

# IEEE International Symposium on Antennas & Propagation & USNC-URSI Radio Science Meeting JULY 2019 • ATLANTA



The 2019 IEEE AP-S Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting will be held on July 7-12, 2019, at the Hilton in Atlanta, GA.

The Symposium and Meeting are cosponsored by the IEEE Antennas and Propagation Society (AP-S) and the US National Committee (USNC) for the International Union of Radio Science (URSI).

The technical sessions, workshops, and short courses will be coordinated between the two organizations to provide a comprehensive and well-balanced program.

This meeting is intended to provide an international forum for the exchange of information on state-of-the-art research in antennas, propagation, electromagnetic engineering, and radio science.

*The paper-submission deadline is January 18, 2019.*

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[jpapapol@egr.msu.edu](mailto:jpapapol@egr.msu.edu)

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[entenze@ece.gatech.edu](mailto:entenze@ece.gatech.edu)

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[bshanker@egr.msu.edu](mailto:bshanker@egr.msu.edu)  
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[afpeterson@gatech.edu](mailto:afpeterson@gatech.edu)

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[r.stone@ieee.org](mailto:r.stone@ieee.org)

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[chahal@egr.msu.edu](mailto:chahal@egr.msu.edu)

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[mcohen@gatech.edu](mailto:mcohen@gatech.edu)

Cagri Ulusoy  
[ulusoy@egr.msu.edu](mailto:ulusoy@egr.msu.edu)

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Greg Durgin  
[durgin@gatech.edu](mailto:durgin@gatech.edu)

### Short Courses & Workshops

Lee Harle  
[harle@msu.edu](mailto:harle@msu.edu)  
Glenn Hopkins  
[glenn.hopkins@gtri.gatech.edu](mailto:glenn.hopkins@gtri.gatech.edu)

### International Liaison

Sangmin Yoo  
[syoo@egr.msu.edu](mailto:syoo@egr.msu.edu)

### Young Professionals

Jeff Nanzer  
[nanzerje@egr.msu.edu](mailto:nanzerje@egr.msu.edu)

### Local Arrangements

Carolyn Daley-Foster  
[carolyn.daley-foster@cc.gatech.edu](mailto:carolyn.daley-foster@cc.gatech.edu)

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[dengyimi@egr.msu.edu](mailto:dengyimi@egr.msu.edu)  
Kay Lindsey  
[kay.lindsey@gtri.gatech.edu](mailto:kay.lindsey@gtri.gatech.edu)

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[kempel@egr.msu.edu](mailto:kempel@egr.msu.edu)

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John Albrecht  
[jalbrech@egr.msu.edu](mailto:jalbrech@egr.msu.edu)

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[Adilson.Cardoso@gtri.gatech.edu](mailto:Adilson.Cardoso@gtri.gatech.edu)

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[SueLStone@hotmail.com](mailto:SueLStone@hotmail.com)  
Joanne Wilton  
[jjwilton@mindspring.com](mailto:jjwilton@mindspring.com)  
Judy Long  
[judimlong@swbell.net](mailto:judimlong@swbell.net)

### Women in Engineering

Linda Katehi  
[katehi@ucdavis.edu](mailto:katehi@ucdavis.edu)

# Information

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## Paper Submission

Authors are invited to submit contributions for review and possible presentation at the Symposium or Meeting (the “Conference”) on topics of interest to AP-S and USNC-URSI, including advancements and innovations in the fields of electromagnetics, antennas, and wave propagation. Suggested topics and general information are listed on the Web site. In addition to regularly scheduled sessions for oral and poster presentations, there will be a student paper competition, as well as special sessions, workshops, and short courses that will address timely topics and state-of-the-art advancements in these fields.

- AP-S submissions must be in standard IEEE two-column format, and must be two pages in length.
- USNC-URSI submissions may be in either a one-page, one-column format with a minimum length of 250 words, or in the IEEE two-page, two-column format with a length of two pages.
- In all cases, only accepted and presented submissions that are in the IEEE two-page two-column format and substantially fill the two pages will be submitted for possible inclusion in IEEE Xplore, if the author chooses submission to Xplore.
- All accepted and presented submissions will appear in the proceedings distributed at the Conference.
- The presenting author will be required to register for the Conference by April 7, 2019 in order for their paper to be included in the Conference.
- A complete list of AP-S and URSI topics, as well as detailed instructions, including formats and templates, will be available on the conference website - [www.2019apsursi.org](http://www.2019apsursi.org) - during late summer 2018.

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## AP-S Student Paper Competition

Eligible entries in the Student Paper Competition must have only one student author, and that student must be the first author. Each additional coauthor must submit a signed letter indicating that his/her contribution is primarily advisory. Letters must be in PDF format and must be uploaded to the Conference’s student paper Web site in the indicated area at the time the paper is submitted. All Student Paper Competition entries will be evaluated using a double-blind review process, in addition to the normal review process used for all submissions to the Conference. Detailed instructions are available on the Conference Web site. For additional information, contact Morris Cohen ([mcohen@gatech.edu](mailto:mcohen@gatech.edu)) or Cagri Ulusoy ([ulusoy@egr.msu.edu](mailto:ulusoy@egr.msu.edu)).

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## Exhibits

Industrial, academic, and book exhibits will be open July 9-11, 2019. Exhibitor registration and additional information can be found on the Conference Web site.

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## Special Sessions

Requests to organize special sessions should be submitted to Prem Chahal ([chahal@egr.msu.edu](mailto:chahal@egr.msu.edu)) no later than October 9, 2018. Each proposal should include the title of the special session, a brief description of the topic, an indication of whether the proposed session is for AP-S, USNC-URSI, or is joint, and justification for its designation as a special session. All proposals should be submitted in PDF format. Special sessions will be selected and finalized by the end of November 2018. At that time, additional instructions will be provided to the organizers of the special sessions chosen for inclusion in the Conference. The associated papers or abstracts will be due January 18 2019. A list of special sessions will be posted at the Conference Web site in December 2018.

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## Short Courses/Workshops/Tutorials

Several short courses and tutorials on topics of special and current interest will be solicited by the technical program committee and organized for the Conference. Individuals who wish to organize a short course or workshop should contact Lee Harle ([harle@msu.edu](mailto:harle@msu.edu)) or Glenn Hopkins ([glenn.hopkins@gtri.gatech.edu](mailto:glenn.hopkins@gtri.gatech.edu)) by November 16, 2018.

# AP-S Topics

## Antennas

1. Antenna theory
2. Antenna feeds and matching circuits
3. Mutual coupling in antenna arrays
4. Dielectric resonator antennas
5. Microstrip antennas, arrays, and circuits
6. Slotted and guided wave antennas
7. Phased-array antennas
8. Reflector and reflectarray antennas
9. Electrically small antennas
10. Broadband/ultra-wideband antennas
11. Multi-band antennas
12. Adaptive, active, and smart antennas
13. Reconfigurable antennas and arrays

## Computational & Numerical Techniques

21. Computational electromagnetics
22. High-frequency and asymptotic methods
23. Integral-equation methods
24. FDTD methods
25. FEM methods
26. Hybrid methods
27. Techniques for transient simulations
28. Optimization methods in EM designs
29. Parallel and special-processor-based numerical methods

## Antenna Applications & Emerging Technologies

35. Biomedical applications
36. MIMO implementations and applications
37. Mobile and PCS antennas
38. RFID antennas and systems
39. Ultra-wideband systems
40. Vehicular antennas and electromagnetics
41. Software-defined/cognitive radio
42. On-chip antennas
43. Wireless power transmission and harvesting
44. 3D printed antennas and structures
45. Millimeter-wave, sub-mm-wave, terahertz, optical antennas

## Propagation & Scattering

30. Indoor, urban, terrestrial, and ionospheric propagation
31. Propagation and scattering in random or complex media
32. Scattering, diffraction, and RCS
33. Inverse scattering and imaging
34. Remote sensing

## Electromagnetics & Materials

14. Electromagnetic theory
15. Electromagnetic material properties and measurements
16. Frequency-selective surfaces
17. Electromagnetic bandgap materials
18. Metamaterials and metasurfaces
19. Nano-electromagnetics
20. Electromagnetic education

# URSI Topics

## Commission A Electromagnetic Metrology

USNC CHAIR: **Jeanne Quimby**  
*jeanne.quimby@nist.gov*

- A.1 Microwave to sub-millimeter measurements/standards
- A.2 Quantum metrology and fundamental concepts
- A.3 Time and frequency
- A.4 Time-domain metrology, EM-field metrology
- A.5 EMC and EM metrology
- A.6 Noise
- A.7 Materials
- A.8 Bioeffects and medical applications
- A.9 Antennas
- A.10 Impulse radar
- A.11 Interconnect and packaging
- A.12 Test facilities
- A.13 THz metrology
- A.14 High-Frequency and millimeter wireless metrology

## Commission B Fields & Waves

USNC CHAIR: **Jamesina Simpson**  
*jamesina.simpson@utah.edu*

- B.1 Antenna arrays
- B.2 Antenna theory, design, & measurements
  - B.2.1 Active antennas
  - B.2.2 Active and passive antenna matching
  - B.2.3 Antenna and propagation measurement techniques
  - B.2.4 Small antennas
  - B.2.5 Other antenna topics
- B.3 Complex, novel, or specialized media
  - B.3.1 Electromagnetic-bandgap (EBG) structures
  - B.3.2 Biological media
  - B.3.3 Geophysical media
  - B.3.4 Metamaterials
- B.4 Educational methods and tools
- B.5 Electromagnetic interaction and coupling
- B.6 Frequency-selective surfaces and filters

- B.7 Guided waves and wave-guiding structures
- B.8 High-frequency techniques
- B.9 Imaging, inverse scattering, and remote sensing
- B.10 Microstrip antennas and printed devices
- B.11 Millimeter-wave and terahertz antennas
- B.12 MIMO antennas and systems
- B.13 Nanoscale electromagnetics
- B.14 Nonlinear electromagnetics
- B.15 Numerical methods
  - B.15.1 Fast methods
  - B.15.2 Finite-difference methods
  - B.15.3 Frequency-domain methods
  - B.15.4 Hybrid methods
  - B.15.5 Integral-equation methods
  - B.15.6 Time-domain methods
- B.16 Optimization techniques
- B.17 Propagation phenomena and effects
- B.18 Rough surfaces and random media
- B.19 RFID
- B.20 Scattering and diffraction

- B.21 Theoretical electromagnetics
- B.22 Transient fields, effects, and systems
- B.23 Ultra-wideband electromagnetics
- B.24 Wireless communications
- B.25 Wireless sensors and sensing networks
- B.26 Cognitive radio
  - B.26.1 Reconfigurable antennas
  - B.26.2 Simultaneous transmit and receive systems
  - B.26.3 Spectrum enhancement techniques

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## Commission C Radio Communication and Signal Processing Systems

**USNC CHAIR: Eric L. Mokole**  
*emokole@mitre.org*

- C.1 Cognitive radio, software-defined wireless systems, and waveform diversity
- C.2 Computational imaging and inverse methods
- C.3 Information theory, coding, modulation, and detection
- C.4 MIMO and MISO systems
- C.5 Radar systems, target detection, localization, and tracking
- C.6 Radio communication systems
  - C.6.1 Internet of Things
  - C.6.2 5G
  - C.6.3 Electromagnetic spectral harmony
- C.7 Sensor networks, and sensor array processing and calibration
- C.8 Signal and image processing
- C.9 Spectrum and medium utilization
  - C.9.1 Electromagnetic modeling of systems and environments
- C.10 Synthetic aperture and space-time processing
- C.11 Ground-penetrating radar (GPR)
- C.12 Distributed, multi-modality, electromagnetic, autonomous systems

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## Commission E Electromagnetic Environment and Interference

**USNC CHAIR: Larry Cohen**  
*lawrence.cohen@nrl.navy.mil*

- E.1 Electromagnetic environment
  - E.1.1 Electromagnetic noise of natural origin
  - E.1.2 Manmade noise
- E.2 Electromagnetic compatibility measurement technologies
- E.3 Electromagnetic compatibility standards
- E.4 Legal aspects of electromagnetic compatibility
- E.5 Electromagnetic radiation hazards
- E.6 Electromagnetic compatibility education
- E.7 Computational electromagnetics in electromagnetic compatibility
  - E.7.1 Computer Modeling
  - E.7.2 Model Validation
  - E.7.3 Statistical Analysis
- E.8 Effects of natural and intentional emissions on system performance
  - E.8.1 Crosstalk
  - E.8.2 Effects of transients
  - E.8.3 System analysis
  - E.8.4 Signal integrity
  - E.8.5 Electromagnetic compatibility in communication systems
  - E.8.6 Statistical analysis
- E.9 High-power electromagnetics
  - E.9.1 Electrostatic discharge
  - E.9.2 Electromagnetic pulse and lightning
  - E.9.3 Transients
  - E.9.4 Power transmission
- E.10 Spectrum compatibility issues, usage and management

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## Commission F Wave Propagation and Remote Sensing

**USNC CHAIR: Kamal Sarabandi**  
*saraband@umich.edu*

- F.1 Point-to-point propagation effects
  - F.1.1 Measurements
  - F.1.2 Propagation models
  - F.1.3 Multipath/mitigation
  - F.1.4 Land or water paths
  - F.1.5 Scattering/diffraction
  - F.1.6 Indoor/outdoor links
  - F.1.7 Mobile/fixed paths
  - F.1.8 Horizontal/slant paths
  - F.1.9 Surface/atmosphere interactions
  - F.1.10 Numerical weather prediction
  - F.1.11 Dispersion/delay
  - F.1.12 Natural/manmade structures
- F.2 Microwave remote sensing of the Earth
  - F.2.1 Atmospheric sensing
  - F.2.2 Ocean and ice sensing
  - F.2.3 Field campaigns
  - F.2.4 Interferometry and SAR
  - F.2.5 Subsurface sensing
  - F.2.6 Scattering/diffraction
  - F.2.7 Radiation and emission
  - F.2.8 Propagation effects
  - F.2.9 Urban environments
  - F.2.10 Soil moisture & terrain
- F.3 Propagation and remote sensing in complex and random media

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## Commission K Electromagnetics in Biology and Medicine

**USNC CHAIR: Majid Manteghi**  
*manteghi@vt.edu*

- K.1 Body-area networks
- K.2 Dosimetry and exposure assessment
- K.3 Electromagnetic and mixed-mode imaging and diagnostics
- K.4 Therapeutic and rehabilitative applications
- K.5 Implantable and ingestible devices
- K.6 Human-body interactions with antennas and other electromagnetic devices