



2021 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting

4-10 December 2021, Singapore

<https://2021apsursi.org>

The 2021 IEEE AP-S Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting has been rescheduled to 4-10 December 2021 at Marina Bay Sands, Singapore, in a hybrid format in light of global mass COVID-19 vaccination campaigns. This joint conference is sponsored by the IEEE Antennas and Propagation Society (AP-S) and the US National Committee (USNC) of the International Union of Radio Science (URSI). The technical sessions and short courses will provide a comprehensive and well-balanced program. The joint conference 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 **15 May 2021**.

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PAPER SUBMISSION

Authors are invited to submit contributions for review and possible presentation at this joint 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 website. 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 registered submissions will appear in the proceedings distributed at the conference. The presenting authors will be required to register by due date 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 due dates, formats and templates, are available on the conference website.

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. The letter must be in PDF format and must be uploaded to the conference's student paper website 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 regular submissions. Detailed instructions are available on the conference website. For additional information, please email Yunjia Zeng (zeng_yunjia@i2r.a-star.edu.sg).

AP-S STUDENT DESIGN CONTEST

All students are encouraged to form teams and participate in Student Design Contest. Each team should consist of 2 to 5 students, with at least 50% being undergraduate students. For a 5-year Bachelor-cum-Master degree program, students in years 1 to 3 are considered undergraduates. Each team should be advised by a professional mentor who is a member of the IEEE AP-S, but the work needs to be done primarily by the students. No student or mentor should be involved in more than one team. Detailed instructions are available on the conference website. For additional information, please email Wei Liu (wei.liu@nus.edu.sg).

SPECIAL SESSIONS

Requests to organize special sessions should be emailed to Chao-Fu Wang (cfwang@nus.edu.sg) no later than **16 October 2020**. 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 using the completed form that is downloadable from the conference website. Special sessions will be selected and finalized by the end of November 2020. 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 on **15 May 2021**. A list of special sessions will be posted at the conference website in December 2020.

SHORT COURSES/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 short course or tutorial should complete the proposal form that is downloadable from the conference website and email Chao-Fu Wang (cfwang@nus.edu.sg) by **31 March 2021**.

EXHIBITS AND SPONSORSHIPS

Industrial, academic, and book exhibits will be open during the conference. Sponsorships in various forms are also highly appreciated. Exhibits and sponsorships information can be found on the conference website or by sending email to Richard Xian-Ke Gao (gaokx@ihpc.a-star.edu.sg).

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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. Guided and leaky 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

Electromagnetics and 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

Computational and 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

Propagation and 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

Antenna Applications and 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 and sub-mm-wave antennas
46. Terahertz, infrared, and optical antennas

URSI Topics

Commission A - Electromagnetic Metrology

- 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 and Waves

- B.1 Antenna arrays
- B.2 Antenna theory, design, and measurements
 - B.2.1 Active antennas
 - B.2.2 Active and passive antenna matching
 - B.2.3 Antenna 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

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- 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
- Commission C - Radio Communication and Signal Processing Systems**
- C.1 Cognitive radio and software-defined radio
 - 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.7 Sensor networks, and sensor array processing and calibration
 - C.8 Signal and image processing
 - C.9 Spectrum and medium utilization
 - C.10 Synthetic aperture and space-time processing
 - C.11 Ground-penetrating radar (GPR)

Commission E - Electromagnetic Environment and Interference

- 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 management

Commission F - Wave Propagation and Remote Sensing

- 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.2.11 Propagation and remote sensing in complex and random media

Commission G - Ionospheric Radio and Propagation

- G.1 Global morphology and modeling of the ionosphere
- G.2 Ionospheric space-time variations
- G.3 Development of tools and networks needed to measure ionospheric properties and trends
- G.4 Theory and practice of radio propagation via the ionosphere
- G.5 Application of ionospheric information to radio systems

Commission K - Electromagnetics in Biology and Medicine

- 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