

GEORGE I. HADDAD

Robert J. Hiller Professor of Electrical Engineering and Computer Science

DATE AND PLACE OF BIRTH: April 7, 1935, Aindara, Lebanon

CITIZENSHIP: U. S.

EDUCATION: B.S.E. (EE), 1956, The University of Michigan
M.S.E. (EE), 1958, The University of Michigan
Ph.D. (EE), 1963, The University of Michigan

EMPLOYMENT:

Academic: The University of Michigan, Department of Electrical
Engineering and Computer Science:
Teaching Fellow, 1957–58
Instructor, 1960–63
Assistant Professor, 1963–65
Associate Professor, 1965–69
Professor, 1969–2005
Emeritus Professor, 2005–
Chairman, 1975–86
Chairman, 1991–97

Research: Motorola:
TV Engineering, 1956

The University of Michigan,
Department of Electrical Engineering and Computer Science:
Research Assistant, 1957–58
Assistant Research Engineer, 1959–61
Project Engineer, Electron Physics Laboratory, 1963–
Acting Director, Electron Physics Laboratory,
April 1 to August 1, 1967
Director, Electron Physics Laboratory, 1968–75
Director, Center for High-Frequency Microelectronics, 1986–2000
Director, Solid-State Electronics Laboratory, 1987–91

Consulting: Omni Spectra, Inc.
ITT Avionics, Inc.
MIT, Lincoln Laboratory
United Aircraft Research Laboratory

Midwest Microwave
Westinghouse Electric Corporation
Illinois Institute of Technology Research Institute
Environmental Research Institute of Michigan
Microwave Associate, Inc.
Hughes Research Laboratories
Hughes Microwave Products Division
General Electric Electronic Research Lab
TRW, Inc.
Varian Associates
Hewlett-Packard
Perceptron
Inmet
MCE
Battelle
MCE Technologies Inc.
MCE Optoelectronics Inc.

SCIENTIFIC AND PROFESSIONAL SOCIETIES:

American Physical Society
American Society of Engineering Education
Institute of Electrical and Electronics Engineers

HONORARY SOCIETIES:

Eta Kappa Nu
Phi Kappa Phi
Sigma Xi
Tau Beta Pi

HONORS AND AWARDS

Ford Foundation, "Residencies in Engineering Practice," Omni Spectra, Inc., 1967–68
Curtis W. McGraw Research Award of the American Society
for Engineering Education, 1970
Fellow, Institute of Electrical and Electronics Engineers, 1972
Distinguished Service Award, MTT Society, 1977

Excellence in Research Award, College of Engineering, University of Michigan, 1985
 Distinguished Faculty Achievement Award, The University of Michigan, 1985–86
 S. S. Attwood Award for Distinguished Engineering Achievement
 College of Engineering, 1988
 Robert J. Hiller Professor of Electrical Engineering and Computer Science,
 College of Engineering, 1990–
 Member, National Academy of Engineering, 1994–
 Distinguished Educator Award, IEEE International Microwave Theory and Techniques
 Society, 1996
 IEEE Millennium Medal, 2000

LISTED IN:

American Men and Women of Science	Who's Who in Technology Today
Who's Who in American Higher Education	National Register of Prominent Americans and International Notables
Who's Who in America	Who's Who in Engineering
Dictionary of International Biography	The Dictionary of Distinguished Americans, 1981 Edition
International Who's Who in Community Service	Personalities of America
Men of Achievement	Contemporary Personalities
Community Leaders and Noteworthy Americans	
Notable Americans of 1976–77	Int. Who's Who in Engineering
Who's Who in the World	Personalities in the West and Midwest
Men and Women of Distinction	

UNIVERSITY SERVICE:

Member, Engineering College North Campus Planning Committee, 1965–69
 Member, Executive Committee, Institute of Science and Technology, 1969–72
 Member, Graduate Committee, 1970–75; Ex Officio Member, 1975–86
 Member, Promotions Committee, 1970–74; Chairman, 1975–86
 Member, Office of Energy Research Advisory Committee, 1978–86
 Member, Research Advisory Council, 1977–79
 Member, Committee on the Economic Status of the Faculty, 1973–76
 Member, Instructional Material Royalties Committee, 1973–74
 Chairman, Budget Priorities Committee for Department of
 Electrical and Computer Engineering, 1974–75
 Member, College of Engineering Nominations Committee, 1974–75
 Member, University Research Policies Committee, 1976–79; Chairman, 1977–79

Chairman, Representative Committee, 1975– 83
Member, Executive Committee, Office of Study of Automotive Transportation,
1978–82
Member, IST Review Committee, 1978–80
Member, A-21 Committee, 1979–80
Member, UM Committee on Honorary Degrees, 1981–84
Member, Honors and Awards Committee, College of Engineering, 1986–1990
Member, Applied Physics Faculty Search Committee, 1987– 88
Reviewer, Research Partnership Program, 1986– 88
Member, University Budget Priorities Committee, 1988– 91
Member, Provost Advisory Committee on Excellence, 1990– 92
Member, Technology Management Office, Advisory Board
on Technology Development and Economic Impact, 1996–1999
Member, Science Policy Advisory Group, OVPR, 2000–2001
Member, Primary Research Scientists Awards Committee, OVPR, 2000–2001
Cognate Faculty Panel Member, Faculty Grievance Review Board, (Chair) 2002–2003
Provost and Executive VP for Academic Affairs, 2001–
Resolutions officer, 2001 Resolution Board, Office of Student Conflict
Resolution, VP for Student Affairs, 2001–
Member, University Henry Russell Lecture Committee, 2001-
Member, College of Engineering NAE Membership Committee, 2001-
Member, College of Engineering Honors and Awards Committee, 2002-
Member, University of Michigan Rackham Appeals Panel, 2005-

PROFESSIONAL ACTIVITIES:

Member of the Steering Committee and Chairman of the Technical Program Committee
for the 1968 International Microwave Symposium, Detroit, MI
Member, Technical Program Committees for the International Microwave
Symposium, 1969–73, 1978
Member, Technical Program Committees for the International Solid-State Circuits
Conference, Philadelphia, PA, 1968–74
Editor, *IEEE Transactions on Microwave Theory and Techniques*, 1968–71
Member, Technical Program Committees for the 1967 and 1968 International Electron
Devices Meetings, Washington, D.C.
Chairman, Technical Program Committee 8th Annual Electron and Laser Beam Symposium,
1966
Editor, Proceedings of the 8th Annual Electron and Laser Beam Symposium, 1966
Session Chairman Workshop on Compound Semiconductors for Microwave Devices, 1975
Member, Merger Committee for the Microwave Theory and Techniques Society, 1972
Member, Administrative Committee of the IEEE Society on Microwave

Theory and Techniques, 1968–76
 Publications Chairman, IEEE Society on Microwave Theory and Techniques, 1971–74
 Member Fellow Awards Committee for the Microwave Theory and
 Techniques Society, 1971–73
 Member, Subcommittee on Standards, Solid- State Microwave Devices I,
 for the Electron Devices Society, 1972– 75
 Member, Transactions Review Committee, Division IV, IEEE, 1972
 Session Chairman, 1971 European Microwave Conference, Stockholm
 Co-Coordinator and Lecturer, “Microwave Solid-State Devices and
 Circuits, continuing education course, UCLA, 1981– ; Univ. of Maryland, 1982–
 U. S.-IEEE Delegate to the 1974 Popov Society Congress, USSR
 Microwave Theory and Techniques Society representative on Solid-State Circuit
 Council of the IEEE, 1974–77
 Chairman, Awards Committee for Society on Microwave Theory and Techniques
 of the IEEE, 1974
 Session Chairman, International Solid-State Circuits Conference 1970, 1972–74
 Member, Board of Directors, National Engineering Consortium, Inc., 1976–81
 Session Chairman, International Microwave Symposium, 1969, 1971, 1973
 Panel Member Special Session on TRAPATT and LSA, International
 Microwave Symposium 1974
 Member, IEEE Publication Board, 1975–76
 Member, Editorial Board, *IEEE Transactions on Microwave Theory and Techniques*, 1976–
 Member, Editorial Board, *Microwave and Optical Technology Letters*, 1987–
 Reviewer, *J. of Applied Physics*, Electron Device Society, and MTT Society, 1976–
 Member, Visiting Committee, Lehigh University, Department of Computer
 Science and Electrical Engineering, 1986–90
 Member, Advisory Council, North Carolina State University, School of Engineering, 1986–90
 Member, Editorial Board, *Solid-State Electronics*, 1988–
 Member, Hewlett-Packard Laboratories Research Board, 1988–92
 Member, U. S. Army Science Board, 1991–93
 Member, SEMATECH University Advisory Council, 1991–96
 Member NRC Advisory Committee for the Army Research Laboratory, 1996–
 Member, Electronics Peer Committee, National Academy of Engineering, 1996–99
 Member, Duke University, School of Engineering Board of Visitors, 1998–01
 Member, Dean’s Advisory Board, College of Engineering, University of Florida, 2002-

PATENTS:

“Narrow-Band-Gap Base Transistor Structure with Dual Collector-Base Barrier Including a Graded Barrier,” Patent Number 4,912,539, issued March 27, 1990.

“Digital Logic Design Using Negative Differential Resistance Diodes and Field-Effect Transistors,” U.S. Patent No. 5903170, issued May 11, 1999.

PUBLICATIONS:

Books and Book Chapters

Avalanche Transit-Time Devices, G. I. Haddad (Ed.), Artech House, Inc., Dedham, MA, 1973.

“Impact of Submicron Technology on Microwave and Millimeter-Wave Devices,” (with P. A. Blakey and J. R. East), *Microstructure Science and Engineering/VLSI*, N. Einspruch (Ed.), vol. 1, Academic Press, Inc., New York, 1981.

“Properties and Capabilities of Millimeter-Wave IMPATT Diodes,” (with R. K. Mains), *Infrared and Millimeter-Waves*, K. J. Button (Ed.), vol. 10, Part III, Chap. 3, Academic Press, Inc., New York, 1983.

“Fabrication and Performance of Very High Frequency Diodes,” *VLSI Electronics: Microstructure Science*, N. Einspruch (Ed.), vol. 9, pp. 441–454, Academic Press, Inc., New York, 1985.

“Device Applications of Resonant Tunneling Structures,” (with I. Mehdi) chapter in *Optoelectronic Materials and Device Concepts*, M. Razeghi, (Ed.), SPIE press, November 1991.

“Active Microwave Diodes,” (with H. Eisele) Chapter 6, *Modern Semiconductor Device Physics*, S. M. Sze, (Ed.), John Wiley & Sons, New York, 1997.

“IMPATT Diodes Using InP,” (with H. Eisele), in *Properties, Processing and Applications of Indium Phosphide*, T. Pearsall, (Ed.), IEE, Stevenage, U.K., 1999.

“Population Dynamics of Far-Infrared Intersubband Lasers,” (with X. Zhang, A. Afzali-Kushaa, C. Y. Sung, J. Sun and T. Norris), in *Long-Wavelength IR Emitters Based on QWs and SLs*, Gordon & Breach, Amsterdam, The Netherlands, 2000.

“Quantum Well Intersubband Lasers,” (with J. P. Sun, M. Dutta and M. Stroschio), in *Advances in Semiconductor Lasers and Applications to Optoelectronics*, M. Dutta and M. Stroschio (Eds.), World Scientific, Singapore, 2000.

“Two-Terminal Active Devices for Terahertz Sources,” in *Terahertz Sensing Technology*, D. Woolard, W. R. Loerop and M. Shur (Eds), Vol. 1, World Scientific, 2003.

“Characterization of Amplifier Nonlinearities and their Effects in Communications Systems,” (with J. East and W. Stark), in *RF Technologies for Low Power Wireless Communications*, T. Itoh, G. Haddad and J. Harvey (Eds.), pp. 229–264, John Wiley and Sons, Inc., New York, 2001.

“InP-Based Devices and Circuits,” (with D. Pavlidis and D. Sawdai), in *RF Technologies for Low Power Wireless Communications*, T. Itoh, G. Haddad and J. Harvey (Eds.), pp. 79–124, John Wiley and Sons, Inc., New York, 2001.

Journal Articles

“X-Band Ladder-Line Traveling-Wave Maser” (with J. E. Rowe), *IRE Trans. on Microwave Theory and Techniques*, vol. MTT-10, No. 1, pp. 3–8, January 1962.

“General Velocity Tapers for Phase-Focused Forward-Wave Amplifiers” (with J. E. Rowe) (Correspondence), *Trans. PTGED-IEEE*, vol. ED-10, No. 3, p. 212, May 1963.

“Start Oscillation Conditions of Tapered Backward-Wave Oscillators” (with R. M. Bevens), *Trans. PTGED-IEEE*, vol. ED-10, No. 6, pp. 389–392, November 1963.

“Efficiency of Tapered Backward- Wave Oscillators” (with J. E. Rowe), *Trans. PTGED-IEEE*, vol. ED- 11, No. 1, pp. 20–30, January 1964.

“Start-Oscillation Conditions in Nonuniform Backward- Wave Oscillators,” *Trans. PTGED-IEEE*, vol. ED-11, No. 1, pp. 31-37, January 1964.

“Traveling-Wave Maser Experiments Using Ruby at X- Band” (with D. H. Paxman), *Trans. PTGMIT-IEEE*, vol. MTT-12, No. 4, pp. 406–414, July 1964.

“Harmonic Cross-Relaxation in Chromium-Doped Rutile” (with D. H. Paxman), *Proc. IEEE*, vol. 53, No. 5, pp. 501–502, May 1965.

“Coupled-Mode Description of Space- Charge Waves on Nonuniform Beams” (with J. E. Adair), *IEEE Trans. on Electron Devices*, vol. ED-12, No. 10, pp. 536–547, October 1965.

“Characteristics of Dielectrically Loaded Ladder Lines for Traveling-Wave Masers and Other Applications,” *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-14, No. 3, pp. 120–128, March 1966.

“Millimeter- and Submillimeter-Wave Quantum Detectors,” *Proc. IEEE*, vol. 54, No. 4, pp. 627–632, April 1966.

“The Characteristic Impedance and Coupling Coefficient of Coupled Rectangular Strips in a Waveguide” (with M. K. Krage), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-16, No. 5, pp. 302–307, May 1968.

“A Large- Signal Analysis of IMPATT Diodes” (with W. J. Evans), *IEEE Trans. on Electron Devices*, vol. ED-15, No. 10, pp. 708–717, October 1968.

“Frequency Conversion in IMPATT Diodes” (with W. J. Evans), *IEEE Trans. on Electron Devices*, vol. ED-16, No. 1, pp. 78–87, January 1969.

“Coupled-Mode Analysis of Nonuniform Coupled Transmission Lines” (with J. E. Adair), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-17, No. 10, pp. 746–752, October 1969.

“Comments on Simplified Model for Avalanche-Resonance-Pumped Semiconductor Diodes” (with W. E. Schroeder), *Electronics Letters*, vol. 6, No. 4, pp. 114–115, 19 February 1970.

“Characteristics of Coupled Microstrip Transmission Lines, Part I: Coupled-Mode Formulation of Inhomogeneous Lines” (with M. K. Krage), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-18, No. 4, pp. 217–222, April 1970.

“Characteristics of Coupled Microstrip Transmission Lines, Part II: Evaluation of Coupled-Line Parameters” (with M. K. Krage), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-18, No. 4, pp. 222–228, April 1970.

“Effect of Harmonic and Subharmonic Signals on Avalanche Diode Oscillator Performance” (with W. E. Schroeder), *IEEE Trans. on Microwave Theory and Techniques*, (Correspondence), vol. MTT-18, No. 6, pp. 327–331, June 1970.

“Basic Principles and Properties of Avalanche Transit- Time Devices” (with P. T. Greiling and W. E. Schroeder), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-18, No. 11, pp. 752–772, November 1970.

“Large-Signal Equivalent Circuits of Avalanche Transit- Time Devices (with P. T. Greiling), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-18, No. 11, pp. 842– 853, November 1970.

“Metal-Oxide-Metal (M-O-M) Detector” (with S. P. Kwok and G. Lobov), *J. Appl. Phys.*, vol. 42, No. 2, pp. 554– 563, February 1971.

“The Effects of Doping Profile on Reflection- Type IMPATT Diode Amplifiers” (with R. W. Laton), *Proc. 1971 European Microwave Conf.*, Stockholm, Sweden, pp. A 5/1:1–A 5/1:4, August 1971.

“Avalanche Region Width in Various Structures of IMPATT Diodes” (with W. E. Schroeder), *Proc. IEEE* (Correspondence), vol. 59, No. 8, pp. 1245–1248, August 1971.

“The Effect of Temperature on the Operation of an IMPATT Diode”(with W. E. Schroeder), *Proc. IEEE* (Correspondence), vol. 59, No. 8, pp. 1242–1244, August 1971.

“Millimeter- and Submillimeter-Wave Detection by Paramagnetic Materials” (with C. F. Krumm), *IEEE J. of Quantum Electronics*, vol. QE-7, No. 10, pp. 475–484, October 1971.

“Cavity Perturbation Techniques for Measurement of the Microwave Conductivity and Dielectric Constant of a Bulk Semiconductor Material” (with I. I. Eldumiati), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT- 20, No. 2, pp. 126– 132, February 1972.

“A Microwave-Biased Millimeter- and Submillimeter-Wave Detection Using InSb” (with I. I. Eldumiati). *IEEE Trans. on Electron Devices*, vol. ED- 19, No. 2, pp. 257– 267, February 1972.

“Effects of Tunneling on an IMPATT Oscillator” (with S. P. Kwok), *J. Appl. Phys.*, vol. 43, No. 9, pp. 3824–3830, September 1972.

“Effect of Magnetic Field on the Performance of Millimeter-Wave Detectors Using Bulk InSb,” *IEEE Trans. on Electron Devices* (Correspondence), vol. ED-19, No. 9, pp. 1061– 1063, September 1972.

“Frequency-Dependent Characteristics of Microstrip Transmission Lines” (with M. K. Krage), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT- 20, No. 10, pp. 678–688, Oct. 1972.

“Intermodulation Characteristics of X-Band IMPATT Amplifiers” (with R. J. Trew and N. A. Masnari), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT- 20, No. 12, pp. 805–812, December 1972.

“Microwave Properties of n-Type InSb in a Magnetic Field Between 4 and 300K” (with I. I. Eldumiati), *J. Appl. Phys.*, vol. 44, No. 1, pp. 395–405, January 1973.

“Nonlinear Properties of IMPATT Devices” (with W. E. Schroeder) (Invited Paper), *Proc. IEEE*, vol. 61, No. 2, pp. 153–182, February 1973.

“An Approximate Comparison Between n^+pp^+ and p^+n^+ Silicon TRAPATT Diodes” (with C. M. Lee and W. E. Schroeder) *IEEE Trans. on Microwave Theory and Techniques* (Short Paper), vol. MTT-21, No. 7, pp. 501–502, July 1973.

“Computer Simulation of TRAPATT Oscillations in Si n^+pp^+ and p^+nn^+ Diodes” (with C. M. Lee and R. J. Lomax), *Proc. Fourth Biennial Cornell Electrical Engineering Conf.*, Ithaca, NY, pp. 409–418, August 1973.

“Comparison of S-Band Silicon n^+pp^+ and p^+nn^+ TRAPATT Oscillators” (with R. J. Trew and N. A. Masnari), *Proc. Fourth Biennial Cornell Electrical Engineering Conf.* Ithaca, NY, pp. 419–426, August 1973.

“Effect of Recombination Time on Efficiency and Frequency of Operation GaAs TRAPATT Devices” (with P. E. Bauhahn), *Electronic Letters*, vol. 9, No. 19, p. 455, 20 September 1973.

“Comparison of the Hot Electron- Diffusion Rates for GaAs and InP” (with P. E. Bauhahn and N. A. Masnari), *Electronics Letters*, vol. 9, No. 19, p. 460-461, 20 September 1973.

“Nonlinear Behavior and Bias Modulation of an IMPATT Diode Oscillator” (with C. Chao), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-21, No. 10, pp. 619–630, October 1973.

“Characteristics of IMPATT- Diode Reflection Amplifiers” (with R. W. Laton), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-21, No. 11, pp. 668–680, November 1973.

“Effect of Circuit Load on the Phase of Bias Tuning in Transferred-Electron Devices” (with D. Tang and R. J. Lomax), *Electronics Letters*, vol. 9, No. 24, pp. 564–565, 29 November 1973.

“Effects of Ionization Rates on IMPATT Device Admittance” (with M. M. Seddik), *IEEE Trans. on Electron Devices (Correspondence)*, vol. ED- 20, No. 12, pp. 1164–1168, December 1973.

“Noise Considerations in Self-Mixing IMPATT- Diode Oscillators for Short-Range Doppler Radar Applications” (with M. S. Gupta and R. J. Lomax), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-22, No. 1, pp. 37–43, January 1974.

“A Comparison Between n^+ - p - p^+ and p^+ - n - n^+ Silicon IMPATT Diodes” (with C. M. Lee and R. J. Lomax), *IEEE Trans. on Electron Devices*, vol. ED-21, No. 2, pp. 137–141, February 1974.

“Semiconductor Device Simulation” (Invited Paper) (with C. M. Lee and R. J. Lomax), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT- 22, No. 3, pp. 160–177, March 1974.

“Quenched- Domain Mode Admittance Model for Transferred-Electron Devices” (with J. T. Patterson and R. J. Lomax), *IEEE Trans. on Electron Devices (Correspondence)*, vol. ED-21, No. 10, pp. 654– 656, October 1974.

“Optimization of S-Band TRAPATT Oscillators” (with R. J. Trew and N. A. Masnari), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-22, No. 12, pp. 1166–1170, December 1974.

“Effects of Ionization Rates on Silicon IMPATT Devices” (with C. M. Lee and M. M. Seddik), *IEEE Trans. on Electron Devices (Correspondence)*, vol. ED-21, No. 12, pp. 808– 809, December 1974.

“Properties of Millimeter-Wave IMPATT Diodes” (with M. M. Seddik), *IEEE Trans. on Electron Devices (Correspondence)*, vol. ED-21, No. 12, pp. 809–811, December 1974.

“Harmonic Tuning Effects of TRAPATT Oscillators” (with R. J. Trew and N. A. Masnari), *1975 Int. Microwave Symp. Digest*, Palo Alto, CA, pp. 85–87, May 1975.

“Experimental Investigation of TRAPATT Diode Trigger Conditions” (with J. R. East and N. A. Masnari), *Proc. Fifth Biennial Conf. on Active Semiconductor Devices for Microwaves and Integrated Optics*, Ithaca, NY, August 1975.

“The Operation of S-Band TRAPATT Oscillators with Tuning at Multiple Harmonic Frequencies” (with R. J. Trew and N. A. Masnari), *IEEE Trans. on Microwave Theory and Techniques* (Short Paper), vol. MTT-23, No. 12, pp. 1043–1047, December 1975.

“A Simplified Model of TRAPATT Diode” (with R. J. Trew and N. A. Masnari), *IEEE Trans. on Electron Devices*, vol. ED-23, No. 1, pp. 28–36, January 1976.

“BARITT Devices for Self-Mixed Doppler Radar Applications” (with J. R. East and H. Nguyen-Ba), *1976 IEEE MTT-S Int. Microwave Symp. Digest*, Cherry Hill, NJ, pp. 43–44, June 1976.

“Microwave Solid-State Devices for Self-Mixing Doppler Radars” (with H. Nguyen-Ba and J. R. East), *Proc. Int. Symp. on Automotive Electronics and Electric Vehicles (Convergence)*, Dearborn, MI, September 1976.

“Power Limitations in BARITT Devices” (with S. P. Kwok), *Solid-State Electronics*, vol. 19, No. 9, pp. 795–807, September 1976.

“Finite-Elements Simulation of GaAs MESFET’s with Lateral Doping Profiles and Sub-micron Gates” (with J. J. Barnes and R. J. Lomax), *IEEE Trans. on Electron Devices*, vol. ED-23, No. 9, pp. 1042–1048, September 1976.

“Microwave and mm Wave BARITT Doppler Detectors” (with J. R. East and H. Nguyen-Ba), *Microwave J.*, vol. 19, No. 11, pp. 51–55, November 1976.

“Design Fabrication, and Evaluation of BARITT Devices for Doppler System Applications” (with J. R. East and H. Nguyen-Ba), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-24, No. 12, pp. 943–948, December 1976.

“Transient Analysis of the TRAPATT Mode” (with M. Khochnevis-Rad and R. J. Lomax), *Tech Digest 1976 Int. Electron Devices Meeting*, Washington, DC, pp. 106–109, December 1976.

“Experimental Investigation of TRAPATT Diode Trigger Conditions” (with J. R. East and N. Masnari), *IEEE J. of Solid-State Circuits*, vol. SC-12, No. 1, pp. 14–20, February 1977.

“IMPATT Device Simulation and Properties” (with P. E. Bauhahn), *IEEE Trans. on Electron Devices*, vol. ED-24, No. 6, pp. 634–642, June 1977.

“K. Band BARITT Doppler Detectors” (with J. R. East and P. J. McCleer), *1977 IEEE MTT-S Int. Microwave Symp. Digest*, San Diego, CA, pp. 88–91, June 1977.

“Operation of Transistors in the Punch- Through Mode” (with P. J. McCleer), *Proc. Sixth Biennial Conf. on Active Microwave Semiconductor Devices and Circuits*, Ithaca, NY, August 1977.

“Effects of Doping Profile on the Performance of BARITT Devices” (with H. Nguyen-Ba), *IEEE Trans. on Electron Devices*, vol. ED-24, No. 9, pp. 1154–1163, September 1977.

“Effects of Depletion-Layer Modulation on Spurious Oscillations in IMPATT Diodes” (with D. Tang), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT- 25, No. 9, pp. 734– 741, September 1977.

“Solid-State Devices for Low- Frequency Doppler Detectors” (with I. Iijima and J. R. East), *IEEE Trans. on Microwave Theory and Techniques* (Tech. Note), vol. MTT-26, No. 2, pp. 132–133, February 1978.

“On the Base Region Minority Carrier Concentration in Narrow-Base Transistors” (with P. J. McCleer), *IEEE Trans. on Electron Devices*, vol. ED-25, No. 3, pp. 382–384, March 1978.

“A Proposed New High-Speed Optical Detector” (with P. J. McCleer), *IEEE Trans. on Electron Devices*, vol. ED-25, No. 3, pp. 389–392, March 1978.

“Mixed Tunneling and Avalanche Mechanisms in p-n Junctions and Their Effects on Microwave Transit-Time Devices” (with M. E. Elta), *IEEE Trans. on Electron Devices*, vol. ED-25, No. 6, pp. 694–702, June 1978.

“Device-Circuit Interaction Simulation of a TRAPATT Amplifier” (with R. K. Mains and N. A. Masnari), *1978 IEEE MTT-S Int. Microwave Symp. Digest*, Ottawa, Canada, pp. 85–87, June 1978.

“BARITT Diode Video Detectors” (with P. J. McCleer), *1978 IEEE MTT-S Int. Microwave Symp. Digest*, Ottawa, Canada, pp. 372–374, June 1978.

“Transient Analysis of the TRAPATT Mode in Avalanche Diodes” (with M. Khochnevis-Rad and R. J. Lomax), *Solid-State Electronics*, vol. 21, No. 10, pp. 1245– 1252, October 1978.

“High-Frequency Limitations of IMPATT, MITATT, and TUNNETT Mode Devices” (Invited Paper)(with M. E. Elta), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-27, No. 5, pp. 442–449, May 1979.

“Large-Signal Performance of Microwave Transit-Time Devices in Mixed Tunneling and Avalanche Breakdown” (with M. E. Elta), *IEEE Trans. on Electron Devices*, vol. ED-26, No. 6, pp. 941–948, June 1979.

“Computerized C(V) Profiling Techniques” (with P. A. Blakey, J. R. East, J. Heaton and D. Kinzel), *Proc. Seventh Biennial Conf. on Active Microwave Semiconductor Devices and Circuits*, Ithaca, NY, August 1979.

“Read-Type Varactors for Parametric Amplifier Applications” (with D. F. Peterson), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-28, No. 9, pp. 945–951, September 1980.

“Theoretical Investigations of TRAPATT Amplifier Operation” (with R. K. Mains and N. A. Masnari), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-28, No. 10, pp. 1070–1076, October 1980.

“Microwave Engineers” (invited Editorial), *Microwave J.*, vol. 23, No. 11, p. 16 and 21, November 1980.

“Analytic Modeling of Transit-Time Device Drift Regions with Field-Dependent Transport Coefficients” (with P. J. McCleer, D. E. Snyder and R. O. Grondin), *Solid-State Electronics*, vol. 24, No. 1, pp. 37–48, January 1981.

“Investigations of Broad-Band Linear Phase Shifters Using Optimum Varactor Diode Doping Profiles” (with R. K. Mains and D. F. Peterson), *IEEE Trans. on Microwave Theory and Techniques*, vol. MTT-29, No. 11, pp. 1158–1164, November 1981.

“Millimeter-Wave IMPATT Diode Modeling” (with P. A. Blakey, R. K. Froelich, R. O. Grondin, and R. K. Mains), *Proc. Eighth Biennial Cornell Electrical Engineering Conf. on Microwave Semiconductor Devices and Circuits*, Ithaca, NY, pp. 361–369, August 1981.

“Millimeter-Wave BARITT Diode Mixers and Detectors” (with J. Chen, J. R. East, R. O. Grondin, Y. Anand, D. Densenouci, S. Ellis, and L. Mang). *1982 IEEE MTT-S Digest*, Dallas, TX, pp. 367–368, June 1982.

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"Experimental Realization of the Bound State Resonant Tunneling Transistor," (with W. L. Chan, G. O. Munns and J. R. East). Presented at 1993 IEEE DRC, June 1993.

"Influence of Hydride Purity on InP and InAlAs Grown by CBE," (with G. O. Munns, W. L. Chen, M. E. Sherwin, D. Knightly, L. Davis and P. K. Bhattacharya). Presented at the 4th International Conference on Chemical Beam Epitaxy and Related Growth Technology, Nora, Japan, July 21–23, 1993.

"The Growth of Resonant Tunneling Hot Electron Transistors using Chemical Beam Epitaxy," (with W. L. Chen, G. O. Munns, L. Davis and P. K. Bhattacharya). Presented at ICCBE-4, Nora, Japan, July 21, 1993.

"Development of an Appropriate Model for the Design of D-Band InP Gunn Devices," (with R. Kamoua, H. Eisele, G. Munns and M. Sherwin). Presented at the 14th IEEE Cornell Conference, Ithaca, NY, August 2–4, 1993.

"InGaAs/AlAs/InGaAsP Resonant Tunneling Bipolar Transistors Grown by Chemical Beam Epitaxy," (with W. L. Chen, G. O. Munns, D. Knightly and J. R. East). Presented at the IEEE 1993 Cornell Conference, August 1993.

"InAlAs/InGaAs(P) Double Heterojunction Bipolar Transistors with High Breakdown Voltage Grown by Chemical Beam Epitaxy," (with J. C. Cowles, W. L. Chen and G. O. Munns). Presented at the IEEE 1993 Cornell Conference, August 1993.

“On the Feasibility of Intersubband Transition Lasers,” (with A. Afzali-Kushaa and T. B. Norris). Presented at the IEEE 1993 Cornell Conference, August 1993.

“Structure and Computer Modeling of GaAs TUNNETT and MITATT Devices for Frequencies Above 100 GHz,” (with C. C. Chen and R. K. Mains). Presented at the IEEE 1993 Cornell Conference, August 1993.

“Direct Optical Injection Locking of InP-based MODFETT and GaAs-based HBT Oscillators,” (with W. Li, D. Yang, P. Freeman, J. East and P. Bhattacharya). Presented at the IEEE 1993 Cornell Conference, August 1993.

“Effects of Gate Recess Depth on Very High Performance $0.1\mu\text{m}$ GaAs MESFET's,” (with K. E. Moore, J. R. East and T. Brock). Presented at the 1993 European Microwave Conference, Spain, September 1993.

“Structure Design and Numerical Simulation of High Frequency GaAs/InP Schottky Contact TUNNETT/MITATT Devices,” (with C.-C. Chen, R. K. Mains and H. Eisele). Presented at the Millimeter-Wave Conference, Huntsville, Alabama, September 1993.

“Power Capabilities of CW- Oscillators with GaAs- and InP-Based Two- Terminal Devices in the Millimeter and Submillimeter Wave Frequency Range,” (with H. Eisele, R. Kamoua and C. Kidner). Presented at the Millimeter-Wave Conference, Huntsville, Alabama, September 1993.

“Interband Absorption in p-Type InGaAs at FIR Frequencies,” (with X. Zhang, P. Liao and A. Afzali-Kushaa). Presented at the 1993 Material Research Society Conference on Diagnostic Techniques for Materials Processing, Boston, Massachusetts, November 1993.

“Device Applications of Resonant Tunneling Structure,” (with J. East). Presented at the 1993 International Semiconductor Device Research Symposium, Charlottesville, Virginia, December 1993.

“The Validity of Reciprocity and the Ebers-Moll Model in Abrupt Heterojunction Bipolar Transistors,” (with J. Cowles, K. Yang, A. Guiterrez- Aitken, G. O. Munns, W. L. Chen and P. K. Bhattacharya). Presented at the 1993 International Semiconductor Device Research Symposium, Charlottesville, Virginia, December 1993.

“Optically Pumped Intersubband Lasers,” (with A. Afzali- Kushaa and T. B. Norris). Presented at the 1993 International Semiconductor Device Research Symposium, Charlottesville, Virginia, December 1993.

“Numerical Study of the DC Characteristics of InGaAs Abrupt Emitter HBTs Using a Self- Consistent Boundary Condition Approach,” (with K. Yang and J. East). Presented at the 1993 International Semiconductor Device Research Symposium, Charlottesville, Virginia, December 1993.

“Structure and Simulation of GaAs TUNNETT and MITATT Devices for Frequencies Above 100 GHz,” (with C. C. Chen, R. K. Mains and H. Eisele). Presented at the Conference on Advanced Concepts in High Speed Semiconductor Devices and Circuits, Cornell University, Ithaca, August 2–4, 1993.

“Recent Experimental Results from GaAs TUNNETT Diodes above 100 GHz,” *Proceedings of the International Conference on Millimeter and Submillimeter Waves and Applications*, San Diego, CA, **SPIE 2211**, pp. 45–64, January, 1994.

“High Bandwidth InAlAs/InGaAs PIN- HBT Monolithic Integrated Photoreceiver,” (with A. L. Gutierrez-Aitken, J. Cowles and P. Bhattacharya). Presented at the 6th International InP and Related Materials Conference, Santa Barbara, California, March 1994.

“A Quasi-Optical Subharmonically-Pumped Receiver using Separately Biased Schottky Diode Pairs,” (with T-H Lee, C-Y Chi, J. R. East and G. M. Rebeiz),. Presented at the IEEE MTT-S International Microwave Symposium Symposium 1994, San Diego, CA, May 23- -27, 1994.

“Simplified Nonlinear Model for the Intermodulation Analysis of MESFET Mixers,” (with S. Peng and P. McCleer). Presented at the IEEE MTT-S International Microwave Symposium Symposium 1994, San Diego, CA, May 23–27, 1994.

“Absorption and Population Inversion in P-type InGaAs Strained Layers Based on Intervalence Subband Transitions at FIR Frequency,” (with X. Zhang, A. Afzali-Kushaa, W. L. Chen and G. Munns). Presented at the 6th International Conference on Infrared Physics, Topical Conference on Infrared Lasers, Ascono, Switzerland, May 28–June 3, 1994.

“Enhanced Performance in GaAs TUNNETT Diode Oscillators Above 100 GHz Through Diamond Heat Sinking and Power Combining.” Presented at the IEEE MTT-S International Microwave Symposium 1994, San Diego, CA, May 23–27, 1994.

“Optically Controlled Microwave Oscillators Fabricated Using GaAs/AlGaAs HBTs with Transparent ITO Emitter Contacts,” (with P. N. Freeman, W. Li, M. Karakucuk, J. East and P. Bhattacharya). Presented at SPIE (OE/LASE) International Symposium, Los Angeles, CA, January 1994.

“A Novel Biased Anti-Parallel Schottky Diode Structure for Subharmonic Mixing,” (with T. Lee, C. Chi, J. East and G. Rebeiz). Presented at the Fifth International Symposium on Space Terahertz Technology, Ann Arbor, MI, May 1994.

“Novel Varactor Diode Structures for Improved Power Performance,” (with F. Brauchler and J. East). Presented at the Fifth International Symposium on Space Terahertz Technology, Ann Arbor, MI, May 1994.

“Performance of GaAs TUNNETT Diodes as Local Oscillator Sources,” (with H. Eisele, C. Chen and R. Mains). Presented at the Fifth International Symposium on Space Terahertz Technology, Ann Arbor, MI, May 10–13, 1994.

“High Efficiency InP IMPATT Diodes for High Power Generation,” (with C. C. Chen, R. Mains and H. Eisele). Presented at the Fifth International Symposium on Space Terahertz Technology, Ann Arbor, MI, May 1994.

“Transparent Emitter Contact HBT’s for Direct Optical Injection Locking of Oscillators,” (with M. Karakucuk, W. Li, P. Freeman, J. East and P. Bhattacharya). Presented at the IEEE MTT-S International Symposium, San Diego, CA, May, 1994.

“Optimization of CBE Growth of InP/InGaAs Interface,” (with G. O. Munns, W. L. Chen, J. C. Cowles, Y. C. Chen and P. K. Bhattacharya). Presented at the Electronic Materials Conference, Boulder, CO, June 22–24, 1994.

“The Operation and Device Applications of a Valved- Phosphorus Cracker in Solid-Source Molecular Beam Epitaxy,” (with T. P. Chin, W. L. Chen, J. M. Woodall, J. C. P. Chang, C. Parks and A. K. Ramdas). Presented at the North American MBE Conference, Urbana, IL, October, 1994.

“Large Bandwidth InP-Based Monolithically Integrated PIN- HBT Photoreceivers for Optical Communications,” (with A. L. Gutierrez- Aitken, P. Bhattacharya, K. Yang and J. Cowles). Presented at the Conference on Manufacturing Process Development in Photonics, Redstone, Arsenal, AL, November, 1994.

“Ultrafast, Compact Multiple-Valued Multiplexers Using Quantum Electronic Devices,” (with H. L. E. Chan, S. Mohan, P. Mazumder and W. L. Chen). Presented at GOMAC, San Diego, CA, November, 1994.

“Circuit Simulation of Resonant Tunneling Devices Uses NDR-SPICE,” (with S. Mohan and P. Mazumder). Presented at IEDM, San Francisco, CA, December, 1994.

“Lasers Based on Intersubband Transitions in Quantum Wells,” (with A. Afzali-Kushaa). Presented at the SPIE Optoelectronic Integrated Circuit Materials, Physics and Devices, April, 1995.

“SPICE-Based DC and Microwave Characterization of InAlAs/InGaAs HBT’s Used for Large-Bandwidth Integrated Transimpedance Amplifiers,” (with K. Yang, A. L. Gutierrez-Aitken, X. Zhang and P. Bhattacharya). Presented at the 7th International InP and Related Materials Conference, Sapporo, Japan, May, 1995.

“9-GHz Bandwidth InP-Based Integrated PIN-HBT Photoreceiver,” (with A. L. Gutierrez-Aitken, K. Yang, X. Zhang and P. Bhattacharya). Presented at the 7th International InP and Related Materials Conference, Sapporo, Japan, May, 1995.

"DC and Transient Simulation of Resonant Tunneling Devices in NDR-SPICE," (with P. Mazumder, J. P. Sun and S. Mohan). Presented at the 21st International Symposium on Compound Semiconductors, San Diego, CA, September, 1994.

"Intersubband Relaxation and Population Inversion in Stepped Quantum Wells," (with T. B. Norris, C. Y. Sung and A. Afzali-Kushaa). Presented at the Ultrafast and Optoelectronics and Quantum Optoelectronics Conference, Dana Point, CA, March, 1995.

"InP Gunn Devices and GaAs TUNNETT Diodes as Low-Noise High- Performance Local Oscillators in Fundamental Mode," (with H. Eisele). Presented at the Sixth International Symposium of Space Terahertz Technology, March 21–23, 1995, Pasadena, CA. 0

"9 GHz Bandwidth InP-Based Integrated PIN-HBT Photoreceiver," (with A. L. Gutierrez-Aitken, K. Yang, X. Zhang and P. Bhattacharya). Presented at the 7th International Conference on Indium Phosphide and Related Materials, Sapporo, Hokkaido, Japan, May, 1995.

"Co-integration of High Speed InP- Based HBTs and RTDs Using Chemical Beam Epitaxy," (with W. L. Chen, G. O. Munns and X. Wang). Presented at the International Conference on Chemical Beam Epitaxy and Related Growth Techniques, Charlottesville, Virginia, June, 1995.

"Population Inversion in Step Quantum Wells at $10\mu\text{m}$ Wavelength," (with X. Zhang, J. P. Sun, A. Kushaa, C. Y. Sung and T. Norris. Presented at the 53rd Device Research Conference, Charlottesville, Virginia, June, 1995.

"Room Temperature $10\mu\text{m}$ Intersubband Lasers Based on Carrier Capture Processes in Step Quantum Wells," (with X. Zhang). Presented at the 9th International Conference on Hot Carriers in Semiconductors, Chicago, Illinois, July, 1995.

"Time-Resolved Femtosecond Intersubband Relaxations and Population Inversion in Stepped Quantum Wells," (with C. Y. Sung, T. B. Norris, X. Zhang and A. Afzali-Kushaa. Presented at the 9th International Conference on Hot Carriers in Semiconductors, Chicago, Illinois, July, 1995.

"Wide Bandwidth InAlAs/InGaAs Monolithic PIN-HBT Photoreceiver," (with A. L. Gutierrez-Aitken, K. Yang, X. Zhang and P. Bhattacharya. Presented at the LEOS Summer Topical Meeting, Keystone, Colorado, August, 1995.

"An Ion Implanted $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}$ HFET for Optoelectronic Integration," (with M. P. Liao and J. East. Presented at the 15th Biennial Cornell Conference on Advanced Concepts in High Speed Semiconductor Devices and Circuits, Ithaca, New York, August 7-9, 1995.

"Heterojunction Bipolar Transistors with Low Temperature Be-Doped Base Grown by CBE," (with G. O. Munns and W. L. Chen). Presented at the International Conference of Chemical Beam Epitaxy, San Diego, California, August 13-16, 1995.

“Co-integration of High Speed Heterojunction Bipolar Transistors (HBTs) and Tunnel Diodes,” (with W. L. Chen, G. O. Munns and X. Wang. Presented at the IEEE Cornell Conference on Advanced Concepts in High Speed Semiconductor Devices and Circuits, Ithaca, New York, August, 1995.

“16 GHz Bandwidth InAlAs/InGaAs Monolithically Integrated PIN-HBT Photoreceiver,” (with A. L. Gutierrez-Aitken, K. Yang and X. Zhang). Presented at the European Conference on Optical Communication, Brussels, Belgium, September, 1995.

“A Monolithic Ultrahigh-Speed InAlAs/InGaAs PIN- HBT Photoreceiver with a Bandwidth of 18.6 GHz,” (with K. Yang, A. L. Gutierrez-Aitken, X. Zhang and P. Bhattacharya). Presented at the International Symposium of ISCS-22, Korea, September, 1995.

“Self- Consistent Scattering Calculation of Resonant Tunneling Diode Characteristics,” (with J. P. Sun). Presented at the 4th International Workshop on Computational Electronics, Tempe, Arizona, October, 1995.

“A 32-bit Ultrafast Parallel Correlator Using Resonant Tunneling Devices,” (with S. Kulkarni and P. Mazumder. Presented at the International Conference on Integrated Microtechnology for Space Applications, Houston, Texas, October, 1995.

“Comparative Study on Resonant Tunneling Diodes (RTD's) and Traditional Tunnel Diodes (TD's) and Their Co-Integration with Heterojunction Bipolar Transistors (HBT's),” (with X. Wang, W. L. Chen, G. O. Munns and J. R. East. Presented at the 1995 International Semiconductor Device Research Conference, Charlottesville, Virginia, December 5-8, 1995.

“Fabrication and RF Performance of GaAs MESFETs,” (with T. Abbott, T. Brock and J. East). Presented at the 1995 International Semiconductor Device Research Conference, Charlottesville, Virginia, December 5-8, 1995.

“A High-Speed 32-bit Parallel Correlator for Spread Spectrum Communication,” (with S. Kulkarni and P. Mazumder). Presented at the 9th International Conference on VLSI Design, Bangalore, India, January, 1996.

“Population Inversion in Asymmetrical Step Quantum Wells and Infrared Intersubband Lasers,” (with X. Zhang, C. Y. Sung and T. B. Norris). Presented at the SPIE International Photonics West Conference, San Jose, California, January, 1996.

“Time-Resolved Population Inversion in Intersubband FIR Laser Structures and Femtosecond Intersubband Relaxations,” (with C. Y. Sung, X. Zhang and T. B. Norris). Presented at the SPIE International Conference on Quantum Well and Superlattice Physics VI, San Jose, California, January, 1996.

"Tunneling Devices and Applications in High Functionality/Speed Digital Circuits." Presented at the 1996 Topical Workshop on Heterostructure Microelectronics, Sapporo, Japan, August 18-21, 1996.

"A Novel Technique to Reduce Crosstalk in Monolithically Integrated High Speed Photoreceiver Arrays," (with K. C. Syao, A. L. Gutierrez-Aitken, KJ. Yang, X. Zhang and P. Bhattacharya). Presented at the IEDM, San Francisco, California, December 8-11, 1996.

"InP-Based High-Speed Monolithically Integrated p-i-n/HBT 4- and 8-Channel Photoreceiver Arrays," (with K. Yang, K. C. Syao, A. L. Gutierrez-Aitken, P. Bhattacharya, S. Thomas and G. E. Stillman). Presented at the *IEEE International Electron Devices Meeting*, San Francisco, California, December 8-11, 1996.

"16-Channel Monolithically Integrated InP-Based p-i-n/HBT Photoreceiver Array with 11- Ghz Channel Bandwidth and Low Cross Talk," (with K. C. Syao, K. Yang, A. L. Gutierrez-Aitken, X. Zhang and P. Bhattacharya. Presented at the Conference on Optical Fiber Communication OFC97, Dallas, TX, February 16-21, 1997.

"Double Heterojunction Bipolar Transistors with Chirped InGaAs/InP Superlattice Base-Collector Junction Grown by CBE," (with K. Yang, G. O. Munns and X. Wang). Presented at the Ninth Conference on InP and Related Materials, Cape Code, MA, May 11-15, 1997.

"Intersubband Relaxation in Step Quantum Well Structures," (with J. P. Sun, H. B. Teng, M. A. Stroscio and G. J. Iafrate). Presented at the International Workshop on Computational Electronics, Notre Dame, Indiana, May 28-30, 1997.

"RF Performance Characteristics of InP Millimeter-Wave n+-n n+ Gunn Devices," (with H. Eisele and G. O. Munns). Presented at the 1997 IEEE MTT-S International Microwave Symposium, Denver, Colorado, June 17- 21, 1997.

"Two-Terminal Millimeter-Wave Sources," (with H. Eisele). Presented at the 1997 Topical Symposium on Millimeter Waves, Hayama, Kanagawa, Japan, July 7-8, 1997.

"InP Double Heterojunction Bipolar Transistors with Chirped InGaAs/InP Superlattice Base-Collector Junction Grown by CBE," (with K. Yang, G. O. Munns and J. R. East). Presented at the 16th IEEE Cornell Conference on Advanced Concepts in High Speed Semiconductor Devices and Circuits, Ithaca, NY, August 4- 6, 1997.

"Design, Fabrication and Evaluation of Deep Submicron FETs," (with T. Abbott-Morse, T. Brock and J. East). Presented at the IEEE Cornell Conference on Advanced Concepts in High Speed Semiconductor Devices and Circuits, Ithaca, NY, August 4-6, 1997.

"Electron-Interface Phonon Interaction in Multiple Quantum Well Structures," (with J. P. Sun, H. B. Teng and M. A. Stroscio). Presented at the Surfaces and Interfaces in Mesoscopic Devices Workshop, Maui, Hawaii, December 8-12, 1997.

"Monolithically Integrated InP-based Minority Logic Gate using an RTD/HBT Heterostructure," (with C. H. Lin, K. Yang, M. Bhattacharya, S. Wang, X. Zhang, J. East and P. Mazumder). Presented at the 10th International Conference on InP and Related Materials, Tsukuba, Japan, May 11-15, 1998.

"Automatic Control of Efficiency and Linearity in Power Amplifiers for Low-Power Wireless Communications," (with K. Yang and J. East). Presented at the Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems, Ann Arbor, Michigan, September 17-18, 1998.

"InP-Based High Speed Digital Logic Gates Using an RTD/HBT Heterostructure," (with C.-H. Lin, K. Yang, A. F. Gonzalez, J. R. East and P. Mazumder). Presented at the IPRM'99, Davos, Switzerland, May 16-20, 1999.

"A Fixed-point Harmonic Balance Algorithm for Circuit Simulation under Modulated Carrier Excitation," (with V. Borich and J. East). Presented at the International Symposium on Circuits and Systems, Orlando, Florida, May, 1999.

"The Method of Envelope Currents for Rapid Simulation of Weakly Nonlinear Communications Circuits," (with V. Borich and J. East). Presented at the International Microwave Symposium, Anaheim, California, June, 1999.

"Potential and Capabilities of Two-Terminal Devices as Millimeter- and Submillimeter-Wave Fundamental Sources," (with H. Eisele), invited Paper, presented at the 1999 IEEE MTT-S International Microwave Symposium, June 13-19, 1999, Anaheim, California.

"New Methodologies for the Simulation and Measurement of Distortion in Microwave Power Amplifiers," (with V. Borich and J. East) presented at the IEEE Topical Workshop on Power Amplifiers for Wireless Communications Technical Digest, San Diego, California, September, 1999.

"Class A DC Bias Controlled Amplifiers for OFDM Systems," (with J. Hong, K. Yang and W. Stark), presented at the IEEE Topical Workshop on Power Amplifiers for Wireless Communications, San Diego, CA, September, 1999.

"Performance of OFDM Systems with Realistic Adaptive Nonlinear Power Amplifiers and Their Power Optimization" (with J.-H. Jong, K. Yang and W. Stark), presented at the 5th IEEE Vehicular Technology Conference. Amsterdam, The Netherlands, September 19-22, 1999.

"Power Optimized OFDM Systems with Adaptive Nonlinear Amplifiers," (with J.-H. Hong, K. Yang and W. Stark), presented at the 1999 IEEE Military Communications Conference, Atlantic City, NJ, October 31- November 3, 1999.

"State of the Art of Two Terminal Devices as Millimeter and Submillimeter-wave Sources," (with H. Eisele), presented at the 11th International Symposium on Space Terahertz Technology, Ann Arbor, MI, May 1-3, 2000.

“High-Speed Digital Circuits Using Resonant- Tunneling Diodes and Heterojunction Bipolar Transistors,” (with A. F. Gonzalez, M. Bhattacharya, C.-H. Lin, P. Mazumder and J. East), presented at the Government Microcircuit Applications Conference (GMAC), Anaheim, California, March 20-23, 2000.

“Computer-aided Optimization of Adjacent-channel Power in Nonlinear Communications Amplifiers,” (with V. Borich, J. East and G. Haddad). Presented at the International Microwave Symposium, Boston, MA, June, 2000.

“A Ring oscillator Using an RTD-HBT Heterostructure,” (with C.-H. Lin, K. Yang, J. East, D. Chow, L. Warren, H. Dunlap, J. Roth and S. Thomas III). Presented at the International Conference on Superlattices, Microstructures, and Microdevices 2000, Kyongju, Korea, September 25-27, 2000.

“NPN and PNP InP-based HBT Technology for Power Amplification in Wireless Systems,” (with D. Pavlidis, D. Cui and D. Sawdai). Presented at the Government Microcircuit Applications Conference (GOMAC), San Antonio, TX, March 5-8, 2001.

“Electron Dispersion Relations with Negative Effective Mass in Quantum Wells Grown on the Cleaved Edge of a Superlattice,” (with Z. Gribnikov, R. Bashirov, H. Eisele, and V. Mitin). Presented at the 14th International Conference on the Electronic Properties of Two- Dimensional Systems, Prague, Czech Republic, July 30-August 3, 2001.

“THz Sources”. Presented at the Workshop on THz- Frequency Communications and Sensing on Networked Platforms, Adelphi, MD, October 17, 2001.

“Heterostructure Device on the Cleaved Edge of A Superlattice for Terahertz Power Generation,” (with Z. Gribnikov, N. Vagidov, H. Eisele and V. Mitin). Presented at the 2001 International Semiconductor Device Research Symposium, Washington, D. C., December 5-7, 2001.

“Vacuum Based Sources for THz Applications,” (with J. East). Presented at the Ninth International Conference on Terahertz Electronics, University of Virginia, October 14-15, 2001.

“Two Terminal Solid State THz Sources: State of the Art and Novel Devices” (invited). Presented at the 2001 International Semiconductor Device Research Symposium, Washington, D. C., December, 2001.

“Vacuum THz Devices,” (with J. East). Presented at the Workshop on the Future of Electronics (WOFE), St. Croix, Virgin Islands, January, 2002.

“Novel Heterostructure Device for THz Power Generation,” (with Z. Gribnikov, N. Vagidov, H. Eisele and V. Mitin). Presented at the Thirteen International Symposium on Space Terahertz Technology, Cambridge, MA, March 16, 2002.

"Quantum Engineered Electron Dispersion Relations in 2DEG on the Cleaved Edge of a Superlattice," Z. S. Gribnikov, N. Z. Vagidov, R. Bashirov, V. V. Mitin and G. I. Haddad, Presented at the 26th International Conference on the Physics of Semiconductors, Edinburgh, UK, 29 July - 2 August, 2002.

"Engineering of Dispersion Relation in Two-Dimensional Heterostructures on the Basis of Quantum Real Space Transfer," Z. S. Gribnikov, N. Z. Vagidov, V. V. Mitin, and G. I. Haddad, LDSO 2002, 4th International Conference on Low Dimensional Structures and Devices, Fortaleza-Ceara, Brazil, Book of Abstracts p. PS-II-3, December 8-13, 2002.

"Small Metallic Contacts in the System Metal/Barrier/Semiconductor as the Single-Electron Qubit Cells," Z. Gribnikov and G. Haddad, Presented at the 27th International Conference on the Phys. Semiconductor (ICPS-27, 2004), Flagstaff, Q5 142, AZ, 2004.

"Theory of Heterostructural Tunnel Emitters for Ballistic Transit-Time Terahertz-Range Oscillators," Z. Gribnikov and G. Haddad, Presented at the 27th International Conference on the Phys. Semiconductor (ICPS-27, 2004), Flagstaff, Q5 96, AZ, 2004.

"AlGaIn/GaN Heterostructure Transit-Time Devices: A Novel Device Concept for Submillimeter-Wave Sources," H. Eisele, Y.-R. Wu, J. Singh, G. I. Haddad and M. Singh. Presented at the Space Terahertz Technology Symposium, Stockholm, Sweden, 2005.

SUPERVISION OF Ph.D. STUDENTS

	<u>Name</u>	<u>Year Graduated</u>	<u>Present Position</u>
1.	Herbert M. Federhen	1967	Colonel, U. S. Army (DARPA Scientist)
2.	William J. Evans	1968	Director, Microelectronics Laboratory, Bell Tel. Labs.
3.	James E. Adair	1968	Project Manager, Sperry Microwave
4.	Vijai K. Tripathi	1968	Professor of EE, Oregon State University
5.	Patrick N. Everett	1969	Research Scientist, MIT Lincoln Labs.
6.	Deen D. Khandelwal (Co-chairman)	1969	Department Manager, Martin-Marietta
7.	Charles F. Krumm	1970	Laboratory Manager, Hughes Research Labs.
8.	Paul T. Greiling	1970	Department Head, Hughes Research Labs.
9.	Ismail I. Eldumiati	1970	Department Head, Bell Tel. Lab.
10.	Mark K. Krage	1971	Senior Scientist, General Motors Res. Labs.
11.	William E. Schroeder	1972	Department Head, Bell Tel. Labs.
12.	Richard W. Laton	1973	Manager, Microwave Devices Raytheon

	<u>Name</u>	<u>Year Graduated</u>	<u>Present Position</u>
13.	Joseph T. Patterson (Co-chairman)	1973	Unknown
14.	Denny D. Tang (Co-chairman)	1974	Department Head, IBM, T. J. Watson, Res. Lab.
15.	Charles M. Lee (Co-chairman)	1974	Vice President, Gain Electronics
16.	Siang-Ping Kwok	1974	Chief Scientist, Ford Microelectronics
17.	Chente Chao	1975	Department Head, TRW
18.	Robert J. Trew	1975	Director of Research, U. S. Department of Defense
19.	Mohamed M. Seddik	1975	Professor of Physics, Ain-Shaus Univ., Egypt
20.	Johny J. Barnes (Co-chairman)	1976	Department Manager, Texas Instruments
21.	Hien Nguyen-Ba	1977	Assoc. Professor of EE, Univ. of Florida
22.	Paul E. Bauhahn	1977	Senior Scientist, Honeywell
23.	Michael E. Elta	1977	Research Scientist Electrical Engineering & Computer Science Department Univ. of Michigan
24.	Patrick J. McCleer	1977	Consultant Ann Arbor, Michigan
25.	Shiuh-Wuu Lee	1980	Research Scientist, Intel

	<u>Name</u>	<u>Year Graduated</u>	<u>Present Position</u>
26.	Mohammed Y. Burmawi (Co-chairman)	1981	Dean of Engineering, Saudi Arabia
27.	Robert O. Grondin (PYI)	1981	Assoc. Professor, Arizona State Univ.
28.	James Chen	1982	Department Head, Hughes Research
29.	Hamza Yilmaz	1983	Department Head, General Electric Research
30.	Massoude Radmanesh (Co-chairman)	1984	Research Scientist, Hughes
31.	Cheng Kang Pao	1985	Research Scientist, Hughes
32.	Numan S. Dogan (Co-chairman)	1986	Asst. Professor, Washington State Univ.
33.	Jack R. East	1986	Research Scientist, Univ. of Michigan
34.	Peter A. Sandborn	1987	Research Scientist, MCC
35.	Imran Mehdi	1990	Research Scientist, Jet Propulsion Laboratory
36.	Ridha Kamoua	1991	Asst. Professor, SUNY Stoneybrook, NY
37.	Douglas Teeter	1992	Research Scientist, Raytheon Research Division

	<u>Name</u>	<u>Year Graduated</u>	<u>Present Position</u>
38.	J. P. Sun	1993	Research Scientist, Univ. of Michigan
39.	W. L. Chen	1993	Research Scientist, Texas Instruments
40.	T. Lee	1994	Research Scientist, Jet Propulsion Laboratory
41.	K. Moore	1994	Research Engineer, Motorola, Phoenix
42.	C. C. Chen	1994	Professor, Taiwan University
43.	K. Yang	1994	Assistant Research Scientist, Univ. of Michigan
44.	J. Cowles	1994	Research Scientist, TRW
45.	A. Afzali-Kushaa	1994	Postdoctoral Fellow, Univ. of Michigan
46.	K. Eisenbeiser	1994	Research Engineer, Motorola, Tempe
47.	S. Peng	1995	Research Engineer, Texas Instruments
48.	C. Kidner	1995	Research Engineer, Naval Weapons Center
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50.	M. Liao	1996	Research Engineer, Vanguard International Semiconductor Corp., Taiwan

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51.	F. Brauchler	1996	Research Engineer, Texas Instruments, Dallas
52.	G. Munns	1997	Research Engineer, Applied EPI
53.	T. Abbott-Morse	1997	Research Engineer, Intel
54.	J. Kempf	1999	Research Engineer, Texas Instruments
55.	V. Borich	2000	Research Engineer, Applied Wave Research
56.	C.-H. Lin	2000	Research Engineer, Lucent Technologies
57.	S. Govindaswamy	2004	Research Engineer, Cypress Semiconductors
58.	Xiaochuan Bi	2006	Research Engineer, Texas Instruments