



**2024 IEEE MTT-S
INTERNATIONAL
MICROWAVE
SYMPOSIUM**

16-21 JUNE
THE WALTER E. WASHINGTON
CONVENTION CENTER
Washington, D.C.



IMS2024 (www.ims-ieee.org) is the centerpiece of Microwave Week 2024, 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. IMS2024 will feature a far-reaching Technical Program focused on **Capitalizing Across the Spectrum** – the electromagnetic spectrum from RF-to-optical, the application spectrum from commercial wireless to scientific sensing, and the human spectrum encompassing diversity, equity, and inclusion. Microwave Week provides a wide variety of technical and social activities for attendees and exhibitors. In addition to the diverse choices in technical sessions, attendees can 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 location of IMS2024 is our nation’s capital, Washington D.C. The Walter E. Washington Convention Center is located in downtown Washington D.C., near Chinatown and the city’s hip Shaw neighborhood which is known for its lively social and restaurant scene. Washington is home to many famous landmarks and historical sites such as the White House, the National Mall with its famous monuments and memorials, the Smithsonian Institution – the world’s largest museum complex, the National Zoo, and the Kennedy Center for the Performing Arts.

Washington D.C. is also home to many agencies and institutions that oversee use of the electromagnetic spectrum. One of our conference themes is to highlight advances in spectrum access and use, including coexistence, sustainability and emerging future-G systems. Other themes will feature the critical role of the RF-to-THz spectrum for aerospace and transportation, national security, and radar. The central role that equity, inclusion and diversity play across the spectrum of our community will be highlighted throughout the week.



Important Dates

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- 15 September 2023 (Friday)
PROPOSAL SUBMISSION DEADLINE
(workshops, technical lectures, focus and special sessions, panel and rump sessions)

 - 5 December 2023 (Tuesday)
PAPER SUBMISSION DEADLINE

 - 1 February 2024 (Thursday)
PAPER DISPOSITION

 - 6 March 2024 (Wednesday)
FINAL MANUSCRIPT SUBMISSION DEADLINE
Manuscript and copyright of accepted papers

 - 16-21 June 2024
MICROWAVE WEEK
IMS2024, RFIC 2024, ARFTG, and Exhibition



IMS2024 Conference Themes

IMS2024 will feature a variety of important thematic areas that highlight the symposium's focus on "capitalizing across the spectrum." In addition to showcasing a broad spectrum of engaging technical topics, IMS2024 will celebrate the diversity of contributions, talents, and accomplishments across our society's "human spectrum" throughout the week. Moreover, the major technical themes of the conference will emphasize the role our host city of Washington D.C. has played in supporting the use and management of the RF-to-THz spectrum, including:

Systems & Applications

The development of RF, microwave, mm-wave and THz systems continues to expand in several areas, with many application examples. This broad theme encompasses design from device and module through to the overall system and applications. Particular areas of focus of IMS2024 will be:

- Radar Systems and Phased Arrays,
- Communications, including 6- and Future-G developments,
- RF and microwave system-on-chip integration,
- Applications of High-Power Microwave Systems

Aerospace and Security

This theme includes use of the electromagnetic spectrum for defense and security as well as air and space-based applications, including secure communications, navigation, remote sensing, design for reliability, radiation hardness, LEO Sat systems, and CubeSats.

These technical themes will be aligned with different days of the conference, and will comprise special Focused Technical Paper Sessions, Panel Sessions, Invited Speakers, and Workshops.

Spectrum Coexistence and Sustainability

Access to the RF-to-THz spectrum has become paramount with the rapid advance of wireless technology and applications. Topics in this area include techniques and technologies for spectrum sharing and coexistence between active and passive users, interference mitigation, spectrum monitoring and metrology, energy efficiency and sustainability.

Emerging Technologies and Directions

Innovative and new contributions in AI/ML, quantum technologies, materials, terahertz systems and technologies that enhance security and enable spectrum access across our society.



IMS2024 ExCom and Technical Program Committee

ExCom (Executive Committee)

Scott Barker, *General Co-Chair*
Sanjay Raman, *General Co-Chair*
Dalma Novak, *TPC Co-Chair*
Bobby Weikle, *TPC Co-Chair*
Kavita Goverdhanam, *Outreach and Inclusion Chair*
Ryan Baker, *MP3 Co-Chair*
Sherry Hess, *MP3 Co-Chair*
Tony Ivanov, *LAOC Chair*
Ramesh Gupta, *Finance Chair*
Mark Rosker, *Plenary Session Chair*
Danilo Manstretta, *RFIC Conference General Chair*
Dominique Schreurs, *ARFTG Conference General Co-Chair*
Marco Spirito, *ARFTG Conference General Co-Chair*
Elsie Vega, *Event/Conference Manager*
Robert Alongi, *Treasurer*
Amanda Scacchitti, *MP3 Manager*

Carl Sheffres, *Exhibition Director*
Stefanie Cunniffe, *Exhibition Operations Manager*
Ivar Bazy, *Exhibition Management*
JK McKinney, *IMSEC Chair*

TPC (Technical Program Committee)

Dalma Novak, *TPC Co-Chair*
Bobby Weikle, *TPC Co-Chair*
Sandy Owens, *Electronic Paper Mgmt*
Mike Hamilton, *Workshops Co-Chair*
Alirio Boaventura, *Workshops Co-Chair*
Steven Bowers, *Technical Lectures Chair*
Theodore Reck, *Tutorials/Primers/Pre-Conference Chair*
Eric Bryerton, *Boot Camp Co-Chair*
Cliff Rowland, *Boot Camp Co-Chair*
Zachary Drikas, *Panel Sessions Co-Chair*
TBD, *Panel Sessions Co-Chair*
Thomas Clark, *Focus/Special Sessions Co-Chair*
Vicki Chuang, *Focus/Special Sessions Co-Chair*

Matt Morgan, *Interactive Forum Co-Chair*
Paul Draxler, *Interactive Forum Co-Chair*
Shamima Afroz, *Student Paper Competition Co-Chair*
Lei Liu, *Student Paper Competition Co-Chair*
Sami Hawasli, *Early Career Paper Competition Co-Chair*
Jane Gilligan, *Early Career Paper Competition Co-Chair*
Jeffrey Hesler, *Industrial Keynote/Invited Talks*
Rod Waterhouse, *Industry/Advanced-Practice Paper Competitions Chair*
Kiki Ikossi, *Student Design Competition Co-Chair*
Kasyap Patel, *Student Design Competition Co-Chair*
Brian Novak, *MicroApps Co-Chair*
Jean Kalkavage, *MicroApps Co-Chair*
Paul Matthews, *Industry Workshops Co-Chair*
Ryan Walsh, *Industry Workshops Co-Chair*
TBD, *TMTT Special Issue Co-Editor*
TBD, *TMTT Special Issue Co-Editor*

To view the full IMS2024 Steering Committee list visit ims-ieee.org.

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 a maximum of 3 pages plus one additional page for references, be compliant with the IEEE conference template, which can be downloaded from the IMS2024 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 2023. Late submissions will not be considered.

Paper Selection Criteria

All papers are reviewed by subject-matter expert sub-committees of the IMS2024 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 IMS2024 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 IMS2024 template will be provided.

Notification

Authors will be notified of the decision by 1 February 2024. For accepted papers, an electronic version of the final 3-4 page manuscript along with copyright assignment to the IEEE must be submitted by 6 March 2024.

The submission instructions will also be provided through emails and can be accessed through the IMS2024 website.

Clearances

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



IMS Paper Competitions

Competitions for the best Industry Paper, Advanced Practices Paper, Student Paper, and Early Career Paper will be held at the conference.

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 IMS2024 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 novel competition is open to authors from industry, government agencies/laboratories as well post doctoral scholars with less than 10 years of professional experience, and who are not full-time students. 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 IMS2024 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

EM Field, Design and Measurement 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** — Linear/nonlinear simulation and design optimization techniques; behavioral modeling; statistical approaches; surrogate modeling; space mapping; model order reduction; uncertainty quantification in simulations; stability analysis; non-EM related multiphysics simulations, design automation
- 3 Instrumentation and measurement techniques** — 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 subsystem 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, including cryogenic circuits
- 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

Systems and Applications

- 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-arrays** — Design and characterization of complex III-V ICs, silicon ICs, heterogenous 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 Microwave and Terahertz Photonics** — Photonic techniques for the generation, processing, control, and distribution of microwave, mm-wave, and THz signals, Radio-over-fiber links; Design and characterization of microwave photonic and THz circuits; Interaction between microwaves, THz waves, and optical waves; THz circuits for communications, radar, imaging, and sensing applications; Nanophotonics, nanoplasmonics, and nano-optomechanics.
- 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 (<300 GHz) communication systems, incl. 5G - 6G, with hardware implementation for terrestrial, vehicular, and indoor applications, point-to-point links, cognitive and software-defined radios, 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 system for UAVs, high altitude platforms, 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

Emerging Technologies

- 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
- 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 SubTHz and THz circuits and systems** — SubTHz and THz systems (300GHz to 1 THz+), incl. sub-THz architectures and implementations for passive and active sensing, 6G and Future-G communication systems.
- 31 Microwave field-matter interaction, material sensing and high-power applications** — Industrial and scientific applications of microwave energy (e.g., chemistry, metallurgy, ceramic sintering, plasma generation, waste treatment, "green" materials, energy converters); MHz-to-THz sensing (from microwave microscopy to large surface/volume imaging) of materials for electronics and energy applications; multiphysics modeling of materials processing and characterization.
- 32 Other innovative MHz-to-THz systems and applications** — Submissions that describe innovative contributions in new and emerging areas of interest to the MTT community not falling under the above categories are encouraged.