GREETINGS

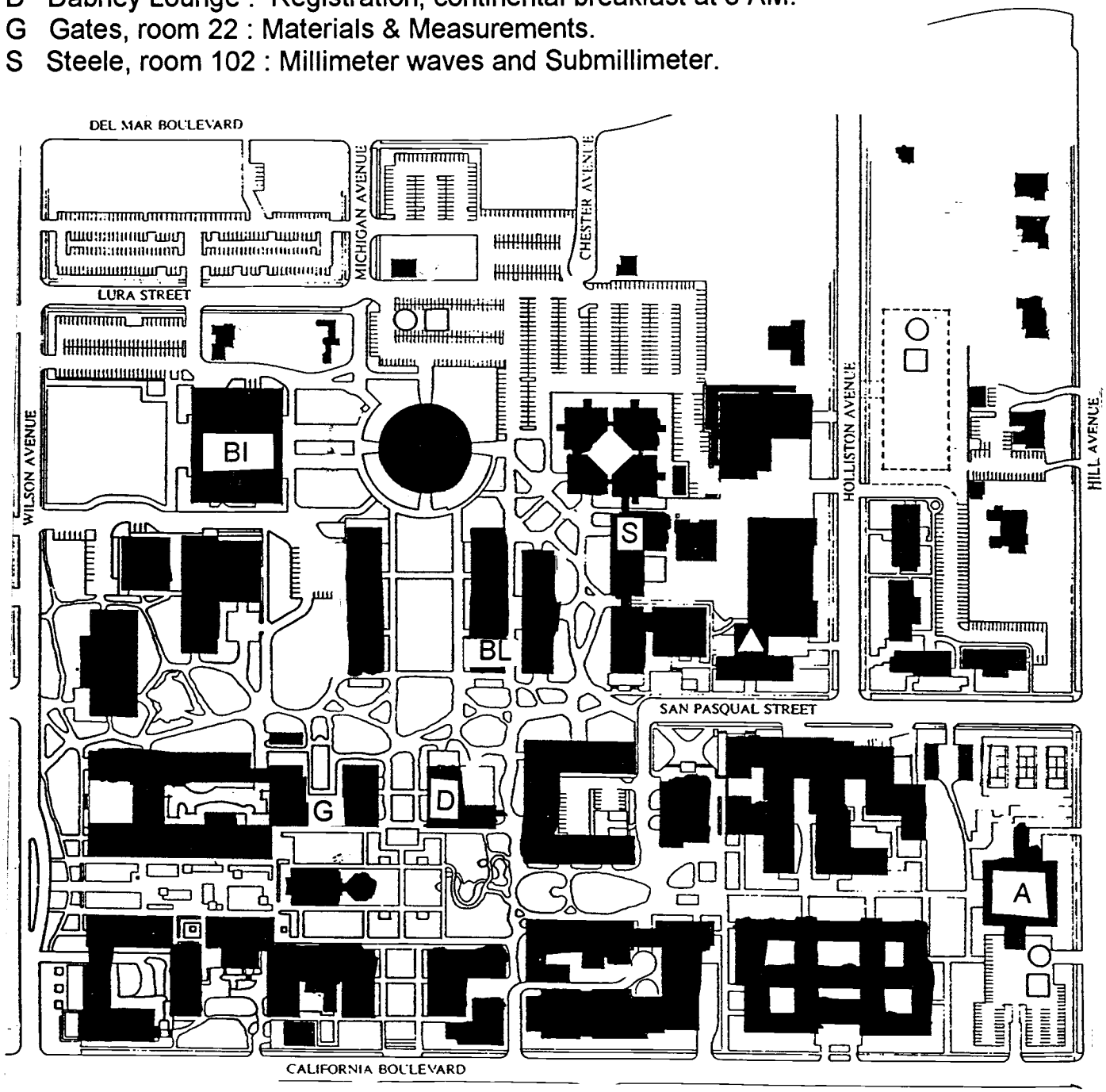
On behalf of the California Institute of Technology, I would like to welcome you to the Seventeenth International Conference on Infrared and Millimeter Waves. The conference will be held in lecture rooms here at Caltech; these rooms and the sessions are noted on the map. There will be a continental breakfast before the talks begin, starting at 8:00 AM in Dabney Lounge. Coffee and soft drinks will be available in Dabney Lounge throughout the conference sessions. On Monday and Wednesday there will be a buffet dinner that starts at 6:30 PM in the Rathskeller of the Athenaeum, the Caltech faculty club. The dinner will be free for conference attendees and their spouses (you will need to show your conference badge). I hope that this proves a productive meeting for all.

David Rutledge
Conference Chairman

17th International Conference on Infrared and Millimeter Waves, edited by Richard J. Temkin, Proc. of SPIE Vol. 1929, 192901 · © (1992) 2017 SPIE · CCC code: 0277-786X/17/$18 · doi: 10.1117/12.2298118

CALIFORNIA INSTITUTE OF TECHNOLOGY

A Athenaeum Rathskeller: Buffet dinner, Monday, Wednesday, 6:30 PM.
BI Beckman Institute, room 134: Millimeter waves.
BL Baxter Lecture Hall, upstairs from Ramo auditorium: FEL/ Gyrotron.
D Dabney Lounge : Registration, continental breakfast at 8 AM.
G Gates, room 22 : Materials & Measurements.
S Steele, room 102 : Millimeter waves and Submillimeter.



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THE 18th INTERNATIONAL CONFERENCE ON INFRARED AND MILLIMETER WAVES

September 6-10, 1993

UNIVERSITY OF ESSEX
Wivenhoe Park, Colchester, Essex, C04 3SQ
United Kingdom

Sponsored by SPIE, The International Society of Optical Engineering

The eighteenth conference in this series will be held at the University of Essex in Colchester. Colchester is Britain's oldest recorded town with a rich and colorful past. It is situated in Essex about 60 miles north-east of London (about 50 minutes by train) in an attractive area near the coast surrounded by river estuaries, and it is close to the River Stour and the border with the county of Suffolk, which is a delightful area associated with the artist John Constable. The university is modern with a purpose built lecture block which can accommodate all parallel sessions in one building. Ample residential accommodation is available on campus within a few minutes walk of the lecture block, with a range of prices and facilities that should suit everyone.

The conference will cover progress in all areas of infrared and millimeter waves, including the following topics, with special emphasis on new fields of research. Sources: lasers, free electron lasers, gyrotrons, synchrotrons, frequency mixing, calibration and standards. Detectors: receivers, mixers, amplifiers, thermal and photon detectors, Schottky diodes, Josephson and SIS devices, imaging arrays, FET amplifiers. Guided propagation and components: waveguides and other structures, Gaussian beams integrated devices, optical fibers. Spectroscopic techniques: interferometric, laser and heterodyne spectroscopy, spectroscopy of solids, liquids and gases. Astronomy and atmospheric physics: techniques, results and interpretation. Applications in biology and medicine. Plasma interactions and diagnostics. Technical and industrial applications: imaging, remote sensing, nondestructive testing.

General Chairman:

Kenneth J. Button
P.O. Box 372455
Satellite Beach, FL 32937-0455

Conference Chairman:

T.J. Parker, Department of Physics, University of Essex,
Wivenhoe Park, Colchester, CO4 3SQ, UK

Program Chairman:

J.R. Birch, Divisional of Electrical Science,
National Physical Laboratory
Teddington, Middlesex TW11 OLW, UK

NOTES FROM THE EXHIBIT MANAGER

The annual millimeter and submillmeter wave exhibit will be held for two full days, Tuesday and Wednesday, December 15 and 16, 1992 from 8AM to 8PM. in the Dabney Lounge of the Califonia Insttitute of Technology (Caltech)

The continental breakfast and morning and afternoon coffee will be served inside the exhibition room on Tuesday and Wednesday. The list below shows names of companies who have expressed their interest to participate at press time.

Mohammed N. Afsar (Tufts University)
Exhibit Manager

AB MILLIMETRE, SARTROUVILLE, FRANCE

COCHISE INSTRUMENTS, INC., HEREFORD, ARIZONA

DORADO COMPANY, SEATTLE, WASHINGTON

W. L. GORE AND ASSOCIATES, INC., NEWARK, DELWARE

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QMC INSTRUMENTS LIMITED, MILE END ROAD, LONDON, U.K.

VARIAN ELECTRON DEVICES, PALO ALTO, CALIFORNIA

WILTRON COMPANY, MORGAN HILL, CALIFORNIA

1992 KENNETH J. BUTTON PRIZE

AWARDED TO
PROFESSOR DEREK H. MARTIN

The citation reads:

For contributions to the field of infrared and millimeter waves, especially for the invention of a polarizing interferometer that has been used in instruments that investigate the cosmic microwave background spectrum, characterize plasmas in Tokamak reactors, study atmospheric properties, and measure refractive indices of solids, liquids and gases.

CONFERENCE PROGRAM
Seventeenth International Conference on Infrared and Millimeter Waves
14-17 December 1992

	MILLIMETER WAVES	MATERIALS MEASUREMENTS	MILLIMETER WAVES & SUBMILLIMETER	FEL/ GYROTRON
Mon AM	MMW Sources	High T_c Superconductors	Cavities/ Waveguides	FEL/CARM I
Mon PM	Freq. Multipliers & Power Combiners	Measurement Techniques	Transmission Lines	FEL/CARM II
Tues AM	MMW Systems	Material Properties	Lasers I	Gyrotron I
Tues PM	Detectors & Mixers	Semiconductors I	Lasers II	Gyrotron II
Wed AM	Antennas	Semiconductors II	Lasers III	Gyrotron III
Wed PM	Receivers & Astronomy	MMW Devices	Plasma Diagnostics	Gyrotron IV
Thurs AM	Integrated Circuits	Filters	Other Sources	Gyrotron V
Thurs PM	Guided Propagation	Post Deadline I	Post Deadline II	Gyrotron VI

FINAL PROGRAM

The program listed in this Digest is the final conference program. A number of changes have been made from the preliminary program. Please disregard the preliminary program and use only the final program printed in this Digest.

Morning sessions begin at 0900 hours. Afternoon sessions begin at 1400 hours.

Invited Keynote papers are allotted 40 minutes, 30 minutes for presentation and 10 minutes for discussion; contributed papers are alloted 20 minutes, 15 minutes for presentation and 5 minutes for discussion.

SESSION M1

Monday AM **MMW SOURCES** Dec. 14

M1.1 GYROTRON: FROM THE PHYSICS CONCEPT TO THE PHYSICS AND TECHNOLOGY ISSUES RELATED TO MEGAWATT SOURCES FOR FUSION REACTOR – *(Invited Keynote)* – M.Q. Tran, CRPP, EPFL, Lausanne, Switzerland

M1.2 SMITH-PURCELL RADIATION AT SUBMILLIMETER AND FAR-INFRARED WAVELENGTHS – J. Walsh, Dept. of Physics & Astronomy, Dartmouth College, 6127 Wilder Laboratory, Hanover, NH 03755; G. Doucas, J. Mulvey, M. Omori, Oxford University; M. Kimmitt, University of Essex

M1.3 COHERENT TRANSITION RADIATION – M. Ikezawa, Research Institute for Scientific Measurements, Tohoku University, Sendai 980, Japan

M1.4 PARAMETRIC DESIGN OF Ka-BAND TUNABLE WAVEGUIDE VOLTAGE CONTROLLED OSCILLATOR – N. Sultan, Canadian Space Agency, 240 Sparks St., West Tower, 8th Floor, Ottawa, Ontario K1A 1A1 Canada

M1.5 SPONTANEOUS EMISSION IN THE UNIFORM MAGNETIC FIELD WITH A DIELECTRIC MEDIUM – J. Soln, Harry Diamond Laboratories, 2800 Powder Mill Road, Adelphi, MD 20783

M1.6 A NEW INFRARED SYNCHROTRON BEAMLINE AT LURE – P. Roy, Y-L. Mathis, A. Gerschel, Laboratoire pour l'Utilisation de Rayonnement Electromagnétique, Université Paris-Sud, 91405 Orsay, France; P. Calvani, Universitá di Roma La Sapienza, P.le A. Moro, 2, 00185 Roma, Italy

M1.7 TWO DIMENSIONAL JOSEPHSON JUNCTION ARRAY OSCILLATORS – B. Liu, A. Pance, M.J. Wengler, University of Rochester, NY

SESSION M2

Monday AM — **HIGH T_c SUPERCONDUCTORS** — Dec. 14

M2.1 FAR INFRARED ELLIPSOMETRIC SIGNATURE OF GAP AND OF UNKNOWN HIGH-TEMPERATURE PHASE OF YBaCuO – K-L. Barth, F. Keilmann, Max-Planck-Institut für Festkörperforschung, 7000 Stuttgart 80, Germany

M2.2 FAR INFRARED AND MID-INFRARED ABSORPTION IN (bI, pB)-sR-(CA,y)-cU-0 – P. Calvani, M. Capizzi, P. Dore, S. Lupi, P. Maselli, G. Paleologo, Univ di Roma La Sapienza, P.le A. Moro, 2, Roma, Italy; P. Roy, Y-L. Mathis, Lab pour l'Utilisation de Rayonnement Electromagnétique, Univ Paris-Sud, 91405 Orsay, France; H. Berger, Ecole Polytechnique, France

M2.3 FAR INFRARED RESPONSE OF THIN FILM $Bi_2Sr_2CaCu_2O_8$ USING THE UCSB-FEL – W. Prettl, H. Lengfellner, Univ of Regensburg, Germany; J.P. Kaminski, CFELS - Univ of California, Santa Barbara, CA; Gi. Schneider, P.G. Huggard, T. O'Brien, W. Blau, Trinity College, Dublin, Ireland

M2.4 SURFACE RESISTANCE AND FAR IR ABSORPTIVITY AT T=7 K, and T=65 K of High T_c YBaCuO SUPERCONDUCTORS – A. Hadni, X. Gerbaux, Lab Infrarouge Lointain, URA CNRS n° 809, Univ of Nancy I, BP 239, F-54506 Vandoeuvre les Nancy, France

M2.5 SUBMILLIMETER AND MICROWAVE RESIDUAL LOSSES IN EPITAXIAL FILMS OF Y-Ba-Cu-O AND Tl-Ca-Ba-Cu-O – D. Miller, P.L. Richards, Dept of Physics, U.C. Berkeley and Materials Sciences Division, Lawrence Berkeley Lab, Berkeley, CA; C.B. Eom, T.H. Geballe, Stanford Univ., Stanford, CA; S.M. Garrison, N. Newman, Conductus, Inc. Sunnyvale, CA; S. Etemad, A. Inam, T. Venkatesan, Bell Communications Research, Red Bank, NJ; J.S. Martens, Sandia Natl. Lab., Albuquerque, NM; W.Y. Lee, IBM Almaden, San Jose, CA; L.C. Bourne, Superconductor Technologies, Santa Barbara, CA

M2.6 HARMONIC MIXING IN HIGH-T_c YBCO JOSEPHSON JUNCTIONS AT 94 GHz – Y. Yasuoka, K. Kawaguchi, T. Nozue, J. Chen, T. Yamashita, Dept of EE, The National Defense Academy, Hashirimizu, 239 Japan

M2.7 FABRICATION OF HIGH-T_c FILMS ON SILICON MEMBRANES FOR BOLOMETRIC DETECTORS – R. Parsons, L. Ngo Phong, G. Clarke, N. Osborne, F. Orfino, S. Wessel, Dept of Physics, The Univ of British Columbia, Vancouver, B.C., V6T 1Z1, Canada

SESSION M3

Monday AM **CAVITIES/WAVEGUIDES** Dec. 14

M3.1 SPECTRAL DOMAIN ANALYSIS OF OPEN CAVITIES – K.R. Chu, C.S. Kou, J.M. Chen, Y.C. Tsai, Dept of Phys., National Tsing Hua Univ., Hsinchu, Taiwan; C. Cheng, S.S. Bor, Dept. of EE, Chung Cheng Inst. of Tech., Taoyuan, Taiwan

M3.2 ANALYSIS OF PARTIALLY OPEN CAVITY RESONATORS USING COMPLEX EIGENMODES – A. Jöstingmeier, A.S. Omar, J. Jelonnek, Technische Universität Hamburg-Harburg, Postfach 90 10 53, D-W-2100 Hamburg 90, Germany

M3.3 CONDITIONS TO ACHIEVE STABLE PROPAGATION OF A GAUSSIAN-BEAM-LIKE MODE MIXTURE IN A DEFORMED WAVEGUIDE – A. Möbius, J. Pretterebner, Kernforschungszentrum Karlsruhe, Inst. f. Technische Physik, P.O. Box 3640, D-W-7500 Karlsruhe, Germany

M3.4 DETERMINATION OF RESONANCE FREQUENCIES AND QUALITY FACTORS OF HIGH POWER MICROWAVE RESONATORS – D. Wagner, J. Pretterebner, Inst. f. Plasmaforschung, Univ. Stuttgart, Germany; M. Thumm, Universität Karlsruhe, D-7500 Karlsruhe, Germany

M3.5 MODE COUPLING IN VARYING-RADIUS COAXIAL WAVEGUIDES – J. Shafii, R.J. Vernon, Univ. of Wisconsin, Dept. of EE, 1415 Johnson Dr., Madison, WI 53706

M3.6 IMPROVEMENT OF QUASI-OPTICAL MODE CONVERTERS BY LAUNCHING AN APPROPRIATE MIXTURE OF MODES – J. Pretterebner, A. Möbius, M. Thumm, Univ. of Stuttgart, Pfaffenwaldring 31, D-W-7000 Stuttgart 80, Germany

M3.7 A COUPLED CAVITY WHISPERING GALLERY MODE TRANSDUCER – C.P. Moeller, General Atomics, P.O. Box 85608, San Diego, CA 92186

M3.8 INADEQUACY OF COUPLED EQUATIONS FOR FORWARD TRAVELING WAVES IN CASE OF VERY LARGE WAVEGUIDE PERTUBATIONS – J. Pretterebner, D. Wagner, Inst. f. Plasmaforschung, Univ. Stuttgart; M. Thumm, Univ. Karlsruhe, D-7500 Karlsruhe 1, Germany

M3.9 ON THE VALIDITY OF GEOMETRIC - OPTICAL MODE CONVERTER DESIGN – A. Möbius, Karlsruhe; J. Pretterebner, Univ. Stuttgart, Germany

SESSION M4

Monday AM **FEL/CARM I** Dec. 14

M4.1 NRL UBITRON AMPLIFIER PERFORMANCE – D.E. Pershing, R.H. Jackson, R.D. Seeley, H.P. Freund, Naval Research Lab, Washington, DC

M4.2 FIRST OPERATION OF A COMPACT FEL IN THE MILLIMETER WAVE REGION – F. Ciocci, R. Bartolini, A. Doria, G.P. Gallerano, E. Giovenale, M.F. Kimmitt, G. Messina, A. Renieri, ENEA, Area INN, P.O. Box 65, 00044 Frascati (Rome), Italy

M4.3 RECENT ADVANCEMENT ON ORBITRON MASER TUBE AND ITS RADAR DEMONSTRATION – M.G. Niimura, R.J. Churchill, American Research Corp. of Virginia, Radford, VA; I. Alexeff, M. Rader, Univ. of Tennessee, Knoxville, TN

M4.4 THE STUTTGART RAMAN-FREE ELECTRON LASER PROJECT: THEORETICAL AND EXPERIMENTAL RESULTS – G. Renz, G. Spindler, Institut für Technische Physik, German Aerospace Research Est., Pfaffenwald 38-40, D-7000 Stuttgart 80, Germany

M4.5 ROBUST, PLASMA-BASED, VARIABLE PULSE-LENGTH ELECTRON BEAM SOURCE – R. Liou, T. Hsu, G. Kirkman, R. Temkin, M. Gundersen, Univ. of Southern California, Los Angeles, CA 90089

M4.6 SECOND HARMONIC MAGNICON AMPLIFIER EXPERIMENT – S.H. Gold, C.A. Sullivan, B. Hafizi, W.M. Manheimer, Naval Research Lab, Washington, DC 20375

M4.7 NONLINEAR ANALYSIS OF A MAGNICON OUTPUT CAVITY – B. Hafizi, S.H. Gold, W.M. Manheimer, P. Sprangle, Naval Research Lab, Washington, DC

M4.8 PHASE ORBITS OF THE EQUILIBRIUM ELECTRONS IN A FEL WITH A REVERSED AXIAL GUIDE MAGNETIC FIELD – S.C. Zhang, Y. Xu, Dept. of Appl. Phys., Southwest Jiaotong Univ., Chengdu, Sichuan, P.R. China

SESSION M5

Monday PM **FREQUENCY MULTIPLIERS & POWER COMBINERS** Dec. 14

M5.1 PROGRESS IN QUASI-OPTICAL POWER COMBINING – *(Invited Keynote)* – J.W. Mink, US Army Research Office, Research Triangle Park, NC 27709; J.C. Wiltse, Georgia Tech Research Inst, Atlanta, GA 30332

M5.2 HIGH POWER MILLIMETER-WAVE QUASI-OPTICAL FREQUENCY TRIPLER ARRAYS USING RESONANT TUNNELLING DEVICES – E.I. Chung, H-X. Liu, C.W. Domier, N.C. Luhmann, Jr., Center for High Frequency Electronics, Dept of EE, Univ of California, Los Angeles, CA 90024

M5.3 PLANAR VARACTOR DIODE DEVELOPMENT – B.J. Rizzi, T.W. Crowe, Dept of EE, University of Virginia, Charlottesville, VA 22903

M5.4 HIGH Q QUANTUM-BARRIER-VARACTOR (QBV) DIODES FOR MILLIMETER WAVE MULTIPLIERS – K. Krishnamurthi, R.G. Harrison, H.C. Liu, T. Spring Thorpe, M. Buchanan, Carlton University, Ottawa, Canada K1S 5B6

M5.5 A NEW METHOD OF DETERMINATION OF THE I-V CHARACTERISTICS OF NEGATIVE DIFFERENTIAL CONDUCTANCE DEVICES – R.J. Hwu, A.M Abhyankar, University of Utah, Dept of EE, Salt Lake City, UT

M5.6 NEGATIVE DIFFERENTIAL RESISTANCE (NDR) FREQUENCY CONVERSION WITH GAIN – R.J. Hwu, S.C. Lee, A. Djuandi, University of Utah, Dept of EE, Salt Lake City, UT

M5.7 COMPARISON BETWEEN SINGLE AND BACK-TO-BACK VARACTOR DIODE CHARACTERISTICS AND FREQUENCY TRIPLING – R.J. Hwu, L.P. Sadwick, S.C. Lee, University of Utah

M5.8 A TWO DIMENSIONAL POWER COMBINING ARRAY EMPLOYING AN EXTENDED RESONANCE TECHNIQUE – A. Mortazawi, B.C. DeLoach Jr., Dept of Electrical and Cmptr Engr, Univ of Central Florida, Orlando, FL 32816

SESSION M6

Monday PM **MEASUREMENT TECHNIQUES** Dec. 14

M6.1 THE DESIGN OF THE HIGH-PERFORMANCE MILLIMETER-WAVE AND TERAHERTZ OPTIC SYSTEMS – *(Invited Keynote)* – D.H. Martin, Dept of Physics, Queen Mary and Westfield College, Mile End Road, London E1 4NS, UK

M6.2 FAR-INFRARED MICROSCOPY OF LOW-DIMENSIONAL SEMICONDUCTORS – *(Invited Keynote)* – R. Merz, F. Keilmann, Max-Planck-Institut für Festkörperforschung, 7000 Stuttgart 80, Germany

M6.3 DEVELOPMENT OF A NEW HIGH RESOLUTION FAR INFRARED FOURIER TRANSFORM SPECTROMETER – T. Dumelow, T.J. Parker, Dept of Physics, Univ of Essex, Wivenhoe Park, Colchester, CO4 3SQ, UK

M6.4 A HIGH PRECISION REFLECTOMETER FOR THE STUDY OF OPTICAL PROPERTIES OF MATERIALS IN THE SUBMILLIMETER – A.J. Gatesman, R.H. Giles, J. Waldman, Univ of Massachusetts at Lowell, Dept of Physics, Lowell, MA 01854

M6.5 SUB-MILLIMETER-WAVE COMPLEX CONDUCTIVITY MEASUREMENTS ON $Ba_{0.6}K_{0.4}BiO_3$, Y. Liu, J.F. Whitaker, Univ of Michigan, Center for Ultrafast Optical Science; C.E. Platt, Univ of Illinois, Science and Technology Center for Superconductivity

M6.6 VERY HIGH FREQUENCY ELECTRON SPIN RESONANCE – L-C. Brunel, Grenoble High Magnetic Field Laboratory, MPI-CNRS, BP 166, 38042 Grenoble Cedex 9, France

M6.7 CHARACTERIZATION OF 100 GHz GaAs/AlGaAs MULTIQUANTUM WELL AVALANCHE TRANSIT TIME DEVICES – C.C. Meng, H.R. Fetterman, Dept. of EE, Univ. of California, LA 90024; D. Streit, T. Block, Y. Saito, TRW, Redondo Beach, CA

M6.8 ALL-ELECTRONIC SUPICOSECOND PULSES FOR TERAHERTZ SIGNAL GENERATION AND DETECTION – D.W. Van Der Weide, J.S. Bostak, B.A. Auld, D.M. Bloom, Edward L. Ginzton Laboratory, Stanford Univ, Stanford, CA 94305

M6.9 MULTIQUANTUM-WELL DETECTION OF NANOSECOND FAR-INFRARED SUPERRADIANT PULSES AT TEMPERATURES ABOVE 77 K – J. Waldman, E.R. Mueller, E.S. Jacobs, M.J. Coulombe, Submillimeter Technology Laboratory, Univ. of Massachusetts, Lowell, MA 01854; W.D. Goodhue, MIT Lincoln Lab; D.B. Moix, D.P. Scherrer, F.K. Kneübuhl, Inst. of Quantum Electronics, Switzerland

SESSION M7

Monday PM **TRANSMISSION LINES** Dec. 14

M7.1 EXPERIMENTAL INVESTIGATION OF A QUASI-OPTICAL ANTENNA FOR A WHISPERING-GALLERY-MODE GYROTRON OUTPUT – J.A. Lorbeck, R.J. Vernon, Univ. of Wisconsin, 1415 Johnson Dr., Madison, WI

M7.2 FIRST RESULTS ON A 110 GHz EVACUATED TRANSMISSION LINE – J.M. Krieg, E. Giguet, P. Garin, A. Dubrovin, G. Mourier, Thomson Tubes Electroniques, 78141 Velizy Villacoublay, France

M7.3 DESIGN AND MEASUREMENTS OF HE_{11} & HE_{12} MODE CONVERTERS – T. Groubner, W. Kasparek, H. Kumrić, Univ. Stuttgart, Pfaffenwaldring 31, D-7000 Stuttgart 80 (Vaihingen) Germany

M7.4 DESIGN REVIEW OF THE MILLIMETRE-WAVE SYSTEM FOR ECRH ON THE FTU TOKAMAK – L. Argenti, A. Bruschi, S. Cirant, F. Granucci, G. Mirizzi, S. Nowak, A. Simonetto, G. Solari, Istituto di Fisica del Plasma, EURATOM/ENEA/CNR Association - Milano, Italy

M7.5 DISCUSSION ON CALCULATIONS OF MODE CONVERTERS IN CORRUGATED WAVEGUIDES – H. Kumrić, Univ. Stuttgart, Pfaffenwaldring 31, D-7000 Stuttgart 80 (Vaihingen) Germany

M7.6 WHISPERING-GALLERY-MODE GENERATION BY MEANS OF AN AZIMUTHAL ARRAY OF APERTURES – R.A. Peebles, M. Kasraian, R.J. Vernon, Univ. Wisconsin, 1415 Johnson Dr., Madison, WI 53706

M7.7 CALCULATION OF EIGENMODE MIXTURES IN CORRUGATED WAVEGUIDES – D. Wagner, J. Pretterebner, Univ. Stuttgart, Germany; M. Thumm, Univ. Karlsruhe, D-7500 Karlsruhe 1, Germany

M7.8 THE EFFECT OF TE_{03} MODE INTO TE_{01}–TE_{02} MODE CONVERTERS FOR HIGH POWER MILLIMETER WAVES APPLICATIONS – C.D.R. Bocio, T. Sancho, M. Sorolla, ETSEET-La Salle Dept. Comunicacions, Uni. Ramon Liull, Passeig Bonanova, 8, 08022 Barcelona, Spain

M7.9 RIGOROUS ANALYSIS OF SLOTTED-CIRCULAR WAVEGUIDES USED IN HIGHER HARMONIC GYROTRONS – A. Jöstingmeier, C. Rieckmann, A.S. Omar, Technische

Univ. Braunschweig, Inst. f. Hochfrequenztechnik, Postfach 33 29, D-W-3300 Braunschweig, Germany

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M7.10 PRECISE MEASUREMENTS OF THE FIELDS OF APERTURE ANTENNAS LAUNCHING HIGH ORDER MODES – J. Pretterebner, D. Wagner, A. Möbius, Univ. Stuttgart, Pfaffenwaldring 31, D-W-7000 Stuttgart 80, Germany

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M7.11 BEAM PRESHAPING IN A VLASOV ANTENNA LAUNCHER USING WALL PERTURBATIONS – S. Rauf, J.A. Lorbeck, R.J. Vernon, Univ. Wisconsin, Dept. of Elec. and Cmptr. Engr., 1415 Johnson Dr., Madison, WI

M7.12 EFFECTIVE CONVERSION OF HIGH WAVEGUIDE MODES TO EIGENWAVES OF OPEN MIRROR LINES – G.G. Denisov, M.I. Petelin, D.V. Vinogeadov, Inst. of Appl. Physics of Russian Academy of Science, Nizhny Novgorod, Russia

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SESSION M8

Monday PM **FEL/CARM II** Dec. 14

M8.1 THE 1 MW, 200 GHz FOM-FUSION-FEM – *(Invited Keynote)* – A.G.A. Verhoeven, W.A. Bongers, R.W. B. Best, A.M. van Igen, P. Manintveld, W.H. Urbnus, M.J. van der Wiel, FOM Instituut voor Plasmafysica Rijnhuizen, P.O. Box 1207, 3430 BE Nieuwegein, the Netherlands; V.L. Bratman, G.G. Denisov, A.V. Savilov, M.Yu. Shmelyov, Inst. of Appl. Phys., Russia; H-U. Nickel, M. Thumm, Kernforschungszentrum Karlsruhe, Germany; G. Müller, W. Kasparek, J. Pretterebner, D. Wagner, Institut für Plasmaforschung, Stuttgart, Germany; M. Caplan, LLNL, Livermore, CA

M8.2 HIGH-POWER CYCLOTRON AUTORESONANCE MASER (CARM) EXPERIMENTS – *(Invited Keynote)* – S. Alberti, B. Danly, E. Giguet, G. Gulotta, T. Kimura, W.L. Menninger, J.L. Rullier, R.J. Temkin, Plasma Fusion Center, MIT, Cambridge, MA 02139

M8.3 MICROWAVE FEL EXPERIMENT AT CESTA – H. Bottollier-Curtet, A. Devin, J. Gardelle, G. Germain, J. Labrouche, P. Le Taillandier de Gabory, CEA/CESTA - BP N° 2 – 33114 Le Barp, France

M8.4 DESIGN OF A QUASIOPTICAL GYROTRON PUMPED IR FREE-ELECTRON LASER – A.W. Fliflet, W.M. Manheimer, Naval Research Lab, Washington, DC 20375

M8.5 ELECTRON TRAPPING IN RELATIVISTIC GYRO-DEVICES – P.E. Latham, G.S. Nusinovich, S. Tantawi, Laboratory for Plasma Research, Univ. of Maryland, College Park, MD 20742

M8.6 EFFICIENCY OF FREQUENCY UP-SHIFTED GYRO-DEVICES: CYCLOTRON HARMONICS VERSUS CARM OPERATION – G.S. Nusinovich, P.E. Latham, H. Li, Laboratory for Plasma Research, Univ. of Maryland, College Park, MD 20742

M8.7 A COMPACT RELATIVISTIC ELECTRON BEAM SOURCE FOR GENERATION OF FAR INFRARED RADIATION – C.R. Jones, M.J. Peters, J.M. Dutta, North Carolina Central University, Durham, NC 27707

M8.8 INFLUENCE OF THE ADIABATIC-MAGNETIC-FIELD DISTRIBUTION AT THE ENTRANCE ON THE OUTPUT POWER AND EFFICIENCY IN A FEL – S.C. Zhang, W.Y. Wang, Y. Xu, Dept. of Appl. Phys., Southwest Jiaotong Univ., Chengdu, Sichuan, P.R. China

M8.9 QUALITY OF ELECTRON BEAM DIAGNOSTIC SYSTEM FOR SG-1 FREE ELECTRON LASER AMPLIFIER – F. Luo, CAEP - China Acad. of Engr. Phys., P.O. Box 517-50, Chengdu, Sichuan 610003, P.R. China

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SESSION T1

Tuesday AM — **MMW SYSTEMS** — Dec. 15

T1.1 APPLICATIONS OF GYROTRONS TO RADAR AND ATMOSPHERIC SENSING – *(Invited Keynote)* – W. Manheimer, Code 4707, Naval Research Lab, Washington, DC 20375

T1.2 RECENT ADVANCES ON W-BAND THEORY AND TECHNOLOGY IN CHINA – *(Invited Keynote)* – L. He, W. Hong, Y. Chen, Dept of Radio Engr, Southeast Univ, 210018 Nanjing, P.R.China

T1.3 A PROPOSAL FOR NOVEL ACTIVE PHASED ARRAY RADAR – *(Invited Keynote)* – N. Fourikis, K.W. Eccleston, DSTO/MRD, PO Box 1500 Salisbury, South Australia 5108; D.R. Wehner, Radar and Electromagnetic Systems, 4410 Algeciras St, San Diego, CA

T1.4 RADIOMETRIC GROUND SPEED SENSOR FEASIBILITY – J.C. Wiltse, Georgia Tech Research Institute, Atlanta, GA 30332

T1.5 A MILLIMETER-WAVE RADIOMETER FOR DETECTING WIND SHEAR – R.W. McMillan, Georgia Tech Research Institute, Atlanta, GA 30332

T1.6 WHISPERING GALLERY MODE IN DIELECTRIC WAVEGUIDE AND DIELECTRIC RESONATORS – S. Liu, Univ. of Electronic Science and Tech. of China; T. Lothar, Leeds Polytechnic, UK

SESSION T2

Tuesday AM **MATERIALS PROPERTIES** Dec. 15

T2.1 SUBMILLIMETER WAVE SPECTROSCOPY: DIELECTRIC MEASUREMENT, MATERIAL TESTING – *(Invited Keynote)* – G.V. Kozlov, Academy of Sciences of Russia, 38 Vavilova St, Moscow, Russia

T2.2 CALIBRATION TECHNIQUE FOR A FIR/LMR SPECTROMETER TO USE IN MEASUREMENTS OF FREE RADICALS OF THE LOWER STRATOSPHERE – G.P. Galvao, E.C.C. Vasconcellos, L.R. Zink, J.M. Brown, K.M. Evenson, National Inst of Standards and Technology, 325 Broadway Av, Boulder, CO 80303

T2.3 DIELECTRIC PROPERTIES OF SAPPHIRE AT MICROWAVE FREQUENCIES – J. Mollá, A. Ibarra, EURATOM-CIEMAT Association Inst Investigación Básica, CIEMAT, Avda. Complutense. 22 E-28040 Madrid, Spain

T2.4 WINDOW MATERIALS FOR HIGH POWER GYROTRONS – M.N. Afsar, H. Chi, Dept. of EE, Tufts Univ, Medford, MA 02155

T2.5 A NEW MICROWAVE AND MILLIMETER WAVE SPECTROMETER FOR PERMEABILITY MEASUREMENTS OF MAGNETIC MATERIALS – M.N. Afsar, H. Chi, Tufts University, Medford, MA 02155

T2.6 SILICONE BASED ANECHOICS AT TERAHERTZ FREQUENCIES – R.H. Giles, T.M. Horgan, J. Waldman, Univ of Massachusetts at Lowell, Dept of Physics, Lowell, MA 01854

T2.7 PRESSURE BROADENING OF H_2O AND HDO BETWEEN 90 K AND 600 K – J.M. Dutta, T.M. Goyette, D.W. Ferguson, F.C. DeLucia, C.R. Jones, Dept of Physics, North Carolina Central Univ, Durham, NC 27707

T2.8 PHOTOACOUSTIC AND DOUBLE RESONANCE SPECTRA OF H_2CS – A.M. Darwish, J.R. Izatt, Dept of Physics and Astronomy, Univ of Alabama, Tuscaloosa, AL 34587; J.C. Petersen, Danish Inst. of Fundamental Metrology, Denmark

T2.9 EFFECT OF THE ORGANIC SOLVENTS ON THE ABSORPTION BANDS IN THE IR-REGION OF THE SPECTRUM – M.I. Nasser, National Research Centre Dokki, Cairo, Egypt; A.H. Bassyouni, Univ of Zagazig, Egypt

SESSION T3

Tuesday AM **LASERS I** Dec. 15

T3.1 NEW PHENOMENA IN OPTICALLY PUMPED FAR-INFRARED SUPERRADIANT AND RAMAN EMISSIONS *(Invited Keynote)* – D.P. Scherrer, A.W. Kälin, R. Kesselring, J.S. Bakos, F.K. Kneubühl, Inst. of Quantum Electronics, Swiss Federal Inst. of Tech (ETH), CH-8093 Zurich, Switzerland

T3.2 NEW CONCEPT OF OPTICAL-FREE-INDUCTION-DECAY (OFID) PICOSECOND-PULSE 10μm-CO_2-LASER SYSTEMS – D.P. Scherrer and F.K. Kneubühl, Inst. of Quantum Electronics

T3.3 COMPETITION BETWEEN FORWARD AND BACKWARD EMISSION IN AN OPTICALLY PUMPED FIR RING LASER – K. Matsushima*, N. Higashida, N. Sokabe, T. Ariyasu*, *Dept. EE, Kansai Univ, Japan; and Dept of Applied Physics, Osaka City Univ., Sugimoto, Osaka 558, Japan

T3.4 PHASE OF RADIATION FROM STIMULATED EMISSION – M. Hirooka, College of General Education, Osaka Univ, Toyonaka, Osaka, Japan

T3.5 HIGH POWER NS FIR RAMAN PULSES IN NH_3 PUMPED BY A SHORT PULSE TAIL-FREE CO_2 OSCILLATOR – S. Marchetti, R. Simili, IFAM-CNR, Via del Giardino 7, 56100, Pisa, Italy

T3.6 GAIN OF THE p-Ge INTERBAND LASER – H. Zuckermann, F. Keilmann, Max-Planck-Institut für Festkörperforschung, 7000 Stuttgart 80, Germany

T3.7 LINEWIDTH OF THE p-Ge LASER – V.N. Shastin, A.V. Murav'jov, S.G. Pavlov, Inst. of Applied Physics of Russian Academy of Science, Nizhny Novgorod 603600, Russia; E. Brüendermann, M.F. Kimmit, H.P. Roeser, Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, D-5300 Bonn 1, Germany

SESSION T4

Tuesday AM **GYROTRON I** Dec. 15

T4.1 LONG-PULSE OPERATION OF A GYROTRON WITH BEAM/RF SEPARATION – *(Invited Keynote)* – K. Felch, T.S. Chu, J. Feinstein, H. Huey, H. Jory, J. Neilson, R. Schumacher, Varian Associates, Inc. 811 Hansen Way, Palo Alto, CA 94304

T4.2 500 kW OPERATION OF A 140 GHz GYROTRON: EXPERIMENT AND SIMULATION – *(Invited Keynote)* – G. Gantenbein, E. Borie, G. Dammertz, O. Dumbrajs, M. Kuntze, H-U. Nickel, B. Piosczyk, M. Thumm, Kernforschungszentrum Karlsruhe GmbH, ITP Postfach 3640 D-7500 Karlsruhe 1, Germany

T4.3 DEVELOPMENT OF A HIGH POWER GYROTRON FOR ECH OF TOKAMAK PLASMA – K. Sakamoto, M.Tsuneoka, S. Maebara, A. Kasugai, H. Fujita, M. Kikuchi, T. Yamamoto, T. Nagashima, Japan Atomic Energy Res. Inst., Naka-machi, Naka-bun, Ibaraki-ken, Japan 311-01; T. Kariya, Y. Okazaki, N. Shirai, T. Okamoto, Toshiba Corp., Japan; K. Hayashi, Y. Mitsunaka, Y. Hirata, R&D Center, Toshiba Corp., Japan

T4.4 INVESTIGATION AND DEVELOPMENT OF GYROTRON AT THE INSTITUTE OF APPLIED PHYSICS – V. Flyagin, A. Goldenberg, V. Zapevalov, IAP, Nizhny Novgorod, Russia

T4.5 HIGH POWER OPERATION OF A 200-300 GHz GYROTRON OSCILLATOR – T.L. Grimm, P.M. Borchard, K.E. Kreischer, R.J. Temkin, MIT Plasma Fusion Center, Cambridge, MA 02139

T4.6 DESIGN OF A 3 MW, 140 GHz GYROTRON WITH A COAXIAL CAVITY – M.E. Read, G. Nusinovich, B. Levush, O. Dumbrajs, G. Bird, Physical Sciences Inc.; K. Kreischer, MIT Plasma Fusion Center, Cambridge, MA 02139

T4.7 MULTIMEGAWATT GYROTRONS FOR ITER – K.E. Kreischer, W.C. Guss, R.J. Temkin, MIT Plasma Fusion Center, Cambridge, MA 02139

SESSION T5

Tuesday PM **DETECTORS & MIXERS** Dec. 15

T5.1 ANTENNA-COUPLED THIN-FILM NANOMETER METAL-OXIDE-METAL INFRARED DIODES – *(Invited Keynote)* – I. Wilke, Y. Oppliger*, W. Herrmann, F.K. Kneubühl, Inst of Quantum Electronics, Swiss Federal Inst of Tech, CH-8093 Zurich, Switzerland; *CSEM, CH-2007 Neuchatel, Switzerland

T5.2 DESIGN OF HIGH T_c BOLOMETERS ON SILICON MEMBRANES FOR A FAR INFRARED IMAGING ARRAY, S. Verghese, P.L. Richards, Dept of Physics, Univ of California and Materials Sciences Div, Lawrence Berkeley Lab, Berkeley, CA 94720; K. Char, Conductus Inc., Sunnyvale, CA 94086; D.K. Fork, Xerox PARC, Palo Alto, CA 94304; T.H. Geballe, Dept of Applied Physics, Stanford Univ, Stanford, CA 94305

T5.3 High T_c COMPOSITE MICROBOLOMETERS – J.M. Lewis, D.P. Neikirk, Dept of Electrical and Cmptr Engr, The Univ of Texas at Austin, TX 78712

T5.4 MECHANISM AND PROPERTIES OF ANTENNA COUPLED POINT-CONTACT WARM CARRIER DEVICES AT 10.6μm – T. Simizu, Y. Yasuoka, Dept of Electronic Engr, The National Defense Academy, Hashirimizu, Yokosuka 239 Japan

T5.5 ON THE WORK MECHANISM OF MIM POINT CONTACT DIODES – G. Carelli, M. Inguscio, N. Ioli, A. Moretti, M. Prevedelli, F. Strumia, Dept di Fisica dell'Università CNR. p. Torricelli, 2, 56126 - Pisa, Italia; D. Pereira, UNICAMP, Brasil

T5.6 2 DEG ELECTRON BOLOMETRIC MIXERS: NEW RESULTS AND POTENTIAL FOR LOW-NOISE THz RECEIVERS – J-X. Yang, F. Agahi, D. Dai, C. Musante, W. Grammer, K.M. Lau, K.S. Yngvesson, Dept. of Elec. Eng., U of Massachusetts, Amherst, MA 01003

T5.7 FABRICATION OF SUBMICRON GaAs SCHOTTKY DIODES FOR MIXERS/DETECTORS OPERATING IN THE SUBMILLIMETER WAVE RANGE – T. Suzuki, J.J. Chang+, T. Nozokido++, K. Mizuno, R. Kuwano, Research Inst of Electrical Comm, Tohoku Univ, Japan; +Exploratory Research for Advanced Tech, Research Development Corp of Japan; ++Photodynamics Research Center, RIKEN

T5.8 A FULL HEIGHT WAVEGUIDE SIS MIXER FOR A WAVEGUIDE BAND OPERATION – A. Karpov, J. Blondel, C. Grassl, K.H. Gundlach, Institut de Radioastronomie

Millimetrique, 300 Rue de la Piscine, Domaine Univ de Grenoble, F338406 Saint Martin d'Hères, France

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T5.9 FREQUENCY DEPENDENT SIMULATION OF PLANAR MILLIMETER-WAVE MIXER DIODES – J.A. Wells, N.J. Cronin, Univ of Bath, Bath BA2 7AY, UK

T5.10 THE RELIABILITY OF PLANAR GaAs SCHOTTKY DIODES – J.L. Bowers, W.L. Bishop, T.W. Crowe, Dept of EE, Univ of Virginia, Charlottesville, VA 22903

T5.11 A BROADBAND INTEGRATED MATCHING STRUCTURE FOR SIS-MIXERS – U. Kotthaus, K. Jacobs, KOSMA, Physikalisches Inst, Univ zu Köln, Zülpicher str. 77, D W-5000 Köln 1, Germany

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SESSION T6

Tuesday PM — **SEMICONDUCTORS I** — Dec. 15

T6.1 INFRARED AND FAR-INFRARED MAGNETO-SPECTROSCOPY OF SEMICONDUCTORS IN HIGH MAGNETIC FIELD IN THE MEGAGAUSS RANGE – *(Invited Keynote)* – N. Miura, J. Kono, O. Portugall, D. Barnes, Y. Imanaka, T. Takamasu, H. Nojiri, H. Yokoi, S. Takeyama, Inst for Solid State Physics, Univ of Tokyo, Roppongi, Minato-ku, Tokyo 106, Japan

T6.2 FAR INFRARED MEASUREMENTS ON DOPED GaAs/AlGaAs MULTIPLE QUANTUM WELLS – S.K. Kang, J.P. Bryant, T. Dumelow, T.J. Parker, Dept of Physics, Univ of Essex, Wivenhoe Park, Colchester, CO4 3SQ, UK; C.T. Foxon, J.W. Orton, J.J. Harris, Univ of Nottingham, University Park, Nottingham, NG7 2RD, UK

T6.3 MAGNETOOPTICS ON CHROMIUM-BASED DILUTED MAGNETIC SEMICONDUCTORS – R. Krevet, M. von Ortenberg, Hochmagnetfoldanalage der Technischen Universitat Braunschweig, Mendelssohnstrasse 3, D-3300 Braunschweig, Germany; A. Twardowski, Inst for Experimental Physics, Univ of Warsaw, Poland

T6.4 INFRARED ABSORPTION SPECTRUM OF SINGLY IONIZED MAGNESIUM DONOR IMPURITIES IN SILICON – L.T. Ho, F.Y. Lin, W.J. Lin, Institute of Physics, Academia Sinica, Taipei, Taiwan

T6.5 SILICON DOPED WITH GALLIUM PHOTOCONDUCTORS: EFFECT OF UNIAXIAL STRESS – C. Meny, G. Sirmain, J. Ristorcelli, M. Giard, C. Lucas, J. Léotin, Laboratoire de Physique des Solides, INSA, 31077 Toulouse Cedex, France

T6.6 RESPONSE OF STRESSED GeGa PHOTOCONDUCTOR AT MILLIMETER WAVELENGTHS – C. Mény, J. Birch, J. Léotin, Laboratoire de Physique des Solides, France

SESSION T7

Tuesday PM **LASERS II** Dec. 14

T7.1 FAR INFRARED LASER LINES AND ASSIGNMENTS OF CH_3OH: A REVIEW – G. Moruzzi, F. Strumia, Dept. di Fisica dell'Universitá di Pisa, Italy; J.C.S. Moraes, Dept. de Ciencias, Brazil

T7.2 GENERATION OF TUNABLE FIR LASER PULSES WITH DURATIONS OF LESS THAN 100 ps – W. Schatz, M.A. Heusinger, R.S. Nebosis, K.F. Renk, Univ. of Regensburg, Regensburg, Germany; P.P. Lang, M.P.I. Plasmaphysik, Garching, Germany

T7.3 OBSERVATION OF NEW FIR LASER LINES FROM $^{12}CH_3OH$ – D. Pereira, E.M. Telles, J.C.S. Moraes, A. Scalabrin, Inst. de Fisica-UNICAMP, Brasil; G. Carelli, N. Ioli, A. Moretti, F. Strumia, Deppartimento di Fisica, dell'Universitá, 56.100, Pisa, Italy

T7.4 ASSIGNMENT OF THE FTS SPECTRUM OF CD_3OH – G. Moruzzi, Dept di Fisica dell/Universita di Pisa, Italy; R.M. Lees, L-H. Xu, Dept. of Physics, U of New Brunswick, Canada; B.P. Winnewisser, M. Winnewisser, Physikalisch-Chemisches Institut der Justus-Liebit-Universität Giessen, Germany

T7.5 FTIR SPECTROSCOPY OF THE LOWER VIBRATIONAL MODES OF 0-18 METHANOL – S.Zhao, R.M. Lees, U of New Brunswick, Canada; J.W.C. Johns, Herzberg Institute of Astrophysics, Canada; C.P. Chan, U of British Columbia, Canada

T7.6 INTERMODULATED PHOTOACOUSTIC MEASUREMENTS OF PRESSURE BROADENING COEFFICIENTS OF $^{12}CH_3OH,v_5$ LINES BY CO_2 LASERS – H. Okabe, N. Sokabe, Dept of Applied Physics, Osaka City University, Japan

T7.7 TORSION-VIBRATION ENERGY STRUCTURE AND INTERACTIONS AMONG THE LOWER VIBRATIONAL MODES OF $^{13}CD_3OH$ – L.H. Xu, R.M. Lees, U of New Brunswick, Canada; J.W.C. Johns, M. Noël, Herzberg Inst of Astrophysics, Canada

T7.8 NEW FAR INFRARED LASER LINES AND FREQUENCY MEASUREMENTS IN N_2H_4 AND $^{13}CD_3OH$ MOLECULES PUMPED BY A CONVENTIONAL CO_2 LASER – E.C.C. Vasconcellos, Instituto de Fisica, Brasil; L.R. Zink, G.P. Galväo, K.M. Evenson, Inst Nacional de Pesquisas Espaciais, Brasil

T7.9 SUBMILLIMETER CYCLOTRON RESONANCE LASERS AND THEIR APPLICATIONS – Yu.B. Vasilyev, S.D. Suchalkin, Yu.L. Ivanov, AF Ioffe Inst, Academy of Sciences, Russia

T7.10 IR AND FIR OPTOACOUSTIC STARK SPECTROSCOPY OF THE ^{13}C-O STRETCHING Q-BRANCH OF $^{13}CD_3OH$ – D. Paraira, E.M. Talles, J.C.S. Moraes, A. Scalabrin, Inst de Fisica, UNICAMP, Brasil; G. Carelli, N. Ioli, A Moretti, F. Strumia, Dept di Fisica dell'Universitá, Italy

SESSION T8

Tuesday PM — **GYROTRON II** — Dec. 15

T8.1 35 GHz SLOTTED FOURTH HARMONIC GYRO-KLYSTRON – D.B. McDermott, C.K. Chong, N.C. Luhmann, Jr., Dept of EE, Univ. of California, Los Angeles, CA 90024

T8.2 THE NRL 85 GHz QUASIOPTICAL GYROKLYSTRON EXPERIMENT – R.P. Fischer, A.W. Fliflet, W.M. Manheimer, Naval Research Laboratory, Washington, DC 20375

T8.3 33.2 GHz, 3-CAVITY GYROKLYSTRON – J.D. McNally, M.P. Bobys, D.B. McDermott, N.C. Luhmann, Jr., Dept. of EE, Univ. of California, Los Angeles, CA

T8.4 INVESTIGATION OF ROTATING MODES IN HIGH POWER GYROTRONS – M. Blank, K.E. Kreischer, R.J. Temkin, MIT Plasma Fusion Center, Cambridge, MA 02139

T8.5 NUMERICAL OPTIMIZATION OF HIGH ORDER VOLUME-MODE GYROTRON CAVITIES WITH RESPECT TO MODE CONVERSION AND MODE COMPETITION – O. Dumbrajs, G. Gantenbein, M. Thumm, Inst. f. Technische Physik, Kernforschungszentrum Karlsruhe, Germany

T8.6 MODE COOPERATION IN GYROTRONS WITH HIGHLY OVERMODED CAVITY – K. Xu, M. Thumm, Kernforschungszentrum Karlsruhe GmbH, ITP Postfach 3640, D-7500 Karlsruhe 1, Germany

T8.7 SIDEBAND MODE COMPETITION IN A GYROTRON OSCILLATOR – W.C. Guss, M.A. Basten, K.E. Kreischer, R.J. Temkin, MIT Plasma Fusion Center, Cambridge, MA; T.M. Antonsen, Jr. S.Y. Cai, G. Saraph, B. Levush, Univ. of Maryland, College Park, MD

T8.8 OPERATION OF A QUASI-OPTICAL GYROTRON WITH A GAUSSIAN OUTPUT COUPLER – J.P. Hogge, M. Pedrozzi, M.Q. Tran, T.M. Tran, H. Cao, P.J. Paris, CRPP, Ecole Polytechnique Fédérale de Lausanne, 21. Av. des Bains, CH-1007 Lausanne, Switzerland

T8.9 POSSIBLE TEM MODE COMPETITION IN GYROTRONS WITH COAXIAL CAVITY – K. Xu, M. Thumm, Institut für Technische Physik, Karlsruhe, Germany

T8.10 AN AUTONOMOUS BEAM BUNCHER FOR ECM APPLICATIONS – J.L. Vomvoridis, D.J. Frantzeskakis, K. Hizanidis, Dept. of Electrical and Cmptr. Engr., National Technical University of Athens

SESSION W1

Wednesday AM **ANTENNAS** Dec. 16

W1.1 RECENT DEVELOPMENTS IN MILLIMETER-WAVE POWER TRANSMISSION AND CONVERSION – K. Chang, Dept of EE, Texas A&M Univ, College Station, TX 77843

W1.2 NEW DEVELOPMENTS FOR MONOLITHIC MILLIMETER-WAVE DIODE ARRAY BEAM CONTROLLERS – L.B. Sjogren, F. Wang, T. Liu, H-X.L. Liu, X-H. Qin, E. Chung, C.W. Domier, N.C. Luhmann, Jr., Dept of EE, Univ of California, 90024

W1.3 DIELECTRIC-SLAB LOADED INTEGRATED HORN ANTENNAS – G.V. Eleftheriades, C-Y. Chi, S.S. Gearhart, G.M. Rebeiz, NASA Ctr for Space Terahertz Technology, Univ of Michigan, Ann Arbor, MI

W1.4 NOVEL LOW TEMPERATURE SUPERCONDUCTING BOLOMETERS – M. Nahum, P.L. Richards, Dept of Physics, U.C. Berkeley and Materials Sciences Div, Lawrence Berkeley Lab, CA; M. Gaidis, D.E. Prober, Dept of Applied Physics, Yale Univ, New Haven, CT

W1.5 OFF-AXIS-FED FRESNEL ZONE PLATE ANTENNA – J.C. Wiltse, Georgia Tech Research Institute, Atlanta, GA 30332; C.A. Barrett, Texas Instruments, Dallas, TX

W1.6 A MILLIMETER-WAVE SLOT-V ANTENNA – A. Moussessian, D.B. Rutledge, Div. of Engr. and Applied Sci., California Inst. of Technology, Pasadena, CA 91125

W1.7 EXPERIMENTAL ANALYSIS OF METAL COATED DIELECTRIC WAVEGUIDES – C.S. Yeh, N. Urimindi, J. Liu, J.K. Butler, Southern Methodist Univ, Dallas TX 75275

W1.8 FABRICATION AND PERFORMANCE OF MMW AND SMMW PLATELET HORN ARRAYS – R.W. Haas, D. Brest, H. Mueggenburg, L. Lang, D. Heimlich, Aerojet Electronic Systems Div, Azuza, CA 91702

W1.9 FINITE SIZE EFFECTS OF WAVE COUPLING BY SEW GRATING ANTENNAS – R. Petruskevicius, Inst of Physics, A. Gostauto 12, Vilnius 2600, Lithuania

W1.10 ANTENNA ARRAY DESIGN USING WINDOW FUNCTIONS – S. Qi, Q. Yang, State Key Laboratory of Millimeter Wave, Dept of Radio Engr., Southeast Univ, Nanjing 210018, P.R. China

W1.11 TOLERANCE OPTIMIZATION OF LOW SIDELOBE ARRAYS USING A GENERAL NONLINEAR MINIMAX METHOD – Y. Qi, W. Hong, Y. Chen, Southeast Univ; Y. Jiao, Research Inst. of Antennas, Xidian Univ, Xian 710071, P.R. China

SESSION W2

Wednesday AM **SEMICONDUCTORS II** Dec. 16

W2.1 SUBMILLIMETER WAVES: A SUITABLE TOOL FOR BOTH RESONANT AND NON-RESONANT HIGH FIELD MAGNETO-SPECTROSCOPY ON NARROW GAP SEMICONDUCTORS – *(Invited Keynote)* – O. Portugall, Inst fur Halbleiterphysik und Optik, Technische Universitat Braunschweig, Germany; J. Lono, Y. Shimamoto, H. Yokoi, S. Takeyama, Livan Bockstal, K. Buchholz-Stepputis, N. Miura, F. Herlach, M. von Ortenberg, G. Baur, W. Dobrowolski

W2.2 FAR INFRARED PHOTOCONDUCTIVITY IN n-GaAs AT FILAMENTARY CURRENT FLOW – V.A. Golubev, A.F. Ioffe Physico-Technical Inst, St. Petersburg, Russia; A. Schilz, O. Bauer, W. Prettl, Univ of Regensburg, Germany

W2.3 FAR INFRARED STUDY OF INTERFACE BROADENING IN GaAs/A1As SUPERLATTICES – A.Z. Mamun, J.P. Bryant, T. Dumelow, T.J. Parker, S.R.P. Smith, R. York, Dept of Physics, Univ of Essex, Wivenhoe Park, Colchester, UK; C.T. Foxon, J.W. Orton, K.J. Moore, Univ of Nottingham, University Park, UK

W2.4 TEMPERATURE DEPENDENCE OF InSb REFLECTIVITY AT FIR FREQUENCIES: INTRINSIC AND DOPED CRYSTALS – C. Carelli, N. Ioli, A.M. Messina, A. Moretti, D. Pereira, S. Schepis, F. Strumia, Dipartimento di Fisica dell'Universita and CNR, Piazza Torricelli, 2 I-56126 Pisa, Italy

W2.5 FIR MAGNETOOPTICAL INVESTIGATION OF $ZnMn_2As_2$ – I. Laue, M. von Ortenberg, Technische Univ Braunschweig, D-3300 Braunschweig, Germany; A.N. Nateprov, E.K. Arushanov, Inst. of Appl. Phys., Academy of Sciences, Akademicheskaya 5, 277028 Kishinev, Moldavia

SESSION W3

Wednesday AM **LASERS III** Dec. 16

W3.1 MIXING EFFECT IN THE NH_3 ABSORPTION AND MIR EMISSION SPECTRA PUMPED BY A CONTINUOUSLY TUNABLE CO_2 LASER – S. Marchetti, R. Simili, M. Giorgi, IFAM-CRN, Via del Giardino 7, 56100 Pisa, Italy

W3.2 OPTIMUM OPERATING GAS PRESSURE OF MINIATURE OPFIRL – L.Yao, L. Yikun, Dept of Electronics, Zhongshan Univ, Guangzhou 510275, PR China

W3.3 STRIP GRATING OUTPUT COUPLERS FOR FAR INFRARED LASERS – R. Densing, C.E. Hawkins, III, Dept EE, Univ of Virginia, Charlottesville, VA; T.J. Scholz, Dept Physics, Univ of Virginia, Charlottesville, VA; A. Gatesman, Dept of Physics and Applied Physics, Univ of Massachusetts, Lowell, MA

W3.4 LENGTH AND PRESSURE DEPENDENCE OF METHYLFLOURIDE RAMAN FIR LASER EMISSION SPECTRA – J.R. Izatt, Dept. of Physics and Astronomy, Univ. of Alabama, Tuscaloosa, AL 35487; W. Schatz, K.F. Renk, Angewandte Physik Universität Regensburg, Germany

W3.5 INTERACTION ENHANCEMENT OF TWO-PHOTON PRECESSES IN MINATURE OPFIRL – Y. Lin, X. Zheng, Zhongshan Univ., Guangzhou 510279 P.R.China

SESSION W4

Wednesday AM **GYROTRON III** Dec. 16

W4.1 BROAD-BAND GYRO-AMPLIFIER RESEARCH AT NRL – *(Invited Keynote)* – J.J. Choi, G.S. Park, S.Y. Park, C.M. Armstrong, R. Kyser, M.L. Barsanti, Naval Research Laboratory, Code 6840, Washington, DC 20375

W4.2 CYCLOTRON HARMONIC GYROAMPLIFIER BASED ON ELECTROSTATIC MODES OF A BEAM-FILLED COAXIAL WAVEGUIDE – J.L. Hirshfield, Omega-P, Inc. 2008 Yale Station, New Haven, CT 06520

W4.3 NONLINEAR THEORY OF COHERENT FAST WAVE RADIATION FROM SPATIOTEMPORALLY MODULATED GYRATING ELECTRON BEAM – A.K. Ganguly, NRL, Washington, DC; J.L. Hirshfield, Omega-P, Inc., 2008 Yale Station, New Haven, CT

W4.4 STREAK PHOTOGRAPHS OF CATHODE PLASMA FLARE SIMULTANEOUS WITH MM-WAVE EMISSION FROM A GYROTRON – S.N. Spark, K. Ronald, A.W. Cross, W. He, A.D.R. Phelps, Dept. of Physics and Applied Physics, Strathclyde Univ., Glasgow, G4 ONG, U.K.

W4.5 CYCLOTRON RESONANCE MASERS WITH SLOW ELECTROMAGNETIC WAVES – G.S. Nusinovich, P.E. Latham, S. Tantawi, Lab for Plasma Research, Univ. of Maryland, College Park, MD 20742

W4.6 DESIGN OF EXPERIMENTAL DIELECTRIC LOADED WIDEBAND GYRO-TWT – K.C. Leou, D.B. McDermott, N.C. Luhmann, Jr., Dept. of EE, Univ. of California, Los Angeles, CA 90024

W4.7 POWERFUL MILLIMETER-WAVE AMPLIFIER WITH QUASI-OPTICAL STRUCTURE – N.L. Romashin, Inst. of Radioengineering and Electronics Russian Academy of Sciences, Marx av. 18. Moscow, 103907, Russia; A.I. Kleev, P.L. Kapitza Inst. for Physical Problems ul. Kosygina, 2, Moscow, 117973, Russia; V.A. Solntsev, B. Vuzovsky. 3/12. MIEM. Moscow, 109028, Russia

SESSION W5

Wednesday PM **RECEIVERS & ASTRONOMY** Dec. 16

W5.1 250 GHz QUASI-INTEGRATED LOW-NOISE SCHOTTKY RECEIVER – W.Y. Ali-Ahmad, G.M. Rebeiz, NASA/Ctr for Space Terahertz Tech, Univ of Michigan, Ann Arbor, MI 48109; W. L. Bishop, T.W. Crowe, Univ. of Virginia-Charlottesville, VA 22901

W5.2 PERFORMANCE OF A 230 GHz SIS RECEIVER USING BROADBAND INTEGRATED MATCHING STRUCTURES – K. Jacobs, U. Kotthaus, KOSMA, Physikalisches Inst., Universität zu Köln, Zülpicher Str. 77, D W-5000 Köln 1, Germany

W5.3 REMOTE SENSING OF STRATOSPHERIC OH FROM HIGH ALTITUDE AIRCRAFT – M. Birk, F. Schreier, D. Hausamann, DLR Inst of Optoelectronics, 8031 Obernfafferling, Germany; S. Miller, Phillips Laboratory, Hanscom AFB, MA

W5.4 CURRENT-FREQUENCY CHARACTERISTIC OF SUBMICRON GaAs SCHOTTKY BARRIER DIODES WITH FEMTOFARAD CAPACITANCES – H.P. Roeser, R.U. Titz, G.W. Schwaab, M.F. Huegel 69, 5300 Bonn, Germany

W5.5 A 380 GHz SIS RECEIVER USING HIGH QUALITY AND HIGH CURRENT DENSITIES Nb/A10x/Nb JUNCTIONS – P. Feautrier, P. Febvre, R. Maoli, B. Leridon, G. Ruffie, J.C. Pernot, G. Beaudin, M. Hanus, M. Gheudin, P. Encrenaz, Observatoire de Meudon, DEMIRM, 5 place Janssen, 92195 Mendon, Cedex, France

W5.6 FIR-FTS VERSUS FIR-HETERODYNE SPECTROMETER: A SENSITIVITY COMPARISON FOR ATMOSPHERIC APPLICATION – M. Birk, DLR Inst of Optoelectronics, 8031 Oberpfaffenhofen, Germany

W5.7 THE 350 GHz AND 230 GHz MIXERS WITH THE TUNED SIS JUNCTIONS – A. Karpov, M. Carter, B. Lazareff, M. Voss, D. Billon-Pierron, K.H. Gundlach, Institut de Radioastronomie Millimetrique, 300 Rue de la Piscine, Domaine Univer de Grenoble, F-38406 Saint Martin, France

W5.8 BALLOON-BORNE IMAGING OF THE CYGNUS REGION AT 250 μm WAVELENGTH – G. Schenker, D. Huguenin, F.K. Kneubühl, Inst of Quantum Electronics, Swiss Federal Inst of Technology, Zurich, Switzerland

W5.9 STRATOSPHERIC BALLOON-BORNE TELESCOPE FOR SUBMILLIMETER-WAVE IMAGING OF ASTRONOMICAL OBJECTS – G. Schenker, A.P. Holenstein, D. Huguenin, F.K. Kneubühl, Inst of Quantum Electonics, Switzerland

W5.10 MICROWAVE RECEIVER SYSTEM WITH QUANTUM SUPERCONDUCTION JOSEPHSON JUNCTION – S.E. Anischenko, S.V. Korsunskiy, P.V. Khabayev, S.Y. Larkin, Scientific-Research Center FONON, 37, Pobedy Av, KPI-3240, Kiev, Ukraine, 252056

SESSION W6

Wednesday PM — **MMW DEVICES** — Dec. 16

W6.1 AN EIGHT-CHANNEL HIGH-POWER CONTIGUOUS-BAND MULTIPLEXER FOR BROADCASTING SATELLITE TRANSPONDERS – F. Suginosita, T. Nomoto, N. Yazawa, NHK Science and Tech Res Lab, 1-10-11, Kinuta, Setagaya-ku, Tokyo, 157, Japan

W6.2 FIN-LINE PIN DIODE BPSK AND QPSK MODULATORS – L. He, X. Wu, X. Zhu, Dept of Radio Engr, Southeast Univ, 210018 Nanjing, P.R. China

W6.3 REAL TIME REVIEW OF RAIN-BOW HOLOGRAM WITH DCP IN WHITE-LIGHT – H. Guo, Southwest Inst of Fluid Physics, P.O. Box 523-59 Chengdu, Sichuan, P.R. China

W6.4 PROGRESS OF OPTICAL CONTROL OF QUASI-OPTICAL OSCILLATORS USING MESFETs – S. Kawasaki, T. Itoh, Dept. of EE, Univ. of California, Los Angeles, CA 90024

W6.5 HIGH SPEED PIN DIODE SWITCH FOR NARROW PULSE GENERATION – B.K. Sarker, Special Radar Div, IIT Campus, Powai, Bombay 400 076, India

W6.6 AlAs/InGaAs HETEROJUNCTION BARRIER VARACTOR DIODES – V.K. Reddy, D.P. Neikirk, Dept of Electrical and Cmptr Engr, The Univ of Texas at Austin, TX 78712

W6.7 A BROADBAND Ka-BAND MICROSTRIP CIRCULATOR FOR INTEGRATED MILLIMETER SYSTEMS – W.B. Dou, Z.L. Sun, Millimeter Wave Lab., Dept of Radio Engr, Southeast University, 210018 Nanjing, P.R. China

W6.8 ANALYSIS AND EXPERIMENT OF THE 3mm-BAND HIGHER ORDER MODES WAVEGUIDE Y-JUNCTION CIRCULATORS – W.B. Dou, Z.L. Sun, State Key Lab of Millimeter Waves, Dept of Radio Engr, Southeast University, 210018 Nanjing, P.R. China

W6.9 WAVEGUIDE PIN DIODE SWITCH AT Ka-BAND – B.K. Sarker, S. Gupta, IIT Campus, Powai, Bombay, 400.076 India

W6.10 UHF TO Ka BAND UPCONVERTER – S.K. Verma, G. Shankar, D. Singh, Defense Electronics Applications Lab, P.O. Box 54, Raipur Road, Dehradun 248 001 India

SESSION W7

Wednesday PM **PLASMA DIAGNOSTICS** Dec. 16

W7.1 DEVELOPMENT OF FIR LASERS FOR PLASMA DIAGNOSTICS ON LARGE HELICAL DEVICE (LHD) – S. Okajima*, K. Kawahata, Y. Naitou*, A. Ejiri, Y. Hamada, J. Fujita, *Appl. Phys. Lab., Chubu Univ., Kasugai, Aichi 487, Japan; National Inst. Fusion Sci., Nagoya, 464-01, Japan

W7.2 CALIBRATION OF AN INFRARED POLARIMETER FOR ALCATOR C-MOD – C.H. Ma, D.P. Hutchinson, Oak Ridge Natl. Lab., TN 37831; J. Irby, MIT PFC, Cambridge, MA 02139

W7.3 A BROADBAND REFLECTOMETER FOR THE GAMMA 10 TANDEM MIRROR – A. Mase, Y. Ito, T. Tokuzawa, A. Itakura, H. Satake, Y. Nagayama, T. Tamano, Plasma Res. Center, Univ. of Tsukuba, Tsukuba, Ibaraki 305, Japan

W7.4 SCATTERING FROM THE TORTUS TOKAMAK PLASMA USING A GYROTRON – P.W. Fekete, K.D. Hong, G.F. Brand, T. Idehara, School of Physics, Univ. of Sydney, NSW, 2006 Australia; Faculty of Engr., Fukui Univ., Fukui 910, Japan

W7.5 THE STUDY OF DENSITY FLUCTUATIONS IN THE JIPP T-IIU TOKAMAK USING HCN LASER SCATTERING – K. Kawahata, A. Ejiri, Y. Hamada, J. Fujita, Natl. Inst. for Fusion Sci., Nagoya 464, Japan; S. Okajima, Dept. of Applied Physics, Chubu Univ., Kasugai 487, Japan

W7.6 AN ICRF ANTENNA EDGE PLASMA DENSITY PROFILE DIAGNOSTIC FOR THE DIII-D TOKAMAK – T.S. Bigelow, G.R. Hansen, J.B. Wilgen, Oak Ridge National Lab; E. Doyle, T. Rhodes, UCLA, Los Angeles, CA

W7.7 INTERFEROMETRY MEASUREMENT OF LINE AVERAGE ELECTRON DENSITY IN ALVAND IIC TOKAMAK – M. Ghorannevis, M. Avakian, Islamic Azad Univ., P.O. Box 19395-1775 Thran, Iran

W7.8 APPLICATION OF NON-COHERENT REFLECTOMETRY METHOD FOR MEASUREMENT OF PLASMA CUT-OFF LAYER POSITION – V.V. Kulik, K.A. Lukin, V.A. Rakityansky, Inst. of Radiophysics and Electronics, Ukrainian Academy of Sciences, 12. Acad. Proskura st., 310085, Kharkov, Ukraine

SESSION W8

Wednesday PM | **GYROTRON IV** | Dec. 16

W8.1 STUDIES OF THE SELF-CONSISTENT FIELD STRUCTURE IN A QUASI-OPTICAL GYROTRON – *(Invited Keynote)* – T.M. Antonsen*, A. Bondeson, M. Roulin, M.Q. Tran, *University of Maryland, College Park, MD 20742; CRPP, 21 Av. des Bains, CH-1007 Lausanne, Switzerland

W8.2 HIGH POWER, LONG-PULSE, INTENSE e-BEAM, TAPERED GYROTRON-BACKWARD-WAVE OSCILLATORS – R.M. Gilgenbach, M.T. Walter, P.R. Menge, T.A. Spencer, University of Michigan, Nuclear Engr. Dept. Ann Arbor, MI 48109

W8.3 MECHANISMS OF EFFICIENCY ENHANCEMENT IN GYRO BACKWARD WAVE OSCILLATORS WITH TAPERED MAGNETIC FIELDS – A.T. Lin, Univ. of California, Los Angeles, CA 90024

W8.4 EXPERIMENTAL STUDY OF AN INJECTION LOCKED GYROTRON BACKWARD WAVE OSCILLATOR – C.S. Kou, S.H. Chen, L.R. Barnett, K.R. Chu, Dept. of Physics, National Tsing Hua Univ., Hsinchu, Taiwan

W8.5 DESIGN OF A 95 GHz SLOTTED HARMONIC GYRO-TWT AMPLIFIER – C.K. Chong, T.L. Stewart, C.F. Kinney, A.J. Balkcum, D.B. McDermott, N.C. Luhmann, Jr., Dept of EE, Univ. of California, Los Angeles, CA 90024; J. Pretterebner, Institut fur Plasmaforschung, Univ. of Stuttgart, Germany; W.J. DeHope, Varian Assoc., Palo Alto, CA 94303

W8.6 SECOND HARMONIC OPERATION OF GYROTRON V – K.D. Hong, G.F. Brand, T. Idehara, School of Physics, Univ. of Sydney, NSW, 2006 Australia; Faculty of Engineering, Fukui Univ., Fukui 910, Japan

W8.7 GYROTRON EXPERIMENTS USING CAVITIES OF DIFFERENT OHMIC Q – A.W. Cross, S.N. Spark, A.D.R. Phelps, Dept of Physics and Applied Physics, Strathclyde Univ., Glasgow, G4 ONG, U.K.

W8.8 SINGLE STAGE HIGH POWER SECOND HARMONIC GYRO-TWT – Q.S. Wang, D.B. McDermott, A.T. Lin, N.C. Luhmann, Jr., Dept of EE, Univ. of California, Los Angeles, CA 90024; J. Pretterebner, Institut fur Plasmaforschung, Univ. of Stuttgart, Germany

W8.9 GYROMAGNETRON OF 6-MM WAVE REGION – V.D. Yeremka, L.P. Mospan, Inst. of Radiophysics and Electronics, Academy of Sciences of Ukraine, 12 Acad. Proskura st., Kharkov, 310085, Ukraine

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W8.10 NONSTATIONARY NONLINEAR THEORY OF FAST WAVE DEVICES – A.P. Chetverikov, Saratov State Univ., Astrahanskay, 83, Saratov 410071, Russia

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W8.11 STARTING CONDITIONS OF SPONTANEOUS OSCILLATIONS IN FAST WAVE DEVICES – A.P. Chetverikov, A.E. Konevetz, Saratov State Univ., Astrahanskay, 83, Saratov 410071, Russia

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SESSION Th1

Thursday AM **INTEGRATED CIRCUITS** Dec. 17

Th1.1 A 35 GHz HBT MONOLITHIC GRID OSCILLATOR – M. Kim, E.A. Sovero*, R.M. Weikle II**, J.B. Hacker, M.P. DeLisio, D.B. Rutledge, Div of Engr, CA Inst of Tech, Pasadena, CA; *Rockwell International Science Center, 1049 Camino dos Rios, Thousand Oaks, CA 91360; **Dept of Applied Electron Physics, Chalmers Univ of Tech, S 41296 Goteborg, Sweden

Th1.2 SCALED MODELLING OF PLANAR ARRAY SIS MIXERS – H. Xue, R. Blundell, R. Padman, Cavendish Laboratory, Madingley Rd, Cambridge, CB3 OHE England

Th1.3 MICROSWITCH BEAM-STEERING GRID – J-C. Chiao, D.B. Rutledge, Div of Engr and Applied Science, California Institute of Technology, Pasadena, CA 91125

Th1.4 GaAs NONLINEAR TRANSMISSION LINES USING SCHOTTKY SUPERLATTICE BARRIER VARACTORS – W-M. Zhang, H. Shi, C.W. Domier, N.C. Luhmann, Jr., Ctr for High Frequency Electronics, Dept of EE, Univ of CA, Los Angeles, CA 90024

Th1.5 CHIP TO CHIP OPTICAL INTERCONNECTS IN A MULTICHIP MODULE ARCHITECTURE – J.A. Holmes, F.C. Jain, Univ. of Connecticut, 260 Glenn Brood Rd., Storrs, CT

Th1.6 CHARACTERIZATION OF MICROSTRIP MEANDER LINE SLOW-WAVE STRUCTURES FOR APPLICATIONS IN MM-WAVE PRINTED CIRCUITS – A.R. Jha, Jha Technical Consulting Services, 12354 Charlwood St, Cerritos, CA 90701

Th1.7 DEVELOPMENT OF NEW MICROWAVE AND MILLIMETER-WAVE END-COUPLED BAND-PASS FILTERS USING BROADSIDE-COUPLED COPLANAR WAVEGUIDE – C. Nguyen, Dept of EE, Texas A&M Univ, College Station, TX 77843

Th1.8 AN ACCURATE, HIGH RESOLUTION 30-250 GHz FREE-SPACE VECTOR TRANSMISSION MEASUREMENT SYSTEM USING MONOLITHIC GaAs ICs – Y. Konishi, M. Kamegawa, M. Case, R. Yu, M.J.W. Rodwell, Electrical and Cmptr Engr, Univ of California, Santa Barbara, CA 93106

Th1.9 SURFACE EMITTING CHARACTERISTICS OF SILICON WAVEGUIDES – N. Urimindi, C.S. Yeh, J. Liu, J.K. Butler, Southern Methodist Univ., Dallas, TX

Th1.10 HYBRID INTEGRATION OF MILLIMETER WAVE DEVICES USING THE EPITAXIAL LIFTOFF (ELO) TECHNIQUE – A.J. Tsao, M.S. Islam, D.P. Neikirk, Dept of Electrical and Cmptr Engr, The Univ of Texas at Austin, Austin, TX 78712

SESSION Th2

Thursday AM **FILTERS** Dec. 17

Th2.1 LOW-PASS AND HIGH-PASS FILTERS USING COAXIAL-TYPE DIELECTRIC RESONATORS – S. Toyoda, Dept of EE, Osaka Inst of Technology, 5-16-1 Omiya, Asahi-ku, Osaka 535, Japan

Th2.2 POLARIZATION SENSITIVE REFLECTORS MADE BY GRIDS OF THICK WIRES – L. Argenti, A. Bruschi, S. Cirant, G. Granucci, A. Simonetto, G. Solari, Instituto de Fisica del Plasma, EURATOM/ENA/CNR, Milano, Italy

Th2.3 ACCURATE DETERMINATION OF THE RESONANT FREQUENCY OF A RECTANGULAR APERTURE IN WAVEGUIDE AND ITS FILTER APPLICATION – R. Yang, A.S. Omar, Technische Universität Hamburg-Harburg, Germany

Th2.4 SUSPENDED STRIPLINE LOW PASS FILTERS DESIGN USING THE TLM METHOD – L.R.A.X. de Menezes, A.H. Machado, H. Abdalla Júnior, Universidada de Brasilia

Th2.5 BROAD-BAND BAND-PASS FILTER WITH VARIABLE CENTER FREQUENCY AND BAND WIDTH – S. Toyoda, Dept of EE, Osaka Institute of Technology, Japan

Th2.6 WAVEGUIDE BANDPASS FILTER WITH IMPROVED STOP-BAND RESPONSE – R. Yang, A.S. Omar, Technische Universität Hamburg-Harburg, Germany

Th2.7 A RF TUNABLE FILTER BASED ON ACOUSTO-ELECTRO-OPTIC INTERACTION – G.M. Pacheco, Div de Astrofisica, Brasil

Th2.8 A NEW ACOUSTO-ELECTRO-OPTIC IMPROVED RESOLUTION DEFLECTOR FOR HIGH FREQUENCY OPERATION – G.M. Pacheco, Brasil

Th2.9 USING JOSEPHSON JUNCTIONS FOR SPECTRUM ANALYZING MICROWAVE SIGNALS OF MM- & SUBMM- FREQUENCY BANDS – S.Y. Larkin, S.E. Anischenko, P.V. Khabayev, V.V. Kamyshin, S.V. Korsunskiy, Scientific-Research Center, 37, Pobedy AV., KPI-3240, Kiev, Ukraine, 252056

SESSION Th3

Thursday AM **OTHER SOURCES** Dec. 17

Th3.1 RECENT DEVELOPMENT OF FEL RESEARCH ACTIVITIES IN P.R.CHINA – *(Invited Keynote)* – S. Liu, Univ. of Electronic Science and Technology of China, Chengdu, Sichuan 610054, PRC

Th3.2 DEVELOPMENT AND INVESTIGATION OF MM WAVE REGION KLYSTRONS IN INSTITUTE OF RADIOPHYSICS AND ELECTRONICS OF UKRAINIAN ACADEMY OF SCIENCES – A.Ya. Usikov, V.D. Yeremka, Inst of Radiophysics and Electronics, Academy of Sciences of Ukraine 12, Acad. Proskura st., Kharkov, 310085, Ukraine

Th3.3 ANALYSIS OF TWO MUTUALLY COUPLED RADIAL LINE TRANSFORMERS IN DUAL-DIODE MILLIMETER-WAVE OSCILLATORS – J-P. Xu, S-F. Li, Dept of Electromagnetic Field Engr., Xidian Univ, Xidian, 710071, P.R. China

Th3.4 COAXIAL TWT OF MM WAVE REGION – V.D. Yeremka, Inst of Radiophysics and Electronics, Academy of Sciences of Ukraine

Th3.5 THEORETICAL STUDY OF HARMONIC INJECTION LOCKING OF MILLIMETER WAVE HARMONIC OSCILLATORS – J-P. Xu, Xidian University, P.R. China

Th3.6 GENERATORS OF STOCHASTIC OSCILLATIONS OF MM WAVE REGION – P.D. Burjunov, M.V. Mil'cho, A.B. Shermerevitch, B.P. Yephimov, V.D. Yeremka, Academy of Sciences of Ukraine

Th3.7 ECHELETTRON WITH TREE BEAM ELECTRON FLOW OF MM WAVE REGION – A.Ya. Belukcha, A.I. Fisun, A.M. Fursov, V.D. Yeremka, Academy of Sciences of Ukraine

Th3.8 MILLITRON WITH BROADED AMPLIFICATION BAND – A.Ya. Belukcha, L.P. Mospan, A.A. Shtanko, V.D. Yeremka, Academy of Sciences of Ukraine

Th3.9 HIGH-STABILITY SPHERE-CORNER-ECHELETTE OPEN RESONATOR GUNN-DIODE AND IMPATT-DIODE OSCILLATORS – O.I. Belous, A.I. Fisun, A.M. Fursov, Academy of Sciences of Ukraine

SESSION Th4

Thursday AM **GYROTRON V** Dec. 17

Th4.1 NUMERICAL ANALYSIS OF A CRYOGENICALLY COOLED GYROTRON WINDOW – F.V. Hartemann, P. Garin, G. Faillon, G. Mourier, Thomson Tubes Electroniques, 78141 Velizy, France; G. Tonon, J.P. Crenn, M. Bon-Mardion, CEA Cadarache, St-Paul-lés-Durance, France

Th4.2 EFFECT OF WINDOW TOLERANCES ON GYROTRON PERFORMANCE – O. Abo Elnor, K. Schünemann, Inst. Hochfrequenztechnik, Technical Univ. of Hamburg-Harburg, Germany

Th4.3 DEVELOPMENT OF CRYOGENIC WINDOW FOR HIGH POWER MILLIMETER WAVE – T. Yamamoto, K. Yokokura, A. Kasugai, K.Salamoto, M. Tsuneoka, T. Nagashima, Japan Atomic Energy Research Inst., Japan; K. Itoh, Y. Saitoh, Toshiba Corp., Tokyo, Japan

Th4.4 VACUUM WINDOWS FOR FREQUENCY TUNABLE HIGH-POWER MILLIMETER WAVE SYSTEMS – H-U. Nickel, U. Ambrosy, M. Thumm, Univ. Karlsruhe, Kaiserstr. 12, D-7500 Karlsruhe, Germany

Th4.5 POLARIZATION SENSITIVE REFLECTORS MADE BY GRIDS OF THICK WIRES – L. Argenti, A. Bruschi, S. Cirant, G. Granucci, A. Simonetto, G. Solari, EURATOM/ENEA. CNR Association, Milano, Italy

Th4.6 MODE LOCKING IN A CLOSED CAVITY GYROTRON OSCILLATOR – A.H. McCurdy, Univ. of Southern California, Los Angeles, CA 90089

Th4.7 SUB μ-SECOND GYROTRON DIODE RECOVERY TIME AND 330 Hz PRF MEASUREMENTS – S.N. Spark, A.W. Cross, A.D.R. Phelps, Dept. of Physics and Appl. Phys., Strathclyde Univ., Glasgow, G4 ONG, U.K.

Th4.8 STEPS TOWARDS SYNTHESIS OF MAGNETIC FIELD PROFILES IN DEPRESSED COLLECTOR REGION OF GYROTRONS – J. Cooperstein, A. Singh, V.L. Granatstein, Univ. of Maryland, College Park, MD 20742

Th4.9 SOME FEATURES OF HIGH POWER GYROTRON OSCILLATOR FOR THE RADIATION SOURCE OF AN EM WIGGLER – Z. Yang, C. Tang, C. Zhang, Univ. of Electronic of Science and Technology of China, Sichuan 610054, P.R. China

SESSION Th5

Thursday PM **GUIDED PROPAGATION** Dec. 17

Th5.1 SOLITONS IN PERIODIC STRUCTURES – *(Invited Keynote)* – J. Feng, F.K. Kneubühl, Institute of Quntum Electronics, Swiss Federal Inst of Technology, CH-8093 Zurich, Switzerland

Th5.2 ANALYSIS OF H-PLANE WAVEGUIDE JUNCTIONS WITH PARTIAL-HEIGHT FERRITE AND METAL POST – Y.Y. Tsai, Technische Univ Braunschweig, Postfach 33 29, D-3300 Braunschweig, Germany; A.S. Omar, Technische Univ Hamburg-Harburg, Postfach 90 10 52, D-2100 Hamburg 90, Germany

Th5.3 A SIMPLE DIVIDE-BY MEASUREMENT METHOD FOR TRANSMISSION COEFFICIENT MEASUREMENTS OF NON-COAXIAL COMPONENTS – M. Li, K.A. Hummer, K. Chang, Dept of EE, Texas A&M Univ, College Station, TX 77843

Th5.4 PROPAGATION CHARACTERISTICS IN MULTILAYERED DIELECTRIC PERIODIC STRUCTURES – J.C.W.A. Costa, A.J. Giarola, School of EE, State Univ of Campinas (UNICAMP), 13081 Campinas, SP, Brazil

Th5.5 CHARACTERIZATION OF UNILATERAL FINLINE CONSIDERING THE CONDUCTOR THICKNESS – H.C.C. Fernades, E.A.M. de Souza, N.D. de Freitas, E.D. Barbosa, Dept. of EE, Tech Ctr, Fed Univ of Rio Grande do Norte, Cx. Postal 1583, Brazil

Th5.6 ANALYSIS AND EXPERIMENTS OF AN INTERCONNECT FOR MICROSTRIP LINES – G.M. Luong, K. Chang, Texas A&M Univ., College Station, TX

Th5.7 TM NONLINEAR ELECTROMAGNETIC WAVES GUIDED BY AN INHOMOGENEOUS MEDIUM – M.M. Shabat, Physics Dept, The Islamic Univ of Gaza, P.O. Box 108, Gaza, Gaza Strip, Via - Israel

Th5.8 ANALYSIS OF OPTICAL FIBERS HAVING AN UNIAXIAL ANISOTROPIC DIELECTRIC WITH A VARIABLE INDEX OF REFRACTION PROFILE, BY THE FINITE-DIFFERENCE METHOD – C.L.S.S. Sobrinho, Fed Univ of Pará, Depto. of EE, 66050 Belém, PA, Brazil; A.J. Giarola, UNICAMP, School of EE, 13081 Campinas, SP, Brazil

Th5.9 A GENERAL METHOD FOR ANALYZING EM WAVE SCATTERING FROM ARBITRARILY SHAPED TWO-DIMENSIONAL PERIODIC SURFACES – K. Liu, W. Hong, Dept of Radio Engr, Southeast Univ, Nanjing, 210018, P.R. China

Th5.10 ANALYSIS OF RECTANGULAR ANISOTROPIC DIELECTRIC WAVEGUIDES BY THE FINITE-DIFFERENCE METHOD – C.L.S.S. Souza, Federal Univ. of Pará, 66050 Belém, Brazil; A.J. Giarola, UNICAMP, 13081 Campinas, Brazil

Thursday PM **POST DEADLINE I** Dec. 17

Th6.1 BUILT-IN CONVERTER FOR HIGH-POWER GYROTRON – M.A. Shapiro, S.N. Vlasov, A.N. Kuftin, Inst. of Appl. Phys. Russian Acad. of Science, 46, Uljanov Street, Nizhny Novgorod, Russia

Th6.2 COMBINED WAVEGUIDE LINES FOR HIGH-POWER MILLIMETER WAVES – M.A. Shapiro, S.N. Vlasov, Inst. Appl. Phys. Russian Acad. of Sciences, Russia

Th7.

SESSION Th8

Thursday PM **GYROTRON VI** Dec. 17

Th8.1 PARAMETERS OF GYROTRON ELECTRON BEAMS MEASURED BY THE METHOD OF RETARDING FIELDS – B. Piosczyk, Kernforschungszentrum Karlsruhe, ITP, Postfach 3640, D-7500 Karlsruhe 1, Germany

Th8.2 INFLUENCE OF ELECTRON BEAM ON TRANSVERSE STRUCTURE OF GYROTRON RADIATION – G.S. Nusinovich, Univ. of Maryland, College Park, MD 20742

Th8.3 DESIGN AND EXPERIMENTS OF HIGHER CYCLOTRON HARMONIC PENIOTRON OSCILLATORS – K. Yokoo, H. Shimawaki, H. Tadano, T. Ishiwara, K. Sagae, N. Sato, S. Ono, Research Inst. of Electrical Comm., Tohoku Univ., Sendai 980, Japan

Th8.4 35 GHz GYRO-PENIOTRON AMPLIFIER EXPERIMENT – G.S. Park, J.L. Hirshfield, Omega-P, Inc., New Haven, CT 06520; R.H. Kyser, B-K Systems, Inc., Rockville, MD 20850; C.M. Armstrong, A.K. Ganguly, Naval Research Lab, Washington, DC 20375

Th8.5 HIGH POWER X-BAND AND K-BAND SECOND HARMONIC GYROKLYSTRON EXPERIMENTS – W. Lawson, H.W. Matthews, V. Specht, J.P. Calame, B. Hogan, M.K.E. Lee, C.D. Striffler, V.L. Granatstein, Laboratory for Plasma Research, Univ. of Maryland, College Park, MD 20742

Th8.6 MODE INTERACTION AT THE CYCLOTRON HARMONICS IN GYROTRON OSCILLATORS – G.P. Saraph, G.S. Nusinovich, T.M. Antonsen, B. Levush, Univ. of Maryland, College Park, MD

Th8.7 EXPERIMENTAL STUDY OF THE MODE SELECTIVE CIRCUITS FOR PHASE-CONTROLLED HARMONIC GYROTRONS OSCILLATORS AND AMPLIFIERS – H. Guo, J.P. Tate, M. Naiman, B. Levush, T.M. Antonsen, Jr., S.Y. Cai, G.S. Nusinovich, V.L. Granatstein, Univ. of Maryland, College Park, MD

Th8.8 SLOW EQUATIONS FOR HIGH-HARMONIC MODE COMPETITION INVESTIGATIONS IN GYROTRONS – G.F. Brand, T. Idehara, School of Physics, Univ. of Sydney, NSW, 2006 Australia; Faculty of Engineering, Fukui Univ., Fukui 910, Japan

Th8.9 STARTING CURRENT IN GYROTRON COAXIAL CAVITIES – R.A. Correa, J.J. Barroso, A. Montes, Laboratorio Associado de Plasma, Instituto Nacional de Pesquisas Espaciais, 12201 - São José dos Campos, SP - Brasil

Th8.10 LIMITING CURRENT IN GYROTRON COAXIAL CAVITIES – R.A. Correa, J. J. Barroso, Laboratorio Associado de Plasma, Instituto Nacional de Pesquisas Espaciais, 12201 - São José dos Campos, SP - Brasil

Th8.11 A COMPARATIVE STUDY FOR HIGH HARMONIC GYROTRONS WITH TWO STRUCTURES – H. Li, P. Du, J. Hu, Univ. of Electronic Sci. and Tech. of China, Chengdu, Sichuan, P.R. China

Th8.12 THEORY OF HELICAL ELECTRON BEAMS IN GYROTRONS – A.N. Kuftin, V.N. Manuilov, B.V. Raisky, E.A. Solujanova, Sh.E. Tsimring, USSR Academy of Sciences, 46 Uljanov Str., 603600 Nizhny Novgorod, Russia

Th8.13 MATCHING OF THE FREQUENCY-TUNABLE GYROTRON TO THE OTHER MIRROR WAVEGUIDE – A.V. Chirkov, G.G. Denisov, M.Yu. Shmelyov, D.V. Vinodradov, Inst. of App. Phuysics of Russian Academy of Science, Nizhny Novgorod, Russia

Th8.14 GENERATOR AND AMPLIFIER REGIMES OF AUTORESONANT PENIOMAGNETRON – V.D. Yeremka, V.A. Zhurakhovskiy, Inst. of Radiophysics and Electronics, Acad. of Sci. of Ukraine, Kharkov, 310085, Urkaine