USNC–URSI National Radio Science Meeting

The National Academies of
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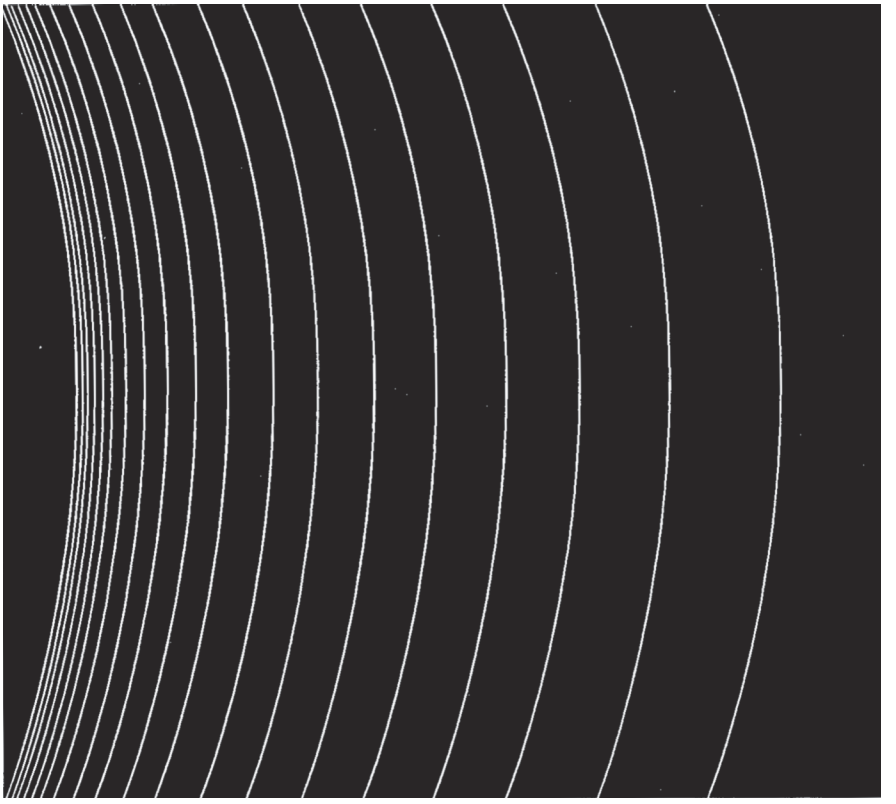

4-7 January 2017

Boulder, Colorado, USA

Sponsored by the US National Committee for the

International Union of Radio Science

and CU Conference Services,

University of Colorado Boulder

www.nrsmboulder.org

2017 USNC-URSI National Radio Science Meeting
Meeting Overview: Technical Program and Commission Business Meetings

Room	105	135	150	151	155	200	245	265	1B40	Math 100
Wednesday 4 January 08:20-12:00	FGH1 - GNSS and Radio Beacon Remote Sensing I	D1 - Solid-State RF Power Amplifiers D2 - Linear and Nonlinear Devices	F1 - RF Propagation Utilizing Numerical Weather Prediction	B4 - Scattering B5 - Liquid Metal Antennas	G1 - Space-based Ionospheric Measurements	B2 - Advances in CEM and Emerging Applications	B3 - Antennas	H1 - Waves and Turbulence in Space and Laboratory Plasmas I	B1 - Advanced Theory and Applications of Metamaterials	J1 - New Telescopes, Techniques and Technology I
Lunch										
Wednesday 4 January 13:20-17:00	B9 - Antenna Arrays I	FGH2 - GNSS and Radio Beacon Remote Sensing II F2 - RF Propagation Modeling and Measurements	K1 - Electromagnetic Imaging and Sensing Applications in Medicine	C1 - Advances in Imaging, Detection, and Localization Systems	H3 - Waves and Turbulence in Space and Laboratory Plasmas II G2 - Space Plasma Measurement Techniques	B7 - Magnetic Resonance Imaging	B8 - Inverse Scattering and Remote Sensing B10 - Antennas for Small Satellites	H2 - Physics of the Radiation Belts I	B6 - Complex Media and Nano-electromagnetics	J2 - Next Generation Very Large Array
17:00	Commission A 17:00						Commission E 17:00			
18:00						Commission C 18:00		Commission F 18:00		Commission J 18:00
Reception	**Reception for all Attendees in Engineering Center Lobby from 18:30 to 21:00**									
Thursday 5 January 08:20-12:00	**Plenary Session (Math 100):** **Ernest K. Smith USNC-URSI Student Paper Competition** ***Highlight Plenary Talks: (1) The Future of the Electromagnetic Specttrum; (2) Fast Radio Bursts: The Story so Far***									
Lunch	**Lunch Provided for Student Travel Awardees and Student Paper Finalists (Atrium at Koelbel – Business School)**									
Thursday 5 January 13:20-17:00	CDE1 - Spectrum Issues, Developments, and Solutions	F4 - Complex and Random Media	F3 - Nanosatellites for Remote Sensing	GH1 - Meteors, Orbital Debris and Dusty Plasmas I	A1 - Microwave and Millimeter Wave Propagation and Measurement	H4 - Physics of the Radiation Belts II	B12 - Terahertz Antennas and Applications	HEG1 - Lightning and its Interaction with the Ionosphere I	B11 - Wearable Antennas and Electronics	J3 - New Telescopes, Techniques and Technology II J4 - Cosmic Microwave Background Polarization
17:00	Commission D 17:00						Commission G 17:00		Commission B 17:00	
18:00						Commission K 18:00		Commission H 18:00		
Friday 6 January 08:20-12:00	B15 - Advanced Analysis, Design, and Applications of Waveguiding Structures HG1 - Ionospheric Modification	C2 - Interfacing Hardware and Signal Processing in Distributed Radar and Sensing Systems	F5 - Microwave Remote Sensing of the Earth and Atmosphere		K2 - Human Body Interactions with Antennas and Other Electromagnetic Devices	G3 - New Horizons in Active and Passive Radio Techniques for Geospace Remote Sensing	B14 - Antenna Arrays II	HEG2 - Lightning and its Interaction with the Ionosphere II	B13 - Antenna Measurements and Simulations	J5 - New Telescopes, Techniques and Technology III
Lunch	**Special Event: Fourth Hans Liebe Lecture (Math 100)**									
Friday 6 January 13:20-17:00	B18 - Advanced Modeling of EM Propagation		F6 - Atmospheric Effects and EM Propagation during the CASPER Field Campaign		K3 - Electromagnetics and Thermal Therapy Advances	GH2 - Meteors, Orbital Debris and Dusty Plasmas II B17 - Numerical Methods		H5 -Waves in Outer Solar System Plasmas	B16 - Microstrip Antennas and Printed Devices	J6 - Observatory Reports and Lessons Learned J7 - Planetary Remote Sensing

International Union of Radio Science / Union Radio Scientifique Internationale

Founded in 1919, the International Union of Radio Science (URSI) coordinates studies, research, applications, scientific exchange, and communication in all fields of radio science from telecommunications and radio astronomy to medicine (*www.ursi.org*).

Both URSI and the U.S. National Committee (USNC) of URSI are organized into ten commissions:

Electromagnetic Metrology (Commission A)
Fields and Waves (Commission B)
Radiocommunication Systems and Signal Processing (Commission C)
Electronics and Photonics (Commission D)
Electromagnetic Environment and Interference (Commission E)
Wave Propagation and Remote Sensing (Commission F)
Ionospheric Radio and Propagation (Commission G)
Waves in Plasmas (Commission H)
Radio Astronomy (Commission J)
Electromagnetics in Biology and Medicine (Commission K)

About the USNC-URSI

The U.S. National Committee for URSI (USNC-URSI) is appointed by the National Academies of Sciences, Engineering, and Medicine, and represents U.S. radio scientists in URSI. It encourages studies in radio science, provides a forum for the dissemination of research findings, and provides an organizational infrastructure for the radio science community in the United States.

The USNC-URSI hosts the National Radio Science Meeting (NRSM) each January in Boulder, Colorado. The IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (RSM), co-sponsored by USNC-URSI and the Antennas and Propagation Society of the Institute of Electrical and Electronics Engineers (IEEE/AP-S), is held each summer. Every five to eight years, a North American Radio Science Meeting (NARSM) is organized, co-sponsored by the U.S. and Canadian National Committees for URSI. The last NARSM was held in Vancouver, British Columbia, Canada on July 19-25, 2015.

The international URSI General Assembly and Scientific Symposium is held every three years in locations around the world. The 31st URSI General Assembly and Scientific Symposium was held in Beijing, China, on August 17-23, 2014. Over 1300 papers were presented by authors from over 50 countries in technical sessions covering the areas of all ten URSI Commissions. The 32nd URSI General Assembly and Scientific Symposium will be held in Montreal, Quebec, Canada, on August 19-26, 2017. The symposium website is www.gass2017.org.

For further information on USNC-URSI please visit www.usnc-ursi.org.

U.S. National Committee Leadership and Commission Chairs (2015-2017)

(In addition to the individuals listed below, the USNC-URSI includes Members at Large, Society Representatives, and scientists serving in executive roles in international URSI.)

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UNITED STATES NATIONAL COMMITTEE
INTERNATIONAL UNION OF RADIO SCIENCE
TECHNICAL PROGRAM
National Radio Science Meeting
4-7 January 2017
University of Colorado Boulder
Sponsored by USNC–URSI

ROOM AND TIME SCHEDULE FOR SESSIONS

TUESDAY, 3 January 2017

WEDNESDAY, 4 January 2017

THURSDAY, 5 January 2017

FRIDAY, 6 January 2017

SATURDAY, 7 January 2017

National Radio Science Meeting

4-7 January 2017

University of Colorado Boulder

Sponsored by USNC-URSI

TUESDAY EVENING, 3 January 2017

19:00 – 23:00 USNC-URSI Business Meeting, Marriott Hotel

WEDNESDAY MORNING, 4 January 2017

Session B1: Advanced Theory and Applications of Metamaterials (Special Session)
Room 1B40
Co-Chairs: Ashwin Iyer, *University of Alberta;*
Filippo Capolino, *University of California Irvine*

08:20 B1-1
BINARY HUYGENS' METASURFACE: A SIMPLE AND EFFICIENT RETROREFLECTOR AT NEAR-GRAZING ANGLES
Alex M. H. Wong*, Philip Christian, George V. Eleftheriades
Electrical and Computer Engineering, University of Toronto, Toronto, CANADA

08:40 B1-2
PERTURBATION THEORY APPLIED TO DIELECTRIC METAMATERIAL RESONATORS
Salvatore Campione, Larry K. Warne*, Lorena I. Basilio, William L. Langston, Michael B. Sinclair
Sandia National Laboratories, Albuquerque, NM

09:00 B1-3
BROADBAND METAMATERIAL ABSORBERS IN THE VISIBLE SPECTRUM: EFFECT OF NANOPARTICLE SHAPE
Chinmay Garud*[1], Ahmed M. Hassan[1], Edward Garboczi[2]
[1]*Computer Science and Electrical Engineering, University of Missouri Kansas City, Kansas City, MO*
[2]*Applied Chemicals and Materials Division, National Institute of Standards and Technology, Boulder, CO*

09:20 B1-4
ENHANCED TRANSMISSION INTO LAYERED-PLASMONIC METAMATERIALS THROUGH K-SPACE HARMONIC COUPLING
Iman Aghanejad, Kenneth J. Chau, Loic Markley*
School of Engineering, University of British Columbia, Kelowna, BC, CANADA

09:40 B1-5
UNIVERSAL SPIN-MOMENTUM LOCKING OF LIGHT
Zubin Jacob*, Todd V. Mechelen
Electrical and Computer Engineering, Purdue University, West Lafayette, IN

10:00 Break

10:20 B1-6
NOVEL PROPAGATION MODEL OF DEGENERATE BAND EDGE MODES USING DUAL NON-IDENTICAL PAIR OF COUPLED TRANSMISSION LINES
Muhammed R. Zuboraj*, Kubilay Sertel, John L. Volakis
Electrical and Computer Engineering, Electroscience Laboratory, The Ohio State University, Columbus, OH

10:40 B1-7
THEORY OF EXCEPTIONAL POINTS OF DEGENERACY IN COUPLED WAVEGUIDES WITH BALANCED GAIN AND LOSS
Mohamed Othman*, Filippo Capolino
Electrical Engineering and Computer Science, University of California Irvine, Irvine, CA

11:00 B1-8
BOUNDARY CONDITIONS FOR MULTIPOLAR MEDIA DETERMINED FROM MAXWELL'S EQUATIONS AND CONSTITUTIVE RELATIONS
Arthur D. Yaghjian*
Electromagnetics Research Consultant, Concord, MA

11:20 B1-9
DESIGN OF DUAL-BAND LINEARLY AND CIRCULARLY POLARIZED MICROSTRIP PATCH ANTENNAS USING UNIPLANAR METAMATERIAL-BASED EBGS
Stuart Barth, Braden P. Smyth, Ashwin K. Iyer*
Electrical and Computer Engineering, University of Alberta, Edmonton, AB, CANADA

11:40 B1-10
RF CONTROLLED ATOM-VAPOR BASED MATERIAL FOR ELECTRIC FIELD METROLOGY
Christopher L. Holloway*, Matt T. Simons, Josh A. Gordon
National Institute of Standards and Technology, Boulder, CO

Session B2: Advances in CEM and Emerging Applications (Special Session), Room 200
Co-Chairs: Branislav Notaros, *Colorado State University*;
Yahya Rahmat-Samii, *University of California Los Angeles*

08:20 B2-1
SURFACE INTEGRAL EQUATION DISCONTINUOUS GALERKIN (IEDG) METHOD WITH IMPEDANCE BOUNDARY CONDITION
Xuezhe Tien, Yongpin Chen, Jin-Fa Lee*
Electrical and Computer Engineering, The Ohio State University, Columbus, Ohio

08:40 B2-2
COMPUTATIONAL ELECTROMAGNETICS WITH DISCRETE EXTERIOR CALCULUS
Shu Chen*[1], Weng C. Chew[2]
[1]*Physics, University of Illinois Urbana-Champaign, Champaign, IL*
[2]*Electrical and Computer Engineering, University of Illinois Urbana-Champaign, Champaign, IL*

09:00 B2-3
TOWARD NEXT-GENERATION BENCHMARKING OF CEM METHODS: COMPARING COMPUTATIONAL COSTS
Jackson W. Massey, Anton Menshov, Ali E. Yılmaz*
Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX

09:20 B2-4
FDTD ACCELERATION USING MATLAB AND PARALLEL COMPUTING TOOLBOX ON GPU CARDS
Joseph E. Diener*, Atef Z. Elsherbeni
Electrical Engineering and Computer Science, Colorado School of Mines, Golden, CO

09:40 B2-5
SYNTHESIZING THIN DIELECTRIC LENSES FOR CONICAL SCANNING BEAMS: A HYBRID NUMERICAL ALGORITHM
Jordan F. Budhu*, Yahya Rahmat-Samii
University of California Los Angeles, Los Angeles, CA

10:00 Break

10:20 B2-6
CHAOTIC HIGH-FIDELITY AND QUANTITATIVE STATISTICAL ANALYSIS IN WAVE SYSTEMS
Zhen Peng*[1], Shen Lin[1], Thomas Antonsen[2]
[1]*Electrical and Computer Engineering, University of New Mexico, Albuquerque, NM*
[2]*University of Maryland College Park, MD*

10:40 B2-7
FIGURE OF MERIT FOR COMPUTATIONAL ELECTROMAGNETICS SOLVERS
Tayfun Ozdemir*[1], Robert J. Burkholder[2]
[1]*Virtual EM Inc., Ann Arbor, MI*
[2]*Electrical and Computer Engineering, The Ohio State University, Columbus, OH*

11:00 B2-8
PARALLEL COMPUTATION IN HIERARCHICALLY SEMISEPERABLE METHODS FOR SURFACE INTEGRAL EQUATIONS
Aaron P. Smull*, Ana B. Manic, Branislav M. Notaros
Electrical and Computer Engineering, Colorado State University, Fort Collins, CO

11:20 B2-9
DIAGNOSING SPURIOUS CHERENKOV RADIATION FROM NUMERICAL DISPERSION ON UNSTRUCTURED GRIDS
Dong-Yeop Na*[1], Fernando L. Teixeira[1],
Yuri A. Omelchenko[2]
[1] *Electrical and Computer Engineering, The Ohio State University, Columbus, OH*
[2]*Trinum Research Inc., San Diego CA*

11:40 B2-10
FULL-WAVE SIMULATION OF METALLIC NANOPARTICLES USING QUADRILATERAL BARYCENTRIC BASIS FUNCTIONS
Michael Wei*, Weng C. Chew
Electrical and Computer Engineering, University of Illinois Urbana-Champaign, Champaign, IL

Session B3: Antennas
Room 245
Co-Chairs: Dejan Filipovic, *University of Colorado Boulder*; Karl Warnick, *Brigham Young University*

08:20 B3-1
TRANSMITTING A BASEBAND SIGNAL THROUGH AN ELECTRICALLY SMALL ANTENNA
Majid Manteghi*
Virginia Tech, Blacksburg, VA

08:40 B3-2
A REMOTE RADIATION PATTERN MEASUREMENT TECHNIQUE FOR ELECTRICALLY SMALL ANTENNAS
Majid Manteghi*
Virginia Tech, Blacksburg, VA

09:00 B3-3
EXPERIMENTAL DEMONSTRATION OF A SUPERDIRECTIVE HORN ANTENNA DESIGNED BY POYNTING STREAMLINE METHOD
Junming Diao*, Karl F. Warnick
Electrical and Computer Engineering, Brigham Young University, Provo, UT

09:20 B3-4
QUALITY FACTOR CALCULATIONS FOR THE CHARACTERISTIC MODES OF DIELECTRIC RESONATOR ANTENNAS
Binbin Yang*, Jacob J. Adams
Electrical and Computer Engineering, North Carolina State University, Raleigh, NC

09:40 B3-5
TUNABLE SIW CAVITY BACKED ACTIVE ANTENNA WITH CIRCULAR POLARIZATION
Farhad Farzami*, Seiran Khaledian, Besma Smida,
Danilo Erricolo
Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, IL

10:00 Break

10:20 B3-6
MULTI-DIRECTIONAL, MULTI-POLARIZATION, AND MULTI-BAND RF ENERGY HARVESTING: MODELING AND DEVELOPMENT OF A HEMISPHERICAL MONOPOLE ARRAY
Bohan Zhang*, Joshua M. Kovitz, Yahya Rahmat-Samii
Electrical and Computer Engineering, University of California Los Angeles, Los Angeles, CA

10:40 B3-7
FEED STUDY FOR WIDEBAND MILLIMETER-WAVE LUNEBURG LENS
Milica Notaros*, Carlos Mulero Hernandez, Maxim Ignatenko,
Dejan S. Filipovic
Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

11:00 B3-8
NOVEL LOW-PROFILE SURFACE-CONFORMING LEAKY-WAVE ANTENNAS FOR VERY HIGH PEAK POWER APPLICATIONS
Robert A. Koslover*[1], Sammuel M. Jalali[2], Greg R. Raith[3]
[1]*Scientific Applications & Research Associates (SARA), Inc., Tyler, TX*
[2]*Scientific Applications & Research Associates (SARA), Inc., Cypress, CA*
[3]*Scientific Applications & Research Associates (SARA), Inc., Irvine, CA*

11:20 B3-9
MODIFICATION, MODELING, AND MEASUREMENT OF A BALANCED ANTIPODAL VIVALDI FOR A MULTI-CHANNEL RECEIVER
Seth A. McCormick*[1], William O. Coburn[2]
[1]*United States Army Research Laboratory, Adelphi, MD*
[2]*General Technical Services LLC, Wall, NJ*

11:40 B3-10
COUPLING REDUCTION TECHNIQUES FOR WIDE-BAND SIMULTANEOUS TRANSMIT AND RECEIVE ANTENNA SUBSYSTEMS
Prathap Valale Prasannakumar*, Mohamed A. Elmansouri, Dejan S. Filipovic
University of Colorado Boulder, Boulder, CO

Session B4: Scattering
Room 151
Co-Chairs: Alex Yuffa, *National Institute of Standards and Technology*;
Piergiorgio Uslenghi, *University of Illinois at Chicago*

08:20 B4-1
ELECTROMAGNETIC SCATTERING BY A TRUNCATED CONCAVE PARABOLIC CYLINDER
Piergiorgio L. E. Uslenghi*
Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, IL

08:40 B4-2
SCATTERING OF SHORT PULSES BY CANONICAL METALLIC OBJECTS
D V. Giri*[1], F M. Tesche[2], W D. Prather[3]
[1]*PRO-TECH, ALAMO*
[2]*EM Consultant (Retired), Lakeville, CT*
[3]*Air Force Research Laboratory, Kirtland AFB, NM*

09:00 B4-3
SCATTERING BY A SKEW TRIHEDRAL REFLECTOR
Piergiorgio L. E. Uslenghi*
Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, IL

09:20 B4-4
SURFACE INTEGRAL EQUATION FORMULATION OF ELECTROMAGNETIC SCATTERING FOR CLOAKING APPLICATIONS
Alex J. Yuffa*
RF Technology Division, National Institute of Standards and Technology, Boulder, CO

09:40 B4-5
METALLIC OGIVAL RESONATORS PARTIALLY FILLED WITH DNG METAMATERIAL
Piergiorgio L. E. Uslenghi*
Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, IL

Session B5: Liquid Metal Antennas
Room 151
Co-Chairs: Jacob Adams, *North Carolina State University*;
William Davis, *Virginia Tech*

10:20 B5-1
DESIGN AND ANALYSIS OF FEED TECHNIQUES FOR RECONFIGURABLE LIQUID-METAL MONOPOLE ANTENNAS
Jonathan T. Thews*[1], Alan J. Michaels[1], William Davis[2]
[1]*Hume Center, Virginia Tech, Blacksburg, VA*
[2]*Electrical and Computer Engineering, Virginia Tech, Blacksburg, VA*

10:40 B5-2
ANALYSIS OF THE LINEARITY AND TUNING RANGE OF FREQUENCY RECONFIGURABLE ANTENNAS USING LIQUID METALS
Meng Wang*, Ian Kilgore, Michael B. Steer, Jacob J. Adams
Electrical and Computer Engineering, North Carolina State University, Raleigh, NC

11:00 B5-3
HIGHLY TUNABLE, ULTRASTRETCHABLE LIQUID METAL WIRE ANTENNAS
Clifford A. Muchler*[1], Ying Liu[2], Michael D. Dickey[2], Jacob J. Adams[1]
[1]*Electrical and Computer Engineering, North Carolina State University, Raleigh NC*
[2]*Chemical and Biomolecular Engineering, North Carolina State University, Raleigh, NC*

11:20 B5-4
ANALYSIS OF PARASITIC EFFECTS OF SODIUM HYDROXIDE (NAOH) ELECTROLYTE ON LIQUID-METAL MONOPOLE ANTENNAS
Jonathan T. Thews*, Alan J. Michaels
Hume Center, Virginia Tech, Blacksburg, VA

11:40 B5-5
CONFORMAL LOG PERIODIC FOLDED SLOT ARRAY ANTENNA WITH FRESH WATER FILLED CAVITY BACKING FOR OPERATION IN GLACIAL ICE
Omkar P. Pradhan*, Albin J. Gasiewski, Srikumar Sandeep
University of Colorado Boulder, Boulder, CO

Session D1: Solid-State RF Power Amplifiers
Room 135
Co-Chairs: Zoya Popovic, *University of Colorado Boulder*;
Charles Baylis, *Baylor University*

08:20 D1-1
DEVELOPMENT OF A WIDEBAND CLASS-E POWER AMPLIFIER WITH HIGH EFFICIENCY
Farshid Tamjid*, Matthew Richardson,
Ahmadreza Ghahremani, Aly E. Fathy
Electrical Engineering and Computer Science, University of Tennessee Knoxville, Knoxville, TN

08:40 D1-2
OPTIMIZATION OF LOAD IMPEDANCE AND BIAS VOLTAGE FOR POWER-ADDED EFFICIENCY, DELIVERED POWER, AND ADJACENT-CHANNEL POWER RATIO USING THE BIAS SMITH TUBE
Matthew W. Fellows*[1], Sarvin Rezayat[1], Alicia Magee[1], Charles Baylis[1], Lawrence Cohen[2], Robert J. Marks II[1]
[1]*Baylor University, Waco, TX*
[2]*Naval Research Laboratory, Washington, DC*

09:00 D1-3
A 52GHZ MMIC POWER AMPLIFIER WITH 28DBM OUTPUT POWER USING 90-NM GAN-ON-SIC TECHNOLOGY
Mauricio E. Pinto*, Zoya Popovic
Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

09:20 D1-4
CAVITY AND AMPLIFIER DESIGN FOR A SOLID-STATE MICROWAVE OVEN
Dubari Borah, Priya Vemparala Guruswamy, Patrick Bluem, Matthew Cullen*, Zoya Popovic
Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO

09:40 D1-5
HIGH POWER TEST OF X-BAND ACCELERATOR CAVITY POWERED BY SOLID STATE RF SOURCE
Mohamed Othman*[1,2], Emilio A. Nanni[2], Valery Dolgashev[2], Sami Tantawi[2], Jeff Neilson[2]
[1]*University of California Irvine, Irvine, CA*
[2]*SLAC National Accelerator Laboratory, Menlo Park, CA*

Session D2: Linear and Nonlinear Devices
Room 135
Co-Chairs: Zoya Popovic, *University of Colorado Boulder*; Leonardo Ranzani, *Raytheon BBN Technologies*

10:20 D2-1
SUPERCONDUCTING PARAMETRIC DEVICES FOR QUANTUM INFORMATION PROCESSING
Leonardo M. Ranzani*, Kin C. Fong, Thomas A. Ohki
Raytheon BBN Technologies, Cambridge, MA

10:40 D2-2
ENHANCEMENT OF BACKSCATTER TAGS EFFICIENCY BY MEANS OF LOW-POWER TRANSISTOR-BASED REFLECTION AMPLIFIER AND QPSK MODULATOR
Seiran Khaledain*, Farhad Farzami, Besma Smida, Danilo Erricolo
Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, Illinois

11:00 D2-3
STUDY OF NONLINEAR TRANSMISSION LINE PARAMETERS AND THEIR EFFECT ON OUTPUT HARMONIC GENERATION
Caitlyn Cooke, Philip Zurek*, Zoya Popovic
Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

11:20 D2-4
COMPARISON OF GAIN OPTIMIZATION TECHNIQUES ON RECONFIGURABLE POWER AMPLIFIERS WITH A REAL-TIME VARACTOR TUNING NETWORK
Zachary Hays*[1], Lucilia Lamers[1], Charles Baylis[1], Robert Marks[1], Ed Viveiros[2], Ali Darwish[2], John Penn[2], Abigail Hedden[2]
[1]*WMCS, Baylor University, Waco, TX*
[2]*Army Research Laboratory, Adelphi, MD*

11:40 D2-5
PARITY-TIME-RECIPROCAL SYMMETRY IN RADIO-FREQUENCY ELECTRONICS
Maryam Sakhdari*, Pai-Yen Chen
Electrical and Computer Engineering, Wayne State University, Detroit, MI

12:00 D2-6
BREAKDOWN LIMITED CAPACITORS
Richard W. Kenyon*, Frank Barnes
Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO

Session F1: RF Propagation Utilizing Numerical Weather Prediction
(Special Session)
Room 150
Co-Chairs: Katherine Horgan, *Naval Surface Warfare Center Dahlgren Division*; Tracy Haack, *Naval Research Laboratory - Marine Meteorology Division*

08:20 F1-1
RADIO FREQUENCY PROPAGATION MEASUREMENTS AND MODELING DURING THE TAPS 2013 FIELD CAMPAIGN
Tracy Haack*[1], Rachel Norris[1,2], Hedley Hansen[3], Andrew Kulessa[3,4]
[1]*Marine Meteorology Division, Naval Research Laboratory, Monterey, CA*
[2]*Electrical and Computer Engineering, University of Michigan, Ann Arbor, MI*
[3]*Cyber and Electronic Warfare Division, Defence Science and Technology Organisation, Adelaide, Queensland, AUSTRALIA*
[4]*Airborne Research Australia, Adelaide, Queensland, AUSTRALIA*

08:40 F1-2
MULTI-WAVELENGTH STUDY OF SPATIO-TEMPORAL RADIO FREQUENCY EMITTER DETECTION RANGE USING NUMERICAL WEATHER PREDICTION FORECASTS OF NON-STANDARD PROPAGATION
Rob Marshall*
Mount Pleasant Meteorology, Woodford, VA

09:00 F1-3
ANALYSIS OF US NAVY EM AND NWP MODELS USING WALLOPS 2000 EXPERIMENTATION DATA
Steven Strang*[1], Tracy Haack[2], Zach Liebowitz[1]
[1]*Naval Research Laboratory, Washington, DC*
[2]*Naval Research Laboratory, Monterey, CA*

09:20 F1-4
A REVIEW OF REFRACTIVITY STRUCTURE MATCHING AS A PRE-PROCESSING COMPONENT WHEN CONSIDERING ITS USE WITH NUMERICAL WEATHER PREDICTION
Katherine Horgan*, Edward Burgess, William Thornton, Victor Wiss
Naval Surface Warfare Center Dahlgren Division, Dahlgren, VA

09:40 F1-5
UPDATES AND VALIDATION FOR THE NAVY ATMOSPHERIC VERTICAL SURFACE LAYER MODEL (NAVSLAM)
Paul A. Frederickson*
Meteorology, Naval Postgraduate School, Monterey, CA

10:00 Break

10:20 F1-6
HULL-MOUNTED SEA SURFACE MEASUREMENTS IN THE NORTH ATLANTIC FOR RF PERFORMANCE PREDICTIONS
Rick L. Navarro*[1], Amalia Barrios[1], Katherine Horgan[2], Vincent van Leijen[3], Erik van de Pol[3], Tjarda Wilbrink[3], Fok Bolderheij[4], Earl M. Williams[1]
[1]*Space and Naval Warfare Systems Center Pacific, San Diego, CA*
[2]*Naval Surface Warfare Center Dahlgren Division, Dahlgren, VA*
[3]*Knowledge, Innovation, eXperimentation and Simulation (KIXS), Defense Material Organisation, Den Helder, NL, NETHERLANDS*
[4]*Netherlands Defense Academy, Den Helder, NL, NETHERLANDS*

10:40 F1-7
ROUGH OCEAN SURFACE EFFECTS ON GENETIC ALGORITHM INVERSIONS FOR ESTIMATING EVAPORATION DUCT REFRACTIVITY PROFILES
Stephen E. Penton*, Erin E. Hackett
Coastal and Marine Systems Science, Coastal Carolina University, Conway, SC

11:00 F1-8
FURTHER STUDIES OF THE X-BAND BEACON-RECEIVER PHASED ARRAY AND EVAPORATION DUCT HEIGHT ESTIMATION
Jonathan M. Pozderac*[1], Joel T. Johnson[1], Caglar Yardim[1], Craig F. Merrill[2], Tom Cook[3], Tony de Paolo[3], Eric Terrill[3], Frank J. Ryan[4], Paul Frederickson[5]
[1]*Electrical and Computer Engineering, ElectroScience Laboratory, The Ohio State University, Columbus, OH*
[2]*Carderock Division, NSWC, West Bethesdam, MD*
[3]*UC San Diego, Scripps Institution of Oceanography, San Diego, CA*
[4]*Applied Technology Inc., San Diego, CA*
[5]*Meteorology, Naval Postgraduate School, Monterey, CA*

11:20 F1-9
A TECHNIQUE TO EVALUATE NUMERICAL WEATHER PREDICTION PERFORMANCE: AN ENGINEERING PERSPECTIVE
Matt Wilbanks*[1], Stephanie Billingsley[1], Katherine Horgan[1], William Thornton[1], Qing Wang[2], Tracey Haack[3]
[1]*Naval Surface Warfare Center Dahlgren Division, Dahlgren, VA*
[2]*Naval Postgraduate School, Monterey, CA*
[3]*Marine Meteorology Division, Naval Research Laboratory, Monterey, CA*

11:40 F1-10
NUMERICAL COMPUTATION OF FADING DEPTH FOR TROPOSPHERIC SCINTILLATION
Swagato Mukherjee*[1], Caglar Yardim[1], Qing Wang[2]
[1]*Electrical and Computer Engineering, The Ohio State University, Columbus, OH*
[2]*Naval Postgraduate School, Monterey, CA*

Session FGH1: GNSS and Radio Beacon Remote Sensing I (Special Session), Room 105
Co-Chairs: Clara Chew, *NASA Jet Propulsion Laboratory*; Carl Siefring, *Naval Research Laboratory*; Atilla Komjathy, *NASA Jet Propulsion Laboratory*

08:20 FGH1-1
JOINT ESTIMATION OF IONOSPHERE TEC, RECEIVER INTER-FREQUENCY BIASES, AND CARRIER AMBIGUITIES USING 3-FREQUENCY GPS MEASUREMENTS
Brian Breitsch*, Jade Morton
Electrical and Computer Engineering, Colorado State University, Fort Collins, CO

08:40 FGH1-2
MULTI-CONSTELLATION GNSS TEC MEASUREMENTS
YuXiang Peng*[1,2], Xavier E. Gomez[1], Wayne A. Scales[1,2]
[1]*Electrical and Computer Engineering, Virginia Tech, Blacksburg, VA*
[2]*Center for Space Science and Engineering Research, Virginia Tech, Blacksburg, VA*

09:00 FGH1-3
PFISR GPS TRACKING MODE FOR RESEARCHING HIGH-LATITUDE IONOSPHERIC ELECTRON DENSITY GRADIENTS ASSOCIATED WITH GPS SCINTILLATION
Diana C. Loucks*[1], Scott Palo[1], Marcin Pilinski[2], Geoff Crowley[2], Irfan Azeem[2], Don Hampton[3]
[1]*Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, CO*
[2]*Atmospheric & Space Technology Research Associates (ASTRA), Boulder, CO*
[3]*Geophysical Institute, University of Alaska Fairbanks, Fairbanks, AK*

09:20 FGH1-4
USING GPS TEC MEASUREMENTS TO PROBE IONOSPHERIC STRUCTURE ASSOCIATED WITH SCINTILLATION
Erin H. Lay*[1], Peter A. Parker[1], Max E. Light[2]
[1]*ISR-2, Los Alamos National Laboratory, Los Alamos, NM*
[2]*AOT-AE, Los Alamos National Laboratory, Los Alamos, NM*

09:40 FGH1-5
ESTIMATION OF IONOSPHERIC IRREGULARITIES WITH A SCINTILLATION AURORAL GPS ARRAY
Yang Su*[1], Seebany Datta-Barua[1], Gary Bust[2], Kshitija Deshpande[3]
[1]*Illinois Institute of Technology, Chicago, IL*
[2]*Johns Hopkins University Applied Physics Laboratory, Laurel, MD*
[3]*Virginia Tech, Blacksburg, VA*

10:00 Break

10:20 FGH1-6
THE RAMIFICATIONS OF CONFIGURATION-SPACE MODELS FOR GNSS SCINTILLATION
Charles L. Rino*, Charles S. Carrano, Keith M. Groves
Institute for Scientific Research, Boston, MA

10:40 FGH1-7
ASSESSMENT OF THE IMPACT OF FORMOSAT-7/COSMIC-2 GNSS RO OBSERVATIONS ON IONOSPHERE SPECIFICATION AND FORECAST USING OBSERVING SYSTEM SIMULATION EXPERIMENTS
Chih-Ting Hsu*[1], Tomoko Matsuo[2,3], Xinan Yue[4], Jann-Yenq Liu[1]
[1]*National Central University, Institute of Space Science, Taoyuan, TAIWAN*
[2]*University of Colorado at Boulder, Cooperative Institute for Research in Environmental Sciences, University of Colorado Boulder, Boulder, CO*
[3]*National Oceanic and Atmospheric Administration, Space Weather Prediction Center, Boulder, CO*
[4]*Chinese Academy of Sciences, Institute of Geology and Geophysics, Beijing, CHINA*

11:00 FGH1-8
AIRBORNE MEASUREMENT OF SEA SURFACE MEAN SQUARE SLOPE IN 2008 HURRICANE IKE USING GNSS REFLECTIONS AND WIDE-SWATH RADAR ALTIMETER
Scott Gleason*[1], Valery Zavorotny[2], Dennis Akos[3], Edward Walsh[2]
[1]*Southwest Research Institute, Boulder, CO*
[2]*NOAA Earth System Research Laboratory, Boulder, CO*
[3]*University of Colorado Boulder, Boulder, CO*

11:20 FGH1-9
BEHAVIOR OF GNSS SIGNALS REFLECTED FROM AN OCEAN SURFACE AT WEAK WINDS
Valery U. Zavorotny*, Alexander G. Voronovich
NOAA Earth System Research Laboratory, Boulder, CO

Session G1: Space-based Ionospheric Measurements (Special Session), Room 155
Co-Chairs: Paul Bernhardt, *Naval Research Laboratory*; Nicolas Lee, *Stanford University*

08:20 G1-1
A PROPAGATION MODEL FOR GEOLOCATING IONOSPHERIC IRREGULARITIES ALONG RADIO OCCULTATION RAY-PATHS
Charles S. Carrano*, Keith M. Groves, Charles L. Rino, William J. McNeil
Boston College, Chestnut Hill, MA

08:40 G1-2
OVERVIEW OF DATA RECORDED TO-DATE BY THE E-POP RADIO RECEIVER INSTRUMENT (RRI)
Gordon James*[1], Gareth Perry[2], Andrew Yau[2]
[1]*Retired, Ottawa, ON, CANADA*
[2]*Physics and Astronomy, University of Calgary, Calgary, AB, CANADA*

09:00 G1-3
DETECTION OF SMALL-SCALE PLASMA DENSITY IRREGULARITIES WITH E-POP RRI
Gareth W. Perry*, Harry G. James, Robert G. Gillies, Andrew W. Yau
Physics and Astronomy, University of Calgary, Calgary, Alberta, CANADA

09:20 G1-4
HF RADAR FOR LARGE AREA SEA MAPPING WITH GROUND-IONOSPHERE-OCEAN-SPACE (GIOS)
Paul A. Bernhardt*[1], Stanley J. Briczinski[1], Carl L. Siefring[1], Donald E. Barrick[2], Jehu Bryant[3], Andrew Howarth[4], H G. James[4], Andrew Yau[4]
[1]*Code 6754, Naval Research Laboratory, Washington, DC*
[2]*Code Oceans Systems, Menlo Park, CA*
[3]*Raytheon IIS, Chesapeake, VA*
[4]*Physics and Astronomy, University of Calgary, Calgary, AB, CANADA*

09:40 G1-5
THE INFLUENCE OF ATMOSPHERIC GRAVITY WAVES EXCITED BY DEEP CONVECTION ON THE IONOSPHERE
Sharon Vadas*
CoRA, NorthWest Research Associates/CoRA, Boulder, CO

10:00 Break

10:20 G1-6
THE IONOSPHERIC CONNECTION EXPLORER: MISSION DESIGN AND PERFORMANCE
Thomas J. Immel*
University of California Berkeley, Berkeley, CA

10:40 G1-7
GLOBAL-SCALE QUANTIFICATION OF IONOSPHERIC STATE FROM UV REMOTE SENSING ONBOARD THE IONOSPHERIC CONNECTION EXPLORER (ICON)
Farzad Kamalabadi*[1], Andrew W. Stephan[2], Robert R. Meier[2], Jianqi Qin[1], Jonathan J. Makela[1], Stephen B. Mende[3], Harald U. Frey[3], Jerry Edelstein[3], Eric Korpela[3], Scott England[3], Thomas J. Immel[3]
[1]*University of Illinois at Urbana-Champaign, Champaign, IL*
[2]*Naval Research Laboratory, Washington, DC*
[3]*University of California Berkeley, Berkeley, CA*

11:00 G1-8
ADVANCING IONOSPHERIC OBSERVATIONS WITH THE GLOBAL-SCALE OBSERVATIONS OF THE LIMB AND DISK (GOLD) MISSION
Richard W. Eastes*[1], Alan G. Burns[2], Stanley C. Solomon[2], William E. McClintock[3]
[1]*Florida Space Institute, University of Central Florida, Orlando, FL*
[2]*High Altitude Observatory, National Center for Atmospheric Research, Boulder, CO*
[3]*Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, CO*

11:20 G1-9
IT-SPINS: A CUBESAT MISSION TO IMAGE THE NOCTURNAL IONOSPHERE
Gary S. Bust[1], Romina Nikoukar*[1], Rick Doe[2], David M. Klumpar[3]
[1]*Johns Hopkins University Applied Physics Laboratory, Laurel, MD*
[2]*SRI International, Menlo Park, CA*
[3]*Montana State University, Bozeman, MT*

11:40 G1-10
DETAILED CHARACTERISTICS OF RADIATION BELT ELECTRONS REVEALED BY CSSWE/REPTILE MEASUREMENTS
Kun Zhang*[1,2], Xinlin Li[1,2], Quintin Schiller[3], David Gerhardt[2], Hong Zhao[1], Robyn Millan[4]
[1]*Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO*
[2]*Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, CO*
[3]*Heliophysics Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD*
[4]*Physics and Astronomy, Dartmouth College, Hanover, NH*

Session H1: Waves and Turbulence in Space and Laboratory Plasmas I (Special Session), Room 265
Co-Chairs: Bill Amatucci, *Naval Research Laboratory*; Stephen Vincena, *University of California Los Angeles*

08:20 H1-1
KINETIC ALFVEN WAVES AND THE ACCELERATION OF AURORAL PARTICLES
Robert L. Lysak*, Yan Song
School of Physics and Astronomy, University of Minnesota, Minneapolis, MN

WEDNESDAY MORNING, continued

08:40 H1-2
ELECTROMAGNETIC TURBULENCE AND TRANSPORT IN HIGH β LABORATORY PLASMAS
Troy Carter*[1], Giovanni Rossi[1], Mj Pueschel[2], Paul Terry[2], Frank Jenko[1]
[1]*Physics and Astronomy, University of California Los Angeles, Los Angeles, CA*
[2]*Physics, University of Wisconsin, Madison, Madison, WI*

09:00 H1-3
GENERATION OF ALFVENIC QUASI-STATIONARY ELECTROMAGNETIC PLASMA STRUCTURES AND AURORAL PARTICLE ACCELERATION
Yan Song*, Robert L. Lysak
School of Physics and Astronomy, University of Minnesota, Minneapolis, MN

09:20 H1-4
NONLINEAR INTERACTIONS OF KINK-UNSTABLE FLUX ROPES AND SHEAR ALFVEN WAVES
Stephen Vincena*
University of California Los Angeles, Los Angeles, CA

09:40 H1-5
ELECTRON SLOSHING ASSOCIATED WITH INERTIAL ALFVEN WAVES
J. W. R. Schroeder*[1], F. Skiff[1], G. G. Howes[1], C. A. Kletzing[1], T. A. Carter[2], S. Vincena[2], S. Dorfman[2]
[1]*Physics and Astronomy, University of Iowa, Iowa City, IA*
[2]*Physics and Astronomy, University of California Los Angeles, Los Angeles, CA*

10:00 Break

10:20 H1-6
TWO DIMENSIONAL LIF MEASUREMENTS AND POTENTIAL STRUCTURE OF ION BEAM FORMATION IN AN ARGON HELICON PLASMA
Evan M. Aguirre*[1], Timothy Good[2], Earl E. Scime[1]
[1]*Physics and Astronomy, West Virginia University, Morgantown, WV*
[2]*Physics, Gettysburg College, Gettysburg, PA*

10:40 H1-7
IN-FLIGHT INSTABILITIES OF DOUBLE PROBE ELECTRIC FIELD INSTRUMENTS: A SURVEY OF OBSERVATIONS AND ANALYSES
John W. Bonnell*
Space Sciences Laboratory, University of California Berkeley, Berkeley, CA

11:00 H1-8
MAGNETOHYDRODYNAMIC INSTABILITIES IN JETS AND BUBBLES USING A COMPACT COAXIAL PLASMA GUN IN A BACKGROUND MAGNETIZED PLASMA
Mark Gilmore*[1], Yue Zhang[1], Dustin M. Fisher[1], Ben Walllace[1], Scott C. Hsu[2]
[1]*University of New Mexico, Albuquerque, NM*
[2]*Los Alamos National Laboratory, Los Alamos, NM*

Session J1: New Telescopes, Techniques and Technology I (Special Session), Math 100
Co-Chairs: David DeBoer, *University of California Berkeley*; Jeffery Mangum, *National Radio Astronomy Observatory*

08:20 J1-1
MURCHISON WIDEFIELD ARRAY: HIGHLIGHTS AND PLANS
Randall B. Wayth, Adrian Sutinjo*
ICRAR/Curtin Institute of Radio Astronomy, Curtin University, Perth, WA, AUSTRALIA

08:40 J1-2
ENABLING DETECTION OF THE EPOCH OF REIONIZATION WITH NEXT-GENERATION RADIO INSTRUMENTS
Nithyanandan Thyagarajan*[1], Aaron R. Parsons[2], David R. DeBoer[2], Judd D. Bowman[1]
[1]*School of Earth and Space Exploration, Arizona State University, Tempe, AZ*
[2]*Astronomy, University of California Berkeley, Berkeley, CA*

09:00 J1-3
MEERKAT STATUS UPDATE
Schalk W. Esterhuyse*
Engineering, SKA South Africa, Pinelands, SOUTH AFRICA

09:20 J1-4
PROGRESS ON HIRAX, THE HYDROGEN INTENSITY AND REAL-TIME ANALYSIS EXPERIMENT
Benjamin R. Saliwanchik*
Mathematics, Statistics, and Computer Science, University of KwaZulu-Natal, Durban, KwaZulu-Natal, SOUTH AFRICA

09:40 J1-5
ADVANCES IN 21CM EOR IMAGING PIPELINES
Adam P. Beardsley*
Arizona State University, Tempe, AZ

10:00 Break

10:20 J1-6
MITIGATING SPECTRAL LEAKAGE IN DELAY FILTERED PAPER-64 VISIBILITIES USING FOREGROUND SUBTRACTION
Joshua R. Kerrigan*, Jonathan C. Pober
Physics, Brown University, Providence, RI

10:40 J1-7
INTERFEROMETRIC BANDPASS CALIBRATION WITH REDUNDANT BASELINES FOR 21 CM COSMOLOGY
Joshua S. Dillon*,
Hydrogen Epoch of Reionization Array (HERA) Collaboration
University of California Berkeley, Berkeley, CA

11:00 J1-8
PRECISION COSMOLOGICAL MEASUREMENTS WITH DARE AND EDGES
Raul A. Monsalve*[1], Jack O. Burns[1], Richard F. Bradley[2], Keith Tauscher[1], Bang Nhan[1], Judd D. Bowman[3], David Newell[4], David Draper[4], David Drapetti[1], Alan E. E. Rogers[5], Thomas J. Mozdzen[3]
[1]*University of Colorado Boulder, Boulder, CO*
[2]*National Radio Astronomy Observatory, Charlottesville, VA*
[3]*Arizona State University, Tempe, AZ*
[4]*Ball Aerospace & Technologies, Boulder, CO*
[5]*MIT Haystack Observatory, Westford, MA*

11:20 J1-9
CALIBRATION REQUIREMENTS FOR DETECTING THE 21CM EPOCH OF REIONIZATION POWER SPECTRUM AND IMPLICATIONS FOR THE SKA
Nichole Barry*[1], Bryna Hazelton[1,2], Ian Sullivan[3], Miguel F. Morales[1], Jonathan C. Pober[4]
[1]*Physics, University of Washington, Seattle, WA*
[2]*eScience Institute, University of Washington, Seattle, WA*
[3]*Astronomy, University of Washington, Seattle, WA*
[4]*Physics, Brown University, Providence, RI*

11:40 J1-10
SEARCHING FOR COSMIC DAWN FROM THE SUB-ANTARCTIC WITH SCI-HI
Hsin C. Chiang*
University of KwaZulu-Natal, Durban, SOUTH AFRICA

12:00 J1-11
RESULTS FROM THE LATEST COMMISSIONING RUN OF A CRYOGENICALLY COOLED PHASED ARRAY FEED FOR THE GREEN BANK TELESCOPE
Nickolas M. Pingel*[1], Richard Black[2], Dj Pisano[1], Brian Jeffs[2]
[1]*Astronomy, West Virginia University, Morgantown, WV*
[2]*Electrical and Computer Engineering, Brigham Young University, Provo, UT*

WEDNESDAY AFTERNOON, 4 January 2017

Session B6: Complex Media and Nanoelectromagnetics
Room 1B40
Co-Chairs: Edward Kuester, *University of Colorado Boulder*; Christos Argyropoulos, *University of Nebraska-Lincoln*

13:20 B6-1
A NOVEL V-BAND SINGLE-LAYER CP-FPC MADE OF CIRCULAR-POLARIZED CAPACITIVE-METALLIC FSS WITH A LINEAR-POLARIZED FEEDING ANTENNA
Saman Kabiri*, Alister Hosseini, Evangelos Kornaros, Franco De Flaviis
University of California Irvine, Irvine, CA

13:40 B6-2
POLARIZATION-INSENSITIVE KU-BAND FREQUENCY SELECTIVE SURFACE (FSS)
Atieh Talebzadeh*[1], Ali Foudazi[2], Kristen M. Donnell[2], David J. Pommerenke[1]
[1]*Electrical and Computer Engineering, Missouri University of Science and Technology, EMC Lab, Rolla, MO*
[2]*Electrical and Computer Engineering, Missouri University of Science and Technology, Applied Microwave Nondestructive Testing Laboratory (AMNTL), Rolla, MO*

14:00 B6-3
GRAPHENE METASURFACES TO DESIGN BROAD-BAND POLARIZERS AND NON-RECIPROCAL DEVICES
Tianjing Guo*, Christos Argyropoulos
Electrical and Computer Engineering, University of Nebraska-Lincoln, Lincoln, NE

14:20 B6-4
MUTUAL COUPLING REDUCTION IN APERTURE-COUPLED PATCH ANTENNAS FED BY ORTHOGONAL SIW LINE BY METASURFACE
Ali Foudazi*, Kristen M. Donnell
Electrical and Computer Engineering, Missouri University of Science and Technology, Applied Microwave Nondestructive Testing Laboratory (AMNTL), Rolla, MO

14:40 B6-5
NONLINEAR PLASMONIC METASURFACES TO ENHANCE FOUR-WAVE MIXING
Boyuan Jin*, Christos Argyropoulos
Electrical and Computer Engineering, University of Nebraska-Lincoln, Lincoln, NE

15:00 Break

15:20 B6-6
GIANT FIELD AND RADIATIVE EMISSION ENHANCE-MENT IN ANISOTROPIC EPSILON-NEAR-ZERO SLABS
Mohammad Kamandi*, Caner Guclu, Filippo Capolino
University of California Irvine, Irvine, CA

15:40 B6-7
EXTRAORDINARY TRANSMISSION OF AN ELECTRO-MAGNETIC WAVE THROUGH A DIELECTRIC -LOADED SLOT IN A METALLIC SHIELD OF FINITE THICKNESS
Abdulaziz Haddab*, Edward Kuester
University of Colorado Boulder, Boulder, CO

16:00 B6-8
MAGNETIC NANOANTENNAS EXCITED BY AZIMUTHALLY POLARIZED BEAMS
Mehdi Veysi*, Caner Guclu, Mahsa Darvishzadeh-Varcheie, Filippo Capolino
University of California Irvine, Irvine, CA

16:20 B6-9
SUPERRADIANCE, SUBRADIANCE AND PT-SYMME-TRY WITH PLASMONIC NANOCHANNELS
Ying Li*, Christos Argyropoulos
Electrical and Computer Engineering, University of Nebraska-Lincoln, Lincoln, NE

16:40 B6-10
CHARACTERISTIC MODE ANALYSIS OF CONDUC-TIVE NANOWIRES AND MICROWIRES
Daniel S. Kiddle*[1], Ethan J. Wilcox[1], Ahmed M. Hassan[1], Edward J. Garboczi[2]
[1]*Computer Science and Electrical Engineering, University of Missouri-Kansas City, Kansas City, MO*
[2]*Applied Chemicals and Materials Division, National Institute of Standards and Technology, Boulder, CO*

17:00 B6-11
ELECTROMAGNETIC SCATTERING FROM CRUMPLED GRAPHENE FLAKES
Kalyan C. Durbhakula*[1], Ahmed M. Hassan[1], Deb Chatterjee[1], Fernando Vargas- Lara[2], Jack F. Douglas[2], Edward J. Garboczi[3]
[1]*Computer Science and Electrical Engineering, University of Missouri-Kansas City, Kansas City, MO*
[2]*Materials Science and Engineering Division, National Institute of Standards and Technology, Gaithersburg, MD*
[3]*Applied Chemicals and Materials Division, National Institute of Standards and Technology, Boulder, CO*

Session B7: Magnetic Resonance Imaging (Special Session), Room 200
Co-Chairs: Branislav Notaros, *Colorado State University*; Zoya Popovic, *University of Colorado Boulder*; Erdem Topsakal, *Virginia Commonwealth University*

13:20 B7-1
HIGH POWER, HIGH SPEED CONTROL DEVICE MODELS FOR MRI APPLICATIONS
Robert Caverly*
Villanova University, Villanova, PA

13:40 B7-2
ELECTROMAGNETIC ANALYSIS OF ACTIVE IMPLANTABLE MEDICAL DEVICES DURING MRI EXPOSURE USING A SCHUR-COMPLEMENT INTEGRAL-EQUATION METHOD
Jackson W. Massey*[1], Yaniv Brick[2], Ali E. Yılmaz[1,2]
[1]*Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX*
[2]*Institute of Computational Engineering and Sciences, The University of Texas at Austin, Austin, TX*

14:00 B7-3
STANDARDIZED PHANTOMS FOR QUANTITATIVE MRI
Kathryn E. Keenan*, Michael A. Boss, Karl F. Stupic, Stephen E. Russek
National Institute of Standards and Technology, Boulder, CO

14:20 B7-4
UNCONVENTIONAL DESIGNS OF RF PROBES FOR HIGH-FIELD MRI TO ENHANCE MAGNETIC FIELD UNIFORMITY
Elena Semouchkina*[1], Navid Gandji[1], Bahram Seifi[1], Gangchea Lee[2], Seokwon Jung[2], Michael Lanagan[2], Thomas Neuberger[2]
[1]*Michigan Technological University, Houghton, MI*
[2]*Pennsylvania State University, University Park, PA*

14:40 B7-5
EXCITATION PROBES FOR ULTRA-HIGH FIELD MAGNETIC RESONANCE IMAGING
Patrick Bluem*[1], Andrew Kiruluta[2], Pierre-Francois Van de Moortele[3], Gregor Adriany[3], Zoya Popovic[1]
[1]*University of Colorado Boulder, Boulder, CO*
[2]*Harvard University, Cambridge, MA*
[3]*Center for Magnetic Resonance Research, University of Minnesota, Minneapolis, MN*

15:00 Break

15:20 B7-6
MAGNETIC RESONANCE IMAGING AT THE BOUNDARY OF QUASI-STATIC TO FAR-FIELD RF REGIME
Andrew M. Kiruluta*[1], Patrick Bluem[2], Zoya Popovic[2], Pierre-Francois Van de Moortel[3], Branislav M. Notaros[4]
[1]*Physics, Harvard University, Cambridge, MA*
[2]*Electrical, Computer and Energy Engineering, University of Colorado, Boulder, CO*
[3]*Radiology, University of Minnesota, Minneapolis, MN*
[4]*Electrical and Computer Engineering, Colorado State University, Fort Collins, CO*

15:40 B7-7
IMPROVEMENTS TO TRAVELING-WAVE MRI SENSITIVITY AND HOMOGENEITY USING THIN METAMATERIAL BORE LINERS
Justin G. Pollock[1], Navid Hosseini[2], Nicola De Zanche[1], Ashwin K. Iyer*[1]
[1]*Electrical and Computer Engineering, University of Alberta, Edmonton, Alberta, CANADA*
[2]*Electrical and Electronics Engineering, Middle East Technical University, Ankara, TURKEY*

16:00 B7-8
ELECTRO-TEXTILES AS POTENTIAL CANDIDATE OF FLEXIBLE MRI RF COIL FOR STROKE PREVENTION
Daisong Zhang*, Yahya Rahmat-Samii
Electrical Engineering, University of California Los Angeles, Los Angeles, CA

16:20 B7-9
HIGH AND ULTRA-HIGH FIELD MAGNETIC RESONANCE IMAGING RF COIL DESIGNS AND OPTIMIZATION
Pranav S. Athalye*[1], Milan M. Ilic[1,2], Andrew J. M. Kiruluta[3], Pierre-Francois Van de Moortele[4], Branislav M. Notaros[1]
[1]*Electrical and Computer Engineering, Colorado State University, Fort Collins, CO*
[2]*Electrical Engineering, University of Belgrade, Belgrade, Serbia, YUGOSLAVIA*
[3]*Radiology, Massachusetts General Hospital, Harvard Medical School, Boston, MA*
[4]*Radiology, University of Minnesota, Minneapolis, MN*

Session B8: Inverse Scattering and Remote Sensing Room 245
Co-Chairs: Piergiorgio Uslenghi, *University of Illinois at Chicago*; Pai-Yen Chen, *University of Texas at Austin*

13:20 B8-1
EFFICIENT MICROWAVE BIOMEDICAL IMAGING THROUGH SPARSE RECONSTRUCTION OF FREQUENCY INDEPENDENT PARAMETERS
Md Asiful Islam*, Asimina Kiourti, John L. Volakis
Electrical and Computer Engineering, Electroscience Laboratory, The Ohio State University, Columbus, OH

13:40 B8-2
INCORPORATING MULTIPLE SCATTERING IN IMAGING WITH ITERATIVE BORN METHODS
Mert Hidayetoglu*, Anthony Podkowa, Michael L. Oelze, Levent Gurel, Wen-Mei Hwu, Weng Cho Chew
Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, IL

14:00 B8-3
IMAGING PERFORMANCE COMPARISON IN REINFORCED CONCRETE PILLARS USING GROUND PENETRATING RADAR AND RADIO FREQUENCY TOMOGRAPHY
Tadahiro Negishi[1], Gianluca Gennarelli[2], Yangqing Liu[1], Danilo Erricolo*[1], Francesco Soldovieri[2]
[1]*Electrical and Computer Engineering, University of Illinois Chicago, Chicago, IL*
[2]*Institute for Electromagnetic Sensing of the Environment, National Research Council, Napoli, ITALY*

14:20 B8-4
ULTRASENSITIVE PARITY-TIME SYMMETRIC WIRELESS MICROSENSORS
Mehdi Hajizadegan*, Pai-Yen Chen
Wayne State University, Detroit, MI

14:40 B8-5
NOVEL MULTI-FREQUENCY ELECTROMAGNETIC COUPLER FOR POWER AND DATA TRANSMISSION
Christopher S. Deloglos*, Afroditi V. Filippas
Virginia Commonwealth University, Richmond, VA

Session B9: Antenna Arrays I
Room 105
Session Co-Chairs: Randy Haupt, Colorado School of Mines; Dejan Filipovic, *University of Colorado Boulder*

13:20 B9-1
ARRAY OF SLOT PAIRS IN A RECTANGULAR WAVEGUIDE FOR OMNIDIRECTIONAL RADIATION
Sembiam R. Rengarajan*[1], Jeffrey Pawlan[2]
[1]*California State University, Northridge, CA*
[2]*Pawlan Communications, San Jose, CA*

13:40 B9-2
INVESTIGATION AND MEASUREMENT OF A SEA WATER ANTENNA ARRAY
Kristopher R. Buchanan, Timi Adeyemi*, Carlos Flores
Electromagnetics Technology Branch, SSC Pacific, San Diego CA

14:00 B9-3
INVESTIGATION OF THE HIGH FREQUENCY RADIATIVE CAPABILITIES OF A TWO MAST CANONICAL SUPERSTRUCTURE
Kristopher R. Buchanan, Carlos Flores*, Timi Adeyemi, Sara Wheeland
Electromagnetics Technology Branch, SSC Pacific, San Diego CA

14:20 B9-4
A DUAL POLARIZATION MASSIVE MIMO PANEL ARRAY ANTENNA AT KA-BAND WITH BEAMFORMING CAPABILITY
Sandhya Krishna, Satish K. Sharma*
Electrical and Computer Engineering, San Diego State University, San Diego, CA

14:40 B9-5
PULSE DISPERSION IN PHASED AND TIMED ARRAYS
Payam Nayeri*, Randy L. Haupt
Colorado School of Mines, Golden, CO

15:00 Break

15:20 B9-6
COMPROMISE BETWEEN PEAK SIDELOBE LEVEL AND ELEMENT NUMBER AND DENSITY FOR ELECTRICALLY SCANNED ROTATIONAL APERIODIC SUBARRAYS
Junming Diao*, Jakob W. Kunzler, Karl F. Warnick
Electrical and Computer Engineering, Brigham Young University, Provo, UT

15:40 B9-7
UAV SWARM-BASED ANTENNA SYSTEM
Tsotne Kvelashvili*, Ozlem Kilic, Baris C. Secim, Erion Plaku
Electrical Engineering and Computer Science, The Catholic University of America, Washington, DC

16:00 B9-8
HIGH GAIN OMNIDIRECTIONAL ARRAY ANTENNA WITH LOW SIDE LOBE LEVELS IN THE ELEVATION PLANE
Omid Manoochehri*[1], Amin Darvazehban[2], Farhad Farzami[1], Danilo Erricolo[1]
[1]*Electrical and Computer Engineering, University of Illinois Chicago, Chicago, IL*
[2]*Electrical and Computer Engineering, Amirkabir University of Technology, Tehran, IRAN*

16:20 B9-9
HIGH GAIN MINIATURIZED MULTI-BEAM LUNEBURG LENS ANTENNA FOR SATELLITE COMMUNICATIONS
Omid Manoochehri*[1], Amin Darvazehban[2], Farhad Farzami[1], Danilo Erricolo[1]
[1]*Electrical and Computer Engineering, University of Illinois Chicago, Chicago, IL*
[2]*Electrical and Computer Engineering, Amirkabir University of Technology, Tehran, IRAN*

Session B10: Antennas for Small Satellites (Special Session), Room 245
Co-Chairs: Reyhan Baktur, *Utah State University*; David Jackson, *University of Houston*

15:20 B10-1
DEVELOPMENT AND CHARACTERIZATION OF A KA BAND MESH REFLECTOR ANTENNA FOR EMERGING HIGH PERFORMANCE CUBESATS
Vignesh Manohar*, Joshua M. Kovitz, Yahya Rahmat-Samii
Electrical Engineering, University of California Los Angeles, Los Angeles, CA

15:40 B10-2
OPTICALLY TRANSPARENT CIRCULARLY POLARIZED X BAND REFLECTARRAY FOR SOLAR PANEL INTEGRATION
Salahuddin Tariq*, Reyhan Baktur
Electrical and Computer Engineering, Utah State University, Logan, UT

16:00 B10-3
INKJET PRINTED ANTENNAS ON GLASS
Muhammadeziz Tursunniyaz*, Reyhan Baktur
Electrical and Computer Engineering, Utah State University, Logan, UT

16:20 B10-4
A COMPARISON OF TWO TECHNIQUES FOR MAKING TRANSPARENT MICROSTRIP ANTENNAS FOR CUBESATS
Xinyu Liu*, David R. Jackson, Ji Chen
Electrical and Computer Engineering, University of Houston, Houston, TX

Session C1: Advances in Imaging, Detection, and Localization Systems
Room 151
Co-Chairs: Ozlem Kilic, *The Catholic University of America*; Eric Mokole, *Consultant*

13:20 C1-1
POLARIMETRIC INTERFERENCE ALIGNMENT IN MIMO BROADCAST CHANNELS
Carlos A. Viteri-Mera*[1,2], Fernando L. Teixeira[1]
[1]*ElectroScience Laboratory, The Ohio State University, Columbus, OH*
[2]*Electronics Engineering, Universidad de Narino, Pasto, Narino, COLOMBIA*

13:40 C1-2
THE ISOLATION BOOTH
Keaton Brown*, Jean-Francois Chamberland, Gregory H. Huff
Electrical and Computer Engineering, Texas A&M, College Station, TX

14:00 C1-3
MICROWAVE IMAGING WITH A DYNAMIC METASURFACE ANTENNA
Timothy Sleasman*[1], Mohammadreza F. Imani[1], Michael Boyarsky[1], Laura Pulido[1], Thomas Fromenteze[1], Jonah N. Gollub[1], Matthew S. Reynolds[2], David R. Smith[1]
[1]*Electrical and Computer Engineering, Duke University, Durham, NC*
[2]*Electrical Engineering, University of Washington, Seattle, WA*

14:20 C1-4
MAXIMIZING THE SHANNON INFORMATION OF MILLIMETER-WAVE COMPUTATIONAL IMAGING SYSTEMS
Naren Viswanathan*, Suresh Venkatesh, David Schurig
Electrical and Computer Engineering, University of Utah, Salt Lake City, UT

14:40 C1-5
NON-CAUSAL FILTERING APPLIED TO NUMERICAL WHISTLER MODE RAYTRACING
Ashanthi S. Maxworth*, Titsa Papantoni, Mark Golkowski
Electrical Engineering, University of Colorado Denver, Denver, CO

15:00 Break

15:20 C1-6
ANOMALY DETECTION AND IMAGE CLASSIFICATION FOR MULTISPECTRAL AND HYPERSPECTRAL IMAGES
Travis Taghavi*, Jean-Francois Chamberland, Gregory H. Huff
Electrical and Computer Engineering, Texas A&M University, College Station, TX

15:40 C1-7
DYNAMIC METASURFACE ANTENNAS AS AN ENABLING PLATFORM FOR ALTERNATIVE SYNTHETIC APERTURE RADAR (SAR) MODALITIES
Michael Boyarsky*[1], Timothy Sleasman[1], Laura Pulido-Mancera[1], Mohammadreza F. Imani[1], Matthew S. Reynoldds[2], David R. Smith[1]
[1]*Electrical and Computer Engineering, Duke University, Durham, NC*
[2]*Electrical Engineering, University of Washington, Seattle, WA*

16:00 C1-8
ON THE DESIGN OF UNIVERSAL SCHEMES FOR MASSIVE UNCOORDINATED MULTIPLE ACCESS
Austin A. Taghavi*, Avinash Vem, Jean-Francois Chamberland, Krishna R. Narayanan
Texas A&M University, College Station, TX

16:20 C1-9
PRELIMINARY SPECTRAL ANALYSIS OF TAPS AIRBORNE MEASUREMENTS
Eric Hallenborg*[1], Ted Rogers[1], Stephen Hammel[1], Tracy Haack[2]
[1]*SPAWAR Systems Center, San Diego*
[2]*Naval Research Laboratory, Monterey, CA*

Session F2: RF Propagation Modeling and Measurements
Room 135
Co-Chairs: Michael Newkirk, *Johns Hopkins University Applied Physics Laboratory*; Nicholas DeMinco, *Institute for Telecommunication Sciences*

15:20 F2-1
A STATISTICAL SHORT-RANGE, LOW-ANTENNA HEIGHT PROPAGATION MODEL BASE ON ELECTROMAGNETIC THEORY AND MEASUREMENTS
Nicholas N. DeMinco*, Paul M. McKenna, Robert T. Johnk
Institute for Telecommunication Sciences, Boulder, CO

15:40 F2-2
SPREAD SPECTRUM RF CHANNEL SOUNDING IN A MOUNTAIN SHADOW ZONE
Samuel S. Streeter*[1], Daniel J. Breton[1], Johnathan M. Corgan[2]
[1]*Signature Physics Branch, Cold Regions Research and Engineering Laboratory, Hanover, NH*
[2]*Corgan Labs, San Jose, CA*

16:00 F2-3
TEMPORAL AND SPATIAL CHANGES IN MOUNTAIN REFLECTIVITY: MULTIPATH EFFECTS ON A WIDEBAND UHF RADIO LINK IN MOUNTAINOUS TERRAIN
Daniel J. Breton*, Samuel S. Streeter, Steven A. Arcone
Signature Physics, Cold Regions Research and Engineering Laboratory, Hanover, NH

16:20 F2-4
HIGH ANGLE, X-BAND SHIP RCS OVER ROUGH SEA SURFACES IN DUCTING ENVIRONMENTS USING PO-PTD AND PWE METHODS
Frank Ryan*[1], Dale Zolnick[2]
[1]*Applied Technology, Inc., San Diego, CA*
[2]*Radar Analysis Branch, Radar Division, Naval Research Laboratory, Washington, DC*

16:40 F2-5
THE CURRENT STATE OF RADAR AND COMMUNICATION ELECTROMAGNETIC PROPAGATION MODELS
Abby Anderson*
NSWC Dahlgren, Dahlgren, VA

17:00 F2-6
ESTIMATING REFRACTIVITY FROM PROPAGATION LOSS IN TURBULENT MEDIA
Mark A. Wagner*[1], Peter Gerstoft[1], Ted Rogers[2]
[1]*Electrical and Computer Engineering, University of California San Diego, La Jolla, CA*
[2]*SPAWAR, Point Loma, CA*

Session FGH2: GNSS and Radio Beacon Remote Sensing II (Special Session), Room 135
Co-Chairs: Clara Chew, *NASA Jet Propulsion Laboratory*;
Carl Siefring, *Naval Research Laboratory*;
Atilla Komjathy, *NASA Jet Propulsion Laboratory*

13:20 FGH2-1
ASSESSMENT OF OCEAN-REFLECTED GNSS SIGNALS RECEIVED FROM SMAP
Matthew L. Buchanan*, Andrew J. O'Brien, Joel T. Johnson
The Ohio State University, Columbus, OH

13:40 FGH2-2
TECHDEMOSAT-1 LAND ALTIMETRY AND SEA ICE BOUNDARY DETECTION
Jake R. Mashburn*[1], Penina Axelrad[1], Kristine Larson[1], Stephen Lowe[2]
[1]*Aerospace Engineering Sciences, University of Colorado Boulder, Boulder Colorado*
[2]*NASA Jet Propulsion Laboratory, Pasadena, CA*

14:00 FGH2-3
EARTH REMOTE SENSING OF VEGETATION USING GPS-REFLECTED SIGNALS COLLECTED FROM SMAP
Hugo Carreno-Luengo*, Stephen Lowe, Cinzia Zuffada, Clara Chew, Rashmi Shah
NASA Jet Propulsion Laboratory, Pasadena, CA

14:20 FGH2-4
THE FROST DYNAMICS OBSERVATORY (FRODO) CONCEPT
Clara C. Chew*[1], Kyle C. McDonald[1,2], Cinzia Zuffada[1], Erika Podest[1], Nick Steiner[2]
[1]*NASA Jet Propulsion Laboratory, Pasadena, CA*
[2]*Earth and Atmospheric Sciences, The City College of New York, New York, NY*

14:40 FGH2-5
SNOWCUBE MISSION CONCEPT: P-BAND SIGNAL OF OPPORTUNITY FOR REMOTE SENSING OF SNOW
Simon Yueh*[1], Steve Margulis[2], Chris Derksen[3], Michael Durand[4], Kelly Elder[5], Andreadis Konstantinos[1], Glen Liston[6], Rashmi Shah[1], Xiaolan Xu[1], Chun-Sik Chae[1]
[1]*NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA*
[2]*University of California Los Angeles, Los Angeles, CA*
[3]*Environment and Climate Change Canada, Toronto, CANADA*
[4]*The Ohio State University, Columbus, OH*
[5]*United States Forest Service, Fort Collins, CO*
[6]*Colorado State University, Fort Collins, CO*

Session G2: Space Plasma Measurement Techniques (Special Session), Room 155
Co-Chairs: Tom Gaussiran, *ARL:UT*;
Terry Bullett, *University of Colorado Boulder*

15:20 G2-1
THIRD GENERATION MF-HF RADAR FOR IONOSPHERE RADIO SCIENCE
Robert C. Livingston[1], Richard N. Grubb[2], Terence W. Bullett*[2]
[1]*Scion Associates, Port Townsend, WA*
[2]*University of Colorado Boulder, Boulder, CO*

15:40 G2-2
D-REGION IONOSPHERIC REMOTE SENSING USING LF/MF SIGNALS OF OPPORTUNITY
Marc A. Higginson-Rollins*, Morris B. Cohen
School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA

16:00 G2-3
ESTIMATING THE D-REGION IONOSPHERIC ELECTRON DENSITY PROFILE USING VLF NARROWBAND TRANSMITTERS
Nicholas C. Gross*, Morris B. Cohen
Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA

16:20 G2-4
ON THE SPECTRAL FEATURES OF EQUATORIAL SPREAD F ECHOES OBSERVED BY MELISSA
Weijia Zhan*[1], Fabiano S. Rodrigues[1], Eurico R. de Paula[2]
[1]*The University of Texas at Dallas, Richardson, TX*
[2]*Instituto Nacional de Pesquisas Espaciais, Sao Jose Dos Campos, BRAZIL*

16:40 G2-5
OBSERVATION OF ACOUSTIC WAVES AND OTHER TRANSIENT DISTURBANCES USING VIPIR IONOSONDE.
Justin J. Mabie*[1,2], Terence Bullett[1,2]
[1]*CIRES, University of Colorado Boulder, Boulder, CO*
[2]*NCEI, NOAA, Boulder, CO*

17:00 G2-6
DOING SCIENCE WITH UNIVERSITY CUBESATS
John W. Meriwether*, Therese M. Jorgensen
National Science Foundation, Arlington, VA

17:20 G2-7
TWO-DIMENSIONAL UHF RADAR OBSERVATIONS OF EQUATORIAL SPREAD F EVENTS IN THE AMERICAN SECTOR
Fabiano S. Rodrigues*[1], Marco A. Milla[2], Karim K. Kuyeng[2], Ramiro Yanque[2], Juan Arratia[3]
[1]*The University of Texas at Dallas, Richardson, TX*
[2]*Jicamarca Radio Observatory, Lima, PERU*
[3]*Ana G. Mendez University System, Student Research Development Center, San Juan, PR*

Session H2: Physics of the Radiation Belts I (Special Session), Room 265
Co-Chairs: Christopher Crabtree, *Naval Research Laboratory*; Craig Kletzing, *University of Iowa*

13:20 H2-1
OBSERVATIONS OF ENERGETIC ELECTRON PRECIPITATION BY THE BARREL BALLOON CAMPAIGNS
John Sample*[1], Robyn Millan[2]
[1]*Montana State University, Bozeman, MT*
[2]*Dartmouth College, Hanover, NH*

13:40 H2-2
VAN ALLEN PROBE MULTIPOINT MEASUREMENTS OF THE SPATIAL AND COHERENCE SCALES OF EMIC WAVES
Lauren W. Blum*[1], John W. Bonnell[2], Oleksiy Agapitov[2]
[1]*NASA/GSFC, Greenbelt, MD*
[2]*Space Sciences Laboratory, University of California Berkeley, Berkeley, CA*

14:00 H2-3
VAN ALLEN PROBES OBSERVATIONS OF OXYGEN CYCLOTRON HARMONIC WAVES IN THE INNER MAGNETOSPHERE
Maria E. Usanova*[1], David M. Malaspina[1], Allison N. Jaynes[1], Robert Bruder[2], Ian R. Mann[3], John R. Wygant[4], Robert E. Ergun[1]
[1]*LASP, Boulder, CO*
[2]*University of Colorado Boulder, Boulder, CO*
[3]*University of Alberta, Edmonton, AB, CANADA*
[4]*University of Minnesota, Minneapolis, MN*

14:20 H2-4
THE VIRTUES OF PARAMETERIZING PLASMASPHERIC HISS (AND OTHER INNER MAGNETOSPHERE WAVE MODES) BY PLASMAPAUSE LOCATION
David M. Malaspina*[1], Allison N. Jaynes[1], Jacob Bortnik[2], Robert E. Ergun[1], Craig Kletzing[3], John R. Wygant[4]
[1]*Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO*
[2]*Atmospheric and Oceanic Sciences, University of California Los Angeles, Los Angeles, CA*
[3]*Physics and Astronomy, University of Iowa, Iowa City, IA*
[4]*Physics and Astronomy, University of Minnesota, Minneapolis, MN*

14:40 H2-5
USING COLD PLASMA THEORY AND WHISTLER MODE WAVES TO CHARACTERIZE THE ANTENNA-SHEATH IMPEDANCE OF THE VAN ALLEN PROBES EFW INSTRUMENT
David P. Hartley*[1], Craig A. Kletzing[1], William S. Kurth[1], George B. Hospodarsky[1], Scott R. Bounds[1], Terrance F. Averkamp[1], John W. Bonnell[2], Ondrej Santolik[3,4], John R. Wygant[5]
[1]*Physics and Astronomy, University of Iowa, Iowa City, IA*
[2]*Space Sciences Laboratory, University of California Berkeley, Berkeley, CA*
[3]*Space Physics, Institute of Atmospheric Physics, Prague, CZECH REPUBLIC*
[4]*Mathematics and Physics, Charles University, Prague, CZECH REPUBLIC*
[5]*Physics and Astronomy, University of Minnesota, Minneapolis, MN*

15:00 Break

15:20 H2-6
MODELING VERY LOW FREQUENCY RADIO INPUTS TO THE RADIATION BELTS
Michael J. Starks*[1], Alan G. Ling[2], Steven M. O'Malley[2]
[1]*Space Vehicles Directorate, Air Force Research Laboratory, Kirtland AFB, NM*
[2]*Atmospheric and Environmental Research, Inc, Lexington, MA*

15:40 H2-7
WARM PLASMA RAYTRACING OF WHISTLER MODE WAVES IN THE EARTH'S MAGNETOSPHERE
Ashanthi S. Maxworth*, Mark Golkowski
Electrical Engineering, University of Colorado Denver, Denver, CO

16:00 H2-8
WHISTLER-MODE WAVES DETECTED BY THE VAN ALLEN PROBES SATELLITES INSIDE DENSITY DUCTS IN THE MAGNETOSPHERE
Anatoly V. Streltsov*, Miles T. Bengtson
Physical Sciences, Embry-Riddle Aeronautical University, Daytona Beach, FL

16:20 H2-9
A NEW APPROACH TO LOCATE IONOSPHERIC EXIT POINTS OF MAGNETOSPHERIC WHISTLER MODE EMISSIONS
Poorya Hosseini*, Hamid Chorsi, Mark Golkowski, Stephen Gedney
Electrical Engineering, University of Colorado Denver, Denver, CO

16:40 H2-10
STUDYING THE RELATIONSHIP BETWEEN ENERGETIC PARTICLE INJECTIONS, CHORUS, AND OUTER RADIATION BELT ELECTRONS WITH NASA'S MMS AND VAN ALLEN PROBES
Drew L. Turner*[1], Joe Fennell[1], J. Bernard Blake[1], Allison Jaynes[2], Dan Baker[2], Rick Wilder[2], Geoff Reeves[3], Wen Li[4], Craig Kletzing[5], Ian Cohen[6], Barry Mauk[6]
[1]*The Aerospace Corporation, El Segundo, CA*
[2]*Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO*
[3]*Los Alamos National Laboratory, Los Alamos, NM*
[4]*University of California Los Angeles, Los Angeles, CA*
[5]*University of Iowa, Iowa City, IA*
[6]*Applied Physics Lab, Laurel, MD*

Session H3: Waves and Turbulence in Space and Laboratory Plasmas II (Special Session), Room 155

Co-Chairs: Bill Amatucci, *Naval Research Laboratory*; Stephen Vincena, *University of California Los Angeles*

13:20 H3-1
RADIO EMISSIONS OF AURORAL ORIGIN, LATEST RESULTS
James W. LaBelle*
Physics and Astronomy, Dartmouth College, Hanover, NH

13:40 H3-2
SIMULATION OF ELECTRON BERNSTEIN WAVES BY CHARGE-CONSERVING EMPIC ON IRREGULAR MESHES
Dong-Yeop Na*[1], Fernando L. Teixeira[1], Yuri A. Omelchenko[2]
[1]*ElectroScience Laboratory, The Ohio State University, Columbus, OH*
[2]*Trinum Research Inc., San Diego, CA*

14:00 H3-3
SIMULATION OF MAGNETOSPHERIC MAGNETOSONIC WAVE PROPAGATION IN INHOMOGENEOUS MAGNETIZED PLASMA
Xu Liu*, Lunjin Chen
W. B. Hanson Center for Space Sciences, Physics, University of Texas Dallas, Richardson, TX

14:20 H3-4
GLOBAL RATES OF ALFVENIC ENERGY DEPOSITION, ELECTRON PRECIPITATION, AND ION OUTFLOW DURING GEOMAGNETIC STORMS
Spencer M. Hatch*, James W. LaBelle
Physics and Astronomy, Dartmouth College, Hanover, NH

Session J2: Next Generation Very Large Array (Special Session), Math 100

Co-Chairs: Bryan Butler, *National Radio Astronomy Observatory*; Steve Durand, *National Radio Astronomy Observatory*

13:20 J2-1
NEXT GENERATION VERY LARGE ARRAY: SCIENCE OVERVIEW AND COMMUNITY STUDIES
Chris Carilli*, Eric Murphy, Mark Mckinnon
National Radio Astronomy Observatory, Socorro, NM

13:40 J2-2
NEXT GENERATION VERY LARGE ARRAY - AN OVERVIEW
Bryan Butler*, Chris Carilli, Mark McKinnon, Eric Murphy
National Radio Astronomy Observatory, Socorro, NM

14:00 J2-3
STRAWMAN SPECIFICATIONS FOR THE NEXT-GENERATION VERY LARGE ARRAY
Robert J. Selina*, Chris Carilli
National Radio Astronomy Observatory, Socorro, NM

14:20 J2-4
DESIGN CONSIDERATIONS FOR THE NGVLA ANTENNAS
David P. Woody*
Owens Valley Radio Observatory, Caltech, Big Pine, CA

14:40 J2-5
TOWARDS OPTICS DESIGN FOR THE NEXT GENERATION VERY LARGE ARRAY
Sivasankaran Srikanth*
National Radio Astronomy Observatory, Charlottesville, VA

15:00 Break

15:20 J2-6
NGVLA CRYOGENIC SUBSYSTEM CONCEPT
Denis R. Urbain*, Wes Grammer, Steven Durand
National Radio Astronomy Observatory, Socorro, NM

15:40 J2-7
NGVLA BASELINE RECEIVER SYSTEM CONCEPTUAL DESIGN
Wes Grammer*[1], Sivasankaran Srikanth[2], Marian Pospieszalski[2], Silver Sturgis[1]
[1]*Electronics, National Radio Astronomy Observatory, Socorro, NM*
[2]*Central Development Laboratory, National Radio Astronomy Observatory, Charlottesville, VA*

16:00 J2-8
IMPLEMENTATION STATUS OF THE ULTRA-WIDEBAND RECEIVER PACKAGE FOR THE NORTH AMERICAN ARRAY
Jose E. Velazco*, Melissa Soriano, Daniel Hoppe, Damon Russell, Larry D'Addario, Ezra Long, Jim Bowen, Lorene Samoska, Andrew Janzen, Joseph Lazio
NASA Jet Propulsion Laboratory, Pasadena, CA

16:20 J2-9
ANTENNA ELECTRONICS CONCEPT FOR THE NEXT-GENERATION VERY LARGE ARRAY
James M. Jackson*, Robert Selina
Electronics Division, National Radio Astronomy Observatory, Socorro, NM

16:40 J2-10
THEORY AND MEASUREMENTS OF WIDE-BAND FIBER-OPTIC LINKS
James W. Lamb*
Owens Valley Radio Observatory, California Institute of Technology, Big Pine, CA

17:00 J2-11
ARRAY PROCESSING METHODS FOR RADIO ASTRONOMICAL RFI MITIGATION: A CASE STUDY FOR THE NGVLA
Brian D. Jeffs*, Richard A. Black, Karl F. Warnick
Electrical and Computer Engineering, Brigham Young University, Provo, UT

17:20 J2-12
EXPERIMENTS IN ADVANCED FAULT DETECTION IN THE JANSKY VERY LARGE ARRAY
Alan Erickson*, Kerry Shores
EE, National Radio Astronomy Observatory, Socorro, NM

WEDNESDAY AFTERNOON, continued

Session K1: Electromagnetic Imaging and Sensing Applications in Medicine
Room 150
Co-Chairs: Magda El-Shenawi, *University of Arkansas*; Mahta Moghaddam, *University of Southern California*

13:20 K1-1
NANOPARTICLE-ENHANCED TERAHERTZ IMAGING OF BREAST CANCER PHANTOMS
Tyler Bowman*[1], Alec Walter[1], Olga Shenderova[2], Nicholas Nunn[2], Gary McGuire[2], Magda El-Shenawee[1]
[1]*Electrical Engineering, University of Arkansas, Fayetteville, AR*
[2]*Adamas Nanotechnologies, Inc., Raleigh, NC*

13:40 K1-2
TERAHERTZ IMAGING OF FRESHLY EXCISED MURINE BREAST CANCER TUMORS
Tyler Bowman*[1], Sruthi Ravindranathan[2], David Zaharoff[2], Narasimhan Rajaram[2], Keith Bailey[3], Magda El-Shenawee[1]
[1]*Electrical Engineering, University of Arkansas, Fayetteville, AR*
[2]*Biomedical Engineering, University of Arkansas, Fayetteville, AR*
[3]*Oklahoma Animal Disease Diagnostics Laboratory, Oklahoma State University, Stillwater, OK*

14:00 K1-3
TERAHERTZ SPECTROSCOPY FOR THE CHARACTERIZATION OF MICRODIAMOND AND NANO-ONION PARTICLES
Alec Walter*[1], Tyler Bowman[1], Olga Shenderova[2], Nicholas Nunn[2], Gary McGuire[2], Magda El-Shenawee[1]
[1]*Electrical Engineering, University of Arkansas, Fayetteville, AR*
[2]*Adamas Nanotechnologies, Inc., Raleigh, NC*

14:20 K1-4
TERAHERTZ IMAGING FOR DEFECT IDENTIFICATION IN LIQUID-STERILIZING MEMBRANE DEVICES
Nathan Burford[1], Tyler Bowman*[2], Robert Beitle[3], Magda El-Shenawee[2]
[1]*Microelectronics-Photonics Program, University of Arkansas, Fayetteville, AR*
[2]*Electrical Engineering, University of Arkansas, Fayetteville, AR*
[3]*Chemical Engineering, University of Arkansas, Fayetteville, AR*

14:40 K1-5
POLARIMETRIC THZ IMAGING OF HUMAN BRAIN TISSUES EXHIBITING ALZHEIMER'S DISEASE
Nandhini Srinivasan*, Cosan Caglayan, Kubilay Sertel
The Ohio State University, Columbus, OH

15:00 Break

15:20 K1-6
THREE DIMENSIONAL LEVEL SET METHOD FOR MICROWAVE IMAGING
Andre C. Batista*[1], Pratik Shah[2], Guanbo Chen[2], John Stang[2]
[1]*Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, BRAZIL*
[2]*Electrical Engineering, University of Southern California, Los Angeles, CA*

15:40 K1-7
RECTENNA FOR WIRELESS POWERING OF IMPLANTABLE GLUCOSE SENSOR
Ryan B. Green*, Panagiotis Efthymakis, Arthur French, Afroditi V. Filippas, Erdem Topsakal
Electrical and Computer Engineering, Virginia Commonwealth University, Richmond, VA

16:00 K1-8
THE EFFECT OF GLUCOSE ON THE ELECTRICAL PROPERTIES OF BLOOD PLASMA
Arthur W. French*[1], Afroditi V. Filippas[1], Erdem Topsakal[1], Anastasios C. Karles[2]
[1]*Electrical and Computer, Virginia Commonwealth University, Richmond, VA*
[2]*Henrico High School, Henricho, VA*

16:20 K1-9
ANALYSIS OF MICRO-DOPPLER SIGNATURE OF HUMANOID ROBOT MOTIONS FOR HEALTH MONITORING
Nghia H. Tran*, Ankit Bhargava, Ozlem Kilic
Electrical Engineering and Computer Science, The Catholic University of America, Washington, DC

Commission Business Meetings

17:00	Commission A	Room 105
17:00	Commission E	Room 245
18:00	Commission C	Room 200
18:00	Commission F	Room 265
18:00	Commission J	Math 100

THURSDAY MORNING, 5 January 2017

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) The Future of the Electromagnetic Spectrum

(2) Fast Radio Bursts: The Story So Far

Co-Chairs: Greg Huff, *Texas A&M University*;
Charles Baylis, *Baylor University*;
David DeBoer, *University of California Berkeley*

10:00 P1-1
THE FUTURE OF THE ELECTROMAGNETIC SPECTRUM
William Chappell*
Director, Microsystems Technology Office, Defense Advanced Research Projects Agency, Arlington, VA

10:50 P1-2
FAST RADIO BURSTS: THE STORY SO FAR
Duncan Lorimer*
Physics and Astronomy, West Virginia University, Morgantown, WV

11:40 Awards Ceremony for Student Paper Competition

12:00 Lunch for Student Travel Awardees, USNC Officers and Commission Chairs
Atrium at Koelbel – Business School

THURSDAY AFTERNOON, 5 January 2017

Session A1: Microwave and Millimeter Wave Propagation and Measurement
Room 155
Co-Chairs: Steven Weiss, *US Army Research Lab*;
Kristopher Buchanan, *SPAWAR*

13:20 A1-1
TERRESTRIAL LINK RAIN ATTENUATION MEASUREMENTS AT 84 GHZ
Eugene Hong*[1], Steven Lane[1], David Murrell[1], Nicholas Tarasenko[1], Christos Christodoulou[2]
[1]*Space Vehicles Directorate, Air Force Research Laboratory, Albuquerque, NM*
[2]*Electrical and Computer Engineering, University of New Mexico, Albuquerque, NM*

13:40 A1-2
NUMERICALLY CALCULATED TRANSFER FUNCTIONS FOR SOLVING ARBITRARY LENGTH SIGNAL PROPAGATION USING FDTD METHOD
Joseph E. Diener*[1], Jeanne T. Quimby[2], Kate A. Remley[2], Atef Z. Elsherbeni[1]
[1]*Electrical Engineering and Computer Science, Colorado School of Mines, Golden, CO*
[2]*National Institute of Standards and Technology, Boulder, CO*

14:00 A1-3
A NOVEL V-BAND PRINTED QUASI-PARABOLIC REFLECTOR ANTENNA
Alister Hosseini, Evangelos Kornaros, Saman Kabiri*, Franco De Flaviis
University of California Irvine, Irvine, CA

14:20 A1-4
SEAWATER DIELECTRIC MEASUREMENT BY USING A CAVITY TECHNIQUE: EXIT-HOLE EFFECT ANALYSIS
Yiwen Zhou*, Roger H. Lang
Electrical and Computer Engineering, The George Washington University, Washington, DC

14:40 A1-5
PRECISION PORTABLE CRYOGENIC BLACKBODY TARGET FOR MICROWAVE/MILLIMETER WAVE RECEIVER CALIBRATION
Fredrick S. Solheim*
Dakota Ridge R&D, Boulder, CO

15:00 Break

15:20 A1-6
FIBER GLASS-WEAVE SKEW ANALYSIS USING THE FINITE-DIFFERENCE TIME-DOMAIN METHOD
Ravi C. Bollimuntha*[1], Venkata D. Paladugu[1], Rounak Saha[1], Melinda J. Piket-May[1], Atef Z. Elsherbeni[2], Mohammed F. Hadi[1,2,3]
[1]*Electrical, Computer and Energy Engineering, University of Colorado, Boulder, CO*
[2]*Electrical Engineering and Computer Science, Colorado School of Mines, Golden, CO*
[3]*Electrical Engineering, Kuwait University, Kuwait, KUWAIT*

15:40 A1-7
EXPERIMENTAL DEMONSTRATION OF HIGHER ORDER DISPERSION IN INHOMOGENEOUS SLOW WAVE STRUCTURES FOR BACKWARD WAVE OSCILLATORS
Ushemadzoro Chipengo*, Niru K. Nahar, John L. Volakis
Electrical and Computer Engineering, The Ohio State University, Columbus, OH

16:00 A1-8
CHARACTERIZATION OF METHODS OF REMOVING SURFACE CHARGE FOR REDUCTION OF ELECTROSTATIC DISCHARGE EVENTS
Khandakar Nusrat Islam*, Mark Gilomore
Electrical and Computer Engineering, University of New Mexico, Albuquerque, NM

16:20 A1-9
ELECTRICAL BREAKDOWN STRENGTHS OF VARIOUS GASSES AND GAS MIXTURES
D V. Giri*[1], V Carbonu[2], J M. Lehr[3]
[1]*PRO-TECH, ALAMO*
[2]*L3 Communications (Retired), San Leandro, CA*
[3]*University of New Mexico, Albuquerque, NM*

Session B11: Wearable Antennas and Electronics (Special Session)
Room 1B40
Co-Chairs: Asimina Kiourti, *ElectroScience Laboratory, The Ohio State University*;
Bashir Morshed, *The University of Memphis*

13:20 B11-1
FUTURE OF WIRELESS MEDICAL TELEMETRY
Erdem Topsakal*
Virginia Commonwealth University, Richmond, VA

13:40 B11-2
IMPEDANCE PHLEBOGRAPHY BASED PULSE SENSING USING INDUCTIVELY-COUPLED INKJET-PRINTED WRAP SENSOR
Bashir I. Morshed*
Electrical and Computer Engineering, The University of Memphis, Memphis, TN

14:00 B11-3
A LOW POWER WEARABLE RESPIRATION MONITORING SENSOR USING PYROELECTRIC TRANSDUCER
Ifana Mahbub*[1], Syed K. Islam[1], Salvatore A. Pullano[2], Antonino S. Fiorillo[2], Samira Shamsir[1], Mark S. Gaylord[3], Yichien Lorch[3]
[1]*Electrical Engineering and Computer Science, University of Tennessee Knoxville, Knoxville, TN*
[2]*Health Sciences, University Magna Graecia of Catanzaro, Catanzaro, ITALY*
[3]*Obstetrics and Gynecology, University of Tennessee Knoxville, Knoxville, TN*

14:20 B11-4
AN EXPERIMENTAL STUDY ON THE FEASIBILITY OF FALL PREVENTION USING A WEARABLE K-BAND FMCW RADAR
Yao Tang*, Zhengyu Peng, Changzhi Li
Electrical and Computer Engineering, Texas Tech University, Lubbock, TX

14:40 B11-5
SIMULATION OF COIL SEPARATION AND ANGLE EFFECTS ON THE MUTUAL INDUCTANCE FOR 13.56 MHZ WRAP SENSORS
Babak Noroozi, Bashir I. Morshed*
Electrical and Computer Engineering, The University of Memphis, Memphis, TN

15:00 Break

15:20 B11-6
A LOW-POWER CMOS ENERGY HARVESTING CIRCUIT FOR WEARABLE SENSORS USING PIEZOELECTRIC TRANSDUCERS
Taeho Oh*[1], Islam K. Syed[1], Mohamed Mahfouz[2], Gary To[2]
[1]*Electrical Engineering and Computer Science, University of Tennessee Knoxville, Knoxville, TN*
[2]*Mechanical, Aerospace, and Biomedical Engineering, University of Tennessee Knoxville, Knoxville, TN*

15:40 B11-7
WEARABLE ELECTRONICS INTEGRATED WITH FLEXIBLE TEXTILE ANTENNAS
Navtej S. Saini*, Asimina Kiourti, John L. Volakis, Robert Lee
Electrical and Computer Engineering, The Ohio State University, Columbus, OH

16:00 B11-8
PERFORMANCE ANALYSIS OF TEXTILE AMC ANTENNA ON BODY MODEL
Ala A. Alemaryeen*, Sima Noghanian
Electrical Engineering, University of North Dakota, Grand Forks, ND

16:20 B11-9
LOW-POWER IMPULSE RADIO ULTRA-WIDEBAND (IR-UWB) TRANSMITTER FOR BIOMEDICAL SENSOR APPLICATIONS
Ifana Mahbub*, Syed K. Islam
University of Tennessee Knoxville, Knoxville, TN

Session B12: Terahertz Antennas and Applications (Special Session), Room 245
Co-Chairs: Kubilay Sertel, *The Ohio State University*;
Georgios Trichopoulos, *Arizona State University*

13:20 B12-1
PLANAR HIGH PERFORMANCE ANTENNAS AT TERAHERTZ FREQUENCIES
Goutam Chattopadhyay*
NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA

13:40 B12-2
DYNAMICALLY TUNABLE AND RECONFIGURABLE ANTENNAS FOR ADVANCED THZ SENSING AND IMAGING
Lei Liu*, Zhenguo Jiang, Itrat Shams, Syed Rahman, Patrick Fay
Electrical Engineering, University of Notre Dame, Notre Dame, IN

14:00 B12-3
MM-WAVE HIGH GAIN BEAM-SCANNING FOCAL PLANE ARRAYS WITH MICROFLUIDICALLY SWITCHED FEED NETWORKS
Enrique J. Gonzalez*, Gokhan Mumcu
Electrical Engineering, University of South Florida, Tampa, FL

14:20 B12-4
MONOLITHIC REALIZATION AND CHARACTERIZATION OF ON-CHIP UWB PHASED ARRAYS FOR MMW AND THZ CONNECTIVITY
Seckin Sahin*, Cosan Caglayan, Niru K. Nahar, Kubilay Sertel
Electrical and Computer Engineering, The Ohio State University, Columbus, OH

14:40 B12-5
NON-CONTACT, ON-WAFER CHARACTERIZATION OF SCHOTTKY DIODES
Cosan Caglayan*, Kubilay Sertel
ElectroScience Laboratory, The Ohio State University, Columbus, OH

15:00 Break

15:20 B12-6
MULTIPHYSICAL MODELS OF ELECTRON-PLASMA ELECTRONICS FOR TERAHERTZ SOURCES AND DETECTORS
Shubhendu Bhardwaj*, John Volakis
Electrical and Computer Engineering, The Ohio State University, Columbus, OH

15:40 B12-7
TERAHERTZ IMAGING VIA SINGLE-BIT COMPRESSIVE SENSING
Syed An Nazmus Saqueb*, Kubilay Sertel
The Ohio State University, Columbus, OH

16:00 B12-8
USING COMPUTERIZED TOMOGRAPHY'S ALGORITHMS FOR REAL TIME THZ IMAGING SYSTEMS
Panagiotis Theofanopoulos*, Georgios Trichopoulos
Arizona State University, Tempe, AZ

16:20 B12-9
A RADAR AND SPECTROMETER INSTRUMENT PROTOTYPE FOR PLANETARY SCIENCE AT MILLIMETER AND SUBMILLIMETER-WAVE FREQUENCIES
Tristan Ossama El Bouayadi*
NASA Jet Propulsion Laboratory, Pasadena, CA

16:40 B12-10
A RAPID FILTER BANK DESIGN AND MEASUREMENT SCHEME FOR SUPERSPEC
George Che*[1], Philip Mauskopf[1], Georgios Trichopoulos[2], Steven Hailey-Dunsheath[3], Charles M. Bradford[3,4], Jason Glenn[5], Corwin Shiu[6], Erik Shirokoff[7], Jordan Wheeler[5]
[1] *Earth & Space Exploration, Arizona State University, Tempe, AZ*
[2] *Electrical, Computer and Energy Engineering, Arizona State University, Tempe, AZ*
[3]*Astronomy, California Institute of Technology, Pasadena, CA*
[4]*Astronomy & Space Sciences, NASA Jet Propulsion Laboratory, Pasadena, CA*
[5]*Astrophysical & Planetary Sciences, University of Colorado Boulder, Boulder, CO*
[6]*Physics, Princeton University, Princeton, NJ*
[7]*Astronomy & Astrophysics, University of Chicago, Chicago, IL*

Session CDE1: Spectrum Issues, Developments, and Solutions
(Special Session), Room 105
Co-Chairs: Charles Baylis, *Baylor University*;
Zoya Popovic, *University of Colorado Boulder*;
Eric Mokole, *Consultant*

13:20 CDE1-1
SUGGESTED R&D AREAS FOR RADAR-COMMUNICATION CO-EXISTENCE AND CO-DESIGN
Eric L. Mokole*[1], Lawrence Cohen[2]
[1]*Consultant, Burke, VA*
[2]*Radar Division, Naval Research Laboratory, Washington, DC*

13:40 CDE1-2
SUMMARY OF RECENT RADAR SPECTRUM ACTIVITIES
Eric L. Mokole[1], Lawrence Cohen*[2]
[1]*Consultant, Burke, VA*
[2]*Radar Division, Naval Research Laboratory, Washington, DC*

14:00 CDE1-3
DYNAMIC SPECTRUM COLLABORATION BETWEEN RADAR AND WIRELESS COMMUNICATION: A PROPOSED FRAMEWORK FOR THE SIMULTANEOUS OPTIMIZATION OF POLICY, NETWORKS, AND CIRCUITS
Charles Baylis*[1], Robert J. Marks II[1], Liang Dong[1], Andrew Clegg[2], Lawrence Cohen[3]
[1]*Wireless and Microwave Circuits and Systems Program, Baylor University, Waco, TX*
[2]*Google, Reston, VA*
[3]*Radar Division, Naval Research Laboratory, Washington, DC*

14:20 CDE1-4
DUAL-LOOP JOINT CIRCUIT AND WAVEFORM OPTIMIZATION TECHNIQUE FOR AMBIGUITY FUNCTION, SPECTRAL PERFORMANCE, AND POWER EFFICIENCY
Casey Latham*[1], Alicia Magee[1], Jacob Boline[1], Alexander Tsatsoulas[1], Matthew Fellows[1], Charles Baylis[1], Lawrence Cohen[2], Robert J. Marks II[1]
[1]*Electrical and Computer Engineering, Baylor University, Waco, TX*
[2]*Naval Research Laboratory, Washington, DC*

14:40 CDE1-5
WIDEBAND RF SELF-INTERFERENCE CANCELLATION FILTER FOR SIMULTANEOUS TRANSMIT/RECEIVE SYSTEMS
Satheesh Bojja Venkatakrishnan*, Elias A. Alwan, John Volakis
The Ohio State University, Columbus, OH

15:00 Break

15:20 CDE1-6
A FREQUENCY-SELECTIVE TUNABLE POWER AMPLIFIER FOR BROADBAND PHASED ARRAY TRANSMITTERS
Allison Duh*, Dimitra Psychogiou, Zoya Popovic
University of Colorado Boulder, Boulder, CO

15:40 CDE1-7
REAL-TIME AMPLIFIER IMPEDANCE OPTIMIZATION USING A NONLINEAR TUNABLE VARACTOR MATCHING NETWORK WITH POWER-DEPENDENT CHARACTERIZATION
Sarvin Rezayat*[1], Zach Hays[1], Christopher Kappelmann[1], Matthew Fellows[1], Charles Baylis[1], Robert Marks[1], Ed Viverios[2], Abigail Hedden[2], John Penn[2], Ali Darwish[2]
[1]*Electrical and Computer Engineering, Baylor University, Waco, TX*
[2]*Army Research Laboratory, Adelphi, MD*

THURSDAY AFTERNOON, continued

16:00 CDE1-8
IMPROVING CUBESAT TRANSMITTER EIRP TO ENABLE SPACE NETWORK COMMUNICATION CAPABILITIES
Sushia Rahimizadeh*[1], Peter Fetterer[2], Zoya Popovic[1], Harry Shaw[2]
[1]*University of Colorado Boulder, Boulder, CO*
[2]*Goddard Space Flight Center, Greenbelt, MD*

16:20 CDE1-9
MILLIMETER-WAVE TRANSMIT/RECEIVE SYSTEM FOR SECURE HIGH DATA RATE COMMUNICATIONS
Dimitrios Siafarikas*, Elias A. Alwan, John L. Volakis
Electrical and Computer Engineering, The Ohio State University, Columbus, OH

16:40 CDE1-10
WIDEBAND AND MULTI-BEAM ANGLE OF ARRIVAL ESTIMATION USING ON-SITE CODING
Satheesh Bojja Venkatakrishnan*, Elias A. Alwan, John Volakis
Electrical and Computer Engineering, The Ohio State University, Columbus, OH

Session F3: Nanosatellites for Remote Sensing (Special Session), Room 150
Co-Chairs: Albin Gasiewski, *University of Colorado Boulder*; Steven C. Reising, *Colorado State University*; William Blackwell, *MIT Lincoln Laboratory*

13:20 F3-1
DESIGNING A CLIMATE-MONITORING MICROWAVE RADIOMETER
Philip W. Rosenkranz*[1], William J. Blackwell[1], Albin J. Gasiewski[2], R. V. Leslie[1], Carl A. Mears[3], Jeffrey R. Piepmeier[4], Paul E. Racette[4], Benjamin D. Santer[5]
[1]*Massachusetts Institute of Technology, Cambridge, MA*
[2]*University of Colorado Boulder, Boulder, CO*
[3]*Remote Sensing Systems, Santa Rosa, CA*
[4]*NASA Goddard Space Flight Center, Greenbelt, MD*
[5]*Lawrence Livermore National Laboratory, Livermore, CA*

13:40 F3-2
MICROWAVE-IR POLARIMETRY AND RADIOMETRY FOR REMOTE SENSING OF CLOUD ICE MICROPHYSICAL PROPERTIES
Dong L. Wu*[1], Jie Gong[1,2]
[1]*NASA Goddard Space Flight Center, Greenbelt, MD*
[2]*Universities Space Research Association, Greenbelt, MD*

14:00 F3-3
TROPOSPHERIC WATER AND CLOUD ICE (TWICE) MILLIMETER- AND SUB-MILLIMETER-WAVE RADIOMETER FOR 6U-CLASS SATELLITES: PERFORMANCE ANALYSIS OF COMMAND AND DATA HANDLING (C&DH) SUBSYSTEM
Mehmet Ogut*[1], Xavier Bosch-Lluis[1], Steven C. Reising[1], Yuriy V. Goncharenko[1], Pekka Kangaslahti[2], Erich Schlecht[2], Richard Cofield[2], Nacer Chahat[2], Sharmila Padmanabhan[2], Jonathan Jiang[2], Shannon T. Brown[2], William R. Deal[3], Alex Zamora[3], Kevin Leong[3], Sean Shih[3], Gerry Mei[3]
[1]*Electrical and Computer Engineering, Colorado State University, Fort Collins, CO*
[2]*NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA*
[3]*Northrop Grumman Aerospace Systems, Redondo Beach, CA*

14:20 F3-4
THE CUBESAT RADIOMETER RADIO FREQUENCY INTERFERENCE TECHNOLOGY VALIDATION (CUBERRT) MISSION
Christa McKelvey*[1], Joel T. Johnson[1], Chi-Chih Chen[1], Andrew O'Brien[1], Graeme E. Smith[1], Mark Andrews[1], J. Landon Garry[1], Sidharth Misra[2], Shannon Brown[2], Jonathan Kocz[2], Robert Jarnot[2], Damon C. Bradley[3], Priscilla N. Mohammed[3], Jared F. Lucey[3], Jeffrey R. Piepmeier[3], Kevin Horgan[3], Michael Solly[3], Joseph Knuble[3]
[1]*Electrical and Computer Engineering, ElectroScience Laboratory, The Ohio State University, Columbus, OH*
[2]*NASA Jet Propulsion Laboratory, Pasadena, CA*
[3]*NASA Goddard Space Flight Center, Greenbelt, MD*

14:40 F3-5
CYGNSS: EARLY LAUNCH ENGINEERING AND SCIENCE COMMISSIONING
Scott Gleason*[1], Valery Zavorotny[2], Christopher Ruf[3], Randy Rose[1]
[1]*Southwest Research Institute, Boulder, CO*
[2]*NOAA Earth System Research Laboratory, Boulder, CO*
[3]*Climate and Space, University of Michigan, Ann Arbor, MI*

15:00 Break

15:20 F3-6
PRE-LAUNCH CALIBRATION AND PERFORMANCE STUDY OF THE POLARCUBE 3U TEMPERATURE SOUNDING RADIOMETER MISSION
Lavanya Periasamy*, Albin J. Gasiewski
Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

15:40 F3-7
RADIOMETER CALIBRATION WITH GPS RADIO OCCULTATION FOR THE MIRATA CUBESAT MISSION
Kerri Cahoy*[1], Anne Marinan[1], Rebecca Bishop[2], Susan Lui[2], James Bardeen[2], Tamitha Skov[2], William Blackwell[3], R. Vincent Leslie[3], Idahosa Osaretin[3], Michael Shields[3]
[1]*Aeronautics and Astronautics, Massachusetts Institute of Technology, Cambridge, MA*
[2]*The Aerospace Corporation, El Segundo, CA*
[3]*MIT Lincoln Laboratory, Lexington, MA*

16:00 F3-8
ENABLING TIME-RESOLVED OBSERVATIONS OF CLOUD AND PRECIPITATION PROCESSES FROM 6U-CLASS SATELLITE CONSTELLATIONS: TEMPORAL EXPERIMENT FOR STORMS AND TROPICAL SYSTEMS TECHNOLOGY DEMONSTRATION (TEMPEST-D)
Steven C. Reising*[1], Todd C. Gaier[2], Christian D. Kummerow[3], V Chandrasekar[1], Sharmila Padmanabhan[2], Boon H. Lim[2], Cate Heneghan[2], Wesley Berg[3], Jon P. Olson[1], Shannon T. Brown[2], John Carvo[4], Matthew Pallas[4]
[1]*Electrical and Computer Engineering, Colorado State University, Fort Collins, CO*
[2]*NASA Jet Propulsion Laboratory, Pasadena, CA*
[3]*Atmospheric Sciences, Colorado State University, Fort Collins, CO*
[4]*Blue Canyon Technologies, Boulder, CO*

16:20 F3-9
THE TEMPEST-D DEMONSTRATION RADIOMETER INSTRUMENT FOR MEASUREMENT OF CLOUDS AND PRECIPITATION
Todd Gaier*[1], Sharmila Padmanabhan[1], Boon Lim[1], Richard Cofield[1], Mary Easter[1], Mary Soria[1], Heather Owen[1], Steven C. Reising[2]
[1]*NASA Jet Propulsion Laboratory, Pasadena, CA*
[2]*Electrical and Computer Engineering, Colorado State University, Fort Collins, CO*

Session F4: Complex and Random Media (Special Session), Room 135
Co-Chairs: Saba Mudaliar, *Air Force Research Laboratory*; Akira Ishimaru, *University of Washington*

13:20 F4-1
IMPROVEMENTS IN THE SINGLE SCATTER SUBTRACTION APPROACH
Kevin Diomedi, Gary S. Brown*
Virginia Tech, Blacksburg, VA

13:40 F4-2
MODELING OF COHERENT AND DIFFUSE SCATTERING FROM ROUGH SURFACE WITH SMALL AND MODERATE RAYLEIGH PARAMETER
Alexander G. Voronovich*, Valery V. Zavorotny
NOAA Earth System Research Laboratory, Boulder, CO

14:00 F4-3
COHERENT BISTATIC SCATTERING MODEL FOR VEGETATED LAND COVER IN SUPPORT OF SOIL MOISTURE RETRIEVAL
Amir Azemati*, Mahta Moghaddam
Ming Hsieh Department of Electrical Engineering, University of Southern California, Los Angeles, CA

14:20 F4-4
ANTENNA BEAMWIDTH EFFECT IN DETECTING MICROWAVE ENHANCED BACKSCATTER FROM A LAYER OF VEGETATION
Avinash Sharma*[1], Roger H. Lang[2]
[1]*Johns Hopkins University Applied Physics Laboratory, Laurel, MD*
[2]*Electrical and Computer Engineering, The George Washington University, Washington, DC*

14:40 F4-5
DESIGNING SOURCES FOR ENHANCEMENT OF EARLY-TIME DIFFUSION IN SHORT PULSE PROPAGATION THROUGH RANDOM PARTICULATE MEDIA
Elizabeth Bleszynski*, Marek Bleszynski, Thomas Jaroszewicz
Monopole Research, Thousand Oaks, CA

15:00 Break

15:20 F4-6
A RAYLEIGH-RITZ APPROACH TO GREEN'S FUNCTION OF AN INHOMOGENEOUS LAYER
Saba Mudaliar*[1], C. P. Vendhan[2], C. Prabavathi[3]
[1]*Sensors Directorate, Air Force Research Laboratory, Dayton, OH*
[2]*Indian Institute of Technology Madras, Chennai, INDIA*
[3]*P.O. Box 24467, Dayton, OH*

15:40 F4-7
PASSIVE INFRARED RETRIEVAL OF TROPOSPHERIC REFRACTIVITY, TEMPERATURE, AND WATER VAPOR PROFILES
Fredrick S. Solheim*
Dakota Ridge R&D, Boulder, CO

16:00 F4-8
POINT-TO-POINT BACKHAUL SYSTEMS AT 3.5GHZ PREDICTIONS VS. MEASUREMENTS IN A VEGETATED RESIDENTIAL AREA OF WASHINGTON, DC
Saul A. Torrico*[1], Roger H. Lang[2]
[1]*Comsearch, Ashburn, VA*
[2]*Electrical and Computer Engineering, The George Washington University, Washington, DC*

16:20 F4-9
MEASUREMENTS OF WIDEBAND MICROWAVE PROPAGATION WITHIN A SMALL AIRCRAFT FOR REPLACING WIRE HARNESSES
Miyuki Hirose*, Takehiko Kobayashi
Tokyo Denki University, Tokyo, JAPAN

Session GH1: Meteors, Orbital Debris and Dusty Plasmas I (Special Session), Room 151
Co-Chairs: Eric Gillman, *Naval Research Laboratory*; Edward Thomas, *Auburn University*; Julio Urbina, *Pennsylvania State University*

13:20 GH1-1
ANALYSIS OF PLASMA TURBULENCE ON THE FORMATION OF SPECULAR METEOR ECHOES
Freddy R. Galindo[1], Julio V. Urbina*[1], Lars P. Dyrud[2]
[1]*Electrical Engineering and Computer Science, Pennsylvania State University, University Park, PA*
[2]*OmniEarth, Inc., Arlington, VA*

13:40 GH1-2
INVERSION OF METEOR RADAR CROSS SECTION TO PLASMA DENSITY USING AN FDTD NUMERICAL SCATTERING MODEL
Robert A. Marshall*[1], Sigrid Close[2], Peter Brown[3], Gunter Stober[4], Carsten Schult[4], Jorge Chau[4]
[1]*University of Colorado Boulder, Boulder, CO*
[2]*Stanford University, Stanford, CA*
[3]*University of Western Ontario, London, ON, CANADA*
[4]*Institute of Atmospheric Physics, Kuhlungsborn, GERMANY*

THURSDAY AFTERNOON, continued

14:00 GH1-3
SIMULTANEOUS UHF/VHF RADAR AND OPTICAL OBSERVATIONS OF METEORS AT ARECIBO
Michael DeLuca*[1,2], Diego Janches[3], Robert Michell[4,5], Rebecca Chen[6], Zoltan Sternovsky[1,2]
[1]*Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO*
[2]*Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, CO*
[3]*Space Weather Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD*
[4]*Geospace Environment Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD*
[5]*Astronomy, University of Maryland, College Park, College Park, MD*
[6]*River Hill High School, Clarksville, MD*

14:20 GH1-4
METEOROID SPUTTERING AS A SOURCE FOR LOWER-THERMOSPHERIC METALS AND THE RADIO SCIENCE OF HIGH-ALTITUDE RADAR METEORS
John D. Mathews*[1], Boyi Gao[1], Saiveena Kesaraju[1], Shikha Raizada[2]
[1]*Radar Space Sciences Lab, Pennsylvania State University, University Park, PA*
[2]*Space Science Division, Arecibo Observatory, Arecibo, PR*

15:00 Break

15:20 GH1-5
LOW-ALTITUDE RADAR METEORS AND BOLIDE LANGMUIR WAVES
John D. Mathews*[1], Qian Zhu[1], Frank T. Djuth[2]
[1]*Radar Space Sciences Lab, Pennsylvania State University, University Park, PA*
[2]*Geospace Research, Inc., El Segundo, CA*

15:40 GH1-6
RADAR DETECTABILITY OF METEOR HEAD ECHOES AND ITS IMPLICATION ON THE ZODIACAL DUST CLOUD POPULATIONS
Diego Janches*[1], Petr Pokorny[2], Nimalna Swarnalingam[2], David Nesvorny[3], John M. C. Plane[4], Wuhu Feng[4], Juan Diego Carrillo-Sanches[4], Juan Carlos Gomez Martin[4], David Vokrouhlicky[5]
[1]*Space Weather Laboratory, NASA, Greenbelt, MD*
[2]*Physics, Catholic University of America, Washington, D.C*
[3]*SouthWest Research Institute, Boulder, CO*
[4]*Chemistry, University of Leeds, Leeds, UNITED KINGDOM*
[5]*Institute of Astronomy, Charles University, Prague, CZECH REPUBLIC*

16:00 GH1-7
MICROMETEOROID ABLATION SIMULATED IN THE LABORATORY USING A DUST ACCELERATOR
Z. Sternovsky*[1,2,3], E. Thomas[2,3], M. DeLuca[1,2], M. Horanyi[1,3,4], D. Janches[5], N. Swarnalingam[5], R. Marshall[2], T. Munsat[3,4], J. M. C. Plane[6]
[1]*LASP, University of Colorado Boulder, Boulder, CO*
[2]*Aerospace Eng. Sci., University of Colorado Boulder, Boulder, CO*
[3]*IMPACT, University of Colorado Boulder, Boulder, CO*
[4]*Physics, University of Colorado Boulder, Boulder, CO*
[5]*Space Weather Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD*
[6]*School of Chemistry, University of Leeds, Leeds, UNITED KINGDOM*

16:20 GH1-8
RADIO-FREQUENCY EMISSION DETECTION AND SCALING FROM HYPERVELOCITY IMPACTS ON CHARGED TARGETS
Andrew Nuttall*, Sigrid Close
Stanford University, Stanford, CA

16:40 GH1-9
HYPERVELOCITY IMPACT PLASMA EXPANSION: SCALING FROM EXPERIMENT TO SPACE
Nicolas Lee*, Sigrid Close, Ashish Goel
Aeronautics and Astronautics, Stanford University, Stanford, CA

Session H4: Physics of the Radiation Belts II (Special Session), Room 200
Co-Chairs: Christopher Crabtree, *Naval Research Laboratory*; Craig Kletzing, *University of Iowa*

13:20 H4-1
MODULATION OF WHISTLER-MODE CHORUS WAVES BY ULF AND THE EFFECTS ON PRECIPITATION
Allison N. Jaynes*[1], Maria Usanova[1], Marc Lessard[2], Kazue Takahashi[3], Ashar Ali[1], David Malaspina[1], Robert Michell[4], Emma Spanswick[5], Daniel N. Baker[1], J B. Blake[6], Chris Cully[5], Eric Donovan[5], Craig Kletzing[7], Geoff Reeves[8], Marilia Samara[4], Harlan Spence[2], John Wygant[9]
[1]*LASP, University of Colorado Boulder, Boulder, CO*
[2]*University of New Hampshire, Durham, NH*
[3]*Johns Hopkins University Applied Physics Laboratory, Laurel, MD*
[4]*NASA Goddard Space Flight Center, Greenbelt, MD*
[5]*University of Calgary, Calgary, CANADA*
[6]*Aerospace Corporation, El Segundo, CA*
[7]*University of Iowa, Iowa City, IA*
[8]*Los Alamos National Laboratory, Los Alamos, NM*
[9]*University of Minnesota, Minneapolis, MN*

13:40 H4-2
DIAGNOSING PARAMETERS OF NONLINEAR WHISTLER MODE GROWTH IN THE MAGNETOSPHERE FROM OBSERVATIONS OF RELATIVE PHASE OF SIDEBANDS OF TRIGGERED EMISSIONS
Mark Golkowski*, Jamie Costabile, Randall Wall
Electrical Engineering, University of Colorado Denver, Denver, CO

14:00 H4-3
UNIQUE CONCURRENT OBSERVATIONS OF WHISTLER MODE HISS, CHORUS, AND TRIGGERED EMISSIONS
Poorya Hosseini*, Mark Golkowski
Electrical Engineering, University of Colorado Denver, Denver, CO

14:20 H4-4
BAYESIAN SPECTRAL ANALYSIS OF CHORUS SUB-ELEMENTS
Christopher Crabtree*[1], Gurudas Ganguli[1], Erik Tejero[1], George Hospodarsky[2], Craig Kletzing[2]
[1]*Naval Research Laboratory, Washington, DC*
[2]*University of Iowa, Iowa City, IA*

14:40 H4-5
FIRST DIRECT EVIDENCE OF A ONE-ONE CORRESPONDENCE OF CHORUS WAVE PACKETS AND MICROBURSTS: VAN ALLEN PROBES EFW AND FIREBIRD
Aaron Breneman*[1], Alex Crew[2]
[1]*University of Minnesota, Minneapolis, MN*
[2]*Johns Hopkins University Applied Physics Laboratory, Laurel, MD*

Session HEG1: Lightning and its Interaction with the Ionosphere I
(Special Session), Room 265
Co-Chairs: Robert Marshall, *University of Colorado Boulder*; Morris Cohen, *Georgia Institute of Technology*; Ningyu Liu, *University of New Hampshire*

13:20 HEG1-1
THE ASSOCIATION OF TERRESTRIAL GAMMA-RAY FLASHES WITH ENERGETIC IN-CLOUD LIGHTNING PULSES
Steven A. Cummer*[1], Fanchao Lyu[1], Michael S. Briggs[2], David M. Smith[3]
[1]*Duke University, Durham, NC*
[2]*University of Alabama Huntsville, Huntsville, AL*
[3]*University of California Santa Cruz, Santa Cruz, CA*

13:40 HEG1-2
ESTIMATION OF RADIATION DOSES RECEIVED BY AIRCRAFT PASSENGERS IN A TGF PHOTON BEAM
Sebastien Celestin*[1], Francois Trompier[2], Jean-Louis Pincon[1]
[1]*LPC2E, University of Orleans, CNRS, Orleans, FRANCE*
[2]*Institut de Radioprotection et de Surete Nucleaire, Fontenay-aux-Roses, FRANCE*

14:00 HEG1-3
A NEW TYPE OF TRANSIENT LUMINOUS EVENTS PRODUCED BY TERRESTRIAL GAMMA-RAY FLASHES
Wei Xu*[1], Sebastien Celestin[2], Victor P. Pasko[3], Robert A. Marshall[1]
[1]*Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, CO*
[2]*Laboratory of Physics and Chemistry of the Environment and Space (LPC2E), University of Orleans, CNRS, Orleans, FRANCE*
[3]*Communications and Space Sciences Laboratory, Pennsylvania State University, University Park, PA*

14:20 HEG1-4
TRYAD: A PAIR OF CUBESATS TO OBSERVE TERRESTRIAL GAMMA-RAY FLASH BEAMS
Michael S. Briggs*[1], Pete Jenke[1], Jean-Marie Wersinger[2], Mike Folge[2]
[1]*CSPAR, University of Alabama Huntsville, Huntsville, AL*
[2]*Physics, Auburn University, Auburn, AL*

14:40 HEG1-5
USING WWLLN TO FIND WEAKER TGFS IN THE FERMI GBM DATA
Michael S. Briggs*, Kareem Omar
CSPAR, University of Alabama Huntsville, Huntsville, AL

15:00 Break

15:20 HEG1-6
CALCULATING HF AND VHF EMISSIONS FROM COMPACT INTRACLOUD DISCHARGES
Joseph R. Dwyer*, Ningyu Liu
Physics Department and Space Science Center (EOS), University of New Hampshire, Durham NH

15:40 HEG1-7
FRACTAL DIMENSION OF CLOUD-TO-GROUND LIGHTNING
Ningyu Liu*[1], Julia Tilles[1], Levi Boggs[2], Alan Bozarth[2], Hamid Rassoul[2], Jeremy Riousset[3]
[1]*Physics and Space Science Center, University of New Hampshire, Durham, NH*
[2]*Physics and Space Sciences, Florida Institute of Technology, Melbourne, FL*
[3]*Center for Space and Atmospheric Research, Physical Sciences Department, Embry Riddle Aeronautical University, Daytona Beach, FL*

16:00 HEG1-8
3-D MODELING OF TWO INTERACTING STREAMERS
Feng Shi*[1], Ningyu Liu[1], Hamid K. Rassoul[2]
[1]*Physics and Space Science Center, University of New Hampshire, Durham, NH*
[2]*Physics and Space Sciences, Florida Institute of Technology, Melbourne, FL*

16:20
HEG1-9 RADIO INTERFEROMETER STUDY OF HIGH-POWER LIGHTNING NARROW BIPOLAR EVENTS IN FLORIDA
Julia N. Tilles*[1], Ningyu Liu[1], Paul R. Krehbiel[2], William Rison[2], Mark A. Stanley[2], Robert G. Brown[3], Jennifer G. Wilson[3], Levi Boggs[4], Michael Stock[5]
[1]*Physics and Space Science Center, University of New Hampshire, Durham, NH*
[2]*Langmuir Laboratory, New Mexico Tech, Socorro, NM*
[3]*NASA Kennedy Space Center, Kennedy Space Center, FL*
[4]*Physics and Space Sciences, Florida Institute of Technology, Melbourne, FL*
[5]*Osaka University, Osaka, JAPAN*

Session J3: New Telescopes, Techniques and Technology II
(Special Session), Math 100
Co-Chairs: David DeBoer, *University of California Berkeley*; Jeffery Mangum, *National Radio Astronomy Observatory*

13:20 J3-1
ALMA DIGITAL DOWNCONVERTER
Sylas Ashton*
National Radio Astronomy Observatory, Socorro, NM

13:40 J3-2
SURVEYING THE MOLECULAR GAS FUELING EARLY STAR FORMATION: PRESENT RESULTS AND FUTURE DIRECTIONS
Garrett K. Keating*[1], Daniel P. Marrone[2], Geoffrey C. Bower[3]
[1]*Smithsonian Astrophysical Observatory, Cambridge, MA*
[2]*Astronomy, University of Arizona, Tucson, AZ*
[3]*ASIAA, Hilo, HI*

THURSDAY AFTERNOON, continued

14:00 J3-3
SUSTAINING SUBMILLIMETER SCIENCE IN THE NEXT DECADE AND BEYOND
Henry A. Wootten, Jeffrey G. Mangum*
National Radio Astronomy Observatory and University of Virginia, Charlottesville, VA

Session J4: Cosmic Microwave Background Polarization (Special Session), Math 100
Co-Chairs: Dan Marrone, *University of Arizona*; Miguel Morales, *University of Washington*

15:20 J4-1
OVERVIEW OF DETECTOR ARRAYS FOR THE MEASUREMENT OF COSMIC MICROWAVE BACKGROUND POLARIZATION
Johannes Hubmayr*
National Institute of Standards and Technology, Boulder, CO

15:40 J4-2
NEXT-GENERATION COSMOLOGY WITH ADVANCED ACTPOL
Sara M. Simon*
University of Michigan, Ann Arbor, MI

16:00 J4-3
THE BICEP/KECK CMB POLARIZATION APPROACH: MEASURING DEGREE ANGULAR SCALES WITH SMALL APERTURES
Kirit S. Karkare*
Harvard-Smithsonian Center for Astrophysics, Cambridge, MA

16:20 J4-4
SPT-3G: THE THIRD GENERATION CAMERA AND SURVEY FOR THE SOUTH POLE TELESCOPE
Joaquin Vieira*
Astronomy, The University of Illinois at Urbana-Champaign, Urbana, IL

16:40 J4-5
THE COSMOLOGY LARGE ANGULAR SCALE SURVEYOR
Lucas P. Parker*
Johns Hopkins University, Baltimore, MD

17:00 J4-6
MEASURING GALACTIC SYNCHROTRON WITH THE C-BAND ALL SKY SURVEY
Heiko M. Heilgendorff*
University of KwaZulu-Natal, Durban, SOUTH AFRICA

Commission Business Meetings

17:00	Commission B	Room 1B40
17:00	Commission D	Room 105
17:00	Commission G	Room 245
18:00	Commission H	Room 265
18:00	Commission K	Room 200

FRIDAY MORNING, 6 January 2017

Session B13: Antenna Measurements and Simulations (Special Session)
Room 1B40
Co-Chairs: Steven Weiss, *US Army Research Lab*; Jeanne Quimby, *National Institute of Standards and Technology*

08:20 B13-1
MEASURED PERFORMANCE OF LOW PROFILE ANTENNAS FED IN A BALANCED CONFIGURATION
Steven Weiss*, Gregory Mitchell
United States Army Research Laboratory, Adelphi, MD

08:40 B13-2
MODIFICATION, MODELING, AND MEASUREMENT OF A BALANCED ANTIPODAL VIVALDI FOR A MULTI-CHANNEL RECEIVER
Seth A. McCormick*[1], William O. Coburn[2]
[1]*General Technical Services LLC, Wall, NJ*
[2]*United States Army Research Laboratory, Adelphi, MD*

09:00 B13-3
UNIQUE GEOMETRY FOR A CONCENTRIC DUAL BAND ARRAY ANTENNA AT S- AND X-BAND
Gregory Mitchell*
United States Army Research Laboratory, Adelphi, MD

09:20 B13-4
STUDY OF PHASE VARIATION ON PROPAGATING THROUGH METAMATERIAL
Quang M. Nguyen*, Amir I. Zaghloul, Steven J. Weiss
United States Army Research Laboratory, Adelphi, MD

09:40 B13-5
MODELING AND MEASUREMENT OF 3D PRINTED λ/30 SPHERICAL SPIRAL DIPOLES
Theodore K. Anthony*, Keefe Coburn, Amir I. Zaghloul
United States Army Research Laboratory, Adelphi, MD

10:00 Break

10:20 B13-6
NOVEL CHOKE RINGS FOR ULTRA-WIDEBAND ANTENNA ARRAY
Zahra Manzoor*[1], Gholamreza Moradi[2]
[1]*Electrical and Computer Engineering, Missouri Science and Technology University, Rolla, MO*
[2]*Electrical and Computer Engineering, Amir Kabir University, Tehran, IRAN*

10:40 B13-7
DESIGN AND CALIBRATION OF A CLOSED LOOP LABORATORY RF PROPAGATION SECTION
William O. Coburn*[1], Andre K. Witcher[1], Seth A. McCormick[2]
[1]*United States Army Research Laboratory, Adelphi MD*
[2]*General Technical Services LLC, Adelphi MD*

11:00 B13-8
THE TRISKELION-ARCHIMEDEAN SPIRAL ANTENNA
Seunghwan Yoon*[1], Alfred G. Besoli[1], Franco De Flaviis[2], Nicolaos G. Alexopoulos[3]
[1]*Movandi Corporation, Newport Beach, CA*
[2]*University of California Irvine, Irvine, CA*
[3]*Broadcom Foundation, Newport Beach, CA*

Session B14: Antenna Arrays II
Room 245
Co-Chairs: Dejan Filipovic, *University of Colorado Boulder*; Gokhan Mumcu, *University of South Florida*

08:20 B14-1
INVESTIGATION OF MULTI-OCTAVE WIDEBAND CAVITY-BACKED VIVALDI ARRAY ANTENNAS
Elie G. Tianang*, Mohamed A. Elmansouri, Dejan S. Filipovic
Electrical, Computer, and Energy Engineering, University of Colorado Boulder, Boulder, CO

08:40 B14-2
DUAL POLARIZED 7.2:1 BANDWIDTH PHASED ARRAY WITH 60 DEGREE SCANNING
Jingni Zhong*, Elias A. Alwan, John L. Volakis
Electrical and Computer Engineering, The Ohio State University, Columbus, OH

09:00 B14-3
WIDEBAND PHASED ARRAY OF SPIRAL ANTENNAS FOR SIMULTANEOUS TRANSMIT AND RECEIVE (STAR)
Alexander Hovsepian*, Elias A. Alwan, John L. Volakis
Electrical and Computer Engineering, The Ohio State University, Columbus, OH

09:20 B14-4
INVESTIGATION OF LATERAL SPACE WAVE AND SURFACE WAVE ON THE LINK BUDGET OF CHIP-TO-CHIP SWITCHED-BEAM 60-GHZ ARRAY
Prabhat Baniya*, Kathleen L. Melde
Electrical and Computer Engineering, University of Arizona, Tucson, AZ

09:40 B14-5
DIRECTIONAL ARRAY FOR MILLIMETER-WAVE CELLULAR NETWORK
Toan K. Vo Dai*, Ozlem Kilic
The Catholic University of America, Washington, DC

10:00 Break

10:20 B14-6
PHASE SHIFTER CONTROL SCHEME IMPLEMENTATION FOR STEERABLE/ADAPTIVE L-BAND PHASED ARRAYS
Farhan Quaiyum*[1], Robab Kazemy[2], Aly E. Fathy[1]
[1]*Electrical Engineering and Computer Science, University of Tennessee, Knoxville, TN*
[2]*Electrical and Computer Engineering, University of Tabriz, Tabriz, IRAN*

10:40 B14-7
ADAPTIVE WIRELESS ENERGY HARVESTING SYSTEMS USING FOCUSED ANTENNA ARRAYS
Daniel E. Schemmel*, Payam Nayeri
Electrical Engineering and Computer Science, Colorado School of Mines, Golden, CO

11:00 B14-8
EXAMINATION OF THE NEAR FIELD RESPONSE OF CIRCULAR ANTENNA ARRAYS
Kristopher R. Buchanan*, Oren Sternberg, Sara Wheeland, John Rockway
SSC Pacific, San Diego, CA

Session B15: Advanced Analysis, Design, and Applications of Waveguiding Structures (Special Session), Room 105
Co-Chairs: Michael Havrilla, *Air Force Institute of Technology*; Edward Rothwell, *Michigan State University*

08:20 B15-1
OPTIMIZATION OF STEPPED-WAVEGUIDE APPLICATORS FOR THE CHARACTERIZATION OF CONDUCTOR-BACKED ABSORBING MATERIALS
Edward J. Rothwell*, Jonathan L. Frasch
Electrical and Computer Engineering, Michigan State University, East Lansing, MI

08:40 B15-2
OPTICALLY TRANSPARENT PLANAR COMPOSITE STRUCTURE CONTAINING METALS AND DNG METAMATERIALS
Piergiorgio L. E. Uslenghi*
University of Illinois Chicago, Chicago, IL

09:00 B15-3
MULTIMODAL WAVEGUIDES WITH EXCEPTIONAL POINTS OF DEGENERACY OF VARIOUS ORDERS
Mohamed Othman[1], Mehdi Veysi[1], Farshad Yazdi[1], Mohamed Nada[1], Dmitry Oshmarin[1], Alexander Figotin[2], Filippo Capolino*[1]
[1]*Electrical Engineering and Computer Science, University of California Irvine, Irvine, CA*
[2]*Mathematics, University of California Irvine, Irvine, CA*

09:20 B15-4
RECTANGULAR WAVEGUIDE MODE AND BANDWIDTH ENHANCEMENT USING COMMON AND DIFFERENTIAL EXCITATION
Michael J. Havrilla*
Air Force Institute of Technology, Wright-Patterson AFB, OH

09:40 B15-5
PHOTONIC TOPOLOGICAL INSULATOR WAVEGUIDING FROM A CLASSICAL ELECTROMAGNETICS PERSPECTIVE
Ali Hassani*, George W. Hanson
Electrical Engineering, University of Wisconsin Milwaukee, Milwaukee, WI

Session C2: Interfacing Hardware and Signal Processing in Distributed Radar and Sensing Systems Room 135
Co-Chairs: Jean-Francois Chamberland, *Texas A&M University*; Laura Pulido Mancera, *Duke University*

08:20 C2-1
ON THE IMPACT OF ANTENNA DESIGN IN THE CONTEXT OF GRAPH INFERENCE BASED ON WI-FI METADATA
Mandel Oats*, Travis Taghavi, Jean-Francois Chamberland, Gregory H. Huff
Electrical and Computer Engineering, Texas A&M University, College Station, TX

08:40 C2-2
ADAPTING RANGE MIGRATION TECHNIQUES FOR FAST IMAGE RECONSTRUCTION WITH METASURFACE ANTENNAS
Laura M. Pulido Mancera*[1], Thomas Fromenteze[1], Timothy Sleasman[1], Michael Boyarsky[1], Mohammadreza F. Imani[1], Matthew Reynolds[2], David R. Smith[1]
[1]*Duke University, Durham, NC*
[2]*University of Washington, Seattle, WA*

09:00 C2-3
A NOVEL MODEL FOR DIRECTION OF ARRIVAL ESTIMATION USING THE PHASE CENTER CONCEPT
Evangelos Kornaros, Saman Kabiri*, Alister Hosseini, Franco De Flaviis
University of California Irvine, Irvine, CA

09:20 C2-4
DEVELOPMENT OF A LOW COST COMPACT INTEGRATED STEP FREQUENCY CONTINUOUS WAVE RADAR FOR NON-CONTACT VITAL SIGN DETECTION
Lingyun Ren*, Sabikun Nahar, Aly E. Fathy
Electrical Engineering and Computer Science, University of Tennessee, Knoxville, TN

09:40 C2-5
INTEGRATING REAL TIME WEATHER RADAR DATA INTO THE CLOUD-HOSTED REAL-TIME DATA SERVICES FOR THE GEOSCIENCES (CHORDS) PROJECT
Ryan Gooch*[1], V. Chandrasekar[1], Mike Daniels[2]
[1]*Electrical and Computer Engineering, Colorado State University, Fort Collins, CO*
[2]*National Center for Atmospheric Research, Boulder, CO*

10:00 Break

10:20 C2-6
A FLEXIBLE FPGA DEVELOPMENT ENVIRONMENT FOR THE SWOT ON-BOARD RADAR PROCESSOR
Cody Vaudrin*, David Hawkins
Radar Science and Engineering, NASA Jet Propulsion Laboratory, Pasadena, CA

10:40 C2-7
HUMAN RESPIRATION RATE ESTIMATION USING SFCW RADAR SYSTEM
Sabikun Nahar*[1], Lingyun Ren[1], Tuan Phan[2], Ozlem Kilic[2], Aly E. Fathy[1]
[1]*Electrical Engineering and Computer Science, The University of Tennessee, Knoxville, TN*
[2]*Electrical Engineering and Computer Science, The Catholic University of America, Washington, DC*

11:00 C2-8
SYNDICATED TEST BENCH SET-UP FOR TESTING OF REAL-TIME RECONFIGURABLE POWER AMPLIFIERS FOR THE NEXT GENERATION RADAR
Lucilia R. Lamers*[1], Zachary Hays[1], Charles Baylis[1], Robert Marks[1], Edward Viveiros[2], John Penn[2], Abigail Hedden[2], Ali Darwish[2]
[1]*Electrical and Computer Engineering, Baylor University, Waco, TX*
[2]*Army Research Laboratory, Adelphi, MD*

11:20 C2-9
NASA D3R RADAR UPGRADE: ENHANCING SENSITIVITY AND SPATIAL RESOLUTION
Mohit Kumar*[1], Robert M. Beauchamp[1], Shashank S. Joshil[1], Manuel Vega[1,2], V. Chandrasekar[1]
[1]*Electrical and Computer Engineering, Colorado State University, Fort Collins, CO*
[2]*NASA Goddard Space Flight Center, Greenbelt, MD*

Session F5: Microwave Remote Sensing of the Earth and Atmosphere
Room 150
Co-Chairs: Chandrasekar V. Chandra, *Colorado State University*;
Kamal Sarabandi, *University of Michigan Ann Arbor*

08:20 F5-1
CLOUD OBSERVATION USING KA-BAND CLOUD RADAR IN CHENGDU PLAIN
Xuehua Li*[1], V. Chandrasekar[2], Jianxin He[1], Lin Yang[1]
[1]*Electronic Engineering, Chengdu University of Information Technology, Chengdu, Sichuan, CHINA*
[2]*Electrical and Computer Engineering, Colorado State University, Fort Collins, CO*

08:40 F5-2
USING DOPPLER VELOCITY DIFFERENCE FROM 3- AND 35-GHZ VERTICALLY POINTING RADARS TO RETRIEVE VERTICAL AIR MOTION AND RAINDROP SIZE DISTRIBUTIONS
Christopher R. Williams*[1,2], Robert M. Beauchamp[3], Chandra V. Chandrasekar[3]
[1]*Cooperative Institute for Research in Environmental Science (CIRES), University of Colorado Boulder, Boulder, CO*
[2]*Physical Science Division, NOAA Earth System Research Laboratory, Boulder, CO*
[3]*Electrical and Computer Engineering, Colorado State University, Fort Collins, CO*

09:00 F5-3
A MACHINE LEARNING MODEL FOR RADAR RAINFALL ESTIMATION BASED ON GAUGE OBSERVATIONS
Haiming Tan*, V. Chandrasekar, Haonan Chen
Colorado State University, Fort Collins, CO

09:20 F5-4
TESTING RAINFALL RATE ALGORITHMS FOR CSU-CHILL X-BAND RADAR
Pranav S. Athalye*[1], Merhala Thurai[1], V. N. Bringi[1], Patrick C. Kennedy[2], Branislav M. Notaros[1]
[1]*Electrical and Computer Engineering, Colorado State University, Fort Collins, CO*
[2]*Atmospheric Science, Colorado State University, Fort Collins, CO*

09:40 F5-5
SCATTERING CALCULATIONS FOR ASYMMETRIC RAIN DROPS UNDERGOING MIXED MODE OSCILLATIONS
Sanja Manic*, Merhala Thurai, V. N. Bringi, Branislav Notaros
Electrical and Computer Engineering, Colorado State University, Fort Collins, CO

10:00 Break

10:20 F5-6
RANGE AMBIGUITY CHARACTERIZATION AND MITIGATION FOR THE NASA D3R
Shashank S. Joshil*, Robert M. Beauchamp, V. Chandrasekar
Electrical and Computer Engineering, Colorado State University, Fort Collins, CO

10:40 F5-7
IDENTIFICATION OF SNOW FROM GPM-DPR OBSERVATIONS AND CROSS VALIDATION WITH S-BAND GROUND RADAR DUAL POLARIZATION MEASUREMENTS
Sounak K. Biswas*, Minda Le, V. Chandrasekar
Electrical and Computer Engineering, Colorado State University, Fort Collins, CO

11:00 F5-8
SPACE BORNE DUAL FREQUENCY RADAR SIGNATURES OF HAIL AND GRAUPEL
Karthik Ganesan*, V. Chandrasekar, Minda Le
Electrical and Computer Engineering, Colorado State University, Fort Collins, CO

11:20 F5-9
ANALYSIS OF DDSCAT-BASED PHASE MATRIX SYMMETRY FOR 3-D RADIATIVE TRANSFER MODEL DEVELOPMENT
Kun Zhang*, Albin J. Gasiewski
Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO

11:40 F5-10
L-BAND HIGH RESOLUTION SOIL MOISTURE MAPPING USING A SMALL UNMANNED AERIAL SYSTEM
Eryan Dai*[1], Albin Gasiewski[1], Maciej Stachura[2], Jack Elston[2], Aravind Venkitasubramony[1]
[1]*University of Colorado Boulder, Boulder, CO*
[2]*Black Swift Technologies (BST) LLC, Boulder, CO*

Session G3: New Horizons in Active and Passive Radio Techniques for Geospace Remote Sensing (Special Session), Room 200
Co-Chairs: Philip Erickson, *MIT Haystack Observatory*; Julio Urbina, *Pennsylvania State University*

08:20 G3-1
THZ LIMB SOUNDER (TLS) FOR LOWER THERMOSPHERIC WIND, OXYGEN DENSITY, AND TEMPERATURE
Dong L. Wu*[1], Jeng-Hwa Yee[2], Erich T. Schlecht[3], Imran Mehdi[3], Jose V. Siles[3], Brian J. Drouin[3]
[1]*NASA Goddard Space Flight Center, Greenbelt, MD*
[2]*Johns Hopkins University Applied Physics Laboratory, Laurel, MD*
[3]*NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA*

08:40 G3-2
STUDIES OF THERMOSPHERIC WAVE ACTIVITY USING DYNASONDE TECHNIQUES: CURRENT STATE AND THE FUTURE
Nikolay Zabotin*[1], Catalin Negrea[1], Oleg Godin[2], Terence Bullett[1]
[1]*University of Colorado Boulder, Boulder, CO*
[2]*Naval Postgraduate School, Monterey, CA*

09:00 G3-3
NEW CAPABILITY AT SONDRESTROM RADAR: SUB-SECOND AURORAL ELECTRON DENSITY MEASUREMENTS
Asti Bhatt*[1], Juha Vierinen[2], Joshua Semeter[3], Michael Hirsch[3], Mary McCready[1]
[1]*SRI International, Menlo Park, CA*
[2]*University of Trmoso, Tromso, NORWAY*
[3]*Boston University, Boston, MA*

09:20 G3-4
OPPORTUNITIES FOR POLAR CAP SCIENCE USING COORDINATED RISR-C AND RISR-N EXPERIMENTS
Roger H. Varney*[1], Robert G. Gillies[2]
[1]*Center for Geospace Studies, SRI International, Menlo Park, CA*
[2]*Physics and Astronomy, University of Calgary, Calgary, AB, CANADA*

09:40 G3-5
HIGH-ORDER PARTICLE-IN-CELL SIMULATIONS OF INCOHERENT SCATTER RADAR SPECTRA
Alex Fletcher*[1,2], William Longley[1], Meers M. Oppenheim[1]
[1]*Center for Space Physics, Boston University, Boston, MA*
[2]*Physics, Massachusetts Institute of Technology, Cambridge, MA*

10:00 Break

10:20 G3-6
THE MIT INCOHERENT SCATTER PERFORMANCE SIMULATOR (MIPS)
Philip J. Erickson*[1], Juha Vierinen[2], Frank D. Lind[1], Ryan Volz[1]
[1]*Haystack Observatory, Massachusetts Institute of Technology, Westford, MA*
[2]*Physics and Technology, University of Tromso, Tromso, NORWAY*

10:40 G3-7
A SYNTHESIS ARRAY FOR RADIO AND RADAR IMAGING OF THE IONOSPHERE
Brett Isham*[1], Terence Bullett[2], Bjorn Gustavsson[3], Vasyl Belyey[4]
[1]*Interamerican University of Puerto Rico, Bayamon, PR*
[2]*University of Colorado Boulder, Boulder, CO*
[3]*University of Tromso, Tromso, NORWAY*
[4]*Pinhole AS, Tromso, NORWAY*

11:00 G3-8
COVARIANCE ESTIMATION OF POLARIZED SIGNALS WITH APPLICATION TO VECTOR SENSOR IMAGING
Ryan Volz[1], Frank C. Robey[2], Mary Knapp[3], Frank D. Lind[1], Philip J. Erickson*[1]
[1]*Haystack Observatory, Massachusetts Institute of Technology, Westford, MA*
[2]*Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA*
[3]*Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA*

11:20 G3-9
CALCULATING THE ABSORPTION OF HF RADIO WAVES IN THE IONOSPHERE
Katherine A. Zawdie*, Douglas P. Drob, David E. Siskind, Clayton Coker
Space Science Division, Naval Research Laboratory, Washington, DC

Session HEG2: Lightning and its Interaction with the Ionosphere II (Special Session), Room 265
Co-Chairs: Robert Marshall, *University of Colorado Boulder*; Morris Cohen, *Georgia Institute of Technology*; Ningyu Liu, *University of New Hampshire*

10:20 HEG2-1
THUNDERSTORM TO IONOSPHERE COUPLING: RECENT RESULTS AND FUTURE DIRECTION
Erin H. Lay*
ISR-2, Los Alamos National Laboratory, Los Alamos, NM

10:40 HEG2-2
ION DYNAMICS IN LIGHTNING-INDUCED HEATING OF THE LOWER IONOSPHERE
Daniel A. Kotovsky*, Robert C. Moore
University of Florida, Gainesville, FL

11:00 HEG2-3
LWPC MODELING OF VLF PERTURBATIONS ON OVERLAPPING PROPAGATION PATHS FROM LIGHTNING INDUCED ENERGETIC ELECTRON PRECIPITATION
C. Renick*[1], M. Golkowski[1], S. Sarker[1], M. B. Cohen[2]
[1]*Electrical Engineering, University of Colorado Denver, Denver, CO*
[2]*Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA*

11:20 HEG2-4
LWPC ANALYSIS OF LIGHTNING SFERIC ELF PROPAGATION VELOCITY
Sandeep R. Sarker*[1], Mark Golkowski[1], Chad Renick[1], Robert Moore[2], Neal Dupree[2]
[1]*University of Colorado Denver, Denver, CO*
[2]*University of Florida, Gainesville, FL*

Session HG1: Ionospheric Modification (Special Session), Room 105
Co-Chairs: Michael Sulzer, *Arecibo Observatory*; Robert Moore, *University of Florida*

10:20 HG1-1
IONOSPHERIC REMOTE SENSING USING BROADBAND SFERICS IN SPACE AND TIME
Jackson C. McCormick*, Morris B. Cohen
Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA

10:40 HG1-2
IONOSPHERIC FEEDBACK INSTABILITY IN THE IONOSPHERIC ALFVEN RESONATOR AT HIGH LATITUDES: MODELING AND OBSERVATIONS
Beket Tulegenov*, Anatoly V. Streltsov
Physical Sciences, Embry-Riddle Aeronautical University, Daytona Beach, FL

11:00 HG1-3
ARTIFICIAL IONOSPHERIC SCINTILLATION EXCITED DURING ACTIVE MODULATION OF THE IONOSPHERE
Alireza Mahmoudian*[1], Wayne A. Scales[2], Paul A. Bernhardt[3], K. Papadopoulos[4], G. Milikh[4], S. Ghader[1], A. Najmi[4]
[1]*Institute of Geophysics, University of Tehran, Tehran, IRAN*
[2]*Electrical and Computer Engineering, Virginia Tech, Blacksburg, VA*
[3]*Plasma Physics, Naval Research Laboratory, Washington, DC*
[4]*Physics and Astronomy, University of Maryland, College Park, MD*

11:20 HG1-4
HF MEASUREMENTS OF THE IONOSPHERE USING THE E-POP RADIO RECEIVER INSTRUMENT
Stanley J. Briczinski*[1], Paul A. Bernhardt[1], Carl A. Siefring[1], Michael P. Sulzer[2], Phil Perillat[2], Eframir Franco[2], Andrew Yau[3], Andrew Howarth[3], H. Gordon James[3]
[1]*Plasma Physics Division, Naval Research Laboratory, Washington, DC*
[2]*Arecibo Observatory, Arecibo, PR*
[3]*University of Calgary, Calgary, CANADA*

Session J5: New Telescopes, Techniques and Technology III (Special Session), Math 100
Co-Chairs: David DeBoer, *University of California Berkeley*; Jeffery Mangum, *National Radio Astronomy Observatory*

08:20 J5-1
SPHERICAL HARMONIC POWER SPECTRA AND THE LIGHT CONE PROBLEM IN INTENSITY MAPPING SURVEYS
Adrian Liu*
Astronomy, University of California Berkeley, Berkeley, CA

08:40 J5-2
PRECISION SIMULATIONS OF COSMIC DAWN EXPERIMENTS
Adam E. Lanman*
Physics, Brown University, Providence, RI

09:00 J5-3
INVESTIGATION ON IMPROVEMENT OF RADIO INTERFEROMETRY CALIBRATION USING REDUNDANT CALIBRATION ALONG WITH SKY MODEL CALIBRATION
Wenyang Li*, Jonathan C. Pober
Physics, Brown University, Providence, RI

09:20 J5-4
THE BREAKTHROUGH LISTEN SETI PROGRAM
Dan Werthimer*[1], David Anderson[1], Jeff Cobb[1], Steve Croft[1], David DeBoer[1], Jamie Drew[2], J. Emilio Enriquez[1], Daniel Farias[1], Vishal Gajjar[1], Greg Hellbourg[1], Jack Hickish[1], Barb Hoversten[1], Howard Isaacson[1], Pete Klupar[2], Eric Korpela[1], Matt Lebofsky[1], David MacMahon[1], Geoff Marcy[1] Danny Price[1], Chris Schodt[1], Isaac Shivvers[1], Andrew Siemion[1], Pete Worden[2]
[1]*Astronomy, University of California Berkeley, Berkeley, CA*
[2]*Breakthrough Prize Foundation, Moffett Field, CA*

09:40 J5-5
A SYMBIOTIC BEAMFORMING APPROACH FOR IMPROVED ASTRONOMICAL SURVEYS
Greg Hellbourg*
University of California Berkeley, Berkeley, CA

10:00 Break

10:20 J5-6
AN L-BAND CRYOGENIC PHASED ARRAY FOR THE GREEN BANK TELESCOPE: INSTRUMENTATION UPGRADES AND EXPANDED FIELD-OF-VIEW
William Shillue*[1], Damodaran A. Roshi[1], J R. Fisher[1], Matthew A. Morgan[1], Jason Castro[1], Wavley Groves[1], Tod Boyd[1], Richard Prestage[2], Steven White[2], Robert Simon[2], Vereese Van Tonder[2], J D. Nelson[2], Jason Ray[2], Thomas Chamberlain[2], Karl F. Warnick[3], Brian Jeffs[3]
[1]*Central Development Laboratory, National Radio Astronomy Observatory, Charlottesville, VA*
[2]*Green Bank Observatory, Green Bank, WV*
[3]*Brigham Young University, Provo, UT*

10:40 J5-7
ULTRA LOW NOISE S-BAND LNA FOR DEEP SPACE COMMUNICATION
Andrew Janzen*
NASA Jet Propulsion Laboratory, Pasadena, CA

11:00 J5-8
AUTOMATED RADIO ASTRONOMY OBSERVATIONS WITH THE NASA DEEP SPACE NETWORK
Thomas B. H. Kuiper*[1], Charles J. Naudet[1], Cristina Garcia Miro[2], Shinji Horiuchi[3], Steven R. Levoe[1], Danny Luong[1], George Q. Wang[1]
[1] *NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA*
[2]*Instituto Nacional de Tecnica Aeroespacial, Ingenier a de Sistemas para la Defensa de Espana, Madrid, SPAIN*
[3]*Canberra Deep Space Communications Complex, Commonwealth Scientific and Industrial Research Organization, Canberra, AUSTRALIA*

11:20 J5-9
THE STATUS OF THE FIVE-HUNDRED-METER APERTURE SPHERICAL RADIO TELESCOPE
Di Li*, Youling Yue
National Astronomical Observatory China, Beijing, CHINA

Session K2: Human Body Interactions with Antennas and Other Electromagnetic Devices
Room 155
Co-Chairs: Majid Manteghi, *Virginia Tech*; Erdem Topsakal, *Virginia Commonwealth University*

08:20 K2-1
MINIATURIZED ANTENNA SYSTEM DESIGNS AND CHARACTERIZATIONS FOR WIRELESS AND FULLY-PASSIVE BRAIN-MACHINE INTERFACE
Lingnan Song*, Yahya Rahmat-Samii
Electrical Engineering, University of California Los Angeles, Los Angeles, CA

08:40 K2-2
INVESTIGATION OF CREEPING WAVE PROPAGATIONS AROUND THE HUMAN HEAD AND NECK AT ISM FREQUENCY BANDS
Drew G. Bresnahan*, Yang Li
Electrical and Computer Engineering, Baylor University, Waco, TX

09:00 K2-3
CLASSIFICATION OF FINGER MOVEMENTS USING REFLECTION COEFFICIENT VARIATIONS OF A BODY-WORN ELECTRICALLY SMALL ANTENNA
Bin Xu*[1], Yang Li[1], Youngwook Kim[2]
[1]*Electrical and Computer Engineering, Baylor University, Waco, TX*
[2]*Electrical and Computer Engineering, California State University, Fresno, Fresno, CA*

09:20 K2-4
UNINTENTIONAL RF ENERGY TRANSFER DURING ENDOSCOPY
Satheesh Bojja Venkatakrishnan*[1], Edward L. Jones[2], Asimina Kiourti[1]
[1]*Electrical and Computer Engineering, The Ohio State University, Columbus, OH*
[2]*Surgery, University of Colorado, Denver, CO*

09:40 K2-5
NEW INSIGHT INTO ELECTROMAGNETIC FIELD ENHANCED MAGNETIC ISOTOPE AND NUCLEAR SPIN EFFECTS ON BIOLOGICAL SYSTEMS
Yanyu Xiong*
Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO

10:00 Break

10:20 K2-6
MAGNETIC INDUCTION COMMUNICATIONS FOR WIRELESS BODY AREA NETWORK
Negar Golestani*, Mahta Moghaddam
Ming Hsieh Department of Electrical Engineering, University of Southern California, Los Angeles, CA

10:40 K2-7
NEAR-FIELD 1.4 GHZ PROBES FOR POWER DELIVERY TO DEEP TISSUE LAYERS
Parisa Momenroodaki*[1], Mojtaba Fallahpour[2], Zoya Popovic[1]
[1]*University of Colorado Boulder, Boulder, CO*
[2]*Stanford University, Palo Alto, CA*

11:00 K2-8
SIMULATION OF DYNAMIC LOWER-BODY ELECTROMAGNETIC WAVE PROPAGATION WITH EXPERIMENTAL VERIFICATION
George Lee*, Brian Garner, Yang Li
Electrical and Computer Engineering, Baylor University, Waco, TX

11:20 K2-9
MICROWAVE ABSORPTION IN THE BRAIN AT 5G USING REALISTIC COMPUTATIONAL AND IN VITRO HEAD MODELS
Roxanne Jassawalla*, Erdem Topsakal
Electrical and Computer Engineering, Virginia Commonwealth University, Richmond, VA

FRIDAY AFTERNOON, 6 January 2017

Session B16: Microstrip Antennas and Printed Devices
Room 1B40
Co-Chairs: Erdem Topsakal, *Virginia Commonwealth University*; Ozlem Kilic, *The Catholic University of America*

13:20 B16-1
SIMULATION AND FABRICATION OF A RECTIFIER ANTENNA AT THE PROPOSED 5G BAND
Panagiotis Efthymakis*, Afroditi V. Filippas, Erdem Topsakal
Electrical and Computer Engineering, Virginia Commonwealth University, Richmond, VA

13:40 B16-2
LOW COST MULTI-LAYERED ARRAY DESIGN FOR MM-WAVE COMMUNICATIONS
Varittha Sanphuang, Brock J. DeLong*, Markus Novak, Elias A. Alwan, John L. Volakis
Electrical and Computer Engineering, The Ohio State University, Columbus, OH

14:00 B16-3
DESIGN OF A MICROSTRIP PATCH ANTENNA FOR MICROWAVE SENSING OF PETROLEUM PRODUCTION LINES
Ali Foudazi*, Kristen M. Donnell
Electrical and Computer Engineering, Missouri University of Science and Technology, Applied Microwave Nondestructive Testing Laboratory (AMNTL), Rolla, MO

14:20 B16-4
CONCEPTUAL 3600 SCANNING BEAMFORMER DESIGN FOR MASSIVE MIMO SYSTEM
Tuan M. Nguyen*, Ozlem Kilic
Electrical Engineering and Computer Science, The Catholic University of America, Washington, DC

14:40 B16-5
INVESTIGATIONS OF WIDEBAND CIRCULAR POLARIZED HIGH GAIN MICROSTRIP PATCH ARRAY ANTENNA AT KU-BAND ON CURVED SURFACES
Roshin Rose George*, Alejandro T. Castro, Satish K. Sharma
Electrical and Computer Engineering, San Diego State University, San Diego, CA

15:00 Break

15:20 B16-6
A COMPACT MICROSTRIP ROTMAN LENS DESIGN
Toan K. Vo Dai*, Tuan Nguyen, Ozlem Kilic
The Catholic University of America, Washington, DC

15:40 B16-7
3D PRINTED ANTENNAS USING CONDUCTIVE FILAMENTS
Umar Hasni*, Ryan B. Green, Afroditi V. Filippas, Erdem Topsakal
Virginia Commonwealth University, Richmond, VA

16:00 B16-8
SIGNAL INTERFERENCE-BASED BANDPASS FILTERS WITH FREQUENCY RECONFIGURABLE IN-BAND REJECTION BANDS
Dimitra Psychogiou*[1], Roberto Gómez-García[2], Dimitrios Peroulis[3]
[1]*Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO*
[2]*Dpt. Signal Theory & Commun., University of Alcala, Alcala de Henares, Madrid, SPAIN*
[3]*Electrical and Computer Engineering, Purdue University, West Lafayette, IN*

16:20 B16-9
OPTICALLY TRANSPARENT ANTENNA FOR 5G COMMUNICATION
Ryan B. Green*, M.d. B. Ullah, Vitaliy Avrutin, Umit Ozgur, Hadis Morkoc, Erdem Topsakal
Electrical and Computer Engineering, Virginia Commonwealth University, Richmond, VA

Session B17: Numerical Methods
Room 200
Co-Chairs: Atef Elsherbeni, *Colorado School of Mines*; Melinda Piket-May, *University of Colorado Boulder*

15:20 B17-1
FAST SIMULATION OF MEASUREMENT-WHILE-DRILLING ELECTROMAGNETIC TELEMETRY USING THIN WIRE KERNEL AND LAYERED MEDIUM GREEN'S FUNCTION
Shubin Zeng*, Dawei Li, Donald R. Wilton, Jiefu Chen
Electrical and Computer Engineering, University of Houston, Houston, TX

15:40 B17-2
NULL-FIELD GENERATION METHOD APPLIED TO DOUBLE-HIGHER-ORDER METHOD OF MOMENTS SOLVER
Nabeel N. Moin*, Branislav M. Notaros
Electrical and Computer Engineering, Colorado State University, Fort Collins, CO

16:00 B17-3
ENHANCEMENT OF HIGHER ORDER FDTD METHOD USING OPENCL, CUDA, AND MPI ON SINGLE AND MULTIPLE CPUS/GPUS
Alec Weiss*[1], Sanjay DMello[1], Ashik Akbar Basha[1], Atef Z. Elsherbeni[2], Melinda J. Piket-May[1], Mohammed F. Hadi[1,2,3]
[1]*Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO*
[2]*Electrical Engineering and Computer Science, Colorado School of Mines, Golden, CO*
[3]*Electrical Engineering, Kuwait University, Kuwait, KUWAIT*

16:20 B17-4
OGIVE MODELING WITH CONFORMAL STANDARD AND HIGHER-ORDER FDTD
Ravi C. Bollimuntha[1], Joseph Diener*[2], Mohammed F. Hadi[1,2,3], Melinda J. Piket-May[1], Atef Z. Elsherbeni[2]
[1]*Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO*
[2]*Electrical Engineering and Computer Science, Colorado School of Mines, Golden, CO*
[3]*Kuwait University, Kuwait, KUWAIT*

16:40 B17-5
TOWARDS A REAL-TIME SOLUTION OF EXTREME-SCALE ELECTROMAGNETIC PROBLEMS
Brian MacKie-Mason*, Zhen Peng
Electrical and Computer Engineering, University of New Mexico, Albuquerque, NM

17:00 B17-6
A COMPARISON OF INTEGRATION SCHEMES FOR SOMMERFELD INTEGRAL EVALUATION IN THE HALF-SPACE PROBLEM
Dawei Li*, Donald R. Wilton, David R. Jackson, Ji Chen
Electrical and Computer Engineering, University of Houston, Houston, TX

Session B18: Advanced Modeling of EM Propagation (Special Session), Room 105
Co-Chairs: Jamesina Simpson, *University of Utah*; Robert Marshall, *University of Colorado Boulder*

15:20 B18-1
TECHNIQUES AND APPLICATIONS OF VLF PROPAGATION MODELING
Steven A. Cummer*, Bogdan Popa, Joel Weinert
Duke University, Durham, NC

15:40 B18-2
MODELING VLF TRANSMITTER AMPLITUDE AND PHASE VARIATIONS IN THE EARTH-IONOSPHERE WAVEGUIDE
Robert A. Marshall*[1], Thomas Wallace[2], Michael Turbe[3]
[1]*University of Colorado Boulder, Boulder, CO*
[2]*Vesperix Corporation, Arlington, VA*
[3]*Leidos Incorporated, Huntsville, AL*

16:00 B18-3
THREE-DIMENSIONAL FORWARD MODELING OF LIGHTNING-INDUCED ELECTRON PRECIPITATION FROM THE RADIATION BELTS
Austin P. Sousa*[1], Robert A. Marshall[2]
[1]*Electrical Engineering, Stanford University, Stanford, CA*
[2]*Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, CO*

16:20 B18-4
MODELING ELECTROMAGNETIC WAVE PROPAGATION IN SPACE PLASMA
Lunjin Chen*
Physics, Center for Space Sciences, The University of Texas at Dallas, Richardson, TX

16:40 B18-5
MODELING OF ULTRA-LOW-FREQUENCY WAVES IN EARTH'S MAGNETOSPHERE
Robert L. Lysak*[1], Colin L. Waters[2], Murray D. Sciffer[2]
[1]*Physics and Astronomy, University of Minnesota, Minneapolis, MN*
[2]*Mathematical and Physical Sciences, University of Newcastle, Callaghan, New South Wales, AUSTRALIA*

17:00 B18-6
GLOBAL FDTD MODELING OF ULF SCATTERINGS FROM SUBMERGED OBJECTS
Sean Burns*[1], Alireza Samimi[2], Jamesina Simpson[1]
[1]*University of Utah, Salt Lake City, UT*
[2]*Nanometrics, Milpitas, CA*

Session F6: Atmospheric Effects and EM Propagation during the CASPER Field Campaign (Special Session), Room 150
Co-Chairs: Qing Wang, *Naval Postgraduate School*; Katherine Horgan, *Naval Surface Warfare Center Dahlgren Division*

13:20 F6-1
CASPER SCIENCE OBJECTIVES REVIEW AND MONIN-OBUKHOV SIMILARITY FOR EVAPORATIVE DUCT CHARACTERIZATIONS
Qing Wang*[1], Robin C. Cherrett[2], Denny P. Alappattu[1,3], Kyle B. Franklin[1], Ryan T. Yamaguchi[1], Richard J. Lind[1], John A. Kalogiros[4]
[1]*Naval Postgraduate School, Monterey, CA*
[2]*Meteorology and Oceanography, US Navy*
[3]*Moss Landing Marine Laboratory, Moss Landing, CA*
[4]*National Observatory of Athens, Athens, GREECE*

13:40 F6-2
OBSERVATIONS OF INTERNAL MARINE ATMOSPHERIC BOUNDARY LAYER DEVELOPMENT DURING THE CASPER EAST CAMPAIGN
Adam J. Christman*[1], H. J. S. Fernando[1], Raghavendra Krishnamurthy[1], David Grober[2], Chris Hocut[3], Ed Creegan[3], Qing Wang[4]
[1]*University of Notre Dame, Notre Dame, IN*
[2]*Motion Picture Marine-Perfect Horizon Stabilization, Marina del Rey, CA*
[3]*U.S. Army Research Laboratory, White Sands, NM*
[4]*Naval Postgraduate School, Monterey, CA*

14:00 F6-3
CHARACTERIZATION OF THE ENVIRONMENT ALONG AN X-BAND PROPAGATION PATH USING THE CONTROLLED TOWED VEHICLE (CTV) DURING CASPER-EAST
Djamal Khelif*[1], Robert J. Burkholder[2], Caglar Yardim[2], Qing Wang[3]
[1]*Mechanical & Aerospace Engineering, University of California Irvine, Irvine, CA*
[2]*Electrical and Computer Engineering, The Ohio State University, Columbus, OH*
[3]*Meteorology, Naval Postgraduate School, Monterey, CA*

14:20 F6-4
VARIABILITY OF EVAPORATION DUCT PROPERTIES OBSERVED IN A COASTAL ENVIRONMENT DURING CASPER
Denny P. Alappattu*[1,2], Qing Wang[1], John Kalogiros[3]
[1]*Meteorology, Naval Postgraduate School, Monterey, CA*
[2]*Moss Landing Marine Laboratories, Moss Landing, CA*
[3]*National Observatory of Athens, Athens, Greece, GREECE*

14:40 F6-5
EVAPORATION DUCT HEIGHT ESTIMATION FROM UWB LOWER ATMOSPHERIC PROPAGATION (LATPROP) MEASUREMENT SYSTEM
Luyao Xu*[1], Caglar Yardim[1], Swagato Mukherjee[1], Robert J. Burkholder[1], Jon Pozderac[1], Adam Christman[2], Harindra Fernando[2], Qing Wang[3], Edward Creegan[4]
[1]*Electrical and Computer Engineering, ElectroScience Laboratory, The Ohio State University, Columbus, OH*
[2]*University of Notre Dame, Notre Dame, IN*
[3]*Naval Postgraduate School, Monterey, CA*
[4]*Army Research Laboratory, White Sands Missile Range, NM*

15:00 Break

15:20 F6-6
EVAPORATION DUCT HEIGHT COMPARISONS FROM X-BAND EM PROPAGATION MEASUREMENTS OF THE CASPER CAMPAIGN AND NAVSLAM PREDICTIONS
Qi Wang*[1], Robert J. Burkholder[1], Luyao Xu[1], Jon Pozderac[1], Swagato Mukherjee[1], Caglar Yardim[1], Adam Christman[2], Harindra J. Fernando[2], Qing Wang[3], Edward Creegan[4]
[1]*The Ohio State University, Columbus, OH*
[2]*University of Notre Dame, Notre Dame, IN*
[3]*Naval Postgraduate School, Monterey, CA*
[4]*Army Research Laboratory, White Sands Missile Range, NM*

15:40 F6-7
NUMERICAL MODELING OF SHIP MOTION AND SEA SURFACE ROUGHNESS EFFECTS ON X-BAND EM PROPAGATION MEASUREMENTS OF THE CASPER CAMPAIGNS
Qi Wang*, Robert Burkholder, Caglar Yardim, Jon Pozderac
Electrical and Computer Engineering, The Ohio State University, Columbus, OH

16:00 F6-8
EO/IR, RF AND MM-WAVE PROPAGATION MEASUREMENTS IN THE MARINE ATMOSPHERIC SURFACE LAYER DURING THE CASPER ENVIRONMENT
Thomas R. Hanley*[1], Marc B. Airola[1], Andrea M. Brown[1], David M. Brown[1], Benjamin J. Drewry[1], Jonathan Z. Gehman[1], Richard M. Giannola[1], Randall T. Hanna[1], Ian M. Hughes[1], Amit V. Itagi[1], Jessica K. Makowski[1], Michael E. Thomas[1], Qing Wang[2], Adam H. Willitsford[1], Nathaniel S. Winstead[1]
[1]*Johns Hopkins University Applied Physics Lab, Laurel, MD*
[2]*Naval Postgraduate School, Monterey, CA*

16:20 F6-9
MEASUREMENTS OF ATMOSPHERIC TURBULENT REFRACTIVITY IN COASTAL ZONE AND MICROWAVE PROPAGATION
Frank Ryan*[1], Steven Russell[2]
[1]*Applied Technology, Inc., San Diego, CA*
[2]*CODE 331, Office of Naval Research, Arlington, VA*

16:40 F6-10
APPLYING REFRACTIVITY FROM RADIO (RFR) INVERSIONS TO ENHANCE LOCAL NWP SIMULATIONS DURING THE CASPER EAST MEASUREMENT CAMPAIGN
Edward Bertot*[1], Hank Owen[2], Ted Rogers[1]
[1]*Atmospheric Propagation, SSC Pacific, San Diego, CA*
[2]*HS Owen LLC, Medford, NJ*

17:00 F6-11
DUCTING CONDITIONS ASSOCIATED WITH OFFSHORE FLOW AND MARITIME AIR INTERACTIONS DURING CASPER EAST FIELD CAMPAIGN
Marcela Ulate*[1], Qing Wang[1], Tracy Haack[2], Teddy Holt[2]
[1]*Naval Postgraduate School, Monterey, CA*
[2]*Naval Research Laboratory, Monterey, CA*

Session GH2: Meteors, Orbital Debris and Dusty Plasmas II (Special Session), Room 200
Co-Chairs: Eric Gillman, *Naval Research Laboratory*; Julio Urbina, *Pennsylvania State University*; Edward Thomas, *Auburn University*

13:20 GH2-1
RECENT ADVANCES IN EXPLORING IONOSPHERIC DUSTY PLASMAS USING GROUNDBASED HIGH POWER HIGH FREQUENCY (HF) RADIOWAVE HEATING
Wayne Scales*
Electrical and Computer Engineering, Virginia Tech, Blacksburg, VA

13:40 GH2-2
ON DUST CHARGING PROCESS ASSOCIATED WITH METEORIC SMOKE PARTICLES (MSP) IN THE MESOSPHERE
Alireza Mahmoudian*[1], W.a. Scales[2], M. Kosch[3,4], A. Senior[4], A. Mohebalhojeh[1], M. Farahani[1], S. Ghader[1]
[1]*Institute of Geophysics, University of Tehran, Tehran, IRAN*
[2]*Virginia Tech, Blacksburg, VA*
[3]*South African National Space Agency, Hermanus, SOUTH AFRICA*
[4]*Physics, Lancaster University, Lancaster, UNITED KINGDOM*

14:00 GH2-3
DUSTY PLASMA MICROPARTICLE CONTROL AND RAPID EXPANSION IN A MAGNETIZED GLOW DISCHARGE
Eric D. Gillman*, W E. Amatucci
Plasma Physics Division, Naval Research Laboratory, Washington, DC

14:20 GH2-4
PROBE-INDUCED DUST VOIDS IN THE MAGNETIZED DUSTY PLASMA EXPERIMENT (MDPX)
Spencer LeBlanc*, Edward Thomas
Auburn University, Auburn, AL

14:40 GH2-5
GROUND AND ISS APPLICATIONS OF PARTICLE IMAGE VELOCIMETRY DIAGNOSTICS FOR THE PK-4 AND PLASMALAB/EKOPLASMA MICROGRAVITY COMPLEX PLASMA EXPERIMENTS
Edward Thomas*[1], Taylor Hall[1], Jeremiah Williams[2], Uwe Konopka[1], Tetyana Antonova[3], Christina Knapek[3], Mikhail Pustylnik[3], Hubertus Thomas[3]
[1]*Physics, Auburn University, Auburn, AL*
[2]*Physics, Wittenberg University, Springfield, OH*
[3]*Complex Plasma Division, Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Oberpfaffenhofen, GERMANY*

Session H5: Waves in Outer Solar System Plasmas (Special Session), Room 265
Co-Chairs: William Kurth, *University of Iowa*; George Hospodarsky, *University of Iowa*

13:20 H5-1
PLASMA WAVES AT MARS: MAVEN OBSERVATIONS
Suranga Ruhunusiri*[1], Jasper S. Halekas[1], Yuki Harada[2], Gina A. DiBraccio[3], Norberto Romanelli[4,5], Jared R. Espley[3], Laila Andersson[6], Christian Mazelle[4,5], David A. Brain[6], David L. Mitchell[2], Bruce M. Jakosky[6]
[1]*The University of Iowa, Iowa City, IA*
[2]*Space Sciences Laboratory, University of California Berkeley, Berkeley, CA*
[3]*Solar System Exploration Division, NASA Goddard Space Flight Center, Greenbelt, MD*
[4]*CNRS, IRAP, Toulouse, FRANCE*
[5]*University Paul Sabatier, Toulouse, FRANCE*
[6]*Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, CO*

13:40 H5-2
FIRST OBSERVATIONS NEAR JUPITER BY THE JUNO WAVES INVESTIGATION
William S. Kurth*[1], Masafumi Imai[1], George B. Hospodarsky[1], Donald A. Gurnett[1], Sadie S. Tetrick[1], Scott J. Bolton[2], John E. P. Connerney[3], Steven M. Levin[4]
[1]*University of Iowa, Iowa City, IA*
[2]*Southwest Research Institute, San Antonio, TX*
[3]*NASA Goddard Space Flight Center, Greenbelt, MD*
[4] *NASA Jet Propulsion Laboratory, Pasadena, CA*

14:00 H5-3
LANGMUIR WAVES DETECTED BY THE JUNO WAVES INSTRUMENT UPSTREAM OF THE JOVIAN BOW SHOCK
George B. Hospodarsky*[1], William S. Kurth[1], Donald A. Gurnett[1], Scott J. Bolton[2], Steven M. Levin[3], John E. P. Connerney[4]
[1]*Physics and Astronomy, University of Iowa, Iowa City, IA*
[2]*Southwest Research Institute, San Antonio, TX*
[3] *NASA Jet Propulsion Laboratory, Pasadena, CA*
[4]*NASA Goddard Space Flight Center, Greenbelt, MD*

14:20 H5-4
JUPITER'S DECAMETRIC RADIATION OBSERVED BY JUNO AND EARTH-BASED RADIO OBSERVATORIES
Masafumi Imai*[1], William S. Kurth[1], George B. Hospodarsky[1], Scott J. Bolton[2], John E. P. Connerney[3], Steven M. Levin[4], Laurent Lamy[5], Tracy E. Clarke[6], Charles A. Higgins[7]
[1]*University of Iowa, Iowa City, IA*
[2]*Southwest Research Institute, San Antonio, TX*
[3]*NASA Goddard Space Flight Center, Greenbelt, MD*
[4]*NASA Jet Propulsion Laboratory, Pasadena, CA*
[5]*Observatoire de Paris, Meudon, FRANCE*
[6]*Naval Research Laboratory, Washington, DC*
[7]*Middle Tennessee State University, Murfreesboro, TN*

14:40 H5-5
AN INVESTIGATION OF WHISTLER-MODE AURORAL HISS AT JUPITER USING THE JUNO SPACECRAFT
Sadie S. Tetrick*[1], William S. Kurth[1], Masafumi Imai[1], George B. Hospodarsky[1], Donald A. Gurnett[1], Scott J. Bolton[2], John E. P. Connerney[3], Steven M. Levin[4], Barry H. Mauk[5]
[1]*University of Iowa, Iowa City, IA*
[2]*Southwest Research Institute, San Antonio, TX*
[3]*NASA Goddard Space Flight Center, Greenbelt, MD*
[4]*NASA Jet Propulsion Laboratory, Pasadena, CA*
[5]*Johns Hopkins University Applied Physics Laboratory, Laurel, MD*

15:00 Break

15:20 H5-6
ELECTRON AND PROTON WHISTLERS DETECTED AT JUPITER BY THE JUNO SPACECRAFT
D. A. Gurnett*[1], W. S. Kurth[1], G. B. Hospodarsky[1], S. J. Bolton[2], J. E. P. Connerney[3], S. M. Levin[4]
[1]*University of Iowa, Iowa City, IA*
[2]*Southwest Research Institute, San Antonio, TX*
[3]*NASA Goddard Space Flight Center, Greenbelt, MD*
[4] *NASA Jet Propulsion Laboratory, Pasadena, CA*

15:40 H5-7
AN OVERVIEW OF SATURN RADIO EMISSIONS
Shengyi Ye*[1], William S. Kurth[1], Georg Fischer[2], John D. Menietti[1], Donald A. Gurnett[1]
[1]*Physics and Astronomy, University of Iowa, Iowa City, IA*
[2]*Space Research Institute, Austrian Academy of Sciences, Graz, AUSTRIA*

Session J6: Observatory Reports and Lessons Learned (Special Session), Math 100
Co-Chairs: David DeBoer, *University of California Berkeley*; Jeffery Mangum, *National Radio Astronomy Observatory*

13:20 J6-1
OWENS VALLEY RADIO OBSERVATORY SITE REPORT
James W. Lamb*
California Institute of Technology, Big Pine, CA

13:40 J6-2
THE GREEN BANK TELESCOPE: A STATUS UPDATE
Richard M. Prestage*, Robert Anderson, Joseph Brandt, Dennis Egan, Felix J. Lockman, Randy McCullough, Mark Whitehead
Green Bank Observatory, Green Bank, WV

14:00 J6-3
EXTREMELY LOW-NOISE CRYOGENIC AMPLIFIERS FOR RADIO ASTRONOMY: PAST, PRESENT AND FUTURE
Marian W. Pospieszalski*
Central Development Laboratory, National Radio Astronomy Observatory, Charlottesville, VA

Session J7: Planetary Remote Sensing (Special Session), Math 100
Co-Chairs: Bryan Butler, *National Radio Astronomy Observatory*;
Peter Williams, *Harvard University*

15:00 J7-1
EARLY OBSERVATIONS OF JUPITER WITH JUNO'S MICROWAVE RADIOMETER
Michael A. Janssen*[1], Scott J. Bolton[2], Steven M. Levin[1], Virgil Adumitroaie[1], Michael D. Allison[3], John K. Arballo[1], Sushil K. Atreya[4], Amadeo Bellotti[5], Shannon T. Brown[1], Andrew P. Ingersoll[6], Laura A. Jewell[1], Cheng Li[1], Liming Li[7], Jonathan I. Lunine[8], Sidharth Misra[1], Glenn S. Orton[1], Maarten Roos[4], Daniel Santos-Costa[2], Edwin Sarkissian[1], Paul G. Steffes[5], Ross Williamson[1]
[1]*NASA Jet Propulsion Laboratory, Pasadena, CA*
[2]*Southwest Research Institute, San Antonio, TX*
[3]*Goddard Institute of Space Studies, New York, NY*
[4]*University of Michigan, Ann Arbor, MI*
[5]*Georgia Institute of Technology, Atlanta, GA*
[6]*California Institute of Technology, Pasadena, CA*
[7]*University of Texas, Houston, TX*
[8]*Cornell University, Ithaca, NY*

15:40 J7-2
USE OF THE JUNO MICROWAVE RADIOMETER (MWR) IN THE STUDY OF JOVIAN ATMOSPHERIC COMPOSITION, STRUCTURE, AND DYNAMICS
Amadeo Bellotti*[1], Paul G. Steffes[1], Michael A. Janssen[2], Steven M. Levin[2], Samuel Gulkis[2]
[1]*Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA*
[2]*NASA Jet Propulsion Laboratory, Pasadena, CA*

16:00 J7-3
INVESTIGATING AMMONIA GAS IN THE JOVIAN ATMOSPHERE USING CENTIMETER WAVELENGTH TOTAL FLUX
Ramsey L. Karim*[1], David DeBoer[1], Imke de Pater[1], Garrett Keating[2]
[1]*Astronomy, University of California Berkeley, Berkeley, CA*
[2]*Harvard-Smithsonian Center for Astrophysics, Cambridge, MA*

16:20 J7-4
IMPROVING THE PLANETARY EPHEMERIS WITH VLBA ASTROMETRY: TRANSITIONING FROM CASSINI TO JUNO
Dayton Jones*[1], William Folkner[2], Robert Jacobson[2], Christopher Jacobs[2], Jonathan Romney[3], Vivek Dhawan[3], Edward Fomalont[4]
[1]*Space Science Institute, Boulder, CO*
[2]*NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA*
[3]*National Radio Astronomy Observatory, Socorro, NM*
[4]*National Radio Astronomy Observatory, Charlottesville, VA*

16:40 J7-5
OBSERVATIONS OF SOLAR SYSTEM BODIES WITH THE VLA AND ALMA
Bryan Butler*
National Radio Astronomy Observatory, Socorro, NM

17:00 J7-6
INVESTIGATING THE ICE SHELL AND BURIED OCEAN ON EUROPA WITH THE SCHUMANN RESONANCE
Thomas Marshall Eubanks*
Asteroid Initiatives LLC, Clifton, VA

Session K3: Electromagnetics and Thermal Therapy: Advances in Treatment Planning (Special Session), Room 155
Co-Chairs: John Stang, *University of Southern California*;
Michael Fromandi, *University of Colorado Boulder*

13:20 K3-1
MULTI-FUNCTIONAL PHOTOACOUSTIC IMAGING OF TUMOR ENVIRONMENT IN THERMOTHERAPY
Junjie Yao*
Biomedical Engineering, Duke University, Durham, NC

13:40 K3-2
ESTIMATION OF TEMPERATURE INCREASE FOR PASSIVE IMPLANTS UNDERGOING MRI PROCEDURE
Anirudh S. Annavajhala, Ran Guo*
Electrical and Computer Engineering, University of Houston, Houston, TX

14:00 K3-3
RFI MITIGATION IN MICROWAVE RADIOMETERS FOR INTERNAL BODY THERMOMETRY VIA ADAPTIVE FILTERING
Michael Fromandi*, Parisa Momenroodaki, Zoya Popovic
Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO

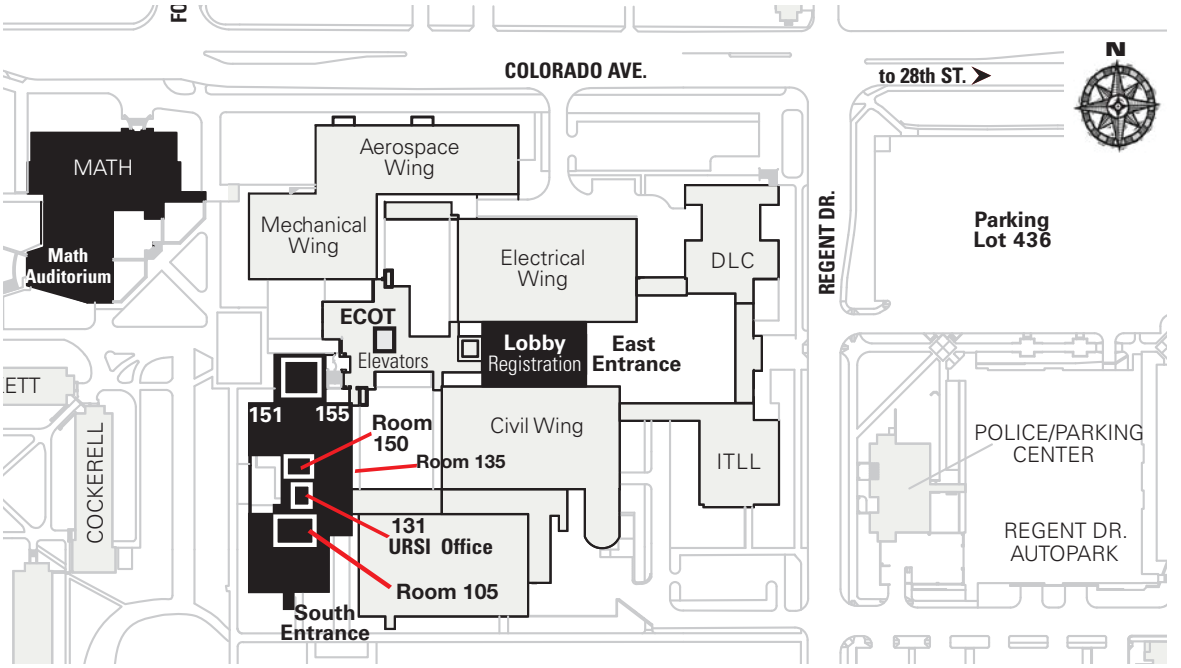
14:20 K3-4
RECENT ADVANCES IN REAL-TIME MICROWAVE IMAGING FOR THERMAL THERAPY MONITORING
John Stang*, Guanbo Chen, Mahta Moghaddam
University of Southern California, Los Angeles, CA

14:40 K3-5
THE HEALTH RISK FOR PHYSICIANS PERFORMING MICROWAVE ABLATION FOR LIVER CANCER TREATMENT
Angelica M. Sunga*, Umar Hasni, Erdem Topsakal
Electrical and Computer Engineering, Virginia Commonwealth University, Richmond, VA

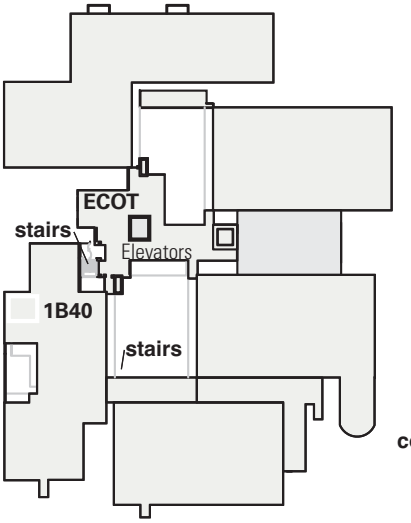
SATURDAY MORNING, 7 January 2017

08:00 – 11:00 USNC-URSI Executive Council Breakfast Meeting, Marriott Hotel

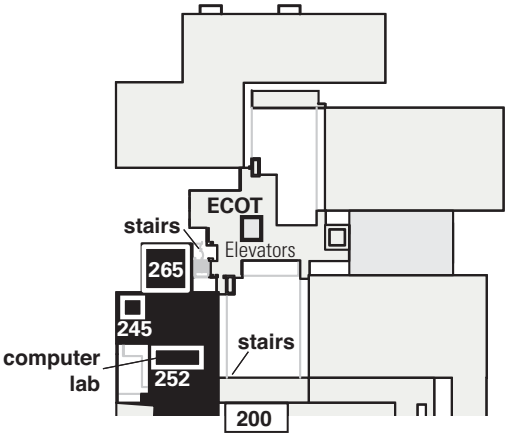
CU-Boulder Engineering Center (EC)



Main / First Floor



Ground / B Level



Second Floor

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