ICOPS 2000

The 27th IEEE International Conference on Plasma Science

International Ballroom • 8:30 a.m. • Monday, June 5, 2000

WELCOME

Dr. Michael Mazzola
2000 ICOPS Chair
Mississippi State University

Plenary Talk:
Plasmas and Pulsed Power for Biomedical Applications

Dr. Robert Barker
Air Force Office of Scientific Research

Chair
Dr. Igor Alexeff
President, IEEE, NPSS

International Ballroom • 10:00 a.m. • Monday, June 5, 2000

Oral Session 1A • Partially Ionized Gases

Chair: **Karl Schoenbach, Physical Electronics Research Institute**

1A01-02 Physics and Applications of Dielectric-Barrier Discharges
U. Kogelschatz, ABB Corporate Research Ltd., Ch-5405, Baden-Dattwil, Switzerland

1A03 Atmospheric Pressure Plasma Jet Technology Applied to Chem/bio Decontamination
Hans W. Herrmann, G.S. Selwyn, I. Henins, J. Park, Los Alamos National Labatory, MS E526, Los Alamos, NM 87545 USA

1A04 Mass Spectrometry of Active Species Convected From a One Atmosphere Uniform Glow Discharge Plasma (OAUGDP) in Air
F. Karakaya, D.M. Sherman, Z. Chen, J. R. Roth, University of Tennessee, 409 Ferris Hall, Knoxville, TN 37966-2100 USA

1A05 Electron Heating In Atmospheric Pressure Air Discharges
R.H. Stark, K.H. Schoenbach, Old Dominion University, Department of ECE, 1014 W. 46th Street, Norfolk, VA 23529 USA

1A06 Dynamics Of Electric Discharge Supported by High-Voltage Nanosecond Pulses At Low And Intermediate Pressures
S.O. Macheret, M.N. Shneider, R.B. Miles, Princeton University, D-418 E-Quad,MAE Dept., Princeton, NJ 08544-5263 USA

1A07 Laser Initiation and Radiofrequency Sustainment of Seeded Air Plasmas
J.E. Scharer, R. Cao, H. Gui, K.L. Kelly, E.S. Paller, R. Sund, University of Wisconsin, 1500 Engineering Dr., 513 ERB, Madison, WI 53706-1687 USA

1A08 Spectroscopic Studies of High-Pressure Microhollow Cathode Discharge Plasmas in Ne/H_2 & Ne/N_2 Mixtures
P. Kurunczi, K. H. Becker, Physics Department, Stevens Institute of Technology, Castle Point on Hudson, Hoboken, NY 07030 USA

1A09 Heating Mechanism and Wave Propagation in Magnetically Enhanced Inductively Coupled Plasmas
R.L. Kinder, M.J. Kushner, University of Illinois, 1406 W. Green St., Urbana, IL 61801 USA

1A10 Large Volume Discharges In Water And Application To Sludge Treatment
H. Akiyama, H. Nomiyama, S. Katsuki, I. Lisitsyn, Kumamoto University, Kurokami 2-39-1, Kumamoto 860-8555 Japan

Gold • 10:00 a.m. • Monday, June 5, 2000

Oral Session 1B • Non-Equilibrium Plasma Processing

Chair: **Jeff Hopwood, Northeastern University**

1B01-02 **Coupling Reactor and Feature Scale Models**
P. Stout, V. Kolobov, CFD Research Corporation
215 Wynn Drive, Huntsville, AL 35805 USA

1B03 **Surface and Gas Phase Reactions for Fluorocarbon Plasma Etching of Si and SiO_2**
Da Zhang, M.J. Kushner, University of Illinois, 1406 W. Green St., Urbana, IL 61801 USA

1B04 **An Integrated Plasma Equipment-Feature Scale Model for Ionized Metal Physical Vapor Deposition**
J. Lu, M.J. Kushner, University of Illinois, 1406 W. Green St., Urbana, IL 61801 USA

1B05 **Deposition of Thin Film Ceramics and Ceramic Nanocomposites by Inductively Coupled Plasma Assisted Hybrid Chemical/Physical Vapor Deposition**
W.J. Meng, B. Feng, D.M. Cao, Mechanical Engineering Department, Louisiana State University, 2508 CEBA Bldg., Baton Rouge, LA 70803 USA

1B06 **Steady State Direct Current Plasma Immersion Ion Implantation (PIII) Using a Grounded Conducting Grid**
D.T.K. Kwok, X. Zeng, C. Chan, P.K. Chu, City University of Hong Kong, Department of Physics and Materials Science, 83 Tat Chee Avenue, Kowloon, Hong Kong SAR China

1B07 **A Study on Gas Desorption from Inductively Coupled Plasma Chamber Wall by Optical Emission Spectroscopy Method**
Azam A.B.M. Shafiul, S. Xu, Y.A. Li, Plasma Processing Lab, Nanyang Technological University, 469 Bukit Timah Rd., Singapore 259756 Republic of Singapore

1B08 **Real-Time Feedback Control of Plasma Density in Inductively Coupled Plasmas**
C.H. Chang, K.C. Leou, C. Lin, National Tsing Hua University, Department of Engineering and System Science, 101, Sec.2, Kuang-Fu Rd., Hsinchu, Taiwan 300 Taiwan

1B09 **Doping of Thin Plasma Polymerized Aniline Films**
P.D. Pedrow, K.G. Lynn, R. Mahalingam, M.A. Osman, L.V. Shepsis, Washington State University, School of EE/CS, Pullman, WA 99164-2752 USA

1B10 **NOx Reduction Using NH_3 Radical Prepared By Intermittent Dielectric Barrier Discharge At Atmospheric Pressure**
M. Nishida, K. Yukimura, S. Kambara, T. Maruyama, Doshisha University, Department of Electrical Engineering, 1-3 Tatara-Miyakodani, Kyotanbe, Kyoto, 610-0321 Japan

Bayou I and III • 10:00 a.m. • Monday, June 5, 2000

Oral Session 1C • Z-Pinches and Plasma Foci

Chair: **Victor Kantsyrev, University of Nevada, Reno**

1C01-02 Plasma Formation and Seeding of Rayleigh-Taylor Instabilities in Wire Array Z-Pinches
S.V. Lebedev, J.P. Chittenden, S.N. Bland, F.N. Beg, A.E. Dangor, M.G. Haines, S.A. Pikuz, T.A. Shelkovenko, Imperial College, Prince Consort Rd., London SW7 2BZ UK

1C03-04 Effects of Interwire Gap and Initial Load Diameter on Long Implosion Time Aluminum Z-pinches on Saturn
C.A. Coverdale, C. Deeney, M.R. Douglas, P.D. LePell, H. Sze, B. Failor, P. Coleman, K.G. Whitney, J.W. Thornhill, J.P. Apruzese, J. Davis, R. Schneider, Sandia National Laboratories, PO Box 5800, MS-1159, Albuquerque, NM 87185-1159 USA

1C05 Improved Dynamics And Radiated Powers From Titanium Z-Pinch Implosions By Employing Nested Wire Arrays
C. Deeney, C.A. Coverdale, M.R. Douglas, J. Bailey, J.W. Thornhill, K.G. Whitney, J.P. Apruzese, J. Davis, R. Clark, R. Schneider, Sandia National Laboratories, P.O. Box 5800, MS-1194, Albuquerque, NM 87185 USA

1C06 Measurements of Ion Temperatures of Al Wire Arrays in Short And Long Current Pulse Z-Pinches
E.J. Yadlowsky, E.P. Carlson, F. Barakat, R.C. Hazelton, C.C. Klepper, C.R. Coverdale, C. Deeney, J.E. Bailey, R.B. Spielman, B.H. Failor, J.S. Levine, Y. Song, B.L. Whitten, J.B. Apruzese, J. Davis, HY-Tech Research Corporation, 104 Centre Court, Radford, VA 24141 USA

1C07 Factors Affecting the Expansion of Single 25 μm Wires Driven by a Current Rise Rate of 10^{10} A/s for <100 ns
D.B. Sinars, Min Hu, K.M. Chandler, S.A. Pikuz, T.A. Shelkovenko, J.B. Greenly, D.A. Hammer, B.R. Kusse, Cornell University, 369 Upson Hall, Ithaca, NY 14853 USA

1C08 Radiation Trapping Efficiency In Double Liner And Dynamic Hohlraum
S.V. Zakharov, A.F. Nikiforov, V.G. Novikov, A.S. Chuvatin, Ecole Polytechnique, Palaiseau 91128 France

1C09 Recent Results Of Experiments with PF-1000 Plasma-Focus Facility Operated at Energy Levels Above 0.5 MJ
M. Scholz, L. Karpinski, M. Paduch, K. Tomaszewski, R. Miklaszewski, T. Pisarczyk, M. Sadowski, A. Szydlowski, Institute of Plasma Physics and Laser Microfusion, Warsaw 00-908 Poland

1C10 New Plasma-Focus Experiments Without and With Additional Targets
M. Sadowski, P. Kubes, J. Kravarik, M. Paduch, E. Skladnik, M. Scholz, K. Tomaszewski, J. Zebrowski, The Andrzej Soltan Institute for Nuclear Studies, Swierk, Otwock-Swierk, PL 05-400 Poland

Bayou II and IV • 10:00 a.m. • Monday, June 5, 2000

Oral Session 1D • Slow Wave Devices

Chair: **David Whaley, Northrop Gruman Corporation**

1D01-02 Theory of Intermodulation in a Klystron
Y.Y. Lau, C. Wilsen, R.M. Gilgenbach, D. Chernin, University of Michigan, Cooley Bldg., Ann Arbor, MI 48109-2104 USA

1D03 3d Simulation Of Cross Field Devices
L.D. Ludeking, D.N. Smithe, R. Smith, C. Chung, Mission Research Corporation, 8560 Cinderbed Road, #700, Newington, VA 22122 USA

1D04 3-D Simulation Of Klystrons
D. Smithe, L. Ludeking, M. Bettenhausen, Mission Research Corporation, 8560 Cinderbed Road, #700, Newington, VA 22122 USA

1D05 Physics of Pasotrons
G.S. Nusinovich, Yu. P. Bliokh, Institute for Plasma Research, University of Maryland, College Park, MD 20742 USA

1D06 A Model Of Ion Noise In Microwave Tubes
W.M. Manheimer, H.P. Freund, B. Levush, T.M. Antonsen,Jr., Code 6707, Naval Research Laboratory, 4555 Overlook Ave., Washington, DC 20375-5346 USA

1D07 Low Frequency Noise In A Coupled-Cavity Traveling Wave Tube
H.B. Smith, J.P. Verboncoeur, W. Qiu, C.K. Birdsall, University of California, Berkeley, Cory Hall, Berkeley, CA 94720-1770 USA

Poster Session 1P
- **Computational Plasma Physics**
- **Environmental/Energy Issues in Plasma Science**
- **Space Plasmas**
- **Partially Ionized Gases**
- **Microwave Systems**

1P01 – 1P13 Computational Plasma Physics

1P01 **Application of a Parallel Two-Dimensional Particle-in-Cell-Code**
J.D. Blahovec, J.W. Luginsland, J.J. Watrous, Air Force Research Lab/DEHE, 3550 Aberdeen SE, Kirtland AFB, NM 87117-5776 USA

1P02 **Thermal Lattice Boltzmann Simulations for Multi-Species Fluid Equilibration**
L. Vahala, G. Vahala, D. Wah, J. Carter, P. Pavlo, Old Dominion University, Department of Electrical and Computer Engineering, Norfolk, VA 23529 USA

1P03 **Particle-In-Cell Simulation of Plasma Immersion Ion Implantation (PIII) of Industrial Gears**
Dixon T.K. Kwon, P.K Chu, City University of Hong Kong, Department of Physics and Material Science, 83 Tat Chee Avenue, Kowloon, Hong Kong, China

1P04 **Simulation of Temperature Distribution on a Spherical Target During Plasma Immersion Ion Implantation**
X. Tian, P.K. Chu, X. Zeng, Y. Leng, D.T.-K. Kwok, B. Tang, City University of Hong Kong, Department of Physics and Material Sciences, 83 Tat Chee Avenue, Kowloon, Hong Kong, China

1P05 **Modeling of Transient Effects in Resonant Discharges**
K.J. Bowers, W. Qiu, University of California, Cory Hall, EECS Dept. - 1770, Berkeley, CA 94720-1770 USA

1P06 **Progress on a 3D Particle-In-Cell Model of a W-Band Klystron**
P.J. Mardahl, J.P. Verboncoeur, C.K. Birdsall, University of California-Berkeley, Cory Hall, Berkeley, CA 94720-1770 USA

1P07 **Modeling of the Plasma Heating in Unmagnetized Low Pressure Microwave Discharges**
T.A. Grotjohn, Michigan State University, 2120 Engineering Bld., ECE Dept., East Lansing, MI 48824 USA

1P08 **Algebraic Method to Analyze the Ion-Beam Plasma Instability in Quasineutral Plasma**
J. Silva, J. Puerta, C. Cereceda, Universidad Simón Bolívar, Dept. de Física, Apdo 89000, Caracas 1080 A Venezuela

1P09 **3-D Thermo-Fluid Computer Simulations of High Intensity Discharge Lamps**
M. Galvez, OSRAM SYLVANIA Research and Development, 71 Cherry Hill Drive, Beverly, MA 01915 USA

1P10 **Computation of Multiply Charged Ion Transport in Curved Magnetic Field**
D.T.K. Kwok, M. Keidar, P.K. Chu, I.G. Brown, Department of Physics and Materials Science, 83 Tat Chee Avenue, Kowloon, Hong Kong, China

1P11 **Numerical Modeling of an Atlas-Like Liner Experiment Driven by an Explosive Magnetic Generator**
R.J. Faehl, W.L. Atchison, R.K. Keinigs, I.R. Lindemuth, Los Alamos National Laboratory, MS-B259, Los Alamos, NM 87545 USA

1P12 **DT Alpha Energy Deposition in a Magnetized Plasma**
F. Guerton, M. de Peretti, M. Sabatier, CEA/B3 BP 12 Bruyéres-le-Châtel 91680 France

1P13 **Multi-Temperature, Thermal and Ion Fraction Effects Over Wedge and Bluff Body in Hypervelocity Flow**
W.W. Vuillemot, U. Shumlak, University of Washington, Aeronautics and Astronautics Department, Box 332400, Seattle, WA 98195-2400 USA

1P14 – 1P17 Environmental/Energy Issues in Plasma Science

1P14 **The Photo-Triggered Discharge as an Alternative Device for NO-Removal**
G. Baravian, F. Fresnet, S. Pasquiers, C. Postel, V. Puech, A. Rousseau, M. Rozoy, CNRS, LPGP, Bat. 210, University Paris, Orsay 91605 France

1P15 **Energy Transfer Phenomena Between Reactant and Fluent Gases in PACT (Plasma Assisted Catalytic Technology) Chemical Reactor**
Y. Hayashi, H. Matsumoto, K. Irie, G. Yamauchi, Japan Fine Ceramics Center, 2-4-1 Mutsuno, Atsutat-ku, Nagoya, Aichi 456-8587 Japan

1P16 **De-NOx by Bidirectional Pulse Corona Discharge**
M. Akiyama, K. Minami, M. Watanabe, A. Okino, K. Ko, E. Hotta, Tokyo Institute of Technology, 4259 Nagatsuta, Midori-ku, Yokohama 226-8502 Japan

1P17 **Influence of Excitation And Geometrical Parameters on the VUV Radiation of a Pure Xenon Dielectric Barrier Discharge**
N. Sewraj, M.C. Bordage, G. Zissis, Center de Physique des Plasmas et de leurs Applications,Université Paul Sabatier, 118, Rte de Nurbonne, Toulouse, 31062 Cedex 04 France

1P18 Space Plasmas

1P18 **A Unified View of Recently Observed Multiple Coupling Among Cloud-to-Ground, Cloud-to-Cloud, and Cloud-to-Ionosphere Discharges, Based on Joint Effects of Electric Reconnection and Critical Velocity**
H. Kikuchi, Institute for Environmental Electromagnetics, 3-8-18, Komagome, Toshima-ku, Tokyo 170 Japan

1P19 – 1P31 Partially Ionized Gases

1P19 **Chemical and Bacterial Decontamination Using a Micromachined Plasma Discharge**
J. Birmingham, MesoSystems Technology Inc., 3200 George Washington Way, Richland, WA 99352 USA

1P20 **On the Use of the Resistive Barrier Discharge to Kill Bacteria: Recent Results**
J.P. Richardson, F.F. Dyer, F.C. Dobbs, I. Alexeff, M. Laroussi, Old Dominion University, Old Applied Research Center, 12050 Jefferson Ave., Newport News, VA 23606 USA

1P21 **The DC Atmospheric Barrier Plasma Discharge - Recent Results**
I. Alexeff, C. Garland, W.L. Kang, M. Laroussi, University of Tennessee, Electrical Engineering Department, Ferris 315, Knoxville, TN 37796-2100 USA

1P22 **Kinetics of Air Plasmas Generated by Electron Beams**
M.N. Shneider, S.O. Macheret, R.B. Miles, Princeton University, D-414 E-Quad, MAE Dept., Princeton, NJ 08544-5263 USA

1P23 **Plasma Cathode Sustained Filamentary Glow Discharges in Atmospheric Air**
R. Block, A.H. Mohamed, K.H. Schoenbach, Old Dominion University, KDH 231, Norfolk, VA 23529 USA

1P24 **Parallel Operation of Microhollow Cathode Discharges**
R.H. Stark, A. El-Habachi, K.H. Schoenbach, Old Dominion University, PERI, 1014 W. 46th Street, Norfolk, VA 23529 USA

1P25 **High Pressure Glow Discharges Based on MSE Arrays**
C. Penache, A. Brauning-Demian, L. Spielberger, H. Schmidt-Bocking, J.W. Goethe University, Frankfurt, August Euler Str. 6, Frankfurt am Main D-60486 Germany

1P26 **Plasma Properties of High-Pressure Microhollow Cathode Discharges in Argon**
U. Ernst, K. Frank, W. Hartmann, University of Erlangen-Neremberg, Erwin-Rommel-Str., 1, Erlangen 91058 Germany

1P27 **Diagnostics and Analyses of a Laser-Produced Organic Vapor Plasma**
G. Ding, J.E. Scharer, R. Cao, K.L. Kelly, University of Wisconsin, 1500 Engineering Dr., 506 ERB, Madison, WI 53706-1687 USA

1P28 **A Laser-Produced Plasma Sustained by a Radiofrequency Source**
K.L. Kelly, J.E. Scharer, G. Ding, E. Paller, R. Cao, University of Wisconsin, 1500 Engineering Dr., 506 ERB, Madison, WI 53706-1687 USA

1P29 **Argon and Air Mixture Plasmas Produced by a Radiofrequency Plasma Source**
E.S. Paller, J.E. Scharer, K.L. Kelly, G. Ding, University of Wisconsin, 1500 Engineering Dr., 506 ERB, Madison, WI 53706-1687 USA

1P30 **Electrical Properties of Plasmas Formed in Explosive Magnetic Flux Compression Generator Environments**
D.J. Dorsey, B.L. Freeman, Texas A&M University, Department of Nuclear Engineering, College Station, TX 77843-3133 USA

1P31 **Two-Dimensional Simulation of Ion Energy and Angular Distributions at the Wafer in Low-Pressure RF Discharges**
Y. Hu, T.L. Lin, C.Y. Huang, National Tsing Hua University, 101, Sec. 2, Kuang Fu Rd., Hsinchu 30043 Taiwan

1P32 Microwave Systems

1P32 **A Design for a Multipactor Experiment on a Dielectric Surface**
R. Anderson, W. Getty, Y.Y. Lau, M.L. Brake, A. Valfells, R.M. Gilgenbach, University of Michigan, Cooley Bldg, Ann Arbor, MI 48109-2104 USA

ICOPS 2000

The 27th IEEE International Conference on Plasma Science

International Ballroom • 1:30 p.m. • Monday, June 5, 2000

Plenary Talk: Modeling of Thermal Plasmas

Dr. Emil Pfender
University of Minnesota

Chair
Dr. Don Rej
Los Alamos National Laboratory

A very special event at this year's International Conference on Plasma Science will be two oral sessions on Thermal Plasma Chemistry and Processing, which will be dedicated to Professor Emil Pfender, University of Minnesota, in celebration of his 75th birthday. Professor Pfender is a world authority in arc technology, plasma heat transfer, and plasma processing, with more than 270 journal publications in the field. In recognition of his distinguished career, he has received many awards, including election into the National Academy of Engineering. In addition to the oral sessions, Professor Pfender will deliver the plenary talk "Modeling of Thermal Plasmas". All of these events build on a growing trend at the conference to include non-equilibrium and equilibrium processing and chemistry. Earlier plenary talks have included "Thermal Plasma Characteristics" by Joachim Heberlein (U. Minnesota) in 1998 and "Thermal Plasma Processes" by Pierre Fauchais (U. Limoges) in 1999.

International Ballroom • 3:00 p.m. • Monday, June 5, 2000

Oral Session 2A • Thermal Plasma Chemistry and Processing (Session 1)

Chair: **Noah Hershkowitz, University of Wisconsin**

2A01 **Local Thermodynamic Equilibrium Analysis of the Supersonic Induction Plasma Jet**
V. Sember, A. Schwenk, D.V. Gravelle, M.I. Boulos, Plasma Tech. Research Center, University of Sherbrooke, Sherbrooke, Quebec J1K2R1 Canada

2A02 **Electrode Phenomena Investigation of Wire Arc Spraying for Preparation of Ti-Al Intermetallic Compounds**
T. Watanabe, T. Sato, A. Nezu, Tokyo Inst. Technology, Research Lab. for Nuclear Reactors, 2-12-1 O-okayama, Meguro-ku, Tokyo 152-8550 Japan

2A03 **Production of Coherent Oscillations in Thermal Plasma Jet Generated in Water Stabilized Torch**
M. Hrabovsky, V. Kopecky, P. Macura, Institute of Plasma Physics AS CR, ZA Slovankou 3, Praha 8 182 21 Czech Republic

2A04 **Enthalpy and Heat Flux Distributions in a Triple Torch Plasma Reactor**
H. Kim, H. Chen, J. Heberlein, University of Minnesota, Department of Mechanical Engineering, 111 Church St. SE, Minneapolis, MN 55455 USA

2A05-06 **RF Thermal Plasma CVD of Diamond: The Role of Acetylene in Film Morphology**
J.L. Larson, D.I. Iordanoglou, S.L. Girshick, Department of Mechanical Engineering, University of Minnesota, 111 Church St. S.E., Minneapolis, MN 55455 USA

2A07 **A Molecular Bean Mass Spectrometer for Plasma Jet Chemical Vapor Deposition Reactor Diagnostics**
A.E. Kull, M.A. Cappelli, Stanford University, Thermosciences Division, Bldg. 520, Mechanical Engineering Department, Stanford, CA 94305-3032 USA

2A08-09 **Modeling Studies of Diamond Deposition with Thermal Plasmas**
D. Kolman, M. Breiter, G. Nutsch, Tu Ilmenau, Ilmenau D-98684 Germany

2A10 **The Deposition of Ultra-Nanocrystalline Diamond Films Using a $Ar/H_2/CH_4$ Microwave Discharge**
W.S. Huang, J. Asmussen, B. Wright, A.R. Krauss, D.M. Gruen, A. Sumant, Michigan State University, 2120 Engineering Building, East Lansing, MI 48824 USA

Gold • 3:00 p.m. • Monday, June 5, 2000

Oral Session 2B • Vacuum Microelectronics/Microwave Systems

Chair: **Andreas Neuber, Texas Tech University**

2B01-02 FEA Cathodes (FEACs) for Space Based Applications
B.E. Gilchrist, K.L. Jensen, C.M. Marrese, J.G. Severns, A.D. Gallimore, D. Morris, University of Michigan, 2455 Hayward Ave., Ann Arbor, MI 48109-2143 USA

2B03 Application of Field Emitter Arrays to Microwave Power Amplifiers
D.R. Whaley, B. Gannon, C.R. Smith, C.A. Spindt, Northrop Grumman Corporation, 600 Hicks Rd., Rolling Meadows, IL 60008 USA

2B04 Development of a Miniature Cold-Cathode Electron Gun
D.M. Menz, J.E. Velazco, P.H. Ceperley, Microwave Technologies Incorporated, 10386B Democracy Lane, Fairfax, VA 22030 USA

2B05-06 Mechanism of Spontaneous Pulse Shortening and a Method to Lengthen Microwave Pulse in a Gigawatt Relativistic BWO
G.A. Mesyats, S.D. Korovin, I.V. Pegel, S.D. Polevin, D.I. Proskurovsky, Institute of Electrophysics US RAS, 34 Komsomolskaya, Ekaterinburg 620049 Russia

2B07 Generation of Oscillations in a Plasma Filled Diode
J. Zhang, P.A. Lindsay, X. Chen, Queen Mary and Westfield College, Department of Electronic Engineering, London E1 4NS United Kingdom

2B08 Pressure Dependence of High Power Microwave Solid Dielectric/Gas Interface Breakdown
A. Neuber, D. Hemmert, H. Krompholz, L.L. Hatfield, M. Kristiansen, Texas Tech University, EE-Dept., Box 43102, Lubbock, TX 79409-3102 USA

2B09-10 A Microwave Dielectric Properties Measurement System for Studying Composite Lossy Ceramics
J.P. Calame, F. Wood, B.G. Danly, D.K. Abe, B. Levush, D. Lobas, Naval Research Laboratory, Code 6843, 4555 Overlook Ave. SW, Washington, DC 20375 USA

2B11 Development Of A Diamond RF Switch For A Pulse Compression System
X. Xu, J. Schein, N. Qi, R.R. Prasad, M. Krishnan, F. Tamura, S. Tantawi, Alameda Applied Sciences Corporation, 2235 Polvorosa Ave. Suite 230, San Leandro, CA 94577 USA

Bayou I and III • 3:00 p.m. • Monday, June 5, 2000

Oral Session 2C • Flat Panel Displays

Chair: **John Verboncoeur, University of California, Berkeley**

2C01-02 Efficiency and Power Optimization of Plasma Display Panel by Simulation
J.K. Lee, M.S. Hur, H.C. Kim, C.H. Shon, Pohang University of Science & Technology, San-31 Hyoja, Pohang 790-784 South Korea

2C03 Vacuum Ultraviolet Emission And Metastable State Properties of DC Microdischarges
O.B. Postel, M.A. Cappelli, Stanford University, Building 520, Rm. 520I, Stanford, CA 94305-3032 USA

2C04 Modeling and Diagnostics of Micro-Plasmas for Application to Plasma Display Panels
H. Park, H. Okuda, Princeton University, P.O. Box 451, Princeton, NJ 08540 USA

2C05-06 Fundamental Properties of Inert Gas Mixtures for Plasma Display Panels
G. Veronis, U.S. Inan, V.P. Pasko, Stanford University, 350 Serra Mall, #351 David Packard Building, Stanford, CA 94305-9515 USA

Bayou II and IV • 3:00 p.m. • Monday, June 5, 2000

Oral Session 2D • Opening Switches

Chair: **Major David Bell, Defense Threat Reduction Agency**

2D01 **High Current Experiments with Ranchero Explosive Pulsed Power Generators**
J.H. Goforth, W.J. Denninger, C.M. Fowler, D.H. Herrera, J.C. King, I.R. Lindemuth, E.A. Lopez, J.A. McGuire, E.C. Martinez, H. Oona, F.C. Sena, J.L. Stokes, L.J. Tabaka, D.G. Tasker, D.T. Torres, Los Alamos National Laboratory, DX-3, MS J566, Los Alamos, NM 87545 USA

2D02 **Differences in Liner Performance at Atlas Current Levels**
W.L. Atchison, R.J. Faehl, R. Keinigs, R.E. Reinovsky, Los Alamos National Laboratory, Plasma Physics Group, MS-B259, Los Alamos, NM 87545 USA

2D03 **Results of Fiber Optic Interferometer Measurements on a Magnetically Confined Plasma Opening Switch**
M. McFarland, S. Gensler, M. Krishnan, M. Savage, J. Goyer, D. Huet, Alameda Applied Sciences Corporation, 2235 Polvorosa Ave., Suite 230, San Leandro, CA 94577 USA

2D04 **Operation of a Plasma Opening Switch Utilizing Heated Electrodes**
J.R. Goyer, D. Kortbawi, J.R. Thompson, S. Davis, J. Banister, N. Pereira, J. Sallay, W. Rix, Maxwell Technologies, 8888 Balboa Avenue, San Diego, CA 92123 USA

2D05 **MACH2 Simulations Of An Explosively Formed Fuse**
D. Keefer, R. Rhodes, University of Tennessee Space Institute, B.H. Goethert Parkway, Tullahoma, TN 37388 USA

2D06 **Explosively Formed Fuses for High Voltage Systems**
D.G. Tasker, J.H. Goforth, C.M. Fowler, D.H. Herrera, J.C. King, E.A. Lopez, E.C. Martinez, H. Oona, J.L. Stokes, L.J. Tabaka, D.T. Torres, F.C. Sena, G. Kiuttu, J. Degnan, Los Alamos National Laboratory, DX-3, MS J566, Los Alamos, NM 87545 USA

2D07 **A Plasma Opening Switch for PRS Loads on Double-Eagle**
J.S. Levine, S. Chantrenne, D. Price, P. Spence, S. Putnam, V. Bailey, K. Ware, Maxwell Physics International, 2700 Merced Street, San Leandro, CA 94577 USA

2D08 **Optimization of the Decade Quad, a Modular NWE Simulator**
D. Kortbawi, D. Price, M. Babineau, V. Kenyon, Maxwell Physics International, 2700 Merced St., San Leandro, CA 94577 USA

2D09 **Observation of Snow Plow Motion and Surface Plasma Formation in Plasma Opening Switches**
E.J. Yadlowsky, R.C. Hazelton, J.J. Moschella, C.C. Klepper, G.T. Thaler, M.W. Manzanzani, C. Vidoli, HY-TECH Research Corp., 104 Centre Court, Radford, VA 24141 USA

2D10 **Characterization of the ACE 4 Catcher's MITT Pos-Load Configuration**
J.R. Thompson, P.L. Coleman, R.J. Crumley, P.J. Goodrich, J.R. Goyer, D.E. Parks, J.E. Rauch, P. Steen, E.M. Waisman, Y. Maron, J.J. Moschella, Maxwell Technologies, 8888 Balboa Avenue, San Diego, CA 92123 USA

Poster Session 2P • Z-Pinches, Session 1
• Laser Produced Plasmas
• Basic Phenomena

2P01 – 2P14 Z-Pinches, Session 1

2P01 **Analysis of the Dynamics and Spectra from Long Implosion Time Aluminum Wire Array Experiments on the 8-MA Saturn Generator**
C. Deeney, C.A. Coverdale, M.R. Douglas, J.P. Apruzese, J.W. Thornhill, K.G. Whitney, J. Davis, H. Sze, B. Failor, P. Coleman, R. Schneider, Sandia National Laboratories, P.O. Box 5800, MS-1194, Albuquerque, NM 87185 USA

2P02 **Computational Modeling of Long Implosion Time Aluminum Z-Pinches On The Saturn Generator**
M. Douglas, C. Coverdale, C. Deeney, N. Roderick, Sandia National Laboratories, P. O. Box 5800, Albuquerque, NM 87185-1194 USA

2P03 **Multi-KeV Photon Production on the Z Accelerator**
C.A. Coverdale, C. Deeney, M.R. Douglas, J. Bailey, K.G. Whitney, J.P. Apruzese, J.W. Thornhill, J. Davis, R. Schneider, Sandia National Laboratories, PO Box 5800, MS-1159, Albuquerque, NM 87185-1159 USA

2P04 **Modelling the Interaction of Nested Wire Arrays in Imploding Z-Pinches**
J.P. Chittenden, S.V. Lebedev, S.N. Bland, A. Ciardi, M.G. Haines, Imperial College, Blackett Laboratory, Prince Consort Road, London SW 7 2B2 United Kingdom

2P05 **Wire Dynamic Model of Offset Nested Arrays**
R.E. Terry, J. Davis, A.L. Velikovich, Naval Research Laboratory, Plasma Physics Division, Code 6720, Washington, DC 20375-5346 USA

2P06 **A Solution to the Radiative Collapse Problem in Z-Pinch Simulations?**
R.W. Clark, J.L. Giuliani, A.L. Velikovich, J. Davis, L.I. Rudakov, Naval Research Laboratory, Plasma Physics Division, 6720, Washington, DC 20375-5346 USA

2P07 **Modeling and Analysis of Magnetic Screening and Other Resistive Sheath Structure of Wires in the Sanford Effect Range with Improved Conductivity Models**
F.L. Cochran, R.L. Morse, D.E. Carroll, Los Alamos National Laboratory, Mail Stop B529, Los Alamos, NM 87545 USA

2P08 **Measurements of the Structural Evolution of X Pinches and the Formation of Radiating Hot Spots**
S.A. Pikuz, T.A. Shelkovenko, D.B. Sinars, D.A. Hammer, K.M. Chandler, Min Hu, Cornell University, 369 Upson Hall, Ithaca, NY 14853 USA

2P09 **Spectroscopic Investigations of X-ray Radiation from X Pinches**
T.A. Shelkovenko, S.A. Pikuz, D.B. Sinars, I. Yu. Scobelev, D.A. Hammer, K.M. Chandler, Min Hu, Cornell University, 369 Upson Hall, Ithaca, NY 14853 USA

2P10 **Study of the Rapid Expansion Rates of 25 μm Ag, Au, and Cu Wires Driven by a Current Rise Rate of 10^{10} A/s for < 100 ns**
K.M. Chandler, Min Hu, D.B. Sinars, T.A. Shelkovenko, S.A. Pikuz, J.B. Greenly, D.A. Hammer, B.R. Kusse, Cornell University, 369 Upson Hall, Ithaca, NY 14853 USA

2P11 **Optical Measurements of the Properties of Exploding Wires**
B.R. Kusse, Min Hu, S.A. Pikuz, D.B. Sinars, K.M. Chandler, J.B. Greenly, D.A. Hammer, T.A. Shelkovenko, Cornell University, 369 Upson Hall, Ithaca, NY 14853 USA

2P12 **Polarizability Measurements of Exploding Wire Vapor Using Optical Interferometry and X-pinch Backlighting**
M. Hu, D.B. Sinars, S.A. Pikuz, K.M. Chandler, J.B. Greenly, D.A. Hammer, B.R. Kusse, T.A. Shelkovenko, Cornell University, 369 Upson Hall, Ithaca, NY 14853 USA

2P13 **Dense Z-Pinch at the Nevada Terawatt Facility**
B.S. Bauer, V.L. Kantsyrev, N. LeGalloudec, R.C. Mancini, A.G. Petrashen, R. Presura, G.S. Sarkisov, A.S. Shlyaptseva, V.I. Sotnikov, F. Winterberg, S. Batie, W. Brinsmead, H. Faretto, B. Le Galloudec, A. Oxner, M. Al-Shorman, D.A. Fedin, M. Gharaibeh, I.E. Golovkin, S. Hansen, I. Paraschiv, M. Sherrill, H. Zheng, D. McCrorey, J.W. Farley, J. Glassman, J.S. De Groot, University of Nevada, Reno, MS 220, Reno, NV 89557-0058 USA

2P14 **Investigation of the Initial Stage of Exploding Wire**
G.S. Sarkisov, D. McCrorey, B.S. Bauer, D. Reisman, J.S. De Groot, University of Nevada, Reno, MS 220, Reno, NV 89557-0058 USA

2P15 – 2P19 Laser Produced Plasmas

2P15 **Implosion of Magnetized Laser Targets**
S. Gond, A. Bourdier, Department of Physics, BP 12, Bruyeres-le-Chatel 91680 France

2P16 **Relativistic Focusing and Ponderomotive Self-Channeling of Intense Laser Beams**
B. Hafizi, A. Ting, P. Sprangle, R.F. Hubbard, Naval Research Laboratory, Code 6791, Washington, DC 20375-5346 USA

2P17 **Investigation of Magnetic Guiding of Laser Plasmas for Thin Film Deposition**
D.G. Redman, S. Roupassov, Y.Y. Tsui, R. Rankin, C.E. Capjack, R. Fedosejevs, University of Alberta, Department of Electrical and Computer Engineering, Edmonton, Alberta T6G 2G7 Canada

2P18 **Experimental Methods for Investigation of Photo-Field Fusion Concept**
V.S. Belyaev, A.P. Matafonov, Center Research Institute, Russian Aviation Space Agency 4, Pionerskaya St., Korolev, Moscow Region 141070 Russia

2P19 **Measurement of Ar($1s_2$) Population in a Carbon Plume Excited by ArF Excimer Laser Using a Laser Absorption Method**
Y. Sakai, M.A. Bratescu, Y. Suda, M. Mizuno, Engineering Department, Hokkaido University, Kita-13, Nishi-8, Sapporo, Hokkaido 060-8628 Japan

2P20 – 2P29 Basic Phenomena

2P20 **Spatio-Temporal Dynamics of Charged Species in the Afterglow of a Plasma Containing Negative Ions**
I.D. Kaganovich, B.N. Ramamurthi, D.J. Economou, University of Houston, 5-222D, Department of Chemical Eng., Houston, TX 77204-4792 USA

2P21 **Wake Formation Behind a Finite-Size Dust Grain in a Plasma**
O. Ishihara, S.V. Vladimirov, N.F. Cramer, Yokohama National University, Department of Physics, 79-5 Tokiwadai, Hodogaya-ku, Yokohama 240-8501 Japan

2P22 **New Model to Calculate the Vibrational Lattice Frequency in Dust Crystals Using a Generalized Nonlinear Screening Potential**
C. Cereceda, J. Puerta, P. Martin, Universidad Simón Bolívar, Caracas, D.F. 1080-A Venezuela

2P23 **Nonlocal Transport in Weakly Ionized Plasmas**
F. Bouzid. A. Bendib, Laboratoire de Physique des Milieux Ionisés, Institut de Physique, U.S.T.H.B., El Alia, B.P. 32, Bab Ezzouar, Algiers 16111 Algeria

2P24 **Experimental and Numerical Investigation of a Planar Type Radio Frequency Inductively Coupled Oxygen Plasma**
T.H. Chung, D.C. Seo, S.W. Chung, H.J. Yoon, Department of Physics, Dong-A University, Hadan-dong, Saha-Gu, Pusan 604-714 Korea

2P25 **Construction and Characterization of an Ar-Fe Hollow Cathode Tube with Modeling of the Argon Plasma Discharge**
C.C. Motta, A. Mirage, Centro Tecnológico da Marinha, Ave. Angélica 1777 Apt. 52, São Paulo, SP 01227-200 Brazil

2P26 **Measuring Electron Densities in Highly Collisional Plasmas Using a 110 GHz Interferometer**
K.L. Kelly, J.E. Scharer, M. Laroussi, R. Block, K. Schoenbach, University of Wisconsin, 1500 Engineering Dr., 506 ERB, Madison, WI 53706-1687 USA

2P27 **Enhanced Corona Discharge: I-V Characterization and Ion Density Measurements**
W.L. Kang, I. Alexeff, University of Tennessee, ECE Dept., 414 Ferris Hall, Knoxville, TN 37996-2100 USA

2P28 **First Experimental Measurement of the Free Streaming Plasma Mode**,
J.R. Hoffman, P. Muggli, T. Katsouleas, C. Joshi, University of Southern California, SSC 300/Physics Dept., Los Angeles, CA 90089 USA

2P29 **Experimental Investigation of Power Deposition and Ionization Kinetics in an Inductively Coupled Discharge**
W. Rullenraad, B. Crowley, M.M. Turner, D. Vender, Dublin City University, Sch. Physical Science, Dublin, Ireland

ICOPS 2000

The 27th IEEE International Conference on Plasma Science

International Ballroom • 8:30 a.m. • Tuesday, June 6, 2000

Plenary Talk:
Linking Plasma Chaos to Free-Electron-Laser Chaos

Prof. J.K. Lee
Pohang University of Science and Technology, Korea
and
President, Division of Plasma Physics of the Korean Physical Society

Chair
Prof. Kyu-Sun Chung
Hanyang University, Korea

International Ballroom • 10:00 a.m. • Tuesday, June 6, 2000

Oral Session 3A • Plasma, Ion, and Electron Sources

Chair: **Jes Asmussen, Michigan State University**

3A01-02 Large Area Plasma Processing System Based on Electron Beam Ionization
D. Leonhardt, S.G. Walton, D.B. Blackwell, D.P. Murphy, R.F. Fernsler, R.A. Meger, US Naval Research Laboratory, 4555 Overlook Ave. SW, Washington, DC 20375-5346 USA

3A03 Theoretical Overview of the Large Area Plasma Processing System (LAPPS)
W.M. Manheimer, R. Fernsler, M. Lampe, R. Meger, Code 6707, Naval Research Laboratory, 4555 Overlook Ave., Washington, DC 20375-5346 USA

3A04-05 Microfabrication of Inductively Coupled Plasma Reactors
J. Hopwood, Y. Yin, Northeastern University, 110 Forsyth St., Rm 442 DA, Boston, MA 02115 USA

3A06 Improved Utility of Microwave Energy for Semiconductor Plasma Processing through Rf System Stability Analysis
P.W. Rummel, T.A. Grotjohn, Michigan State University, 2120 Eng. Bld., ECE Dept., East Lansing, MI 48824 USA

3A07 The Effect of Static Magnetic Field Configuration on the Ion Production Efficiency and Operational Stability of a Microwave Plasma Source
M. Perrin, T.A. Grotjohn, J. Asmussen, Michigan State University, 2120 Engineering Building, East Lansing, MI 48823 USA

3A08 Experimental Characterization of a Compact Microwave Plasma Source Employing Three Different Coupling Geometries
A. Khan, J. Asmussen, Michigan State University, 2120 Engineering Building, East Lansing, MI 48824 USA

3A09 Triggerless Shunting Arc Generation and Pulsed Ion Extraction
K. Yukimura, Y. Tani, K. Yoshioka, S. Masamune, Doshisha University, Department of Electrical Engineering, 1-3 Tatara-Miyakodani, Kyotanbe, Kyoto 610-0321 Japan

3A10 Suppression of Ion Emission And Pinching Using Heated Tantalum Anodes In High-Power Electron-Beam Diodes
B.V. Weber, S.J. Stephanakis, D.C. Black, G. Cooperstein, N.R. Pereira, Naval Research Laboratory, Code 6770, Washington, DC 20375 USA

Gold • 10:00 a.m. • Tuesday, June 6, 2000

Oral Session 3B • Microwave Plasmas

Chair: **Spencer Kuo, Polytechnic University**

3B01-02 Comparison Of Circular TM01 and TM11 Modes Generated Electron Cyclotron Resonance Microwave Discharges - A Monte Carlo Simulation Study
S.S. Kuo, TRW Antenna Products Center, One Space Park, Redondo Beach, CA 90278 USA

3B03 Characterization of a Surface Wave Argon Discharge Sustained by Microwave
C.C. Motta, A.D. Fonseca, G.H. Gomes, H.S. Maciel, Centro Tecnologico da Marinha; Ave. Angelica 1777 Apt. 52, São Paulo, SP 01227-200 Brazil

3B04 Pulsed Microwave Discharge In Gas Mixtures N_2/O_2/No: Experimental Study And Modeling
M. Baeva, H. Gier, A. Pott, J. Uhlenbusch, Institute Laser & Plasma Physics, University of Dusseldorf, Universitätsstr. 1 GEB.25.32, Dusseldorf, NRW D-40225 Germany

3B05 A High Power Microwave-Driven Plasma Torch
M. Read, M. Kremer, D. Oakes, A. Gelb, Physical Sciences Inc., 5705A General Washington Dr., Alexandria, VA 22312 USA

3B06 Microwave Plasma-Electron Beam Interactions for Hypersonic Flow Control
J. Kline, R. Murray, R. Miles, Research Support Instruments, 73 West Broad St., Hopewell, NJ 08525 USA

3B07 A Transmission Line Filled with Fast Switched Periodic Plasma as a Wideband Frequency Transformer
S.P. Kuo, D. Bivolaru, L. Orlick, I. Alexeff, D.K. Kalluri, Polytechnic University, 901 Route 110, Farmingdale, NY 11735 USA

3B08 An Incidence of Electromagnetic Wave on a Flat Plasma Layer
A. Nerukh, K. Yemelyanov, Department Theoretical Radio Physics, Kharkov National University, 4 Svobody Sq., Kharkov, Ukraine 61077 Russia

3B09 Control of Sub-Critical Microwave Filamentary Plasmas in Dense Gases
P.F. Barker, B. McAndrew, S.O. Macheret, R.B. Miles, Princeton University, D-414 E-Quad, MAE Dept., Princeton, NJ 08544-5263 USA

Bayou I and III • 10:00 a.m. • Tuesday, June 6, 2000

Oral Session 3C • Inertial Confinement Fusion/Laser Produced Plasmas

Chair: **Rick Spielman, Sandia National Laboratories**

3C01-02 Recent Progress in Static-Wall Hohlraum Development for ICF Studies
T.W.L. Sanford, R.E. Olson, J.E. Bailey, G.A. Chandler, D.L. Fehl, D.E. Hebron, J.S. Lash, R.J. Leeper, R.C. Mock, T.J. Nash, J.L. Porter, L.E. Ruggles, C.L. Ruiz, W.W. Simpson, K.W. Struve, R.A. Vesey, R.L. Bowers, R.E. Chrien, G.C. Idzorek, W. Matuska, D.L. Peterson, R.G. Watt, R.R. Peterson, N.F. Roderick, D.B. Reisman, Sandia National Laboratories, MS-1196, P.O. Box 5800, Albuquerque, NM 87185-1196 USA

3C03 A Two-Sided Z-Pinch Driven Hohlraum for Improved ICF Radiation Symmetry
M.E. Cuneo, R.A. Vesey, D.L. Hanson, J.L. Porter, Jr., R.B. Spielman, G.A. Chandler, S.A. Slutz, T.J. Gilliland, P. Reynolds, L.E. Ruggles, W.W. Simpson, H. Seaman, P. Primm, J. Torres, J. McGurn, J.H. Hammer, Sandia National Laboratories, PO Box 5800, MS-1193, Albuquerque, NM 87185-1193 USA

3C04 Laser Megajoule Project Status
M. Andre, F. Jequier, CEA-DAM, BP2, Le Barp 33114 France

3C05 Shock Waves Generated by Intense Femtosecond Lasers
T. Ao, A. Ng., University of British Columbia, Department of Physics and Astronomy, 6224 Agricultural Road, Vancouver, BC V6T 1Z1 Canada

3C06-07 Isotopic Enrichment Of Swift Ions From Laser Plasmas
P.P. Pronko, P.A. VanRompay, Z. Zhang, J. Nees, University of Michigan-CUOS/EECS, 2200 Bonisteel Blvd., Ann Arbor, MI 48109-2099 USA

Bayou II and IV • 10:00 a.m. • Tuesday, June 6, 2000

Oral Session 3D • Computational Plasma Physics

Chair: **Vladimir Kolobov, CFD Research Corporation**

3D01-02 Modeling of Strongly Coupled Dusty Plasmas
V.A. Schweigert, I.V. Schweigert, A.L. Alexandrov, A. Melzer, A. Piel, University of Minnesota, 111 Church Street, Minneapolis, MN 55455 USA

3D03 A TCAD-Suited Hybrid Model for the Simulation of the Sheath/Presheath Kinetics of DC or RF Driven Low-Pressure Discharges
M. Kratzer, R.P. Brinkmann, Infineon Technologies AG, Germany

3D04 Kinetic Simulation of Positive Column Instabilities
M.M. Turner, D. Vender, Dublin City University, Sch. Physical Science, Dublin, Ireland

3D05 Numerical Modelling of Electrode Plasma Generation
W.L. Ng, O.R. Tutty, J.W. McBride, University of Southampton, Mechanical Engineering, Southampton, Hampshire 5017 1BJ England

3D06-07 Application of Techniques Used in Continuum Computational Fluid Dynamics to the Boltzmann Equation
E.A. Richley, P.O. Box 64, Gaithersburg, MD 20884-0064 USA

3D08 Non-Statistical Boltzmann Solver for Electron Kinetics in Gas Discharges
V.I. Kolobov, CFD Research Corporation, 215 Wynn Drive, Huntsville, AL 35805 USA

3D09 Particle in Cell Monte Carlo Collisions Modeling of Inductively Coupled Plasmas
V.A. Schweigert, U.R. Kortshagen, University of Minnesota, 111 Church St. SE, Minneapolis, MN 55955 USA

3D10 Computation and Measurement of Electron Circulation Patterns in Phase Space
U.R. Kortshagen, B. Heil, Department of Mechanical Engineering, University of Minnesota, 111 Church St. SE, Minneapolis, MN 55455 USA

Poster Session 3P
- **Slow Wave Devices**
- **Fast Wave Devices**
- **Plasma Foci**
- **Plasma Diagnostics**

3P01 – 3P06 Slow Wave Devices

3P01 **Multifrequency Beam-Wave Interaction in an Idealized Broadband Vacuum Microwave Amplifier Model**
J.G. Wohlbier, I. Dobson, J.H. Booske, University of Wisconsin, 1415 Engineering Dr., Madison, WI 53706 USA

3P02 **Nonlinear Characterization and Comparison with Simulation of a High Gain, Broad Band Helix Traveling Wave Tube**
M.M. McNeely, M.C. Converse, J.H. Booske, J.E. Scharer, C.L. Kory, D. Zavadil, University of Wisconsin-Madison, 1415 Engineering Dr., Madison, WI 53706 USA

3P03 **Investigations of Non-Linear Spectral Behavior in Multi-Toned Helix Traveling Wave Tubes**
M.A. Wirth, J.E. Scharer, J.H. Booske, M.C. Converse, M.M. McNeely, J.G. Wohlbier, G. Groshart, B. Gannon, C. Armstrong, G. Groshart, B. Gannon, C. Armstrong, University of Wisconsin, 1500 Engineering Dr., 506 ERB, Madison, WI 53706-1687 USA

3P04 **PIC-Circuit Hybrid Model for Coupled Cavity Traveling Wave Tubes**
W.D. Qiu, J.P. Verboncoeur, C.K. Birdsall, University of California, Berkeley, Cory Hall, EECS Dept. -1770, Berkeley, CA 94770-1770 USA

3P05 **Dispersion Relation of a Sheet Beam Driven Backward Wave Oscillator**
A. Gokhale, Y. Choyal, K.P. Maheshwari, K.C. Mittal, P.H. Ron, Department of Physics, D.A. University, Indore 452017 India

3P06 **Computer Characterization of Resonance Modes of a Magnetron Cavity**
Z. Wang, X. Chen, M. Esterson, P.A. Lindsay, Queen Mary and Westfield College, Mile End, London E1 4NS United Kingdom

3P07 – 3P17 Fast Wave Devices

3P07 **Ka-Band Second-Harmonic Cusp-Gun Gyro-TWT**
S.B. Harriet, D.B. McDermott, Y. Hirata, T.H. Chang, K.R. Chu, N.C. Luhmann, Jr., Department of Applied Science, University of California at Davis, 228 Walker Hall, Davis, CA 95616 USA

3P08 **High Efficiency Ka-Band Second-Harmonic Peniotron**
L.J. Dressman, D.B. McDermott, Y. Hirata, D.A. Gallagher, N.C. Luhmann, Jr., Department of Applied Science, University of California at Davis, 228 Walker Hall, Davis, CA 95616 USA

3P09 **94 GHz Sixth-Harmonic Slotted Gyrotron**
R.C. Stutzman, D.B. McDermott, Y. Hirata, D.A. Gallagher, T.A. Spencer, N.C. Luhmann, Jr., Department of Applied Science, 228 Walker Hall, University of California at Davis, Davis, CA 95616 USA

3P10 **Heavily-Loaded W-Band TE01 Gyro-TWT**
Y. Hirata, A.T. Lin, T.H. Chang, K.R. Chu, N.C. Luhmann, Jr., Department of Applied Science, 228 Walker Hall, University of California at Davis, Davis, CA 95616 USA

3P11 **Simulation of Beam Collector Heating Patterns in Small-Orbit Gyrodevices**
J.P. Calame, B.G. Danly, B. Levush, K.T. Nguyen, M. Blank, K. Felch, T.S. Chu, Naval Research Laboratory, Code 6843, 4555 Overlook Ave. SW, Washington, DC 20375 USA

3P12 **Design of a Low-Voltage W-Band Gyro-Amplifier with Depressed Collector**
M. Blank, G.P. Saraph, K. Felch, P. Borchard, B.G. James, B.G. Danly, B. Levash, K.T. Nguyen, Communications and Power Industries, 811 Hansenway, M/S B-450, Palo Alto, CA 94303 USA

3P13 **X-Band Magnicon Amplifier Experiment**
S.H. Gold, A.W. Flifet, O.A. Nezhevenko, V.P. Yakovlev, J.L. Hirshfield, E.V. Kozyrev, A.K. Kinkead, Naval Research Lab, Code 6793, 4555 Overlook Ave. SW, Washington, DC 20375-5346 USA

3P14 **Experimental Study of an Injection Locked Gyro-BWO**
S.H. Chen, T.H. Chang, F.H. Cheng, C.S. Kuo, K.R. Chu, National Tsing Hua University, Dept. of Physics, Hsinchu 300 Taiwan

3P15 **1 MW, 140 GHz, CW Gyrotron for Wendelstein 7-X**
G. Dammertz, S. Alberti, A. Arnold, E. Borie, V. Erckmann, W. Förster, G. Gantenbein, P. Garin, E. Giguet, S. Illy, W. Kasparek, H. Laqua, G. Le Cloarec, Y. Le Goff, R. Magne, G. Michel, G. Müller, B. Piosczyk, M.Q. Tran, M. Thumm, Forschungszentrum Karlsruhe, IHM Postfach 3640 D-76021, Karlsruhe, Germany

3P16 **Status Of A 35 GHz Sixth-Harmonic Amplifier Experiment**
J.E. Velazco, P.H. Ceperley, D.M. Menz, Microwave Technologies Incorporated, 10386B Democracy Lane, Fairfax, VA 22030 USA

3P17 **Gryokinetic Analysis of the E-Beam Misalignment Effect on a Millimeter-Wave Gyrotron Oscillator**
S. Zhang, Southwest Jiaotong University, Chengdu, Sichuan 610021 P.R. China

3P18 – 3P21 Plasma Foci

3P18 **High Energy Electrons in the Micropinch Region of Vacuum Spark**
O. G Semyonov, ALFT Inc., P.O. Box 8763, Station T, Ottawa, Ontario KIG 3JI Canada

3P19 **Observation of the Metallic Vapor from a Plasma Focus with a Laser Differential Interferometer**
X. Wang, C. Luo, M. Han, Department of Electrical Engineering, Tsinghua University, Beijing 100084 Peoples Republic of China

3P20 **Experimental Study of Neutron Emission Under Low Rep-Rate Operation in a Small Plasma Focus Device**
M. Han, Zh.G. Guo, X.X. Wang, Tsinghua University, East Building 15-6-501, Beijing 100084 P.R. China

3P21 **Kinetic and Electrical Energy Profiles in a Plasma Focus Device**
A.V. Gholap, F.B. Sigalo, National University of Science and Technology, P.O. Box AC 939, Ascot, Bulawayo, Zimbabwe

3P22 – 3P34 Plasma Diagnostics

3P22 **Demonstrated Sub-Nanosecond Timing of Waveform Data in the Distributed Data Acquisition at the Z Facility**
J.A. Mills, J. Slopek , T. Dinwoodie, J.S. McGurn ,Ktech Corporation, 2201 Buena Vista SE, Suite 400, Albuquerque, NM 87106 USA

3P23 **Fiber-Optic Array Streak-Camera Coupled Diagnostics in Use at the Z Accelerator Record Single Point, One-, or Two-Dimensional Data from Z-Pinch Plasmas**
S. Lazier, M. Bernard, M. Derzon, C. Hall, J. Torres, Ktech Corporation, 2201 Buena Vista SE Suite 400, Albuquerque, NM 87106 USA

3P24 **Electron Density Measurements in Pulsed Atmospheric Pressure Air Plasmas by IR Heterodyne Interferometry**
F. Leipold, R.H. Stark, A. El-Habachi, K.H. Schoenbach, Old Dominion University, 12050 Jefferson Ave., Newport News, VA 23606 USA

3P25 **E-157: A 1.4 Meter-Long Plasma Wakefield Acceleration Experiment**
P. Muggli, T.C. Katsouleas, S. Lee, R. Assmann, F.J. Decker, M. Hogan, R. Iverson, P. Raimondi, R.H. Siemann, D. Walz, B. Blue, C.E. Clayton, E. Dodd, R. Hemker, C. Joshi, K.A. Marsh, W.B. Mori, S. Wang, University of Southern California, 56-125 B, Eng. IV, EE-UCLA, Los Angeles, CA 90095 USA

3P26 **Heavy Ion Beam Probe Development**
K.A. Conner, T.P. Crowley, D.R. Demers, S.J. Howard, J. Lei, J.G. Schatz, P.M. Schoch, U. Shah, J. Si, Rensselaer Polytech Institute, JEC 6003, ECSE Department, Troy, NY 12180 USA

3P27 **Diagnostic Development of a Diode Laser Based LIF Instrument for Velocity Space Diffusion Measurements in Quiescent and Chaotic Low Temperature Thermionic Discharge Plasmas**
G.D. Severn, Department of Physics, University of San Diego, 5998 Alcala Park, San Diego, CA 92110 USA

3P28 **Plasma Diagnostic Measurements of Agron-Hydrogen-Methane Discharges Used for Ultra-Nanocrystalline Diamond Deposition in a Microwave CVD System**
W.S. Huang, T.A. Grotjohn, J. Asmussen, Michigan State University, 2120 Engineering Building, East Lansing, MI 48824 USA

3P29 **A Novel Inversion Algorithm for Optical Tomography of Plasmas**
K. Etemadi, E.C. Benck, NIST, 100 Bureau Dr., Stop 8421, Gaithersburg, MD 20899-8421 USA

3P30 **Temperature Fields in Glow Discharges Measured with Ultra Violet Filtered Rayleigh Scattering,**
A.P. Yalin, Y. Ionikh, R.B. Miles, Princeton University, Dept. of Mech. and Aerospace Eng., Room d-414 Engineering Quad., Olden St., Princeton, NJ, 08544 USA

3P31 **Calculation of Ion Energy Distributions from RF Plasmas Using a Simplified Kinetic Model**
M. Misakian, Y. Wang, National Institute of Standards & Technology, 100 Bureau Dr., M/S 8113, Gaithersburg, MD 20899-8113 USA

3P32 **Direct Spectroscopic Observation of Multicharged MeV Ions in Plasma, Heated by Intense Femtosecond Laser Radiation**
A.Ya. Faenov, I.Yu Skobelev, A.I. Magunov, T.A. Pikuz, T. Auguste, P. d'Oliveira, S. Hulin, P. Monot, A.G. Zhidkov, A. Sasaki, T. Tajima, Multicharged Ions Spectra Data Center of VNIIFTRI, MISDC of VNIIFTRI, Mendeleevo, Moscow 141570 Russia

3P33 **Using Spherically Bent Crystals for Obtaining High-resolution, Large-field, Monochromatic X-ray Backlighting Imaging for Wide Range of Bragg Angles**
T.A. Pikuz, A. Ya. Faenov, M. Fraenkel, A. Zigler, F. Flora, S. Bollanti, P. Di Lazzaro, T. Letardi, A. Grilli, L. Palladino, G. Tomassetti, A. Reale, L. Reale, A. Scafati, T. Limongi, F. Bonfigli, L. Alainelli, M. Sanchez del Rio, Multicharged Ions Spectra Data Center of VNIIFTRI, MISDC of VNIIFTRI, Mendeleevo, Moscow 141570 Russia

3P34 **Hot-Electron Influence for K Spectra Emission of Ar Clusters, Heated by 65 fs High-Intensive Laser Radiation**
A.Ya. Faenov, I.Yu. Skobelev, A.I. Magunov, T.A. Pikuz, J. Abdallah, Jr., T. Auguste, P. d'Oliveira, S. Hulin, P. Monot, Multicharged Ions Spectra Data Center of VNIIFRI, MISDC of VNIIFRI, Mendeleevo, Moscow Region, 141570 Russia

ICOPS 2000

The 27th IEEE International Conference on Plasma Science

International Ballroom • 1:30 p.m. • Tuesday, June 6, 2000

Plenary Talk:
Communicating With Nonscientists: Kids, Congressmen, and Other Important People in Your Life

Dr. David Newman
University of Alaska – Fairbanks

Chair
Dr. Gerald Rogoff, Chairman
Coalition for Plasma Science

This session is co-sponsored by the Coalition for Plasma Science.

International Ballroom • 3:00 p.m. • Tuesday, June 6, 2000

Oral Session 4A • Plasma Thrusters

Chair: **Mark Capelli, Stanford University**

4A01-02 Plasma Instabilities in Plasma Thrusters
E. Choueiri, Princeton University, Applied Physics Group/MAE Dept., Princeton, NJ 08544 USA

4A03 Plasma Density Measurements Inside a Laboratory Model Hall Thruster Using a Resonance Probe Diagnostic
J.M. Haas, B.E. Beal, A.D. Gallimore, University of Michigan, 1919 Green Rd., Rm B107, Ann Arbor, MI 48105 USA

4A04 Using Emissive and Non-Emissive Segmented Electrodes to Control Beam Divergence in Hall Thrusters
L. Dorf, Y. Raitses, N.J. Fisch, Princeton Plasma Physics Laboratory, PO Box 451, Princeton, NJ 08543 USA

4A05 Fluctuation-Induced Electron Transport in Closed-Drift Hall Discharges
M.A. Cappelli, N.B. Meezan, E. Chesta, Stanford University, Building 520, Rm 520I, Stanford, CA 94305-3032 USA

4A06 Experimental Investigation of Hall Thruster Magnetic Field Topography
P.Y. Peterson, J.M. Haas, A.D. Gallimore, University of Michigan, 1919 Green Rd., Rm. B107, Ann Arbor, MI 48105 USA

4A07 Two Dimensional Simulations of Hall Thrusters
E. Fernandez, M. Cappelli, Eckerd College, 4200 54th Ave. South, St. Petersburg, FL 33711 USA

4A08 Spectroscopic Characterization of FMT-2 Discharge Ionization Processes
T.B. Smith, G.J. Williams, Jr., A.D. Gallimore, University of Michigan, RM B107, 1919 Green Rd., Ann Arbor, MI 48105-2554 USA

4A09-10 Two-Stream Efficiency Model of the Pulsed Plasma Thruster
R.L. Burton, University of Illinois-Urbana Champaign, Dept. of Aeronautical and Astronautical Engineering, Urbana, IL USA

4A11 Small and Microthruster Propulsion Research at the Air Force Research Laboratory
Edwards AFB, M. Dulligan, F. Gulczinski, G. Spanjers, AFRL/PRRS/ERC, 43424 16th St. West, Apt.24, Lancaster, CA 93534 USA

Gold • 3:00 p.m. • Tuesday, June 6, 2000

Oral Session 4B • Plasma Diagnostics

Chairs: **Timothy Grotjohn, Michigan State University**
Thomas Katsouleas, University of Southern California

4B01 **Plasma-Surface Diagnostics in LAPPS**
S.G. Walton, D. Leonhardt, D.P. Murphy, R.F. Fernsler, R.A. Meger, Naval Research Laboratory, 4555 Overlook Ave., Washington, DC 20375-5320 USA

4B02 **Probes in Non-Uniform Plasma**
L. Oksuz, N. Hershkowitz, T. Lho, Engineering Physics Department, University of Wisconsin, 104-D Eagle Heights, Madison, WI 53705 USA

4B03 **Spatial and Time Resolved Investigations of NO- and OH-distributions in Dielectric Barrier Discharge Plasmas Using Planar Laser Induced Fluorescence**
R. Kleinhans, L. Tiase, V. Beushausen , Laser-Laboratorium Goettingen e.V., Hans-Adolf-Krebs-Weg 1, Goettingen D-37077 Germany

4B04 **An Improved Model of the SEERS Diagnostic Method**
R.P. Brinkman, Infineon Technologies AG, Germany

4B05-06 **Use of Localized Self-Induced Plasmas to Focus High Energy Electron Beams**
P. Chen, W. Craddock, F. Decker, R. Iverson, F. King, R. Kirby, T. Kotseroglou, J. Ng, D. Walz, Y. Yan, D. Cline, Y. Fukui, V. Kumar, P. Colestock, C. Crawford, R. Noble, T. Katsouleas, D. Meyerhofer, S. Masuda, A. Ogata, S. Chattopadhyay, A. Sessler, A. Weidemann, H. Baldis, P. Bolton, F. Esparza, J. Foy, Lawrence Livermore National Laboratory, P.O. Box 808, L-43, Livermore, CA 94550 USA

4B07 **Simulations of Cerenkov Wake Radiation Sources**
N. Spence, T. Katsouleas, P. Muggli, W.B. Mori, University of Southern California, 1745 N.Wilcox Ave., #450, Hollywood, CA 90028 USA

4B08 **Pulsed ICP Plasma Generation and Characterization**
W. Guo, C.A. DeJoseph, Jr., Innovative Scientific Solutions, Inc., 2766 Indian Ripple Rd., Dayton, OH 45440-3638 USA

4B09 **X-Ray Spectromicroscopy Investigations of Fast Ions and Hot Electrons in Plasmas, Heated by Nanosecond Laser Radiation with Different Wavelengths**
A.Ya. Faenov, I.Yu. Skobelev, A.I. Magunov, T.A. Pikuz, F.B. Rosmej, D.H.H. Hoffmann, W. Sub, M. Geibel, R. Bock, T. Letardi, F. Flora, S. Bollanti, P. Di Lazzaro, Yu. A. Satov, Yu.B. Smakovskii, A.E. Stepanov, V.K. Roerich, S.V. Khomenko, S. Nischuk, K.N. Makarov, A. Reale, A. Scafati, T. Auguste, P. d'Oliveira, S. Hulin, P. Monot, B.Yu. Sharkov, Multicharged Ions Spectra Data Denter of VNIIFTRI, MISDC of VNIIFTRI, Mendeleevo, Moscow 141570 Russia

Bayou I and III • 3:00 pm • Tuesday, June 6, 2000

Oral Session 4C • Spherical Configurations

Chair: **J. Reece Roth, University of Tennessee**

4C01-02 The Plasma Sphere and Its Possible Role in Ball Lightning
S. Singer, Athenex Research Associates, 381 S. Meridith Ave., Pasadena, CA 91106-3576 USA

4C03 Performance of the Vacuum Spark (VSX) and the Spherical Pinch (SPX) X- Ray/ EUV Point Sources
I. Ahtik, X. Guo, L. Klibanov, O. Semyonov, W. Tang, K.W. Wirpszo, F. Wu, M. Xu, E. Panarella, Advanced Laser and Fusion Technology Inc., 189 Deveault St., Unit 6, Hull, Quebec J8Z 1S7 Canada

4C04 A Generalization of Critical Velocity Concept to Neutral or Charged Particles and Beams in Neutral and/or Partially Ionized Collisional Gases
H. Kikuchi, Institute for Environmental Electromagnetics, 3-8-18, Komagome, Toshima-ku, Tokyo 170 Japan

4C05 Transport and Collapse of Micro Ball Lighting
T. Matsumoto, Hokkaido University, North 13, West 8, Kita-ku, Sapporo, Hokkaido 060-0813 Japan

4C06 On the Spheric Radiation
G.H. Arnhoff, Premlednergasse, 3/7, A-1120, Wien, Austria

Bayou II and IV • 3:00 pm. • Tuesday, June 6, 2000

Oral Session 4D • Fast Wave Devices

Chair: **Steven Gold, Naval Research Laboratory**

4D01-02 A 250 GHz Gryotron for NMR Spectroscopy
K. Kreischer, C. Farrar, R. Griffin, R. Temkin, J. Vieregg, MIT Plasma Science and Fusion Center, MIT NW16-174, Cambridge, MA 02139 USA

4D03 A 360 GHz, Second Harmonic Gyroklystron for Epr
M. Read, G. Nusinovich, M. Walter, M. Kremer, Physical Sciences Inc., 5705A General Washington Dr., Alexandria, VA 22312 USA

4D04 Continued Testing and Applications of a High Power Cusp Gun
D. Gallagher, P. Frawley, M. Barsanti, F. Scafuri, C. Armstrong, Northrop Grumman, 600 Hicks Rd, MS H6402, Rolling Meadows, IL 60008 USA

4D05 Calculation of the Effect of Electron Correlations on Shot Noise in Gyroklystrons
A.W. Fliflet, T. M. Antonsen, Jr., J.P. Calame, B.G. Danly, Naval Research Lab, Code 6793, 4555 Overlook Ave. SW, Washington, DC 20375-5346 USA

4D06-07 Nonlinear Contraction of Field Profile in the Gyro-BWO and Its Effect on Frequency Tuning
T.H. Chang, S.H. Chen, K.R. Chu, National Tsing Hua University, Department of Physics, Hsinchu 300 Taiwan

4D08 Advanced High Power Gyrotrons for ECRH Applications
M. Kuntze, A. Arnold, E. Borie, G. Dammertz, S. Illy, K. Koppenburg, B. Piosczyk, M. Thumm, Forschungszentrum Karlsruhe, IHM Postfach, 3640 D-76021, Karlsruhe, Germany

4D09 New Design for a Gyroklystron Output Cavity with Radial Power Extraction
E.S. Gouveia, I. Spassovsky, W. Lawson, B. Hogan, Y. Kim, M. Castle, N. Benammar, V.L. Granatstein, University of Maryland Institute for Plasma Research, College Park, MD 20742-3511 USA

4D10 Modeling of Multifrequency Process in Lossy Structures by Using Magy
A.N. Vlasov, T.M. Antosen, Jr., K.T. Nguyen, University of Maryland, IPR UMD,IPR, College Park, MD 20742 USA

4D11 Progress in Experimental Studies of Harmonic Multiplying Gyro-Amplifiers
H. Guo, V.L. Granatstein, J. Rodgers, J.J. Zhao, W.J. Chen, Y. Miao, University of Maryland at College Park, Institute For Plasma Research, College Park, MD 20742 USA

Poster Session 4P
- **Microwave Plasmas**
- **Non-Equilibrium Plasma Processing**
- **Z-Pinches and X-Ray Lasers**
- **Magnetic Fusion Energy**

4P01 – 05 Microwave Plasmas

4P01 **Interpulse Plasmas of High Power Short Pulse Microwaves**
S. Bhattacharjee, The Institute of Physical and Chemical Research (RIKEN), Hirosawa 2-1 Wakoshi, Saitama 351-0198 Japan

4P02 **Rf Breakdown by Toroidal Bounded Whistlers**
S.K.P. Tripathi, D. Bora, Institute for Plasma Research, Bhat, Gandhinagar, Gujarat 382428 India

4P03 **Collisionaless Transport Coefficients in Heated Plasmas by High-Frequency Electromagnetic Waves**
A. Tahraoui, A. Bendib, Institute of Physique, BP 32 El Alia, Algiers, Algeria

4P04 **Attenuation of Microwaves by Plasma Torches**
D. Bivolaru, S.P. Kuo, Polytechnic University, 901 Route 110, Farmingdale, NY 11735 USA

4P05 **Gas Discharges Induced by a High-Power and Short-Pulse Microwave**
M. Onoi, K. Azuma, E. Fujiwara, M. Yatsuzuka, Himeji Institute of Technology, 2167 Shosha Himeji, Hyogo 671-2201 Japan

4P06 – 4P19 Non-Equilibrium Plasma Processing

4P06 **Modeling of a Two Stage RF Plasma Reactor for SiC Deposition**
G.M. Petrov, J.L. Giuliani, Naval Research Laboratory, Plasma Physics Division, 6720, Washington, DC 20375-5346 USA

4P07 **Plasma Surface Modification of LDPE to Improve Insulation Property**
M. Chen, Q.S. Yu, H.K. Yasuda, SET Division of InnerDyne Inc., 5060 W. Amelia Earhart Dr., Salt Lake City, UT 84116 USA

4P08 **Portable Decontamination Systems Using Nonequilibrium Plasmas**
T.M. Moeller, J. Cordell, P.M. Irving, InnovaTek, Inc., 350 Hills Street, Suite 104, Richland, WA 99352 USA

4P09 **Temporal Behaviors of Charged Particles in Cylindrical Corona Reactors**
K.-S. Chung, Y.H. Jung, Y.S. Choi, S.W. Jung, S.T. Chun, G.H. Kim, K.C. Ko, Y.W. Han, K.R. Chang, Hanyang University, Hang Dang Dong 17 Sung Dong Gu, Seoul 133-791 Korea

4P19 **The Effects of Treatment Temperature on the Structure and Corrosion-Resistance of AISI304 Stainless Steel Treated by Low Voltage Plasma Immersion Ion Implantation**
X. Tian, P.K. Chu, D.T.-K. Kwok, L. Wang, B. Tang, City University of Hong Kong, Department of Physics and Materials Science, 83 Tat Chee Avenue, Kowloon, Hong Kong, China

4P20 – 4P30 Z-Pinches and X-Ray Lasers

4P20 **Polar Flux Symmetry in A-pinch-driven Hohlraums Using a Self-backlit Foam Ball Diagnostic**
D.L. Hanson, M.E. Cuneo, R.A. Vesey, J.L. Porter, Jr., R.B. Spielman, G.A. Chandler, T.J. Gilliland, P. Reynolds, L.E. Ruggles, W.W. Simpson, H. Seaman, P. Primm, J. Torres, J. McGurn, D.E. Hebron, S.C. Dropinski, R.E. Hawn, D.G. Schroen-Carey, J.H. Hammer, O. Landen, J. Koch, Sandia National Laboratories, Department 1673, Mailstop 1193, Albuquerque, NM 87185-1193 USA

4P21 **Examination of Emission Mitigation Protocols for Power Flow Surfaces on 20-MA Z Utilizing Electrochemical Processing, Hydrogen Firing, and Vacuum Firing**
J.L. McKenney, J.E. Garrity, J.W. Gluth, D.K. Lobley, A.R. Romero, R.B. Spielman, J.F. Seamen, W.A. Stygar, D.J. Johnson, T. Renk, Ktech Corporation, 2201 Buena Vista SE, Suite 400, Albuquerque, NM 87106 USA

4P22 **Gas-Puff-On-Wire-Array Structured Load Experiment on the GIT-12 Facility**
A.V. Shishlov, R.B. Baksht, A.V. Fedunin, B.M. Kovalchuk, V.A. Kokshenev, A. Yu. Labetsky, V.I. Oreshkin, A.G. Russkikh, High Current Electronics Institute, 4 Academichesky Ave., Tomsk 634055 Russia

4P23 **On Structure of Imploding Double Shell Liner**
S.A. Chaikovsky, S.A. Sorokin, High Current Electronics Institute, 4 Academichesky Ave, Tomsk 634055 Russia

4P24 **PRS Experiments With Shell-On-Shell Gas Puff Loads**
Y. Song, P.L. Coleman, B.H. Failor, A. Fisher, R. Ingermanson, J.S. Levine, H.M. Sze, E. Waisman, C. Coverdale, C. Deeney, R.F. Schneider, Maxwell Physics International, 2700 Merced Street, San Leandro, CA 94577-0599 USA

4P25 **2-D Snowplow Modeling of Gas Puff Z-Pinches**
R. Ingermanson, E. Waisman, P. Coleman, Y. Song, Maxwell Technologies, 8888 Balboa Avenue, San Diego, CA 92123 USA

4P26 **Z Pinch Implosions in the Kinetic Ion Regime**
A.G. Sgro, Los Alamos National Laboratory, MS B259, Los Alamos, NM 87545 USA

ICOPS 2000

The 27th IEEE International Conference on Plasma Science

International Ballroom • 8:30 a.m. • Wednesday, June 7, 2000

Plenary Talk:
Modeling of Collisional, Low Temperature Plasmas: Fundamentals and Applications

Prof. Mark Kushner
University of Illinois
PSAC Award Winner

Chair
Dr. Virginia Ayres
Plasma Science and Applications Committee

Oral Session 5A • Thermal Plasma Chemistry and Processing (Session 2)

Chair: **Maher Boulos, University of Sherbrooke**

5A01 **How Thermal Are (Certain) Thermal Plasmas?**
U.R. Kortshagen, Department of Mechanical Engineering, University of Minnesota, 111 Church St. SE, Minneapolis, MN 55455 USA

5A02 **Mathematical Modeling of the Induction Plasma Torch and its Associated MHD Fields Using the Fluent Code**
A. Merkhouf, P. Proulx, M. Boulos, Plasma Tech. Research Center, University of Sherbrooke, Sherbrooke, Quebec J1K2R1 Canada

5A03-04 **Modeling of a Transferred Arc in Presence of an External Magnetic Field**
A. Blais, A. Merkhouf, P. Proulx, M. Boulos, Plasma Technology Research Center, (CRTP), Sherbrooke, Quebec J1K2R1 Canada

5A05 **Physics of an Arc in Cross-Flow**
M. Kelkar, J. Heberlein, Department of Mechanical Engineering, University of Minnesota, 111 Church St. SE, Minneapolis, MN 55455 USA

5A06 **Thermal Plasma Treatment of Electroplating Sludge**
K. Ramachandran, N. Kikukawa, National Institute for Resources and Environment, 16-3 Onogawa, Tsukuba 305-8569 Japan

5A07-08 **Future of Plasma Treatment of Wastes**
M.J. Plodinec, Mississippi State University/DIAL, 205 Research Blvd., Starkville, MS 39759 USA

5A09 **Consequences of Soot Particles on the Plasma Remediation of NOx in the Presence of Hydrocarbons**
R. Dorai, K. Hassouni, M.J. Kushner, University of Illinois, 1406 W. Green St., Urbana, IL 61801 USA

Gold • 10:00 a.m. • Wednesday, June 7, 2000

Oral Session 5B • Basic Phenomena

Chair: **Mark Kushner, University of Illinois**

5B01 **Nonlinear Skin Effect in Inductive Discharge**
V.A. Godyak, R.B. Piejak, B.M. Alexandrovich, A.I. Smolyakov, OSRAM SYLVANIA Development Inc., 71 Cherry Hill Drive, Beverly, MA 01915 USA

5B02 **Instabilities in Low Pressure Inductive Discharges with Attaching Gases**
M.A. Lieberman, A.J. Lichtenberg, A.M. Marakhtanov, P. Chabert, M. Tuszewski, UC Berkeley, Dept EECS-1770, University of California, Berkeley, CA 94720-1770 USA

5B03 **Evidence of Electron Trapping in a Helicon Discharge**
A. Degeling, J. Scharer, R. Boswell, University of Wisconsin, 1500 Engineering Dr., 513 ERB Madison, WI 53706-1687 USA

5B04-05 **Explosive Generation of Cold Electrons in Low-Pressure Discharges**
S. Berezhonoi, I. Kaganovich, L. Tsendin, 2120 Fountainview #4, Houston, TX 77057 USA

5B06 **Bohm Presheaths**
N. Hershkowitz, L. Oksuz, A.M. Hala, M.A. Khedr, University of Wisconsin-Madison, 1500 Engineering Drive, Rm 337, Madison, WI 53706 USA

5B07 **Absolute Measurements of Rf Fields Using a Retarding Field Energy Analyser**
C. Charles, A. Degeling, T. Sheridan, J. Harris, R. Boswell, M. Lierberman, Aust. Nat. University, Canberra, ACTON, ACT 0200 Australia

5B08 **Langmuir Probe and Ion Acoustic Velocity Measurement of the Concentration of Two Species in a Multi-dipole Plasma**
A.M. Hala, N. Hershkowitz, University of Wisconsin Madison, 6301 Offshore Dr. #319, Madison, WI 53705 USA

5B09 **Spontaneous Generation of a Magnetic Field in a Compressing Inhomogeneous Plasma**
R.E. Peterkin, Jr., P.J. Turchi, Air Force Research Lab AFRL/DEH, Kirtland AFB NM 87117-5776 USA

5B10 **Radiofrequency Sustainment of a Laser-Produced Plasma**
K. L. Kelly, J.E. Scharer, E. Paller, H. Gui, R. Cao, University of Wisconsin, 1500 Engineering Dr., 506 ERB, Madison, WI 53706-1687 USA

Bayou I and III • 10:00 a.m. • Wednesday, June 7, 2000

Oral Session 5C • Intense Electron and Ion Beams

Chair: **Bryan Oliver, Mission Research Corporation**

5C01-02 Pulsed Power Driven Radiographic Approaches
J. Maenchen, Sandia National Laboratories, PO Box 5800, MS-1193, Albuquerque, NM 87185-1193 USA

5C03 Assessment of the Rod-Pinch as a 1-2 MV Radiography Source on the NRL Gamble II Generator
S.J. Stephanakis, R.J. Commisso, G. Cooperstein, D. Mosher, J.M. Neri, F.C. Young, R.L. Carlson, R.D. Fulton, D.M. Oro, M.D. Ulibarri, E.E. Hunt, D.W. Droemer, Naval Research Laboratory, Code 6770, NRL, Washington, DC 20375 USA

5C04 The Role of Ion Production on the Physics of Small Diameter Rod-Pinch Electron Beam Diodes
S.B. Swanekamp, R.J. Commisso, G. Cooperstein, J.W. Schumer, J.E. Maenchen, P.R. Menge, B.V. Oliver, D.V. Rose, D.R. Welch, Naval Research Laboratory, 4555 Overlook Ave., SW, Washington, DC 20375 USA

5C05 Experimental Development of Radiographic Sources on TriMeV
P. R. Menge, J. Gustwiller, D.L. Johnson, J.E. Maenchen, I. Molina, D.C. Rovang, R. Shear, S. Cordova, D. Droemer, E. Hunt, E. Ormand, L.Woo, R.J. Commisso, G. Cooperstein, S.B. Swanekamp, B.V. Oliver, D.V. Rose, D.R. Welch, Sandia National Laboratories, P. O. Box 5800, MS-1193, Albuquerque, NM 87185-1193 USA

5C06 Numerical Simulations of the TriMeV and SABRE Rod-Pinch Electron Beam Diodes
D.V. Rose, D.R. Welch, B.V. Oliver, R.E. Clark, J.E. Maenchen, C.L. Olson, P.R. Menge, D.C. Rovang, R.J. Commisso, G. Cooperstein, J.W. Schumer, S.B. Swanekamp, Mission Research Corp., 5001 Indian School Rd. NE, Albuquerque, NM 87110 USA

5C07 Z-Discharge Electron Beam Transport for Decade Quad
D.D. Hinshelwood, D.C. Black, G. Cooperstein, P.F. Ottinger, D.V. Rose, J.W. Schumer, V. Harper-Slaboszewicz, Naval Research Laboratory, Code 6773, Washington, DC 20375 USA

5C08 Experimental Results from a Dynamic Magnetic Field Controlled Ion Ring
B.L. Freeman, W. Deninger, R. Faehl, S. Glidden, J. Greenly, A. Luginbill, H. Oona, J. Rock, J. Shannon, P. Williams, Texas A&M University,

5C09 **Ion Trajectories in a Coaxial Ion Diode with Magnetic Confinement, and an Axial Anode Surrounded by a Magnetically Insulated Cylindrical Cathode**

J.C. Rock, B.L. Freeman, P.E. Williams, J. Greenly, Texas A&M University, Department of Nuclear Energy, College Station, TX 77843-3133 USA

5C10 **Development and Application of Pulsed Ion Beams Under the Combination of Cryogenic and Pulsed-Power Technique**

K. Kasuya, T. Kamiya, M. Funatsu, T. Renk, B. Turman, J. Quintenz, Tokyo Institute of Technology, Department of Energy Science, Nagatsuta 4259, Midori-ku Yokohama 226-8502 Japan

Bayou II and IV • 10:00 a.m. • Wednesday, June 7, 2000

Oral Session 5D: Intense Beam Microwave Devices

Chair: **John Luginsland, Air Force Research Laboratory**

5D01 **Ferroelectric Plasma Sources and Their Applications**
Y.E. Krasik, A. Dunaevsky, J. Felsteiner, A. Krokhmal, S. Dorfman, Technion, Department of Physics, Haifa 32000 Israel

5D02 **Overview of Intense Beam-Driven Relativistic Backward Wave Oscillators and their Use in High Power Microwave Effects Studies**
E. Shamiloglu, F. Hegeler, C.T. Abdallah, K. Hahn, S. Choi, University of New Mexico, 125 EECE Building, Albuquerque, NM 87131 USA

5D03 **Overmoded GW-Class Surface Wave Microwave Oscillator**
A.N. Vlasov, A.G. Shkvarunets, J. Rodgers, Y. Carmel, T.M. Antonsen, T.M. Abuelfadl, D. Lingze, V.A. Cherepenin, G.S. Nusinovich, M. Botton, V.L. Granastein, University of Maryland, College Park Campus, College Park, MD 20742 USA

5D04-05 **MILO Research at ARFL: Past and Present**
M.D. Haworth, T. Cavazos, K. Golby, K. Hendricks, D. Henley, M. LaCour, R. Lemke, J. Luginsland, D. Ralph, M. Sena, US Air Force Research Laboratory AFRL/DEHE, 3550 Aberdeen SE, Kirtland AFB, NM 87117 USA

5D06 **Multi-Dimensional Effects in Space-Charge-Limited Emission: An Improved Voltage-Current Relation for Parallel Plate Geometry**
J.J. Watrous, J.W. Luginsland, M.H. Frese, Air Force Research Lab, Directed Energy Directorate, 2309 Renard Place, STE 220, Albuquerque, NM 87106 USA

5D07 **Plasma Enhancement Of Radial Acceletron**
M.J. Arman, US Air Force Research Laboratory AFRL/DEHE, 3550 Aberdeen SE, Kirtland AFB, NM 87117-5776 USA

5D08 **New Spatial Cyclotron Accelerator**
A. Bourdier, S. Gond, Commissariat à l'Energie Atomique, Direction Ile de France, Départment de Physique Théorique et Appliquée, BP 12, 91680 Bruyéres-le-Châtel, France

Poster Session 5P
- **Plasma Thrusters**
- **Spherical Configurations**
- **Plasmas for Lighting**
- **Thermal Plasma Chemistry and Processing**

5P01 – 5P05 Plasma Thrusters

5P01 **Modeling and Simulation Of Electric Arc Plasmas In Low Voltage Circuit Breakers**
A. Zolfaghari, Schneider Electric, North American Division, 1010 Airpark Center Drive, Nashville, TN 37217 USA

5P02 **Optimization of Hall Thruster Magnetic Field Topography**
R.R. Hofer, P.Y. Peterson, A.D. Gallimore, University of Michigan, 1919 Green Rd., Rm B107, Ann Arbor, MI 48105. USA

5P03 **Radiation Power Emitted From Ar Torch Short Plasma as Function of In-put Power in Several Kw**
T. Iwao, H. Miyazaki, T. Hayashi, T. Hirano, T. Inaba, Chuo University, Imaba Lab, Kasuga, Bunkyo 112-8551 Japan

5P04 **MACH2 Simulations of Cablegun and PPT-4 Geometries**
D. Thomas, L. Montgomery Smith, D. Keefer, N. Wright, R. Rhodes, University of Tennessee Space Institute, B.H. Goethert Parkway, Tullahoma, TN 37388 USA

5P05 **A Model of Teflon Ablation in a Pulsed Plasma Thruster**
M. Keidar, I.D. Boyd, I.I. Beilis, Department of Aerospace Engineering, University of Michigan, Ann Arbor, MI 48109 USA

5P06 – 5P09 Spherical Configurations

4P06 **Little Black Hole Model of Ball Lightning**
M. Rabinowitz, Armor Research, 715 Lakemead Way, Redwood City, CA 94062 USA

5P07 **Geophysical Meteors**
A. Ol'khovatov, Moscow, Russia

5P08 **Origin of Space Charge Configurations in Plasmas**
M. Sanduloviciu, C. Borcia, S. Popescu, E. Lozneanu, Department of Plasma Physics, 'Al.I. Cuza' University, 6600 Iasi, Romania

5P09 **Possible Formation of a Toroidal Current Layer in a Plasma Vortex**
A.N. Vlasov, Fulcra LTD, P.O. Box 98, Ryazan 390023 Russia

5P10 – 5P19 Plasmas for Lighting

5P10 **Spectroscopic Study of a Moly-Oxide Electrodeless Discharge for Lighting Applications**
J.L. Giuliani, R.E. Pechacek, R.A. Meger, V. Shamamian, Naval Research Laboratory, Plasma Physics Division, 6720, Washington, DC 20375-5346 USA

5P11 **XeCl Excimer Fluorescence in a Microwave Discharge**
S. Anderson, M. Keyser, C. Collard, M.L. Brake, Nuclear Engineering, University of Michigan, 2355 Bonisteel Blvd., Ann Arbor, MI 48103-2104 USA

5P12 **Characteristic Improvement of Inductively Coupled Electrode-Less Metal Halide Lamps**
K. Uemura, T. Ishigami, A. Itoh, I. Yokozeki, K. Shimizu, Toshiba Lighting and Technology Corp., Funakoshi-cho1-201-1, Yokosuka, Kanagawa 237-8510 Japan

5P13 **Excimer Emission from Microhollow Cathode Discharges in Rare Gas Halides**
A. El-Habachi, W. Shi, M. Moselhy, R.H. Stark, K.H. Schoenbach, Old Dominion University PERI, 1014 W. 46th Street, Norfolk, VA 23529 USA

5P14 **Modeling Rare-Gas Medium Pressure Discharge Lamps**
G. Zissis, J. Damelincourt, Y. Li, G. Lister, OSRAM SYLVANIA, 71 Cherry Hill Dr., Beverly, MA 01915 USA

5P15 **A Coupled Radiation Transport Particle-in-cell Model for Fluorescent Lamp Discharges**
H.J. Lee, J.P. Verboncoeur, H.B. Smith, G.J. Parker, C.K. Birdsall, EECS, UC-Berkeley, 187M Cory Hall, MC 1770, EECS Department, Berkeley, CA 94720-1770 USA

5P16 **Investigations on Emitter Depletion of Cathodes During Ignition of 50 Hz Low-Pressure Hg Discharge Lamps**
W.J. van den Hoek, M. Haverlag, T.L.G. Thijssen, Philips Lighting, PO Box 80020, Eindhoven 5600 JM Netherlands

5P17 **Barium Transport in Fluorescent Lamps**
R.C. Garner, P. Moskowitz, OSRAM SYLVANIA, 71 Cherry Hill Drive, Beverly, MA 01915 USA

5P18 **Dynamics of the Low Pressure Negative Glow**
R. Hutcherson, OSRAM SYLVANIA Inc., 71 Cherry Hill Dr., Beverly, MA 01915 USA

5P19 **Analysis of the Diffuse-to-Hot Spot Attachment Mode Transition for High Pressure Arcs on Thermionic Cathodes**
S. Coulombe, GE Corporate Research & Development, One Research Circle, Niskayuna, NY 12309 USA

5P20 – 5P26 Thermal Plasma Chemistry and Processing

5P20 **Increasing the Surface Energy of Nonwoven Fabrics by Exposure to a One Atmosphere Uniform Glow Discharge Plasma (OAUGDP)**
P.P.Y. Tsai, D.M. Sherman, F. Karakaya, Z. Chen, J.R. Roth, University of Tennessee, 409 Ferris Hall, Knoxville, TN 37966-2100 USA

5P21 **Pspice Simulation of a One Atmosphere Uniform Glow Discharge Plasma (OAUGDP)**
Z. Chen, J.E. Morrison, J.R. Roth, University of Tennessee, 409 Ferris Hall, Knoxville, TN 37966-2100 USA

5P22 **Viral Inactivation By A One Atmosphere Uniform Glow Discharge Plasma**
K. Kelly-Wintenberg, T. Montie, J.R. Roth, Z. Chen, J. Morrison, University of Tennessee, 409 Ferris Hall, Knoxville, TN 37966-2100 USA

5P23 **Sterilization by Active Species from an Improved Remote Exposure Reactor (RER) Using a One Atmosphere Uniform Glow Discharge Plasma (OAUGDP)**
J. R. Roth, D.M. Sherman, F. Karakaya, Z. Chen, T.C. Montie, K. Kelly-Wintenberg, P.P.-Y. Tsai, D.J. Helfritch, P. Feldman, University of Tennessee, 409 Ferris Hall, Knoxville, TN 37966-2100 USA

5P24 **Killing a Pathogenic Food-Borne Bacteria Exposed to a One Atmosphere Uniform Glow Discharge Plasma (OAUGDP)**
M.M. Kayes, D.A. Golden, G. Hulbert, J.R. Roth, J. Morrison, T.C. Montie, K. Kelly-Wintenberg, University of Tennessee, 409 Ferris Hall, Knoxville, TN 37966-2100 USA

5P25 **Advances in Air Filter Sterilization Using a One Atmosphere Uniform Glow Discharge Plasma (The OAUGDP Volfilter)**
D.M. Sherman, Z. Chen, F. Karakaya, J.R. Roth, K. Kelly-Wintenberg, T.C. Montie, P.P.-Y. Tsai, D.J. Helfritch, P.L. Feldman, University of Tennessee, 409 Ferris Hall, Knoxville, TN 37966-2100 USA

5P26 **Plasma Processing and Surface Treatments in Lapps**
D. Leonhardt, S.G. Walton, D.B. Blackwell, D.P. Murphy, R.F. Fernsler, R.A. Meger, Code 6707, NRL, 4555 Overlook Ave., Washington, DC 20375-5346 USA

ICOPS 2000

The 27th IEEE International Conference on Plasma Science

International Ballroom • 1:30 p.m. • Wednesday, June 7, 2000

Plenary Talk:
The Fusion Portfolio

Dr. Robert Goldston
Director, Princeton Plasma Physics Laboratory

Chair
Dr. Richard Siemon
Los Alamos National Laboratory

Oral Session 6A: Plasmas for Lighting

Chair: **Rich Garner, OSRAM SYLVANIA**

6A01-02 Excimer Emission from Microhollow Cathode Discharges
A. El-Habachi, M. Moselhy, R.H. Stark, K.H. Schoenbach,
Old Dominion University PERI, 1014 W. 46th Street, Norfolk, VA 23529 USA

6A03 Hg 185nm and 254nm Resonance Radiation Production from a Low Pressure Hg-Ar Discharge at High Current Densities
J.J. Curry, J.E. Lawler, G.G. Lister, University of Wisconsin-Madison,
1150 University Avenue, Madison, WI 53706 USA

6A04 Numerical Predictions of the Power Balance in the Positive Column of a Low-Pressure Ba Discharge
J.J. Curry, G.G. Lister, J.E. Lawler, University of Wisconsin-Madison,
1150 University Avenue, Madison, WI 53706 USA

6A05 Thermal and Transport Modeling of High Pressure Discharge Lamps
T. Kruecken, H. Giese, Philips Research Laboratories, Weisshausstr. 2,
Aachen 52066 Germany

6A06 Energy Balance of Metal Halide Lamps in Quartz and Ceramic Envelopes
Z. Krasko, M. Maher, OSRAM SYLVANIA, 71 Cherry Hill Drive,
Beverly, MA 01915 USA

6A07 New Mathematical Models of Metal Halide Lamps for Ballast Circuit Design
J. Luo, K.J. Tseng, School of EEE, Nanyang Technological University, Blk S2,
Nanyang Avenue, Singapore 639798 Republic of Singapore

Gold • 3:00 p.m. • Wednesday, June 7, 2000

Oral Session 6B: Magnetic Fusion Energy

Chair: **Richard Siemon, Los Alamos National Laboratory**

6B01-02 Operation Of The National Spherical Torus Experiment
D. Mueller, Princeton Plasma Physics Laboratory, MS 34, PO Box 451, Princeton, NJ 08543-0451 USA

6B03-04 Progress in Development of Theta Pinches for Formation of Field Reversed Configurations Suitable for Subsequent Compression to Magnetized Target Fusion Conditions
J.H. Degnan, D.C. Barnes, T. Cavazos, S.K. Coffey, R.J. Faehl, M. Frese, D. Gale, T.W. Hussey, T.P. Intrator, R. Kirkpatrick, G.F. Kiuttu, F.M. Lehr, J.D. Letterio, I. Lindemuth, R. Moses, R.E. Peterkin, N.F. Roderick, E.L. Ruden, K. Schoenberg, R.E. Siemon, W. Sommars, P.J. Turchi, G.A. Wurden, R. White, F. Wysocki, AFRL/DEHP, 3550 Aberdeen SE, Kirtland AFB, NM 87117-5776 USA

6B05 Excitation Of Electron Bernstein Waves In Spherical Tori
J. Preinhaelter, M. Irzak, L. Vahala, G. Vahala, Old Dominion University, Electrical and Computer Engineering, Norfolk, VA 23529 USA

Bayou I and III • 3:00 p.m. • Wednesday, June 7, 2000

Oral Session 6C: Z-Pinches

Chair: **Henry Sze, Maxell Physics International**

6C01-02 Energy Balance and Ionization Dynamics in an Imploding Z-Pinch Plasma
L. Gregorian, E. Kroupp, G. Davara, V. Bernshtam, Yu. V. Ralchenko, Y. Maron, Weizmannn Institute of Science, Department of Particle Physics, Rehovot 76100 Israel

6C03-04 Radiation in Dynamic Z-Pinches: History, Current Status and Implications for the Future
J. Davis, J. Giuliani, Jr., R. Clark, J. Apruzese, J. Thornhill, K. Whitney, A. Dasgupta, A. Velikovich, R. Terry, P. Kepple, Radiation Hydrodynamics Branch, Naval Research Laboratory , 4555 Overlook Avenue, Washington, DC 20375 USA

6C05 Analysis of Nested Gas-Puff Z-Pinch Implosion Dynamics and Radiation Performance Using Measured Initial-Density Distributions
D. Mosher, B.V. Weber, B. Moosman, P. Coleman, E. Waisman, H. Sze, Y. Song, D. Parks, P. Steen, J. Levine, B. Failor, A. Fisher, Naval Research Laboratory, Code 6770, Washington, DC 20375 USA

6C06 Use of Tracers in Double Shell Z-Pinches to Study Implosion Dynamics
P.L. Coleman, B.H. Failor, J.S. Levine, Y. Song, H. Sze, A. Fisher, J.P. Apruzese, J. Davis, A.L. Velikovich, B.V. Weber, Maxwell Technologies, 8888 Balboa Avenue, San Diego, CA 92123 USA

6C07 2-D MHD Calculations for Argon Double Shell Experiments on Double Eagle and Saturn
E.M. Waisman, P. Coleman, R. Ingermanson, D. Parks, P. Steen, Maxwell Technologies, 8888 Balboa Avenue, San Diego, CA 92123 USA

6C08 Laser Shearing Interferometer for Space-and Time-Resolved Imploding Z-Pinch Plasmas
N. Qi, J. Schein, R.R. Prasad, M. Krishnan, B.V. Weber, B.G. Moosman, D. Mosher, R.J. Commisso, Alameda Applied Sciences Corporation, 2235 Polvorosa Ave. Suite 230, San Leandro, CA 94577 USA

6C09 Gas Puff Implosion Measurements and Modeling
B. Moosman, J.R. Boller, R.J. Commisso, D. Mosher, S.J. Stephankis, B.V. Weber, F.C. Young, N. Qi, J. Schein, S. Gensler, R.R. Prasad, M. Krishnan, Naval Research Laboratory, 4555 Overlook Ave. SW, Washington, DC 20375 USA

6C10 Uniform-Fill Nozzles for Long-Implosion-Time PRS Experiments
J.S. Levine, P.L. Coleman, B.H. Failor, A. Fisher, S.K. Lam, J.C. Riordan, Y. Song, H.M. Sze, J.P. Apruzese, J. Davis, F.L. Cochran, B. Moosman, J.W. Thornhill, A.L. Velikovich, B.V. Weber, K.G. Whitney, C.A. Coverdale, C. Deeney, J.S. McGurn, R. Schneider, Maxwell Physics International, 2700 Merced Street, San Leandro, CA 94577 USA

Bayou II and IV • 3:00 p.m. • Wednesday, June 7, 2000

Oral Session 6D: Closing Switches

Chair: **James Dickens, Texas Tech University**

6D01-02 Gas and Vacuum Switches - A Review
J. Lehr, M. Kristiansen, Texas Tech University, Department Electrical Engineering, Lubbock, TX 79409-3102 USA

6D03 Solid State Pulsed Power Systems for Plasma Applications
M.P.J. Gaudreau, J.A. Casey, J.M. Mulvaney, M.A. Kempkes, T.J. Hawkey, Diversified Technologies, Inc., 35 Wiggins Avenue, Bedford, MA 01730 USA

6D04 Charge Transport and Persistent Conduction in High Gain Photoconductive Semiconductor Switches Used in Pulsed Power Applications
N.E. Islam, E. Schamiloglu, University of New Mexico, 125 EECE Building, Albuquerque, NM 87131 USA

6D05 Effects of Discharge Channels on Field Distribution in Polymer Film Capacitors
Y.P. Lee, M.G. Kong, M.R. Dunn, Loughborough University, Department of Electronic and Electrical Engineering, Loughborough, Leicestershire LE 11 3TU UK

6D06 Design and Implementation of a Portable Lightning Current Simulator
C. Warren, E. Burnett, M. Mazzola, J.P. Donohoe, G.M. Molen, Mississippi State University - High Voltage Laboratory, P.O. Box 9571, Mississippi State, MS 39762 USA

6D07 Studies to Improve Performance of Maxwell Atlas Rail-Gap Switches,
T.L. Guy, B.L. Freeman, Texas A&M University, Nuclear Engineering, College Station, TX 77843-3133 USA

Poster Session 6P:
- Intense Beam Microwave Devices
- Opening and Closing Switches
- Plasma, Ion, and Electron Sources
- Intense Electron and Ion Beams
- Postdeadline

6P01 – 6P14 Intense Beam Microwave Devices

6P01 **Microwave Generation in a Reflex Triode Powered by an Explosive Wire Generator**
Y.E. Krasik, A. Dunaevsky, J. Felsteiner, Technion, Department of Physics, Haifa 32000 Israel

6P02 **Near Field Diagnostics for HPM Sources**
K.J. Hendricks, P.D. Coleman, M.D. Haworth, M.C. Clark, R. Gallegoes, US Air Force Research Laboratory AFRL/DEHE, 3550 Aberdeen SE, Kirtland AFB, NM 87117-5776 USA

6P03 **Testing and Benchmarking of a Novel Resistive Wall Boundary Condition in the Presence of an Intense Relativistic Electron Beam**
L.A. Bowers, J.W. Luginsland, J.J. Watrous, K.J. Hendricks, G.E. Sasser, US Air Force Research Laboratory AFRL/DEHE, 3550 Aberdeen SE, Kirtland AFB, NM 87117 USA

6P04 **Electrodynamic Beam Loading and Pulse Shortening Effects Due to a Intense Relativistic Electron Beam/Plasma**
J.W. Luginsland, Y.Y. Lau, K.J. Hendricks, R.W. Lemke, M.D. Haworth, C. Baca, US Air Force Research Laboratory AFRL/DEHE, 3550 Aberdeen SE, Kirtland AFB, NM 87117 USA

6P05 **Magnetron Simulations and Experiments**
M.R. Lopez, R.M. Gilgenbach, S.A. Anderson, Y.Y. Lau, M.L. Brake, C.W. Peters, W.E. Cohen, R.L. Jaynes, J.W. Luginsland, T.A. Spencer, R.W. Lemke, D. Price, J.H. Booske, M.J. McNeely, L. Ludeking, University of Michigan, Nuclear Engineering and Radiological Science Department, 2325 Bonisteel Blvd., Cooley Bldg, Ann Arbor, MI 48109-2104 USA

6P06 **Numerical Analysis of Non-Axisymmetric Mode Radiation from a High Power Backward Wave Oscillator with Beam Having Perpendicular Velocity Component**
K. Minami, Y. Choyal, K.P. Maheshwari, V.L. Granatstein, University of Maryland, Azalea Lane, Bldg. 223, College Park, MD 20742-3511 USA

6P07 **Pulse-Shortening Observations in Large-Orbit, Coaxial Gyrotron High Power Microwave Experiments**
W.E. Cohen, R.L. Jaynes, R.M. Gilgenbach, C.W. Peters, M.R. Lopez, Y.Y. Lau, T.A. Spencer, University of Michigan, 1906 Cooley Bldg, Ann Arbor, MI 48109-2104 USA

6P08 **3-D PIC Simulations of a SLAC Klystrino**
T.A. Spencer, J.W. Luginsland, K. Hackett, L. Song, G. Schietrum, US Air Force Research Laboratory AFRL/DEHE, 3550 Aberdeen SE, Kirtland AFB, NM 87117-5776 USA

6P09 **High-Power Annular Beam Klystrons**
J. Pasour, D. Smithe, L. Ludeking, M. Friedman, Mission Research Corporation, 8560 Cinderbed Road, #700, Newington, VA 22122 USA

6P10 **Simulation of Pulse Shortening in a Relativistic Klystron Oscillator**
K.L. Cartwright, J.P. Verboncoeur, University of California, 231 Cory Hall, Berkeley, CA 94720-1770 USA

6P11 **Optimization of the Signal Growth Rate in a Class of Multicavity RKOs with Axially Varying Geometry Using a Parallel Real-Valued Evolutionary Algorithm**
L. D. Merkle, J.W. Luginsland, HQ USAFA/DFCS, 2354 Fairchild Dr., Ste. 6K41, USAF Academy, CO 80840-6234 USA

6P12 **Effects of Energy Loss and Momentum Transfer on the Limiting Current in a Crossed-Field Gap**
L.K. Ang, T.J.T. Kwan, Los Alamos National Laboratory, P.O. Box 1663, MS B259, Los Alamos, NM 87545 USA

6P13 **Development of a Repetitive Virtual Cathode Oscillator with a Hole Anode**
T. Hayashida, H. Tanaka, M. Onoi, K. Azuma, E. Fujiwara, M. Yatsuzuka, Himeji Institute of Technology,Department of Electrical Engineering, 2167 Shosha, Himeji, Hyogo 671-2201 Japan

6P14 **Two-Frequency Undulator Brightness and Gain with the Aid of Induced Betatron Oscillations**
S. Chouhan, G. Mishra, School of Physics, Devi Ahilya University, Khandwa Road, Indore 452017 India

6P15 – 6P19 Opening and Closing Switches

6P15 **Evaluation of Fast Turn-on Characteristics of Power Devices by IR-Laser Probing Technique**
K. Yasuoka, S. Ibuka, S. Ishii, Department of Electrical and Electronic Engineering, Tokyo Institute of Technology, 2-12-1 O-okayama, Meguro-ku, Tokyo 152-8552 Japan

6P16 **Critique of Fluid Model of the Microsecond Plasma Opening Switch**
D.E. Parks, P. Coleman, R. Ingermanson, P. Steen, J. Thompson, E. Waisman, Maxwell Technologies, 8888 Balboa Avenue, San Diego, CA 92123 USA

6P17 **Fundamental Studies of a Simple Helical Magnetic Flux Compression Generator**
A. Neuber, J. Dickens, M. Giesselmann, B. Freeman, J. Rasty, H. Krompholz, M. Kristiansen, Texas Tech University, Electrical Engineering Department, Box 43102, Lubbock, TX 79409-3102 USA

6P18 **Spectroscopic Study of the Magnetic Field Penetration and Electron Density Evolution in a Pos**
R. Arad Weizmann, K. Tsigutkin, Yu. V. Ralchenko, D. Osin, Y. Maron, A. Fruchtman, Institute of Science, Department of Particle Physics, Rehovot 76100 Israel

6P19 **Pulsed Generator Based on Shock Demagnetization of Ferromagnetic Material**
S.I. Shkuratov, M. Kristiansen, J. Dickens, Texas Tech University, Department of Electrical Engineering, Lubbock, TX 79409-3102 USA

6P20 – 6P25 Plasma, Ion, and Electron Sources

6P20 **Cathode Development for LAPPS**
D.P. Murphy, D. Leonhardt, S.G. Walton, D.B. Blackwell, R.A. Meger, Code 6707, NRL, 4555 Overlook Ave., Washington, DC 20375-5346 USA

6P21 **High Current Low Energy Plasma Electron Gun Based on Magnetic Field Controlled Vacuum Arc**
A.S. Bugaer, V.I. Gushenets, Yu. A. Khuzeev, E.M. Oks, G. Yu. Yushkov, High Current Electronics Institute, 4 Academichesky Ave, Tomsk 634055 Russia

6P22 **Emission Properties of Metal-Ceramic and Velvet Cathodes**
Ya E. Krasik, A. Dunaevsky, J. Felsteiner, A.V. Gunin, I.V. Pegel, S.D. Korovin, Department of Physics, Technion, Haifa 32000 Israel

6P23 **Operation of a Carbon Fiber Cathode**
Ya E. Krasik, A. Dunaevsky, J. Felsteiner, Technion, Department of Physics, Haifa 32000 Israel

6P24 **Pulsed Operation of Spherically Convergent Beam Fusion Device**
K. Yamauchi, K. Ogasawara, M. Watanabe, A. Okino, Y. Sunaga, K. Ko, E. Hotta, Tokyo Institute of Technology, 4259 Nagatsuta, Midori-ku, Yokohama 226-8502 Japan

6P25 **Development Dynamics of the 2-D Vortex Structures in High-Current Plasma Lens**
A. Goncharov, G. Kirichenko, I. Litovko, Institute of Nuclear Research, An Ukraine, 252039, Pr. Nauki, 46, Kien 252650 Ukraine

6P26 – 6P36 Intense Electron and Ion Beams

6P26 **Ion-species Distribution in a High-current Broad Beam**
N. Sakudo, K. Hayashi, S. Okuji, K. Komatsu, A. Miyamoto, M. Yutani, Y. Nishiyama, Kanazawa Institute of Technology, 7-1 Ohgigaoka, Ishikawa 921-8501 Japan

6P27 **Theory and Simulation of Electron Beam Dynamics in the Tri-MeV Magnetically Immersed Diode**
B.V. Oliver, D.R. Welch, C.L. Olson, S.E. Rosenthal, Mission Research Corporation, 5001 Indian School Rd. NE, Albuquerque, NM 87110 USA

6P28 **Numerical Simulation Techniques for the Study of High-Power Diodes for Radiography**
D.R. Welch, D.V. Rose, B.V. Oliver, T.P. Hughes, R.E. Clark, Mission Research Corporation, 5001 Indian School Rd. NE, Albuquerque, NM 87110 USA

6P29 **New Developments in Pulsed Power Technology and Associated Electron Beam Transport Mechanisms at The United Kingdom Atomic Weapons Establishment**
A.R. Birrell, R.D. Edwards, T.J. Goldsack, M.A. Sinclair, Pulsed Power Group, Atomic Weapons Building H36.1 Establishment, Aldermaston Reading, Berkshire RG7 4PR England

6P30 **Stabilization of Electron Beam Spot with Gas Cells in High-Dose X-ray Radiography**
L.K. Ang, T.J.T. Kwan, Los Alamos National Laboratory, P.O. Box 1663, MS B259, Los Alamos, NM 87545 USA

6P31 **Effects of Plasmas on Electron Beam Transport in a Fast Magnetic Kicker**
P.J. Christenson, K.L. Ang, T.J.T. Kwan, Los Alamos National Laboratory, MS B259, Los Alamos, NM 87545 USA

6P32 **Multi-Foil Targets and Pellicle Dynamics for X-ray Radiography**
D.D.-M. Ho, Y.-J. Chen, Lawrence Livermore National Laboratory, L31, P.O. Box 808, Livermore, CA 94550 USA

6P33 **F-Type Centers and Transformation in BaF_2:Sr Crystals Irradiated by Electron Beam**
G. Wang, J. Zhang, J. Yang, Yunnan University, Department of Physics, 52 North Cuihu Road, Kumming 650091 China

6P34 **Intense Electron Beam Generation by a Fast Filamentary Discharge**
M. Udrea, H. Goktas, H. Kirici, Auburn University, Electrical Engineering, 200 Broun Hall, Auburn, AL 36849 USA

6P35 ***Production and Application of Low-Energy*, High-Current Electron Beams**
D.I. Proskurovsky, G.E. Ozur, V.P. Rotshtein, Institute of High-Current Electronics, Tomsk 634055 Russia

6P36 **Experimental Diagnostic of an Industrial SF_6 PTFE Confined Circuit Breaker**
F. Gentils, C. Fleurier, C. Fievet, E. Le Menn, Gremi Université d'Orléans, BP 6744, Orléans Cedex 2 45067 France