

FRANK S. BARNES

Title

Distinguished Professor Emeriti
Department of Electrical, Computer and Energy Engineering, CB 425
University of Colorado, Boulder, Colorado 80309-0425
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Date and Place of Birth

July 31, 1932 -- Pasadena, California

Education

B.S., Princeton University, 1954 (Electrical Engineering)
M.S., Stanford University, 1955 (Electrical Engineering)
Engineer, Stanford University, 1956 (Electrical Engineering)
Ph.D., Stanford University, 1958 (Electrical Engineering)

Professional Experience

Distinguished Professor, Department of Electrical Computer and Energy Engineering
University of Colorado, Boulder, Colorado 1997-2014

Professor, Department of Electrical Engineering
University of Colorado, Boulder, Colorado 1965-1997

Director of Interdisciplinary Telecommunications Program
University of Colorado, Boulder, Colorado 1971-74, 1996-1998

Acting Chairman, Department of Electrical Engineering
University of Colorado, Boulder, Colorado 1989-1990

Acting Dean, College of Engineering and Applied Science
University of Colorado, Boulder, Colorado 1980-1981

Chairman, Department of Electrical Engineering
University of Colorado, Boulder, Colorado 1964-1980

Associate Professor, Department of Electrical Engineering
University of Colorado, Boulder, Colorado 1959-1965

Physicist, U.S. National Bureau of Standards
Boulder, Colorado 1959-1962

Research Associate, Colorado Research Corporation
Denver, Colorado 1958-1959

Fulbright Professor, College of Engineering
Baghdad, Iraq 1957-1958

Research Assistant, Stanford University
Stanford, California 1955-1957

Engineer, Denver Research Institute
Denver, Colorado 1954 (summer)

Selected Professional Activities

Member Princeton Advisory Board for the Keller Center. 2008-2015
Associate Editor ASCE Journal of Energy Engineering 2008 -2010
Representative for CU on Solar Tech 2007-2010
President, Bioelectromagnetics Society 2000-2001 \

U.S, Chair Commission K of URSI 1999- 2002

Member, Educational Advisory Board, National Communications Forum, 1990-1999
Executive Editor, *Annual Reviews of Telecommunications*, 1993-
Editor, *IEEE Transactions on Education*, 1988-1994
Member, IEEE Press Board, 1986-1992
Chair, IEEE Publication Review Board, 1986
Chair, University of Colorado, Telecommunications Executive Committee
Member, WHO Document Review on VDT's, 1985
Chair, IEEE Educational Activities Board - Pre-College Guidance Brochure
Commission A of URSI
Board of Directors, Engineering Information, 1984-1990
Board of Directors, Bioelectromagnetics Society (BEMS), 1981-1982 and 1996-1998
Board of Trustees for the Engineering Index, Inc., 1979-1984
Vice Chair, Electrical Engineering Department Heads Association, ASEE, 1978-1979; Chair, 1979-1980
Member, Princeton University, Advisory Council, Electrical Engineering Department, 1971- 1983
Member, ANSI Committee on Laser Safety, 1965-1975
Member, ANSI C95 Committee on Microwave Safety Standards, 1976-1992
Member, URSI Steering Committee, 1976
Chair, ECPD (now ABET) Committee on Advanced Level Accreditation, 1976-1978
Member, NCRP Committee #S39, 1975-1980
Member, IEEE Board of Directors, 1974-1975
Member, IEEE Executive Committee, 1974-1975
Chair, IEEE Electron Devices Society, 1975, Vice Chair 1973-4
Chair, IEEE Publications Board, 1974-1975
Vice President of IEEE for Publications, 1974-1975
Technical Program Committee, MTT International Meeting, 1973
Member, IEEE Nominations and Appointment Committee, 1972
Chair, 1971 NSF Workshop on Non-Ionizing Radiation
Chair, 1971 Electron Ion and Laser Beam Technology Symposium
Chair, Device Research Conference, 1971;
Vice Chair, Student Activities Board, IEEE, 1970
Vice Chair, IEEE Editorial Board, 1970
Member, Editorial Board of *IEEE Spectrum*, 1970-1971
Regional Editor, IEE *Electronic Letters*, 1969-1975
Member, IEEE Editorial Board, 1968-1970 and 1972
IEEE Electron Device Group, 1968-1973 (AdCom)
Editor, IEEE Student Journal, 1968-1970
Member, ECPD Accreditation Team, 1968

Service on Advisory and Peer Review Panels

Member of Review Panel for the FDA EMF effects on bone growth 2013
 Member of advisory panel to the Air Force program on the effects of electric and magnetic fields on biology 2010
 Invited member for Workshop on "Identification of research priorities for Canada on wireless telecommunication devices and potential biological or adverse health effects" 2008
Member Princeton Advisory Board for the Keller Centre for Innovation in Engineering Education
 Chair of National Research Counsel Committee on the Identification of Research Needs relating to Potential Biological or Adverse Health Effects of Wireless Communication Devices 2007
 NIH Study Section Member for Nonionizing Radiation 2004
 Chair of National Research Counsel Committee on Pave Paws Radar, 2001-2004
 IEEE Prize Paper Selection Committee 1998-2003
 NATO Post Doc Review on Toxicology for NSF, January 1993
 Chair, Grant Panel on Toxicology of ELF for NIEHS, February 1992, Durham, NC
 Study Section on Radiation Biology, NIH, January 1992, Taos, NM.
 Member, National Science Foundation Review Panels, 1966-1997
 NIOSH Review, 1996, NIEHS Review, 1997

Professional and Honor Societies

Institute of Electrical and Electronics Engineers, Inc.
 Sigma Xi; President of Boulder Chapter, 1971
 American Physical Society
 American Association for the Advancement of Science
 Eta Kappa Nu
 Tau Beta Pi
 Bioelectromagnetics Society
 American Society for Lasers and Medicine
 Aviation Space and Environmental Medicine Society
 National Academy of Engineering
 URSI

Awards, Honors, etc.

Doctor of Science Honoris Causa from the University of Guelph Canada 2010
 ITERA's , First Distinguished Researcher Award, from the International Telecommunications Education and Research Association 2006
 Pinnacles of Inventorship Award from Tech Transfer Univ. of Colo. 2006
 Colorado Institute of Technology Catalyst Award 2004
 Bernard M. Gordon Prize from National Academy of Engineering for Innovations in Engineering Education 2004
 IEEE Education Society 2003 Achievement Award
 2002 ECE Distinguished Educator Award from ASEE ECE Section
 National Academy of Engineering, 2001
 Distinguished Professor, University of Colorado - Boulder, 1997
 Fellow, International Engineering Consortium, 1995
 Fellow, American Society for Lasers and Medicine, 1986
 Fellow, American Association for the Advancement of Science, 1977
 Fellow, IEEE, 1970
 Distinguished Lecturer for IEEE Electron Device Society 1994-1997
 University of Colorado's Centennial Celebration, Engineering Recognition, 1994
 International Communications Association, Leon Montgomery Award, 1994
 IEEE Education Meritorious Service Award, 1993
 American Society for Engineering Education, Centennial Certificate, 1993.
 IEEE, EAB Meritorious Service Award, 1989
 International Communications Association, Certificate of Merit, 1989
 Distinguished Engineering Alumni Award, University of Colorado, 1986

Max S. Peters Service Award, College of Engineering, 1985
 IEEE Centennial Award, 1984
 Stearns Award, University of Colorado, 1980
 Faculty Mentor for two President's Senior Award Winners, 1967 and 1969
 Faculty Research Lecturer, 1965
 Curtis McGraw Research Award, ASEE, 1965

Patents

- 13 Patent filed for May ,2006 “MULTI-EXCITATION DIAGNOSTIC SYSTEMS AND METHODS FOR CLASSIFICATION OF TISSUE” with Priya N. Werahera, John Daily, M. Scott Lucia, Adrie van Bokhoven, E. David Crawford,
- 12“A Voltage-Tunable Phased Array Antenna Apparatus Including Ferroelectric Material,” U.S. Patent #5,589,845 (Yandroski, Price, Barnes, Hermann, Scott)(Zhang, Wu) issued Dec. 31, 1996.
- 11" Tuneable Microwave Devices Incorporating High Temperature Superconducting and Ferroelectric Films" (Barnes , Price, Herman, Yandroski, and Scot), U. S. Patent #5,472,935 issued Dec. 5, 1995.
- 10" Amplifying and Synchronizing Signals In Optical Computing System" (Barnes) U.S. Patent #5,295,010 issued Mar. 15, 1994.
- 9"Recording Head Suspension Utilizing Superconductor Means,"U.S. Patent # 5,082,827 issued January 21, 1992.
- 8" Storing Information-bearing Signals in a Superconductive Environment Using Vortices as Digital Storage Elements," U.S. Patent # 5,079,219 issued 1992.
- 7"Unitary Skate Assembly Having Vertical Spring Means" (Barnes and Baer), U.S. Patent # 4,993,725 issued February 19, 1991.
- 6"Superconductor Magnetic Reading and Writing Heads" (Barnes and Dugas), U.S. Patent #4,971,947 issued November 20, 1990.
- 5"Superconductor Devices for Disk Drives," U.S. Patent # 4,926,082 issued May 15, 1990.
- 4"Superconductor Magnetic Reading and Writing Heads," U.S. Patent #4,971,947 issued Nov. 20, 1990 and reissued as U.S. Patent # RE35212 on Apr. 16, 1996.
- 3"Superconductor Devices Useful for Disk Drives and the Like," U.S. Patent # 4,843,504 issued June 27, 1989.
- 2"Resonant Pile Driving System," U.S. Patent # 4,645,016 issued February 24, 1987.
- 1"Quantum State Memory," U.S. Patent #3,754,988 issued Aug. 28, 1973.

Publications

2014 Vanessa Pool, Benjia Dou, Douglas van Campen, Talysa Klein-Stockert, Frank Barnes, Sean Shaheen, Mohammed Ahmad, Maikel van Hest, and Michael Toney "Thermal engineering of FAPbI₃ perovskite material via radiative thermal annealing and in-situ XRD" Nature Communications [Paper #NCOMMS-16-20911B] November 2016

2013 Eugene Freeman, Davide Occello , Frank Barnes "Energy storage for electrical systems in the USA" <http://www.aimspress.com/journal/energy> 2016

2012 F.S.Barnes and B.Greenebaum "Some Effects of Weak Magnetic Fields on Biological Systems" IEEE Power Electronics Magazine March 2016 pp 60-67

2011 F.S. Barnes, D. Budd, M Lim and E. Freeman "Compressed Air Energy Storage" Chapter 19 pp 2715-2742 Handbook of Clean Energy Systems Vol 5, Editors Cabeza, L. Sioshansi R. Yan, J. Wiley, 2015

2010. F. S. Barnes and B. Greenebaum. 2015. The effects of weak magnetic fields on radical pairs. Bioelectromagnetics 36: 45–54. DOI: 10.1002/bem.21883.

209 Frank Barnes and Ben Greenebaum "How can future Epidemiology and Laboratory Studies Complement each Other? Chapter 12, in Epidemiology of Electromagnetic Fields Edited by Martin Roosli CRC Press 2014

208. P.T. Fracasso, F.S. Barnes, A.H.R. Costa, Energy cost optimization in water 468 distribution systems using Markov Decision Processes, in: Green Computing 469 Conference (IGCC), Arlington, VA, 2013, pp. 1–6.

207 Mohit Chhabra , Frank Barnes "Robust Current Controller Design using Mu-Synthesis for Grid-Connected Three Phase Inverter"IEEE-PVSC 2014

206 Mohit Chhabra , Frank Barnes," Robust Current Controller Based Solar-Inverter System Used for Voltage Regulation at a Substation" IEEE-PVSC 2014 207

205 Pablo R. Castello^{1, 4}, Iain Hill⁴, Lucas Portelli², Frank Barnes², R.Usselman³, Carlos F Martino^{*4}, "Inhibition of cellular proliferation and enhancement of hydrogen peroxide production in fibrosarcoma cell line by weak radio frequency magnetic fields" Bioelectromagnetics Dec 2014, Vol35, pp 598-602

204 Large Energy Storage Systems Handbook Ed by Frank Barnes and Jonah Levine was translated into Chinese.

203. Lucas A. Portelli^{*}, Theodore Schomay^{‡, §}, and Frank Barnes[†] "Background Magnetic Fields in Biological Incubators is a Potential Confounder for Experimental Variability and Irreproducibility" Bioelectromagnetics Vo. 34, No.5, July 2013

202. Chhabra, M., Mahadevan, R., Pasrich, P., Barnes, F., "A Review of Battery Technologies", Book Chapter, (*Transportation Technologies for Sustainability*) Springer 2013, New Delhi, India

201. Chhabra, M., Lim, M., Barnes, F., "Frequency Stabilization Using Solar Smoothing, Leveling, and Time Shifting in a Hybrid Renewable Network", IEEE ISGT, December 2011, Kollam, Kerala, India

200. Chhabra, M., Harnesswalla, T., Lim, M., Barnes, F., "Arbitrage Operation of a Wind Farm in a Hybrid Renewable Network", IEEE ICEAS, December 2011, Bhubaneswar, Orissa, India

199. Lim, M., Chhabra, M., Barnes, F., "Use of Energy Storage to Mitigate Frequency Variations in a Load Frequency Model", Sandia EESAT, October 2011, San Diego, CA, USA

198. Lim, M., Chhabra, M., Pasrich, P., Newman, K., Barnes, F., "Frequency Variations in Hybrid Renewable Energy Network with Integrated Storage", IEEE Smart Grid Comm, October 2011, Brussels, Belgium
197. Pratibha Sharma, Kimberly Newman, Frank Barnes, "Exposure Systems to measure effect of GSM frequency (900 MHz)," International Journal of Applied Engineering Research 11/2012; 7:973-4562.
- 196 Lucas Portelli^{1*}, Dinu Madapatha³, Carlos Martino¹, Mark Hernandez², and Frank Barnes "Reduction of the Ambient Magnetic Field Inhibits *Drosophila melanogaster* Ability to Survive Ionizing Radiation" Bioelectromagnetic April 2012 on Line. Also Vol. 33, No. 8 pp706-709 Dec 2012
- 195 Barnes, F., Levine, J., "Applications of Energy Storage to Generation and Absorption of Electric Power" Chapter 1 CRC Large Energy Storage Systems, Handbook Edited by F.Barnes and J. Levine.March 2011
- 194 Report to the Governor's Energy Office Smart Grid Deployment in Colorado with Kevin Doran and Puneet Pasrich 7-01-2010
193. Tigrek,S., Barnes,F. "Water structures and effects of electric and magnetic fields" in Non-thermal effects and Mechanisms of interaction between electromagnetic fields and living matter. Edited by Livio Giuliani and Morando Soffritti European Journal of Oncology Eur. J. Oncol. - Library Vol. 5 October 2010
- 192 Carlos F. Martino,^{1*} Kevin McCabe,² Lucas Portelli,¹ Mark Hernandez,² and Frank Barnes "Reduction of the Earth's Magnetic Field Inhibits Growth Rates of Model Cancer Cell" Bioelectromagnetics 00:1^7 (2010)
- 191 Levine, J. F, Barnes. "Energy Variability and Produced Water: Two Challenges one synergistic management approach utilizing pumped hydroelectric energy storage" *Journal of Energy Engineering*. ASCE Vol 136, No 1 pp 6-10, 2010 ?
- 190 Effects of 900-MHZ Radio Frequencies on Chemotaxis of Human Neutrophils in Vitro" Ashraf, A.,Cheema , M., Tambawala, M. , Laterza, R., Zhou, E., Rathnabharathi K., Barnes, F . IEEE Trans on Biomedical Engineering Vol 55 No 2 pp795-797 (2008)
- 189, Hu, C.J, Barnes, F.S. " A New Approach to the Design of a Small Power Network Using a Self Control Re-Usable Energy Source" Proceeding of the Tenth IASTED International Conference Power and Energy Systems (PES 2008) April 2008
188. Barnes, F. Levine J. G, Martin. R, Moutoux. February 2008. CAES and Pumped Hydro for today's Utility Scale Energy Storage Needs. Renewable Power Generation Conference 2008. Pen Well. Las Vegas, NV.
187. Levine, J. F, Barnes. 2007. Potential Pumped Hydroelectric Storage Sites in Colorado. Electrical Energy Storage Applications and Technologies (EESAT).
- 186 "The effect of ultrasonic irradiation on doxorubicin-induced cytotoxicity in three human bladder cancer cell lines" with Caroline Arthur^a, Thomas Flaig^{b,*}, Lih-Jen Su^b, Richard Denney^c, , L. Michael Glodé^b. Vol 46, 2007 ,68-73 Ultrasonics.
- 185 *The CRC Handbook on Biological Effects of Electromagnetic Fields*, 3rd Edition Edited with Ben Greenebaum Nov. 2006
- 184 "Interaction of DC and ELF Electric Fields with Biological Materials and Systems," Chapter 5 in *The CRC Handbook on Biological Effects of Electromagnetic Fields*, 3rd Edition Edited by Frank Barnes and Ben Greenebaum Nov. 2006
- 183 "Setting Standards in the Presence of Developing Scientific Understanding" *Electromagnetic Biology and Medicine* Nov 2006
- 182 "Online Laboratory for Optical Circuits Courses: Effective concept mapping" with Driss Benhaddou and Deniz Gurkan, Harshita Kodali Engineering Technology Department, University of Houston Ed McKenna, Alan Mickelson ASEE-GSW regional meeting 2006
- 181 Biological Effects and Electromagnetic Fields" with Bonnie Slaten Handbook of Electrical Engineering Editor Richard Dorff. Chapter 7.3 pp7-33 to 7-54 CRC January 2006

180 "Mechanisms for Electric and Magnetic Fields Effects on Biological Cells" *Advances in Magnetism IEEE Transactions on Magnetism*, Vol41, No 11, November 2005. pp 4219- 4224

179 "Dielectric Slab Rotman Lens with Tapered Slot Antenna Array" with Jaeheung Kim *IEEE Proceeding Microwave Antenna Propagation* , 2005 online no. 20045118 pp 1-6, doi:101049/ip-map:20045118

178. *ASSESSING THE EFFECTIVENESS OF DISTANCE NETWORKING LABORATORY EXPERIENCES* [Session S3F: Labs: Remote & Local] Douglas C. Sicker, Tom Lookabaugh, Jose Santos and Frank Barnes, At FIE in October of 2005

177. "Carriers' Spatial Separation Nonlinearity in Quantum Wells" with Fahhad Alharbi, *Journal of Modern Optics*, Vol. 52, No. 16, 10 Nov. 2005, pp 2279-2292

176 E-learning Environmental Design of a Distributed Online Laboratory for Optical Circuits Courses Edward McKenna*, Randal Direen*, Frank Barnes*, Deniz Gurkan, Alan Mickelson*, and Driss Benhaddou University of Houston/*University of Colorado June 2005 ASSEE

175 "Dielectric Slab Rotman Lens for Microwave/Millimeter-Wave Applications" with Jaeheung Kim and Choon Sik Cho. *IEEE Transactions on Microwave Theory and Techniques* Vol. 53. No 8 August 2005

174 "An Assessment of Potential Health Effects from Exposure to PAVE PAWS Low-Level Phased-Array Radiofrequency Energy" National Academic Press. Committee chair, 14 coauthors. February 2005

173 "Dielectric Slab Rotman Lens" with Jaeheung Kim, Choon Sik Cho, *IEEE Microwave and Wireless Components Letters*, Vol 15, No 5 May 2005

172. "Frequency and Amplitude Windows in the Combined Action of DC and Low Frequency AC Magnetic Fields on Ion Thermal Motion in a Macromolecule: Theoretical Analysis" with Mikhail Zhadin, *Bioelectromagnetics* Vol. 26, No 4, pp323-330, May 2005

171 "A Theoretical Study of the Effects of RF Fields in the Vicinity of Membranes" with Y. Kwon, *Bioelectromagnetics* Vol 26 , No 2 p 118-124 ,2005

170 "Opportunities and Challenges for Engineering Education as Seen from an Interdisciplinary Telecommunications Master's Degree Program" *The Bridge* winter 2004, p55-61

169 "Some Frontiers for Engineering Education" 2004 Gordon Prize Lecture, *Journal of Engineering Education* July 2004

168 "Iterative method for designing a dual-phase-conjugation- mirror-resonator with multiple apertures" with Young Kwon, , *Applied Optics* January 2004

167 "A New Frontier In Engineering Education: Importing Courses" *Proceeding of FIE* Oct 2003

166 "Inadequate Models Make For Evaluation Make Universities Less Than They Can Be" *Proceeding of FIE* Oct 2003

165 "Analysis of Bragg fiber with unequal layers" with Anak Muthitachoen, Submitted *Applied Optics* Nov. 2002

164 "Effects of Low-Level 50 Hz Magnetic Fields on the Level of Host Defense and on Spleen Colony Formation," H. A. Korneva, V. A. Grigoriev, E. N. Isaeva, S. M. Kaloshina, F. S. Barnes, *Bioelectromagnetics* 20:57-62, 1999.

163 "A Model for the Detection of Weak ELF Electric and Magnetic Fields," *Bioelectrochemistry and Bioenergetics*, 47(1998)207-212, 1999.

162 "Combined Action of Static and Alternating Magnetic Fields on Ionic Current in Aqueous Glutamic Acid Solution" (Zhadin M.N., primary author) *Bioelectromagnetics* 19:41-45, 1998.

161 "Doped Ba_{0.6} Sr_{0.4} TiO₃ Thin Films For Microwave Device Applications At Room Temperature," with Huey-Daw Wu, *Integrated Ferroelectrics*, 22(1-4)291-305, 1998.

160 "Real-Time, Multi-Channel Computerized Electrogastrograph," with Mingying Zhou, Hui Zhang, Robert Shaw, *IEEE Transactions on Biomedical Engineering* . 44(12): 1228-1236, December 1997.

155 "Vibratory Excavation and Anchoring Tools for the Lunar Surface," with J. L. Klosky, S. Sture, H. Ko, *Proceedings of SPACE '96 Conference*, Albuquerque, NM, June 1996.

154 "Mechanical Properties of JSC-1 Lunar Regolith Simulant," with J. L. Klosky, S. Sture, and H. Ko, *Proceedings of SPACE '96 Conference*, Albuquerque, NM, June 1996.

153 "Effects of Pulsed Acoustic and Mechanical Stimuli on the Excitability of Isolated Neuronal and Cardiac Cells," with Richard T. Mihran, Sean K. Lineaweaver, and Howard Wachtel, *Appl. Occup. Environ Hyg.* 11(4), 1-4, April 1996.

152 "Biological Effects of Radio Frequency Fields," with V. E. Irizarry-Sepulveda, *Worldwide Wireless Communications*, Frank S. Barnes, Ed., National Engineering Consortium, 1995 (released February 1996).

151 *Worldwide Wireless Communications*, Frank S. Barnes, Ed., National Engineering Consortium, 1995 (released February 1996).

150 "Interaction of DC and ELF Electric Fields with Biological Materials and Systems," in *The CRC Handbook on Biological Effects of Electromagnetic Fields*, C. Polk and E. Postow, Eds., 103-147, CRC Press, Boca Ration, Florida, Jan 1, 1996.

149 "The Effects of Electric and Magnetic Fields on Chemical Reaction Rates in Biological Systems," *Biofizika* (Russian Journal of Biophysics), 41/4, p.790-797, 1996.

148 "The Effects of Electric and Magnetic Fields on Chemical Reaction Rates in Biological Systems," *Biological Effects of Magnetic and Electromagnetic Fields*, S. Ueno, Ed., Plenum Press, 1996.

147 "Coaxial Lines for Multiphase Power Distribution," with P. Harwick and A. Banerjee, *Journal of Bioelectromagnetics* 17, 162-164 (1996).

146 "Typical Electric and Magnetic Field Exposures at Power Line Frequencies and their Coupling to Biological Systems," in *Advances in Chemistry Series No. 250, Biological Effects of Environmental Electromagnetic Fields*, Martin Blank, Ed., American Chemical Society Books, Washington, D.C., Dec 1995.

145 "Effect of Electromagnetic Fields on the Level of Host Defense Reaction and on the Spleen Colony Formation," with V. A. Grigoriev, E. N. Isaeva, S. M. Kaloshina, E. A. Korneva, *Proceedings of Abs. Int. Co-Conf. on Environmental Pollution (ICEP'95) and Proceedings of Neuroimmuno Interactions and Environment (ICONE'95)*, St. Petersburg, Russia, 114, July 17-24 , 1995.

144 "Augered Foundation Elements for Lunar Operations," with J. Ledlie Klosky, Stein Sture, Hon-Yim Ko, *Proceedings of the Colorado School of Mines at Meeting on Mining and Construction*, 1995.

143"Some Microwave Applications of BaSrTiO₃ and High Temperature Superconductors" with John Price, Allen Hermann, Zhihang Zhang, Huey-Daw Wu, David Galt, Ali Naziripour, *Intergrated Ferroelectrics*, vol. 8 , 171-184, 1995.

142"Editorial: new challenges for engineering education", *IEEE Transactions on Education*, vol. 37, (2), 119-121, May 1994.

141"Editorial: engineering education under attack", *IEEE Transactions on Education*, vol. 37, (1), 1-2, February 1994.

140"Mechanisms for Biological Changes Resulting from Electric and Magnetic Fields," *Proceedings of the 1994 Japan-U.S. Science Seminar on Electromagnetic Field Effects Caused by High Voltage Systems (Modeling, Characterization, Measurements, Mitigation)*, Sapporo, Japan, 1994.

139"Typical Electric and Magnetic Field Exposures at Power Line Frequencies and Their Coupling to Biological Systems," *Proceedings of the 1994 Japan-U.S. Science Seminar on Electromagnetic Field Effects Caused by High Voltage Systems (Modeling, Characterization, Measurements, Mitigation)*, Sapporo, Japan, 1994.

138"Fabrication of Ba_{1-x}Sr_xTiO₃ tunable capacitors with Tl₂Ba₂Ca₁Cu₂O_x electrodes," with A. Outzourhit, J. U. Trefny, Z.-H. Zhang, J. Cleckler and A. M. Hermann, *Physica C*, 387-394, 1994.

137"Dielectric properties of thin film SrTiO₃ grown on LaAlO₃ using YBa₂Cu₃O_{7-x} microstrip resonators", with H. D. Wu, D. Galt, J. Price and J.A. Beall, Proceedings for the SPIE - The International Society for Optical Engineering Conference, in January 1994, Los Angeles, California, High-T_c Microwave Superconductors and Applications, R.B. Hammond and R.S. Withers, Eds., vol. 2156, 131-140.

136"Voltage tunable capacitors using high temperature superconductors and ferroelectrics", with H. D. Wu, Z. Zhang, C. Jackson and A. Kain, *IEEE Transactions on Superconductivity*, September 1993.

135"The case for liberal engineering programs - and an approach to implementing them", with H. Wachtel and R. Ravenel, 1992 Frontiers in Education Conference.

134"Mass and energy tradeoffs of axial penetration devices on lunar soil simulant", with M. P. Nathan, H.Y. Ko and S. Sture, Proc. of Amer. Civil Engrs., vol. I, 441-457, W. Z. Sadeh, S. Sture, and R. J. Miller, Eds., 3rd International Conference on Engineering, Construction and Operations in Space C, Denver, Colorado, 31 May-4 June 1992.

133"A theoretical basis for coupling via induced currents to biological systems for ultra fast switched magnetic fields," New York Academy of Sciences, 1992.

132"Some engineering models for interactions of electric and magnetic fields with biological systems", *Bioelectromagnetics*, Supplement 1, 67-85, 1992.

131"The use of high temperature superconducting films for the magnetic storage of information", with J. Cairns, Z.Zhang and M. Dugas, *IEEE Transactions on Magnetics* , vol. 28, (5), 2077-2080, 1992.

130"Radically focusing fiber optic probes for laser angioplasty", with R.T. Mihran and H. D. Wu, *Biomedical Optics*, January 1992.

129"Modification of the 1979 "Denver wire code" for different wire or Plumbing types", with E. Leeper, N. Wertheimer, D. Savitz and H. Wachtel, *Bioelectromagnetics*, vol. 12, (5), 315-318, November 1991.

- 128 "A one room school house plan for education", with C.H. Marbury, L. Lawsine and R.N. Nicholson, *IEEE Transactions on Education*, vol. 34, (4), November 1991.
- 127 "Editorial: some sources of hazards, safety, and electrical engineering," *IEEE Transactions on Education*, vol. 34, (3), 209-210, August 1991.
- 126 "Modulation of nerve excitability *in vitro* by pulsed ultrasound", with R.T. Mihran and H. Wachtel, *Innovation Et Technologie En Biologie Et Medicine*, vol. 12, (1), 53-63, 1991.
- 125 "Engineering properties of lunar regolith and their impact on mining", with Perkins, S. Sture and H. Y. Ko, *Proceedings of the International Symposium on Mine Mechanization and Automation*, June 1991.
- 124 "Laser ablation of biological material using focused and pulsed laser beam", with K.S. Lee and M. Mertz, Sung Kyun Kwan University Collection of Technical Papers (Science & Technology Section), vol. 42, (1), special edition, April 1991.
- 123 Microlenses. coupling light to optical fiber, H.D. Wu and F.S. Barnes, Eds., IEEE Press, New York, 1991.
- 122 "A theory of shot noise in quantum wells and applications in resonant tunneling heterojunction bipolar transistors," with J. Han, *IEEE Transactions on Electron Devices*, 38, 2, 237-241, February 1991.
- 121 "Editorial", *IEEE Transactions on Education*, vol. 33, (4), 313, November 1990.
- 120 "The effects of time varying magnetic fields on biological materials," *IEEE Transactions on Magnetics*, vol. 26, (5), September 1990.
- 119 "Transient modification of membrane potential and conductance by single ultrasound bursts modulates neuronal excitability," with R.T. Mihran and H. Wachtel, Annual International Conference of IEEE Engineering in Medicine and Biology Society, vol. 12, (1), 1990.
- 118 "Optical response of bulk Bi-Sr-Ca-Cu-O," with W. Eidelloth, *IEEE Journal of Quantum Electronics*, 25 (11), 2405-2409, 1989.
- 117 "Suspension in magnetic recording using high T_c superconductors," with B. R. Scharf and M. Dugas, *IEEE Transactions on Magnetics*, 25 (5), 3230-3232, 1989.
- 116 "Radio-microwave interactions with biological materials," *Health Physics*, 56 (5), 759-766, 1989.
- 115 "Josephson junctions with bulk $YBa_2Cu_3O_{7-x}$, $Bi_2Sr_2CaCu_2O_x$ and $Tl_2Ca_2Ba_2Cu_3O_{10+x}$," with W. Eidelloth, S. Geller, K.-Y. Wu, Z.Z. Sheng, and A.M. Hermann, *IEEE Trans. on Magnetism*, 25 (2), 939-942, 1989.
- 114 "The use of wiring configuration and wiring codes for estimating externally-generated electric and magnetic fields," with D. Savitz, H. Wachtel and J. Fuller, *Bioelectromagnetics* 10, 13-21, 1989.
- 113 "Applications of high temperature superconductors to recording heads," with M. Dugas, W. Eidelloth, *IEEE Trans on Magnetism* 24 (6), 2395-2397, 1988.
- 112 "Pair tunneling and weak links in bulk $Tl_2Ca_2Ba_2Cu_3O_{10+x}$ up to 77 K," with W. Eidelloth, Z. Z. Sheng and A. M. Hermann, *Applied Physics Communications* 8 (4), 191-200, 1988.
- 111 "An M.S. curriculum in telecommunications," with Julian Holtzman, *IEEE Transactions on Education* 31, (3), 213-214, August 1988.

- 110"Interdisciplinary M. S. Program in Telecommunications at the University of Colorado," with R. Shain, *Telematics and Informatics* 5 (2), 115-120, 1988.
- 109"Case-control study of childhood cancer and exposure to 60-hertz magnetic fields," with D. Savitz, H. Wachtel, E. John and J. Tvrđik, *Amer. J. Epidemiol.* 128 (1), 21-38, 1988.
- 108"Mechanisms of interaction of magnetic fields with biological systems," *IEEE Trans. on Magnetics* 24 (4), 2101-2104, 1988.
- 107"Case control study of childhood cancer and electromagnetic fields," with D. Savitz, *Amer. J. Epidemiol.*, 126 (4), 780, 1988.
- 106"Editorial: new directions for the IEEE Transactions on Education", *IEEE Transactions on Education*, vol. 21, (2), 53, May 1988.
- 105"Case-control study of childhood cancer and residential exposure to electric and magnetic fields," Contractor's Final Report, with D. Savitz and H. Wachtel, report for the New York State Power Lines Project, Wadsworth Center for Laboratories and Research, Albany, NY, 1987.
- 104"Simple side coupler for coupling between laser diode and single-mode optical fiber," with K. S. Lee. *Applied Optics* 26 (12), 2294-2296, June 1987.
- 103"A Potentially Low-Noise Avalanche Diode Microwave Amplifier," with W.-H. Su and K. F. Brennan, *IEEE Transactions on Electron Devices* ED-34 (5), 966-972, May 1987.
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