



**2023 IEEE MTT-S
INTERNATIONAL
MICROWAVE
SYMPOSIUM**

**11-16 JUNE
CONVENTION CENTER
San Diego, California**



CALL FOR PAPERS

IMS2023 is the centerpiece of Microwave Week 2023, which includes the RFIC Symposium (www.rfic-ieee.org) and the ARFTG Microwave Measurement Conference (www.arftg.org).

Microwave Week is the world's largest gathering and industry exhibition for **MHz through THz** professionals. IMS2023 will feature an exciting Technical Program with the **Coolest Ideas Under the Sun** — think high efficiency, thermal management, model-based design, space and aerospace systems, and so much more. Microwave Week provides a wide variety of technical and social activities for attendees and exhibitors. Besides the diverse choice in technical sessions, explore interactive forums, plenary and panel sessions, workshops and technical lectures, application seminars, and also participate in paper contests for Students, Industry, and Young Professionals. The best Industry papers will be presented in a showcase as well as awarded "Best Industry Paper" prizes. Enjoy networking events such as Young Professionals, Women in Microwaves (WiM), Amateur Radio (HAM) enthusiasts, and Industry centric functions.

The location of IMS2023 is San Diego: very cool. The Convention Center is on the bayfront, adjacent to the Gaslamp Quarter, which is the lively social center of San Diego, with plenty of restaurants for all tastes. San Diego is also home to famous landmarks such as the USS Midway, Balboa Park containing many museums, the San Diego Zoo, and SeaWorld. And cool beaches.

San Diego is the bridge between North America and Latin America. One of our conference themes is to highlight advances in RF and Microwave research in Latin America, and we will have a Latin American flavor to social events throughout the week.

Important Dates

- 16 September 2022 (Friday)
PROPOSAL SUBMISSION DEADLINE
(workshops, technical lectures, focus and special sessions, panel and rump sessions)
- 6 December 2022 (Tuesday)
PAPER SUBMISSION DEADLINE
All submissions must be made electronically.
- 1 February 2023 (Wednesday)
PAPER DISPOSITION
Authors will be notified by email.
- 8 March 2023 (Wednesday)
FINAL MANUSCRIPT SUBMISSION DEADLINE
Manuscript and copyright of accepted papers
- 11-16 June 2023
MICROWAVE WEEK
IMS2023, RFIC 2023, ARFTG, and Exhibition



IMS2023 Conference Themes

At IMS2023 we will have several focus themes to highlight a number of areas of RF and microwave engineering that are of topical interest or impact. These themes are:

Systems & Applications

The development of RF, microwave, mm-wave and THz systems continues to expand in several areas, with many application examples. This broad topic can encompass design from semiconductor through device and module through to the overall system and applications. We are giving particular focus to:

- Wireless Communications, including 6G developments, Wi-Fi, RF and microwave system-on-chip integration, massive MIMO systems and subsystems
- Wireless Power Transfer;
- Automotive Systems;
- Model-Based Systems Engineering.

Space

In this area of Aerospace we are specifically calling out 'Space' as a focus theme. This can include such topics as: satellite communications, design for reliability, radiation hardness, internet of space systems, CubeSats.

Biomedical Applications

Illustrating the use of RF and microwave techniques and technology in biomedical applications.

These technical themes will be identified with different days of the conference, and will comprise special Focused Technical Paper Sessions, Panel Sessions, Invited Speakers, and Workshops. The Exhibition will feature a **Systems Pavilion** illustrating several practical examples of RF through THz systems and applications.

Authors are encouraged to submit technical papers in these themed topics.

In addition to this Call for Technical Papers, there will also be Calls for Focus and Special Sessions Proposals, Panel Session Proposals, and Workshop Proposals. Prospective organizers of these events are encouraged to target the conference themes. The submission date for these proposal is 16 September 2022.

RF & Microwaves in Latin America

In addition to the above technical themes, IMS2023 will feature a Focus Technical Paper Session to celebrate "RF and Microwaves in Latin America." This session is being championed by Professor Jose Rayas-Sanchez and Professor Apolinar Reynoso-Hernandez. There will also be a **Latin America Pavilion** in the Exhibition, and the Latin America flavor will run through the whole of IMS2023.



IMS2023 Conference and Technical Program Committee

Executive Committee

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Kamran Ghorbani, *Workshops*
Anding Zhu, *Focus/Special Sessions Co-Chair*
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Holger Maune, *Space Theme Focus Sessions*
Markus Gardill, *Space Theme Focus Sessions*
Ian Gresham, *Systems/Apps Focus Sessions*
Ramon Beltran, *Systems/Apps Focus Sessions*
Jim Carroll, *Interactive Forum*
Gianpiero Gibiino, *Interactive Forum*
Nuno Carvalho, *Panel Sessions*
Ke Wu, *Panel Sessions*
Tomislav Markovic, *Technical Lectures*
Joseph Staudinger, *MicroApps*
David Runton, *MicroApps*

Electronic Paper Management

Sandy Owens

Student Paper Competition

Holger Maune
Mike Roberg

Student Design Competitions

Pawel Barmuta
Koen Buisman

Industry & Advanced Practice Paper Competitions

Freek van Straten
Neil Braithwaite

Early Career Paper Competition

Jonas Urbonas
Paolo deFalco

Industry Workshops

Venkata Vanukuru
Gustavo Avolio

Tutorials

Matt Ozalas

RF Bootcamp

Ulf Johannsen
JoAnne Mistler
Larry Dunleavy

Connected Futures Summit

Debabani Choudhury
Ashutosh Dutta
Peiyang Zhu

Senior Advisors

John Barr
Fred Schindler

Technical Paper Submission

Authors are invited to submit technical papers describing original work and/or advanced practices on MHz through THz theory and technology. A double-blind review process will be used ensuring anonymity for both authors and reviewers. The Symposium proceedings will be archived electronically and submitted to IEEE Xplore.

Submission Instructions

- All submissions must be in English.
- Submissions must be 3-4 pages long, be compliant with the IEEE conference template, which can be downloaded from the IMS2023 website, and be compliant with double-blind requirements.
- The submission must be in PDF format and cannot exceed 4 MB in size.
- Authors must upload their paper submission by midnight Hawaii time on 6 December 2022. Late submissions will not be considered.

Paper Selection Criteria

- All papers are reviewed by subject-matter expert sub-committees of the IMS2023 Technical Program Review Committee (TPRC). The selection criteria will be:
- **Originality:** Is the contribution unique and significant? Does it advance the state of the art of the technology and / or practices? Are proper references to previous work by the authors and others provided?
- **Quantitative content:** Does the paper give a comprehensive description of the work with adequate independent verification (measurements, if applicable, or otherwise independent simulated data) ?
- **Clarity:** Is the paper contribution and technical content presented clearly and in a logical manner? Are the English writing and accompanying figures clear and understandable?
- **Interest to MTT-S membership:** Will this paper interest the IMS audience and encourage discussion?

Technical areas: During the paper submission process, authors will choose a primary and two alternative technical areas (see the Technical Areas). The paper abstract should contain information that clearly reflects the choice of the area(s). Author-selected technical areas will be used to determine an appropriate committee for reviewing the paper, whereby the TPC co-chairs reserve the right to place papers in the most appropriate technical area. The technical areas are divided into five different categories that are used to organize the paper presentation schedule. It is permissible to choose primary and alternative technical areas that are in different categories.

Presentation Format: IMS offers three types of presentation formats. The authors' preference will be honored where possible, but the final decision on the presentation format is with the IMS2023 TPRC

1. Full-length papers report significant contributions, advancements, or applications in a formal (20 minute) presentation format with questions and answers (Q&A) at the end.
2. Short papers typically report specific refinements or improvements in the state of the art in a formal (10 minute) presentation format with Q&A at the end.
3. Interactive forum papers provide an opportunity for authors to present their theoretical and/or experimental developments and results in greater detail and in a more informal and conversational setting. An IMS2023 template will be provided.

Notification

Authors will be notified of the decision by 1 February 2023. For accepted papers, an electronic version of the final 3-4 page manuscript along with copyright assignment to the IEEE must be submitted by 8 March 2023.

The submission instructions will also be provided through emails and can be accessed through the IMS2023 website.

Clearances

It is the responsibility of the authors to acquire all required company and government clearances, prior to submission of their manuscript



Paper Competitions

Competitions for the best Industry Paper, Advanced Practices Paper, Student Paper, and Early Career Paper will be held at the conference. Student and Early Career Awards will be presented at the Conference Closing Ceremony. The Industry Paper and Advanced Practice Paper Awards will be presented at the Opening Plenary Session/Industry Showcase. Only papers submitted as 20-minute presentation format will be considered for these competitions.

Student Paper Competition: Eligible students are encouraged to submit papers for the Student Paper Competition. These papers will be reviewed in the same manner as all other contributed papers. First, second, and third prizes will be awarded based on content and presentation. To be considered for an award, the student must be a full-time student during the time the work was performed and still be a student on the submission deadline, be the lead author, and personally present the paper at IMS. Eligibility details can be found on the IMS2023 webpage.

Industry Paper Competition: Authors from industry are encouraged to submit papers for the Industry Paper Competition. Papers will be evaluated using the same standards as all contributed papers, the work should highlight technical innovation or state-of-the-art performance. The prize will be awarded based on content, and the prize includes a free advertisement in Microwave Journal or IEEE Microwave Magazine, for the author's company.

Advanced Practice Paper: Any author who submits a paper on advanced practices may be entered into the Advanced Practice Paper Competition. A paper on advanced practices describes an innovative RF/microwave design integration technique, process enhancement, and/or combination thereof that results in significant improvements in performance and/or in time to production for RF/microwave components, subsystems, or systems. The prize will be awarded based on content.

Early Career Paper Competition: This new competition is open to authors from industry, government agencies, and post-doctoral candidates, with less than 10 years of professional experience, and who are not full-time students or faculty members. The first-named author on the paper will be the qualifying author. These papers will be reviewed in the same manner as all other contributed papers, and the prize will be awarded based on content and presentation.

IEEE Transactions MTT Special Issue

Authors of all papers presented at IMS2023 can submit an expanded version of their paper to a special symposium issue of the *IEEE Transactions on Microwave Theory and Techniques*.

IEEE Microwave and Wireless Technology Letters

Up to 50 of the best papers at the Symposium will be published in a special issue of *IEEE Microwave and Wireless Technology Letters*, at the authors' discretion.

Details at www.ims-ieee.org

Technical Areas

Electromagnetic Field, Device, and Circuit Techniques

- 1 **Field analysis, guided waves, and computational EM** — Novel guiding, radiating, and electromagnetic structures; new analytical techniques and numerical methods for such structures, and new computational EM methods, incl. EM-coupled multiphysics modeling
- 2 **Circuit and system CAD algorithms** — Linear/nonlinear simulation and design optimization techniques; behavioural modeling (excl. PAs); statistical approaches; surrogate modeling; space mapping; model order reduction; uncertainty quantification in simulations; stability analysis; non-EM related multiphysics simulations
- 3 **Instrumentation and techniques for guided and over-the-air measurements** — Measurement techniques from microwave to THz for materials, linear and nonlinear devices, circuits, and systems; calibration and de-embedding techniques, measurement uncertainty, and over-the-air measurement methods and novel instrumentation

Passive Components and Packaging

- 4 **Planar passive components and circuits, excl. filters** — Novel planar transmission-line components; artificial transmission lines, metamaterial structures, and high-impedance surfaces; planar couplers, dividers/combiners, multiplexers, resonators, and lumped-element approaches
- 5 **Planar passive filters** — Planar passive filters, including lumped elements, theoretical filter and multiplexer synthesis methods
- 6 **Integrated passive circuits and filters** — Design and characterization of silicon integrated, III-V integrated passive components and filters, including IPDs
- 7 **Non-planar passive components, filters, and other circuits** — Transmission line components, resonators, filters and multiplexers based on dielectric, waveguide, coaxial, or other non-planar structures
- 8 **Tunable passive circuits and active filters** — Tunable and active filters, tunable phase shifters and couplers
- 9 **Microwave acoustic, ferrite, ferroelectric, phase-change, & MEMS components** — Surface and bulk acoustic wave devices including FBAR devices, bulk and thin-film ferrite components, ferroelectric-based devices, and phase change devices and components. RF microelectromechanical and micromachined components and subsystems
- 10 **Packaging, MCMs, and 3D manufacturing technologies** — Component and sub-system packaging, assembly methods, multi-chip modules, wafer stacking, 3D interconnect, and integrated cooling; package characterization; novel processes related to inkjet printing, 3D printing, or other additive manufacturing techniques

Active Devices and Circuits

- 11 **Semiconductor device technologies and modeling** — RF to THz devices on III-V, silicon, and other emerging technologies, incl. 2D devices; MMIC and Si RFIC manufacturing, reliability, failure analysis, yield, and cost; linear and nonlinear device modeling (CAD, compact, physics-based, empirical) including characterization, parameter extraction, and validation
- 12 **HF/VHF/UHF circuits, technologies, and applications** — Advances in passive and active circuits (incl. PAs), components, and systems that operate in the HF, VHF, and UHF frequency ranges (<1 GHz)
- 13 **Signal generation, modulators, frequency conversion** — CW and pulsed oscillators in silicon and III-V processes including VCOs, DROs, YTOs, PLOs, and frequency synthesizers, frequency conversion ICs in silicon and III-V processes, such as IQ modulators, mixers, frequency multipliers/dividers
- 14 **Microwave and millimeter-wave low-noise amplifiers, variable-gain amplifiers, and receivers** — LNAs, VGAs, receivers, detectors, integrated radiometers, and low-noise circuit characterization
- 15 **Low-power (<10 W) amplifiers, below 30 GHz** — Advances in discrete and IC power amplifier devices and design techniques based on Si and III-V devices, demonstrating improved power, efficiency, and linearity for the microwave band (1-30 GHz)
- 16 **High-power (>=10 W) RF and microwave amplifiers, below 30 GHz** — Advances in discrete and IC power amplifier devices and design techniques based on III-V and LD-MOS devices, demonstrating improved power, efficiency, and linearity for the microwave band (1-30 GHz); power-combining techniques for SSPA and vacuum electronics

- 17 **Millimeter-wave and THz power amplifiers** — Advances in IC power amplifier circuits, design techniques, and power combining based on Si and III-V compound semiconductor devices demonstrating improved power, efficiency, and linearity for millimeter-wave and THz bands; vacuum electronics for millimeter-wave
- 18 **Linearization and transmitter techniques for power amplifiers** — Power amplifier behavioral modeling; linearization and pre-distortion techniques; envelope-tracking, out phasing, and Doherty transmitters for III-V and silicon technologies
- 19 **Mixed-signal, wireline, and signal shaping circuits** — High-speed mixed-signal components and subsystems, including: PLLs, TDCs, ADCs, DACs, DDSs, and supporting circuits to interface these to the analog world
- 20 **Integrated transceivers and phased-array chips for beamformers and imaging** — Design and characterization of complex III-V ICs, silicon ICs, heterogeneous systems in the RF to mm-wave band including narrowband and wideband designs; innovative circuits and sub-systems for communications, radar, imaging, and sensing applications; Integrated on-chip antennas and on-package antennas
- 21 **Terahertz and photonic integrated circuits** — Design and characterization of THz active circuits; THz circuits for communications, radar, imaging, and sensing applications; Interaction between microwaves, THz waves, and optical waves for the generation, processing, control, and distribution of microwave, mm-wave, and THz signals; nanophotonics, nanoplasmonics, and nano-optomechanics

Systems and Applications

- 22 **Wireless power transmission** — Energy harvesting systems and applications, rectifiers, self-biased systems, combined data and power transfer systems
- 23 **Sensing and RFID systems** — Short range wireless and RFID sensors, gas and fluidic sensors; passive and active tags from HF to millimeter-wave frequencies; RFID systems including wearables and ultra-low-power
- 24 **Microwave and millimeter-wave wireless subsystems and systems** — Technology advances combining theory and hardware implementation in microwave/millimeter-wave subsystems such as beamformers; microwave and millimeter-wave (<100 GHz) communication systems, incl. 5G – 6G, with hardware implementation for terrestrial, vehicular, and indoor applications, point-to-point links, radio-over-fiber links, cognitive and software-defined radios applied to (massive) MIMO, full-duplex technologies, shared and novel spectrum use, novel modulation schemes, and channel modeling
- 25 **Radar and imaging systems** — RF, millimeter-wave, and sub-THz radar and imaging systems, automotive radars, sensors for intelligent vehicular highway systems, UWB and broadband radar, remote sensing, radiometers, passive and active imaging systems, radar detection techniques, and related signal processing
- 26 **Airborne and space systems** — Technologies and systems for remote sensing for earth observation; positioning, navigation, and timing; space exploration, human spaceflight and space transportation; satellite communications including 5G, 6G applications involving aerospace platforms; communication and sensor systems for UAVs, HAPSS, airplanes, and satellites
- 27 **MHz-to-THz devices, circuits, and systems for biological and healthcare applications** — Electromagnetic field interaction at molecular, cellular, tissue and living systems levels; devices, circuits, and systems for characterizations of biological samples; microwave-enhanced chemistry; instrumentation and systems for biomedical diagnostic and therapeutic applications, incl. MRI and microwave imaging; wireless, wearable, and implantable devices for health monitoring
- 28 **AI/ML for RF to mmWave** — AI/ML algorithms implementations, and demonstrations for: spectrum sensing; mobile edge networking; MIMO and array beam operations and management; design and optimization; in-situ sensing, diagnostics, control, reconfiguration of MHz to THz communication and sensing circuits and systems

Emerging Technologies

- 29 **Quantum devices, circuits, and systems** — Quantum devices and circuits (incl. cryogenic RF circuits); algorithms, interfaces, and systems for quantum computing and quantum sensing applications
- 30 **Model-based system engineering** — Applications or demonstrations of model-based system engineering (MBSE) applied to system architecture, behavioral analysis, simulation, performance analysis, and test of RF systems, over the whole product life cycle; applications areas such as aerospace, wireless systems, EMC, and automotive
- 31 **SubTHz and THz Systems** — SubTHz and THz systems, incl. space and sub-THz architectures for 6G communication systems with hardware implementation
- 32 **Other innovative MHz-to-THz systems and applications**