



The National Academies of
SCIENCES • ENGINEERING • MEDICINE



National Radio Science Meeting

January 10-14, 2023

University of Colorado at Boulder

Meeting website: www.nrsmboulder.org

USNC-URSI website: www.usnc-ursi.org

This open scientific meeting is sponsored by the U.S. National Committee (USNC) for the International Union of Radio Science (URSI). More information about USNC-URSI is available at www.usnc-ursi.org. Through technical co-sponsorship of the meeting by the IEEE Antennas and Propagation Society, authors will have their choice of submitting one-page abstracts that are not posted in IEEE Xplore, or two-page summaries that may be archived in IEEE Xplore. At least one author is required to register for each presented abstract or summary. While USNC-URSI encourages in-person attendance for all presenters, a hybrid meeting is planned to allow for authors to present remotely and for all attendees to participate fully in the conference. Papers must be presented for their corresponding summaries to be included in the proceedings and submitted to IEEE Xplore. Abstracts or summaries on any topic in the interest area of a Commission are welcome. Contact the appropriate USNC-URSI Commission Chair listed below or visit the meeting website for further information.

USNC-URSI Chair: Michael Newkirk, Michael.Newkirk@jhuapl.edu

USNC-URSI Secretary: Jamesina Simpson, Jamesina.Simpson@utah.edu

PLENARY SPEAKERS

Susan Hagness, University of Wisconsin – Madison, Women in Radio Science (WIRS) Invited Speaker

John Mather, NASA, Senior Project Scientist for the James Webb Space Telescope

ABSTRACT AND SUMMARY SUBMISSION

Abstract and summary preparation and submission instructions are found at the conference website, www.nrsmboulder.org. Authors may submit to special sessions in addition to the general topics listed below. A list of special sessions will be available on the conference website. Abstracts or summaries must be submitted by **Friday, September 16, 2022**. If you have any questions on abstract/summary submission or the technical program, please direct them to the USNC-URSI Secretary. Abstracts must have a minimum of 250 words and summaries are limited to two pages. Note that registration is required to present accepted papers and attend any session of the meeting.

ERNEST K. SMITH USNC-URSI STUDENT PAPER COMPETITION

Prizes will be awarded to three student papers. Awards will be made for First Prize in the amount of \$1000, Second Prize \$750, and Third Prize \$500. The deadline for submission of *full papers* is the same as the regular submission deadline. Please see www.nrsmboulder.org for additional information, or contact the Student Paper Chair, Prof. Erdem Topsakal, Dept. of ECE, Virginia Commonwealth University, etopsakal@vcu.edu. Student papers will be presented at a separate session and awards will be presented during the conference. Student Paper Competition participants will have the option of submitting their papers for publication in a special section of the journal *Radio Science*.

WORKSHOPS, SHORT COURSES AND EXHIBITS

A variety of workshops and short courses will be organized for Tuesday, Jan. 10, 2023. In addition, exhibitors will have booths open throughout the meeting. Please see www.nrsmboulder.org for additional information.

Questions?

For questions concerning conference logistics, please contact Christina Patarino at:
Phone: (303) 492-5151
E-mail: nrsmboulder@colorado.edu

**Abstract / Summary Submissions and
Student Paper Competition Submissions
are due by**

September 16, 2022

Please visit www.nrsmboulder.org



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COMMISSION TOPICS

COMMISSION A, Electromagnetic Metrology

Chris Anderson, canderso@usna.edu

TOPICS

Antennas
Bioeffects and medical applications
EM-field metrology
EMC and EM pollution
Impulse radar
Interconnect and packaging
Materials
Microwave to THz measurements/standards
Millimeter-wave, sub-THz, and THz communications
Noise
Planar structures and microstrip circuits
Quantum metrology and fundamental concepts
Time and frequency
Time domain metrology

COMMISSION B, Fields and Waves

Branislav Notaros, notaros@colostate.edu

TOPICS

Antennas:
Antenna theory, design, and measurements
Antenna arrays and systems
Microstrip and printed antennas, circuits, and devices
Antenna feeds and reflector and reflectarray antennas
Propagation, Scattering, Sensing:
Electromagnetic propagation, scattering, and interaction
Guided-wave structures and systems
Imaging, inverse scattering, and remote sensing
Wireless sensors, networks, and communication
Numerical Methods:
Integral-equation methods
Finite-element, finite-difference, and hybrid methods
Computational electromagnetics, analysis, and optimization
Theory, Materials, Education:
Electromagnetic theory
Metamaterials and complex media
Electromagnetics education
Devices, Systems, Applications:
RF and microwave devices, structures, and systems
THz and optical antennas, devices, and systems
Biomedical applications of fields and waves

COMMISSION C, Radio-communication Systems and Signal Processing

Greg Huff, ghuff@psu.edu

TOPICS

Addressing digital divide through radiocommunication systems
Artificial intelligence/Machine learning for RF systems
Cognitive radio
Computational imaging and inverse methods
Computational resource management
Distributed sensor networks
Dynamic spectrum networks
Physics-based signal processing
Quantum RF theory/Technologies/Applications
Radar systems
Radar target detection, localization, and tracking
RF spectrum convergence/Harmony/Maneuver
Sensor array processing and calibration
Signal processing for radar remote sensing
Software-defined and cognitive radio/Radar/Sensing
Statistical signal processing of waves in random media
Synthetic aperture and space-time processing

COMMISSION D, Electronics and Photonics

Jonathan Chisum, jchisum@nd.edu

TOPICS

Electronic devices, circuits, and applications
Photonic devices, circuits, and applications
Physics, materials, CAD, technology and reliability of electronic and photonic devices, in radio science and telecommunications
Wireless Power
Wearable Antennas
THz electronics and antennas
Integrated antenna systems for MMW and THz
Active Antennas
Reconfigurable RF
IoT and RFID antennas, circuits, and systems
Metamaterials and plasmonics



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COMMISSION TOPICS - CONTINUED

COMMISSION E, Electromagnetic Environment and Interference

Robert Gardner, Robert.Gardner@gtri.gatech.edu

TOPICS

- Radio-communication systems (IoT, 5G, NextG, MIMO, MISO) in presence of noise*
- Radiofrequency (communication, radar, sensing, calibration, surveillance, telemetry, etc.) in presence of noise*
- Radiofrequency spectrum, medium utilization, and convergence (cognitive and cooperative techniques, electromagnetic spectral harmony)*
- Scientific basis and effects of natural and intentional emissions on system performance*
- Electromagnetic modeling of systems and environments (artificial, composite noise, terrestrial and planetary noise of natural origin)*
- Electromagnetic compatibility in computational electromagnetics, education, measurement technologies, standards, and radiation hazards*
- High-power electromagnetic effects of transients on electronic systems*
- Signal and power integrity*

COMMISSION F, Wave Propagation and Remote Sensing

Thomas Hanley, Thomas.Hanley@jhuapl.edu

TOPICS

- Point-to-point propagation effects:*
 - Measurements* *Mobile/fixed paths*
 - Propagation models* *Horizontal/slant paths*
 - Multipath/mitigation* *Surface/atmosphere interactions*
 - Land or water paths* *Numerical weather prediction*
 - Scattering/diffraction* *Dispersion/delay*
 - Indoor/outdoor links* *Natural/man-made structures*
- Microwave remote sensing of the earth:*
 - Atmospheric sensing* *Ocean and ice sensing*
 - Field campaigns* *Interferometry and SAR*
 - Subsurface sensing* *Scattering/diffraction*
 - Radiation and emission* *Propagation effects*
 - Urban environments* *Soil moisture & terrain*
- Propagation and remote sensing in complex and random media*

COMMISSION G, Ionospheric Radio and Propagation

Thomas Gaussiran, gauss@utexas.edu

TOPICS

- Ionospheric imaging*
- Ionospheric morphology*
- Ionospheric modeling and data assimilation*
- Meteoroids and orbital debris*
- Radar and radio techniques for ionospheric diagnostics*
- Space weather – radio effects*
- Transionospheric radio propagation and systems effects*

COMMISSION H, Waves in Plasmas

Mark Golkowski, mark.golkowski@ucdenver.edu

TOPICS

- Chaos and turbulence in plasmas*
- Plasma instabilities*
- Spacecraft-plasma interactions*
- Solar/planetary-plasma interactions*
- Space as a research laboratory*
- Space environment modeling and forecasting*
- Wave-wave and wave-particle interactions*
- Waves in space and laboratory plasmas*

COMMISSION J, Radio Astronomy

Alyson Ford, alysonford@arizona.edu

TOPICS

- New Telescopes, Techniques, and Technologies*
- Observatory Reports*
- Timely Technical Tutorials*

COMMISSION K, Electromagnetics in Biology and Medicine

Asimina Kiourti, kiourti.1@osu.edu

TOPICS

- Biological effects*
- Dosimetry and exposure assessment*
- Electromagnetic imaging and sensing applications*
- Human body interactions with antennas and other electromagnetic devices*
- Therapeutic, rehabilitative and other biomedical applications*



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NRSM Sponsors

Sponsorship opportunities are also available, and include the benefits of an exhibitor booth along with the additional benefits listed below:

Platinum Sponsorship \$5,000

This sponsorship includes the organization's logo on the conference site banner (before, during, and after the meeting), logo on the NRSM website, 2 complimentary Registrations, and 1 Exhibit Booth. In addition, your organization's sponsorship will be mentioned in the opening remarks before the plenary session, and your logo will be shown during that mention. Additionally, your organization's logo will be included on all hold screens between sessions on all days (hold screens are what attendees will see when they enter a session and are waiting for the first presentation to be given).

Gold Sponsorship \$3,000

This sponsorship includes the organization's logo on the conference site banner (during the meeting), logo on the NRSM website, 2 complimentary Registrations, and 1 Exhibit Booth. In addition, your organization's sponsorship will be mentioned in the opening remarks before the plenary session, and your logo will be shown during that mention. Additionally, your organization's logo will be included on all hold screens between sessions on one conference day.

Silver Sponsorship \$2,000

This sponsorship includes the organization's logo on the conference site banner (during the meeting) and 1 complimentary Registrations. In addition, your organization's sponsorship will be mentioned in the opening remarks before the plenary session, and your logo will be shown during that mention.

Coffee Sponsorship \$1,250 (per coffee break)

This sponsorship includes the organization's logo on the conference site banner (during the meeting) and 1 complimentary Registration. In addition, your organization's logo will be prominently displayed during the selected coffee break(s) during the three days of sessions, so there are six available coffee break sponsorships. Your logo will also be shown during the opening remarks before the plenary session.

In addition, all sponsor levels will receive a listing of NRSM attendees' contact information (names, affiliations, and email addresses). If you would like to sponsor the 2023 NRSM at one of these levels or have any questions, please contact nrsmboulder@colorado.edu.



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NRSM Exhibits

USNC-URSI is taking advantage of this year's hybrid NRSM to explore new ways for our members, students, attendees, and industry to connect. We are striving to provide our community with a suitable venue to highlight the work they are doing in their laboratories and companies and to encourage impromptu discussions both through in-person and remote attendance.

The hybrid approach will allow for exhibitors to have a booth/table in the Lobby of the Engineering Center of UC Boulder, which is the traditional hub of NRSM activities. In addition to a physical presence, exhibitors will be given access to the Whova platform that was used at the 2021 & 2022 NRSMs, which enabled the completely virtual interactions at that meeting.

Whova provides us with a robust platform on which to build our hybrid conference. The exhibitor center in Whova allows for virtual Exhibitor booths, which is an opportunity for your institution, lab, or organization to highlight your work throughout the conference. We can set up dedicated blocks of time during the meeting where you can interact with online attendees just as you would in person. During these times, exhibitors can hold an open house and host free-form discussions with interested attendees. The virtual booths will be accessible at all times during the conference, so even when you are not 'open', your showcase, video tour, or product video is available for attendees to browse.

Benefits of being an exhibitor include:

- Network with the active scholars, researchers, and industry leaders in the field
- Recruiting for open positions in your company
- Recruiting for open positions in your University's graduate or post-doctoral program
- Showcasing and demonstration of new software and hardware technologies
- Workshops on selected topics of your choice
- Topical discussion of your choosing

The fee for this booth is \$1,000, which will allow you to list the link for your virtual meeting (Zoom, WebEx, etc.) on the Whova site. In addition, your company or University logo and link of your choosing will be listed on the NRSM site under the Exhibitor page. Should you elect to have a physical booth/table in Boulder during the meeting, the fee includes the costs of furniture rental and access to daily refreshments and the Reception. The furniture includes: 1- 6' table, 1-2 chairs, 1-tablecloth for table and electricity. Included in the fee is one complimentary registration so that you are able to fully participate in the 2023 NRSM sessions, Plenary and other special events.

If you would like to reserve a booth or have any questions, please contact nrsmboulder@colorado.edu.

All requests for exhibitor booths and sponsorships must be received by December 1, 2022 in order to allow time for payment and Whova set up.