



The 2018 IEEE MTT-S
International Microwave Symposium
10-15 June 2018, Philadelphia, PA



“Microwaves, Medicine, Mobility” Don't miss IMS2018 in Philadelphia!

The 2018 IMS Microwave Week is held, 10 - 15 June 2018, at the Pennsylvania Convention Center in Philadelphia. Register today for the IMS Microwave Week of conferences, including the Radio Frequency Integrated Circuits (RFIC) Symposium, International Microwave Symposium (IMS), and the Automatic Radio Frequency Techniques Group (ARFTG) Conference. Unique to the 2018 IMS Microwave Week, the International Microwave Bio-Conference (IMBioC) will be a co-located conference.

IMS Microwave Week – At a Glance

| | |
|-------------------------|--|
| Sunday, 10 June 2018 | Workshops, Short Courses RFIC Plenary, Joint Industry Show Case & Interactive Forum, RFIC Reception |
| Monday, 11 June 2018 | Workshops, Short Courses, RF Bootcamp; Three Minute Thesis (3MT®) Competition RFIC Technical Sessions, Panel Session, IMS Historical Exhibit IMS Plenary, Welcome Reception |
| Tuesday, 12 June 2018 | IMS, RFIC Technical Sessions and Interactive Forum; Student Design Competition IMS Exhibition, Historical Exhibit, Industry Workshops & MicroApps 5G Summit and Lunch Panel; Joint IMS/RFIC Panel Session Young Professionals (YoPros) Panel, Networking Event Amateur Radio (HAM) Talk and Networking Reception |
| Wednesday, 13 June 2018 | IMS Technical Sessions, Panel, and Interactive Forums IMS Student Design and Student Paper Competition IMS Exhibition, Historical Exhibit, Industry Workshops & MicroApps Industry Hosted Reception; MTT-S Awards Banquet |
| Thursday, 14 June 2018 | IMS Technical Sessions and Interactive Forums; Physicians Lunch Panel Session MTT-S Student Awards Luncheon; (Student) Career Counseling Fair (1:00 – 2:30 PM) IMS Exhibition, Historical Exhibit, Industry Workshops & MicroApps IMS Closing Ceremony; Also, IMBioC Opening Ceremony Women in Microwaves Panel Session and Networking Reception |
| Friday, 15 June 2018 | Workshops, Short Courses ARFTG Conference and Exhibition; IMBioC Technical Sessions and Exhibition |

WWW.IMS2018.ORG

PENNSYLVANIA CONVENTION CENTER • PHILADELPHIA, PENNSYLVANIA, USA

Exhibition Dates: 12–14 June 2018 • Symposium Dates: 10–15 June 2018



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IMS2018 Keynote Speakers

Plenary Session Talk Monday, 11 June 2018



Stephen K. Klasko, MD, MBA
President and CEO, Thomas Jefferson
University and Jefferson Health

“The Hitchhiker’s Guide to the Healthcare Galaxy: The Actions That Changed the Healthcare Landscape in America from 2017-2027”

The author of the books, We CAN Fix Healthcare and The Phantom Stethoscope, President Klasko uses science fiction to challenge audiences to imagine an ideal future and identify what it takes to design that future today. He reviews twelve “disruptors” for the demise of the old healthcare system and shows how each is an opportunity to take the trends and incremental steps we see today and create the transformations and disruptions tomorrow.

Closing Session Talk Thursday, 14 June 2018



Nader Engheta, PhD
H. Nedwill Ramsey Professor
University of Pennsylvania

“Extreme Platforms for Extreme Functionality”

Platforms with unprecedented “extreme” electromagnetic features can now be constructed, providing ample opportunities for manipulating, tailoring, and sculpting waves and fields at various scale lengths. We have been exploring a series of phenomena related to the wave-matter interaction in platforms with extreme scenarios, such as near-zero-index materials and specially engineered materials that solve equations as waves go through them. These “extreme platforms” offer new opportunities for functional devices in the future.

Closing Session Talk Thursday, 14 June 2018



Dr. Nicholas J. Ruggiero II, MD
Thomas Jefferson University

“Renal Denervation for Uncontrolled Hypertension: Complexity After Symplicity”.

Renal denervation for uncontrolled hypertension was demonstrated to be extremely successful in many early trials. The large, randomized, pivotal US trial, Symplicity HTN 3, unfortunately showed no benefit in comparison to optimal medical therapy. These results bridled enthusiasm for this technology and accounted for many companies to desert the premise altogether. Fortunately, those who believe in the procedure are pressing forward and multiple new trials which are currently enrolling will ultimately determine the future of renal denervation.



The IMS Welcome Reception will be held on Monday, 11 June 2018 at the historic Reading Terminal Market Building in Philadelphia. The reception immediately follows the conclusion of the IMS Plenary Session. The plenary session attendees will be led, as a parade, to the Reading Terminal Market by the “Mummers”.

For the latest on IMS and Microwave Week visit www.ims2018.org

Technical Sessions, Tuesday, 12 June 2018

| Time | Room Number, Location | | | | | | | | |
|--|---|--|--|---|---|---|---|---|---------------------------------------|
| | 201A | 201B | 201C | 202AB | 203AB | 204A | 204B | 204C | Exhibition Area |
| 08:00 - 09:40 | | | Session Tu1C Advances in Combiners and Dividers | Session Tu1D Novel MW and MMW Materials, Devices, and Radiating Structures | | | Session Tu1G Resonator-based Sensors | Session Tu1H Advanced Structures using Additive Manufacturing Process | |
| 09:40 - 10:10 | AM Coffee Break, Grand Hall and Exhibition Hall | | | | | | | | |
| 10:10 - 11:50 | | | Session Tu2C Recent Developments in Passive Circuits | Session Tu2D Advances in Modeling and Design Optimization | Session Tu2E Focus Session Radio to Terahertz Waves toward Nanoscale Sensing, Imaging and Characterization of Biological Samples | | Session Tu2G Advances in Near-Range Radar Sensors | Session Tu2H 3D-Printed Waveguide Structures | IMS Student Paper Competition |
| 11:50 - 13:30 | IMS/RFIC Panel Can a residential wireless Gbs internet connection compete with wired alternative? | | | | | | | | |
| 13:30 - 15:10 | | Session Tu3B Nonlinear Circuit Analysis, Modeling, and Distortion Compensation | Session Tu3C Advances in Millimeter-Wave Integrated Waveguide Components and Transitions | Session Tu3D Advances in Numerical Modelling for Multi-Scale and Multi-Physics Applications | Session Tu3E Advances in Microwave and Terahertz Applications in Nanotechnology | Session Tu3F Biomedical Radar | Session Tu3G Advances in Backscattering and RFID Circuits | Session Tu3H Novel Package-PCB Integration Concepts | |
| 15:10 - 15:55 | PM Coffee Break (15:10 - 15:40), Exhibition Hall | | | | | | | | |
| 15:55 - 17:15 | | Session Tu4B Focus Session Non-Doherty Load Modulated Power Amplifiers | Session Tu4C Integrated Wave-guide Structures and Techniques | Session Tu4D Novel Theoretical Approaches in MW Structure Analysis & Design | Session Tu4E Nano-Scale Devices and Antennas | | Session Tu4G Advances in Chipless and RFID Sensors | Session Tu4H Novel Interconnects for W- and D-band | TUIF1: Interactive Forum #1 |
| Technical Track Key: Field, Device and Circuit Tech. Passive Components Active Components Systems & Applications Emerging Technical Areas Focus or Special Sessions | | | | | | | | | |

IMS Exhibition, MicroApps Seminars, Student Design Competitions

Also on Tuesday: 5G Summit; Industry Workshops; YoPros Panel and Networking Event; Amateur Radio Talk and Networking Reception; Prof. Herczfeld Celebration Event

For the latest on IMS and Microwave Week visit www.ims2018.org

Technical Sessions, Wednesday, 13 June 2018

| Time | Room Number Location | | | | | | | | | |
|-----------------------------|---|---|---|--|--|---|---|--|---------------------------------------|------------------------------------|
| | 201A | 201B | 201C | 202AB | 203AB | 204A | 204B | 204C | Exhibition Area | |
| 08:00 – 09:40 | Session We1A 5G sub-systems: from predistortion to complete link | Session We1B VHF-UHF Components and Analog Signal Processing | Session We1C Planar Multiplexers and Multi-Band Filters | Session We1D Advanced Behavioral Models of Devices and Systems | Session We1E Advanced MEMS Filters, Resonators, and Waveguides | Session We1F Si-based MMW-THz Circuits | Session We1G Enabling Array Components and Beam Forming Architectures | Session We1H High Performance Power Amplifiers | | |
| 09:40 – 10:10 | AM Coffee Break, Grand Hall and Exhibition Hall | | | | | | | | | |
| 10:10 – 11:50 | Session We2A Multi GHz all Digital and Mixed Signal Circuit and Systems | Session We2B Advances in Mixers and Frequency Multipliers | Session We2C Filter Tuning, Synthesis, and Innovative Coupling Realizations | Session We2D Trapping Phenomena in GaN HEMTs | Session We2E Ferrite, Ferroelectric, and Phase-Change Components | Session We2F THz and mm-Wave Amplification Multiplication and Control Innovations | Session We2G Phased Array Systems and Applications | Session We2H High Power Doherty Power Amplifiers | WEIF1: Interactive Forum #2 | IMS Exhibition, MicroApps Seminars |
| 11:50 – 13:30 | IMS Panel Body Wearable Technology; is it still relevant and what's its future? | | | | | | | | | |
| 13:30 – 15:10 | Exhibit Hall Only Time; No Technical Sessions | | | | | | | | | |
| 15:10 – 15:55 | PM Coffee Break (15:10 - 15:40), Exhibition Hall | | | | | | | | | |
| 15:55 – 17:15 | Session We3A Novel Microwave Circuits and Systems Applications | Session We3B Focus Session Emerging RF switch technologies for 5G and defense applications | | | Session We3E Microwave Acoustic Components for Wireless Applications | Session We3F Terahertz and mm-wave Technologies and Applications | Session We3G Broadband Radar Systems and Technologies | Session We3H Special Session Women in Microwaves: Research on Biomedical Applications | WEIF2: Interactive Forum #3 | |
| Technical Track Key: | Field, Device and Circuit Tech. | Passive Components | Active Components | Systems & Applications | Emerging Technical Areas | Focus or Special Sessions | | | | |

Also on Wednesday: Industry Workshops; Prof. Haddad Celebration Event Industry Hosted Reception; MTT-S Awards Banquet

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Technical Sessions, Thursday, 14 June 2018

| Time | Room Number Location | | | | | | | | | |
|---------------|--|---|--|--|--|--|--|--|---------------------------------------|------------------------------------|
| | 201A | 201B | 201C | 202AB | 203AB | 204A | 204B | 204C | Exhibition Area | |
| 08:00 – 09:40 | Session Th1A Advanced Technologies for Non-Planar Filters and Duplexers | Session Th1B Advanced Rectifiers and Energy Harvesters for Wireless Power Transfer | Session Th1C Electromagnetic Biosensing | Session Th1D IMS/ARFTG Advanced High Frequency Large Signal Measurement Techniques | Session Th1E Recent Advances in Terahertz and Photonics | Session Th1F RF Transceiver Architecture for MIMO and Beam Steering | | Session Th1H Doherty and Load-Modulated Power Amplifiers | | IMS Exhibition, MicroApps Seminars |
| 09:40 – 10:10 | AM Coffee Break, Grand Hall and Exhibition Hall | | | | | | | | | |
| 10:10 – 11:50 | Session Th2A Synthesis and Design of Non-Planar Filters and Multiplexers | Session Th2B Recent Developments in Wireless Power Transfer Techniques | Session Th2C Hyperthermia Treatment and Implants Wireless Powering | Session Th2D IMS/ARFTG Session Innovative mm-wave calibration and measurement techniques | Session Th2E Focus Session Integrated Microwave Photonics for Millimeter-wave and 5G Applications | Session Th2F Focus Session 5G Millimeter-Wave Beamformers and Phased-Arrays | | Session Th2H Millimeter Wave Broadband Power Amplifiers | THIF1: Interactive Forum #4 | |
| 11:50 – 13:30 | IMS Panel 5G mmW PA/FEM: Si or III-V who will win the race? | | | | | | IMS Physicians Panel (12:00 - 14:00) Utilization of RF/Microwave in Medicine | | | |
| 13:30 – 15:10 | Session Th3A New Tuning Concepts for 3-D, Planar, and Integrated Filters and Duplexers | Session Th3B Focus Session Techniques and Components for High-Power Microwave Technology | Session Th3C Biomedical Devices | Session Th3D Advances in CMOS Microwave and Millimeter Wave Signal Sources | Session Th3E Advances in Semiconductor Monolithic Integrated Circuit Technology | Session Th3F THz and mm-Wave Sensing and Communication Systems | | Session We3H Advances in Low Noise Technology | IMS Student Career Fair | |
| 15:10 – 15:55 | | | | | | | | | | |

Technical Track Key:

Field, Device and Circuit Tech.

Passive Components

Active Components

Systems & Applications

Emerging Technical Areas

Focus or Special Sessions

Also on Thursday: Industry Workshops; IMS Closing and IMBioC Opening Ceremony and Reception, Women in Microwaves Panel

For the latest on IMS and Microwave Week visit www.ims2018.org

Workshops, Short Courses

| Day | Morning (08:00 – 11:50) | Afternoon (13:30 – 17:15) |
|----------------------------|--|---|
| Sunday, 10 June 2018 | WSA: RFIC Design in CMOS FinFET and FD-SOI | |
| | WSB: ICs for Quantum Computing and Quantum Technologies | |
| | WSC: 5G mm-Wave Power Amplifiers, Transmitters, Beamforming Techniques and Massive MIMO | |
| | WSD: eXtreme-bandwidth: architectures for RF and mmW transceivers in nanoscale CMOS | |
| | WSE: Integrated mm-wave & THz sensing technology for automotive, industrial and healthcare | |
| | WSF: Advanced integrated RF filtering circuits and techniques | |
| | WSG: Synthesizer Design and Frequency Generation/Synchronization Schemes for High-Performance Wireless Systems | |
| | WSH: High-performance WLAN transceiver Design and Calibration Techniques | |
| | WSI: High Efficiency Power Amplification for Emerging Wireless Communications Solutions from Devices to Circuits and Systems | |
| | WSJ: Millimeter-wave Systems; Manufacturing, Packaging and Built-in Self Test | |
| | | WSK: Towards Direct Digital RF Transceivers |
| | WSL: Ultra Low-Power Transceiver SoC Designs for IoT Applications | |
| Monday, 11 June 2018 | SMA: Practical computer modeling for electromagnetic medical device design | |
| | WMH: Microwave and Millimeter-wave Radiometers: Component Technologies, System Architectures, and Emerging Applications | |
| | WMA: Wireless Technologies for Implantable and Wearable Systems | |
| | WMB: Microwave to THz imaging technologies for biomedical applications | |
| | WMC: 3D-/4D-/Inkjet-Printed RF Components and Modules for IoT, 5G and Smart Skin Applications | |
| | WMD: Power Amplifier Technologies for 5G Communications Systems | |
| | WME: Digital Pre-Distortion and Post-Correction from DC to mmWave for Wireline and Optical Communications | |
| | WMF: Microwaving cells: from biological effects to innovative techniques for cell analysis | |
| | WMG: Recent Advances in Efficiency and Linearity Enhancement Techniques for RF Power Amplification | |
| | WMJ: Advanced Applications of Nonlinear Vector Network Measurements for broadband RF Power Amplifiers Design and Linearization | |
| | WMK: Affordable Phased-Arrays for SATCOM and Point-to-Point Systems Using Silicon Technologies | |
| | SMB: Fundamentals of Magnetic-Resonance Imaging | |
| | WMI: Automotive Radar and Vehicular Network Security | |
| Friday, 15 June 2018 | SFA: Multi-Beam Antennas and Beam-Forming Networks | |
| | WFD: Advanced Synthesis techniques for reduced size filtering networks | |
| | WFA: Ultra-Low-Power Nanowatt to Microwatt Receivers for the Internet of Things | |
| | WFB: RF Front-Ends for Enhanced Mobile Communications towards 5G | |
| | WFF: Tunable Passive Devices for Multi-band Systems | |
| | WFG: Advances in Linearization Techniques for 5G and Beyond | |
| | WFH: Module Integration and Packaging/IC Co-Integration for Millimeter-wave Communications and 5G | |
| | WFI: Innovative Technologies for RF and millimeter-wave Tuning and Switching | |
| | WFJ: Design of Matching Networks for Optimal Performance of Power Amplifiers and Transmitters | |
| | WFK: The New GaN: Advancements in novel-materials based GaN Microwave and mm-Wave Technologies | |
| | WFE: Recent advances in non-linear and non-reciprocal RF microwave devices | |
| | SFB: Using active fiber optic for distributed antenna system (DAS) system in 5G MIMO system and automobile radar system | |

For the latest on IMS and Microwave Week visit www.ims2018.org

5G Summit, Panel Sessions, RF Boot Camp

5G Summit, Tuesday, 12 June 2018; Room 103

The 5G Summit, at the Pennsylvania Convention Center in Philadelphia, is an IEEE event that is organized by two of IEEE's largest societies – MTT-S and ComSoc. This special collaboration, for the second year running, complements MTT-S' "hardware and systems" focus with ComSoc's "networking and services" focus. The one-day Summit features talks from experts from government, academia, and industry experts on various aspects of 5G services and applications. It's further complemented by the 5G Pavilion at the IMS2018 exhibition where table top demonstrations and "fire-side" chats are presented at the 5G theater.

5G Summit Speakers:



"Bringing the World Closer Together"

Jin Bains
Head of Connectivity, SCL, Facebook



"AT&T Perspectives on 5G Services"

David Lu
Vice President, AT&T

Other featured presentations from Huawei, GM, Keysight, NI, Global Foundries, MACOM as well as academia will include following topics:

- Spectrum/Regulatory
- Infrastructure/Trials, Applications
- Technologies, Circuits, Systems
- Design, Test & Measurement Challenges
- Test-bed Services for 5G

Lunchtime Panel session: "mmWave Radios in Smartphones: What they will look like in 2, 5, and 10 years"

For complete agenda visit: www.ims2018.org/5g-summit

Panel Sessions

Can a residential wireless Gbps internet connection compete with wired alternatives?

Tuesday, 12 June 2018, 12:00-13:00,
Room 201A

5G PA/FEM: Si or III-V - who will win the race?

Thursday, 14 June 2018, 12:00-13:00,
Room 201A

Body Wearable Technology: is it still relevant and what is its future?

Wednesday, 13 June 2018, 12:00-13:00,
Room 201A

Physicians Panel: Utilization of RF/Microwaves in Medicine

Thursday, 14 June 2018, 12:00-14:00,
Room 204B

RF Boot Camp, Monday, 11 June 2018; Room 109B

This one-day course is ideal for newcomers to the microwave world, such as technicians, new engineers, college students, engineers changing their career path, as well as marketing and sales professionals looking to become more comfortable in customer interactions involving RF & Microwave circuit, and system concepts and terminology. The format of the RF Boot Camp is like that of a workshop or short course, with multiple presenters from industry and academia presenting on a variety of topics including:

- The RF/Microwave Signal Chain
- Network Characteristics, Analysis and Measurement
- Fundamentals of RF Simulation
- Impedance Matching & Device Modeling Basics
- Introduction to RF and Microwave Filters
- Spectral Analysis and Receiver Technology
- Signal Generation
- Modulation and Vector Signal Analysis
- Microwave Antenna Basics
- Introduction to Radar and Radar Measurements

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Exhibition, Mobile App, Key Deadlines

Exhibition Overview:

The Exhibition consists of over 600 exhibiting companies who represent the state of the art when it comes to materials, devices, components, and subsystems, as well as design and simulation software and test/measurement equipment. Whatever you are looking to acquire, you will find the industry leaders ready and willing to answer your purchasing and technical questions.

Exhibition Dates and Hours

| | |
|----------------------------|----------------|
| Tuesday, 12 June 2018 | 09:30 to 17:00 |
| Wednesday, 13 June 2018 | 09:30 to 17:00 |
| Exhibit-Only Time: | 13:30 to 15:10 |
| Industry Hosted Reception: | 17:00 to 18:00 |
| Thursday, 14 June | 09:30 to 15:00 |

MicroApps

The Microwave Application seminars (MicroApps) offered Tuesday, 12 June through Thursday, 14 June, 2018, provide a unique forum for the exchange of ideas and practical knowledge related to the design, development, production, and test of products and services. MicroApps seminars are presented by technical experts from IMS2018 exhibitors with a focus on providing practical information, design, and test techniques that practicing engineers and technicians can apply to solve the current issues in their projects and products.

Industry Workshops

The Industry Workshops are 2-hour industry-led presentations featuring hands-on, practical solutions often including live demonstrations and attendee participation. These Workshops are open to all registered Microwave Week attendees at a nominal charge.

Visit <https://ims2018.org/exhibition> for more information.

IMS Microwave Week Mobile App:

The IMS Microwave Week app is now available in the Apple App store and Google Play store. Install the app on your Android or iOS device to view the full schedule of Workshops, Short Courses, IMS and RFIC Technical Sessions, IMBioC, ARFTG, Panel Sessions, Social Events and Exhibition information. On-site during Microwave Week you will be able to download IMS and RFIC papers, locate exhibitors, upload photos and explore all that Philadelphia, PA has to offer! Download today!



Apple App Store



Google Play Store

Key Deadlines:

Early Bird Registration Deadline: 14 May 2018
Advance Registration Deadline: 8 June 2018
Housing Bureau Deadline: 18 May 2018

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Keynote Speakers. Haptic Human-Machine Interaction: From Motor Skill Training to Cognitive Skill Learning. Thursday's Keynote Speaker. Prof. Yuru Zhang. Automatic Synthesis of Haptic Content. Friday's Keynote Speaker. Prof. Seungmoon Choi. Keynote Speakers. Tutorials. Organizing Committee. IMS World Forum 2018. Home. Press Center. The 15th annual edition of IMS World Forum will be held on 25-26 April 2018 at Amba Marble Arch, London. As the world's only dedicated IMS event, this year's programme will offer an unbiased perspective exploring the operators' experience with vIMS deployment and current capabilities along with the technical advancements promoting operator investment. Along with the global industry experts and leaders, Huawei will discuss the evolution of 5G oriented IMS architecture and business innovation based on VoLTE+ at the forum, and will showcase its leading IMS innovation solutions. Download the ... SPEAKER. Aaron Pearce. Senior Engineer and Project Manager at Sunrise, Communications AG. SPEAKER. Nie Xin.