

**National Radio Science Meeting
9-12 January 2019
University of Colorado Boulder
Sponsored by USNC-URSI**

TUESDAY EVENING, 8 January 2019

17:00 – 21:00 USNC-URSI Business Meeting, Marriott Hotel

WEDNESDAY MORNING, 9 January 2019

**Session A1: Channel Sounder Measurements and Verification
Room 105**

Co-Chairs: Jeanne Quimby, *NIST Boulder*;
Christopher Anderson, *US Naval Academy*

08:20 A1-1

AN NTIA/ITS HIGH-PERFORMANCE CW CHANNEL SOUNDER

Robert T. Johnk*, Chris A. Hammerschmidt

Institute for Telecommunication Sciences, Boulder, CO

08:40 A1-2

A SOFTWARE DEFINED RADIO PN CHANNEL SOUNDER FOR UNMANNED AERIAL VEHICLES

Kenneth R. Baker*¹, Christopher R. Anderson²

¹*Theory Division, Institute for Telecommunication Sciences, Boulder, CO*

²*Wireless Measurement Group, US Naval Academy, Annapolis, MD*

09:00 A1-3

PRECISION GEOLOCATION FOR PROPAGATION MEASUREMENTS IN THE FIELD:
CONSIDERATIONS AND BEST PRACTICES

Anna Paulson*

*Institute for Telecommunication Sciences/Spectrum and Propagation Measurements Division,
National Telecommunications and Information Administration, Boulder, CO*

09:20 A1-4

MODELING THE SPATIO-TEMPORAL RESOLUTION OF DIRECTIONAL CHANNEL
SOUNDERS

David G. Michelson*, Anmol Bhardwaj

Electrical & Computer Engineering, University of British Columbia, Vancouver, BC, CANADA

09:40 A1-5

WEDNESDAY MORNING

CHANNEL SOUNDER MEASUREMENT VERIFICATION: CONDUCTED
MEASUREMENT CAMPAIGN

Jeanne Quimby*¹, Chris Hammerschmidt², Amanda Koepke¹, Robert Johnk², Jacob Rezac¹,
Jeffrey Jargon¹, Rod Leonhardt¹, Kate A. Remley¹, Paul Mckenna², Irena Stange², Mike Chang²,
Paul Hale¹, Nicholas DeMinco², Savio Tran²

¹NIST Boulder, Boulder, CO

²ITS Boulder, Boulder, CO

10:00 Break

10:20 A1-6

CHANNEL SOUNDER MEASUREMENT VERIFICATION: OPEN AREA TEST SITE
MEASUREMENT CAMPAIGNS

Robert Johnk*¹, Jeanne Quimby², Chris Hammerschmidt¹, Amanda Koepke², Irena Strang¹,
Mike Chang¹, Savio Tran¹, Jacob Rezac², Jeffrey Jargon², Rod Leonhardt², Paul Mckenna¹,
Nicholas DeMinco¹, Paul Hale², Kate A. Remley²

¹ITS Boulder, Boulder, CO

²NIST Boulder, Boulder, CO

10:40 A1-7

CHANNEL SOUNDER MEASUREMENT VERIFICATION: RANDOM MEASUREMENT
ERROR

Amanda Koepke*¹, Jeanne Quimby¹, Chris Hammerschmidt², Jacob Rezac¹, Rod Leonhardt¹,
Paul Hale¹, Robert Johnk², Paul Mckenna², Jeffrey Jargon¹, Irena Stange², Mike Chang²,
Kate A. Remley¹, Savio Tran², Nicholas DeMinco²

¹NIST Boulder, Boulder, CO

²ITS Boulder, Boulder, CO

11:00 A1-8

CHANNEL SOUNDER MEASUREMENT VERIFICATION: BEST PRACTICES

Chris Hammerschmidt*¹, Jeanne Quimby², Amanda Koepke², Jacob Rezac², Robert Johnk¹,
Jeffrey Jargon², Rod Leonhardt², Paul Hale², Kate A. Remley², Paul Mckenna¹, Irena Stange¹,
Mike Chang¹, Savio Tran¹, Nicholas DeMinco¹

¹ITS Boulder, Boulder, CO

²NIST Boulder, Boulder, CO

11:20 A1-9

CHANNEL MODEL COMPARISON FOR 28 GHZ MILLIMETER WAVE IN SUBURBAN
AND RURAL ENVIRONMENTS

Yaguang Zhang¹, Christopher R. Anderson*², James V. Krogmeier¹

¹School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN

²Electrical and Computer Engineering, United States Naval Academy, Annapolis, MD

11:40 A1-10

SPATIAL VARIABILITY OF RADIO-FREQUENCY NOISE IN URBAN ENVIRONMENTS
IN THE VHF AND UHF BANDS

Caitlin E. Haedrich*, Daniel J. Breton, Keith D. Wilson

Signature Physics, Cold Regions Research and Engineering Laboratory, Hanover, NH

WEDNESDAY MORNING

Session B1: Antenna Arrays

Room 200

Co-Chairs: Filippo Capolino, *University of California, Irvine*;
Nader Behdad, *University of Wisconsin-Madison*

08:20 B1-1

SIMPLIFYING AND GENERALIZING ANTENNA ARRAY EXPRESSIONS WITH THE ANTENNA EQUATION

Everett G. Farr*

Farr Fields, LC, Albuquerque, NM

08:40 B1-2

EXPERIMENTAL COMPARISON OF DIGITAL BEAMFORMING INTERFERENCE CANCELLATION ALGORITHMS USING A SOFTWARE DEFINED RADIO ARRAY

Daniel C. Gaydos*, Payam Nayeri, Randy Haupt

Electrical Engineering, Colorado School of Mines, Golden, CO

09:00 B1-3

A COMPACT BEAM STEERING DRA ANTENNA FOR WIRELESS POWER TRANSFER

Reza Karimian Bahnemiri, Behzad Koosha*, Shahrokh Ahmadi, Mona Zaghoul

Electrical and Computer Engineering, The George Washington University, Washington, DC

09:20 B1-4

DESIGN OF WIDEBAND ELLIPTIC MONOPOLE ANTENNA ARRAYS WITH CONSTANT HALF-POWER BEAMWIDTH

Dakotah J. Simpson*, Christopher G. Gay, Dimitra Psychogiou

Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

09:40 B1-5

A WIDEBAND DIFFERENTIALLY FED TIGHTLY COUPLED DIPOLE ARRAY

Alexander D. Johnson*, Elias A. Alwan, John L. Volakis

Florida International University, Miami, FL

10:00 Break

10:20 B1-6

5G MASSIVE MIMO BASE STATION PANELS WITH DUAL LINEAR POLARIZED VIVALDI ARRAY ANTENNA APERTURE

Hao-Lung Chu, Ghanshyam Mishra*, Satish Kumar Sharma

Electrical and Computer Engineering, San Diego State University, San Diego, CA

10:40 B1-7

DEPLOYABLE ULTRA-WIDEBAND TIGHTLY COUPLED DIPOLE TEXTILE ARRAY

Matthew W. Nichols*, Alexander D. Johnson, Elias A. Alwan, John L. Volakis

Florida International University, Miami, FL

WEDNESDAY MORNING

11:00 B1-8

EXTENDED BUTLER MATRIX DESIGN BY USING PHASE RECONFIGURABLE CRLH TRANSMISSION LINE

Reza Karimian Bahnemiri, Behzad Koosha*, Shahrokh Ahmadi, Mona Zaghoul
Electrical and Computer Engineering, The George Washington University, Washington, DC

11:20 B1-9

WIDEBAND DUAL-POLARIZED CAVITY-BACKED VIVALDI ARRAY ANTENNAS FOR BI-STATIC SIMULTANEOUS TRANSMIT RECEIVE

Elie G. Tianang*, Mohamed A. Elmansouri, Dejan S. Filipovic
Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

11:40 B1-10

BROADBAND SMALL-APERTURE DIRECTION FINDING ARRAY WITH AZIMUTH AND ELEVATION ESTIMATION CAPABILITY

Ruyu Ma*, Nader Behdad
Electrical and Computer Engineering, University of Wisconsin-Madison, Madison, WI

**Session B2: Nano-electromagnetics and Waveguiding Structures
Room 1B40**

Co-Chairs: Zoya Popovic, *University of Colorado Boulder*;
Dimitrios Peroulis, *Purdue University*

08:20 B2-1

H-PLANE CAVITY FILTERS AND DIPLEXERS FOR MICROWAVE RADIOMETERS

Zheng Wang*
Boulder Environmental Sciences and Technology, Boulder, CO

08:40 B2-2

CAD OF SELF-BIASED FERRITE CIRCULATORS

Laila F. Marzall*, Mauricio Pinto, Andrea Ashley, Dimitra Psychogiou, Zoya Popovic
Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

09:00 B2-3

GAAS MMIC ACTIVE CIRCULATOR

Laila Marzall*, Zoya Popovic
Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

09:20 B2-4

HYBRID WEDGE-INTEGRATED PLASMONIC-PHOTONIC WAVEGUIDE

Zahra Manzoor*
Missouri University of Science and Technology, Rolla, MO

09:40 B2-5

EMBEDDED MTM-EBGS FOR ANTENNA APPLICATIONS

Stuart Barth, Braden P. Smyth, Jacob A. Brown, Ashwin K. Iyer*
Electrical and Computer Engineering, University of Alberta, Edmonton, Alberta, CANADA

WEDNESDAY MORNING

**Session B3: Antennas for Specialized Platforms: SmallSats, UAVs, and UUVs
Room 1B40**

Co-Chairs: Reyhan Baktur, *Utah State University*;
David Jackson, *University of Houston*

10:20 B3-1

REPRESENTATIVE LOW-PROFILE GREGORIAN REFLECTOR ANTENNA DESIGN
WITH A COMPACT DEPLOYMENT STRATEGY FOR EMERGING CUBESATS

Vignesh Manohar*, Jordan Budhu, Yahya Rahmat-Samii

Electrical and Computer Engineering, University of California, Los Angeles, Los Angeles, CA

10:40 B3-2

COMPACT HIGH ISOLATION PLANAR RX-TX KU BAND PHASED ARRAYS FOR
UNMANNED AERIAL SYSTEMS (UAS)

Jakob W. Kunzler*, Jacob M. Bartschi, Karl F. Warnick

Electrical and Computer Engineering, Brigham Young University, Provo, UT

11:00 B3-3 (Invited)

DESIGN OF A RECONFIGURABLE, PLATFORM-BASED HF DIRECTION FINDING
SYSTEM USING THE CHARACTERISTIC MODE THEORY

Kai Ren*, Ruyu Ma, Nader Behdad

Electrical and Computer Engineering, University of Wisconsin-Madison, Madison, WI

11:20 B3-4

INFLATABLE ANTENNAS AND ANTENNAS PRINTED ON WEATHER BALLOONS

Robert M. McKay*, Reyhan Baktur

Electrical and Computer Engineering, Utah State University, Logan, UT

11:40 B3-5

A STUDY ON EFFECTS OF SMALL BREAKAGES ON AN ANTENNA

Dave W. Barker*, Reyhan Baktur

Electrical Engineering, Utah State University, Logan, UT

Session C1: Imaging and Distributed Sensing

Room 135

Co-Chairs: Jean-Francois Chamberland, *Texas A&M University*;

Gregory Huff, *The Pennsylvania State University*;

Eric Mokole, *The MITRE Corporation*

08:20 C1-1

AUTOMATIC SENSOR RECONFIGURATION BASED ON ADAPTIVE RELEVANCE
VECTOR MACHINE FOR UNCERTAINTY REDUCTION IN TOMOGRAPHY IMAGING

Daniel Ospina Acero*¹, Shah M. Chowdhury¹, Fernando L. Teixeira¹, Qussai M. Marashdeh²

WEDNESDAY MORNING

¹*ElectroScience Laboratory, Electrical and Computer Engineering, The Ohio State University, Columbus, OH*

²*Tech4Imaging, Columbus, OH*

08:40 C1-2

EVALUATING CROSS-PLANE ACQUISITIONS FOR VOLUME PROCESS
TOMOGRAPHY IN THE LAPLACIAN REGIME

Rafiul K. Rasel*¹, Daniel Ospina Acero¹, Fernando L. Teixeira¹, Qussai M. Marashdeh²

¹*Electrical and Computer Engineering, The Ohio State University, Columbus, OH*

²*Tech4Imaging LLC, Columbus, OH*

09:00 C1-3

VELOCITY PROFILING OF TWO-PHASE FLOWS BASED ON SOFT-FIELD VOLUME
TOMOGRAPHY

Shah M. Chowdhury*¹, Rafiul K. Rasel¹, Fernando L. Teixeira¹, Qussai M. Marashdeh²

¹*Electrical and Computer Engineering, The Ohio State University, Columbus, OH*

²*Tech4Imaging LLC, Columbus, OH*

09:20 C1-4

A SELF-SUSTAINING MARITIME MESH NETWORK

Ali Hosseini-Fahraji*, Kexiong Zeng, Yaling Yang, Majid Manteghi

Electrical and Computer Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA

09:40 C1-5

AN ANTENNA SYSTEM FOR AUTONOMOUS UNDERWATER VEHICLE

Pedram Lohmannia*, Majid Manteghi

Electrical and Computer Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA

Session C2: Array Performance for Transmit and Receive Systems

Room 135

Co-Chairs: Lawrence Cohen, *Naval Research Laboratory*;

Eric Mokole, *The MITRE Corporation*

10:20 C2-1

USING THE ANTENNA EQUATION TO DESCRIBE COUPLING INTO AND LEAKAGE
FROM IMPERFECTLY SHIELDED ENCLOSURES

Everett G. Farr*

Farr Fields, LC, Albuquerque, NM

10:40 C2-2

WIDEBAND TRANSMIT NOISE SUPPRESSION IN STAR SYSTEM WITH UWB ARRAYS

Satheesh Bojja Venkatakrishnan*, Alexander Hovsepian, Elias Alwan, John Volakis

Electrical and Computer Engineering, Florida International University, Miami, FL

11:00 C2-3

WEDNESDAY MORNING

IMPROVING THE PERFORMANCE OF ARRAY RECEIVERS BY EXPLOITING THE BASIC PHYSICS OF SPACETIME

Arjuna Madanayake*¹, Soumyajit Mandal², Yingying Wang², Jifu Liang², Leonid Belostotski³

¹Florida International University (FIU), Miami, FL

²Case Western Reserve University (CWRU), Cleveland, OH

³University of Calgary, Calgary, AB, CANADA

11:20 C2-4

MECHANICAL ROTATING ARRAYS FOR SIDELobe SUPPRESSION

Junming Diao*, Maziar Hedayati, Rustu U. Tok, Yuanxun E. Wang

University of California, Los Angeles, Los Angeles, CA

11:40 C2-5

EXPERIMENTAL DEMONSTRATION OF DISTRIBUTED BEAMFORMING ON TWO FLYING MINI-DRONES

Junming Diao*, Maziar Hedayati, Yunxuan E. Wang

University of California, Los Angeles, Los Angeles, CA

Session F1: Random and Complex Media Models

Room 155

Co-Chairs: Saba Mudaliar, *Air Force Research Laboratory*;
Gary Brown, *Virginia Polytechnic Institute & State University*

08:20 F1-1

ANALYTIC APPROACHES TO MULTIPLE SCATTERING ON ROUGH SURFACES

Gary S. Brown*, Kevin Diomedi

EMIL, Electrical & Computer Engineering, Virginia Polytechnic Institute & State University, Blacksburg, VA

08:40 F1-2 (Invited)

A METHOD OF A TANGENT CYLINDER IN THE THEORY OF WAVE SCATTERING BY CONVEX SURFACES

Alexander G. Voronovich*

Physical Sciences Division, NOAA/ESRL, Boulder, CO

09:00 F1-3 (Invited)

BISTATIC RADAR SCATTERING FROM THE OCEAN SURFACE: ASSESSMENT OF VALIDITY OF THE KIRCHHOFF-GEOMETRIC OPTICS APPROACH USING THE SMALL SLOPE APPROXIMATION

Valery U. Zavorotny*^{1,2}, Alexander G. Voronovich¹

¹*NOAA/Earth System Research Laboratory, Boulder, CO*

²*CIRES, University of Colorado Boulder, Boulder, CO*

09:20 F1-4 (Invited)

A STUDY OF FORWARD MODELS FOR PREDICTING CROSS-POLARIZED BACKSCATTER FROM SOIL SURFACES

Shanka N. Wijesundara*, Joel T. Johnson

WEDNESDAY MORNING

ElectroScience Laboratory, The Ohio State University, Columbus, Ohio

09:40 F1-5 (Invited)

TIME-DOMAIN ANALYSIS OF MULTIPLE SCATTERING EFFECTS ON THE RADAR CROSS SECTION (RCS) OF OBJECTS IN A RANDOM MEDIUM

Chenxin Su*¹, Akira Ishimaru¹, Yasuo Kuga¹, Sermsak Jaruwatanadilok²

¹*Electrical Engineering, University of Washington, Seattle, WA*

²*Jet Propulsion Laboratory, Pasadena, CA*

10:00 Break

10:20 F1-6

A MODAL ANALYSIS OF SCATTERING OF OBJECTS IN AN INHOMOGENEOUS WAVEGUIDE

Saba Mudaliar*¹, Prabavathi Chidambaram²

¹*Sensors Directorate, Air Force Research Laboratory, Dayton, OH*

²*P.O. Box 24467, Independent Researcher, Huber Heights, OH*

10:40 F1-7 (Invited)

PROPAGATION IN HIGHLY ANISOTROPIC RANDOM MEDIA

Charles L. Rino*, Charles S. Corrano

Institute for Scientific Research, Boston College, Chestnut Hill, MA

11:00 F1-8 (Invited)

DECONVOLUTION-IMPROVED ANGULAR RESOLUTION IN THE EARLY-TIME DIFFUSION IMAGING THROUGH RANDOM MEDIA

Elizabeth Bleszynski*, Marek Bleszynski, Thomas Jaroszewicz

Monopole Research, Thousand Oaks, CA

11:20 F1-9 (Invited)

NUMERICAL COMPUTATION OF SIGNAL LOG-AMPLITUDE VARIANCE IN TROPOSPHERIC TURBULENCE

Swagato Mukherjee*, Caglar Yardim

The Ohio State University, Columbus, OH

11:40 F1-10 (Invited)

BISTATIC SCATTERING FROM FORESTS WITH UNDERLYING ROUGH SURFACES

Can Suer*, Roger Lang

Electrical and Computer Engineering, George Washington University, Washington, DC

**Session G1: Crowd Sourcing for Terrestrial and Planetary Applications
Room 151**

Co-Chairs: Fabiano Rodrigues, *The University of Texas at Dallas*;
Roy Calfas, *The University of Texas at Austin*

08:20 G1-1

INVESTIGATING CELL PHONE GNSS FOR IONOSPHERE REMOTE SENSING

WEDNESDAY MORNING

Susan Skone*, Sajan Mushini
University of Calgary, Calgary, Alberta, CANADA

08:40 G1-2

FLEXIBLE, DEPLOYABLE RADIO INSTRUMENTS USING RAPID HARDWARE AND DIGITAL RF SOFTWARE

Ryan Volz*, Frank D. Lind, John Swoboda, Philip J. Erickson
MIT Haystack Observatory, Westford, MA

09:00 G1-3

THE IARPA PASSIVE IONOSPHERIC NON-CHARACTERIZED SOUNDING (PINS) CHALLENGE

Torreon Creekmore*¹, Eugene V. Dao², Patrick B. Dandenault³, Ethan S. Miller³, Charles Gill¹
¹*IARPA, Riverdale Park, MD*
²*Space Vehicles Directorate, Air Force Research Laboratory, Albuquerque, NM*
³*Johns Hopkins University Applied Physics Laboratory, Laurel, MD*

09:20 G1-4

DISTRIBUTED SENSOR NETWORKS IN COLLABORATION WITH CITIZEN SCIENTISTS

Asti Bhatt*
SRI International, Menlo Park, CA

09:40 G1-5

PLANS FOR ECLIPSEMOB 2024

Kiersten C. Kerby-Patel*¹, William Liles², Jill Nelson³, Laura Lukes³
¹*University of Massachusetts Boston, Boston, MA*
²*Independent Consultant, Reston, VA*
³*George Mason University, Fairfax, VA*

**Session G2: New Application of SmallSat Sensors in Space
Room 151**

Co-Chairs: Paul Bernhardt, *Naval Research Laboratory*;
Rebecca Bishop, *The Aerospace Corporation*

10:20 G2-1

THE LOW-LATITUDE IONOSPHERE/THERMOSPHERE ENHANCEMENTS IN DENSITY (LLITED) MISSION

Rebecca L. Bishop*¹, James H. Clemmons², Aroh Barjatya³, Richard L. Walterscheid¹
¹*The Aerospace Corporation, El Segundo, CA*
²*University of New Hampshire, Durham, NH*
³*Embry-Riddle Aeronautical University, Daytona Beach, FL*

10:40 G2-2

UTILIZING GNSS RADIO OCCULTATION SENSORS ON SPACE WEATHER CUBESAT MISSIONS

WEDNESDAY MORNING

Rebecca L. Bishop*

The Aerospace Corporation, El Segundo, CA

11:00 G2-3

COMPOSITION OF THE TOPSIDE IONOSPHERE DETERMINED FROM PLASMA WAVE MEASUREMENTS USING THE RADIO RECEIVER INSTRUMENT ON E-POP

Paul A. Bernhardt*¹, Michael K. Griffin², William C. Bougas², A D. Howarth³, Gordon James³

¹*Plasma Physics, Naval Research Laboratory, Washington, DC*

²*Space Systems and Technology, MIT/Lincoln Laboratory, Lexington, MA*

³*Physics and Astronomy, University of Calgary, Calgary, Alberta, CANADA*

11:20 G2-4

SPACE- AND GROUND-BASED MEASUREMENTS OF RADIATION BELT PRECIPITATION: EXTENDING THE CAPABILITIES OF CUBESATS AND RADARS

Diana Juarez Madera*¹, Sigrid Close¹, Alexander Crew², Robert Marshall³

¹*Aeronautics and Astronautics, Stanford University, Stanford, CA*

²*Applied Physics Laboratory, Johns Hopkins University, Laurel, MD*

³*Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, CO*

11:40 G2-5

CYGNSS: GLOBAL REMOTE SENSING WITH A CONSTELLATION OF SMALL SATELLITES

Scott Gleason*¹, Chris Ruf², Dorina Twigg², Charles Bussy-Virat², Aaron Ridley², Kyle Nave³

¹*UCAR, Boulder*

²*University of Michigan, Ann Arbor, MI*

³*Applied Defense Solutions, Denver, CO*

Session H1: Physics of the Radiation Belts I

Room 245

Co-Chairs: Poorya Hosseini, *University of Colorado Denver*;

Christopher Crabtree, *Naval Research Laboratory*

08:20 H1-1

RECENT PROGRESS TOWARDS A RADIATION BELT REMEDIATION STRATEGY BASED ON ARTIFICIAL INJECTION OF PLASMA WAVES

Gian Luca Delzanno*¹, Quinn Marksteiner¹, Geoffrey Reeves¹, Bruce Carlsten¹,

Patrick Colestock², Misa Cowee¹, Gregory Cunningham¹, Seth Dorfman³, Leanne Duffy¹,

Christopher Jeffery¹, Oleksandr Koshkarov¹, Vadim Roytershteyn⁴, Kateryna Yakymenko¹,

Nikolai Yampolsky¹

¹*Los Alamos National Laboratory, Los Alamos, NM*

²*Retired, Pojoaque, NM*

³*University of California, Los Angeles, Los Angeles, CA*

⁴*Space Science Institute, Boulder, CO*

08:40 H1-2

WEDNESDAY MORNING

STATISTICAL OCCURRENCE AND DISTRIBUTION OF THE ELECTRIC AND
MAGNETIC FIELD PEAKS OF HIGH AMPLITUDE WHISTLER-MODE WAVES IN THE
OUTER RADIATION BELT

Evan A. Tyler*¹, Aaron Breneman¹, Cynthia Cattell¹, John Wygant¹, Scott Thaller²,
David Malaspina²

¹*University of Minnesota, Minneapolis, MN*

²*Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO*

09:00 H1-3

OBSERVED PROPAGATION ROUTE OF VLF TRANSMITTER SIGNALS IN THE
MAGNETOSPHERE

Lunjin Chen*, Zhenxia Zhang, Zhiyang Xia

The Center for Space Sciences, The University of Texas at Dallas, Richardson, TX

09:20 H1-4

OBSERVATIONS OF INTERACTIONS BETWEEN EMIC AND MAGNETOSONIC WAVE
MODES AT HEAVY ION BOUNDARIES

Kristoff Paulson*¹, Charles Smith¹, Roy Torbert², Scott Boardsen³

¹*University of New Hampshire, Durham, NH*

²*Southwest Research Institute, Durham, NH*

³*University of Maryland Baltimore, Baltimore, MD*

09:40 H1-5

PARAMETRIC INTERACTION OF VLF AND ELF WAVES AND IMPACT ON
ENERGETIC ELECTRONS IN A RADIATION BELT

Vladimir Sotnikov*

Air Force Research Laboratory, Wright Patterson AFB, Ohio

10:00 Break

10:20 H1-6

SPATIAL SCALES AND PROPERTIES OF EMIC WAVES USING SIMULTANEOUS
MULTI-SATELLITE OBSERVATIONS

Xiaochen Shen*¹, Wen Li¹, Qianli Ma^{2,1}, Run Shi³, Murong Qin⁴

¹*Center for Space Physics, Boston University, Boston, MA*

²*Atmospheric and Oceanic Sciences, University of California, Los Angeles, Los Angeles, CA*

³*Space Physics, Wuhan University, Wuhan, Hebei, CHINA*

⁴*Physics and Astronomy, Dartmouth College, Hanover, NH*

10:40 H1-7

THEORETICAL PLASMA PHYSICS TO BE TESTED IN THE SMART EXPERIMENT

Christopher Crabtree*, Guru Ganguli, Alex Fletcher, Carl Siefring, Bill Amatucci, Erik Tejero
Naval Research Laboratory, Washington, DC

11:00 H1-8

NONLINEAR INTERACTIONS BETWEEN CHORUS WAVES AND RADIATION BELT
ELECTRONS

Wen Li*¹, Longzhi Gan¹, Qianli Ma^{2,1}, Jay M. Albert³

WEDNESDAY MORNING

¹*Boston University, Boston, MA*

²*University of California, Los Angeles, Los Angeles, CA*

³*Air Force Research Laboratory, Kirtland AFB, NM*

11:20 H1-9

ORIENTATION OF WHISTLER-MODE CHORUS WAVE VECTORS AND THE IMPLICATIONS FOR THE CHORUS-TO-HISS MECHANISM

David P. Hartley*¹, Craig A. Kletzing¹, Lunjin Chen², Richard B. Horne³, Ondrej Santolik^{4,5}

¹*University of Iowa, Iowa City, Iowa*

²*University of Texas at Dallas, Richardson, Texas*

³*British Antarctic Survey, Cambridge, UNITED KINGDOM*

⁴*Institute of Atmospheric Physics, Prague, CZECH REPUBLIC*

⁵*Charles University, Prague, CZECH REPUBLIC*

11:40 H1-10

MMS OBSERVATIONS OF HARMONIC ELECTROMAGNETIC ION CYCLOTRON WAVES

Maria E. Usanova*¹, Narges Ahmadi¹, David Malaspina¹, Robert Ergun¹, Karlheinz Trattner¹, Quinton Reece^{1,2}, Trevor Leonard¹, Stephen Fuselier^{3,4}, Roy Torbert⁵, Christopher Russell⁶, Jim Burch³

¹*Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO*

²*Boulder High School, Boulder, CO*

³*Southwest Research Institute, San Antonio, TX*

⁴*Physics and Astronomy, University of Texas at San Antonio, San Antonio, TX*

⁵*Space Science Center, University of New Hampshire, Durham, NH*

⁶*University of California, Los Angeles, CA*

**Session J1: Next Generation Very Large Array Design and Development
Room 265**

Co-Chairs: Steve Durand, *National Radio Astronomy Observatory*;
Robert Selina, *National Radio Astronomy Observatory*

08:20 J1-1 (Invited)

NGVLA: REFERENCE DESIGN OVERVIEW

Robert J. Selina*

ngVLA, National Radio Astronomy Observatory, Socorro, NM

08:40 J1-2 (Invited)

ANTENNA ELECTRONICS REFERENCE DESIGN FOR THE NEXT-GENERATION VERY LARGE ARRAY

James M. Jackson*, Robert Selina, Steven Durand

National Radio Astronomy Observatory, Socorro, NM

09:00 J1-3 (Invited)

TRIDENT FREQUENCY SLICE ARCHITECTURE CORRELATOR/BEAMFORMER REFERENCE DESIGN FOR NGVLA

Mike Pleasance*, Brent Carlson, Michael Rupen

WEDNESDAY MORNING

Herzberg Astronomy and Astrophysics, National Research Council Canada, Penticton, BC, CANADA

09:20 J1-4 (Invited)

WIDEBAND RECEIVER PROTOTYPE FOR NGVLA: DEVELOPMENT REPORT

Hamdi Mani*¹, Sander Weinreb², Jun Shi², Ahmed Akgiray³

¹*School of Earth and Space Exploration, Arizona State University, Tempe, AZ*

²*Electrical Engineering, California Institute of Technology, Pasadena, CA*

³*Electrical Engineering, Ozyegin University, Turkey, TURKEY*

09:40 J1-5 (Invited)

REFERENCE FRONT END DESIGN FOR A NEXT GENERATION VERY LARGE ARRAY

Wes Grammer, Denis Urbain*, Silver Sturgis

National Radio Astronomy Observatory, Socorro NM

10:00 Break

10:20 J1-6 (Invited)

EXPERIMENTAL EVALUATION USING VLA DATASETS OF RFI MITIGATION PERFORMANCE OVER LONG NGVLA BASELINES

Michael Lambert¹, Urvashi Rao Venkata², Mitchell C. Burnett¹, Brian D. Jeffs*¹

¹*Electrical and Computer Engineering, Brigham Young University, Provo, UT*

²*National Radio Astronomy Observatory VLA Operations Center, Socorro, NM*

10:40 J1-7 (Invited)

INCOHERENT CLOCKING AND APPLICATION TO THE NGVLA

Brent R. Carlson*, Thushara G. Gunaratne

National Research Council Canada, Penticton, BC, CANADA

11:00 J1-8 (Invited)

A HIGH PERFORMANCE, OFFSET, SHAPED ANTENNA DESIGN FOR THE NEW GENERATION VLA PROJECT

Lynn Baker*

Consultant, Issaquah, WA

11:20 J1-9 (Invited)

COMPOSITE 18M ANTENNA REFLECTOR FOR THE NGVLA

Dean R. Chalmers*¹, Gordon E. Lacy¹, Mohammad Islam¹, Richard Hellyer¹,

Joeleff Fitzsimmons¹, Lynn Baker², Matt C. Fleming³, Matt Wessel⁴

¹*National Research Council of Canada - Herzberg Astronomy and Astrophysics, Penticton, BC, CANADA*

²*Private Consultant, Issaquah, WA*

³*Minex Engineering, Antioch, CA*

⁴*SED Systems, Saskatoon, SK, CANADA*

11:40 J1-10 (Invited)

THE LONG BASELINE MAJOR OPTION FOR THE NEXT GENERATION VERY LARGE ARRAY

WEDNESDAY MORNING

Thomas J. Maccarone*

Physics & Astronomy, Texas Tech University, Lubbock, TX

WEDNESDAY NOON, 9 January 2019

Special Historical Lecture

Math 100

12:15 LM -1

LISE MEITNER: HER ESCAPE FROM GERMANY AND THE DISCOVERY OF FISSION

Anthea J. Coster*

MIT Haystack Observatory, Westford, MA

WEDNESDAY AFTERNOON, 9 January 2019

**Session AD: Passive and Active Device and System Measurements
Room 105**

Session Co-Chairs: Jeanne Quimby, *NIST*;
Matt Simons, *NIST*

13:20 AD-1

TRANSIENT ANTENNA PATTERNS BASED ON THE ANTENNA EQUATION

Everett G. Farr*

Farr Fields, LC, Albuquerque, NM

13:40 AD-2

RADIO FREQUENCY POWER MEASUREMENTS BASED ON RYDBERG ATOM
SPECTROSCOPY

Matt T. Simons*¹, Abdulaziz H. Haddab¹, Marcus D. Kautz¹, Joshua A. Gordon¹,
David A. Anderson², Georg Raithel^{2,3}, Christopher L. Holloway¹

¹*CTL, NIST, Boulder, CO*

²*Rydberg Technologies, LLC, Ann Arbor, MI*

³*Physics, University of Michigan, Ann Arbor, MI*

14:00 AD-3

DEVELOPMENT AND MEASUREMENT OF ULTRA-THIN ANTENNAS FOR MUOS

Steven Weiss*

US Army Research Laboratory, Adelphi, MD

14:20 AD-4

USING RADIATION PRESSURE TO DEVELOP A NEW SI TRACEABLE POWER
MEASUREMENT

Christopher L. Holloway*, Matthew Simons, Alexandra Artusio-Glimpse, Ivan Ryger,
Abdulaziz Haddab, David Novotny, Kyle Rogers, John Lehman, Paul Williams, Gordon Shaw
NIST, Boulder, CO

14:40 AD-5

ULTRA-WIDEBAND, COMPACT, AND HIGH-GAIN SLOT ANTENNA SYSTEM FOR
FULL-DUPLEX APPLICATIONS

Seyed Mohammad Amjadi*, Kamal Sarabandi

The University of Michigan, Ann Arbor, MI

15:00 Break

15:20 AD-6

A SINGLE LAYER PLANAR K-BAND MONOPULSE RADAR RECEIVER

Michael C. Brown*, Changzhi Li

Electrical and Computer Engineering, Texas Tech University, Lubbock, TX

15:40 AD-7

MILLIMETER WAVE INTEGRATED ANTENNA ARRAY ON LTCC

WEDNESDAY AFTERNOON

Maxence Carvalho*, Abe Akhiyat, John Volakis
Electrical and Computer Engineering, Florida International University, Miami, FL

16:00 AD-8

DIELECTRIC METAMATERIAL FOR ANTENNA SUBSTRATES

Quang Nguyen, Max Burnett*, Amir Zaghloul
U.S. Army Research Laboratory, Adelphi, MD

16:20 AD-9

MEASUREMENT OF A FOUR CHANNEL ANALOG BEAMFORMER FOR ANTI-JAM GPS APPLICATIONS

Jeffrey A. Maloney*¹, Steven D. Keller², Theodore K. Anhony², Steven J. Weiss², Do-Hoon Kwon¹, Ramakrishna Janaswamy¹

¹*Electrical and Computer Engineering, University of Massachusetts Amherst, Amherst, MA*

²*Sensors and Electronic Devices Directorate, The US Army Research Laboratory, Adelphi, MD*

16:40 AD-10

DIELECTRIC MEASUREMENTS OF HIGH PERMITTIVITY 3D PRINTED SUBSTRATES

Gregory Mitchell*, Theodore Anthony, Quang Nguyen
U.S. Army Research Laboratory, Adelphi, MD

Session B4: Metamaterials and Metasurfaces: Theory & Applications

Room 1B40

Session Co-Chairs: Ashwin Iyer, *University of Alberta*;
Filippo Capolino, *University of California, Irvine*

13:20 B4-1 (Invited)

MAGNET-FREE CIRCULATORS BASED ON LINEAR TIME-VARYING CIRCUITS

Ahmed Kord*¹, Andrea Alu²

¹*Electrical and Computer Engineering, University of Texas at Austin, Austin, TX*

²*Advanced Science Research Center, City University of New York, New York, NY*

13:40 B4-2 (Invited)

EXCEPTIONAL POINTS OF DEGENERACY INDUCED IN LINEAR TIME-PERIODIC SYSTEMS

Hamidreza Kazemi*, Mohamad Y. Nada, Tarek Mealy, Ahmed F. Abdelshafy, Filippo Capolino
University of California, Irvine, Irvine, CA

14:00 B4-3 (Invited)

N-PATH NETWORK ANALYSIS USING THE FLOQUET SCATTERING MATRIX METHOD

Cody R. Scarborough*, Anthony Grbic

Electrical Engineering and Computer Science, The University of Michigan, Ann Arbor, Michigan

14:20 B4-4 (Invited)

RECTANGULAR WAVEGUIDE LOADED WITH A DIELECTRIC SLOT IN A THICK METALLIC SHIELD

Abdulaziz H. Haddab*¹, Edward F. Kuester¹, Christopher L. Holloway²

¹*University of Colorado Boulder, Boulder, Colorado*

²*National Institute of Standards and Technology (NIST), Boulder, Colorado*

14:40 B4-5 (Invited)

DISPERSION AND FIELD CONTROL IN A METASURFACE-IMPLANTED WAVEGUIDE

Pai-yen Chen*¹, Danilo Erricolo¹, Yue Li², Atif Shamim³, Hakan Bagci³

¹*Electrical and Computer Engineering, University of Illinois at Chicago, Chicago*

²*Electrical and Systems Engineering, University of Pennsylvania, Philadelphia*

³*Division of Computer, Electrical, and Mathematical Science and Engineering, King Abdullah University of Science and Technology (KAUST), Thuwal, SAUDI ARABIA*

15:00 Break

15:20 B4-6

SHAPE-INDEPENDENT ULTRA-SUBWAVELENGTH TOPOLOGICAL SUPERSCATTERERS

S. Ali Hassani Gangaraj*¹, Constantinos Valagiannopoulos², Francesco Monticone¹

¹*School of Electrical and Computer Engineering, Cornell University, Ithaca, NY*

²*Physics, Nazarbayev University, Astana, KAZAKSTAN*

15:40 B4-7 (Invited)

ADVANCES IN METASURFACES BASED ON METAMATERIAL-LINED APERTURES AND DISCS

Mitchell Semple, Elham Baladi, Ashwin K. Iyer*

Electrical and Computer Engineering, University of Alberta, Edmonton, Alberta, CANADA

16:00 B4-8 (Invited)

MANIPULATION OF FRESNEL COEFFICIENTS USING CROSS-ANISOTROPIC METASURFACE COATING

Guillaume Lavigne*, Christophe Caloz

Polytechnique Montreal, Montreal, Quebec, CANADA

16:20 B4-9 (Invited)

DESIGN OF COMPACT BEAM-STEERING ACTIVE SLOT ANTENNAS WITH A METASURFACE REFLECTOR

Omid Manoochehri¹, Danilo Erricolo*¹, Amin Darvazehban², Francesco Monticone³

¹*Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, IL*

²*Electrical Engineering, University of Queensland, Queensland, AUSTRALIA*

³*School of Electrical and Computer Engineering, Cornell University, Ithaca, NY, SAUDI ARABIA*

16:40 B4-10

A NOVEL X-BAND OPTICALLY TUNABLE TRANSMISSION SURFACE BASED ON LUMPED ELEMENT OPTOELECTRONIC COMPONENTS

WEDNESDAY AFTERNOON

Marco D. Poort*, Piergiorgio L. Uslenghi
University of Illinois at Chicago, Chicago, IL

Session B5: Antennas
Room 200

Session Co-Chairs: Yahya Rahmat-Samii, *University of California, Los Angeles*;
John Volakis, *Florida International University*

13:20 B5-1

EVANESCENT-MODE CAVITY-BACKED TUNABLE SLOT ANTENNA

Abbas Semnani*, Michael D. Sinanis, Dimitrios Peroulis

School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN

13:40 B5-2

A PLANAR POSITIONING SYSTEM FOR ANTENNAS

Damien M. Gilbert*, Yangqinq Liu, Danilo Erricolo

University of Illinois at Chicago, Chicago, IL

14:00 B5-3

SMALL ANTENNA REMOTE IMPEDANCE MEASUREMENT

Ali Hosseini-Fahraji*, Majid Manteghi

Electrical & Computer Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA

14:20 B5-4

PORT TO PORT ISOLATION OF AN OMNIDIRECTIONAL ANTENNA THROUGH PERFECT SYMMETRY FOR SIMULTANEOUS TRANSMIT AND RECEIVE (STAR)

Alexander Hovsepian*, Satheesh Bojja Venkatakrishnan, Elias A. Alwan, John L. Volakis

Florida International University, Miami, FL

14:40 B5-5

HIGH DIRECTIVITY PARABOLIC REFLECTOR ANTENNA FOR SIMULTANEOUS TRANSMIT AND RECEIVE (STAR)

Merarys A. Caquias Olivera*, Prathap Valale Prasannakumar, Mohamed Elmansouri,

Dejan S. Filipovic

Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO

15:00 Break

15:20 B5-6

A NEW 3D-PRINTED ELECTRONICALLY SCANNED SPINNING SPOT BEAM INHOMOGENEOUS DIELECTRIC LENS ANTENNA FOR SPACEBORNE WIND SCATTEROMETER WEATHER RADAR SATELLITES

Jordan F. Budhu*, Yahya Rahmat-Samii

Electrical and Computer Engineering, University of California Los Angeles, Los Angeles, CA

15:40 B5-7

WEDNESDAY AFTERNOON

DEPLOYABLE ULTRA WIDEBAND ANTENNA FOR CUBESATS

Alexander D. Johnson*, Satheesh Bojja Venkatakrisnan, Maifuz Ali, John L. Volakis
Florida International University, Miami, FL

16:00 B5-8

A SYSTEMATIC APPROACH FOR THE DESIGN OF METALLIC DELAY LENSES

Anastasios Papathanasopoulos*, Yahya Rahmat-Samii
Electrical and Computer Engineering, University of California, Los Angeles, Los Angeles, CA

16:20 B5-9

DESIGN OF UWB SMALL LOOP ANTENNA WITH CONTINUOUS TUNING
FREQUENCY 1–10 MHZ

Yubin Cai*, Daisong Zhang, Yahya Rahmat-Samii
Electrical and Computer Engineering, University of California, Los Angeles, Los Angeles, CA

16:40 B5-10

EXPERIMENTAL RESULTS FROM A HIGHLY DIRECTIONAL AIR-TO-GROUND
COMMUNICATIONS LINK

Sunil Ramlall*¹, Sally McGehee¹, Jorge Romero¹, Terrence Gibbons², Nick Marcoux³,
Adam Jones¹, Kevin Quinn¹

¹*SPAWAR Systems Center Pacific, San Diego, CA*

²*MIT Lincoln Laboratory, Lexington, MA*

³*Naval Undersea Warfare Center, Newport, RI*

Session C3: Radar and Sensor Systems

Room 135

Session Co-Chairs: Gregory Huff, *The Pennsylvania State University*;

Jean-Francois Chamberland, *Texas A&M University*;

Eric Mokole, *The MITRE Corporation*

13:20 C3-1

INVESTIGATING 77 GHZ AUTOMOTIVE RADAR CORNER CASES USING HIGH
FIDELITY FULL-PHYSICS SIMULATIONS

Ushemadzoro Chipengo*
ANSYS Inc., Ann Arbor, MI

13:40 C3-2

EFFECTS OF TIME-VARYING TRANSMIT AMPLIFIER MATCHING NETWORKS IN
COGNITIVE RADAR APPLICATIONS

Austin S. Egbert*¹, Kyle Gallagher², Charles Baylis¹, Anthony Martone², Ed Viveiros²,
Robert Marks¹

¹*Baylor University, Waco, TX*

²*Army Research Laboratory, Adelphi, MD*

14:00 C3-3

VIRTUAL ANTENNA ARRAYS IN MIMO FMCW RADAR

Eloi Guerrero-Menéndez¹, Jordi Verdú¹, Pedro de Paco Sánchez*^{1,2}

WEDNESDAY AFTERNOON

¹*Telecommunication and Systems Engineering, Universitat Autònoma de Barcelona, Bellaterra, SPAIN*

²*University of Colorado Boulder, Boulder, CO*

14:20 C3-4

TOWARDS MULTIPLIERLESS DIGITAL ARCHITECTURES FOR APERTURE ARRAYS WITH 1024 RF BEAMS: A 32-BEAM BUILDING BLOCK AT 5.8 GHZ

Arjuna Madanayake¹, Renato Cintra², Soumyajit Mandal³, Viduneth Ariyaratna*¹, Sravan Pulipati¹, Suresh Madishetty⁴, Diego Coelho⁵, Ted Rappaport⁶, Leonid Belostotski⁷

¹*Electrical and Computer Engineering, Florida International University (FIU), Miami, FL*

²*Universidade Federal de Pernambuco, Recife, Pernambuco, BRAZIL*

³*Electrical and Computer Engineering, Case Western Reserve University, Cleveland, OH*

⁴*Electrical and Computer Engineering, University of Akron, Akron, OH*

⁵*Not available, Independent Researcher, Calgary, AB, CANADA*

⁶*Tandon School of Engineering, New York University, Brooklyn, NY*

⁷*Electrical and Computer Engineering, University of Calgary, Calgary, AB, CANADA*

14:40 C3-5

WIDEBAND LEAKAGE CANCELLATION NETWORK FOR MONOSTATIC CONTINUOUS-WAVE RADARS

Farnaz Foroughian*, Aly E. Fathy

The University of Tennessee, Knoxville, TN

**Session CDEJ: Spectrum Issues and Solutions for Next-Generation Wireless Systems
Room 135**

Session Co-Chairs: Lawrence Cohen, *Naval Research Laboratory*;

Eric Mokole, *The MITRE Corporation*;

Zoya Popovic, *University of Colorado Boulder*

15:20 CDEJ-1

APPROACH FOR REAL-TIME SYNTHESIS OF SIMULTANEOUS RADAR AND SPATIALLY SECURE COMMUNICATIONS FROM A COMMON PHASED ARRAY

Gordon L. Ledford*, Pedro Rodriguez-Garcia, Charles Baylis, Robert J. Marks

Electrical and Computer Engineering, Baylor University, Waco, TX

15:40 CDEJ-2

REAL-TIME SYNTHESIS APPROACH FOR COEXISTENCE OF RADAR AND COMMUNICATIONS IN THE SPATIAL-SPECTRAL DOMAIN

Pedro A. Rodriguez-Garcia*¹, Austin Egbert¹, Gordon Ledford¹, Charles Baylis¹, Robert J. Marks II¹, Lawrence Cohen²

¹*Baylor University, Waco, TX*

²*Naval Research Laboratory, Washington, DC*

16:00 CDEJ-3

A SAMPLE UNCERTAINTY BUDGET FOR A CONDUCTED COEXISTENCE TEST

Noel C. Hess*¹, Jason B. Coder²

WEDNESDAY AFTERNOON

¹*University of Colorado Denver, Denver, CO*

²*National Institute of Standards and Technology, Boulder, CO*

16:20 CDEJ-4 (Invited)

SOFTWARE DEFINED, SPECTRALLY SENSITIVE RADAR TRANSMISSION

Charles Baylis¹, Anthony Martone², Kyle Gallagher², Ed Viveiros², Abbas Semnani³,
Dimitrios Peroulis³, Robert J. Marks II¹

¹*Baylor University, Waco, TX*

²*Army Research Laboratory, Adelphi, MD*

³*Purdue University, West Lafayette, IN*

16:40 CDEJ-5 (Invited)

FAST RECONFIGURATION OF SECOND-GENERATION TUNABLE EVANESCENT-MODE CAVITY MATCHING NETWORK FOR FREQUENCY AGILITY IN S-BAND COGNITIVE RADAR APPLICATIONS

Jose A. Alcalá-Medel¹, Caleb Calabrese¹, Charles Baylis¹, Anthony Martone², Kyle Gallagher²,
Ed Viveiros², Abbas Semnani³, Dimitrios Peroulis³

¹*Electrical and Computer Engineering, Baylor University, Waco Texas*

²*Army Research Laboratory, Adelphi, MD*

³*Purdue University, West Lafayette, IN*

**Session D1: Submillimeter-Wave/ Terahertz Circuits and Applications
Room 1B51**

Session Co-Chairs: Negar Ehsan, *NASA Goddard Space Flight Center*;
Berhanu Bulcha, *NASA Goddard Space Flight Center*;
Jonathan Chisum, *University of Notre Dame*

13:20 D1-1 (Invited)

SWIRP: COMPACT SUBMM-WAVE AND LWIR POLARIMETERS FOR CIRRUS ICE PROPERTIES

Dong L. Wu¹, Manuel Vega¹, William R. Deal², William Gaines², Caitlyn M. Cooke²,
Russell Chipman³, Kira Hart³, Ping Yang⁴

¹*NASA Goddard Space Flight Center, Greenbelt, Maryland*

²*Aerospace Systems, Northrop Grumman Corp, Redondo Beach, CA*

³*College of Optical Sciences, University of Arizona, Tucson, AZ*

⁴*Atmos. Sciences, Texas A&M University, College Station, TX*

13:40 D1-2 (Invited)

220 GHZ AND 680 GHZ DIRECT DETECTION POLARIMETRIC RECEIVERS FOR CLOUD ICE MEASUREMENTS

Caitlyn M. Cooke¹, Kevin M. K. H. Leong¹, Xiao Bing Mei¹, Jennifer Arroyo²,
Manuel A. Vega³, Dong L. Wu³, William R. Deal¹

¹*Northrop Grumman Corporation, Redondo Beach, CA*

²*Nuvotronics Inc., Durham, NC*

³*NASA Goddard Space Flight Center, Greenbelt, MD*

14:00 D1-3 (Invited)

WEDNESDAY AFTERNOON

A COMPACT 670-GHZ POLARIMETRIC RADIOMETER FOR CUBESAT CLOUD ICE OBSERVATIONS

Eric Bryerton*, Theodore Reck, Daniel Koller, Yiwei Duan, Jeffrey Hesler
Virginia Diodes, Inc., Charlottesville, VA

14:20 D1-4 (Invited)

SUBMILLIMETER-WAVE SCHOTTKY DIODES BASED ON HETEROGENEOUS INTEGRATION OF GAAS ONTO SILICON

Robert M. Weikle*, Linli Xie, Souheil Nadri, Masoud Jafari, Christopher M. Moore, Naser Alijabbari, Michael E. Cyberey, N S. Barker, Arthur W. Lichtenberger
Electrical and Computer Engineering, University of Virginia, Charlottesville, VA

14:40 D1-5 (Invited)

BROADBAND ULTRA-COMPACT HIGH-POWER ARRAY LOCAL OSCILLATOR SOURCES FOR HIGH-SPECTRAL RESOLUTION SUBMILLIMETER-WAVE RECEIVERS

Jose V. Siles*, Jonathan H. Kawamura, Imran Mehdi
NASA Jet Propulsion Laboratory, Pasadena

15:00 Break

15:20 D1-6 (Invited)

PICTURE THIS SELFI: A TECHNOLOGY MATURATION PROJECT FOR A SUBMILLIMETER ENCELADUS LIFE FUNDAMENTALS INSTRUMENT (SELFI)

Paul Racette*¹, Carrie Anderson¹, Damon Bradley¹, Gordon Chin¹, Negar Ehsan¹, Terry Hurford¹, Tilak Hewagamal², Tracee Jamison¹, Tim Livengood²
¹*NASA Goddard Space Flight Center, Greenbelt, MD*
²*University of Maryland, College Park, MD*

15:40 D1-7 (Invited)

μ -SPEC: AN INTEGRATED SPECTROMETER FOR THZ SPECTROSCOPY

Emily M. Barrentine*¹, Ari D. Brown¹, Berhanu T. Bulcha¹, Giuseppe Cataldo¹, Negar Ehsan¹, Larry Hess¹, Omid Noroozian^{1,2}, Thomas R. Stevenson¹, Eric R. Switzer¹, Kongpop U-Yen¹, Edward J. Wollack¹, S. H. Moseley¹
¹*NASA-Goddard Space Flight Center, Greenbelt, MD*
²*National Radio Astronomy Observatory, Charlottesville, VA*

**Session F2: Microwave Remote Sensing of the Earth
Room 155**

Session Co-Chairs: Thomas Hanley, *Johns Hopkins University Applied Physics Laboratory*;
David Kunke, *The Aerospace Corporation*

13:20 F2-1

RELATING CYGNSS OBSERVATIONS TO SOIL MOISTURE VARIATIONS DURING THE 2018 HURRICANE SEASON

Orhan Eroglu*, Dylan R. Boyd, Ali C. Gurbuz, Mehmet Kurum
Electrical and Computer Engineering, Mississippi State University, Starkville, MS

WEDNESDAY AFTERNOON

13:40 F2-2

L-BAND HIGH SPATIAL RESOLUTION SOIL MOISTURE MAPPING USING SMALL UNMANNED AERIAL SYSTEMS

Eryan Dai*¹, Aravind Venkitasubramony¹, Albin Gasiewski¹, Maciej Stachura², Jack Elston²

¹*ECEE, Colorado University at Boulder, Boulder, CO*

²*Black Swift Technologies (BST) LLC, Boulder, CO*

14:00 F2-3

INVESTIGATION OF ROOT-ZONE SOIL MOISTURE PROFILE SENSITIVITY TO MULTIPLE SIGNAL OF OPPORTUNITY SOURCES

Dylan R. Boyd*¹, Mehmet Kurum¹, Orhan Eroglu¹, Ali Gurbuz¹, James Garrison², Benjamin Nold², Manuel Vega³, Jeffrey Piepmeier³, Rajat Bindlish³

¹*Electrical and Computer Engineering, Mississippi State University, Starkville, MS*

²*Purdue University, West Lafayette, IN*

³*NASA Goddard Space Flight Center, Greenbelt, MD*

14:20 F2-4

NON-DESTRUCTIVE DIELECTRIC CONSTANT MEASUREMENT OF A LOSS-LESS DIELECTRIC SLAB USING COHERENT MULTIPATH INTERFERENCE OF A WIDEBAND RADIATION

Seyedmohammad Mousavi*¹, Roger De Roo², Kamal Sarabandi¹, Anthony England³

¹*Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI*

²*Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor, MI*

³*College of Engineering and Computer Science, University of Michigan, Dearborn, MI*

14:40 F2-5

USING 0.5-2 GHZ MICROWAVE RADIOMETRY FOR ARCTIC SEA-ICE THICKNESS AND SALINITY RETRIEVAL

Oguz Demir*¹, Mark Andrews¹, Joel T. Johnson¹, Kenneth Jezek²

¹*ElectroScience Laboratory, The Ohio State University, Columbus, Ohio*

²*Byrd Polar and Climate Research Center, The Ohio State University, Columbus, OH*

15:00 Break

15:20 F2-6

EXPERIMENTAL VALIDATION OF AN ENDFIRE SAR AMBIGUITY FUNCTION

Omkar P. Pradhan*, Albin J. Gasiewski

University of Colorado Boulder, Boulder CO

15:40 F2-7

DETECTION, ANALYSIS AND MITIGATION OF SEA CLUTTER IN POLARIMETRIC WEATHER RADAR

Amit Dutta*, Chandrasekar Venkatachalam

Electrical and Computer Engineering, Colorado State University, Fort Collins, CO

16:00 F2-8

SIMULATIONS OF 3D CLOUD RADIATION FIELDS USING THE HORIZONTALLY INHOMOGENEOUS UNIFIED MICROWAVE RADIATIVE TRANSFER MODEL

WEDNESDAY AFTERNOON

Kun Zhang*, Albin J. Gasiewski
University of Colorado Boulder, Boulder, CO

16:20 F2-9

IDENTIFYING LIQUID CLOUD DROPLETS AND FROZEN HYDROMETEORS IN MIXED-PHASE CLOUDS USING 35-GHZ VERTICALLY POINTING RADAR VELOCITY SPECTRA

Christopher R. Williams*¹, Maximilian Maahn^{2,3}, Joseph C. Hardin⁴, Gijs de Boer^{2,3}

¹*Smead Aerospace Engineering Science, University of Colorado Boulder, Boulder, CO*

²*Cooperative Institute for Research in Environmental Sciences, University of Colorado Boulder, Boulder, CO*

³*NOAA Earth System Research Laboratory, Boulder, CO*

⁴*Pacific Northwest National Laboratory, Richland, WA*

16:40 F2-10

UTILIZATION OF CONVOLUTIONAL NEURAL NETWORKS IN CLASSIFICATION OF SNOWFLAKES BASED ON IMAGES BY A MULTI-ANGLE SNOWFLAKE CAMERA

Adam C. Hicks*, V.N. Bringi, Branislav M. Notaros

Electrical and Computer Engineering, Colorado State University, Fort Collins, CO

WEDNESDAY AFTERNOON

**Session G3: Space Plasma Measurement Techniques
Room 151**

Session Co-Chairs: Thomas Gaussiran, *The University of Texas at Austin*;
Terry Bullett, *University of Colorado Boulder*

13:20 G3-1

FIRST MESOSPHERIC SOUNDING ROCKET OBSERVATION IN IRAN USING PLASMA IMPEDANCE PROBE (PIP)

Alireza Mahmoudian^{*1}, Swadesh Patra², Fatemeh Sadeghi Kia¹, Paiman Aliparast¹

¹*Aerospace Research Institute, Ministry of Science, Research and Technology, Tehran, IRAN*

²*University of Oslo, Oslo, NORWAY*

13:40 G3-2

JULIA STUDIES OF POST-MIDNIGHT EQUATORIAL SPREAD F EVENTS OBSERVED DURING THE 2008/2009 SOLAR MINIMUM

Fabiano S. Rodrigues^{*1}, Weijia Zhan¹, Marco A. Milla²

¹*The University of Texas at Dallas, Richardson, TX*

²*Jicamarca Radio Observatory, Lima, PERU*

14:00 G3-3

HIGH-LATITUDE INTERMEDIATE-SCALE TEC STRUCTURE

Charles L. Rino^{*1}, Brian Breitsch¹, Yu Morton¹, Charles S. Carrano²

¹*Smead Aerospace Engineering Sciences, University of Colorado, Boulder, Colorado*

²*Institute for Scientific Research, Boston College, Boston, MA*

14:20 G3-4

ANALYSIS OF SEVERE PHASE SCINTILLATION EVENTS OBSERVED IN THE AURORAL OVAL

James P. Conroy^{*1}, Kshitija Deshpande², Wayne Scales¹, Amir Zaghoul¹

¹*Virginia Polytechnic Institute & State University, Blacksburg, VA*

²*Embry-Riddle, Daytona Beach, FL*

14:40 G3-5

DETERMINATION AND ANALYSIS OF THE REFRACTIVE CONTRIBUTION TO GPS PHASE VARIATIONS

Anthony M. McCaffrey^{*}, P. T. Jayachandran

Physics, University of New Brunswick, Fredericton, CANADA

Session GH1: Ionospheric Modification

Room 151

Session Co-Chairs: Eliana Nossa, *Arecibo Observatory*;
Robert McCoy, *Geophysical Institute University of Alaska Fairbanks*;
Stanley Briczinski, *Naval Research Laboratory*

15:20 GH1-1

EXCITATION AND MODELING OF ARTIFICIAL AURORA AT HAARP

Beket Tulegenov^{*1}, Anatoly V. Streltsov¹, Elizabeth Kendall², Mike McCarrick³, Ivan Galkin⁴

WEDNESDAY AFTERNOON

¹*Physical Sciences, ERAU, Daytona beach, FL*

²*SRI International, Menlo Park, CA*

³*Naval Research Laboratory, Washington, DC*

⁴*University of Massachusetts Lowell, Lowell, MA*

15:40 GH1-2

INVESTIGATION OF STIMULATED ELECTROMAGNETIC EMISSION SECOND HARMONIC GENERATION

Augustine D. Yellu*¹, Alireza Mahmoudian², Paul Bernhardt³, Carl Sieftring³

¹*Electrical and Computer Engineering, Virginia Polytechnic Institute & State University, Blacksburg*

²*Electrical and Computer Engineering, InterAmerican University, Puerto Rico*

³*Plasma Physics Division, Naval Research Laboratory, Washington, DC*

16:00 GH1-3

HF TRANSMITTED POWER EXPERIMENT AND THE ISR DIAGNOSTICS AT ARECIBO

Eliana Nossa*, Michael Sulzer, Phil Perillat, Nestor Aponte

Arecibo Observatory, Arecibo, PR

16:20 GH1-4

NARROWBAND AND WIDEBAND STIMULATED ELECTROMAGNETIC EMISSION (NSEE/WSEE) OBSERVATIONS: A REPLACEMENT FOR ISR OBSERVATIONS

Alireza Mahmoudian*¹, Andrew Senior², Wayne Scales³, Paul A Bernhardt⁴, Brett Isham⁵, Eliana Nossa⁶, Mike Kosch⁷

¹*Aerospace Research Institute, Ministry of Science, Research and Technology, Tehran, IRAN*

²*Independent Researcher, Lancaster, UNITED KINGDOM*

³*Virginia Polytechnic Institute & State University, Blacksburg, VA*

⁴*Naval Research Laboratory, Washington, DC*

⁵*Inter American University of Puerto Rico, Bayamon, PR*

⁶*Arecibo Observatory, Puerto Rico*

⁷*South African National Space Agency (SANS), Cape Town, SOUTH AFRICA*

16:40 GH1-5

POLARIZATION MEASUREMENTS OF AN UNEXPECTED EPOP-RRI OBSERVATION DURING AN ARECIBO HF HEATING CAMPAIGN

Ashanthi S. Maxworth*¹, Glenn C. Hussey¹, Paul Bernhardt², Eliana Nossa³, Fraser Hird¹

¹*University of Saskatchewan, Saskatoon, Saskatchewan, CANADA*

²*Naval Research Laboratory, Washington, DC*

³*Arecibo Observatory, Arecibo, PR*

17:00 GH1-6

ELF-VLF WAVE GENERATION IN THE NEAR-EARTH ENVIRONMENT FOR TELECOMMUNICATION APPLICATIONS AND EARTHQUAKE PREDICTION

Alireza Mahmoudian*¹, Bengt Eliasson², Mohammad Javad Kalaei³

¹*Aerospace Research Institute, Ministry of Science, Research and Technology, Tehran, IRAN*

²*University of Strathclyde, Glasgow, UNITED KINGDOM*

³*Institute of Geophysics, University of Tehran, Tehran, IRAN*

Session H2: Physics of the Radiation Belts II

Room 245

Session Co-Chairs: Poorya Hosseini, *University of Colorado Denver*;
Christopher Crabtree, *Naval Research Laboratory*

13:20 H2-1

ACCELERATION OF RELATIVISTIC ELECTRONS IN EARTH'S OUTER RADIATION BELT BY WHISTLER MODE CHORUS: EVIDENCE AND THE IMPORTANCE OF ENERGETIC PARTICLE INJECTIONS

Drew L. Turner*

The Aerospace Corporation, El Segundo, CA

13:40 H2-2

THE DEVELOPMENT OF CHORUS, SOURCE AND SEED ELECTRONS, AND THE RADIATION BELT RESPONSE DURING ICME AND CIR STORMS

Samuel T. Bingham*, Christopher G. Moukis, Lynn M. Kistler, Kristoff W. Paulson, Charlie J. Farrugia, Chia-Lin Huang, Harlan E. Spence, Craig A. Kletzing

Institute for the Study of Earth, Oceans, and Space, University of New Hampshire, Durham, NH

14:00 H2-3

CONSEQUENCES OF OBLIQUE CHORUS WAVES ON THE LOSS AND ACCELERATION OF THE OUTER RADIATION BELT ELECTRONS

Oleksiy Agapitov*¹, Anton Artemyev², Didier Mourenas³, Forrest Mozer¹, Vladimir Krasnoselskikh⁴

¹*Space Science Laboratory, University of California, Berkeley, Berkeley*

²*University of California, Los Angeles, Los Angeles, CA*

³*CEA, Arpajon, FRANCE*

⁴*LPC2E/CNRS-University of Orleans, Orleans, FRANCE*

14:20 H2-4

CHORUS AND MICROBURSTS: QUANTIFYING THE CONNECTION WITH A SUBSTANTIAL DATASET OF SIMULTANEOUS LOW- AND HIGH-ALTITUDE HIGH TIME RESOLUTION OBSERVATIONS

Aaron W. Breneman*¹, Chris Colpitts¹, John G. Sample², Arlo Johnson², Mykhaylo Shumko², Alexander Crew³, David Klumpar², Harlan Spence⁴, Bernard Blake⁵, John Wygant¹, Robyn Millan⁶, Alexa Halford⁵, Leslie Woodger⁶

¹*School of Physics and Astronomy, University of Minnesota, Minneapolis, MN*

²*Physics, Montana State University, Bozeman, MT*

³*Applied Physics Laboratory, Johns Hopkins University, Laurel, MD*

WEDNESDAY AFTERNOON

⁴*Physics and Astronomy, University of New Hampshire, Durham, NH*

⁵*The Aerospace Corporation, El Segundo, CA*

⁶*Physics and Astronomy, Dartmouth College, Hanover, NH*

14:40 H2-5

REMOTE SENSING OF RADIATION BELT ENERGETIC ELECTRONS USING
LIGHTNING TRIGGERED UPPER BAND CHORUS

Poorya Hosseini*, Mark Golkowski, Vijay Harid

University of Colorado Denver, Denver, CO

Session J2: New Telescopes, Techniques and Technology

Room 265

Session Co-Chairs: Jeffery Mangum, *National Radio Astronomy Observatory*;

Alyson Ford, *University of Arizona*

13:20 J2-1

FULL MUELLER AW PROJECTION

Preshanth Jagannathan*¹, Sanjay Bhatnagar¹, Urvashi Rau¹, Andrew R. Taylor^{2,3}

¹*National Radio Astronomy Observatory, Socorro, NM*

²*Astronomy, University of Cape Town, Cape Town, SOUTH AFRICA*

³*Physics, University of Western Cape, Western Cape, SOUTH AFRICA*

13:40 J2-2

NEW RADIO FREQUENCY INTERFERENCE MITIGATION TECHNIQUES IN THE
CONTEXT OF 21-CM COSMOLOGY

Mike J. Wilensky*

University of Washington, Seattle, WA

14:00 J2-3

CAN WE CALIBRATE OUT THE WEDGE WITH HERA AND ITS SUCCESSORS?

Aaron Parsons*, Joshua Dillon

University of California, Berkeley, Berkeley, CA

14:20 J2-4

RFI MITIGATION FOR PULSAR TIMING USING SPECTRAL KURTOSIS

Anastasia Kuske*¹, Luke Hawkins²

¹*Physics & Astronomy, Franklin & Marshall College, Lancaster, PA*

²*Green Bank Observatory, Green Bank, WV*

WEDNESDAY AFTERNOON

14:40 J2-5

DIGITAL BACK-END FOR THE NEW ULTRA-WIDEBAND FEED AND RECEIVER FOR THE PARKES RADIO TELESCOPE

Paul Roberts, Daniel Deorge, John Tuthill*, Mark Leach, Ron Beresford, Michael Brothers, Tasso Tzioumis

CSIRO Astronomy and Space Science, Sydney, NSW, AUSTRALIA

15:00 Break

15:20 J2-6

MODULAR DIGITAL INFRASTRUCTURE FOR RADIO TELESCOPE ARRAYS

Sylas Ashton*

National Radio Astronomy Observatory, Socorro, NM

15:40 J2-7

REAL-TIME, ALL-SKY, EXTREME TIME-RESOLUTION IMAGING FROM THE LWA-SEVILLETA TELESCOPE USING THE EPIC ARCHITECTURE

Nithyanandan Thyagarajan*¹, James Kent², Jayce Dowell³, Adam P. Beardsley⁴, Judd Bowman⁴, Greg Taylor³

¹*National Radio Astronomy Observatory, Socorro, NM*

²*Cavendish Laboratories, University of Cambridge, Cambridge, UNITED KINGDOM*

³*Physics and Astronomy, University of New Mexico, Albuquerque, NM*

⁴*School of Earth and Space Exploration, Arizona State University, Tempe, AZ*

16:00 J2-8

HIRAX INSTRUMENT CHARACTERIZATION

Emily R. Kuhn*, Benjamin R. Saliwanchik, Laura B. Newburgh

Physics, Yale University, New Haven, CT

16:20 J2-9

ASKAP: THE AUSTRALIAN SKA PATHFINDER

Douglas C. -J. Bock*

CSIRO Astronomy and Space Science, Marsfield, NSW, AUSTRALIA

16:40 J2-10

COMMISSIONING RESULTS AND FUTURE WORK WITH THE FOCAL-PLANE L-BAND ARRAY FEED FOR THE GREEN BANK TELESCOPE (FLAG)

Mark W. Ruzindana*¹, Karl F. Warnick¹, Brian D. Jeffs¹, Richard A. Black¹, Mitchell C. Burnett¹, D.j. Pisano², Duncan R. Lorimer², Nicholas Pingel², Kaustubh Rajwade², Richard M. Prestage³, Steve White³, Bob Simon³, Luke Hawkins³, William Shillue⁴, D A. Roshi⁴, Devansh Agarwal²

¹*Electrical/Computer Engineering, Brigham Young University, Provo, UT*

²*Physics and Astronomy, West Virginia University, Morgantown, WV*

³*Green Bank Observatory, Green Bank, WV*

⁴*National Radio Astronomy Observatory CDL, Charlottesville, VA*

Session K1: Biomedical Sensors and Devices

WEDNESDAY AFTERNOON

Room 150

Session Co-Chairs: Majid Manteghi, *Virginia Polytechnic Institute & State University*;
Asimina Kiourti, *The Ohio State University*

13:20 K1-1 (Invited)

A PORTABLE DOPPLER/FSK/FMCW MULTI-MODE RADAR WITH ANALOG DC
OFFSET CANCELLATION FOR BIOMEDICAL APPLICATIONS

Jing Wang*, Changzhi Li

Electrical Engineering, Texas Tech University, Lubbock, TX

13:40 K1-2 (Invited)

GLUCOSE-DEPENDENT DIELECTRIC PROPERTIES OF BLOOD PLASMA FOR 500
MHZ TO 50 GHZ

Sydney Wojcieszak*¹, Nikhat Nusrat^{2,3}, Madeline Hayes³, Lynn Secondo¹, Erdem Topsakal²

¹*Chemical and Life Sciences Engineering, Virginia Commonwealth University College of
Engineering, Richmond, VA*

²*Electrical and Computer Engineering, Virginia Commonwealth University College of
Engineering, Richmond, VA*

³*Biomedical Engineering, Virginia Commonwealth University College of Engineering,
Richmond, VA*

14:00 K1-3 (Invited)

BREAKING THE BOUNDARIES: MONITORING JOINT FLEXION USING RADIO-
FREQUENCY COILS

Vigyanshu Mishra*, Asimina Kiourti

Electrical and Computer Engineering, The Ohio State University, Columbus, OH

14:20 K1-4 (Invited)

IMPROVING ACCURACY OF INKJET PRINTED CORE BODY WRAP TEMPERATURE
SENSOR USING RANDOM FOREST REGRESSION IMPLEMENTED WITH AN
ANDROID APP

Md Juber Rahman, Bashir I. Morshed*

The University of Memphis, Memphis, TN

14:40 K1-5 (Invited)

SUBCUTANEOUS BIOCOMPATIBLE CONTINUOUS GLUCOSE MONITORING SENSOR

Shanze I. Eshai*, Lynn E. Secondo, Sydney Wojcieszak, Madeline Hays, Nastassja Lewinski,
Vitaliy Avrutin, Erdem Topsakal

Electrical and Computer Engineering, Virginia Commonwealth University, Richmond, VA

15:00 Break

15:20 K1-6

ULTRA LOW-POWER OTA FOR BIOMEDICAL APPLICATIONS

Shahram Hatefi Hesari*¹, Ava Hedayatipour¹, Shaghayegh Aslanzadeh¹, Syed K. Islam²

¹*The University of Tennessee, EECS Dept., Knoxville, TN*

²*University of Missouri, Columbia, MO*

WEDNESDAY AFTERNOON

15:40 K1-7

IN VIVO RECORDING OF EPILEPTIFORM NEURAL ACTIVATION USING A NOVEL FULLY-PASSIVE IMPLANTABLE SYSTEM

Carolina Moncion*¹, Lakshmini Balachandar¹, Satheesh Bojja-Venkatakrishnan²,
Jorge Riera Diaz¹, John L. Volakis²

¹*Biomedical Engineering, Florida International University, Miami, FL*

²*Electrical Engineering, Florida International University, Miami, FL*

16:00 K1-8

LOW-POWER HIGHLY EFFICIENT VOLTAGE-BOOSTING RECTIFIER FOR WIDE-BAND INDUCTIVELY-COUPLED POWER TELEMTRY

Ramaa Saket Suri*, Nishat Tarannum Tasneem, Ifana Mahbub
Electrical Engineering, University of North Texas, Denton, TX

Commission Business Meetings

17:00 Commission E	Room 135
17:00 Commission F	Room 155
18:00 Commission A	Room 105
18:00 Commission C	Room 135
18:00 Commission J	Room 265

WEDNESDAY EVENING, 9 January 2019

The Reception will be held in the lobby of the Engineering Center (ECCR) from 18:30 to 21:00. All registrants are welcome to attend the Reception. Guests are also welcome to attend, as long as the registrants have indicated on their registration form that they are bringing a guest. Beer & wine are included.

THURSDAY MORNING

THURSDAY MORNING, 10 January 2019

**Plenary Session
Mathematics Auditorium (Math 100)**

Ernest K. Smith USNC-URSI Student Paper Competition

Chair: Erdem Topsakal, *Virginia Commonwealth University*

8:20 Announcements

8:30 Rules and Guidelines of the Competition

8:40 Student Paper Presentations

9:40 Break

Meeting Highlight Plenary Talks:

(1) IEEE SmartAg Initiative: Technology Applied to the Food Supply Chain

(2) Atacama Large Millimeter Array (ALMA) in 2030

Co-Chairs: Eric Mokole, The Mitre Corporation;
Jeff Mangum, National Radio Astronomy Observatory

10:00 P1-1

IEEE SMART AG INITIATIVE: TECHNOLOGY APPLIED TO THE FOOD SUPPLY CHAIN

John P. Verboncoeur *

Michigan State University, East Lansing, MI

10:50 P1-2

ATACAMA LARGE MILLIMETER ARRAY (ALMA) IN 2030

Sean Dougherty*

ALMA Observatory, Santiago, Chile

11:40 Awards Ceremony for Student Paper Competition

12:00 Lunch for All Students, USNC Officers and Commission Chairs

Atrium of Koelbel - Business School

THURSDAY AFTERNOON

THURSDAY AFTERNOON, 10 January 2019

Session B6: Numerical Methods

Room 200

Session Co-Chairs: Fernando Teixeira, *The Ohio State University*;
Branislav Notaros, *Colorado State University*

13:20 B6-1

ANALYSIS OF MULTIPACTOR EFFECTS BY A PARTICLE-IN-CELL ALGORITHM
COUPLED WITH THE FURMAN-PIVI SECONDARY ELECTRON EMISSION MODEL

Dong-Yeop Na*, Julio L. Nicolini, Fernando L. Teixeira

ElectroScience Laboratory, The Ohio State University, Columbus, OH

13:40 B6-2

PROPER ORTHOGONAL DECOMPOSITION FOR PARTICLE-IN-CELL SIMULATIONS

Julio de Lima Nicolini*, Dong-Yeop Na, Fernando L. Teixeira

The Ohio State University, Columbus, OH

14:00 B6-3

FAR-FIELD EXTRAPOLATION OF THE BODY-OF-REVOLUTION PARABOLIC WAVE
EQUATION

Reid K. McCargar*^{1,2}, Mark C. Strother¹

¹*Applied Physics Laboratory, The Johns Hopkins University, Laurel, MD*

²*Electrical and Computer Engineering, The George Washington University, Washington, DC*

14:20 B6-4

A STUDY OF FIREFLY ALGORITHM, ANT COLONY OPTIMIZATION, AND
ARTIFICIAL BEE COLONY ALGORITHM

Utsav Poudel*, Sembiam R. Rengarajan

Electrical and Computer Engineering, California State University, Northridge, CA

14:40 B6-5

PREDICTING PML PERFORMANCE AT NORMAL INCIDENCE IN CYLINDRICAL FDTD

Mohammed F. Hadi*, Atef Z. Elsherbeni

Electrical Engineering, Colorado School of Mines, Golden, CO

15:00 Break

15:20 B6-6

COMPARISON OF TLBO, DE, AND BBO ALGORITHMS FOR APPLICATIONS IN
ELECTROMAGNETICS

Edwin E. Rebollo*, Sembiam R. Rengarajan

Electrical and Computer Engineering, California State University, Northridge, CA

15:40 B6-7

NATURE INSPIRED METAHEURISTIC OPTIMIZATION ALGORITHMS AND
APPLICATIONS

Samuel Gaxiola*, Sembiam R. Rengarajan

THURSDAY AFTERNOON

Electrical and Computer Engineering, California State University, Northridge, CA

16:00 B6-8

ANALOG COPROCESSORS FOR SOLVING LINEAR- AND NON-LINEAR PARTIAL DIFFERENTIAL EQUATIONS

Arjuna Madanayake¹, Soumyajit Mandal², Nilan Udayanga*¹, Jifu Liang²,
Subramaniya I. Hariharan³, Leonid Belostotski⁴

¹*Florida International University (FIU), Miami, FL*

²*Case Western Reserve University (CWRU), Cleveland, OH*

³*University of Akron, Akron, OH*

⁴*University of Calgary, Calgary, AB, CANADA*

16:20 B6-9

ADJOINT-BASED A POSTERIORI ERROR ESTIMATION AND ITS APPLICATIONS IN CEM: DHO FEM TECHNIQUES AND 3D SCATTERING PROBLEMS

Jake J. Harmon*¹, Cam L. Key¹, Blake A. Troksa¹, Troy D. Butler², Donald Estep³,
Branislav M. Notaros¹

¹*Electrical and Computer Engineering, Colorado State University, Fort Collins, CO*

²*Mathematical and Statistical Sciences, University of Colorado Denver, Denver, CO*

³*Statistics, Colorado State University, Fort Collins, CO*

16:40 B6-10

SCHOTTKY DIODE FULL-WAVE SIMULATION FOR ZERO-BIASED DETECTOR DESIGN

Colton R. Dunlap*

Boulder Environmental Sciences and Technology, Boulder, CO

Session BK: Wearable, Implants, and Body-Area Networks

Room 1B40

Session Co-Chairs: Ryan Green, *Virginia Commonwealth University*;
Bashir Morshed, *The University of Memphis*

13:20 BK-1 (Invited)

ULTRA LOW-POWER INDUCTIVELY COUPLED WEARABLE ECG SENSOR DESIGN WITH INKJET PRINTED DRY ELECTRODES

Bashir I. Morshed*

Electrical and Computer Engineering, The University of Memphis, Memphis

13:40 BK-2 (Invited)

BIO-MAGNETIC DETECTION OF CARDIAC ACTIVITY USING WEARABLES

Keren Zhu, Vigyanshu Mishra*, Asimina Kiourti

Electrical and Computer Engineering / ElectroScience Laboratory, The Ohio State University, Columbus, OH

14:00 BK-3 (Invited)

THURSDAY AFTERNOON

ANALYSIS AND MULTI-CLASS CLASSIFICATION OF PATHOLOGICAL HEART MURMURS BASED ON SEGMENTED PHONOCARDIOGRAM RECORDINGS

Ali Elhouderi*, Kimberly Newman, Frank Barnes

Electrical, Computer and Energy Engineering, University of Colorado at Boulder, Boulder, CO

14:20 BK-4 (Invited)

MULTI-MODE SMART WEARABLE FABRIC ANTENNAS FOR AUGMENTED TOUCH TRACKING AND MOTION DETECTION ON HUMAN SKIN

Umar Hasni*, Erdem Topsakal

Electrical and Computer Engineering, Virginia Commonwealth University, Richmond, VA

14:40 BK-5 (Invited)

TOWARDS EMBROIDERED TEXTILE ANTENNA SYSTEMATIC DESIGN AND ACCURATE MODELING: INVESTIGATION OF STITCH DENSITY

Lingnan Song*, Daisong Zhang, Yahya Rahmat-Samii

Electrical and Computer Engineering, University of California, Los Angeles, Los Angeles, CA

15:00 Break

15:20 BK-6 (Invited)

SHORT RANGE TITANIUM NITRIDE ANTENNA FOR SUBCUTANEOUS IMPLANT

Ryan B. Green*, Jessica R. Shaffer, Madeline R. Hays, Erdem Topsakal

Virginia Commonwealth University, Richmond, VA

15:40 BK-7 (Invited)

DESIGN OF A FLEXIBLE RECEIVER MODULE FOR IMPLANTABLE WIRELESS POWER TRANSFER (WPT) APPLICATIONS

Melissa A. Sinclair*¹, Dipon K. Biswas¹, Tien Le¹, Joshua Hyde¹, Ifana Mahbub¹, Lingqian Chang², Yongcun Hao³

¹*Electrical Engineering, University of North Texas, Denton, TX*

²*Biomedical Engineering, University of North Texas, Denton, TX*

³*Northwestern Polytechnical University, Mechanical Engineering, Xi'an, Shaanxi, CHINA*

16:00 BK-8 (Invited)

LOW-POWER RF ENERGY HARVESTER CIRCUIT DESIGN FOR WEARABLE MEDICAL APPLICATIONS

Taeho Oh¹, Omiya Hassan², Samira Shamsir*², Syed K. Islam²

¹*EECS, The University of Tennessee, Knoxville, TN*

²*EECS, University of Missouri, Columbia, MO*

16:20 BK-9 (Invited)

MICS BAND DIGITAL VOLTAGE-CONTROLLED OSCILLATOR (DVCO) FOR LOW-POWER BIOMEDICAL DATA TRANSMISSION

Hanfeng Wang¹, Samira Shamsir*², Shahram H. Hesari¹, Syed K. Islam²

¹*Electrical Engineering and Computer Science, University of Tennessee, Knoxville, TN*

²*Electrical Engineering and Computer Science, University of Missouri-Columbia, Columbia, MO*

THURSDAY AFTERNOON

16:40 BK-10 (Invited)

INVESTIGATION OF ELECTROMAGNETIC WAVE PROPAGATION FOR IN-BODY TO ON-BODY WIRELESS COMMUNICATIONS

Mary E. Leece*, Yang Li

Baylor University, Waco, TX

**Session D2: Components and Circuits for Wireless Applications
Room 1B51**

Session Co-Chairs: Jonathan Chisum, *University of Notre Dame*;
Negar Ehsan, *NASA Goddard Space Flight Center*

13:20 D2-1

FREQUENCY-SELECTIVE FERRITE-BASED CIRCULATORS

Andrea Ashley*, Laila Marzall, Zoya Popovic, Dimitra Psychogiou

Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

13:40 D2-2

RF CHARACTERIZATION OF 3D-PRINTED COAXIAL CAVITY RESONATORS

Kshitij Sadasivan*, Dimitra Psychogiou

Electrical, Computer, & Energy Engineering, University of Colorado Boulder, Boulder, CO

14:00 D2-3

FREQUENCY-AGILE RECONFIGURATION FOR A HIGH-POWER RESONANT CAVITY TUNER USING PREVIOUS SEARCH RESULTS

Angelique Dockendorf*¹, Ellie Langley¹, Austin Egbert¹, Charles Baylis¹, Abbas Semnani², Dimitrios Peroulis², Anthony Martone³, Ed Viveiros³, Robert Marks II¹

¹*Baylor University, Waco, TX*

²*Purdue University, West Lafayette, IN*

³*Army Research Laboratory, Adelphi, MD*

14:20 D2-4

COUPLED-RESONATOR-BASED DESIGN OF THIN-FILM BULK ACOUSTIC RESONATOR (FBAR)-BASED BANDPASS FILTERS

Nikolaus Luhrs S. Luhrs*, Dimitra Psychogiou

Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

14:40 D2-5

THE ROLE OF THE REFLECTION COEFFICIENT PHASE IN THE DESIGN OF ACOUSTIC WAVE FILTERS

Patricia M. Silveira*, Jordi Verdú, Pedro de Paco

Telecommunications and Systems Engineering, Autonomous University of Barcelona, Barcelona, SPAIN

15:00 Break

15:20 D2-6

THURSDAY AFTERNOON

LOW COST POWER EFFICIENT BEAMFORMER WITH ELEMENT-TO-ELEMENT MIXING (BEEM)

Rimon J. Hokayem*, John L. Volakis, Elias A. Alwan

Electrical and Computer Engineering, Florida International University, Miami, FL

15:40 D2-7

SUPPLY MODULATION OF LOAD-MODULATED POWER AMPLIFIERS

Dan Fishler*, Tommaso Cappello, Zoya Popovic, Taylor Barton

Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

16:00 D2-8

A 2.45 GHZ TEXTILE-BASED RF RECTENNA ARRAY FOR SENSOR APPLICATIONS

Dieff Vital*, Shubhendu Bhardwaj, John L. Volakis

Electrical and Computer Engineering, Florida International University, Miami, FL

16:20 D2-9

ON-TEXTILE COUPLED MAGNETIC RESONATORS FOR WIRELESS POWER HARVESTING APPLICATIONS

Dieff Vital*, John L. Volakis, Shubhendu Bhardwaj

Electrical and Computer Engineering, Florida International University, Miami, FL

**Session F3: RF Propagation Utilizing Numerical Weather Prediction
Room 155**

Session Co-Chairs: Katherine Mulreany, *Naval Surface Warfare Center Dahlgren Division*;
Tracy Haack, *Naval Research Laboratory - Marine Meteorology Division*

13:20 F3-1

PERFORMANCE OF FORECAST MODELS DURING CASPER WEST CAMPAIGN

Tracy Haack*¹, Thomas Hanley², Qing Wang³

¹*Marine Meteorology Division, Naval Research Laboratory, Monterey, CA*

²*Johns Hopkins University/Applied Physics Laboratory, Laurel, MD*

³*Meteorology, Naval Postgraduate School, Monterey, CA*

13:40 F3-2

FIXED-LINK AND RANGE-DEPENDENT X-BAND EM PROPAGATION MEASUREMENTS IN THE MARINE ATMOSPHERIC BOUNDARY LAYER FOR TESTING NUMERICAL WEATHER PREDICTION OF REFRACTIVITY

Qi Wang*¹, Robert Burkholder¹, Caglar Yardim¹, Tracy Haack², Qing Wang³,

Denny Alappattu³, Ryan Yamaguchi³, Joseph Fernando⁴, Adam Christman⁴, Djamal Khelif⁵

¹*The Ohio State University, Columbus, OH*

²*Office of Naval Research, Arlington, VA*

³*Naval Postgraduate School, Monterey, CA*

⁴*University of Notre Dame, Notre Dame, IN*

⁵*The University of California, Irvine, Irvine, CA*

14:00 F3-3

THURSDAY AFTERNOON

LOW ATMOSPHERIC PROPAGATION SYSTEM (LATPROP) MEASUREMENT RESULTS ON CASPER-WEST

Luyao Xu*¹, Caglar Yardim¹, Robert Burkholder¹, Qing Wang², Ryan T. Yamaguchi², David G. Ortiz-Suslow², Harindra Joseph S. Fernando³, Raghu Krishnamurthy³, Kyle B. Franklin², Denny P. Alappattu², Benjamin Wauer²

¹*The Ohio State University, Columbus, OHIO*

²*Naval Postgraduate School, Monterey CA*

³*University of Notre Dame, Notre Dame, IN*

14:20 F3-4

ATMOSPHERIC FEATURES DETECTED IN X-BAND DOPPLER RADAR

Tony de Paolo*¹, Eric Terrill¹, Sophia Merrifield¹, Merrick Haller², Annika O'Dea², Tracy Haack³

¹*Scripps Institution of Oceanography, La Jolla, CA*

²*Oregon State University, Corvallis, OR*

³*Naval Research Laboratory, Monterey, CA*

14:40 F3-5

RF PROPAGATION AND ATMOSPHERIC MEASUREMENTS WITH UAVS AND USVS

Tony de Paolo*, Eric Terrill, Sophia Merrifield, Daniel Bedenko

Coastal Observing Research and Development Center, Scripps Institution of Oceanography, La Jolla, CA

15:00 Break

15:20 F3-6

ANALYSIS OF EVAPORATIVE DUCT VARIABILITY FROM LARGE EDDY SIMULATIONS

Kyle B. Franklin*¹, Qing Wang¹, Tao Cao², Lian Shen²

¹*Meteorology, Naval Postgraduate School, Monterey, CA*

²*University of Minnesota, Minneapolis, MN*

15:40 F3-7

MESOSCALE NUMERICAL WEATHER PREDICTIONS USED FOR RADIO FREQUENCY PROPAGATION ALONG A LOW ELEVATION OVER WATER PATH

Abby Anderson*, Katherine L. Mulreany, Zachary B. Ratliff, Matthew I. Jackson, Victor R. Wiss

NSWC Dahlgren, Dahlgren, VA

16:00 F3-8

BLENDING SURFACE LAYER, NWP MODEL AND CLIMATOLOGICAL REFRACTIVITY PROFILES: METHODS AND ISSUES

Paul A. Frederickson*

Meteorology, Naval Postgraduate School, Monterey, CA

16:20 F3-9

INVESTIGATING CORRELATION DROPOUTS OF NWP FORECAST EM PROPAGATION FOR TAPS FIELD CAMPAIGN

THURSDAY AFTERNOON

Andrew J. Kammerer*¹, Tracy Haack¹, Hedley Hansen²

¹*Marine Meteorology Division, Naval Research Laboratory, Monterey, CA*

²*Cyber and Electronic Warfare Division, Defense Science and Technology Organization, Adelaide, AUSTRALIA*

16:40 F3-10

INVESTIGATING THE ACCURACY OF NUMERICAL WEATHER PREDICTION
MODELING IN SUBREFRACTIVE ENVIRONMENTS

Katherine Mulreany*¹, Tracy Haack², Ted Rogers³

¹*Naval Surface Warfare Center Dahlgren Division, Dahlgren, VA*

²*Naval Research Laboratory, Monterey, CA*

³*SPAWAR Systems Center Pacific, San Diego, CA*

Session G4: Radar and Radio Techniques for Ionospheric Diagnostics Room 151

Session Co-Chairs: Thomas Gaussiran, *The University of Texas at Austin*;
Y. Jade Morton, *University of Colorado Boulder*

13:20 G4-1

THE DISCOVERY OF NOVEL IONOSPHERIC PHENOMENA USING IONOSPHERIC
HIGH FREQUENCY SOFTWARE-DEFINED RADAR

Salih M. Bostan, Julio V. Urbina*, John D. Mathews

Electrical Engineering, The Pennsylvania State University, University Park, PA

13:40 G4-2

IRAN'S FIRST CUBESAT MISSION: RADIO EXPLORER FOR EARTH, IONOSPHERE,
MESOSPHERE AND ATMOSPHERE (REEIMA)

Alireza Mahmoudian*¹, Haiyang Fu², Alireza Alikhani¹, Mike Kosch³,

Mahmoud Talafi Noghani¹, Milad Azimi¹, Andrew Senior⁴

¹*Aerospace Research Institute, Ministry of Science, Research and Technology, Tehran, IRAN*

²*Fudan University, Shanghai, CHINA*

³*South African National Space Agency (SANSA), Western Cape, SOUTH AFRICA*

⁴*Independent Researcher, Lancaster, UNITED KINGDOM*

14:00 G4-3

HAMSCI PERSONAL SPACE WEATHER STATION: A NEW TOOL FOR CITIZEN
SCIENCE GEOSPACE RESEARCH

Joshua S. Vega*¹, Nathaniel A. Frissell¹, Philip J. Erickson², Andrew J. Gerrard¹

¹*New Jersey Institute of Technology, Newark, NJ*

²*MIT Haystack Observatory, Westford, MA*

14:20 G4-4

HIGH ALTITUDE ISR EXPERIMENTS AT JICAMARCA

Sevag Derghazarian*

Earth and Atmospheric Sciences, Cornell University, Ithaca, NY

14:40 G4-5

THURSDAY AFTERNOON

IRREGULARITY PARAMETER ESTIMATION FOR INTERPRETATION OF
SCINTILLATION DOPPLER AND INTENSITY SPECTRA

Charles S. Carrano*, Charles L. Rino
Institute for Scientific Research, Boston College, Chestnut Hill, MA

15:00 Break

15:20 G4-6

ELECTRON-ELECTRON COLLISION EFFECTS ON ISR TEMPERATURE
MEASUREMENTS

William J. Longley*, Meers M. Oppenheim, Yakov S. Dimant
Center for Space Physics, Boston University, Boston, MA

15:40 G4-7

RADIO PROPAGATION EFFECTS FROM INFRASONIC WAVES IN THE IONOSPHERE

Justin J. Mabee*, Terrence Bullett
CIRES, University of Colorado Boulder, Boulder, CO

16:00 G4-8

IONTV: USING TIMING REFERENCE SIGNALS TO OBSERVE IONOSPHERIC
VARIATION

Joseph Dusenbury*¹, William Liles², Philip Erickson³, Kiersten C. Kerby-Patel¹
¹*University of Massachusetts Boston, Boston, MA*
²*Independent Consultant, Reston, VA*
³*MIT Haystack Observatory, Westford, MA*

16:20 G4-9

SOUNDING THE IONOSPHERE WITH SIGNALS OF OPPORTUNITY IN THE HIGH-
FREQUENCY (HF) BAND

Ethan S. Miller*¹, Gary S. Bust¹, Gareth W. Perry², Stephen R. Kaeppler³, Juha Vierinen⁴,
Nathaniel A. Frissell⁵, Andrew A. Knuth¹, Phil J. Erickson⁶, Romina Nikoukar¹,
Alex T. Chartier¹, Pedrina Santos⁷, Christiano Brum⁷, Jonathan T. Fentzke^{7,8},
Thomas R. Hanley¹, Andrew J. Gerrard⁵
¹*Johns Hopkins University Applied Physics Laboratory, Laurel, MD*
²*University of Calgary, Calgary, AB, CANADA*
³*Clemson University, Clemson, SC*
⁴*University of Tromsø, Tromsø, NORWAY*
⁵*New Jersey Institute of Technology, Newark, NJ*
⁶*Haystack Observatory, MIT, Westford, MA*
⁷*Arecibo Observatory, Arecibo, PR*
⁸*Scientific Solutions, Inc, Computational Physics, Inc, North Chelmsford, MA*

Session H3: Waves and Turbulence in Laboratory and Space Plasmas
Room 245

Session Co-Chairs: Carl Siefring, *Naval Research Laboratory*;
Jim Schroeder, *University of Iowa*;

THURSDAY AFTERNOON

Vijay Harid, *University of Colorado Denver*

13:20 H3-1

FARLEY-BUNEMAN INSTABILITIES IN THE AURORAL E-REGION: HYBRID SIMULATIONS AND CONVECTION ESTIMATES

Enrique L. Rojas Villalba*, David L. Hysell

Earth and Atmospheric Sciences, Cornell University, Ithaca, NY

13:40 H3-2

GLOBAL SIMULATION OF ELECTRON CYCLOTRON HARMONIC WAVE INSTABILITY IN A STORM-TIME MAGNETOSPHERE

Xu Liu*¹, Lunjin Chen¹, Miles A. Engel², Vania K. Jordanova²

¹*Physics, University of Texas at Dallas, Richardson, TX*

²*Los Alamos National Laboratory, Los Alamos, NM*

14:00 H3-3

RESONANT HEATING OF THERMAL IONS BY ELECTROMAGNETIC ION CYCLOTRON WAVES IN THE MAGNETOSPHERE

Qianli Ma*¹, Chao Yue¹, Wen Li², Jacob Bortnik¹, Richard M. Thorne¹

¹*Atmospheric and Oceanic Sciences, University of California, Los Angeles, Los Angeles, CA*

²*Center for Space Physics, Boston University, Boston, MA*

14:20 H3-4

INVESTIGATION OF RESONANT ULTRA-LOW FREQUENCY WAVES IN FIELD LINE RESONATOR AND IONOSPHERIC ALFVÉN RESONATOR AT LOW AND MIDDLE LATITUDES

Mergen Alimaganbetov*, Anatoly V. Streltsov

Physical Sciences, Embry-Riddle Aeronautical University, Daytona Beach, FL

14:40 H3-5

PROPAGATION CHARACTERISTICS OF IONOSPHERIC HISS WAVES

Zhiyang Xia*, Lunjin Chen

Physics, University of Texas at Dallas, Richardson, TX

15:00 Break

15:20 H3-6

TWO DIMENSIONAL FULL-WAVE MODELING OF PROPAGATION OF LOW-ALTITUDE HISS IN THE IONOSPHERE

Xiang Xu*, Lunjin Chen

William B. Hanson Center for Space Sciences, University of Texas at Dallas, Richardson, TX

15:40 H3-7

ELECTRON-ION HYBRID INSTABILITY IN A QUASI-STATIC NEAR-EARTH DIPOLARIZATION FRONT

Dong Lin*¹, Wayne A. Scales¹, Gurudas Ganguli², Xiangrong Fu³, Erik Tejero², Chris Crabtree², Yuxi Chen⁴, Alex Fletcher²

THURSDAY AFTERNOON

¹*Electrical and Computer Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA*

²*Naval Research Laboratory, Washington DC*

³*New Mexico Consortium, Los Alamos, NM*

⁴*Center for Space Environment Modeling, University of Michigan, Ann Arbor, MI*

16:00 H3-8

POLARIZATION MEASUREMENTS OF NATURAL LOW-FREQUENCY RADIO EMISSIONS OBSERVED BY EPOP- RRI

Ashanthi S. Maxworth*¹, Glenn C. Hussey¹, Fraser Hird¹, George Sofko¹, Gordon James², Andrew W. Yau²

¹*Physics and Engineering Physics, University of Saskatchewan, Saskatoon, Saskatchewan, CANADA*

²*Physics, University of Calgary, Calgary, Alberta, CANADA*

16:20 H3-9

POLARIZATION MEASUREMENTS OF H⁺ ION CYCLOTRON WHISTLERS OBSERVED BY EPOP- RRI

Ashanthi S. Maxworth*¹, Glenn C. Hussey¹, George Sofko¹, Fraser Hird¹, Gordon James², Andrew W. Yau²

¹*Physics and Engineering Physics, University of Saskatchewan, Saskatoon, CANADA*

²*Physics, University of Calgary, Calgary, Alberta, CANADA*

16:40 H3-10

SPACE MEASUREMENTS OF A ROCKET-RELEASED TURBULENCE (SMART) IS A FUTURE EXPERIMENT TO STUDY TURBULENCE EFFECTS ON THE RADIATION BELTS

Carl L. Siefring*, Gurudas Ganguli, Chris E. Crabtree, Alex Fletcher
Plasma Physics Division, Naval Research Laboratory, Washington, DC

17:00 H3-11

A FRAMEWORK FOR MICROSCOPIC/MACROSCOPIC SIMULATIONS OF MAGNETIZED PLASMAS

Gian Luca Delzanno*¹, Vadim Roytershteyn², Oleksandr Koshkarov¹, Cecilia Pagliantini³, Gianmarco Manzini¹

¹*Los Alamos National Laboratory, Los Alamos, NM*

²*Space Science Institute, Boulder, CO*

³*École Polytechnique Fédérale de Lausanne, Lausanne, SWITZERLAND*

17:20 H3-12

PHASE-SPACE DYNAMIC OF COHERENT WAVE-PARTICLE INTERACTION IN THE RADIATION BELT

Poorya Hosseini*, Vijay Harid, Mark Golkowski
University of Colorado Denver, Denver, CO

17:40 H3-13

HYBRID-PIC SIMULATION OF WHISTLER MODE WAVE-PARTICLE INTERACTIONS IN THE EARTH'S RADIATION BELTS

THURSDAY AFTERNOON

Hoyoung Kim*, Vijay Harid
Electrical Engineering, University of Colorado Denver, Denver, CO

Session J3: Radio Emission from Extrasolar Planets
Room 265

Session Co-Chairs: Joseph Lazio, *Jet Propulsion Laboratory, California Institute of Technology*;
Alex Wolszczan, *The Pennsylvania State University*

13:20 J3-1 (Invited)

OBSERVING JUPITER'S AURORAL RADIO SOURCES AND EMISSIONS WITH JUNO
Masafumi Imai*¹, William S. Kurth¹, George B. Hospodarsky¹, Yasmina M. Martos²,
Philippe Louarn³, Scott J. Bolton⁴, John E. P. Connerney², Corentin K. Louis³, Laurent Lamy⁵,
Philippe Zarka⁵, Tracy E. Clarke⁶, Charles A. Higgins⁷, Baptiste Cecconi⁵

¹*University of Iowa, Iowa City, IA*

²*NASA Goddard Space Flight Center, Greenbelt, MD*

³*IRAP, Toulouse, FRANCE*

⁴*Southwest Research Institute, San Antonio, TX*

⁵*LESIA, CNRS, Observatoire de Paris, Meudon, FRANCE*

⁶*Naval Research Laboratory, Washington, DC*

⁷*Middle Tennessee State University, Murfreesboro, TN*

14:00 J3-2

USING RADIO EMISSION FROM PLANETARY-MASS BROWN DWARFS TO
UNDERSTAND PLANETARY MAGNETISM

Melodie M. Kao*¹, Evgenya Shkolnik¹, Gregg Hallinan², J. S. Pineda³, Adam Burgasser⁴,
David Stevenson⁵

¹*School of Earth and Space Exploration, Arizona State University, Tempe, AZ*

²*Astronomy, California Institute of Technology, Pasadena, CA*

³*School of Earth and Space Exploration, University of Colorado Boulder, Boulder, CO*

⁴*Center for Astrophysics and Space Science, University of California, San Diego, San Diego, CA*

⁵*Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA*

14:20 J3-3

THE SEARCH FOR RADIO EMISSION FROM EXOPLANETS USING LOFAR BEAM-
FORMED OBSERVATIONS

Jake D. Turner*¹, Jean-Mathias Griessmeier^{2,3}, Philippe Zarka^{4,3}, Iaroslavna Vasylieva⁵

¹*Astronomy, Cornell University, Ithaca, NY*

²*Laboratoire de Physique et Chimie de l'Environnement et de l'Espace (LPC2E), Université d'Orléans/CNRS, Orleans, FRANCE*

³*Station de Radioastronomie de Nancay, Observatoire de Paris, CNRS, PSL, Nancay, FRANCE*

⁴*LESIA, Observatoire de Paris, CNRS, PSL, Meudon, FRANCE*

⁵*Institute of Radio Astronomy, National Academy of Sciences of Ukraine, Kharkov, UKRAINE*

14:40 J3-4

MONITORING NEARLY 4000 NEARBY STELLAR SYSTEMS FOR RADIO
EXOPLANETS WITH THE OVRO-LWA

THURSDAY AFTERNOON

Marin M. Anderson*, Gregg Hallinan
Astronomy, California Institute of Technology, Pasadena, CA

15:00 Break

15:20 J3-5

SEARCHING FOR LOW-FREQUENCY RADIO EMISSIONS FROM NEARBY STARS AND EXOPLANETS

Jason Ling*¹, Andrea Isella¹, Christopher M. Johns-Krull¹, Joseph T. Lazio²

¹*Physics and Astronomy, Rice University, Houston*

²*Interplanetary Network Directorate, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA*

15:40 J3-6

USING SUNRISE AS A PATHFINDER FOR DETECTING LOW FREQUENCY RADIO EMISSION FROM EXTRASOLAR PLANETS WITH SPACE BASED RADIO ARRAYS

Alexander M. Hegedus*¹, Justin C. Kasper¹, Joseph Lazio², Andrew Romero-Wolf²,

Timothy S. Bastian³

¹*Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor, MI*

²*Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA*

³*National Radio Astronomy Observatory, Charlottesville, VA*

16:00 J3-7

RADIO EMISSION FROM EXTRASOLAR PLANETS AND THE ASTRONOMY & ASTROPHYSICS 2020 DECADEAL SURVEY

Joseph Lazio*

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA

**Session K2: RF, Microwave and THz Diagnostics/ Therapeutics
Room 150**

Session Co-Chairs: John Stang, *University of Southern California*;
Erdem Topsakal, *Virginia Commonwealth University*

13:20 K2-1

NEURAL NETWORK ASSISTED MULTI-MODALITY MICROWAVE INVERSE SCATTERING FOR BRAIN DIELECTRIC IMAGING

Guanbo Chen, Pratik Shah, John Stang*, Mahta Moghaddam

EE - Electrophysics, University of Southern California, Los Angeles, CA

13:40 K2-2

EFFECT OF WEAK STATIC MAGNETIC FIELDS ON CELL PROLIFERATION AND REACTIVE OXYGEN SPECIES OF HT-1080 HUMAN FIBROSARCOMA CELLS

Hakki Gurhan*, Sahithi Kandala, Frank Barnes

Electrical Engineering, University of Colorado Boulder, Boulder, CO

14:00 K2-3

THURSDAY AFTERNOON

IN VITRO BIOCOMPATIBILITY OF DUAL-BAND TIN ANTENNA IN EXCITED AND NON-EXCITED ENVIRONMENTS IN REAL TIME

Madeline Hays*^{1,2}, Lynn E. Secondo³, Ryan Green², Nastassja Lewinski³, Erdem Topsakal²

¹*Biomedical Engineering, Virginia Commonwealth University, Richmond, VA*

²*Electrical and Computer Engineering, Virginia Commonwealth University, Richmond, VA*

³*Chemical and Life Science Engineering, Virginia Commonwealth University, Richmond, VA*

14:20 K2-4

DIELECTRIC PROPERTIES OF BROWN AND WHITE ADIPOSE TISSUE IN RODENT MODEL FROM 0.5 GHZ TO 50 GHZ

Nikhat Nusrat*, Sydney Wojcieszak, Madeline Hays, Erdem Topsakal

Virginia Commonwealth University, Richmond, Virginia

14:40 K2-5

AIRBORNE INSECTS RADAR SCATTERING CHARACTERISTICS UTILIZING ELECTROMAGNETIC MODELING

Omar Alzaabi*¹, Diego Peñaloza-Aponte¹, Julio Urbina¹, James Breakall¹, Michael Lanagan²

¹*Electrical Engineering, The Pennsylvania State University, University Park Pennsylvania*

²*Engineering Science and Mechanics, The Pennsylvania State University, University Park Pennsylvania*

15:00 Break

15:20 K2-6

VALIDATION OF AN ARM-SWINGING HUMAN PHANTOM MODEL FOR THE STUDY OF WIRELESS BODY AREA NETWORKS

George Lee*, Brian Garner, Yang Li

School of Engineering and Computer Science, Baylor University, Waco, TX

15:40 K2-7

TITANIUM NITRIDE ANTENNAS FOR MEDICAL WIRELESS DATA TELEMETRY

Ryan Assi*, Ryan Green, Vitaliy Avrutin, Erdem Topsakal

Electrical and Computer Engineering, Virginia Commonwealth University, Richmond, VA

Commission Business Meetings

17:00 Commission B	Room 1B40
17:00 Commission G	Room 151
18:00 Commission D	Room 1B51
18:00 Commission H	Room 245
18:00 Commission K	Room 150

FRIDAY MORNING, 11 January 2019

**Session B7: Microstrip and Printed Devices and Antennas
Room 200**

Session Co-Chairs: Payam Nayeri, *Colorado School of Mines*;
Dimitra Psychogiou, *University of Colorado Boulder*

08:20 B7-1

SIW MICROSTRIP CAVITY RESONATORS WITH A SENSING APERTURE

Chaoxian Qi*, David R. Jackson, Yan Yao, Jiefu Chen

Electrical and Computer Engineering, University of Houston, Houston

08:40 B7-2

A BROADBAND PRINTED CONICAL BOWTIE DIPOLE ANTENNA WITH AN INTEGRATED BALUN

Ami Desai*, Payam Nayeri

Electrical Engineering, Colorado School of Mines, Golden, CO

09:00 B7-3

A WIDEBAND DUAL-POLARIZED STACKED MICROSTRIP PATCH ANTENNA WITH A DUMBBELL SHAPED APERTURE

Ami Desai*, Payam Nayeri

Colorado School of Mines, Golden, CO

09:20 B7-4

QUASI-ELLIPTIC BANDPASS FILTERS AND RF-DUPLEXERS WITH TUNABLE CENTER FREQUENCY, BANDWIDTH AND INTRINSIC RF SWITCHING-OFF CAPABILITIES

Dakotah J. Simpson*¹, Roberto Gómez-García², Dimitra Psychogiou¹

¹*Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO*

²*Signal Theory and Communications, University of Alcalá, Spain, Alcalá de Henares, SPAIN*

09:40 B7-5

A COMPACT HARMONIC SENSOR BASED ON A DUAL-RESONANT MICROSTRIP ANTENNA LOADED WITH A MICROFLUIDIC CHANNEL

Liang Zhu*¹, Nasser Alkhalidi², Pai-yen Chen¹

¹*Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, IL*

²*Electrical and Computer Engineering, Wayne State University, Detroit, MI*

**Session B8: Analytical and Theoretical Electromagnetics
Room 1B40**

Session Co-Chairs: Piergiorgio Uslenghi, *University of Illinois at Chicago*;
Branislav Notaros, *Colorado State University*

08:20 B8-1

FRIDAY MORNING

THE ANTENNA EQUATION: A DESCRIPTION OF ANTENNAS INSPIRED BY SCATTERING PARAMETERS

Everett G. Farr*

Farr Fields, LC, Albuquerque, NM

08:40 B8-2

ANALOGY BETWEEN ELASTODYNAMIC DISPLACEMENT AND ELECTROMAGNETIC VECTOR POTENTIALS

John W. Neese*¹, David R. Jackson², Leon A. Thomsen¹

¹*Earth and Atmospheric Sciences, University of Houston, Houston, TX*

²*Electrical and Computer Engineering, University of Houston, Houston, TX*

09:00 B8-3

EXCEPTIONAL POINTS OF DEGENERACIES IN GAIN AND LOSS BALANCED DEVICES

Ahmed Abdelshafy*, Tarek Mealy, Filippo Capolino

Electrical Engineering and Computer Science, University of California, Irvine, Irvine, CA

09:20 B8-4

THE DEGENERACY OF THE DOMINANT-MODE IN RECTANGULAR WAVEGUIDES

Tarek Mealy*, Ahmed F. Abdelshafy, Filippo Capolino

University of California, Irvine, Irvine, CA

09:40 B8-5

EXACT GEOMETRICAL OPTICS SCATTERING BY A RIGHT-ANGLE METALLIC WEDGE ILLUMINATED BY THREE PLANE WAVES

Piergiorgio L. E. Uslenghi*

Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, Illinois

10:00 Break

10:20 B8-6

APPLICATIONS OF SHOOTING-BOUNCING RAY TRACING TO MODELING PROPAGATION IN UNDERGROUND MINES

Blake A. Troksa*, Cam L. Key, Jake J. Harmon, Sanja B. Manic, Branislav M. Notaros

Electrical Engineering, Colorado State University, Fort Collins, CO

10:40 B8-7

FAST SPHERE INTERSECTION TESTS FOR SHOOTING-BOUNCING RAY TRACING: SPACE PARTITIONING AND RAY PATH VOXELIZATION

Cam Key*, Jake Harmon, Blake Troksa, Branislav M. Notaros

Electrical and Computer Engineering, Colorado State University, Fort Collins, CO

11:00 B8-8

WIDEBAND IN-BAND FULL-DUPLEX DUAL REFLECTOR ANTENNA SYSTEM

Prathap Valale Prasannakumar*, Mohamed A. Elmansouri, Dejan S. Filipovic

Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

FRIDAY MORNING

11:20 B8-9

WIRELESS MICROWAVE POWERING OF AGRICULTURAL SENSORS

Abbas Semnani*, Badri Baskaran, Dimitrios Peroulis

School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN

Session B9: Wireless Communications and Periodic Structures

Room 200

Session Co-Chairs: Satish Sharma, *San Diego State University*;

Nader Behdad, *University of Wisconsin-Madison*

10:20 B9-1

A RECIPROCAL TERRESTRIAL BACKHAUL ARCHITECTURE FOR THE INTEGRATION OF 5G IN HTS NETWORKS

Behzad Koosha*, Hermann Helgert, Reza Karimian

The George Washington University, Washington DC

10:40 B9-2

INTERFERENCE MITIGATION FOR 5G MILLIMETER WAVE COMMUNICATION LINKS

Dimitrios Sifarakis*, Elias A. Alwan, John L. Volakis

Florida International University, Miami, FL

11:00 B9-3

A HYBRID BEAM HOPPING DESIGN FOR NON-UNIFORM TRAFFIC IN HTS NETWORKS

Behzad Koosha*, Hermann Helgert, Reza Karimian

The George Washington University, Washington DC

11:20 B9-4

LOW-PROFILE POLARIZATION ROTATING SURFACES WITH SECOND-ORDER BAND PASS RESPONSES

Konstantinos Mavrakakis*, Hung Luyen, John H. Booske, Nader Behdad

Electrical Engineering, University of Wisconsin-Madison, Madison WI

11:40 B9-5

FROZEN-LIGHT MODES IN 3-WAY COUPLED SILICON RIDGE WAVEGUIDES

Raed Almhadi*, Kubilay Sertel

Electrical and Computer Engineering, ElectroScience Laboratory, The Ohio State University, Columbus, OH

Session F4: Remote Sensing: Small Satellites and RFI Mitigation

Room 155

Session Co-Chairs: Steven Reising, *Colorado State University*;

Albin Gasiewski, *University of Colorado Boulder*

08:20 F4-1

FRIDAY MORNING

RAINCUBE, A KA-BAND PRECIPITATION RADAR MISSION IN A CUBESAT

Eva Peral¹, Shannon Statham¹, Simone Tanelli¹, Shivani Joshi*¹, Travis Imken¹, Douglas Price¹, Jonathan Sauder¹, Nacer Chahat¹, Austin Williams²

¹*Jet Propulsion Laboratory, Pasadena, CA*

²*Tyvak Nano-Satellite Systems, Inc., Irvine, CA*

08:40 F4-2

ICECUBE'S 15-MONTH EXPERIMENT WITH A COMMERCIAL 883-GHZ CLOUD RADIOMETER

Dong L. Wu*¹, Jeffrey R. Piepmeier¹, Jaime Esper¹, Negar Ehsan¹, Paul E. Racette¹, Thomas E. Johnson¹, Brian S. Abresh¹, Eric Bryerton²

¹*NASA Goddard Space Flight Center, Greenbelt, Maryland*

²*Virginia Diodes, Inc., Charlottesville, VA*

09:00 F4-3

STATUS OF THE MICROMAS-2 AND TROPICS CUBESAT MISSIONS

William Blackwell*

MIT Lincoln Laboratory, Lexington, MA

09:20 F4-4

THE CUBESAT RADIOMETER RADIO FREQUENCY INTERFERENCE TECHNOLOGY VALIDATION (CUBERRT) MISSION

Joel T. Johnson*¹, Christa McKelvey¹, Chris Ball¹, Chi-Chih Chen¹, Graeme Smith¹, Mark Andrews¹, Sidharth Misra², Shannon Brown², Robert Jarnot², Rudi Bendig², Carl Felten², Kevin Horgan³, Jared Lucey³, Jinzheng Peng³, Jeffrey Piepmeier³, Michael Solly³, Joseph Knuble³, Jonathon Kocz⁴, Doug Laczkowski⁵, Matt Pallas⁵

¹*The Ohio State University, Columbus, OH*

²*NASA Jet Propulsion Laboratory, Pasadena, CA*

³*NASA Goddard Space Flight Center, Greenbelt, MD*

⁴*California Institute of Technology, Pasadena, CA*

⁵*Blue Canyon Technologies, Inc., Boulder, CO*

09:40 F4-5

EARLY RESULTS OF HURRICANE AND SEVERE STORM OBSERVATIONS FROM TEMPORAL EXPERIMENT FOR STORMS AND TROPICAL SYSTEMS - DEMONSTRATION (TEMPEST-D) MISSION

Steven C. Reising*¹, Todd C. Gaier², Sharmila Padmanabhan², Boon H. Lim², Shannon T. Brown², Cate Heneghan², Wesley Berg¹, Christian D. Kummerow¹, V. Chandrasekar¹, Matthew Pallas³, Doug Laczkowski³, C Radhakrishnan¹

¹*Colorado State University, Fort Collins, CO*

²*Jet Propulsion Laboratory, California Institute of Technology Pasadena, CA*

³*Blue Canyon Technologies, Boulder, CO*

10:00 Break

10:20 F4-6

INITIAL RADIANCE VALIDATION OF ON-ORBIT MICROMAS-2A DATA

FRIDAY MORNING

Angela Crews*¹, William Blackwell², R. Vincent Leslie², Michael Grant³, Idahosa Osaretin², Michael DiLiberto², Adam Milstein², Kerri Cahoy¹

¹*MIT, Cambridge, MA*

²*MIT Lincoln Laboratory, Lexington, MA*

³*NASA Langley, Hampton, VA*

10:40 F4-7

RADIO FREQUENCY INTERFERENCE PROCESSING FOR THE CUBESAT
RADIOMETER RADIO FREQUENCY INTERFERENCE TECHNOLOGY VALIDATION
(CUBERTT) MISSION

Joel T. Johnson*¹, Christa McKelvey¹, Chris Ball¹, Graeme Smith¹, Mark Andrews¹, Sidharth Misra², Shannon Brown², Robert Jarnot², Rudi Bendig², Carl Felten², Kevin Horgan³, Jinzheng Peng³, Jeffrey Piepmeier³, Jonathon Kocz⁴

¹*The Ohio State University, Columbus, OH*

²*NASA Jet Propulsion Laboratory, Pasadena, CA*

³*NASA Goddard Space Flight Center, Greenbelt, MD*

⁴*California Institute of Technology, Pasadena, CA*

11:00 F4-8

ATMOSPHERIC AND IONOSPHERIC RADIO OCCULTATION MEASUREMENTS
OBTAINED FROM SPIRE'S NANOSATELLITE CONSTELLATION

Vu Nguyen*¹, Vladimir Irisov¹, Tim Duly¹, Oleguer Nogues-Correig², Linus Tan³, Takayuki Yuasa³, Dallas Masters¹

¹*Spire Global, Inc., Boulder, CO*

²*Spire Global, Inc., Glasgow, UNITED KINGDOM*

³*Spire Global, Inc., Singapore, SINGAPORE*

11:20 F4-9

SIGNALS OF OPPORTUNITY P-BAND INVESTIGATION (SNOOPI)

James L. Garrison*¹, Jeffrey R. Piepmeier², Rashmi Shah³, David Spencer¹, Manuel A. Vega²

¹*School of Aeronautics and Astronautics, Purdue University, West Lafayette, IN*

²*555, NASA Goddard Spaceflight Center, Greenbelt, MD*

³*NASA Jet Propulsion Laboratory, Pasadena, CA*

Session G5: New Horizons in Active and Passive Radio Techniques for Geospace Remote Sensing Room 151

Session Co-Chairs: Philip Erickson, *MIT Haystack Observatory*;
Julio Urbina, *The Pennsylvania State University*

08:20 G5-1

COMPARISON OF METER-SCALE PLASMA IRREGULARITIES PROBED BY TWO
EQUATORIAL RADARS LOCATED IN PERU: JICAMARCA AND HUANCAYO

Adriyel Nieves, Julio Urbina*

Electrical Engineering, The Pennsylvania State University, University Park, PA

FRIDAY MORNING

08:40 G5-2

NEW OBSERVATIONS OF THE HF PLASMA LINE OVERSHOOT AT THE ARECIBO OBSERVATORY

Anthea Coster*¹, Eliana Nossa², Phil Perrilat³, Elizabeth Kendall⁴, Asti Bhatt⁴

¹*MIT Haystack Observatory, Westford, MA*

²*Johns Hopkins Applied Physics Laboratory, Laurel, MD*

³*Arecibo Observatory, Arecibo, PR*

⁴*SRI International, Palo Alto, CA*

09:00 G5-3

USING THE LWA RADIO TELESCOPE TO OBSERVE THE IONOSPHERE

Kenneth S. Obenberger*

Space Vehicles Directorate, Air Force Research Laboratory, NM

09:20 G5-4

AN INVESTIGATION OF IONOSPHERIC FORECASTING USING TIE-GCM AND ENKF

Scott M. Rabidoux*, Roy S. Calfas, Thomas L. Gaussiran

Applied Research Laboratories, The University of Texas at Austin, Austin, TX

09:40 G5-5

COMPARING MSTIDS GENERATED FROM TROPOSPHERIC WEATHER TO THE HOOKE MODEL

Katherine A. Zawdie*, Sarah E. McDonald, Stephen Eckermann, Fabrizio Sassi

Space Science Division, Naval Research Laboratory, Washington, DC

10:00 Break

10:20 G5-6

EXAMINING THE USE OF THE EMPIRICAL CANADIAN HIGH ARCTIC IONOSPHERIC MODEL (E-CHAIM) USING IN SITU MEASUREMENTS

David R. Themens*, P. T. Jayachandran, Anthony M. McCaffrey

Physics, University of New Brunswick, Fredericton, CANADA

10:40 G5-7

EXPLORING THE FORMATION OF POLAR CAP PATCHES VIA MODEL-BASED LAGRANGIAN COHERENT STRUCTURES IN THE IONOSPHERE

Ningchao Wang*¹, Seebany Datta-Barua¹, Uriel Ramirez¹, Alex Chartier²

¹*Illinois Institute of Technology, Chicago, IL*

²*Johns Hopkins University, Laurel, MD*

**Session HEG: Lightning and the Ionosphere
Room 245**

Session Co-Chairs: Robert Marshall, *University of Colorado Boulder*;
Victor Pasko, *The Pennsylvania State University*

08:20 HEG-1 (Invited)

HIGH-ENERGY ATMOSPHERIC PHYSICS THEORY AND MODELING

FRIDAY MORNING

Joseph R. Dwyer*, Ningyu Liu, Kevin M. A. Ihaddadene
Physics, University of New Hampshire, Durham NH

08:40 HEG-2 (Invited)

STUDYING TERRESTRIAL GAMMA-RAY FLASHES WITH FERMI GAMMA-RAY BURST MONITOR AND LIGHTNING LOCATING SYSTEMS

Bagratt G. Mailyan*¹, Amitabh Nag², Michael S. Briggs¹

¹*The University of Alabama in Huntsville, Huntsville, AL*

²*Florida Institute of technology, Melbourne, FL*

09:00 HEG-3

SPRITE STREAMER INITIATION DUE TO IONIZATION OF METALLIC SPECIES AT SPRITE ALTITUDES

Reza Janalizadeh Choobbasti*, Victor P. Pasko

Communications and Space Sciences Laboratory, Electrical Engineering, The Pennsylvania State University, University Park, PA

09:20 HEG-4

PHOTOIONIZATION OF METALLIC SPECIES AT SPRITE ALTITUDES BY FAR-UV EMISSIONS OF LBH BAND SYSTEM OF MOLECULAR NITROGEN

Victor P. Pasko*

The Pennsylvania State University, University Park, PA

09:40 HEG-5 (Invited)

EXPLAINING THE SPECTRUM OF NARROW BIPOLAR EVENTS WITH A SYSTEM OF STREAMERS

Ningyu Liu*¹, Joseph Dwyer¹, Julia Tilles¹, Mark Stanley², Paul Krehbiel², William Rison², Robert Brown³, Jennifer Wilson³

¹*Physics and Space Science Center (EOS), University of New Hampshire, Durham, NH*

²*Physics, New Mexico Tech, Socorro, NM*

³*NASA, Kennedy Space Center, FL*

10:00 Break

10:20 HEG-6

THE RADIO FREQUENCY EMISSION SPECTRUM OF COLLIDING STREAMERS

Jacob H. Koile*¹, Ningyu Liu¹, Feng Shi², Joseph R. Dwyer¹

¹*Physics, University of New Hampshire, Durham, NH*

²*Physics, Auburn University, Auburn, AL*

10:40 HEG-7

INVESTIGATING IONOSPHERIC LIGHTNING RETURNS USING THE LONG WAVELENGTH ARRAY

Joseph B. Malins*¹, Kenneth Obenberger², Gregory Taylor¹

¹*Physics and Astronomy, University of New Mexico, Albuquerque, NM*

²*Kirtland AFB, Air Force Research Laboratory, Albuquerque, NM*

FRIDAY MORNING

**Session J4: Cosmology and Astrophysics at Low Frequencies I
Room 265**

Session Co-Chairs: Greg Taylor, *University of New Mexico*;
Nithyanandan Thyagarajan, *National Radio Astronomy Observatory*;
Judd Bowman, *Arizona State University*

08:20 J4-1 (Invited)

THE LOW FREQUENCY TRANSIENT SKY

Gregg Hallinan*

California Institute of Technology, Pasadena, CA

08:35 J4-2 (Invited)

STRENGTHENING THE COSMOLOGICAL INTERPRETATION OF THE EDGES SIGNAL
THROUGH INSTRUMENTAL VERIFICATION

Raul A. Monsalve*¹, Judd D. Bowman², Alan E. Rogers³, Thomas J. Mozdzen²,
Nivedita Mahesh²

¹*Physics, McGill University, Montreal, Quebec, CANADA*

²*School of Earth and Space Exploration, Arizona State University, Tempe, AZ*

³*Haystack Observatory, Massachusetts Institute of Technology, Westford, MA*

08:50 J4-3 (Invited)

PULSARS AT LOW RADIO FREQUENCIES, CYCLIC SPECTROSCOPY, AND PULSAR
TIMING ARRAYS

Timothy Dolch*

Physics, Hillsdale College, Hillsdale, MI

09:05 J4-4 (Invited)

STATUS OF THE HYDROGEN EPOCH OF REIONIZATION ARRAY

David R. DeBoer*

University of California, Berkeley, CA

09:20 J4-5

DARK COSMOLOGY: INVESTIGATIONS OF DARK MATTER IN THE DARK AGES
WITH THE SPACE-BASED DARK AGES POLARIMETER PATHFINDER (DAPPER)

Jack O. Burns*¹, Stuart Bale², Richard Bradley³, Keith Tauscher¹, David Rapetti¹

¹*CASA, University of Colorado Boulder, Boulder, CO*

²*Space Sciences Laboratory, University of California, Berkeley, Berkeley, CA*

³*Central Development Laboratory, National Radio Astronomy Observatory, Charlottesville, VA*

09:30 J4-6

FUNDAMENTAL LIMITATIONS ON THE CALIBRATION OF REDUNDANT 21-CM
COSMOLOGY INSTRUMENTS AND IMPLICATIONS FOR HERA AND THE SKA

Ruby L. Byrne*¹, Miguel F. Morales¹, Bryna Hazelton¹, Wenyang Li², Nichole Barry³

¹*Physics, University of Washington, Seattle, WA*

²*Physics, Brown University, Providence, RI*

³*Physics, University of Melbourne, Melbourne, Victoria, AUSTRALIA*

09:40 J4-7

FRIDAY MORNING

A RADIO SCREAM AT COSMIC DAWN: MODELING THE IMPACT OF RADIO-LOUD BLACK HOLES IN THE 21 CM SIGNAL

Aaron Ewall-Wice*, Tzu-Ching Chang, Joseph Lazio
Jet Propulsion Laboratory, Pasadena, CA

09:50 J4-8

THE HIGH-Z 21-CM GLOBAL SPECTRUM EXPERIMENT

Jeffrey B. Peterson*
Carnegie Mellon University, Pittsburgh PA

10:00 Break

10:20 J4-9

SPECTRAL INDEX OF THE DIFFUSE RADIO BACKGROUND BETWEEN 50 AND 100 MHZ

Thomas J. Mozdzen¹, Nivedita Mahesh*¹, Raul A. Monsalve², Alan E. E. Rogers³,
Judd D. Bowman¹

¹*Astrophysics, Arizona State University, Tempe, AZ*

²*University of Colorado Boulder, Boulder, CO*

³*MIT Haystack observatory, Westford, MA*

10:30 J4-10 (Invited)

FRB DETECTION & CHARACTERIZATION AT THE DAWN OF THE CHIME ERA

Emmanuel Fonseca*
McGill University, Montreal, CANADA

10:45 J4-11 (Invited)

THE CANADIAN HYDROGEN INTENSITY MAPPING EXPERIMENT (CHIME): UPDATE AND STATUS

Laura Newburgh*
Physics, Yale University, New Haven, CT

11:00 J4-12 (Invited)

AN ANTI-COINCIDENCE SEARCH FOR COSMIC TRANSIENTS WITH THE LWA RADIO TELESCOPES

Kenneth S. Obenberger*¹, Savin S. Varghese², Gregory B. Taylor²

¹*Space Vehicles Directorate, Air Force Research Laboratory, KAFB, NM*

²*Physics and Astronomy, University of New Mexico, Albuquerque, NM*

11:15 J4-13 (Invited)

PREDICTIONS AND DETECTIONS OF HIGH MASS GALAXIES IN CHILES

Monica C. Sanchez*^{1,2}, Patricia A. Henning², Emmanuel Momjian¹, Jacqueline van Gorkom³

¹*National Radio Observatory, Socorro, NM*

²*Physics and Astronomy, University of New Mexico, Albuquerque, NM*

³*Astronomy, Columbia University, New York, NY*

11:30 J4-14

A RE-ANALYSIS OF PAPER-64 WITH THE SIMPLEDS PIPELINE

FRIDAY MORNING

Matthew Kolopanis*¹, Daniel C. Jacobs¹, Carina Cheng²

¹*School of Earth and Space Exploration, Arizona State University, Tempe, AZ*

²*Astronomy, University of California, Berkeley, Berkeley, CA*

11:40 J4-15

FULL DATA ANALYSIS PIPELINE FOR LOW RADIO FREQUENCY MEASUREMENTS
OF THE DARK AGES AND COSMIC DAWN

David Rapetti*^{1,2}, Keith Tauscher¹, Jack O. Burns¹, Jordan Mirocha³

¹*Center for Astrophysics and Space Astronomy, Astrophysical and Planetary Science, University
of Colorado Boulder, Boulder, CO*

²*NASA Ames Research Center, Moffett Field, CA*

³*Physics, McGill University, Montreal, Quebec, CANADA*

11:50 J4-16

RECENT RESULTS FROM THE MWA AND LESSONS LEARNED AT THE FOREFRONT
OF EOR PS ANALYSIS EFFORTS

Miguel F. Morales*

University of Washington, Seattle, WA

FRIDAY NOON, 11 January 2019

Sixth Hans Liebe Lecture Event

Math 100

12:15 HL -1

FOSTERING GROUND-BASED MICROWAVE RADIOMETRY: FROM UNCERTAINTY
TO NETWORKING

Domenico Cimini *

Institute of Methodologies for Environmental Analysis (CNR-IMAA)

C.da S.Loja, Tito Scalo (Potenza), Italy

FRIDAY AFTERNOON

FRIDAY AFTERNOON, 11 January 2019

**Session B10: Low-Profile Antennas from Gigahertz to Terahertz
Room 1B40**

Session Co-Chairs: Goutam Chattopadhyay, *Jet Propulsion Laboratory, California Institute of Technology*;
Satish Sharma, *San Diego State University*

13:20 B10-1 (Invited)

A MECHANICALLY CONFIGURABLE MICROSTRIP PATCH ANTENNA FOR IEEE 802.11 WLAN BAND

Payam Nayeri*, Randy Haupt

Electrical Engineering, Colorado School of Mines, Golden, CO

13:40 B10-2

DESIGN OF STRONGLY MINIATURIZED, INHERENTLY MATCHED, AND SCALABLE FOLDED DIPOLE ANTENNAS

Sanghamitro Das¹, David J. Sawyer¹, Nectaria Diamanti^{2,3}, A. P. Annan³, Ashwin K. Iyer*¹

¹*Electrical and Computer Engineering, University of Alberta, Edmonton, Alberta, CANADA*

²*Aristotle University of Thessaloniki, Thessaloniki, GREECE*

³*Sensors & Software Inc., Mississauga, Ontario, CANADA*

14:00 B10-3

A 2D PERIODIC CROSS-SHAPED LEAKY-WAVE ANTENNA

Sohini Sengupta*¹, David R. Jackson², Ahmed T. Almutawa³, Hamidreza Kazemi³,

Filippo Capolino³

¹*Energous Corporation, San Jose, California*

²*Electrical and Computer Engineering, University of Houston, Houston, Texas*

³*Electrical Engineering and Computer Science, University of California, Irvine, Irvine, California*

14:20 B10-4 (Invited)

3D-PRINTED FREQUENCY SCANNING SLOTTED WAVEGUIDE ARRAY WITH WIDE BAND POWER DIVIDER

Kunchen Zhao*, Grant Senger, Nima Ghalichechian

Electrical and Computer Engineering, ElectroScience Laboratory, The Ohio State University, Columbus, OH

14:40 B10-5 (Invited)

ANTI-REFLECTIVE SUEX COATINGS OF SILICON OPTICS FOR MMW AND THZ APPLICATIONS

Seckin Sahin*, Niru K. Nahar, Kubilay Sertel

Electrical and Computer Engineering, The Ohio State University, Columbus, OH

15:00 Break

15:20 B10-6

FRIDAY AFTERNOON

3D PRINTED LINEAR AND CIRCULAR POLARIZED MAGNETO-ELECTRIC ANTENNA COVERING L1-L5 GPS BANDS

Ghanshyam Mishra*, Satish Kumar Sharma

Electrical and Computer Engineering, San Diego State University, San Diego, California

15:40 B10-7 (Invited)

CAPACITY RECONFIGURABLE ORIGAMI ENABLED MIMO ANTENNA

Nicholas E. Russo*, Constantinos L. Zekios, Stavros V. Georgakopoulos

Electrical and Computer Engineering, Florida International University, Miami, FL

16:00 B10-8 (Invited)

DESIGN OF A CORRUGATED ANTIPODAL VIVALDI ANTENNA WITH STABLE PATTERN

Omid Manoochchri¹, Farhad Farzami¹, Danilo Erricolo*¹, Pai-yen Chen¹, Amin Darvazehban², Atif Shamim³, Hakan Bagci³

¹*Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, IL*

²*Electrical Engineering, University of Queensland, Queensland, AUSTRALIA*

³*Division of Computer, Electrical, and Mathematical Science and Engineering, King Abdullah University of Science and Technology, Thuwal, SAUDI ARABIA*

16:20 B10-9 (Invited)

SIMULTANEOUS TRANSMIT AND RECEIVE ARCHITECTURE FOR REFLECTARRAY ANTENNAS

Aman Samaiyar*, Dejan S. Filipovic

Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

16:40 B10-10 (Invited)

A DUAL-POLARIZED PATCH ANTENNA WITH IMPROVED BANDWIDTH FOR SIMULTANEOUS TRANSMIT AND RECEIVE (STAR)

KueiJih Lu*, Carlene Goodbody, Nicholas A. Trudeau, Tutku Karacolak

School of Engineering and Computer Science, Washington State University Vancouver, Vancouver, WA

**Session F5: Point-to-Point Propagation Effects: Measurements and Models
Room 155**

Session Co-Chairs: Michael Newkirk, *Johns Hopkins University Applied Physics Laboratory*;
David Michelson, *University of British Columbia*

13:40 F5-1

A PHYSICS-DRIVEN DEEP LEARNING NETWORK FOR SUBSURFACE INVERSION

Yuchen Jin*¹, Xuqing Wu¹, Yueqin Huang², Jiefu Chen¹

¹*University of Houston, Houston, TX*

²*Cyentech Consulting LLC, Cypress*

14:00 F5-2

PARABOLIC WAVE EQUATION PROPAGATION IN A MARITIME DUCT WITH A ROUGH SEA SURFACE AND VOLUME TURBULENCE

FRIDAY AFTERNOON

Frank Ryan*
Applied Technology, Inc., San Diego, CA

14:20 F5-3

LOWER ATMOSPHERIC PROPAGATION MEASUREMENT SYSTEM (LATPROP)
RADAR CASPER WEST RESEARCH CAMPAIGN POST PROCESSING UPDATE
Joshua D. Compaleo*¹, Caglar Yardim¹, Luyao Xu¹, Shanka Wijesundara¹, Joel Johnson¹,
Bob Burkholder¹, Qing Wang²
¹*ElectroScience Laboratory, The Ohio State University, Columbus Ohio*
²*Meteorology, Naval Post Graduate School, Monterey California*

14:40 F5-4

MEASURED CHARACTERISTICS OF URBAN DEPOLARIZATION IN GROUND-TO-
GROUND UHF WIDEBAND CHANNELS
Daniel J. Breton*, Caitlin E. Haedrich, Garrett R. Hoch
*Signature Physics Branch, U.S. Army Cold Regions Research and Engineering Laboratory,
Hanover, NH*

15:00 Break

15:20 F5-5

HEIGHT GAIN FUNCTIONS FOR RADIO-WAVE PROPAGATION MODELS
Nicholas N. DeMinco*
Telecommunication Theory Division, Institute for Telecommunication Sciences, Boulder, CO

15:40 F5-6

RECOGNITION AND CLASSIFICATION OF BODY POSTURE AND GESTURES USING
MULTIFREQUENCY SIGNALS
Muneeba Raja¹, Aidan Hughes², Xiyuan Xu², Parham Zarei², David Michelson*², Stephan Sigg¹
¹*Communication and Networking, Aalto University, Espoo, FINLAND*
²*Electrical and Computer Engineering, University of British Columbia, Vancouver, BC,
CANADA*

**Session FGH: GNSS and Radio Beacon Remote Sensing
Room 105**

Session Co-Chairs: Clara Chew, *UCAR*;
Carl Siefring, *Naval Research Laboratory*

13:40 FGH-1

REMOTE SENSING OF IONOSPHERIC IRREGULARITIES OVER RESOLUTE BAY WITH
GNSS AND BEACON SIGNAL PROPAGATION THROUGH GRADIENT-DRIFT
INSTABILITY
Kshitija B. Deshpande*¹, Leslie Lamarche², Matt Zettergren¹, Roger Varney², Carl Siefring³
¹*Physical Sciences, EMBRY RIDDLE AERONAUTICAL UNIV, DAYTONA BEACH, FL*
²*SRI International, Menlo Park, CA*
³*Plasma Physics Division, Naval Research Laboratory, Washington, DC*

FRIDAY AFTERNOON

14:00 FGH-2

AN ANALYSIS OF MAXIMUM HURRICANE WIND RETRIEVALS USING SPACEBORNE GNSS-R SYSTEMS

Mohammad M. Al-Khaldi*¹, Alexandra Bringer¹, Joel T. Johnson¹, Stephen J. Katzberg^{2,3}, Ethan Kubatko⁴

¹*ElectroScience Laboratory, Electrical and Computer Engineering, The Ohio State University, Columbus, Ohio*

²*NASA Langley Research Center, Hampton, VA*

³*South Carolina State University, Orangeburg, SC*

⁴*Civil, Environmental and Geodetic Engineering, The Ohio State University, Columbus, OH*

14:20 FGH-3

CYGNSS CONSTELLATION OCEAN LEVEL 1 CALIBRATION AND WIND SPEED RETRIEVAL UPDATE

Tianlin Wang¹, Ruf, Chris Ruf¹, Scott Gleason*², Darren McKague¹, Andrew O'Brien³

¹*University of Michigan, Ann Arbor, MI*

²*UCAR, Boulder, CO*

³*The Ohio State University, Columbus, OH*

14:40 FGH-4

TIME SERIES SOIL MOISTURE RETRIEVALS USING THE CYGNSS CONSTELLATION

Mohammad M. Al-Khaldi*, Joel T. Johnson

ElectroScience Laboratory, Electrical and Computer Engineering, The Ohio State University, Columbus, Ohio

15:00 Break

15:20 FGH-5

SIMULATION STUDY OF CYGNSS RETRIEVAL ALGORITHMS FOR WETLAND EXTENT

Eric Loria*, Andrew O'Brien

Ohio State University, Columbus, OH

15:40 FGH-6

A GNSS-REFLECTOMETRY INSTRUMENT FOR WETLAND EXTENT AND DYNAMICS

Stephen T. Lowe*, Jeff Dickson, Casey Handmer, David Robison, Larry Young

Jet Propulsion Laboratory, Pasadena, CA

Session GH2: Meteors, Orbital Debris, and Dusty Plasmas

Room 245

Session Co-Chairs: Julio Urbina, *The Pennsylvania State University*;

Sigrid Close, *Stanford University*;

Alex Fletcher, *Naval Research Laboratory*

13:40 GH2-1

FRIDAY AFTERNOON

DUSTY SPACE PLASMA DIAGNOSIS USING TEMPORAL BEHAVIOR OF POLAR MESOSPHERIC SUMMER ECHOES DURING SOLAR PROTON EVENT AND HF HEATING EXPERIMENTS

Alireza Mahmoudian*¹, Andrew Senior², Mike Kosch³, Wayne Scales⁴, Charles Bardeen⁵
¹*Aerospace Research Institute, Ministry of Science, Research and Technology, Tehran, IRAN*
²*Independent Researcher, Lancaster, UNITED KINGDOM*
³*South African National Space Agency (SANS), Cape Town, SOUTH AFRICA*
⁴*Electrical and Computer Engineering, Virginia Polytechnic Institute & State University, Blacksburg, VA*
⁵*National Center for Atmospheric Research (NCAR), Boulder, CO*

14:00 GH2-2

MULTI-STATIC METEOR RADAR

John Marino*, Nicholas Rainville, Scott Palo
University of Colorado Boulder, Boulder, CO

14:20 GH2-3

TRANSMIT ARRAY MULTISTATIC METEOR RADAR

Nicholas Rainville*, Scott Palo, John Marino
Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, CO

14:40 GH2-4

INVESTIGATION OF DUSTY PLASMA EFFECTS ON RADIO FREQUENCY EMISSIONS GENERATED BY HYPERVELOCITY IMPACTS ON SPACECRAFT

Gil Shohet*, Sigrid Close
Stanford University, Stanford, CA

15:00 Break

15:20 GH2-5

STUDIES OF PLASMA INSTABILITIES ON SPECULAR METEOR TRAIL DECAY TIMES

Freddy R. Galindo*¹, Julio V. Urbina¹, Steven J. Franke², Lars P. Dyrud³
¹*Electrical Engineering, The Pennsylvania State University, University Park, PA*
²*Electrical Engineering, University of Illinois at Urbana Champaign, Urbana, IL*
³*EagleView, Washington, DC*

15:40 GH2-6

ESTIMATING WIND FIELDS IN THE LOWER THERMOSPHERE WITH SIMONE, A SPREAD-SPECTRUM, INTERFEROMETRIC, MULTISTATIC METEOR OBSERVATION NETWORK

Ryan Volz*¹, Jorge L. Chau², Juha Vierinen³, Juan M. Urco², Matthias Clahsen², Nico Pfeffer², Jörg Trautner², Philip J. Erickson¹
¹*MIT Haystack Observatory, Westford, MA*
²*Leibniz Institute of Atmospheric Physics at the University of Rostock, Kühlungsborn, GERMANY*
³*UiT Arctic University of Norway, Tromsø, NORWAY*

FRIDAY AFTERNOON

**Session J5: Cosmology and Astrophysics at Low Frequencies II
Room 265**

Session Co-Chairs: Greg Taylor, *University of New Mexico*;
Nithyanandan Thyagarajan, *National Radio Astronomy Observatory*;
Judd Bowman, *Arizona State University*

13:20 J5-1

COMMISSIONING OF THE HIRAX EIGHT-ELEMENT PATHFINDER

Austine A. Gumba*

University of Kwazulu Natal, Durban, SOUTH AFRICA

13:30 J5-2 (Invited)

A SIMULTANEOUS SEARCH FOR PROMPT RADIO EMISSION ASSOCIATED WITH
GRBS USING THE OVRO-LWA

Marin M. Anderson*, Gregg Hallinan

Astronomy, California Institute of Technology, Pasadena, CA

13:45 J5-3 (Invited)

CONFRONTING THE CHALLENGES OF GLOBAL EOR DETECTION

Keith Tauscher*^{1,2}, David Rapetti^{1,3}, Jack O. Burns¹

¹*Center for Astrophysics and Space Astronomy, University of Colorado Boulder, Boulder, CO*

²*Physics, University of Colorado Boulder, Boulder, CO*

³*NASA Ames Research Center, Mountain View, CA*

14:00 J5-4 (Invited)

OBSERVING THE A-TEAM WITH THE ELWA

Frank K. Schinzel*¹, Paul Demorest¹, Kevin Stovall¹, Jayce Dowell², Gregory B. Taylor²

¹*National Radio Astronomy Observatory, Socorro, NM*

²*Physics & Astronomy, University of New Mexico, Albuquerque, NM*

14:15 J5-5 (Invited)

COMMENSAL LOW FREQUENCIES ON THE NRAO VLA: THE VLA LOW-BAND
IONOSPHERE AND TRANSIENT EXPERIMENT (VLITE) AND VLITE-FAST

Tracy Clarke*¹, Wendy Peters¹, Simona Giacintucci¹, Namir Kassim¹, Matthew Kerr²,

Paul S. Ray², Julia Deneva³

¹*Code 7213, Naval Research Laboratory, Washington, DC*

²*Code 7655, Naval Research Laboratory, Washington, DC*

³*George Mason University, Washington, DC*

14:30 J5-6 (Invited)

TOWARD EXPERIMENTAL EVIDENCE OF COSMIC DAWN

Lincoln J. Greenhill*

Harvard University / Smithsonian Astrophysical Observatory, Cambridge, MA

14:45 J5-7 (Invited)

THE SWARM TELESCOPE CONCEPT

Jayce Dowell*, Greg B. Taylor

University of New Mexico, Albuquerque, NM

FRIDAY AFTERNOON

15:00 Break

15:20 J5-8

ALBATROS: A NEW ARRAY FOR LOW-FREQUENCY OBSERVATIONS

Nivek Ghazi*

School of Mathematics, Statistics and Computer Science, University of KwaZulu-Natal, Durban, SOUTH AFRICA

15:30 J5-9

THE COSMIC TWILIGHT POLARIMETER

David D. Bordenave*^{1,2}, Bang D. Nhan^{1,2}, Richard F. Bradley^{1,2}, Jack O. Burns³

¹*Astronomy, University of Virginia, Charlottesville, VA*

²*Central Development Laboratory, National Radio Astronomy Observatory, Charlottesville, VA*

³*Center for Astrophysics and Space Astronomy, Astrophysical and Planetary Sciences, University of Colorado Boulder, Boulder, CO*

15:40 J5-10 (Invited)

A NOVEL APPROACH TO DETECTING 21CM EOR POWER SPECTRUM

Chris L. Carilli*^{1,2}, Nithyanandan Thyagarajan¹, Bojan Nikolic², James Kent², Kingsley Gale-Sides²

¹*National Radio Astronomy Observatory (for the HERA Team), Socorro, NM*

²*Cambridge University, Cavendish Astrophysics Group, Cambridge, UNITED KINGDOM*

15:55 J5-11 (Invited)

SCATTERING STUDY OF PULSARS BELOW 100 MHZ

Karishma Bansal*¹, Greg Taylor¹, Kevin Stovall², Jayce Dowell¹

¹*Physics & Astronomy, University of New Mexico, Albuquerque*

²*National Radio Astronomy Observatory, Socorro, NM*

16:10 J5-12 (Invited)

MILLIARCSECOND IMAGING OF THE HIGHEST REDSHIFT RADIO-LOUD QUASARS

Emmanuel Momjian*

National Radio Astronomy Observatory, Socorro, NM

16:25 J5-13 (Invited)

MAPPING THE UNIVERSE'S ACCELERATED EXPANSION WITH HIRAX

Hsin C. Chiang*

McGill University, Montreal, Quebec, CANADA

16:40 J5-14 (Invited)

REALFAST: REAL-TIME, COMMENSAL FAST TRANSIENT SURVEYS WITH THE VERY LARGE ARRAY

Geoffrey C. Bower*

ASIAA, HI

16:55 J5-15 (Invited)

PERSPECTIVES ON COSMOLOGY & ASTROPHYSICS AT LOW FREQUENCIES

FRIDAY AFTERNOON

Anthony J. Beasley*

National Radio Astronomy Observatory, Charlottesville, VA

SATURDAY MORNING

SATURDAY MORNING, 12 January 2019

08:00 – 11:00 USNC-URSI Executive Council Breakfast Meeting, Marriott Hotel