the Design of Coaxial Coupler Having Multi-Section Short Transformer for Compact-Sized Power Helix Traveling Wave Tubes**

***A. K. Sinha, V. V. P. Singh, V. Srivastava, S. N. Joshi***
*CEERI, Pilani, India*

**P2.26: Backward-Wave Oscillators for the Frequency Range from 300 GHz to 1 THz**

***R. W. Grow, J. M. Baird, K. J. Bunch, R. C. Freudenberger***
*University of Utah, Salt Lake City, UT*

**P2.27: Development of Efficient Backward-Wave Oscillators for Submillimeter Applications**

***L. Ives, J. Neilson, and M. Caplan***
*Calabazas Creek Research, Inc., Saratoga, CA*

**P2.28: MM-Wave Peniomagnetron with Cold Cathode**

***V. D. Yeremka***
*National Academy of Sciences of the Ukraine, Kharkov, Ukraine*

**P2.29: Slow-Wave-Structure High-Power MM-Band TWT**

***V. D. Yeremka, M. O. Khorunzhiy, V. N. Koshparenok***
*National Academy of Sciences of the Ukraine, Kharkov, Ukraine*

**P2.30: Lens Optics Magnetron Triodes of Millimeter Range**

***V. D. Yeremka, G. Ya. Levin, S. N. Teryokhin, O. P. Kulagin***
*National Academy of Sciences of the Ukraine, Kharkov, Ukraine*

**P2.31: Surface-Wave Magnetrons of Millimeter Range**

***V. D. Yeremka, G. Ya. Levin, S. N. Teryokhin***
*National Academy of Sciences of the Ukraine, Kharkov, Ukraine*

***A. A. Gurko***
*Joint Stock Co. "Pluton," Moscow, Russia*

**P2.32: Peculiarities of an Operating Mode Close to the Critical Magnetic Field in a Smooth-Anode Magnetron**

***O. P. Kulagin***
*National Academy of Sciences of the Ukraine, Kharkov, Ukraine*

**P2.33: Bactericidal Installation Using Combined Microwave and Ultraviolet Radiation**

***A. Bezlepkin, V. Perevodchikov, E. Schlifer***
*All-Russian Electrotechnical Institute, Moscow, Russia*

**BANQUET ——————————— (7:00-10:00)**

## Session 11

# CODE APPLICATIONS

**Thursday, May 4 / 8:10-9:50 am / De Anza I**

***Chair:*** **David Whaley**
Northrop Grumman, Rolling Meadows, IL

**11.1:** ***Session Keynote:*** **First-Pass TWT Design Success** **8:10**

***R. T. Benton, C. Chong, W. L. Menninger, C. B. Thorington, X. Zhai, D. S. Komm, J. A. Dayton, Jr.***
*Hughes Electron Dynamics, Torrance, CA*

**11.2:** **Determination of the Interaction Impedance of Helix Slow-Wave Structures** **8:30**

***R. G. Carter***
*Lancaster University, Lancaster, U.K.*

**11.3:** **Effect of Geometric Azimuthal Asymmetries of the PPM Stack on Electron-Beam Characteristics** **8:50**

***C. L. Kory***
*ANALEX Corp., Cleveland, OH*

**11.4:** **Simulation of the Influence of Secondary Electrons on the Performance of Potential Depressed Collectors for TWTs** **9:10**

***S. Musyoki, M. Takahashi, T. Uchikawa***
*NEC Corp., Kanagawa, Japan*

**11.5:** **Secondary-Electron-Emission Modeling for Simulated Multi-Stage Depressed Collector Operation Using MICHELLE** **9:30**

***N. J. Dionne***
*Raytheon Systems Co., Sudbury, MA*

***J. Petillo***
*SAIC, Burlington, MA*

**BREAK** ——————————— **(9:50-10:10)**

## Session 12

# GYRO AMPLIFIERS I

**Thursday, May 4 / 8:10-9:50 pm / De Anza II**

***Chair:*** **Neville Luhmann, Jr.**
University of California, Davis, CA

**12.1:** ***Session Keynote:*** **High-Power Millimeter-Wave Gyro-Amplifiers: Technological Advances and Applications** **8:10**

***B. Danly***
*Naval Research Laboratory, Washington, DC*

**12.2:** **Noise Measurements in a Ka-Band Gyroklystron Amplifier** **8:30**

***J. P. Calame, B. G. Danly, M. Garven, B. Levush***
*Naval Research Laboratory, Washington, DC*

**12.3:** **35-GHz Four-Cavity Gyroklystron Amplifier Experiments** **8:50**

***M. Garven***
*Omega-P, Inc., New Haven, CT*

***J. P. Calame, B. G. Danly, B. Levush***
*Naval Research Laboratory, Washington, DC*

***K. T. Nguyen***
*KN Research, Silver Spring, MD*

**12.4:** **Design and Operation of Harmonic Coaxial Gyroklystrons for Accelerators** **9:10**

***W. Lawson, M. Castle, I. Spassovsky, I. Yovchev, B. Hogan, S. Gouveia, V. L. Granatstein***
*University of Maryland, College Park, MD*

**12.5:** **Design of a Ka-Band Gyro-TWT for Radar Applications** **9:30**

***K. Nguyen***
*KN Research, Silver Spring, MD*

***J. P. Calame, B. G. Danly, B. Levush***
*Naval Research Laboratory, Washington, DC*

***D. Pershing***
*Mission Research Corp., Newington, VA*

***M. Garven***
*Omega-P, Inc., New Haven, CT*

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

**BREAK** ——————————— **(9:50-10:10)**

## Session 13

# LOSSY DIELECTRICS

**Thursday, May 4 / 8:10-9:50 am / De Anza III**

***Chair:*** **Jon Cristensen**
Hughes Electron Dynamics, Torrance, CA

**13.1: Lossy Material 8:10**

***R. F. Tousey***
*Communications and Power Industries, Inc., Palo Alto, CA*

**13.2: Alternative AlN-Based Lossy Ceramics for High-Power Applications 8:30**

***B. Mikijelj***
*Ceradyne, Inc., Costa Mesa, CA*

**13.3: High-Thermal-Conductivity Lossy Aluminum Nitride Dielectrics 8:50**

***E. Savrun***
*Sienna Technologies, Inc., Woodinville, WA*

***D. K. Abe***
*Naval Research Laboratory, Washington, DC*

**13.4: Measurement Techniques for Studying the Dielectric Permittivity of Lossy Ceramic Composites Used in Vacuum Electronics 9:10**

***J. P. Calame, B. G. Danly, D. K. Abe, B. Levush, D. Lobas***
*Naval Research Laboratory, Washington, DC*

***F. Wood***
*DynCorp, Inc., Rockville, MD*

**13.5: Advanced Ceramics for Microwave Tubes 9:30**

***Y. Carmel, I. Lloyd, T. Olorunyolemi, O. Wilson, G. Xu, E. Pert, D. Gershon***
*University of Maryland, College Park, MD*

**BREAK ——————————— (9:50-10:10)**

## Session 14

# SWITCHES AND POWER SUPPLIES

**Thursday, May 4 / 10:10-11:50 am / De Anza I**

***Chair:*** **G.I. (Hap) Cardwell**
Hughes Electron Dynamics, Torrance, CA

**14.1: A Lightweight High-Efficiency Family of Power Conditioners for Space TWTs 10:10**

***T. K. Phelps, G. I. Cardwell***
*Hughes Electron Dynamics, Torrance, CA*

**14.2: ESA-Qualified EPC for Telecommunications-Satellite TWTAs 10:30**

***P. Delporte, P. Fayt, M. Gak, E. Pequet***
*Alcatel ETCA s.a., Charleroi, Belgium*

**14.3: Solid-State Power Control for High-Power Microwave Systems 10:50**

***M. P. J. Gaudreau, J. Casey, J. M. Mulvaney, M. A. Kempkes***
*Diversified Technologies, Inc., Bedford, MA*

**14.4: Multipactor Effect On Board Spacecraft: Present Situation, Future Research Activities, and Testing Capabilities at the European Space Agency 11:10**

***D. Raboso***
*ESA/ESTEC, Noordwijk, The Netherlands*

**14.5: The Hobetron and Hobetron-Plus 11:30**

***R. B. True, R. J. Hansen, G. R. Good***
*Litton Electron Devices, San Carlos, CA*

**LUNCH ——————————— (11:50-1:30)**

## Session 15

# GYRO AMPLIFIERS II

**Thursday, May 4 / 10:10-11:50 am / De Anza II**

***Chair:*** **Robert Parker**
Naval Research Laboratory, Washington, DC

**15.1:** ***Session Keynote:*** **Development of High-Average-Power W-Band Gyro-Amplifiers for Radar Applications** **10:10**

***M. Blank, K. Felch, B. G. James, P. Borchard, P. Cahalan, T. S. Chu***
*Communications and Power Industries, Inc., Palo Alto, CA*

***B. G. Danly, J. P. Calame, B. Levush***
*Naval Research Laboratory, Washington, DC*

***K. Nguyen***
*KN Research, Silver Spring, MD*

***D. Pershing***
*Mission Research Corp., Newington, VA*

***J. Petillo***
*SAIC, Burlington, MA*

***T. A. Hargreaves, R. B. True, A. J. Theiss, G. R. Good***
*Litton Electron Devices, San Carlos, CA*

***W. G. Lawson, T. M. Antonsen, Jr.***
*University of Maryland, College Park, MD*

**15.2:** **Measurement of Phase Pushing in a 34-GHz Harmonic Frequency-Multiplying Gyro-TWT** **10:30**

***J. Rodgers, H. Guo, V. L. Granatstein***
*University of Maryland, College Park, MD*

**15.3:** **Novel Quasioptical W-Band Gyro-TWT** **10:50**

***J. R. Sirigiri, K. E. Kreischer, M. A. Shapiro, R. J. Temkin***
*Massachusetts Institute of Technology, Cambridge, MA*

**15.4:** **Efficient Wideband Gyro-TWT with a Helically Grooved Waveguide** **11:10**

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

***A. W. Cross, W. He, A. D. R. Phelps, K. Ronald, C. G. Whyte, A. R. Young***
*University of Strathclyde, Glasgow, Scotland, U.K.*

**15.5:** **A 1-kW 360-GHz Gyroklystron** **11:30**

***M. E. Read, G. S. Nusinovich, M. Walter, M. Kremer***
*Physical Sciences, Inc., Alexandria, VA*

**LUNCH** ——————————— **(11:50-1:30)**

## Session 16

# ADVANCED TECHNOLOGY

**Thursday, May 4 / 10:10-11:50 am / De Anza III**

***Chair:*** **Thomas A. Hargreaves**
Litton Systems, San Carlos, CA

**16.1: Advances in High-Power Millimeter-Wave Grid-Array Sources 10:10**

***S. A. Rosenau, C. Liang, W-Y. Li, W-K. Zhang, C. W. Domier, N. C. Luhmann, Jr.***
*University of California, Davis, CA*

**16.2: Photonic Bandgap Structures: Oversized Circuits for Vacuum Electron Devices 10:30**

***M. A. Shapiro, W. J. Brown, C. Chen, V. Khemani, I. Mastovsky, J. R. Sirigiri, R. J. Temkin***
*Massachusetts Institute of Technology, Cambridge, MA*

**16.3: Measurement of Loss Coatings Applied to Helix Support Rods 10:50**

***P. Lally***
*Teledyne Electronic Technologies, Mountain View, CA*

***J. Christeson***
*Teledyne Electronic Technologies, Rancho Cordova, CA*

**16.4: Development of High-Power Overmoded Waveguide Windows and Components 11:10**

***L. Ives, J. Neilson, A. Mobius***
*Calabazas Creek Research, Inc., Saratoga, CA*

***W. Lawson***
*University of Maryland, College Park, MD*

***M. Shapiro***
*Massachusetts Institute of Technology, Cambridge, MA*

**16.5: High-Voltage-Breakdown Initiation of Cleaned *vs.* Non-Cleaned 304LMC Stainless-Steel Electrodes 11:30**

***M. Dolak***
*Communications and Power Industries, Inc., Palo Alto, CA*

**LUNCH ——————————— (11:50-1:30)**

## Session 17

# NOISE I & INTERMODULATION

**Thursday, May 4 / 1:30-3:10 pm / De Anza I**

***Chair:*** **Dan Goebel**
Hughes Electron Dynamics, Torrance, CA

**17.1: Transient Ion Disturbances in TWTs 1:30**

***W. Tighe, D. Goebel***
*Hughes Electron Dynamics, Torrance, CA*

**17.2: Computer Simulation of Ion Trapping and Detrapping in PPM Focused TWT 1:50**

***C. B. Thorington***
*Hughes Electron Dynamics, Torrance, CA*

**17.3: Efforts to Reduce CWI TWT Noise and Body Current 2:10**

***D. Thelen***
*Technology Service Corp., Bloomington, IN*

***R. Emerson***
*Naval Surface Warfare Center, Crane, IN*

**17.4: A 2-D Fluid Electron and 1-D Particle Ion Hybrid Model of Ion Noise in Microwave Tubes 2:30**

***W. M. Manheimer, B. Levush***
*Naval Research Laboratory, Washington, DC*

***H. P. Freund***
*SAIC, McLean, VA*

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

**17.5: Simulation of Noise-Power Ratio with the Large-Signal Code CHRISTINE 2:50**

***P. N. Safier, D. K. Abe, B. G. Danly, B. Levush***
*Naval Research Laboratory, Washington, DC*

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

**BREAK (3:10-3:30)**

## Session 18

# GYRO OSCILLATORS I

**Thursday, May 4 / 1:30-3:10 pm / De Anza II**

***Chair:*** **Kwo Ray Chu**
National Tsing Hua University, Taiwan, R.O.C.

**18.1:** ***Session Keynote:*** **High-Average-Power Microwave Sources for Fusion Research** **1:30**

***T. V. George***
*Department of Energy, Washington, DC*

**18.2:** **Development of 1-MW Output Power Level Gyrotrons for Fusion Systems** **1:50**

***M. V. Agapova, G. G. Denisov, V. I. Kurbatov, A. G. Litvak, V. E. Myasnikov, V. O. Nichiporenko, L. G. Popov, E. A. Soluyanova, E. M. Tai, S. V. Usachev, V. E. Zapevalov***
*GYCOM, Ltd., Institute of Applied Physics, Novgorod, Russia*

**18.3:** **Results of 10-sec Pulse Tests on a 110-GHz Gyrotron** **2:10**

***K. Felch, M. Blank, P. Borchard, P. Cahalan, S. Cauffman, T. S. Chu, C. Dubrule***
*Communications and Power Industries, Inc., Palo Alto, CA*

**18.4:** **Development of a 1.5-MW 110-GHz Gyrotron for Plasma Heating** **2:30**

***K. Kreischer, S. Korbly, M. Shapiro, R. Temkin***
*Massachusetts Institute of Technology, Cambridge, MA*

***S. Cauffman, K. Felch***
*Communications and Power Industries, Inc., Palo Alto, CA*

**18.5:** **Experimental Results with the Dutch Free-Electron Maser** **2:50**

***A. G. A. Verhoeven, W. A. Bongers, S. Brons, C. A. J. van der Geer, P. Manintveld, A. J. Poelman, P. H. M. Smeets, W. H. Urbanus***
*Institute of Plasma Physics "Rijnhuizen," Nieuwegein, The Netherlands*

***V. L. Bratman, G. G. Denisov, A. V. Savilov***
*Institute of Applied Physics, Novgorod, Russia*

***M. Caplan***
*Lawrence Livermore National Laboratory, Livermore, CA*

**BREAK** ——————————— **(3:10-3:30)**

## Session 19

# HIGH POWER & NOVEL DEVICES

**Thursday, May 4 / 1:30-3:10 pm / De Anza III**

***Chair:*** **Robert Barker**
Air Force Office of Scientific Research,
Bolling AFB, Washington, DC

**19.1: Development of the Tapered MILO 1:30**

***J. W. Eastwood, M. P. Hook, K. C. Hawkins***
*Culham Science Centre, Abingdon, England, U.K.*

**19.2: Animation of Electromagnetic Fields in Open Resonator of Relativistic BWO 1:50**

***I. A. Chernyavsky***
*High Current Electronics Institute, Tomsk, Russia*

***V. M. Pikunov***
*Moscow State University, Moscow, Russia*

**19.3: 3DPIC Simulation of Relativistic Magnetrons 2:10**

***J. W. Eastwood, W. Arter***
*Culham Science Centre, Abingdon, England, U.K.*

**19.4: Plasma Stream in Transverse Magnetic Field as Amplifier of Monochromatic Microwave Radiation 2:30**

***A. P. Smakhtin, V. V. Rybakov***
*Moscow State Aviation Institute (Technical University), Moscow, Russia*

**19.5: Development of Transverse-Wave Microwave Tubes 2:50**

***V. Savvin***
*Moscow State University, Moscow, Russia*

**BREAK (3:10-3:30)**

## Session 20

# NOISE II, ELECTRON GUNS & MAGNETS

**Thursday, May 4 / 3:30-5:10 pm / De Anza I**

***Chair:*** **Yehuda Goren**
Teledyne Electronic Technologies, Rancho Cordova, CA

**20.1: A Comparison of Two-Tone Intermodulation Experiments with CHRISTINE 1-D Helix TWT Code Simulations 3:30**

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

***M. T. Ngô***
*Mission Research Corp., Newington, VA*

***D. Chernin***
*SAIC, McLean, VA*

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

**20.2: Control of IM3 Distortion in Helix TWTs by Harmonic Injection: An Eulerian Hydrodynamical Study 3:50**

***S. K. Datta***
*Microwave Tube Research & Development Centre, Bangalore, India*

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

**20.3: Self-Bunching Micro-Pulse Guns 4:10**

***F. Mako, L. K. Len***
*FM Technologies, Inc., Fairfax, VA*

**20.4: Grid-Controlled 100-kV Electron-Beam Source for SCALPEL 4:30**

***V. Katsap, W. K. Waskiewicz***
*Lucent Technologies, Murray Hill, NJ*

***P. B. Sewell***
*LAB-6, Woodlawn, Ontario, Canada*

***J. A. Rouse***
*Munro's Electron Beam Software, Ltd., London, U.K.*

***F. H. Read***
*University of Manchester, Manchester, U.K.*

**20.5: A New Class of Permanent-Magnetic Materials for High-Temperature Applications in TWTs 4:50**

***M. S. Walmer, M. H. Walmer, C. H. Chen***
*Electron Energy Corp., Landisville, PA*

## Session 21

# GYRO OSCILLATORS II

**Thursday, May 4 / 3:30-5:30 pm / De Anza II**

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

**21.1:** ***Session Keynote:*** **Development and Application of European High-Power CW Gyrotrons for ECRH Experiments** **3:30**

***R. Magne, C. Darbos, A. Barbuti, Ph. Cara, J. Clary, D. Roux***
*Association Euratom-CEA, St. Paul-lez-Durance, France*

***S. Alberti, J. Ph. Hogge, M. Q. Tran***
*Association Euratom-Confédération Suisse, Lausanne, Switzerland*

***F. Blanchard, C. Dubrovin, E. Giguet, D. Gil, G. Le Cloarec, Y. Le Goff, F. Legrand, Ch. Liévin***
*Thomson Tubes Electroniques, Vélizy-Villacoublay, France*

***M. Thumm***
*Association Euratom-FZK, IHM/PMW, Eggenstein-Leopoldshafen, Germany*

**21.2:** **Fast-Frequency Step-Tunable High-Power Gyrotron with Hybrid Magnet System** **3:50**

***K. Koppenburg, G. Dammertz, B. Piosczyk, M. Thumm***
*Association Euratom-FZK, IHM, Eggenstein-Leopoldshafen, Germany*

**21.3:** **CW Gyrotrons and Gyrotron Systems for Applications in Technology** **4:10**

***Yu. Bykov***
*GYCOM, Ltd., and the Institute of Applied Physics of the Russian Academy of Sciences, Novgorod, Russia*

**21.4:** **Design and Test of Mode Generators for High-Order Rotating Gyrotron Modes** **4:30**

***D. Wagner, M. Blank, T. S. Chu, C. Dubrule, K. Felch***
*Communications and Power Industries, Palo Alto, CA*

***W. Kasparek***
*University of Stuttgart, Stuttgart, Germany*

**21.5:** **Saturated Behavior of the Gyrotron Backward-Wave Oscillator** **4:50**

***S. H. Chen***
*National Center for High-Performance Computing, Hsinchu, Taiwan*

***K. R. Chu, T. H. Chang***
*National Tsing Hua University, Hsinchu, Taiwan*

**21.6:** **Mode Selection in High-Power Microwave Sources** **5:10**

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

## Session 22

# MICROWAVE POWER MODULES

**Thursday, May 4 / 3:30-5:30 pm / De Anza III**

***Chair:*** **Richard Abrams**
Naval Research Laboratory, Washington, DC

**22.1: Microwave Power Module for Space Applications 3:30**

***G. Orsenigo, L. Nebuloni***
*Officine Galileo Spazio B.U., Milan, Italy*

**22.2: Millimeter-Wave Power Modules: Are They a Marriage Made in Heaven — or in Hell? 3:50**

***A. Scott, C. Eng***
*Communications and Power Industries, Inc., Palo Alto, CA*

**22.3: Vacuum Electron Devices for Wideband Decoy Applications 4:10**

***R. F. Watkins***
*Litton Electron Devices, San Carlos, CA*

**22.4: Microwave Power Modules: Now and in the Future 4:30**

***P. C. Ballagh***
*Litton Electron Devices, San Carlos, CA*

**22.5: Advances in Manufacturing of Helix TWTs 4:50**

***R. Stolz, B. Gannon, C. Smith, C. Kottman***
*Northrop Grumman Corp., Rolling Meadows, IL*

**22.6: Development of a Low-Voltage Power-Booster TWT for a Q-Band MMPM 5:10**

***J. Kennedy, C. Columbo***
*Litton Electron Devices, San Carlos, CA*

**ADJOURN**

# Monterey Peninsula Map

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# Notes

# Notes

**International Vacuum Electronics Conference**
**c/o Palisades Institute for Research Services, Inc.**
**411 Lafayette Street, Suite 201**
**New York, NY 10003**

**IVEC 2000**
**Advance Program**