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 Garud¹, Ahmed M. Hassan¹, Edward Garboczi²
¹Computer Science and Electrical Engineering, University of Missouri Kansas City, Kansas City, MO
²Applied 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 EIGS
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)
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. Chew2  
1Physics, University of Illinois Urbana-Champaign, Champaign, IL  
2Electrical 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 Lin1, Thomas Antonsen2  
1Electrical and Computer Engineering, University of New Mexico, Albuquerque, NM  
2University of Maryland College Park, MD

10:40  B2-7  
FIGURE OF MERIT FOR COMPUTATIONAL ELECTROMAGNETICS SOLVERS
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

DIAGNOSING SPURIOUS CHERENKOV RADIATION FROM NUMERICAL DISPERSION ON UNSTRUCTURED GRIDS
Dong-Yeop Na*1, Fernando L. Teixeira1, Yuri A. Omelchenko2
1 Electrical and Computer Engineering, The Ohio State University, Columbus, OH
2 Trinum Research Inc., San Diego CA

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

TRANSMITTING A BASEBAND SIGNAL THROUGH AN ELECTRICALLY SMALL ANTENNA
Majid Manteghi*
Virginia Tech, Blacksburg, VA

A REMOTE RADIATION PATTERN MEASUREMENT TECHNIQUE FOR ELECTRICALLY SMALL ANTENNAS
Majid Manteghi*
Virginia Tech, Blacksburg, VA

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*, Sammuel M. Jalali2, Greg R. Raith3
1Scientific Applications & Research Associates (SARA), Inc., Tyler, TX
2Scientific Applications & Research Associates (SARA), Inc., Cypress, CA
3Scientific 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*, William O. Coburn2
1United States Army Research Laboratory, Adelphi, MD
2General Technical Services LLC, Wall, NJ

11:40  B3-10
COUPLING REDUCTION TECHNIQUES FOR WIDEBAND SIMULTANEOUS TRANSMIT AND RECEIVE ANTENNA SUBSYSTEMS
Prathap Valale Prasannakumar*, Mohamed A. Elmansouri, Dejan S. Filipovic
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. Tesche², W D. Prather³
¹PRO-TECH, ALAMO
²EM Consultant (Retired), Lakeville, CT
³Air 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 OGIIVAL 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
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*, Ying Liu, Michael D. Dickey, Jacob J. Adams
Electrical and Computer 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*, Sarvin Rezayat, Alicia Magee, Charles Baylis, Lawrence Cohen, Robert J. Marks II
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. Nanni2, Valery Dolgashev2, Sami Tantawi2, Jeff Neilson2
1University of California Irvine, Irvine, CA
2SLAC 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*, Lucilia Lamers¹, Charles Baylis¹, Robert Marks¹, Ed Viveiros², Ali Darwish², John Penn², Abigail Hedden²
¹WMCS, Baylor University, Waco, TX
²Army 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*, Rachel Norris¹,², Hedley Hansen³, Andrew Kulessa³,⁴
¹Marine Meteorology Division, Naval Research Laboratory, Monterey, CA
²Electrical and Computer Engineering, Naval Research Laboratory, Ann Arbor, MI
³Cyber and Electronic Warfare Division, Defence Science and Technology Organisation, Adelaide, Queensland, AUSTRALIA
⁴Airborne 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*, Tracy Haack², Zach Liebowitz¹
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 Barrios1, Katherine Horgan2, Vincent van Leijen3, Erik van de Pol3, Tjarda Wilbrink3, Fok Bolderheij4, Earl M. Williams1
1Space and Naval Warfare Systems Center Pacific, San Diego, CA
2Naval Surface Warfare Center Dahlgren Division, Dahlgren, VA
3Knowledge, Innovation, eXperimentation and Simulation (KIXS), Defense Material Organisation, Den Helder, NL, NETHERLANDS
4Netherlands 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. Johnson1, Caglar Yardim1, Craig F. Merrill2, Tom Cook3, Tony de Paolo3, Eric Terrill3, Frank J. Ryan3, Paul Frederickson5
1Electrical and Computer Engineering, ElectroScience Laboratory, The Ohio State University, Columbus, OH
2Carderock Division, NSWC, West Bethesda, MD
3UC San Diego, Scripps Institution of Oceanography, San Diego, CA
4Applied Technology Inc., San Diego, CA
5Meteorology, Naval Postgraduate School, Monterey, CA
A TECHNIQUE TO EVALUATE NUMERICAL WEATHER PREDICTION PERFORMANCE: AN ENGINEERING PERSPECTIVE
Matt Wilbanks*, Stephanie Billingsley¹, Katherine Horgan¹, William Thornton¹, Qing Wang², Tracey Haack³
¹Naval Surface Warfare Center Dahlgren Division, Dahlgren, VA
²Naval Postgraduate School, Monterey, CA
³Marine Meteorology Division, Naval Research Laboratory, Monterey, CA

NUMERICAL COMPUTATION OF FADING DEPTH FOR TROPOSPHERIC SCINTILLATION
Swagato Mukherjee*, Caglar Yardim¹, Qing Wang²
¹Electrical and Computer Engineering, The Ohio State University, Columbus, OH
²Naval 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

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

MULTI-CONSTELLATION GNSS TEC MEASUREMENTS
YuXiang Peng*, ¹², Xavier E. Gomez¹, Wayne A. Scales¹²
¹Electrical and Computer Engineering, Virginia Tech, Blacksburg, VA
²Center for Space Science and Engineering Research, Virginia Tech, Blacksburg, VA

PFISR GPS TRACKING MODE FOR RESEARCHING HIGH-LATITUDE IONOSPHERIC ELECTRON DENSITY GRADIENTS ASSOCIATED WITH GPS SCINTILLATION
Diana C. Loucks*, Scott Palo¹, Marcin Pilinski², Geoff Crowley², Irfan Azeem², Don Hampton³
¹Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, CO
²Atmospheric & Space Technology Research Associates (ASTRA), Boulder, CO
³Geophysical Institute, University of Alaska Fairbanks, Fairbanks, AK
USING GPS TEC MEASUREMENTS TO PROBE IONOSPHERIC STRUCTURE ASSOCIATED WITH SCINTILLATION
Erin H. Lay*, Peter A. Parker¹, Max E. Light²
¹ISR-2, Los Alamos National Laboratory, Los Alamos, NM
²AOT-AE, Los Alamos National Laboratory, Los Alamos, NM

09:40  FGH1-5
ESTIMATION OF IONOSPHERIC IRREGULARITIES WITH A SCINTILLATION AURORAL GPS ARRAY
Yang Su*, Seebany Datta-Barua¹, Gary Bust², Kshitija Deshpande³
¹Illinois Institute of Technology, Chicago, IL
²Johns Hopkins University Applied Physics Laboratory, Laurel, MD
³Virginia 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*, Tomoko Matsuo²,³, Xinan Yue⁴, Jann-Yenq Liu¹
¹National Central University, Institute of Space Science, Taoyuan, TAIWAN
²University of Colorado at Boulder, Cooperative Institute for Research in Environmental Sciences, University of Colorado Boulder, Boulder, CO
³National Oceanic and Atmospheric Administration, Space Weather Prediction Center, Boulder, CO
⁴Chinese 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*, Valery Zavorotny², Dennis Akos³, Edward Walsh²
¹Southwest Research Institute, Boulder, CO
²NOAA Earth System Research Laboratory, Boulder, CO
³University of Colorado Boulder, Boulder, CO

11:20  FGH1-9
BEHAVIOR OF GNSS SIGNALS REFLECTED FROM AN OCEAN SURFACE AT WEAK WINDS
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 Perry², Andrew Yau²
¹Retired, Ottawa, ON, CANADA
²Physics 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. Briczinski¹, Carl L. Siefring¹, Donald E. Barrick², Jehu Bryant³
Andrew Howarth⁴, H G. James⁴, Andrew Yau⁴
¹Code 6754, Naval Research Laboratory, Washington, DC
²Code Oceans Systems, Menlo Park, CA
³Raytheon IIS, Chesapeake, VA
⁴Physics 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)
1University of Illinois at Urbana-Champaign, Champaign, IL
2Naval Research Laboratory, Washington, DC
3University 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. Burns2, Stanley C. Solomon2, William E. McClintock3
1Florida Space Institute, University of Central Florida, Orlando, FL
2High Altitude Observatory, National Center for Atmospheric Research, Boulder, CO
3Laboratory 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. Bust1, Romina Nikoukar*1, Rick Doe2, David M. Klumpar3
1Johns Hopkins University Applied Physics Laboratory, Laurel, MD
2SRI International, Menlo Park, CA
3Montana State University, Bozeman, MT

11:40 G1-10
DETAILED CHARACTERISTICS OF RADIATION BELT ELECTRONS REVEALED BY CSSWE/REPTILE MEASUREMENTS
Kun Zhang*1,2, Xinlin Li1,2, Quintin Schiller3, David Gerhardt2, Hong Zhao1, Robyn Millan4
1Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO
2Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, CO
3Heliophysics Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD
4Physics and Astronomy, Dartmouth College, Hanover, NH
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

08:40 H1-2
ELECTROMAGNETIC TURBULENCE AND TRANSPORT IN HIGH β LABORATORY PLASMAS
Troy Carter*¹, Giovanni Rossi¹, Mj Pueschel², Paul Terry², Frank Jenko¹
¹Physics and Astronomy, University of California Los Angeles, Los Angeles, CA
²Physics, 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. Skiff¹, G. G. Howes¹, C. A. Kletzing¹, T. A. Carter², S. Vincena², S. Dorfman²
¹Physics and Astronomy, University of Iowa, Iowa City, IA
²Physics 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 Good², Earl E. Scime¹
¹Physics and Astronomy, West Virginia University, Morgantown, WV
²Physics, 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*, Yue Zhang¹, Dustin M. Fisher¹, Ben Wallace¹, Scott C. Hsu²
¹University of New Mexico, Albuquerque, NM
²Los 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 Thyagarajan¹, Aaron R. Parsons², David R. DeBoer², Judd D. Bowman¹
¹School of Earth and Space Exploration, Arizona State University, Tempe, AZ
²Astronomy, 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. Monsalve1, Jack O. Burns1, Richard F. Bradley2, Keith Tauscher1, Bang Nhan1, Judd D. Bowman3, David Newell4, David Draper4, David Drapetti1, Alan E. E. Rogers5, Thomas J. Mozdzen3
1University of Colorado Boulder, Boulder, CO
2National Radio Astronomy Observatory, Charlottesville, VA
3Arizona State University, Tempe, AZ
4Ball Aerospace & Technologies, Boulder, CO
5MIT 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 Barry1, Bryna Hazelton1,2, Ian Sullivan3, Miguel F. Morales1, Jonathan C. Pober4
1Physics, University of Washington, Seattle, WA
2eScience Institute, University of Washington, Seattle, WA
3Astronomy, University of Washington, Seattle, WA
4Physics, 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. Pingel1, Richard Black2, Dj Pisano1, Brian Jeffs2
1Astronomy, West Virginia University, Morgantown, WV
2Electrical and Computer Engineering, Brigham Young University, Provo, UT
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
Samandir*, 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*, Ali Foudazi², Kristen M. Donnell², David J. Pommerenke¹
¹Electrical and Computer Engineering, Missouri University of Science and Technology, EMC Lab, Rolla, MO
²Electrical 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 BROADBAND 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 ENHANCEMENT IN ANISOTROPIC EPSILON-NEAR-ZERO SLABS
Mohammad Kamandi*, Caner Guclu, Filippo Capolino
EXTRAORDINARY TRANSMISSION OF AN ELECTROMAGNETIC WAVE THROUGH A DIELECTRIC-LOADED SLOT IN A METALLIC SHIELD OF FINITE THICKNESS  
Abdulaziz Haddab*, Edward Kuester  
University of Colorado Boulder, Boulder, CO

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

SUPERRADIANCE, SUBRADIANCE AND PT-SYMMETRY WITH PLASMONIC NANOCHANNELS  
Ying Li*, Christos Argyropoulos  
Electrical and Computer Engineering, University of Nebraska-Lincoln, Lincoln, NE

CHARACTERISTIC MODE ANALYSIS OF CONDUCTIVE NANOWIRES AND MICROWIRES  
Daniel S. Kiddle*,1, Ethan J. Wilcox1, Ahmed M. Hassan1, Edward J. Garboczi2  
1Computer Science and Electrical Engineering, University of Missouri-Kansas City, Kansas City, MO  
2Applied Chemicals and Materials Division, National Institute of Standards and Technology, Boulder, CO

ELECTROMAGNETIC SCATTERING FROM CRUMPLED GRAPHENE FLAKES  
Kalyan C. Durbhakula*,1, Ahmed M. Hassan1, Deb Chatterjee1, Fernando Vargas-Lara2, Jack F. Douglas2, Edward J. Garboczi3  
1Computer Science and Electrical Engineering, University of Missouri-Kansas City, Kansas City, MO  
2Materials Science and Engineering Division, National Institute of Standards and Technology, Gaithersburg, MD  
3Applied Chemicals and Materials Division, National Institute of Standards and Technology, Boulder, CO

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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 Brick2, Ali E. Yılmaz1,2
1Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX
2Institute 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 Gandji1, Bahram Seifi1, Gangchea Lee2, Seokwon Jung2, Michael Lanagan2, Thomas Neuberger3
1Michigan Technological University, Houghton, MI
2Pennsylvania State University, University Park, PA

14:40  B7-5
EXCITATION PROBES FOR ULTRA-HIGH FIELD MAGNETIC RESONANCE IMAGING
Patrick Bluem*1, Andrew Kiruluta2, Pierre-Francois Van de Moortele3, Gregor Adriany3, Zoya Popovic1
1University of Colorado Boulder, Boulder, CO
2Harvard University, Cambridge, MA
3Center 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 Bluem2, Zoya Popovic2, Pierre-Francois Van de Moortele3, Branislav M. Notaros4
1Physics, Harvard University, Cambridge, MA
2Electrical, Computer and Energy Engineering, University of Colorado, Boulder, CO
15:40  B7-7
IMPROVEMENTS TO TRAVELING-WAVE MRI SENSITIVITY AND HOMOGENEITY USING THIN METAMATERIAL BORE LINERS
Justin G. Pollock¹, Navid Hosseini², Nicola De Zanche¹, Ashwin K. Iyer*¹
¹Electrical and Computer Engineering, University of Alberta, Edmonton, Alberta, CANADA
²Electrical 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. Ilic¹,², Andrew J. M. Kiruluta³, Pierre-Francois Van de Moortele⁴, Branslav M. Notaros¹
¹Electrical and Computer Engineering, Colorado State University, Fort Collins, CO
²Electrical Engineering, University of Belgrade, Belgrade, Serbia, YUGOSLAVIA
³Radiology, Massachusetts General Hospital, Harvard Medical School, Boston, MA
⁴Radiology, 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 Kiouriti, 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 Negishi¹, Gianluca Gennarelli², Yangqing Liu¹, Danilo Erricolo*¹, Francesco Soldovieri²
¹Electrical and Computer Engineering, University of Illinois Chicago, Chicago, IL
²Institute for Electromagnetic Sensing of the Environment, National Research Council, Napoli, ITALY

14:20  B8-4
ULTRASENSITIVE PARITY-TIME SYMMETRIC WIRELESS MICROSENSORS
Mehdi Hajizadehan*, 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 Pawlan²
¹California State University, Northridge, CA
²Pawlan 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*, Amin Darvazehban2, Farhad Farzami1, Danilo Erricolo1
1Electrical and Computer Engineering, University of Illinois Chicago, Chicago, IL
2Electrical 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*, Amin Darvazehban2, Farhad Farzami1, Danilo Erricolo1
1Electrical and Computer Engineering, University of Illinois Chicago, Chicago, IL
2Electrical 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. Teixeira1
1ElectroScience Laboratory, The Ohio State University, Columbus, OH
2Electronics 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 Slesman*1, Mohammadreza F. Imani1, Michael Boyarsky1, Laura Pulido1, Thomas Fromenteze1, Jonah N. Gollub1, Matthew S. Reynolds2, David R. Smith1
1Electrical and Computer Engineering, Duke University, Durham, NC
2Electrical 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 Sleasman1, Laura Pulido-Mancera1, Mohammadreza F. Imani1,
Matthew S. Reynolds2, David R. Smith1
1Electrical and Computer Engineering, Duke University, Durham, NC
2Electrical 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 Rogers1, Stephen Hammel1, Tracy Haack2
1SPAWAR Systems Center, San Diego
2Naval 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. Breton1, Johnathan M. Corgan2
1Signature Physics Branch, Cold Regions Research and Engineering Laboratory, Hanover, NH
2Corgan 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 Zolnick2
1Applied Technology, Inc., San Diego, CA
2Radar 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 Gerstoft1, Ted Rogers2
1Electrical and Computer Engineering, University of California San Diego, La Jolla, CA
2SPAWAR, 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
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 Axelrad1, Kristine Larson1, Stephen Lowe2
1Aerospace Engineering Sciences, University of Colorado Boulder, Boulder Colorado
2NASA 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*, Kyle C. McDonald1,2, Cinzia Zuffada1, Erika Podest1, Nick Steiner2
1NASA Jet Propulsion Laboratory, Pasadena, CA
2Earth 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*, Steve Margulis2, Chris Derksen3, Michael Durand4, Kelly Elder5, Andreadis Konstantinos1, Glen Liston6, Rashmi Shah1, Xiaolan Xu1, Chun-Sik Chae1
1NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA
2University of California Los Angeles, Los Angeles, CA
3Environment and Climate Change Canada, Toronto, CANADA
4The Ohio State University, Columbus, OH
5United States Forest Service, Fort Collins, CO
6Colorado 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. Livingston1, Richard N. Grubb2, Terence W. Bullett*
1Scion Associates, Port Townsend, WA
2University 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. Rodrigues1, Eurico R. de Paula2
1The University of Texas at Dallas, Richardson, TX
2Instituto 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 Bullett1,2
1CIRES, University of Colorado Boulder, Boulder, CO
2NCEI, 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. Milla2, Karim K. Kuyeng2, Ramiro Yanque2, Juan Arratia3
1The University of Texas at Dallas, Richardson, TX
2Jicamarca Radio Observatory, Lima, PERU
3Ana 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 Millan²
¹Montana State University, Bozeman, MT
²Dartmouth 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. Bonnell², Oleksiy Agapitov²
¹NASA/GSFC, Greenbelt, MD
²Space 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. Malaspina¹, Allison N. Jaynes¹, Robert Bruder², Ian R. Mann³, John R. Wygant⁴, Robert E. Ergun¹
¹LASP, Boulder, CO
²University of Colorado Boulder, Boulder, CO
³University of Alberta, Edmonton, AB, CANADA
⁴University 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. Jaynes¹, Jacob Bortnik², Robert E. Ergun¹, Craig Kletzing³, John R. Wygant⁴
¹Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO
²Atmospheric and Oceanic Sciences, University of California Los Angeles, Los Angeles, CA
³Physics and Astronomy, University of Iowa, Iowa City, IA
⁴Physics 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. Kletzing¹, William S. Kurth¹, George B. Hospodarsky¹, Scott R. Bounds¹, Terrance F. Averkamp¹, John W. Bonnell², Ondrej Santolik³,⁴, John R. Wygant⁵
¹Physics and Astronomy, University of Iowa, Iowa City, IA
²Space Sciences Laboratory, University of California Berkeley, Berkeley, CA
³Space Physics, Institute of Atmospheric Physics, Prague, CZECH REPUBLIC
⁴Mathematics and Physics, Charles University, Prague, CZECH REPUBLIC
⁵Physics 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*, Alan G. Ling2, Steven M. O'Malley2
1Space Vehicles Directorate, Air Force Research Laboratory, Kirtland AFB, NM
2Atmospheric 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*, Joe Fennell1, J. Bernard Blake1, Allison Jaynes2, Dan Baker2, Rick Wilder2, Geoff Reeves3, Wen Li3, Craig Kletzing5, Ian Cohen6, Barry Mauk6
1The Aerospace Corporation, El Segundo, CA
2Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO
3Los Alamos National Laboratory, Los Alamos, NM
4University of California Los Angeles, Los Angeles, CA
5University of Iowa, Iowa City, IA
6Applied 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*, Fernando L. Teixeira¹, Yuri A. Omelchenko²
¹ElectroScience Laboratory, The Ohio State University, Columbus, OH
²Trinum 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

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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
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 Srikanth², Marian Pospieszalski², Silver Sturgis¹
¹Electronics, National Radio Astronomy Observatory, Socorro, NM
²Central 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

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 Walter1, Olga Shenderova2, Nicholas Nunn2, Gary McGuire2, Magda El-Shenawee1
1Electrical Engineering, University of Arkansas, Fayetteville, AR
2Adamas Nanotechnologies, Inc., Raleigh, NC

13:40 K1-2
TERAHERTZ IMAGING OF FRESHLY EXCISED MURINE BREAST CANCER TUMORS
Tyler Bowman*1, Sruthi Ravindranathan2, David Zaharoff3, Narasimhan Rajaram2, Keith Bailey3, Magda El-Shenawee1
1Electrical Engineering, University of Arkansas, Fayetteville, AR
2Biomedical Engineering, University of Arkansas, Fayetteville, AR
3Oklahoma 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 Bowman1, Olga Shenderova2, Nicholas Nunn2, Gary McGuire2, Magda El-Shenawee1
1Electrical Engineering, University of Arkansas, Fayetteville, AR
2Adamas Nanotechnologies, Inc., Raleigh, NC

14:20 K1-4
TERAHERTZ IMAGING FOR DEFECT IDENTIFICATION IN LIQUID-STERILIZING MEMBRANE DEVICES
Nathan Burford1, Tyler Bowman*2, Robert Beitle3, Magda El-Shenawee2
1Microelectronics-Photonics Program, University of Arkansas, Fayetteville, AR
2Electrical Engineering, University of Arkansas, Fayetteville, AR
3Chemical 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 Shah², Guanbo Chen², John Stang²
¹Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, BRAZIL
²Electrical 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. Filippas¹, Erdem Topsakal¹, Anastasios C. Karles²
¹Electrical and Computer, Virginia Commonwealth University, Richmond, VA
²Henrico 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
Colorado Room in the Center for Community

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 Lane1, David Murrell1, Nicholas Tarasenko1, Christos Christodoulou2
1Space Vehicles Directorate, Air Force Research Laboratory, Albuquerque, NM
2Electrical 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. Quimby2, Kate A. Remley2, Atef Z. Elsherbeni1
1Electrical Engineering and Computer Science, Colorado School of Mines, Golden, CO
2National 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*, Venkata D. Paladugu1, Rounak Saha1, Melinda J. Piket-May1, Atef Z. Elsherbeni2, Mohammed F. Hadi1,2,3
1Electrical, Computer and Energy Engineering, University of Colorado, Boulder, CO
2Electrical Engineering and Computer Science, Colorado School of Mines, Golden, CO
3Electrical 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 Carbonu2, J M. Lehr3
1PRO-TECH, ALAMO
2L3 Communications (Retired), San Leandro, CA
3University 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. Islam1, Salvatore A. Pullano2, Antonino S. Fiorillo2, Samira Shamsir1, Mark S. Gaylord3, Vichien Lorch3
1Electrical Engineering and Computer Science, University of Tennessee Knoxville, Knoxville, TN
2Health Sciences, University Magna Graecia of Catanzaro, Catanzaro, ITALY
3Obstetrics 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*, Islam K. Syed1, Mohamed Mahfouz2, Gary To2  
1Electrical Engineering and Computer Science, University of Tennessee Knoxville, Knoxville, TN  
2Mechanical, 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 Mauskopf1, Georgios Trichopoulos2, Steven Hailey-Dunsheath3
Charles M. Bradford3,4, Jason Glenn5, Corwin Shiu6, Erik Shirokoff7, Jordan Wheeler5
1Earth & Space Exploration, Arizona State University, Tempe, AZ
2Electrical, Computer and Energy Engineering, Arizona State University, Tempe, AZ
3Astronomy, California Institute of Technology, Pasadena, CA
4Astronomy & Space Sciences, NASA Jet Propulsion Laboratory, Pasadena, CA
5Astrophysical & Planetary Sciences, University of Colorado Boulder, Boulder, CO
6Physics, Princeton University, Princeton, NJ
7Astronomy & 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 Cohen2
1Consultant, Burke, VA
2Radar Division, Naval Research Laboratory, Washington, DC

13:40  CDE1-2
SUMMARY OF RECENT RADAR SPECTRUM ACTIVITIES
Eric L. Mokole1, Lawrence Cohen*2
1Consultant, Burke, VA
2Radar 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 Baylis1, Robert J. Marks II1, Liang Dong1, Andrew Clegg2, Lawrence Cohen3
1Wireless and Microwave Circuits and Systems Program, Baylor University, Waco, TX
2Google, Reston, VA
3Radar 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*, Alicia Magee1, Jacob Boline1, Alexander Tsatsoulas1, Matthew Fellows1, Charles Baylis1, Lawrence Cohen2, Robert J. Marks II1
1Electrical and Computer Engineering, Baylor University, Waco, TX
2Naval 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*, Zach Hays1, Christopher Kappelmann1, Matthew Fellows1, Charles Baylis1, Robert Marks1, Ed Viverios2, Abigail Hedden2, John Penn2, Ali Darwish2
1Electrical and Computer Engineering, Baylor University, Waco, TX
2Army Research Laboratory, Adelphi, MD

16:00  CDE1-8
IMPROVING CUBESAT TRANSMITTER EIRP TO ENABLE SPACE NETWORK COMMUNICATION CAPABILITIES
Sushia Rahimizadeh*, Peter Fetterer2, Zoya Popovic1, Harry Shaw2
1University of Colorado Boulder, Boulder, CO
2Goddard 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
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*, William J. Blackwell¹, Albin J. Gasiewski², R. V. Leslie¹, Carl A. Mears³, Jeffrey R. Piepmeier⁴, Paul E. Racette⁴, Benjamin D. Santer⁵  
¹Massachusetts Institute of Technology, Cambridge, MA  
²University of Colorado Boulder, Boulder, CO  
³Remote Sensing Systems, Santa Rosa, CA  
⁴NASA Goddard Space Flight Center, Greenbelt, MD  
⁵Lawrence 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*, Jie Gong¹,²  
¹NASA Goddard Space Flight Center, Greenbelt, MD  
²Universities 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*, Xavier Bosch-Lluis¹, Steven C. Reising¹, Yuriy V. Goncharenko¹, Pekka Kangaslahti², Erich Schlecht², Richard Cofield², Nacer Chahat², Sharmila Padmanabhan², Jonathan Jiang², Shannon T. Brown², William R. Deal³, Alex Zamora³, Kevin Leong³, Sean Shih³, Gerry Mei³  
¹Electrical and Computer Engineering, Colorado State University, Fort Collins, CO  
²NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA  
³Northrop 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. Johnson1, Chi-Chih Chen1, Andrew O'Brien1, Graeme E. Smith1, Mark Andrews1, J. Landon Garry1, Sidharth Misra2, Shannon Brown2, Jonathan Kocz2, Robert Jarnot2, Damon C. Bradley3, Priscilla N. Mohammed3, Jared F. Lucey3, Jeffrey R. Piepmeier3, Kevin Horgan3, Michael Solly3, Joseph Knuble3
1Electrical and Computer Engineering, ElectroScience Laboratory, The Ohio State University, Columbus, OH
2NASA Jet Propulsion Laboratory, Pasadena, CA
3NASA Goddard Space Flight Center, Greenbelt, MD

14:40  F3-5
CYGNSS: EARLY LAUNCH ENGINEERING AND SCIENCE COMMISSIONING
Scott Gleason*1, Valery Zavorotny2, Christopher Ruf3, Randy Rose1
1Southwest Research Institute, Boulder, CO
2NOAA Earth System Research Laboratory, Boulder, CO
3Climate 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*, Anne Marinan1, Rebecca Bishop2, Susan Lui2, James Bardeen2, Tamitha Skov2, William Blackwell3, R. Vincent Leslie3, Idahosa Osaretin3, Michael Shields3
1Aeronautics and Astronautics, Massachusetts Institute of Technology, Cambridge, MA
2The Aerospace Corporation, El Segundo, CA
3MIT 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. Gaier2, Christian D. Kummerow3, V Chandrasekar1, Sharmila Padmanabhan2, Boon H. Lim2, Cate Heneghan2, Wesley Berg3, Jon P. Olson1, Shannon T. Brown2, John Carvo4, Matthew Pallas4
1Electrical and Computer Engineering, Colorado State University, Fort Collins, CO
2NASA Jet Propulsion Laboratory, Pasadena, CA
THE TEMPEST-D DEMONSTRATION RADIOMETER INSTRUMENT FOR
MEASUREMENT OF CLOUDS AND PRECIPITATION
Todd Gaier*1, Sharmila Padmanabhan1, Boon Lim1, Richard Cofield1, Mary Easter1, Mary Soria1,
Heather Owen1, Steven C. Reising2
1NASA Jet Propulsion Laboratory, Pasadena, CA
2Electrical 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. Lang2
1Johns Hopkins University Applied Physics Laboratory, Laurel, MD
2Electrical 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. Vendhan2, C. Prabavathi3
1Sensors Directorate, Air Force Research Laboratory, Dayton, OH
2Indian Institute of Technology Madras, Chennai, INDIA
3P.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. Lang2
1Comsearch, Ashburn, VA
2Electrical 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 HARNESSSES
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, Penn State

13:20  GH1-1
ANALYSIS OF PLASMA TURBULENCE ON THE FORMATION OF SPECULAR METEOR ECHOES
Freddy R. Galindo1, Julio V. Urbina*1, Lars P. Dyrud2
1Electrical Engineering and Computer Science, Penn State, University Park, PA
2OmniEarth, 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 Close2, Peter Brown3, Gunter Stober4, Carsten Schult4, Jorge Chau4
1University of Colorado Boulder, Boulder, CO
2Stanford University, Stanford, CA
3University of Western Ontario, London, ON, CANADA
4Institute of Atmospheric Physics, Kuhlungsborn, GERMANY

14:00 GH1-3
SIMULTANEOUS UHF/VHF RADAR AND OPTICAL OBSERVATIONS OF METEORS AT ARECIBO
Michael DeLuca*1,2, Diego Janches3, Robert Michell4,5, Rebecca Chen6, Zoltan Sternovsky1,2
1Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO
2Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, CO
3Space Weather Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD
4Geospace Environment Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD
5Astronomy, University of Maryland, College Park, College Park, MD
6River 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 Gao1, Saiveena Kesaraju1, Shikha Raizada2
1Radar Space Sciences Lab, Penn State University, University Park, PA
2Space 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 Zhu1, Frank T. Djuth2
1Radar Space Sciences Lab, Penn State University, University Park, PA
2Geospace 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 Pokorny2, Nimalna Swarnalingam2, David Nesvorny3, John M. C. Plane4, Wuhu Feng4, Juan Diego Carrillo-Sanches4, Juan Carlos Gomez Martin4, David Vokrouhlicky5
1Space Weather Laboratory, NASA, Greenbelt, MD
2Physics, Catholic University of America, Washington, D.C
3SouthWest Research Institute, Boulder, CO
4Chemistry, University of Leeds, Leeds, UNITED KINGDOM
5Institute of Astronomy, Charles University, Prague, CZECH REPUBLIC
16:00 GH1-7
MICROMETEOROID ABLATION SIMULATED IN THE LABORATORY USING A DUST ACCELERATOR
1LASP, University of Colorado Boulder, Boulder, CO
2Aerospace Eng. Sci., University of Colorado Boulder, Boulder, CO
3IMPACT, University of Colorado Boulder, Boulder, CO
4Physics, University of Colorado Boulder, Boulder, CO
5Space Weather Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD
6School 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*, Maria Usanova, Marc Lessard, Kazue Takahashi, Ashar Ali, David Malaspina, Robert Michell, Emma Spanswick, Daniel N. Baker, J B. Blake, Chris Cully, Eric Donovan, Craig Kletzing, Geoff Reeves, Marilia Samara, Harlan Spence, John Wygant
1LASP, University of Colorado Boulder, Boulder, CO
2University of New Hampshire, Durham, NH
3Johns Hopkins University Applied Physics Laboratory, Laurel, MD
4NASA Goddard Space Flight Center, Greenbelt, MD
5University of Calgary, Calgary, CANADA
6Aerospace Corporation, El Segundo, CA
7University of Iowa, Iowa City, IA
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*, Gurudas Ganguli1, Erik Tejero1, George Hospodarsky2, Craig Kletzing2
1Naval Research Laboratory, Washington, DC
2University 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*, Alex Crew2
1University of Minnesota, Minneapolis, MN
2Johns 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*, Fanchao Lyu1, Michael S. Briggs2, David M. Smith3
1Duke University, Durham, NC
2University of Alabama Huntsville, Huntsville, AL
3University 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 Trompier2, Jean-Louis Pincon1
1LPC2E, University of Orleans, CNRS, Orleans, FRANCE
2Institut 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 Celestin2, Victor P. Pasko3, Robert A. Marshall1
1Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, CO
2Laboratory of Physics and Chemistry of the Environment and Space (LPC2E), University of Orleans, CNRS, Orleans, FRANCE
3Communications 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 Jenke1, Jean-Marie Wersinger2, Mike Folge2
1CSPAR, University of Alabama Huntsville, Huntsville, AL
2Physics, 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 Tilles1, Levi Boggs2, Alan Bozarth7, Hamid Rassoul2, Jeremy Riousset3
1Physics and Space Science Center, University of New Hampshire, Durham, NH
2Physics and Space Sciences, Florida Institute of Technology, Melbourne, FL
3Center 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 Liu1, Hamid K. Rassoul2
1Physics and Space Science Center, University of New Hampshire, Durham, NH
2Physics 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
1Physics and Space Science Center, University of New Hampshire, Durham, NH
2Langmuir Laboratory, New Mexico Tech, Socorro, NM
3NASA Kennedy Space Center, Kennedy Space Center, FL
4Physics and Space Sciences, Florida Institute of Technology, Melbourne, FL
5Osaka 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. Marrone2, Geoffrey C. Bower3
1Smithsonian Astrophysical Observatory, Cambridge, MA
2Astronomy, University of Arizona, Tucson, AZ
3ASIAA, Hilo, HI

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. Coburn²
¹General Technical Services LLC, Wall, NJ
²United 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 Moradi²
¹Electrical and Computer Engineering, Missouri Science and Technology University, Rolla, MO
²Electrical 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. Witcher1, Seth A. McCormick2
1United States Army Research Laboratory, Adelphi MD
2General Technical Services LLC, Adelphi MD

11:00  B13-8
THE TRISKELION-ARCHIMEDEAN SPIRAL ANTENNA
Seunghwan Yoon*1, Alfred G. Besoli1, Franco De Flaviis2, Nicolaos G. Alexopoulos3
1Movandi Corporation, Newport Beach, CA
2University of California Irvine, Irvine, CA
3Broadcom 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*, Robab Kazemy¹, Aly E. Fathy¹
¹Electrical Engineering and Computer Science, University of Tennessee, Knoxville, TN
¹Electrical 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 Othman¹, Mehdi Veysi¹, Farshad Yazdi¹, Mohamed Nada¹, Dmitry Oshmarin¹,
Alexander Figotin², Filippo Capolino*¹
¹Electrical Engineering and Computer Science, University of California Irvine, Irvine, CA
²Mathematics, 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 INFEREN CE 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*, Thomas Fromenteze¹, Timothy Sleasman¹, Michael Boyarsky¹, Mohammadreza F. Imani¹, Matthew Reynolds², David R. Smith¹
¹Duke University, Durham, NC
²University 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. Chandrasekar1, Mike Daniels2
1Electrical and Computer Engineering, Colorado State University, Fort Collins, CO
2National 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 Ren1, Tuan Phan2, Ozlem Kilic2, Aly E. Fathy1
1Electrical Engineering and Computer Science, The University of Tennessee, Knoxville, TN
2Electrical 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 Hays1, Charles Baylis1, Robert Marks1, Edward Viveiros2, John Penn2, Abigail Hedden5, Ali Darwish2
1Electrical and Computer Engineering, Baylor University, Waco, TX
2Army Research Laboratory, Adelphi, MD

11:20 C2-9
NASA D3R RADAR UPGRADE: ENHANCING SENSITIVITY AND SPATIAL RESOLUTION
Mohit Kumar*1, Robert M. Beauchamp1, Shashank S. Joshi1, Manuel Vega1,2, V. Chandrasekar1
1Electrical and Computer Engineering, Colorado State University, Fort Collins, CO
2NASA 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. Chandrasekar2, Jianxin He1, Lin Yang1
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. Beauchamp3, Chandra V. Chandrasekar3
1Cooperative Institute for Research in Environmental Science (CIRES), University of Colorado Boulder, Boulder, CO
2Physical Science Division, NOAA Earth System Research Laboratory, Boulder, CO
3Electrical 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, Haoran 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 Thurai1, V. N. Bringi1, Patrick C. Kennedy2,
Branislav M. Notaros1
1Electrical and Computer Engineering, Colorado State University, Fort Collins, CO
2Atmospheric Science, Colorado State University, Fort Collins, CO

09:40  F5-5
SCATTERING CALCULATIONS FOR ASYMMETRIC RAINDROPS 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. Joshi*, 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*, Albin Gasiewski, Maciej Stachura, Jack Elston, Aravind Venkitasubramony
1University of Colorado Boulder, Boulder, CO
2Black Swift Technologies (BST) LLC, Boulder, CO

(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*, Jeng-Hwa Yee, Erich T. Schlecht, Imran Mehdi, Jose V. Siles, Brian J. Drouin
1NASA Goddard Space Flight Center, Greenbelt, MD
2Johns Hopkins University Applied Physics Laboratory, Laurel, MD
3NASA 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*, Catalin Negrea, Oleg Godin, Terence Bullett
1University of Colorado Boulder, Boulder, CO
2Naval Postgraduate School, Monterey, CA

09:00  G3-3
NEW CAPABILITY AT SONDRESTROM RADAR: SUB-SECOND AURORAL ELECTRON DENSITY MEASUREMENTS
OPPORTUNITIES FOR POLAR CAP SCIENCE USING COORDINATED RISR-C AND RISR-N EXPERIMENTS
Roger H. Varney*1, Robert G. Gillies2
1Center for Geospace Studies, SRI International, Menlo Park, CA
2Physics and Astronomy, University of Calgary, Calgary, AB, CANADA

HIGH-ORDER PARTICLE-IN-CELL SIMULATIONS OF INCOHERENT SCATTER RADAR SPECTRA
Alex Fletcher*1,2, William Longley1, Meers M. Oppenheim1
1Center for Space Physics, Boston University, Boston, MA
2Physics, Massachusetts Institute of Technology, Cambridge, MA

THE MIT INCOHERENT SCATTER PERFORMANCE SIMULATOR (MIPS)
Philip J. Erickson*1, Juha Vierinen2, Frank D. Lind1, Ryan Volz1
1Haystack Observatory, Massachusetts Institute of Technology, Westford, MA
2Physics and Technology, University of Tromso, Tromso, NORWAY

A SYNTHESIS ARRAY FOR RADIO AND RADAR IMAGING OF THE IONOSPHERE
Brett Isham*1, Terence Bullett2, Bjorn Gustavsson3, Vasyl Belyey4
1Interamerican University of Puerto Rico, Bayamon, PR
2University of Colorado Boulder, Boulder, CO
3University of Tromso, Tromso, NORWAY
4Pinhole AS, Tromso, NORWAY

COVARIANCE ESTIMATION OF POLARIZED SIGNALS WITH APPLICATION TO VECTOR SENSOR IMAGING
Ryan Volz1, Frank C. Robey2, Mary Knapp3, Frank D. Lind1, Philip J. Erickson*1
1Haystack Observatory, Massachusetts Institute of Technology, Westford, MA
2Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA
3Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA

CALCULATING THE ABSORPTION OF HF RADIO WAVES IN THE IONOSPHERE
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. Golkowski1, S. Sarker1, M. B. Cohen2
1Electrical Engineering, University of Colorado Denver, Denver, CO
2Electrical 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 Golkowski1, Chad Renick1, Robert Moore2, Neal Dupree2
1University of Colorado Denver, Denver, CO
2University 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
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

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

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

SPHERICAL HARMONIC POWER SPECTRA AND THE LIGHT CONE PROBLEM IN INTENSITY MAPPING SURVEYS
Adrian Liu*
Astronomy, University of California Berkeley, Berkeley, CA

PRECISION SIMULATIONS OF COSMIC DAWN EXPERIMENTS
Adam E. Lanman*
Physics, Brown University, Providence, RI

10:40  HG1-2
11:00  HG1-3
11:20  HG1-4
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 Anderson1, Jeff Cobb1, Steve Croft1, David DeBoer1, Jamie Drew2, J. Emilio Enriquez1, Daniel Farias1, Vishal Gajjar1, Greg Hellbourg1, Jack Hickish1, Barb Hoversten1, Howard Isaacson1, Pete Klupar2, Eric Korpela1, Matt Lebofsky1, David MacMahon1, Danny Price1, Chris Schodt1, Isaac Shivvers1, Pete Worden1
1Astronomy, University of California Berkeley, Berkeley, CA
2Breakthrough 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. Roshi1, J R. Fisher1, Matthew A. Morgan1, Jason Castro1, Wavley Groves1, Tod Boyd1, Richard Prestage2, Steven White2, Robert Simon2, Vereese Van Tonder2, J D. Nelson2, Jason Ray2, Thomas Chamberlain2, Karl F. Warnick3, Brian Jeffs3
1Central Development Laboratory, National Radio Astronomy Observatory, Charlottesville, VA
2Green Bank Observatory, Green Bank, WV
3Brigham 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. Naudet1, Cristina Garcia Miro2, Shinji Horiuchi3, Steven R. Levee1, Danny Luong1, George Q. Wang1
1NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA
2Instituto Nacional de Tecnica Aeroespacial, Ingenier a de Sistemas para la Defensa de Espana, Madrid, SPAIN
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*, Yang Li1, Youngwook Kim2
1Electrical and Computer Engineering, Baylor University, Waco, TX
2Electrical and Computer Engineering, California State University, Fresno, Fresno, CA

09:20 K2-4
UNINTENTIONAL RF ENERGY TRANSFER DURING ENDOSCOPY
Satheesh Bojja Venkatakrishnan*, Edward L. Jones2, Asimina Kiourti1
1Electrical and Computer Engineering, The Ohio State University, Columbus, OH
2Surgery, 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 Fallahpour2, Zoya Popovic1
1University of Colorado Boulder, Boulder, CO
2Stanford 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*, Afrodit 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-García2, Dimitrios Peroulis3
1Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO
3Electrical 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 DMello1, Ashik Akbar Basha1, Atef Z. Elsherbeni2, Melinda J. Piket-May1, Mohammed F. Hadi1,2,3
1Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO
2Electrical Engineering and Computer Science, Colorado School of Mines, Golden, CO
3Kuwait University, Kuwait, KUWAIT

16:20 B17-4
OGIVE MODELING WITH CONFORMAL STANDARD AND HIGHER-ORDER FDTD
Ravi C. Bollimuntha1, Joseph Diener*2, Mohammed F. Hadi1,2,3, Melinda J. Piket-May1, Atef Z. Elsherbeni2
1Electrical, Computer and Energy Engineering, University of Colorado Boulder, Boulder, CO
2Electrical Engineering and Computer Science, Colorado School of Mines, Golden, CO
3Kuwait 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*, Thomas Wallace, Michael Turbe
1University of Colorado Boulder, Boulder, CO
2Vesperix Corporation, Arlington, VA
3Leidos Incorporated, Huntsville, AL

16:00 B18-3
THREE-DIMENSIONAL FORWARD MODELING OF LIGHTNING-INDUCED ELECTRON PRECIPITATION FROM THE RADIATION BELTS
Austin P. Sousa*, Robert A. Marshall
1Electrical Engineering, Stanford University, Stanford, CA
2Aerospace 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*, Colin L. Waters, Murray D. Sciffer
1Physics and Astronomy, University of Minnesota, Minneapolis, MN
2Mathematical 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*, Alireza Samimi, Jamesina Simpson
1University of Utah, Salt Lake City, UT
2Nanometrics, 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. Cherrett2, Denny P. Alappattu1,3, Kyle B. Franklin1, Ryan T. Yamaguchi1, Richard J. Lind1, John A. Kalogiros4
1Naval Postgraduate School, Monterey, CA
2Meteorology and Oceanography, US Navy
3Moss Landing Marine Laboratory, Moss Landing, CA
4National 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. Fernando1, Raghavendra Krishnamurthy1, David Grober2, Chris Hocut3, Ed Creegan3, Qing Wang4
1University of Notre Dame, Notre Dame, IN
2Motion Picture Marine-Perfect Horizon Stabilization, Marina del Rey, CA
3U.S. Army Research Laboratory, White Sands, NM
4Naval 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. Burkholder2, Caglar Yardim2, Qing Wang3
1Mechanical & Aerospace Engineering, University of California Irvine, Irvine, CA
2Electrical and Computer Engineering, The Ohio State University, Columbus, OH
3Meteorology, 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 Wang1, John Kalogiros3
1Meteorology, Naval Postgraduate School, Monterey, CA
2Moss Landing Marine Laboratories, Moss Landing, CA
3National 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 Yardim1, Swagato Mukherjee1, Robert J. Burkholder1, Jon Pozderac1, Adam Christman2, Harindra Fernando2, Qing Wang3, Edward Creegan4
1Electrical and Computer Engineering, ElectroScience Laboratory, The Ohio State University, Columbus, OH
2University of Notre Dame, Notre Dame, IN
3Naval Postgraduate School, Monterey, CA
4Army 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. Burkholder1, Luyao Xu1, Jon Pozderac1, Swagato Mukherjee1, Caglar Yardim1, Adam Christman2, Harindra J. Fernando2, Qing Wang3, Edward Creegan4
1The Ohio State University, Columbus, OH
2University of Notre Dame, Notre Dame, IN
3Naval Postgraduate School, Monterey, CA
4Army 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. Airola1, Andrea M. Brown1, David M. Brown1, Benjamin J. Drewry1, Jonathan Z. Gehman1, Richard M. Giannola1, Randall T. Hanna1, Ian M. Hughes1, Amit V. Itagi1, Jessica K. Makowski1, Michael E. Thomas1, Qing Wang2, Adam H. Willitsford1, Nathaniel S. Winstead1
1Johns Hopkins University Applied Physics Lab, Laurel, MD
2Naval Postgraduate School, Monterey, CA

16:20 F6-9
MEASUREMENTS OF ATMOSPHERIC TURBULENT REFRACTIVITY IN COASTAL ZONE AND MICROWAVE PROPAGATION
Frank Ryan*1, Steven Russell2
1Applied Technology, Inc., San Diego, CA
2CODE 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 Owen², Ted Rogers¹
¹Atmospheric Propagation, SSC Pacific, San Diego, CA
²HS 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 Wang¹, Tracy Haack², Teddy Holt²
¹Naval Postgraduate School, Monterey, CA
²Naval 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. Scales², M. Kosch³⁴, A. Senior⁴, A. Mohebalhojeh¹, M. Farahani¹, S. Ghader¹
¹Institute of Geophysics, University of Tehran, Tehran, IRAN
²Virginia Tech, Blacksburg, VA
³South African National Space Agency, Hermanus, SOUTH AFRICA
⁴Physics, 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 Hall¹, Jeremiah Williams², Uwe Konopka¹, Tetyana Antonova³,
Christina Knapek³, Mikhail Pustylnik³, Hubertus Thomas³
¹Physics, Auburn University, Auburn, AL
²Physics, Wittenberg University, Springfield, OH
³Complex 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. Halekas¹, Yuki Harada², Gina A. DiBraccio³,
Norberto Romanelli⁴, Jared R. Espley³, Laila Andersson⁶, Christian Mazelle⁴, David A. Brain⁶,
David L. Mitchell⁶, Bruce M. Jakosky⁶
¹The University of Iowa, Iowa City, IA
²Space Sciences Laboratory, University of California Berkeley, Berkeley, CA
³Solar System Exploration Division, NASA Goddard Space Flight Center, Greenbelt, MD
⁴CNRS, IRAP, Toulouse, FRANCE
⁵University Paul Sabatier, Toulouse, FRANCE
⁶Laboratory 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 Imai¹, George B. Hospodarsky¹, Donald A. Gurnett¹,
Sadie S. Tetrick¹, Scott J. Bolton², John E. P. Connerney³, Steven M. Levin⁴
¹University of Iowa, Iowa City, IA
²Southwest Research Institute, San Antonio, TX
³NASA Goddard Space Flight Center, Greenbelt, MD
⁴NASA 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*, William S. Kurth, Donald A. Gurnett, Scott J. Bolton, Steven M. Levin, John E. P. Connerney
1Physics and Astronomy, University of Iowa, Iowa City, IA
2Southwest Research Institute, San Antonio, TX
3NASA Jet Propulsion Laboratory, Pasadena, CA
4NASA Goddard Space Flight Center, Greenbelt, MD

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

15:40 H5-7
AN OVERVIEW OF SATURN RADIO EMISSIONS
Shengyi Ye*1, William S. Kurth1, Georg Fischer2, John D. Menietti1, Donald A. Gurnett1
1Physics and Astronomy, University of Iowa, Iowa City, IA
2Space 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

15:20 J7-1
EARLY OBSERVATIONS OF JUPITER WITH JUNO'S MICROWAVE RADIOMETER
Michael A. Janssen*1, Scott J. Bolton2, Steven M. Levin1, Virgil Adumitroae1,
Michael D. Allison3, John K. Arbalo1, Sushil K. Atreya4, Amadeo Bellotti5, Shannon T. Brown1,
Andrew P. Ingersoll6, Laura A. Jewell1, Cheng Li1, Liming Li7, Jonathan I. Lunine8,
Sidharth Misra1, Glenn S. Orton1, Maarten Roos8, Daniel Santos-Costa2, Edwin Sarkissian1,
Paul G. Steffes5, Ross Williamson1
1NASA Jet Propulsion Laboratory, Pasadena, CA
2Southwest Research Institute, San Antonio, TX
3Goddard Institute of Space Studies, New York, NY
**USE OF THE JUNO MICROWAVE RADIOMETER (MWR) IN THE STUDY OF JOVIAN ATMOSPHERIC COMPOSITION, STRUCTURE, AND DYNAMICS**

Amadeo Bellotti*1, Paul G. Steffes1, Michael A. Janssen2, Steven M. Levin2, Samuel Gulkis2

1Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA
2NASA Jet Propulsion Laboratory, Pasadena, CA

**INVESTIGATING AMMONIA GAS IN THE JOVIAN ATMOSPHERE USING CENTIMETER WAVELENGTH TOTAL FLUX**

Ramsey L. Karim*1, David DeBoer1, Imke de Pater1, Garrett Keating2

1Astronomy, University of California Berkeley, Berkeley, CA
2Harvard-Smithsonian Center for Astrophysics, Cambridge, MA

**IMPROVING THE PLANETARY EPHEMERIS WITH VLBA ASTROMETRY: TRANSITIONING FROM CASSINI TO JUNO**

Dayton Jones*1, William Folkner2, Robert Jacobson2, Christopher Jacobs2, Jonathan Romney3, Vivek Dhawan3, Edward Fomalont4

1Space Science Institute, Boulder, CO
2NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA
3National Radio Astronomy Observatory, Socorro, NM
4National Radio Astronomy Observatory, Charlottesville, VA

**OBSERVATIONS OF SOLAR SYSTEM BODIES WITH THE VLA AND ALMA**

Bryan Butler*

National Radio Astronomy Observatory, Socorro, NM

**INVESTIGATING THE ICE SHELL AND BURIED OCEAN ON EUROPA WITH THE SCHUMANN RESONANCE**

Thomas Marshall Eubanks*

Asteroid Initiatives LLC, Clifton, VA

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**Session K3: Electromagnetics and Thermal Therapy: Advances in Treatment Planning**

(Special Session)

Room 155

Co-Chairs: John Stang, University of Southern California;
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 RADIONETERS 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