


Introduction to the Winter 2022 Issue

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(Editorial)

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ABSTRACT As we begin our second year, the IEEE JOURNAL OF MICROWAVES hopes to build on its early success in reaching out to both authors and readers in what can only be regarded as an auspicious first step into the realm of fully Open Access publishing within the microwave community. Through a combination of innovative ideas, supportive administrative staff, a technically superb Editorial Board, high quality standards, and a personal focus on our readers, our authors, and our reviewers, we have managed to build up a modicum of community support and a very loyal following. Many of our authors have submitted multiple articles over our first year, despite our lack of rank and impact factor. They have been rewarded by an outstanding number of article views: now over 100,000, putting us near the very top of IEEE's technical journals ranking for downloads/article published. In this first issue of 2022, we bring you twelve regular technical papers, two invited articles, and two more of our special series articles: *Microwave Pioneer Charles Elachi*, *Dare Mighty Things* and *Women in Microwaves* subject Maria Stuchly, a pioneer in microwaves in medicine. We know you will enjoy these and all of this issue's technical features.

INDEX TERMS Editorial board, Journal of Microwaves, opening editorial, winter issue.

I. INTRODUCTION

Welcome to our first issue in Volume 2 of IEEE JOURNAL OF MICROWAVES! As we begin our second year of publication, we are working to expand on our existing author base while continuing to bring our readers articles of broad scope and general interest. Our first year came with unexpected but welcomed visibility, as demonstrated through our exceptionally high download count: over 100,000 article usage counts (html views and downloads) over the past eleven months! This placed us at the very top of the views-per-article-published list within the IEEE, where we ranked #3 out of more than 250 IEEE technical publications within our first six months.¹ We hope to continue this trend throughout 2022, as we await our turn in the queue for commercial database inclusion and

ranking and a designated impact factor –not expected before 2024. In the meantime, we hope you will look to our new journal as a beacon for interesting and relevant overview papers, as well as exclusive research articles that span the whole field of Microwaves, both within the electrical engineering community and flowing out to the general sciences.

II. CONTENT

We open the IEEE JOURNAL OF MICROWAVES, volume 2, issue 1 with our continuing *Microwave Pioneer* series, with this issue highlighting Dr. Charles Elachi, Director of the NASA Jet Propulsion Laboratory and the person most responsible for bringing active remote sensing to space. Allison Marsh then follows with her second *Women in Microwaves*

¹This ranking is for total usage (html views and downloads) and document counts for original research articles published within the first six months of 2021 (the only period for which data on our journal is currently available). BIG DATA MINING AND ANALYTICS ranked first out of 253 IEEE journals, with 27,990 total usage counts for nineteen documents published, and a value of 1,473 usage/document. The prestigious PROCEEDINGS OF THE IEEE follows with 59,340 total usage counts and forty-two papers or 1,412 usage/document. Both of these publications have been around for a while: four years for Big Data and since 1963 for the Proceedings. IEEE JOURNAL OF MICROWAVES is

ranked third, with 62,842 total usage counts and fifty-three papers published over the tracking period, for a count of 1,185 usage/document. The next two journals in the list, IEEE COMMUNICATIONS SURVEYS AND TUTORIALS and IEEE SOLID-STATE CIRCUITS MAGAZINE, have usage/document counts that are 50% lower than JMW (664 and 563 usage/document respectively)! Considering we are still several years away from being indexed on popular databases and receiving an Impact Factor, we are extremely happy with our recent usage numbers!

oral history article featuring University of Victoria, Canada, Professor Emeritus Maria Stuchly, who is recognized for her many “contributions to the understanding of interactions of electromagnetic fields with living systems.” [1].

After our two special series articles, we are extremely excited to lead-off our *regular* contributions this issue with a comprehensive and well-written review paper from one of our most popular author teams, Chris Rodenbeck *et al.* of the US Naval Research Laboratory, Washington, DC, USA, covering, “Terrestrial Microwave Power Beaming.” Be sure to take a look at the video files accompanying Figs. 10 and 26 from the paper [2].

Noted EM theorists Stefano Maci and Enrica Martini at University of Siena, Italy, contributed the first of our two invited papers on the design and control of metasurfaces using microwave fields for realizing multifunctional circuitry. This is an excellent manuscript, on a subject we have been hoping to be able to bring to you since we began JMW last January.

Our second invited paper in this issue is from groups at the Polytechnic University of Valencia (Pablo González, Pablo Soto *et al.*) and the European High Power Radiofrequency Space Laboratory, Val Space Consortium (Raul Cevera *et al.*), on predicting and addressing unwanted high power discharges in RF transmitters, especially in satellite communications systems. The authors present a comprehensive design and analysis approach with wide applicability and practical solutions.

The next four papers all involve microwave radar applications and devices. In “Applicability and Performance of Standard Compression Methods for Efficient Data Transmission and Storage in Radar,” from the renowned radar group of Martin Vossiek *et al.*, at Frederick Alexander University of Erlangen-Nuremberg, Germany, radar compression techniques that can yield more than a 99% savings in data rate transmission are reviewed and discussed.

Prolific author and contributor, Christian Waldschmidt *et al.*, from Ulm University, and colleagues at Endress and Hauser SE and Co. KG, Maulberg, Fraunhofer IZM, Berlin, Sentronics Metrology GmbH, Mannheim and LPFK Laser and Electronics AG, Garbsen in Germany, contribute an article on novel glass-based radar MMIC chips operating at 160 GHz with very low insertion loss and a demonstrated range resolution of only 12 mm.

Jay McDaniel’s group at University of Oklahoma, Norman, OK, USA, describe a sampling method for providing very accurate GPS position estimates at extremely fast update rates for use in SAR imaging in, “An Up-Sampled Particle Filter Fusion Technique and Its Application in Synthetic Aperture Radar Imaging.”

Finally, John Papapolymerou and student Adamantia Chletsou, at Michigan State University, East Lansing, MI, USA, and Ford Motor Company’s John Locke, describe a new car communications antenna and the effects of the environment on transmission and beam patterns in, “Vehicle Platform Effects on Performance of Flexible, Lightweight and Dual-band Antenna for Vehicular Communications.”

Our next four papers involve passive components. Three are filter papers and one involves phase shifters. In “Bandwidth and Center Frequency Reconfigurable Waveguide Filter Based on Liquid Crystal Technology,” by authors at Kiel University (M. Hoft, F. Kamrath *et al.*), Technical University of Darmstadt (S. Matic *et al.*), and Otto von Guericke University, Magdeburg, Germany (H. Maune), present a first-time electronically controlled and reconfigurable liquid crystal-based waveguide filter. The new circuit is designed, analyzed, and characterized at 30 GHz.

Our own Ke Wu, student Wentao Lin and colleague Jean-Jacques Laurin, at Montreal Polytechnic University, Canada, along with collaborators at Xidian University and Ningbo University in China, and Yuhan University in Korea, describe a synthesis technique for tunable bandpass filters that can be easily reconfigured by changing only a few elements in, “Tunable Bandpass Filters with Reconfigurable Symmetric Transmission Zeros on Real or Imaginary Axis.”

The third filter contribution, “Screen-Printable Flexible Textile-Based Ultra-Broadband Millimeter-Wave DC-Blocking Transmission Lines based on Microstrip-Embedded Printed Capacitors,” from Mahmoud Wagih, Abiodun Komolafe and Nicholas Hillier, of University of Southampton, U.K., details a novel, low-loss capacitor-based printed transmission line and filter structure incorporated onto felt fabric to realize a unique flexible textile-based RF circuit with performance up to 50 GHz!

The last passive components paper in this issue focuses on a novel microstrip transmission line with a nanowire-based ground plane and a sandwiched liquid crystal layer, creating a compact tunable phase shifter operating from 5 to 67 GHz: “Fast and Miniaturized Phase Shifter with Excellent Figure of Merit Based on Liquid Crystal and Nanowire-Filled Membrane Technologies.” The manuscript comes to us from authors at Darmstadt University, Germany, with collaborators at Polytechnic University of São Paulo, Brazil, University of Grenoble, France, and University of Magdeburg, Germany. The corresponding author is Dongwei Wang at Darmstadt.

Following our filter manuscripts, we present an analytic paper from Allen Sweet, Sudipta Saha, and Shoba Krishnan, at University of Santa Clara, CA, USA, on calculating oscillator phase noise with a formulaic solution that provides more insight than a numeric approach.

Load modulated balanced amplifier design is the subject of our next-to-last paper, from Taylor Barton *et al.* at University of Colorado, Boulder, CO, USA, and colleagues at the University of Paris East and SOMOS Semiconductor, France. The authors develop an analysis/design formulation and then test it at 2.4 GHz on several amplifier configurations, achieving very high efficiencies.

We conclude our January 2022 issue with a third paper from the very active dosimetry and antennas group at University of Rennes, France, including Maxim Zhadobov, Ronan Sauleau, and colleagues. The paper, “High-Resolution Model of Human Skin Appendages for Electromagnetic Dosimetry at Millimeter Waves,” examines RF dosimetry at

the extreme subwavelength scale, as in micro-organelles and ultrafine structural features of human skin at 60 GHz. Detailed modelling and microabsorption features are simulated and cataloged, based on localized water content and distribution, and on dielectric variability. The paper presents a first, and very detailed look at microscopic RF absorption variability in tissue and will likely be extremely relevant to future studies in 5G dosimetry.

This concludes our paper queue for our first issue in volume 2. We hope you enjoy, download, and cite these manuscripts and we look forward to bringing you an equal number of interesting articles for issue 2, which is due out in mid-April.

III. LOOKING AHEAD

Throughout 2022, we are continuing with a quarterly issue release sequence: winter-spring-summer-autumn (January-April-July-October). Papers that fall between issues will be available in production format as Early Access documents, with the same DOI and IEEEExplore hyperlink as they will have in the bundled issue, but without final page numbers. If our authors are so generous as to swell our paper queue significantly, we will re-evaluate our issue release schedule for 2023.

Our spring issue is already fairly well populated, but we are still seeking research and review papers on several microwave topics of interest that we have not yet explored. This is especially true in the areas of physics and medicine and energy and geology, where microwaves have played a substantial historic and instrument development role, but where authors have generally preferred to publish in broader science-based journals. If you have an idea for a paper, particularly in these cross-engineering subjects, that you think would fit within our scope and be of interest to our community, contact our Editor-in-Chief or one of our Topic Editors to discuss submission possibilities.

We are also looking to expand our Journal Club review process [3] in 2022 and are interested in signing up other groups that may be interested in participating. We have fifty-eight committed research teams in academia, industry and government labs around the world who have already agreed to participate and who are being tapped as we move forward into volume 2. So far, the new process has been working very well and is not noticeably different in quality or outcome than our normal review sequence. Send a note to our Editor-in-Chief if you want to learn more or if you think you might like to participate.

Speaking for the entire Editorial Board and our Administrative and Production Editors, we again thank our authors, our reviewers, and all of you readers for your persistent and growing support for our new journal. We all hope you continue to enjoy and benefit from our efforts in 2022, in “*Expanding Science, Technology, and Connectivity across the Globe.*”

IV. OUR EDITORIAL TEAM

In order to truly span all of the disciplines that make up our microwave community, our twenty-four Topic Editors

have been assembled from the Chairs, Vice-Chairs, and key participants of all twenty-six active technical committees² within the Microwave Theory and Techniques Society. In addition to technical expertise and academic, governmental, and industrial backgrounds, we also have significant publications experience and leadership skills on our Editorial Board, which includes two former and four current IEEE journal Editors-in-Chief, a former MTT-S AdCom President, and twelve current and former IEEE journal Associate Editors. Our technical efforts are aided by a senior Administrative Editor, Kara McArthur and, starting this November, a very experienced Assistant Editor, Sharri Shaw, who has been working on several MTT journals for more than 15 years, including the IEEE TRANSACTIONS ON TERAHERTZ SCIENCE AND TECHNOLOGY, where we overlapped for five years between 2010 and 2015. Our veteran IEEE Production Editor, as many of you who have published with us now know, is Joanna Gojlik.

As I mention every issue, our superb Editorial Board brings an unprecedented level of technical and operational expertise, extensive networking, and a very personal approach to the journal, contributing authors, valued reviewers, and to all of our readers. In September 2021, we welcomed new Editorial Board member, Dr. Ken Cooper, of the NASA Jet Propulsion Laboratory, representing MTT Technical Committee 24 (*Microwave and Millimeter-Wave Radar, Sensing, and Array Systems*), and Technical Committee 21 (*Terahertz Technology and Applications*). Ken is helping with the large number of radar papers we have been receiving lately. More recently (in December), we added to our team Professor David Ricketts, of North Carolina State University. David is replacing founding Editorial Board member Dr. Michael Schröter of Ruhr University, and represents MTT Technical Committee 9 (*Microwave and Millimeter-Wave Solid-State Devices*), for which he is the current committee Chair. You will find photos and short bios of Sharri, Ken, David, and our entire team at the end of this editorial introduction.

ACKNOWLEDGMENT

At this juncture, the EiC would like to single out several individuals within the IEEE Publications community who have gone above and beyond in support of our fledgling publication. Over the autumn quarter, we again want to single out our Manuscript Central trainer and guru for all paper submission and review process problems: Sonal Parikh. Also, Louis Vacca, who continues to generate our Flip-Books, and makes sure our requested Inaugural print issue copies get sent out every month to our requestors, now numbering over 1600 persons in eighty countries! We would also like to thank MTT Society Administrative Committee member Professor Anding Zhu for continued support of web content, and social media outreach for JMW. Tim Pastore and Dena Hoffman at IEEE

²The current 26 MTT technical committees are listed on the IEEE JOURNAL OF MICROWAVES web page: <https://mtt.org/publications/journal-of-microwaves/>, under: Editorial Board (at the very bottom of the page), and they are detailed on the MTT Society web pages under Technical Coordination Committees (<https://mtt.org/technical-committees-list/>).

helped us with an e-mail blast campaign this autumn, and Carl Sheffres and Ed Kiessling at Horizon House generously provided IEEE J. MICROWAVES a full page of advertising space in the November issue of *Microwave Journal*. We are very grateful!

Finally, this EiC cannot thank enough our Administrative Editor and proof-reader extraordinaire, Kara McArthur, who is always willing to help out in a pinch and who this autumn, brought us Sharri Shaw.

We also acknowledge our IEEE Production Editor, Joanna Gojlik and all of our superb Topic Editors. We all meet regularly to discuss our philosophy, exchange ideas, bring in new authors and readers, and work tirelessly to make this journal the best it can be!

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EDITORIAL BOARD

EDITOR-IN-CHIEF



PETER H. SIEGEL (Life Fellow, IEEE) received the B.A. degree in astronomy from Colgate University, Hamilton, NY, USA, in 1976, and the M.S. degree in physics and the Ph.D. degree in electrical engineering (EE) from Columbia University, New York, NY, USA, in 1978 and 1983, respectively. He has held appointments as a Research Fellow and Engineering Staff with the NASA Goddard Institute for Space Studies, New York City, NY, USA, from 1975 to 1983, a Staff Scientist with National Radio Astronomy Observatory, Central

Development Labs, Charlottesville, VA, USA, from 1984 to 1986, a Technical Group Supervisor and Senior Research Scientist with Jet Propulsion Laboratory (JPL), National Aeronautics and Space Administration (NASA), Pasadena, CA, USA, from 1987 to 2014, and a Faculty Associate of electrical engineering and a Senior Scientist of biology with the California Institute of Technology (Caltech), Pasadena, CA, USA, from 2002 to 2014. At JPL, he founded and led for 25 years, the Submillimeter Wave Advanced Technology (SWAT) Team, a group of more than 20 scientists and engineers developing THz technology for NASA's near and long-term space missions. This includes delivering key components for four main satellite missions and leading more than 75 smaller research and development programs for NASA and the U.S. Department of Defense. At Caltech, he was involved in new biological and medical applications of THz, especially low-power effects on neurons and most recently millimeter-wave monitoring of blood chemistry. He was the IEEE Distinguished Lecturer and the Vice-Chair and Chair of the IEEE MTTs THz Technology Committee. He is currently an elected member of the MTTs AdCom. He has more than 300 articles on THz components and technology and has given more than 250 invited talks on this subject throughout his career of 45 years in THz. His current appointments include the CEO of THz Global, a small research and development company specializing in RF bio-applications, a Senior Scientist Emeritus of biology and electrical engineering with Caltech, and a Senior Research Scientist Emeritus and a Principal Engineer with NASA Jet Propulsion Laboratory. Dr. Siegel has been recognized with the 75 NASA technology awards, ten NASA team awards, the NASA Space Act Award, three individual JPL awards for technical excellence, four JPL team awards, and IEEE MTTs Applications Award in 2018. He is honored to continue the responsibilities in 2022, as the Founding Editor-in-Chief of the IEEE JOURNAL OF MICROWAVES, which he hopes will invigorate the microwave field. Among many other functions, he was the Founding Editor-in-Chief of the IEEE TRANSACTIONS ON TERAHERTZ SCIENCE AND TECHNOLOGY, from 2010 to 2015, and the Founder, in 2009,

Chair through 2011, and has been elected General Secretary since 2012, of the International Society of Infrared, Millimeter, and Terahertz Waves (IRMMW-THz), the world's largest non-profit society devoted to THz science and technology.

TOPIC EDITORS (ALPHABETICALLY)

TC-3 & TC-24 TOPIC EDITOR: MICROWAVE MEASUREMENTS & MICROWAVE/MM-WAVE RADAR, SENSING, AND ARRAY SYSTEMS



SHERIF S. AHMED (Senior Member, IEEE) received the M.Sc. degree in microwave engineering from The Technical University of Munich, Munich, Germany, in 2007, and the Ph.D. (Dr. Ing.) degree from The University of Erlangen Nuremberg, Erlangen, Germany, in 2013. He is currently an Adjunct Professor with Stanford University, Stanford, CA, USA, and assembles more than 15 years of professional industry experience in various R&D roles. He has coauthored more than 25 research papers, more than 20 patents, and a book on advanced microwave imaging methods. He was the recipient of the University Academic Award of the Technical University of Munich (TUM) in 2007, Innovation Award of Rohde & Schwarz (R&S) in 2009 and 2018, and the IEEE MTT Microwave Prize Award of 2013. He is also the Co-Chair of the U.S. ANSI standard committee for Measuring the Imaging Performance of mmWave Systems for Security Screening of Humans. His R&D focus extends to microwave and mmWave imaging, stand-off THz sensing, multistatic radars, advanced signal-processing techniques, terahertz technology, and last but not least, automotive radar design and characterization. Over the past decade, he pioneered the body scanner technology with the first fully-electronic multistatic millimeter wave imaging systems, which are being deployed worldwide today at airport checkpoints. In the recent years, he has been advancing the qualifications of automotive radars, towards autonomous driving capabilities.

advanced microwave imaging methods. He was the recipient of the University Academic Award of the Technical University of Munich (TUM) in 2007, Innovation Award of Rohde & Schwarz (R&S) in 2009 and 2018, and the IEEE MTT Microwave Prize Award of 2013. He is also the Co-Chair of the U.S. ANSI standard committee for Measuring the Imaging Performance of mmWave Systems for Security Screening of Humans. His R&D focus extends to microwave and mmWave imaging, stand-off THz sensing, multistatic radars, advanced signal-processing techniques, terahertz technology, and last but not least, automotive radar design and characterization. Over the past decade, he pioneered the body scanner technology with the first fully-electronic multistatic millimeter wave imaging systems, which are being deployed worldwide today at airport checkpoints. In the recent years, he has been advancing the qualifications of automotive radars, towards autonomous driving capabilities.

TC-11 TOPIC EDITOR: MICROWAVE LOW-NOISE TECHNIQUES



JOSEPH BARDIN (Senior Member, IEEE) received the Ph.D. degree in electrical engineering from the California Institute of Technology, Pasadena, CA, USA, in 2009. In 2010, he joined the Department of Electrical and Computer Engineering, University of Massachusetts, Amherst, MA, USA, where he is currently a Full Professor. His research group currently focuses on low temperature integrated circuits with applications in radio astronomy and the quantum information sciences. In 2017, he joined Google Quantum AI

Team, as a Visiting Faculty Researcher and, in addition to his university appointment, he is currently a Staff Research Scientist with this team. Professor Bardin was the recipient of the 2011 DARPA Young Faculty Award, 2014 NSF CAREER Award, 2015 Office of Naval Research YIP Award, 2016 UMass Amherst College of Engineering Barbara H. and Joseph I. Goldstein Outstanding Junior Faculty Award, 2016 UMass Amherst Award for Outstanding Accomplishments in Research and Creative Activity, and 2020 IEEE MTT-S Outstanding Young Engineer Award.

TC-20 TOPIC EDITOR: HF-VHF-UHF TECHNOLOGIES AND APPLICATIONS



ROBERT H. CAVERLY (Life Fellow, IEEE) received the Ph.D. degree in electrical engineering from The Johns Hopkins University, Baltimore, MD, USA, in 1983. Since 1997, he has been a Faculty Member with the Department of Electrical and Computer Engineering, Villanova University, Villanova, PA, USA, and is currently a Full Professor. Previously, he was a Professor for more than 14 years with the University of Massachusetts Dartmouth, North Dartmouth, MA, USA. He has authored or coauthored more than 100 journal and

conference papers and is the author of two books, *Microwave and RF Semiconductor Control Device Modeling* and *CMOS RFIC Design Principles* from Artech House. His research interests include the characterization of semiconductor devices, such as PIN diodes and FETs in the microwave and RF control environment. He is the current Editor-in-Chief of *IEEE Microwave Magazine* and a Member of the MTT-S AdCom and was the General Chair of the 2020 *IEEE Radio and Wireless Week*.

TC-28 TOPIC EDITOR: BIOLOGICAL EFFECTS AND MEDICAL APPLICATIONS



J.-C. CHIAO (Fellow, IEEE) received the B.S. degree from Electrical Engineering Department, National Taiwan University, Taipei, Taiwan, in 1988, and the M.S. and Ph.D. degrees in electrical engineering from the California Institute of Technology, Pasadena, CA, USA, in 1991 and 1995, respectively. He was a Research Scientist with the Optical Networking Systems and Testbeds Group, Bell Communications Research, an Assistant Professor of electrical engineering with the University of Hawaii, Manoa, Honolulu, HI, USA, and the

Product Line Manager and a Senior Technology Advisor with Chorum Technologies. From 2002 to 2018, he was the Janet and Mike Greene Endowed Professor and Jenkins Garrett Professor of electrical engineering with the University of Texas at Arlington, Arlington, TX, USA. He is currently the Mary and Richard Templeton Centennial Chair Professor of electrical and computer engineering with Southern Methodist University, Dallas, TX, USA. He has authored or coauthored and edited numerous peer-reviewed technical journal and conference papers, book chapters, proceedings and books. He holds 16 patents in RF MEMS, MEMS optical, liquid crystal, nano-scale fabrication, and wireless medical sensor technologies. His research works have been covered by media extensively including *Forbes*, *National Geographic* magazine, National Public Radio, and CBS Henry Ford Innovation Nation.

Dr. Chiao was the recipient of the Lockheed Martin Aeronautics Company Excellence in Engineering Teaching Award, Tech Titans Technology Innovator Award, Research in Medicine Award in the Heroes of Healthcare, IEEE Region 5 Outstanding Engineering Educator Award, IEEE Region 5 Excellent Performance Award, 2012-2014 IEEE MTT Distinguished Microwave Lecturer Award, 2017-2019 IEEE Sensors Council Distinguished Lecturer Award, and 2011 Edith and Peter O'Donnell Award in Engineering by The Academy of Medicine, Engineering and Science of Texas. He is the Chair of several international conferences, including the 2018 IEEE International Microwave Biomedical Conference (IMBioC). He was the Chair of the IEEE MTT-S Technical Committee 10 Biological Effect and Medical Applications of RF and Microwave, the Technical Program Chair of 2019 IEEE International Wireless Symposium, and an Associate Editor of IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES. He is the founding Editor-in-Chief of IEEE JOURNAL OF ELECTROMAGNETICS, RF, AND MICROWAVES IN MEDICINE AND BIOLOGY.

TC-23 & TC-25 TOPIC EDITOR: WIRELESS COMMUNICATIONS & WIRELESS POWER TRANSFER AND ENERGY CONVERSION



ZHIZHANG (DAVID) CHEN (Fellow, IEEE) received the B.Eng. degree in radio engineering from Fuzhou University, Fujian, China, the M.Sc. degree in radio engineering from Southeast University (formerly Nanjing Institute of Technology), Nanjing, China, and the Ph.D. degree in electrical engineering from the University of Ottawa, Ottawa, ON, Canada. He is currently a Professor and the former Head of the Department of Electrical and Computer Engineering, Dalhousie University, Halifax, NS, Canada.

Dr. Chen is active in teaching, research, and professional services. He is teaching various undergraduate and graduate courses in the areas of communication systems, RF/Microwave electronics/systems, antennas, and electromagnetics. He has authored or coauthored more than 450 refereed journal/conference papers and 26 industrial reports, published one book, contributed to two books, edited one research monograph and one conference proceeding, and filed eight patent applications in the areas of computational

electromagnetics and RF/microwave circuit and system design (some of his publications have been cited extensively in SCI literatures). He was one of the key originators in developing new numerical algorithms and in designing a new class of compact RF circuits and systems for wireless communications. He is a sole/principal investigator of more than twenty-eight grants from both government and industry, including the NSERC Discovery Accelerator Supplement Grant, NSERC Strategic Project Grants on Ultra-wideband Impulse Radios and novel RF-front ends, a research contract in developing structure composite microwave materials for radar applications (2011–2013), an Atlantic Innovation Fund on generic smart RF transceivers. He is a Fellow of the Canadian Academy of Engineering (CAE) and Engineering Institute of Canada (EIC). He is a registered Professional Engineer and has served as a consultant for local companies.

TC-24 & TC21 TOPIC EDITOR: MICROWAVE/MM-WAVE RADAR, SENSING, AND ARRAY SYSTEMS & TERAHERTZ TECHNOLOGY AND APPLICATIONS



KEN B. COOPER (Senior Member, IEEE) received the A.B. degree in physics from Harvard College, Cambridge, MA, USA, in 1997, and the Ph.D. degree in physics from the California Institute of Technology, Pasadena, CA, USA, in 2003. Following postdoctoral research in superconducting microwave qubits, he has been with Jet Propulsion Laboratory since 2006, as an RF Microwave Engineer, where he has been recognized with the Lew Allen Award for Excellence, the Ed Stone Award for an Outstanding Research Publication,

and a Principal designation for the development of active THz sensors, systems, and techniques. His work with JPL has included the development of scanning 340 GHz and 670 GHz imaging radars for concealed object detection, a compact 95 GHz Doppler radar and 270/560 GHz spectrometer for cometary jet observation, and differential absorption radars at 170 GHz and 560 GHz for humidity sounding on Earth and Mars.

TC-12 TOPIC EDITOR: MICROWAVE HIGH-POWER TECHNIQUES



STEVE C. CRIPPS (Life Fellow, IEEE) received the master's and Ph.D. degrees from Cambridge University, Cambridge, U.K., in the 1970s. After working for several years with the Pioneering Gallium Arsenide (GaAs) Group, Plessey Research, he emigrated to the U.S., where he worked for 15 years in various engineering and management positions with Watkins Johnson, Loral, and Celeritek. In 1996, he returned to the U.K., working as an Independent Consultant before taking on an academic post at Cardiff University, where he is currently a Distinguished Research Professor. He has authored several best-selling books on RFPA design and is a regular contributor to the *IEEE Microwave Magazine* with his popular "Microwave Bytes" column. Dr. Cripps was the 2008 recipient of the IEEE Microwave Application Award.

Dr. Cripps was the 2008 recipient of the IEEE Microwave Application Award.

TC-22 & TC-10 TOPIC EDITOR: MICROWAVE PHOTONICS & SIGNAL GENERATION AND FREQUENCY CONVERSION



AFSHIN S. DARYOUSH (Fellow, IEEE) is currently a Professor of electrical and computer engineering with Drexel University, Philadelphia, PA, USA, where he has developed courses in devices, circuits, and subsystems employed in microwaves, photonics, and antennas. He also conducts research in microwave photonics applied to telecommunications and biomedical engineering that resulted in more than 300 technical articles, ten patents, and eight book chapters. In 2011, he became a Member of Franklin Institute's Committee on Science and

the Arts. Dr. Daryoush was the recipient of the Drexel University's Graduate Teaching Award in 2000, IEEE Philadelphia Section's Franklin Key Award in 2015, and Drexel University's Alumni Award in 2018. After receiving the

Microwave Prize in 1986, his 13 articles have been recognized as the best student papers in various IEEE conferences. He has also organized various IEEE conferences since 1993, particularly serving as the TPC Chair for Radio Wireless Symposium 2008 (RWS 2008) and the Chair of the Radio and Wireless Week 2009 (RWW 2009), Microwave Photonics 2010 (MWP 2010), Benjamin Franklin Symposium on Microwave and Antenna Sub-Systems 2014 (BenMAS 2014), and International Microwave Symposium 2018 (IMS 2018).

TC-29 TOPIC EDITOR: MICROWAVE AEROSPACE SYSTEMS



NELSON J. G. FONSECA (Senior Member, IEEE) received the M.Eng. degree in electrical engineering from Ecole Nationale Supérieure d'Electrotechnique, Electronique, Informatique, Hydraulique et Télécommunications, Toulouse, France, in 2003, the M.Sc. degree in electrical engineering from the Ecole Polytechnique de Montreal, Montreal, QC, Canada, in 2003, and the Ph.D. degree in electrical engineering from Institut National Polytechnique de Toulouse – Université de Toulouse, France, in 2010.

He is currently an Antenna Engineer for the Antenna and Sub-Millimetre Wave Section, European Space Agency (ESA), Noordwijk, The Netherlands. Since November 2020, he has been holds an Honorary Appointment as a Professional Fellow with the University of Technology Sydney, Sydney, NSW, Australia. He has authored or coauthored more than 240 papers in peer-reviewed journals and conferences and has more than 50 patents issued or pending. His current research interests include multiple beam antennas for space missions, beam-former theory and design, ground terminal antennas, transfer of technology from and to terrestrial systems, including 5G networks, and novel manufacturing techniques.

Dr. Fonseca was the Chair of the 38th ESA Antenna Workshop in 2017, and the Co-Chair of the 2018 IET Loughborough Antennas & Propagation Conference (LAPC 2018). He is currently an Associate Editor of *IET Microwaves, Antennas and Propagation* (MAP) and IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES (TMTT), and a Topic Editor of IEEE JOURNAL OF MICROWAVES (JMW). He is also the Co-Vice Chair of the newly founded IEEE MTT-S Technical Committee 29 (TC-29) on Microwave Aerospace Systems. He has been a Board Member of the European School of Antennas and Propagation (ESoA) since January 2019 and is also the Co-ordinator of the ESA/ESoA course on Antennas for Space Applications, for which he was voted best lecturer by the participants of the 2020 edition. He is the elected EurAAP Regional Delegate representing Benelux for the term 2021–2023. He was the recipient of several prizes and awards, including the Best Young Engineer Paper Award at the 29th ESA Workshop on Antennas in 2007, ESA Teamwork Excellence Award in 2020, and multiple ESA Technical Improvement Awards.

TC-5 TOPIC EDITOR: FILTERS



ROBERTO GÓMEZ-GARCÍA (Senior Member, IEEE) received the Dipl.-Eng. degree in telecommunication engineering and the Ph.D. degree in electrical and electronic engineering from the Polytechnic University of Madrid, Madrid, Spain, in 2001 and 2006, respectively. Since 2006, he has been an Associate Professor with the Department of Signal Theory and Communications, University of Alcalá, Alcalá de Henares, Spain. He has been for several research stays with the C2S2 Department, XLIM Research Institute, University of

Limoges, Limoges, France, the Telecommunications Institute, University of Aveiro, Aveiro, Portugal, the U.S. Naval Research Laboratory, Microwave Technology Branch, Washington, DC, USA, and Purdue University, West Lafayette, IN, USA. He is also an Adjunct Part-Time Professor with the University of Electronic Science and Technology of China, Chengdu, China, and was an Invited Professor with the Gdansk University of Technology, Poland, during 2019–2020. He has authored or coauthored more than 100 papers in international journals and more than 140 papers in international conferences in his current research field, which include the design of fixed/tunable high-frequency filters and multiplexers in planar, hybrid, and monolithic

microwave-integrated circuit technologies, multifunction circuits and systems, and software-defined radio and radar architectures for telecommunications, remote sensing, and biomedical applications.

Dr. Gómez-García was a member of the Technical Review Board for several IEEE and EuMA conferences. He is also a member of the IEEE MTT-S Filters (MTT-5), IEEE MTT-S RF MEMS and Microwave Acoustics (MTT-6), IEEE MTT-S Wireless Communications (MTT-23), IEEE MTT-S Biological Effects and Medical Applications of RF and Microwave (MTT-28), and IEEE CAS-S Analog Signal Processing Technical Committees. He was the recipient of the 2016 IEEE Microwave Theory and Techniques Society (MTT-S) Outstanding Young Engineer Award. During 2020–2021, he is an IEEE CAS-S Distinguished Lecturer. He was an Associate Editor of IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES from 2012 to 2016 and IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS PART I: REGULAR PAPERS from 2012 to 2015. From 2016 to 2017, he was the Senior Editor of IEEE JOURNAL ON EMERGING AND SELECTED TOPICS IN CIRCUITS AND SYSTEMS. He was the guest editor for several special/focus issues and sections in IEEE and IET Journals. In addition to his role on IEEE JOURNAL OF MICROWAVES, he is the new Editor-in-Chief of IEEE MICROWAVE AND WIRELESS COMPONENTS LETTERS, an Associate Editor of IEEE MICROWAVE AND WIRELESS COMPONENTS LETTERS, IEEE JOURNAL OF ELECTROMAGNETICS, RF AND MICROWAVES IN MEDICINE AND BIOLOGY, IEEE ACCESS, *IET Microwaves, Antennas, and Propagation*, and the *International Journal of Microwave and Wireless Technologies*, and the MTT-S Newsletter Working Group Chair.

TC-6 TOPIC EDITOR: RF MEMS AND MICROWAVE ACOUSTICS



SONGBIN GONG (Senior Member, IEEE) received the B.S. degree in electrical engineering from the Huazhong University of Science and Technology, Wuhan, China, in 2004, and the Ph.D. degree in electrical engineering from the University of Virginia, Charlottesville, VA, USA, in 2010. He is currently an Associate Professor and an Intel Alumni Fellow with the Department of Electrical and Computer Engineering and Holonyak Micro and Nanotechnology Laboratory, University of Illinois at Urbana–Champaign, Urbana, IL, USA.

His primarily research interests include the design and implementation of MEMS and acoustic devices, components, and subsystems for RF front ends. In addition, his research explores hybrid microsystems based on the integration of MEMS devices with circuits or photonics for signal processing. He was the recipient of the 2014 Defense Advanced Research Projects Agency Young Faculty Award, 2017 NASA Early Career Faculty Award, 2019 Dean's Award for Excellence in Research at UIUC, and 2019 IEEE Ultrasonics Early Career Investigator Award. Along with his students and postdocs, he was the recipient of the Best Paper Awards from the 2017 and 2019 IEEE International Frequency Control Symposium and the 2018 and 2019 IEEE International Ultrasonic Symposium and the 2nd place in the Best Paper Competition at 2018 International Microwave Symposium. He is an Associate Editor for IEEE TRANSACTIONS ON ULTRASONICS, FERROELECTRICS, AND FREQUENCY CONTROL and *Journal of Microelectromechanical Systems*, and also the Technical Committee Chair of the MTT-6 RF-MEMS and Microwave Acoustics of the IEEE Microwave Theory and Techniques Society.

TC-7 TOPIC EDITOR: MICROWAVE SUPERCONDUCTIVITY AND QUANTUM TECHNOLOGIES



MICHAEL C. HAMILTON (Senior Member, IEEE) received the B.S.E.E. degree from Auburn University, Auburn, AL, USA, in 2000, and the M.S.E.E. and Ph.D. degrees in electrical engineering from The University of Michigan, Ann Arbor, MI, USA, in 2003 and 2005, respectively. From 2006 to 2010, he was a member of Technical Staff with MIT-Lincoln Laboratory, where he worked on instrument-level and system-level projects for next-generation geostationary imaging for weather satellite systems, testing and modeling of highly-

scaled and environmentally-optimized CMOS devices subjected to extreme environmental conditions, and modeling, design, fabrication and test of advanced technologies for high-frequency RF sample-and-hold and analog-digital

conversion circuits based on Fully-Depleted Silicon-On-Insulator (FD-SOI) transistors and CCD structures. His current research interests include superconducting electronics technologies, micro/nano fabrication, packaging and integration of high-speed systems, signal and power integrity of densely integrated systems, application of micro and nanostructures for enhanced performance of RF and microwave systems and packaging for extreme environments (both high and low temperature). He joined the Electrical and Computer Engineering Department, Auburn University, as an Assistant Professor in 2010 and was promoted to a Professor in 2019. He is the Director of Alabama Micro/Nano Science and Technology Center (AMNSTC), which is a Micro/Nano Technology Center, Auburn University, funded by the State of Alabama. He is the Auburn University IEEE Student Chapter Faculty Advisor. He is on the IEEE MTT-S Education Committee, the Vice-Chair of MTT-7 Technical Committee on Microwave Superconductivity and Quantum Technologies Committee, and a Producer/Moderator of the IEEE MTT-S Webinar Series.

TC-21 TOPIC EDITOR: TERAHERTZ TECHNOLOGY AND APPLICATIONS



DMITRY KHOKHLOV received the M.S., Ph.D., and Doctor of Science (Russian analog of the Habilitation degree in Germany) degrees from M.V. Lomonosov Moscow State University, Moscow, Russia, in 1980, 1982, and 1992, respectively. Since 1982, he has been with the Department of Physics, M.V. Lomonosov Moscow State University, in positions from a Junior Research Fellow up to a Full Professor, since 1997, the Head of the Chair of General Physics, and Condensed Matter Physics, since 2006. In 2008, he was elected as a

Correspondent Member of the Russian Academy of Sciences. Since 2013, he has been the Head of the Expert Council on Condensed Matter Physics of the Russian Foundation for the Basic Research. Since 2015, he has been also the Head of the Expert Council on International Research Projects of the same Foundation.

He has been active in teaching and he has developed several lecture courses for undergraduate and graduate students and supervised more than 30 M.Sc. students and about 15 Ph.D. theses. He authored or coauthored more than 350 research or conference papers, edited one research monograph and filed two patents. His research interests include physics of narrow-gap semiconductors, development of sensitive detectors of terahertz radiation, photoelectric phenomena under terahertz excitation, organic semiconductors, and several other areas. He is a Principal Investigator of more than 15 research grants from different Russian national agencies.

SPECIAL SERIES TOPIC EDITOR



ALLISON MARSH (Senior Member, IEEE) received the B.S. degree in engineering from Swarthmore College, Swarthmore, PA, USA, and the Ph.D. degree in the history of science, medicine, and technology from The Johns Hopkins University, Baltimore, MD, USA. She is currently an Associate Professor of history and the Co-Director of the Ann Johnson Institute for Science, Technology & Society, University of South Carolina, Columbia, SC, USA. Her research focuses on how the general public comes to understand complex

engineering ideas through informal education, specifically in museum settings. She sees history as a Trojan horse to get people interested in learning more about how engineering affects society. Before coming to U of SC, she was the Curator and the Winton M. Blount Research Chair with Smithsonian National Postal Museum.

Dr. Marsh is a contributing editor to *IEEE Spectrum* and writes the monthly Past Forward column. In 2014, she won the IEEE-USA, Award for Distinguished Literary Contributions furthering Public Understanding and Advancement of the Engineering Profession for work publicizing the Smithsonian's orphaned engineering collections. She is a vocal advocate for women in STEM and is pioneering the Women in Microwaves oral history project in conjunction with the IEEE History Center.

TC-1 TOPIC EDITOR: FIELD THEORY AND COMPUTATIONAL EM

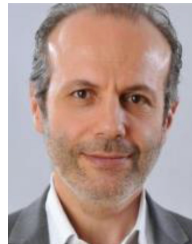


FRANCISCO MESA (Fellow, IEEE) received the B.Sc. and Ph.D. degrees in physics from the University of Seville, Seville, Spain, in 1998 and 1991, respectively. From 1992 to 1997, he was an Assistant Professor with the Department of Applied Physics, University of Seville, where he was promoted to an Associate Professor in 1997 and a Full Professor in 2010. Between 1992 and 2004, he enjoyed four stays in U.S. universities, the first one with the Polytechnic Institute of Brooklyn, NY, USA, and three more with the University of Houston, Houston, TX, USA. From July to December 2019, he was a Visiting Researcher with KTH (Royal Institute of Technology), Stockholm, Sweden.

Since 1988, he has been a member of the Microwave Group, University of Seville. During the first years of his research, he worked on computational electromagnetism and also on the diverse theoretical aspects of wave propagation involving these structures. Later, he worked on the modeling of metamaterials and periodic planar structures, contributing to the development of analytic (or quasi-analytic) equivalent circuits to characterize such structures and to find physically insightful explanations of some exotic phenomena. More recently, he has worked on higher symmetries applied to electromagnetic propagation and on the design of geodesic lenses.

Since January 2014, he has been an IEEE Fellow proposed by the IEEE MTT Society. He was an Associate Editor of IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES from 2013 to 2016, and he is a member of IEEE MTT-S Technical Committee MTT-1 (Field Theory and Computational EM).

TC-26 TOPIC EDITOR: RFID, WIRELESS SENSORS, AND IOT



PAOLO MEZZANOTTE (Member, IEEE) was born in Perugia, Italy, in 1965. He received the Ph.D. degree from the University of Perugia, Perugia, Italy, in 1997. Since 2007, he has been an Associate Professor with the University of Perugia, where he has been involved in teaching the classes Radiofrequencies Engineering and Systems and Circuits for IoT. Since 2014, he has been the Vice Head of the Department of Engineering, University of Perugia. His present h-index is 24 his research activities include testified by more than

170 publications in the most important specialized journals and at the main conferences of the microwave scientific community. His current research interests include the development of microwave circuits on bio-compatible substrates and the enabling technologies for IoT. He is an Associate Editor for the *ACES Journal*. From January 2017 to December 2019, he was the Chair of the IEEE Technical Committee MTT-24- RFID Technologies.

TC-13 TOPIC EDITOR: MICROWAVE CONTROL TECHNIQUES



CHRISTOPHER D. NORDQUIST (Senior Member, IEEE) received the B.S., M.S., and Ph.D. degrees in electrical engineering from Pennsylvania State University, University Park, PA, USA, in 1997, 1998, and 2002, respectively.

At Penn State, he was an Undergraduate and Graduate Research Assistant from 1995 to 1998 and a National Defense Science and Engineering Graduate Fellow from 1998 to 2001, where he explored heterogeneous integration of compound semiconductor devices through self-assembly. In 2002, he joined Sandia National Laboratories, Albuquerque, NM, USA, where he is currently a Distinguished Member of Technical Staff with RF/Optoelectronics Department. He has coauthored more than 80 journal and conference publications and holds nine patents in his current research field and activities, which include the design, fabrication, integration, and application of emerging micromachined and solid-state RF and microwave devices. In this context of exploring new approaches that target key future needs, he has explored the application of a broad range of advanced technology sets, including Si, GaAs, InP, GaN, MEMS, and advanced materials.

Dr. Nordquist is a Senior Member of the IEEE Electron Device and Microwave Theory and Techniques Societies. He is currently the Chair of the IEEE MTT-13 Technical Committee on Microwave Control Materials and is on the Editorial Board of IEEE JOURNAL OF MICROWAVES. He was also the Technical Program Co-Chair for the 2018 IEEE International Microwave Workshop in Advanced Materials, on the IEEE CSICS program committee from 2004–2006, as a reviewer for several IEEE journals, and was a key contributor to Sandia's 2011 R&D100 award-winning Microresonator Filters and Frequency References Team.

TC-9 TOPIC EDITOR: MICROWAVE AND MILLIMETER-WAVE SOLID-STATE DEVICES



DAVID S RICKETTS (Senior Member, IEEE) received the B.S. and M.S. degrees in electrical engineering from Worcester Polytechnic Institute (WPI), Worcester, MA, USA, and the Ph.D. degree in electrical engineering from Harvard University, Cambridge, MA, USA. He is currently a Full Professor of electrical and computer engineering with North Carolina State University, Raleigh, NC, USA. Prior to moving to academia, he spent more than eight years in industrial R&D in the development of integrated circuits in mixed-signal,

RF and power management applications. He is the author of two books: *The Designer's Guide to Jitter in Ring Oscillators and Electrical Solitons*. His research interests include the fields of physics, material science and circuit design, investigating the ultimate capabilities of microelectronic devices and how these are harnessed by differing circuit topologies to produce the highest performing systems.

His work has appeared in *Nature* and in numerous IEEE conferences and journals and was selected for the 2008 *McGraw-Hill Yearbook of Science and Engineering*. He is a Track Editor of IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, the Topic Editor of IEEE JOURNAL OF MICROWAVES, and the Chair of the MTT Technical Committee 9 on Microwave Devices. He was the recipient of the NSF CAREER Award, DARPA Young Faculty Award, and George Tallman Ladd Research Award. In addition as an Educator, he was the recipient of the 2009 Wimmer Faculty Teaching Fellow at Carnegie Mellon University, 2013 Harvard University Bok Center Teaching Award, and 2021 William F. Lane Outstanding Teaching award at NCSU. Since 2015, he has taught experiential hands-on workshops on building a QAM Radio and a FMCW RADAR across the globe at all of the main microwave conferences.

TC-8 TOPIC EDITOR: RF NANOTECHNOLOGY



LUCA ROSELLI (Fellow, IEEE) joined the University of Perugia, Perugia, Italy, in 1991. In 2000, he founded the spin-off WiS Srl, Foligno, Italy. He was involved in electronic technologies for the Internet of Things for six years. He is currently a Qualified Full Professor with the University of Perugia, where he teaches applied electronics and coordinates the High Frequency Electronics Laboratory.

He has authored more than 280 papers (H-i 28, i10 82, and more than 3000 citations in Google Scholar) and *Green RFID Systems* (Cambridge Univ. Press, 2014). His current research interests include HF electronic systems with special attention to RFID, new materials, and wireless power transfer.

Prof. Roselli was a member of the Board of Directors of ART Srl, Urbino, Italy, from 2008 to 2012. He is also a member of the list of experts of the Italian Ministry of Research, the past Chair of the IEEE Technical Committees MTT-24-RFID, the Vice Chair of 25-RF Nanotechnologies, 26-Wireless Power Transfer, the ERC Panel PE7, and the Advisory Committee of the IEEE-WPTC, and the Chairman of the SC-32 of IMS. He is also the Co-Chair of the IEEE Wireless Sensor Network Conference. He organized the VII Computational Electromagnetic Time Domain in 2007 and the first IEEE Wireless Power Transfer Conference in 2013. He is also an Associate Editor for the *IEEE Microwave Magazine*. He is involved on the boards of several international conferences. He is also a reviewer for many international journals, including PROCEEDINGS OF THE IEEE, IEEE TRANSACTIONS ON MICROWAVE

THEORY AND TECHNIQUES, and IEEE MICROWAVE AND WIRELESS COMPONENTS LETTERS.

TC-16 TOPIC EDITOR: MICROWAVE AND MILLIMETER-WAVE PACKAGING, INTERCONNECTS, AND INTEGRATION



KAMAL K. SAMANTA (Senior Member, IEEE) graduated in science (physics), and engineering (ECE) before his double master's in management (R&D), and technology (mmW), which followed his Ph.D. degree in microwave engineering from the University of Leeds, U.K. He has got extensive experience of about 25 years and led multidisciplinary government, scientific, and industrial research and technology/product development activities for a wide range of industries, including satellite/space, defense/security, atomic reactor/green

energy, high power, semiconductor, and wireless communications, covering frequency MHz to THz and power from μ W (MMICs) to megawatts (SSPAs). His developed products (space-qualified and military- and consumer-grade) include advanced multilayer/3D components (with antennas/filters), devices, circuits (GaN/GaAs/Si, MMICs/MCM), and systems. His roles have included that of the Chief/Senior Principal/Lead R&D -Engineer, -Scientist and -Consultant. The organizations, he has worked for include the Thales Aerospace, U.K. (Radar, EW and ESM systems), European Aeronautics Defense and Space (EADS) Astrium (Airbus), U.K., (GaN, HPA, Satellite Comm), Indian Space Research Organization, ISRO, (satellite payload circuits, Tx/Rx), IPR, Department of Atomic Energy (2MW, 64 active phased array system), Milmega (GaN SSPAs), and RFMD and Filtronics Comp Semiconductor (MF MMICs: pt-to-pt radios, PAs). He is currently with Sony Europe B V, U.K., as the Chief Technologist- microwave and mmW, and Technical Lead for the next-generation front-end modules (5G/beyond). He has delivered more than 45 invited talks, including keynotes or panels, in IEEE MTTS conferences and he has authored or coauthored less than 75 peer-reviewed publications (first/sole authored) in his current research field, which include multidisciplinary and multiphysics research and development of novel active/passive devices, multilayer/3D miniaturized components, monolithic integrated circuits (GaAs/SiGe/GaN/InP, PAs), and cost-effective multichip and system-on-package (SoP) modules, and leading industrial solutions.

Dr. Samanta was the recipient of the Commonwealth Fellowship, the Best International Researcher Award, and the Engineering Excellence Award from the IET, London, (2004/5). He is a Fellow of IET and a Life Fellow of IETE, the Chair/Member of IEEE MTT-S Technical Committees – MTT-16 (packaging/integration), MTT-14 (integrated circuits), MTT-12 (high power) and TC-5 (filters). He sits on the TPC of the main IEEE MTT-S conferences and was the Guest Editor of the special issues of the IEEE microwave journals/magazine. He is/was as an Associate Editor for IEEE MICROWAVE AND WIRELESS COMPONENTS LETTERS (2013-18), *IEEE Microwave Magazine*, IET MAP, and IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES.

TC-9 TOPIC EDITOR: MICROWAVE AND MILLIMETER-WAVE SOLID-STATE DEVICES



MICHAEL SCHRÖTER (Senior, IEEE) received the Dr.-Ing. degree and venia-legendi in electrical engineering from Ruhr-University Bochum, Germany, in 1988 and 1994, respectively. During eight years in industry, he held a Engineering and Management Positions with Nortel/BNR, Ottawa, Canada, and also with Rockwell/Conexant and RF-Nano, Newport Beach, CA, USA. Since 1999, he has been a Full Professor with Technical University Dresden, Germany. During 2009–2011 his leave of absence from TUD, he held the position of the Vice

President of RF Engineering at RFNano, where he was responsible for the device design of the first prototyping carbon nanotube FET process technology. He has coauthored more than 270 peer-reviewed publications, four textbook chapters and two textbooks, and has given numerous lectures and invited tutorials on bipolar transistors and carbon nanotube transistors at international conferences. He is the author of the industry standard compact bipolar

transistor model HICUM, and his team created the ITRS (now IRDS) data for SiGe HBTs. He was a Co-Founder of XMOD Technologies in Bordeaux, France, and the Technical Project Manager for the EU projects DOTFIVE and DOTSEVEN, two widely recognized European research projects that led to SiGe HBT technologies with world-record performance. Within the German Excellence Cluster CfAED, he led the Carbon Path project with the goal of establishing the first wafer-level prototyping carbon nanotube transistor technology.

TC-27 TOPIC EDITOR: CONNECTED AND AUTONOMOUS SYSTEMS



HASAN SHARIFI (Senior Member, IEEE) received the bachelor's and master's degrees in electrical engineering and the Ph.D. degree in the areas of microelectronics and nanotechnology from Purdue University, West Lafayette, IN, USA, in 1994, 1997, and 2007, respectively. He is currently the Manager of RF and EO/IR Subsystems Department with HRL Laboratories, Malibu, CA, USA. His research interests include design, fabrication and integration of RF/millimeter wave components and subsystems for next generation phased-array radar,

EW and communication systems and also low-cost, high performance EO/IR imaging sensors. Before joining HRL from 2005 to 2009, he was a Research Staff Member with Birck Nanotechnology Center, Purdue University, working on CMOS-based RF integrated circuits and advanced heterogeneous integration and packaging. He has authored or coauthored more than 60 journal and refereed conference papers and holds more than 35 issued patents. Dr. Sharifi was the recipient of a number of awards, including the Special and extraordinary merit awards from Purdue University and HRL Labs. He was a technical program committee and the Editor of the IEEE Silicon Monolithic Integrated Circuits in RF Systems Conference. He is a member of the Microwave Theory and Techniques and Advanced Packaging societies.

TC-14 TOPIC EDITOR: MICROWAVE AND MM-WAVE INTEGRATED CIRCUITS



ALBERTO VALDES-GARCIA (Senior Member, IEEE) received the B.S. degree (Hons.) in electronic systems engineering from the Monterrey Institute of Technology, Toluca, Mexico, in 1999, and the Ph.D. degree in electrical engineering from Texas A&M University, College Station, TX, USA, in 2006. In 2000, he joined Motorola Broadband Communications, Nogales, Mexico, as an RF Design Engineer. In 2006, he joined IBM Research, Yorktown Heights, NY, USA, where he is currently a Principal Research Staff Member, and the Manager of RF Circuits and Systems Group. In 2013, he was an Adjunct Assistant Professor with Columbia University, New York, NY, USA. He holds more than 65 issued U.S. patents and has authored or coauthored more than 100 peer-reviewed publications. His current research interests include mm-Wave systems for communications and imaging applications. He is the Co-Editor of the book *60 GHz Technology for Gbps WLAN and WPAN: From Theory to Practice* (Wiley, 2011). Dr. Valdes-Garcia is the winner of the 2005 Best Doctoral Thesis Award presented by the IEEE Test Technology Technical Council. He was the recipient of the 2007 National Youth Award for Outstanding Academic Achievements, presented by the President of Mexico, the co-recipient of the 2010 George Smith Award presented by the IEEE Electron Devices Society, the 2017 Lewis Winner Award for Outstanding Paper presented by IEEE International Solid-State Circuits Conference, and the 2017 IEEE JOURNAL OF SOLID-STATE CIRCUITS Best Paper Award. Within IBM, he has been twice the co-recipient of the Pat Goldberg Memorial Award to the best paper in computer science, electrical engineering, and mathematics published by IBM Research (2009 and 2017). He was inducted into the IBM Academy of Technology in 2015 and was recognized as an IBM Master Inventor in 2016 and 2019. From 2006 to 2009, he was served in the IEEE 802.15.3c 60 GHz standardization Committee. Since 2009, he has been a Technical Advisory Board Member with the Semiconductor Research Corporation, where he was the Chair of the Integrated Circuits and Systems

Sciences Coordinating Committee, in 2011 and 2012, respectively. Since 2016, he has been a member of IEEE MTT-S Microwave and Millimeter-wave Integrated Circuits Technical Committee, where he has been the Chair since 2020. In 2013, he was selected by the National Academy of Engineering for its Frontiers of Engineering Symposium.

TC-4 TOPIC EDITOR: MICROWAVE PASSIVE COMPONENTS AND TRANSMISSION LINE STRUCTURES



KE WU (Fellow, IEEE) is the Endowed Industrial Research Chair in Future Wireless Technologies and a Professor of electrical engineering with École Polytechnique de Montréal (University of Montreal), Montreal, QC, Canada, where he is the Director of the Poly-Grames Research Center. He was the Canada Research Chair of RF and millimeter-wave engineering and the Founding Director of the Center for Radiofrequency Electronics Research of Quebec. He held/holds visiting/honorary professorships at various universities around the world and has graduated more than 73 Ph.D. and 95 M.Sc. Students. He has authored or coauthored more than 1400 referred papers, and a number of books and book chapters and filed more than 50 patents. He was the General Chair of the 2012 IEEE MTT-S International Microwave Symposium, and the 2016 President of the IEEE Microwave Theory and Techniques Society (MTT-S). He was also the inaugural North-American representative in the General Assembly of the European Microwave Association.

Dr. Wu was the recipient of many awards and prizes, including the inaugural IEEE MTT-S Outstanding Young Engineer Award, 2004 Fessenden Medal of the IEEE Canada, 2009 Thomas W. Eadie Medal from the Royal Society of Canada, Queen Elizabeth II Diamond Jubilee Medal, 2013 Award of Merit of Federation of Chinese Canadian Professionals, 2014 IEEE MTT-S Microwave Application Award, 2014 Marie-Victorin Prize (Prix du Quebec), 2015 Prix d'Excellence en Recherche et Innovation of Polytechnique Montréal, 2015 IEEE Montreal Section Gold Medal of Achievement, 2019 IEEE MTT-S Microwave Prize, and 2021 EIC Julian C. Smith Medal. He is also an IEEE MTT-S Distinguished Microwave Lecturer and is a Fellow of the Canadian Academy of Engineering and the Royal Society of Canada.

TC-2 TOPIC EDITOR: DESIGN AUTOMATION



QIJUN ZHANG (Fellow, IEEE) received the Ph.D. degree in electrical engineering from McMaster University, Hamilton, ON, Canada, in 1987. During 1988–1990, he was a Research Engineer with Optimization Systems Associates Inc., Dundas, ON, Canada, developing advanced optimization software for microwave modeling and design. In 1990, he joined the Department of Electronics, Carleton University, Ottawa, ON, Canada, where he is currently a Chancellor's Professor. He is the author of the book *Neural Networks for RF and Microwave Design* (Boston: Artech House, 2000), and the Co-Editor of the *Modeling and Simulation of High-Speed VLSI Interconnects* (Boston: Kluwer, 1994) and *Simulation-Driven Design Optimization and Modeling for Microwave Engineering* (London, U.K.: Imperial College Press, 2013). His research interests include modeling, optimization, and neural networks for high-speed/high-frequency electronic design, and has more than 300 publications in the area.

Dr. Zhang is a Fellow of the Canadian Academy of Engineering. He is an Associate Editor of IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES. He was an Associate Editor for the *International Journal of RF and Microwave Computer-Aided Engineering* during 2010–2018, and the General Chair of the IEEE MTT-S International Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization in 2015. He is the Chair of the Technical Committee on Design Automation (MTT-2) of the IEEE Microwave Theory and Techniques (MTT) Society.

ASSISTANT EDITOR



SHARRI SHAW currently resides in Grand Rapids, MI, USA. She received the B.A. degree in english and a minor in psychology from Saginaw Valley State University, University Center, MI, USA, in 1994, and the master's degree in education with initial certification (M.Ed.) program from Aquinas College, Grand Rapids, MI, USA, in 2001, where she received her Secondary Level Teacher Certification. From 2002 to 2005, she was a Teacher in Michigan. From 2006 to 2010, she was an Assistant Editor for IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES. She currently holds the same position with the *IEEE Microwave Magazine*, and is the Publications Administrator of IEEE TRANSACTIONS ON TERAHERTZ SCIENCE AND TECHNOLOGY. She started her additional new role as an Assistant Editor of IEEE JOURNAL OF MICROWAVES in November 2021.

ADMINISTRATIVE EDITOR



KARA MCARTHUR received the B.A. degree in sociology and completed graduate work in healthcare ethics—both from Rice University, Houston, TX, USA. She is currently serves on two Institutional Review Boards (IRBs), an oncology IRB and a community IRB in the Dominican Republic. She is an American Medical Writers Association certified Medical Editor and Writer. She has more than 20 years of experience in scholarly publishing, including the Founding Managing Editor of the Engineering in Medicine and Biology Society's first Gold Open Access journal. Past positions include the Managing Editor of Cambridge University Press's *International Journal of Technology Assessment in Health Care* and the Director of communications for the Department of Medicine, Baylor College of Medicine. She has more than 20 peer-reviewed research publications. Her freelance work includes writing, editing, and evaluation research for national and international nonprofits.

PRODUCTION EDITOR



JOANNA GOJLIK received the B.A. degree in journalism/professional writing from The College of New Jersey, NJ, USA, the M.A. degree in liberal studies from the University of North Carolina at Greensboro, Greensboro, NC, USA, and the Professional Certificate in editing from New York University, New York, NY, USA. Since 2004, she has been with the IEEE Publications Operations Department, where she is currently Journal Production Manager. Over the years, she has managed a large portfolio of journals/transactions/magazines, including the flagship IEEE journal PROCEEDINGS OF THE IEEE since 2007. She has extensive experience in journals copyediting, proofreading, layout, and overall journals production.