Honoring 50+ Years of Continuous Contributions and Impact of Professor Yahya Rahmat-Samii on the year of his 75th Birthday

Session Co-Chairs: Kathleen Melde, University of Arizona; Stuart Long, University of Houston

MO-SP.1A.1 **08:00**

Professor Yahya Rahmat-Samii: A Remarkable Career in Review

Kathleen Melde, University of Arizona, United States; Stuart Long, University of Houston, United States

MO-SP.1A.2 **08:20**

Nearly 50 Years of Numerical Methods and Their EM Applications

Richard Ziolkowski, The University of Technology Sydney, Australia

MO-SP.1A.3 **08:40**

Antennas and Propagation Research Fueling the Mobile Wireless Revolution

Michael Jensen, Brigham Young University, United States

MO-SP.1A.4 **09:00**

Advances in Novel Spacecraft and Reflector Antenna Technologies

Richard Hodges, Daniel Hoppe, Paula Brown, Behrouz Khayatian, CALTECH Jet Propulsion Laboratory, United States

MO-SP.1A.5 **09:20**

Frontiers of Antennas in Medical Applications

Koichi Ito, Chiba University, Japan

Break **09:40**

MO-SP.1A.6 **10:00**

Surface Electromagnetics: From Electromagnetic Bandgap Structure to Reflectarray and Beyond

Fan Yang, Tsinghua Univesity, China; Shenheng Xu, Tsinghua Univerisity, China

MO-SP.1A.7 **10:20**

Metamaterial Lenses, Reflectarrays, and TARC

Jordan Budhu, Majid Manteghi, Virginia Tech, United States

MO-SP.1A.8 **10:40**

Professor Yahya Rahmat-Samii's Exceptional Contributions to Research and Teaching as Seen by a Ph.D. Student: A Great Advisor and a True Friend

Anastasios Papathanasopoulos, University of California Los Angeles (UCLA), United States

MO-SP.1A.9 **11:00**

Professor Rahmat-Samii early contribution in high-frequency techniques

Stefano Maci, University of Siena, Italy

MO-SP.1A.10 **11:20**

A Career in Progress – Reflections after 50 Years

Yahya Rahmat-Samii, University of California at Los Angeles (UCLA), United States

RIS/Metasurface Components and System Analysis for 5G-Advanced and 6G

Session Co-Chairs: Jungsuek Oh, Seoul National University; Seongkwan Kim, KT Corporation; Zhen Peng, University of Illinois at Urbana-Champaign

MO-SP.2A.1 **08:00**

From Time-Modulated Arrays to Time-Modulated Metasurfaces - Advanced Implementations and Applications

Lorenzo Poli, Paolo Rocca, Giacomo Oliveri, Arianna Benoni, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy

MO-SP.2A.2 **08:20**

Multi-Beam Polarized and Massive Reconfigurable Intelligent Surface (RIS): Concept, Design and System Demo Achieving > 4 Gbps Throughput

Hogyeom Kim, Jungsuek Oh, Seoul National University, Korea (South)

MO-SP.2A.3 **08:40**

Intensity-only OMP-based Direction Estimation for Hybrid Reconfigurable Intelligent Surfaces

Idban Alamzadeh, Arizona State University, United States; George C. Alexandropoulos, National and Kapodistrian University of Athens, Greece; Mohammadreza F. Imani, Arizona State University, United States

MO-SP.2A.4 **09:00**

Reconfigurable Intelligent Surface for the Doppler Shift

Jeong woo Hur, Han-Jun Maeng, Seong Ju Kim, Ji-Eun Han, Dongho Kim, Sejong University, Korea (South)

MO-SP.2A.5 **09:20**

Combinatorial Optimization of Reconfigurable Intelligence Surfaces at Wireless Endpoints using the Ising Hamiltonian Model

Charles Ross, Qijian Lim, University of Illinois at Urbana-Champaign, United States; Minglei You, Gabriele Gradoni, University of Nottingham, United Kingdom; Zhen Peng, University of Illinois at Urbana-Champaign, United States

Break **09:40**

MO-SP.2A.6 **10:00**

Field Evaluation of Reconfigurable Intelligent Surface with Varying Surface Size

Doyle Kwon, Sunghyun Kim, Kyujin Park, Seongkwan Kim, KT Corporation, Korea (South); Hogyeom Kim, Hyunjun Yang, Seungwoo Bang, Jungsuek Oh, Seoul National University, Korea (South)

MO-SP.2A.7 **10:20**

Propagation Modeling for RIS-Enabled Channels Based on Ray-Tracing and the Equivalence Principle

Yuanzhi Liu, Costas Sarris, University of Toronto, Canada

MO-SP.2A.8 **10:40**

1-Bit Reflective Metasurface with Random Phase Distribution for Quantization Lobe Suppression at 140 GHz

Taeyoung Kim, Kyungpook national university, Korea (South)

MO-SP.2A.9 **11:00**

Shaping the Scattering Pattern of a Reconfigurable Intelligent Surface through the Manipulation of Composite Vortices

Mirko Barbuto, "Niccolò Cusano" University, Italy; Zahra Hamzavi-Zarghani, "Roma Tre" University, Italy; Michela Longhi, "Niccolò Cusano" University, Italy; Alessio Monti, Muhammad Khalid, Davide Ramaccia, Luca Stefanini, "Roma Tre" University, Italy; Stefano Vellucci, "Niccolò Cusano" University, Italy; Andrea Alù, City University of New York, United States; Filiberto Bilotti, Alessandro Toscano, "Roma Tre" University, Italy

MO-SP.2A.10 **11:20**

Experimental Characterization of a Low-Profile 37-dBi Gain Transmitarray for Backhauling at E-Band

Antonio Clemente, Maciej Smierzchalski, Francesco Foglia Manzillo, CEA-Leti, University Grenoble-Alpes, France; Thierry le Nadan, Radiall, France

Antenna, Theory, and Design I

Session Co-Chairs: Sanghamitro Das, San Diego State University; Satish K. Sharma, San Diego State University; David R. Jackson, University of Houston

MO-UB.1A.1 **08:00**

Reconfigurable Microstrip Antenna Design with Partial Ground Plane for 5G Applications

Abdullah Eroglu, Jyosri M Karra, North Carolina A&T State University, United States

MO-UB.1A.2 **08:20**

Wideband 3-D Printed LP to CP Polarizer Integrated with Phase Correcting Surface for Enhanced Polarization Quality

Kaushik Debbarma, Satish K. Sharma, San Diego State University, United States

MO-UB.1A.3 **08:40**

Directional Modulation Via Antenna Pattern Dynamics Using a Time-Varying Differentially Fed Dipole Antenna

Amer Abu Arisheh, Jeffrey Nanzer, Michigan State University, United States

MO-UB.1A.4 **09:00**

3D Printed Dielectric Lens with Balanced Antipodal Vivaldi Antenna for Broadband High Gain 5G New Radio Applications

Sanghamitro Das, Satish K. Sharma, San Diego State University, United States; Colby O. Hobart, Philip M. Lambert, Fortify, Inc., United States

MO-UB.1A.5 **09:20**

Increasing the Efficiency-Bandwidth Product of Electrically-Small Antennas by Time-Dependent Parametric Coupling of Characteristic Modes

Steve Young, Zachary Fritts, Anthony Grbic, University of Michigan, United States

Break **09:40**

MO-UB.1A.6 **10:00**

Analytical Formulas for Beam Shift and Beam Narrowing in 1-D Leaky-Wave Antennas due to the Element Pattern

Walter Fuscaldo, National Research Council, Italy; Alessandro Galli, Sapienza University of Rome, Italy; David R. Jackson, University of Houston, United States

MO-UB.1A.7 **10:20**

Scattering Based Formulation for Substructure Characteristic Modes

Mats Gustafsson, Johan Lundgren, Lund University, Sweden; Kurt Schab, Santa Clara University, United States; Lukas Jelinek, Miloslav Capek, Czech Technical University in Prague, Czech Republic

MO-UB.1A.8 **10:40**

Rapid Reflection-based mm-Wave Array Pattern Measurement

Abdulhadi Aldawsari, Jacob Adams, North Carolina State University, United States

MO-UB.1A.9 **11:00**

Exploring Polarization Purity in the Reconfigurable Over-The-Air Chamber

Benjamin Arnold, Michael Jensen, Brigham Young University, United States

MO-UB.1A.10 **11:20**

Exploiting Absorptive Electromagnetic Surfaces for Wireless Channel Interference Management by Radio Null Formulation

Youngno Youn, Donggeun An, Cheonga Lee, Daehyeon Kim, Myeonggin Hwang, Wonbin Hong, Pohang University of Science and Technology, Korea (South)

Antenna Measurements I

Session Chair: Tom Weller, Oregon State University

MO-A1.1A.1 **08:00**

Combination of Measurement and Simulation for Fast Virtual Drive Testing

Lucia Scialacqua, Lars Jacob Foged, Microwave Vision Italy, Italy; Philipp Berlt, Berk Altinel, Christian Bornkessel, Matthias A. Hein, Technische Universität Ilmenau, Germany; Reiner Hoppe, Thomas Hager, Jordi Soler Castany, Altair Engineering GmbH, Germany

MO-A1.1A.2 **08:20**

Field Experiment of a Circularly Polarized Underwater Antenna

Takuma Matsushita, Takashi Kawamura, Yukio Kaneko, Sony Group Corporation, Japan; Nobuaki Kawai, Yasuhiro Matsui, Sony Semiconductor Solutions Corporation, Japan; Kazuhiro Hongo, Kazunobu Ohkuri, Sony Group Corporation, Japan; Akihiro Horii, Sony Semiconductor Solutions Corporation, Japan; Hiroshi Yoshida, Japan Agency for Marine-Earth Science and Technology, Japan

MO-A1.1A.3 **08:40**

Characterization of concrete curing using a microwave harmonic sensor

Ismail Uluer, Krishna Chopperla, Daniel Yirenya-Tawiah, Burkan Isgor, Jason Weiss, Tom Weller, Oregon State University, United States

MO-A1.1A.4 **09:00**

Deep Learning Accelerated Antenna Radiation Pattern Prediction for Undersampled Near-Field to Far-Field Transformation

Yuchen Gu, Xiaohong Zhang, Daniel van der Weide, University of Wisconsin-Madison, United States

MO-A1.1A.5 **09:20**

Estimating Antenna Measurements Uncertainty from Quiet Zone Variation

Francesco Saccardi, Andrea Giacomini, Lars Foged, MVG, Italy

Break **09:40**

MO-A1.1A.6 **10:00**

The Bayesian Approach to Derive Wireless Fields in Mobile Stations

Huber Nieto-Chaupis, Universidad Autónoma del Perú, Peru

MO-A1.1A.7 **10:20**

3D Printed Compact Bi-static Measurement Platform for Ka/Ku Band Applications

Nohgyeom Ha, Gyoungdeuk Kim, Sangkil Kim, Pusan National University, Korea (South)

MO-A1.1A.8 **10:40**

Anechoic Chamber Clean Zone Analysis with Angle Dependent Reflection Coefficients

Merve Güvenç, Profen Communication Technology, Turkey; Okyanus Tulgar, TÜBİTAK, Turkey; Tolga Çiftçi, TAI, Turkey; A. Arif Ergin, Yeditepe University, Turkey

MO-A1.1A.9 **11:00**

Wireless Microwave Signal Transmission for Cryogenic Applications

Jalil ur Rehman kazim, University of Glasgow, United Kingdom; Muhammad Zulfiqar Ali, Oxford Instruments, United Kingdom; Ali Al-Moathin, Fatemeh Nikbakhtnasrabadi, University of Glasgow, United Kingdom; Prince Khatri, Megan Powell, University of Strythclyde, United Kingdom; Manoj Stanely, Nick M Ridler, National Physical Laboratory, United Kingdom; Alessandro Rossi, University of Strythclyde, United Kingdom; Martin Weides, Hadi Heidari, Muhammad Ali Imran, Qammer H Abbasi, Chong Li, University of Glasgow, United Kingdom

Finite Element Methods I

Session Co-Chairs: Guido Lombardi, Politecnico di Torino; Roberto Graglia, Politecnico di Torino

MO-A3.1A.1 **08:00**

Low Rank Direct Finite Element Solvers

Nash Lochner, Dimitrios Makris, Marinos Vouvakis, University of Massachusetts - Amherst, United States

MO-A3.1A.2 **08:20**

The pyramid cell and its associated scalar and vector bases for FEM and MoM applications

Roberto Graglia, Politecnico di Torino, Italy

MO-A3.1A.3 **08:40**

Comparative Investigation of Iterative Solutions of the All-Frequency Stable Formulation and Its Vector-Potential-Only Variation

Minyechil Mekonnen, Su Yan, Howard University, United States

MO-A3.1A.4 **09:00**

A Predictor-Corrector Based Charge and Energy Conserving EM-FEMPIC Scheme

Omkar Ramachandran, Leo Kempel, Michigan State University, United States; Balasubramaniam Shanker, The Ohio State University, United States

MO-A3.1A.5 **09:20**

RCS Uncertainty Predictions for Scatterers with Uncertain Material Parameters Using FEM, Adjoints, and HOPS Technique

Stephen Kasdorf, Jake Harmon, Branislav Notaros, Colorado State University, United States

Break **09:40**

MO-A3.1A.6 **10:00**

Spectral Element Method for Modeling Anisotropic Circular Waveguides Loaded with Eccentric Rods via Conformal Transformation Optics

Raul Ribeiro, Guilherme Rosa, José Bergmann, Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Brazil; Fernando Teixeira, The Ohio State University, United States

MO-A3.1A.7 **10:20**

Kriging Methodology for Predicting Material Uncertainty Impact on FEM Scattering Computations

Stephen Kasdorf, colorado state university, United States; Jake Harmon, Branislav Notaros, Colorado State University, United States

MO-A3.1A.8 **10:40**

Adaptive Mesh Refinement Strategy for Solving Electromagnetic Radiation and Scattering

Junhui Yin, Junhong Liu, Li Xu, Hao Wang, Bingqi Liu, Hangxin Liu, Xing Li, Bin Li, University of Electronic Science and Technology of China, China

Metasurfaces

Session Chair: Qammer Abbasi, University of Glasgow

MO-A2.1A.1 **08:00**

A Design Method of Broadband Off-axis Focusing Metasurfaces

Shilong Zhu, Luanfeng Gao, Yulu Hu, Bin Li, Wenkai Deng, University of Electronic Science and Technology of China, China

MO-A2.1A.2 **08:20**

Beam scanning antenna of transmitting metasurface and Radial line slot antenna with beam-tilted

Yalin Wen, Tao Tian, Feng Yang, University of Electronic Science and Technology of China, China

MO-A2.1A.3 **08:40**

Emerging Interface Effects in Flat Optics

Massimo Moccia, Giuseppe Castaldi, University of Sannio, Italy; Andrea Alù, City University of New York, United States; Vincenzo Galdi, University of Sannio, Italy

MO-A2.1A.4 **09:00**

Phase Gradient Metasurface Rasorber for Combined Beam Steering and Absorption Capability

Callum Hodgkinson, University of Edinburgh, United Kingdom; Dimitris Anagnostou, Heriot-Watt University, United Kingdom; Symon Podilchak, University of Edinburgh, United Kingdom

MO-A2.1A.5 **09:20**

Millimeter-Wave Holographic Metasurface Leaky-Wave Multi-Beam Antennas with Gain and Polarization Control

Yu-Zhan Tsai, National Yang Ming Chiao Tung University, Taiwan; Artem Vilenskiy, Marianna Ivashina, Chalmers University of Technology, Sweden, Sweden; Malcolm Ng Mou Kehn, National Yang Ming Chiao Tung University, Taiwan

Break **09:40**

MO-A2.1A.6 **10:00**

Dual Circularly Polarized Metasurface Antenna

Ravikanth Thanikonda, Marco Faenzi, alberto toccafondi, enrica martini, stefano maci, University of siena, Italy

MO-A2.1A.7 **10:20**

Negative Permittivity Property of Finite Male Metasurface

Xiaoxiao Su, Guilin University of Electronic Technology, China; Wanyu Li, Xi'an Electronic Engineering Research Institute, China; Fengyuan Sun, Xinhua Yu, Yiying Wang, Guilin University of Electronic Technology, China; Omar M. Ramahi, University of Waterloo, Canada

PCS Antennas and Communication Systems

Session Co-Chairs: Qammer H Abbasi, University of Glasgow; John Volakis, Florida International University; Arpan Desai, National Yang Ming Chiao Tung University

MO-A5.1A.1 **08:00**

Dual band Coupled feed PIFA integrated in the watchstrap for smart watch application

abdelhakim adli, MARTA Cabedo-Fabrés, Miguel Ferrando Bataller, UPV, Spain

MO-A5.1A.2 **08:20**

Conformally Modularized Antenna-in-Display for Efficient Coverage Manipulation in 5G Smartphone

Jeongtaek Oh, Jungsuek Oh, Institute of New Media and Communication/Seoul National University, Korea (South)

MO-A5.1A.3 **08:40**

Compact High-Isolation MIMO Antenna Pairs with Dummy Antenna for Metal Bezel 5G Smartphone

Yuke Guo, Luyu Zhao, Xidian University, China

MO-A5.1A.4 **09:00**

Indoor Field Trials for RIS-aided Wireless Communications

Saber Hassouna, Jalil ur Rehman Kazim, James Rains, Muhammad Ali Jamshed, Masood Ur Rehman, Muhammad Imran, Qammer H Abbasi, University of Glasgow, United Kingdom

MO-A5.1A.5 **09:20**

Miniature Footprint of Multi-Stage Self Interference Cancellation in a STAR Radio

Md Rakibur Rahman, Satheesh Venkatakrishnan, John Volakis, Florida International University, United States

Break **09:40**

MO-A5.1A.6 **10:00**

A Modified T Shaped Complex FIR-Circuit for Simultaneous Transmit and Receive System

Md Nurul Anwar Tarek, Marisol Roman Guerra, Md Nazim Uddin, Elias Alwan, Florida International University, United States

MO-A5.1A.7 **10:20**

Spatiotemporally Modulated Metasurface Antennas for Direct Signal Modulation

Geng-Bo Wu, City University of Hong Kong, Hong Kong SAR of China; Jun Yan Dai, Southeast University, China; Chi Hou Chan, City University of Hong Kong, Hong Kong SAR of China

MO-A5.1A.8 **10:40**

Secure Non-Coherent Links Using Commercial Software-Defined Radios

John Willis, Satheesh Venkatakrishnan, John Volakis, Florida International University, United States

Phased-array Antennas: Element, Module, and Subarray Development

Session Co-Chairs: Caglar Yardim, Ohio State University; Goutam Chattopadhyay, Jet Propulsion Laboratory

MO-A1.2A.1 **08:00**

Dual Polarized Omnidirectional 5G/6G mmWave Tx/Rx Frontend Module

Winfried Simon, Aline Friedrich, Oliver Litschke, Markus Krengel, Lutz Wunderlich, Michael Wleklinski, Thorsten Liebig, IMST GmbH, Germany

MO-A1.2A.2 **08:20**

A High Gain Wide Beam U-Slot Elliptical Microstrip Patch Antenna for Phased Array Applications

ASHISH K ADIGA, MAHESH A, RASHTREEYA VIDYALAYA COLLEGE OF ENGINEERING, India; ASHUTOSH KEDAR, Defence Research and Development Organisation, India; PRATAP P VANGOL, RASHTREEYA VIDYALAYA COLLEGE OF ENGINEERING, India

MO-A1.2A.3 **08:40**

Circularly-Polarized W-band Satellite Antennas with Split-ring Elements for Axial Ratio Compensation

Changhee Lee, Gangil Byun, Ulsan National Institute of Science and Technology (UNIST), Korea (South)

MO-A1.2A.4 **09:00**

A Compact Dual-Polarized Millimeter-Wave Array with Wide Beam Scanning for Mobile Terminals

Xiaoxue Fan, Yan Wang, Fudan University, China

MO-A1.2A.5 **09:20**

Design of A Reconfigurable-Polarization Slot-Ring Phased Array Antenna

Zahid Hasan, Graduate Student, University of Central Florida, United States; Xun Gong, Professor, University of Central Florida, United States

Break **09:40**

MO-A1.2A.6 **10:00**

Mm-Wave Beam Steering Antennas using Stacked Parallel Plate Lens Antenna Subarrays

Omar Jebreil, Gokhan Mumcu, University of South Florida, United States

MO-A1.2A.7 **10:20**

Dual Band Dual Polarization Phased Array Employing a Magnetic Material

Frank Li, John Sanford, University of California San Diego, United States

MO-A1.2A.8 **10:40**

Phased-Array Antennas for K/Ka-Band Satellite Communication – Prototyping Scalable Apertures Composed of 8x8 Modules

Simon Otto, Simona Bruni, Dirk Lohmann, Michael Wleklinski, Roman Gieron, Winfried Simon, Jochen Mosig, Sybille Holzwarth, Wolfgang Wischmann, IMST GmbH, Germany

MO-A1.2A.9 **11:00**

The Advanced Short Backfire Antenna as an Element for Space-Based Phased Arrays

Colin Mussman, The Pennsylvania State University, United States; Erik Lier, Thomas Hand, Lockheed Martin Space, United States; Douglas Werner, The Pennsylvania State University, United States

MO-A1.2A.10 **11:20**

Tightly Coupled Vivaldi Arrays with Increased Bandwidth

Anastasios G. Koutinos, Constantinos L. Zekios, Stavros V. Georgakopoulos, Florida International University, United States

Reconfigurable Antennas and Arrays I

Session Co-Chairs: Kamal Sarabandi, University of Michigan, Ann Arbor; Youssef Tawk, American University of Beirut

MO-A1.3A.1 **08:00**

Magnetic Metamaterial Frequency Tunable Antenna

Mousa Al-Omari, Hussein Attia, Sharif I. M. Sheikh, KFUPM, Saudi Arabia

MO-A1.3A.2 **08:20**

Dielectric Loaded Reconfigurable SIW Slot Antenna Array

Sriparna De, Shiban K. Koul, IIT Delhi, India; Kamal K. Samanta, AMWT Ltd., United Kingdom

MO-A1.3A.3 **08:40**

An Array of Millimeter-Wave Groove Gap Waveguide Elements with Phase Shifting and Polarization Reconfigurability

Zeina Al Masri, Youssef Tawk, Joseph Costantine, American University of Beirut, Lebanon

MO-A1.3A.4 **09:00**

Impact of Ground Plane Scattering on Performance of Reconfigurable Intelligent Surfaces

Kentaro Murata, Iwate University, Japan; Buon Kiong Lau, Lund University, Sweden; Naoki Honma, Iwate University, Sweden

MO-A1.3A.5 **09:20**

A Novel Antenna Peaking Technique Using Machine Learning in Noisy Satellite Communication Channels

Joshua Roper, Viasat, United States; Andrew Peterson, Georgia Institute of Technology, United States

Break **09:40**

MO-A1.3A.6 **10:00**

An Improved Deconvolution Algorithm for Sidelobe Suppression in Sparse Array SAR and MIMO Imaging Radars

Aditya Varma Muppala, Kamal Sarabandi, University of Michigan, Ann Arbor, United States

MO-A1.3A.7 **10:20**

Wideband Circular Polarization Reconfigurable Phased Array using Rotating 45-degree Linearly Elements

Hao Liu, Yulu Fan, Chunsen Fu, Haojiong Xue, University of Electronic Science and Technology of China, China; Anyong Qing, Southwest Jiaotong University, China; Ziqiang Xu, Xianqi Lin, University of Electronic Science and Technology of China, China

MO-A1.3A.8 **10:40**

Monolithic Co-design of a 15 GHz SPDT-Antenna Allowing Polarization Reconfigurability

Rozenn Allanic, Denis Le Berre, Cédric Quendo, UBO / Lab-STICC, France; Francois Gallée, IMT Atlantique, France; Douglas Silva De Vasconcellos, Virginie Grimal, Damien Valente, Jérôme Billoué, GREMAN Lab, France; Thomas Merlet, Aude Leuliet, THALES LAS OME, France

MO-A1.3A.9 **11:00**

360° Single/Dual-Beam Steering of an EBG Encircled Monopole Antenna by Controlling Ground Surface Currents

Bo Zhang, Zhi Ning Chen, National University of Singapore, Singapore; Yucong Zhou, Huawei Technologies Co., Ltd., China

MO-A1.3A.10 **11:20**

Synthesis of Flat-Top Beams Based on Pencil Beam Widening

Dorian Ljubenko, Goran Molnar, Ericsson Nikola Tesla d.d., Croatia (Hrvatska)

Electromagnetic Environment and Interference

Session Chair: Robert Gardner, Georgia Tech Research Institute

MO-UE.1A.1 **08:00**

RF INTEROPERABILITY ANALYSIS FOR FIGHTER AIRCRAFTS

Ömer Can DABAK, Barış BALABAN, ASELSAN, Turkey

MO-UE.1A.2 **08:20**

Deep-Fake Electromagnetic Emissions: A New Approach to EMC Compliance Testing

Oameed Noakoasteen, Christos Christodoulou, The University of New Mexico, United States; Sameer Hemmady, Verus Research, United States

MO-UE.1A.3 **08:40**

Analytical Approach for Root Cause of Electrical Breakdown in WR187 Leaky Wall Low Pass Filter (LPF) for C-band High Power Transmitter

Kihun Chang, Stephen Diehl, Keith Truman, James Eisenlord, David Sauer, Dave Sar, Raytheon Technologies, United States

MO-UE.1A.4 **09:00**

Susceptibility of the Radio Navigation System of Small UAVs to Radiated Electromagnetic Interference

Daniel Gomez-Garcia, Jilu Li, Fernando Rodriguez-Morales, Carl Leuschen, University of Kansas, United States

MO-UE.1A.5 **09:20**

Estimating Near-Field Signals Emanated by Embedded Systems Using Data-Dependent EM Profiles as Basis Functions

Vishnuvardhan Iyer, Ali Yilmaz, The University of Texas at Austin, United States

MO-UE.1A.7 **10:20**

Assessment of Interference in the 5.9 GHz ITS Band in Metro Vancouver

Berkay Talha Acar, Hamed Noori, David Michelson, The University of British Columbia, Canada

MO-UE.1A.8 **10:40**

Design and implementation of a UHF RFI detector

Amin Aminaei, UC Davis, United States

Frequency-Selective Surfaces I

Session Co-Chairs: Do-Hoon Kwon, University of Massachusetts Amherst; Christophe Fumeaux, The University of Adelaide

MO-A2.2A.1 **08:00**

Dual-Polarized Bandpass Angle-Selective Surface Based on Three-Layer Frequency Selective Surfaces

ZHENTING CHEN, ZHONGXIANG SHEN, NTU, Singapore

MO-A2.2A.2 **08:20**

Analysis of the angular stability of an FSS based on the geometry of open asymmetrical trapezoidal rings

Juliete da Silva Souza, Federal University of Campina Grande, Brazil; Alfredo Gomes Neto, Federal Institute of Paraiba, Brazil; Simone Genovesi, Univeristy of Pisa, Italy; Alexandre Jean René Serres, Federal University of Campina Grande, Brazil

MO-A2.2A.3 **08:40**

Angularly Stable Metasurface Filter Using a Cloverleaf Element

Nadav Goshen, Yarden Mazor, Tel-Aviv University, Israel

MO-A2.2A.4 **09:00**

Efficient Design of Multilayer Wideband Absorbers Using Analytical Grid Impedance

Hakjune Lee, Do-Hoon Kwon, University of Massachusetts Amherst, United States

MO-A2.2A.5 **09:20**

Transmission Phase Controllable Rasorber Using All-Metal Cross-Polarization Converter

MENGYAO LI, ZHONGXIANG SHEN, Nanyang Technological University, Singapore

Break **09:40**

MO-A2.2A.6 **10:00**

An Ultrawideband Microwave Absorber Based on Graphene Frequency-Selective Surfaces

Yize Li, Xiaoyu Xiao, Zhirun Hu, The University of Manchester, United Kingdom

MO-A2.2A.7 **10:20**

A Switchable Transmission/Absorption/Reflection Frequency Selective Surface

Hang Yuan, Nanjing University of Aeronautics & Astronautics, China; Danilo Brizi, University of Pisa, Italy; Qunsheng Cao, Nanjing University of Aeronautics & Astronautics, China; Agostino Monorchio, University of Pisa, Italy

MO-A2.2A.8 **10:40**

Symmetric Reflector/Absorber with Reconfigurable Low-pass Capability

Donovan Brocker, Milwaukee School of Engineering, United States

MO-A2.2A.9 **11:00**

Diode-based Switchable Frequency Selective Surface at 3.6 GHz

Thi-Hong-Le Dam, Gregory Houzet, Thierry Lacrevaz, Tan-Phu Vuong, IMEP-LaHC, France

MO-A2.2A.10 **11:20**

Frequency-Reconfigurable Artificial Magnetic Conductor with Wide Tuning Range

Siti Nailah Mastura Zainarry, The University of Adelaide, Australia; Shengjian Jammy Chen, Flinders University, Australia; Christophe Fumeaux, The University of Adelaide, Australia

Electromagnetic Theory and Modeling I

Session Co-Chairs: Andrea Neto, Delft University of Technology; Edwin Marengo, Northeastern University

MO-A2.3A.1 **08:00**

Electromagnetic analysis of moving ideal or matched plane wave source with the FDTD method

Mohammad Marvasti, Halim Boutayeb, University of Quebec in Outaouais, Canada

MO-A2.3A.2 **08:20**

The Electromagnetic Modelling of Thermal Emission

Riccardo Ozzola, Jinglin Geng, Delft University of Technology, Netherlands; Angelo Freni, Università degli Studi di Firenze, Italy; Andrea Neto, Delft University of Technology, Netherlands

MO-A2.3A.3 **08:40**

Degrees Of Freedom of the Field throught SVD-based approach applied to a Box-shaped Source Region

Laura Passalacqua, University of Siena, Italy; Cristina Yepes, Public University of Navarra, Spain; Alejandro Murillo Barrera, Huawei Technologies, Italy; Enrica Martini, Stefano Maci, University of Siena, Italy

MO-A2.3A.4 **09:00**

Electromagnetic nonradiating surface sources

Edwin Marengo, Giulia Salvio, Robert Costello, Northeastern University, United States

MO-A2.3A.5 **09:20**

A Method for Computing the Electromagnetic Fields Excited in a Cylindrical Cavity by a Longitudinal Aperture

Secil E. Dogan, Joel T. Johnson, Robert J. Burkholder, The Ohio State University, United States

Break **09:40**

MO-A2.3A.6 **10:00**

Derivation of Maxwell's Equations Using Field-Impulses

Eng Leong Tan, Nanyang Technological University, Singapore

MO-A2.3A.7 **10:20**

Analysis of Microstrip Antennas Considering Conductivity of Lossy Metal with IBC-MoM

Jeong-Hun Nam, Il-Suek Koh, INHA university, Korea (South)

MO-A2.3A.8 **10:40**

Theorical Analysis of All-Pass Filter Based Negative Group Delay Circuit

Nathan Gurgel, Glauco Fontgalland, Federal University of Campina Grande, Brazil; Blaise Ravelo, Nanjing University of Information Science & Technology, China

Positioning and Tracking

Session Chair: Kamal Sarabandi, University of Michigan

MO-A4.1A.1 **08:00**

Analysis of AOA Estimation Error in UWB Indoor Positioning

Haining Yang, Xinfeng Ming, Aya Li, Tingjun Li, Yafei Wu, Yujian Cheng, University of Electronic Science and Technology of China, China

MO-A4.1A.2 **08:20**

Indoor Wi-Fi Positioning Based on Model Agnostic Meta Learning

Qiaolin Pu, Youkun Chen, Mu Zhou, Liangbo Xie, Xin Lan, Zhongyin Hu, Chongqing University of Posts and Telecommunications, China

MO-A4.1A.3 **08:40**

An UWB Measurement Error Model for Accurate Positioning Investigation

Haining Yang, Yuting Liu, Xinfeng Ming, Tingjun Li, Yafei Wu, Yujian Cheng, University of Electronic Science and Technology of China, China

MO-A4.1A.4 **09:00**

An Efficient Indoor and Outdoor Localization Method Based on RSSI using Zigbee Modules

Tania Islam, Niamul Quader, Jamiu Abdulsalam, Salman Khan Mithil, Sayan Roy, South Dakota Mines, United States

MO-A4.1A.5 **09:20**

Demonstration of Rapid Indoor Mapping Using Very High Resolution Radar at J-band

Abdullah Alburadi, Aditya Muppala, Kamal Sarabandi, University of Michigan, United States

Break **09:40**

MO-A4.1A.6 **10:00**

An UWB Receiver Model for AOA Estimation Accuracy Analysis

Haining Yang, Xinfeng Ming, Yuting Liu, Tingjun Li, Na Li, Yujian Cheng, University of Electronic Science and Technology of China, China

MO-A4.1A.7 **10:20**

Multi-parameter Estimation Error Bound Analysis for RIS Positioning System

Qiaolin Pu, Xin Lan, Mu Zhou, Liangbo Xie, Youkun Chen, Chongqing University of Posts and Telecommunications, China

MO-A4.1A.8 **10:40**

ADS-B Performance Parameter Variation along Trajectory

Junichi Honda, Keisuke Matsunaga, Electronic Navigation Research Institute, Japan

Biomedical Devices and Applications

Session Chair: Majid Manteghi, Virginia Polytechnic Institute and State University

MO-A5.2A.1 **08:00**

A Dual-Sense Circularly Polarized Flexible Asymmetric CPW-based Antenna

Basim Sadek, Ahmed Abdelreheem, Mahmoud Abdalla, Military Technical College, Egypt; Mohamed El Atrash, MSA University, Egypt

MO-A5.2A.2 **08:20**

A Mammography System based on Low-Frequency Electromagnetic Fields

Hamid Akbari-Chelaresi, University of Waterloo, Canada; Dawood Alsaedi, Taif University, Saudi Arabia; Mohamed El Badawe, Soundskrit Inc., Canada; Ali Albishi, King Saud University, Saudi Arabia; Vahid Nayyeri, Iran University of Science and Technology, Iran; Omar Ramahi, University of Waterloo, Canada

MO-A5.2A.3 **08:40**

Improved Cortical Stimulation Efficiency Using 3D Rotating Fields in Transcranial Magnetic Stimulation

Shashank Chinnakkagari, Majid Manteghi, Virginia Polytechnic Institute and State University, United States

MO-A5.2A.4 **09:00**

Ultra High Sensitive Neural Recorder with Additive Manufacturing

Melany Gutierrez-Hernandez, Carolina Moncion, Satheesh Bojja-Venkatakrishnan, Jorge Riera Diaz, John L. Volakis, Florida International University, United States

MO-A5.2A.5 **09:20**

On the Pressure Sensing of Biological Fluids using Microwaves

Sunil Gaddam, Poulami Samaddar, Keerthy Gopalakrishnan, Devanshi Damani, Suganti Shivaram, Mayo Clinic, United States; Shuvashis Dey, North Dakota State University, United States; Dipankar Mitra, University of Wisconsin-La Crosse, United States; Sayan Roy, South Dakota Mines, United States; Shivaram P. Arunachalam, Mayo Clinic, United States

Break **09:40**

MO-A5.2A.6 **10:00**

Experimental Set Up to Test the Exposition of Implantable Medical Devices to Electromagnetic Fields

EDWIN FERNANDO PINEDA VARGAS, UNIVERSIDAD NACIONAL DE COLOMBIA, Colombia; Robert Urbina, PONTIFICIA UNIVERSIDAD JAVERIANA, Colombia; MARIA PATRICIA BARAJAS SALAMANCA, Zenaida Cucaita Vergara, Andrés Junior Gallego Garcés, UNIVERSIDAD NACIONAL DE COLOMBIA, Colombia; Manuel Ricardo Perez Cerquera, PONTIFICIA UNIVERSIDAD JAVERIANA, Colombia; Javier Leonardo Araque Quijano, UNIVERSIDAD NACIONAL DE COLOMBIA, Colombia

MO-A5.2A.7 **10:20**

Multi-band Wearable Metasurface Antenna for Wireless Body Area Network Applications

Md Ashif Islam Oni, Shuvashis Dey, North Dakota State University, United States

Microstrip Antennas I

Session Chair: Joseph Costantine, American University of Beirut

MO-A1.4A.1 **08:00**

Design of a Flexible Antenna Using Weaving Technique for C-Band Applications

Yohandri Yohandri, Fauzan Al Haqqi, Universitas Negeri Padang, Indonesia; Achmad Munir, Institut Teknologi Bandung, Indonesia

MO-A1.4A.2 **08:20**

High Gain Microstrip Patch Antenna as Illuminating Source for Near Field Imaging

Adrian Eng-Choon Tan, Ian Platt, Andrew Hayward, Joseph Nelson, Kimberley Eccleston, Eva Anton, Lincoln Agritech Limited, New Zealand

MO-A1.4A.3 **08:40**

Unidirectional Patch Antenna Without an Extended Ground Plane

Zilin Peng, Yongsheng Pan, Yuandan Dong, University of Electronic Science and Technology of China, China

MO-A1.4A.4 **09:00**

Wideband Design of a Single-Layer Dual-Band Multi-Ring Microstrip Antenna Fed by an L-probe with Separated L-shaped Elements

Masaya Takahashi, Sakuyoshi Saito, Yuichi Kimura, Saitama University, Japan

MO-A1.4A.5 **09:20**

Wideband of Microstrip Patch Antenna for 28 GHz 5G Applications

Khaled A. Alblaihed, Qammer. H Abbasi, Muhammad Ali Imran, Lina Mohjazi, University of Glasgow, United Kingdom

Break **09:40**

MO-A1.4A.6 **10:00**

MIMO/Diversity Printed Slot Antenna Design with WLAN Band Filtering for UWB Communications

Naser Parchin, Edinburgh Napier University, United Kingdom; Atta Ullah, Abubakar Salisu, University of Bradford, United Kingdom; Isah Musa Danjuma, Nigerian Defense Academy, Nigeria; Raed Abd Alhameed, University of Bradford, United Kingdom

MO-A1.4A.7 **10:20**

Miniaturization of A Single Feed Dielectric Loaded Wideband High-Gain Circularly Polarized Microstrip Antenna

Md Jubaer Alam, Saeed I. Latif, Mehedi Hasan Khan, University of South Alabama, United States

MO-A1.4A.8 **10:40**

A Circular Polarized Antenna for GPS and Iridium Applications

Enrico Boni, Giacomo Giannetti, Stefano Maddio, Giuseppe Pelosi, University of Florence, Italy

MO-A1.4A.9 **11:00**

Analysis and Design of Terahertz Elliptical Slot Antenna Based on Photonic Crystal Substrate

Mohamed Nasr eddine Temmar, Mourad Nedil, Université du Québec en Abitibi-Témiscamingue (UQAT), Canada; Abdellah Chehri, Royal Military College of Canada, Canada

Slotted and Guided Wave Antennas I: Design and Fundamental Operation

Session Chair: Matthew Burfeindt, US Naval Research Laboratory

MO-A1.5A.1 **08:00**

Array of Coaxial Periodic Leaky Wave Antennas in Parallel Configuration for Restricted Volume Applications

Syed Osama Kamal, Lai Bun Lok, University College London, United Kingdom

MO-A1.5A.2 **08:20**

Circularly Polarized Sectoral Horn Array for High Power Deep Space Communications

Matthew Bray, Johns Hopkins Applied Physics Laboratory, United States

MO-A1.5A.3 **08:40**

Circularly Polarized SIW Leaky-Wave Antenna with Continuous Dual-Beam Scanning

Shengnan Zhao, University of Electric Science and Technology of China, China; Yuandan Dong, University of Electronic Science and Technology of China, China

MO-A1.5A.4 **09:00**

High-Efficiency Full-Metal Dual-Mode Cavity-Backed Slot Antenna Array with Filtering Response

Zhi-Cai Liao, Rui-Sen Chen, Qiang Shao, Mustafa K. Taher Al-Nuaimi, Guan-Long Huang, Foshan University, China; Chow-Yen-Desmond Sim, Feng Chia University, Taiwan

MO-A1.5A.5 **09:20**

Evanescent-Mode Filtering Antenna with Tunable Stopband Bandwidth

Dristi singhal, kirti dhwaj, IIT Delhi, India

Break **09:40**

MO-A1.5A.6 **10:00**

Slotted Waveguide for High Dielectric Heating

Zayed Mohammad, Andrew Chrysler, Idaho State University, United States

MO-A1.5A.7 **10:20**

Transient Response of Circuit Shape Right- and Left-handed Waveguide

Kota Unyu, NIT, Hakodate College, Japan; Tamami Maruyama, Masashi Nakatsugawa, National Institute of Technology, Hakodate College, Japan; Manabu Omiya, Hokkaido University, Japan; Yasuhiro Tamayama, Nagaoka University of Technology, Japan

MO-A1.5A.8 **10:40**

Development of MegaWatt Traveling Wave Antennas for Plasma Heating at the DIII-D

Lavanya Periasamy, Charles Moeller, Robert Pinsker, Bart Van Compernolle, Kurt Zeller, James Anderson, General Atomics, United States

Reconfigurable Intelligent Surfaces (RIS) and Systems

Session Co-Chairs: Filippo Capolino, University of California, Irvine; Satish Sharma, San Diego State University

MO-SP.1P.1 **13:20**

Over-the-Air Equalization in RIS-Parametrized Rich-Scattering Environments: Physics-Compliant Model and Applications to Wireless Networks-on-Chip and Computer Chassis

Mohammadreza Imani, Arizona State University, United States; Philipp Del Hougne, Univ Rennes, France

MO-SP.1P.2 **13:40**

A Via-less Fully Screen-Printed Reconfigurable Intelligent Surface for 5G Millimeter Wave Communication

Yiming Yang, Ruiqi Wang, Mohammad Vaseem, King Abdullah University of Science and Technology, Saudi Arabia; Behrooz Makki, Ericsson Research, Sweden; Atif Shamim, King Abdullah University of Science and Technology, Saudi Arabia

MO-SP.1P.3 **14:00**

Blockage Effect Mitigation Phase Mapping for RIS-assisted Wireless Networks

Daehyeon Kim, Youngno Youn, Cheonga Lee, Myeonggin Hwang, Donggeun An, POSTECH, Korea (South); Jungyub Lee, Seungtae Ko, Samsung Electronics, Korea (South); Wonbin Hong, POSTECH, Korea (South)

MO-SP.1P.4 **14:20**

A Reconfigurable Intelligent Surface for Arbitrary mm-Wave Polarization Using Parasitic Enhancing Structures

JUNHUI RAO, YUJIE ZHANG, ROSS MURCH, THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY, Hong Kong SAR of China

High-frequency Metamaterials

Session Chair: Vincenzo Galdi, University of Sannio

MO-A2.1P.1 **13:20**

Dynamic Controlling of Transmission Characteristics of Spoof Plasmonic Metamaterial

Junfan Chen, Yuzhou Wang, Dawei Zhang, Yaxiu Sun, Tao Jiang, Harbin Engineering University, China; Badreddine Ratni, Shah Nawaz Burokur, Université Paris Nanterre, France

MO-A2.1P.2 **13:40**

Full Minimum Feature Size Enforcement toward Freeform Optical Metasurfaces at Wafer-scale

Ronald Jenkins, Sawyer Campbell, Pingjuan Werner, Douglas Werner, The Pennsylvania State University, United States

MO-A2.1P.3 **14:00**

In-Plane Circularly-Polarized Light Enhancement using Surface Lattice Resonances

Damia Casas i Casajuana, J. Sebastian Gomez-Diaz, University of California Davis, United States

MO-A2.1P.4 **14:20**

Spectral-Domain Method of Moments for the Study of Line Waves

Giampiero Lovat, Sapienza University of Rome, Italy; Walter Fuscaldo, National Research Council of Italy, Italy; Massimo Moccia, Giuseppe Castaldi, Vincenzo Galdi, University of Sannio, Italy; Paolo Burghignoli, Sapienza University of Rome, Italy

MO-A2.1P.5 **14:40**

High-Efficient Double Negative Metamaterial-based Absorber

Kozhakhmet Abdugapbar, Kassen Dautov, Mohammad Hashmi, Galymzhan Nauryzbayev, Nazarbayev University, Kazakhstan

Antenna, Theory, and Design II

Session Co-Chairs: Kaushik Debbarma, San Diego State University; Mats Gustafsson, Lund University

MO-UB.1P.1 **13:20**

Uncertainty Analysis of Rotating Linearly Polarized Feeds in Compact Antenna Test Ranges

Adam Mehrabani, NSI-MI Technolgies, United States

MO-UB.1P.2 **13:40**

Wideband 2-D Beam Steering With Gain Enhancement Employing Planar All Dielectric Risley Prism and Phase Correcting Structure

Kaushik Debbarma, Satish K. Sharma, Sanghamitro Das, San Diego State University, United States; Jim Drago, Dennis Kan, Garlock, an Enpro Company, United States

MO-UB.1P.3 **14:00**

Metasurface for mm-Wave Exposure Estimation

Johan Lundgren, Lund University, Sweden; Marzieh Zabihipour, Deyu Tu, Linkoping University, Sweden; Daniel Sjoberg, Lund University, Sweden; Isak Engquist, Linkoping University, Sweden; Mats Gustafsson, Lund University, Sweden

MO-UB.1P.4 **14:20**

Extending the Bandwidth of Electrically Small Antennas with Nonlinear Matching Networks

Seunghwi Kim, Ahmed Mekawy, Gengyu Xu, City University of New York, United States; Christos Argyropoulos, The Pennsylvania State University, United States; Andrea Alù, City University of New York, United States

MO-UB.1P.5 **14:40**

Compact Size and Thin Substrate Ultra-Wideband Antenna for 5G Applications

Prasan Kumar Mishra, Tapan Kumar Patnaik, GIET University, India; Bhavani Prasad Panda, Chikiti Mohavidlaya, India; Anil Kumar Nayak, University of Alberta, Canada/ IIT Roorkee, Canada

Antenna Measurements II

Session Co-Chairs: Dan van der Weide, University of Wisconsin at Madison; KYRIAKOS KASLIS, Technical University of Denmark; Angelo Liseno, Università di Napoli Federico II

MO-A1.2P.1 **13:20**

Experimental Test of Employing Probe Signal Derivatives in Near-Field Antenna Measurements

KYRIAKOS KASLIS, SAMEL ARSLANAGIC, OLAV BREINBJERG, Technical University of Denmark, Denmark

MO-A1.2P.2 **13:40**

Optimal features of SVO

Amedeo Capozzoli, Claudio Curcio, Angelo Liseno, Università di Napoli Federico II, Italy

MO-A1.2P.3 **14:00**

Tri-axial Magnetic Field Sensor up to VHF with Frequency Weighing

Juan Felipe González Pardo, Juan Sebastian Chavez Martinez, Universidad Nacional de Colombia, Colombia; Julian Garnica, Pontificia Universidad Javeriana, Colombia; Germán Augusto Ramirez Arroyave, EPFL - École Polytechnique Fédérale de Lausanne, Switzerland; Javier Leonardo Araque Quijano, Universidad Nacional de Colombia, Colombia

MO-A1.2P.4 **14:20**

Recent progress in fault diagnosis of phased antenna arrays using excitation engineering

Uday Khankhoje, Prajosh K P, Sreekar Sai Ranganathan, Indian Institute of Technology Madras, India; Francesco Ferranti, Vrije Universiteit Brussel, Belgium

MO-A1.2P.5 **14:40**

X-band Field Mapping System for Antenna Pattern Measurements

Yu Huang, Tingyou Guo, Yuchen Gu, Alan Bettermann, Dan van der Weide, University of Wisconsin at Madison, United States

Finite Element Methods II

Session Chair: Mei Song Tong, Tongji University

MO-A3.1P.1 **13:20**

Fast Computation for Solving Three-Dimensional Electromagnetic Wave Scattering

Lan Zhu, Li Xu, Hao Wang, Junhui Yin, Xing Li, Bin Li, University of Electronic Science and Technology of China, China

MO-A3.1P.2 **13:40**

A 3D planar partitioning method for finite element domain decomposition method

Hao Wang, Li Xu, Shenzhen Institute for Advanced Study, UESTC, China; Junhui Yin, Hangxin Liu, University of Electronic Science and Technology of China, China; Xing Li, Shenzhen Institute for Advanced Study, UESTC, China; Bin Li, University of Electronic Science and Technology of China, China

MO-A3.1P.3 **14:00**

Modeling of Electron Device with Lumped Elements Base on Vector Finite Element Method

Zaichao Yang, Li Xu, Hao Wang, Junhui Yin, Xing Li, Bin Li, University of Electronic Science and Technology of China, China

MO-A3.1P.4 **14:20**

Using MGAWE Method for Waveguide Structure Analysis Based on Finite Element DDM

Hangxin Liu, Li Xu, Hao Wang, Junhui Yin, Xing Li, Bin Li, University of Electronic Science and Technology of China, Chengdu, China, China

RCS Analysis and Reduction

Session Chair: Caglar Yardim, Ohio State University

MO-A4.1P.1 **13:20**

3-D Scattering Center Determination Algorithm for Detecting Primary Radar Cross-Section Contributing Regions on a Radar Target

Aşkın Altınoklu, ASELSAN, Turkey; Alper Kürşat Öztürk, RAPIDEM, Turkey; Emrah Sever, Mehmet Erim İnal, ASELSAN, Turkey

MO-A4.1P.2 **13:40**

Developing a Hybrid Radome Structure with Stable Suppression of RCS

Yuan Chang Hou, National Ilan University, Taiwan

MO-A4.1P.3 **14:00**

Research on Active Cancellation Technology Based on Airborne Conformal Antenna for Low-frequency RCS Reduction

Xiaoxuan Huang, University of Electronic Science and Technology of China, China; Wei Gao, Jia Cheng, Shenyang Aircraft Design and Research Institute, China; Xianzheng Zong, Jun Hu, University of Electronic Science and Technology of China, China

MO-A4.1P.4 **14:20**

A Novel Technology for Antenna RCS Reduction with Dielectric Material

Huajun Yang, University of Electronic Science and Technology of China, China; Jingxian Chen, Yu Guo, Shenyang Aircraft Design and Research Institute, China; Xianzheng Zong, Jun Hu, University of Electronic Science and Technology of China, China

Inverse Scattering

Session Co-Chairs: Tommaso Isernia, Università degli Studi Mediterranea di Reggio Calabria; Matthew Burfeindt, US Naval Research Laboratory

MO-A4.2P.1 **13:20**

Solving the Inverse Scattering Obstacle Problem via NIE Model and Contrast Source Inversion Method

Martina T. Bevacqua, Tommaso Isernia, Università degli Studi Mediterranea di Reggio Calabria, Italy

MO-A4.2P.2 **13:40**

Magnetotelluric Data Inversion Using Subdomain Encoding Scheme with Variational Autoencoder

Hongyu Zhou, Rui Guo, Maokun Li, Fan Yang, Shenheng Xu, Tsinghua University, China; Aria Abubakar, Schlumberger, China

MO-A4.2P.3 **14:00**

A Learning-Based Inversion Method for Phaseless Profiling of Circular Buried Objects

Zahra Dastfal, Maryam Hajebi, Mansoureh Sharifzadeh, University of Hormozgan, Iran; Ahmad Hoorfar, Villanova University, United States

MO-A4.2P.4 **14:20**

Modified 2D Backprojection Decomposition for 3D Imaging in Through-the-Wall Applications

Yanisse Boudrouz, Israel Hinostroza, Mohammed Serhir, Paris-Saclay University, France; Christelle Eyraud, Aix-Marseille University, France

MO-A4.2P.5 **14:40**

Fidelity evaluation of the phase-encoded linear sampling method and backprojection imaging

Matthew Burfeindt, Scott Ziegler, Hatim Alqadah, US Naval Research Laboratory, United States

Advanced Technologies for 5G and Beyond

Session Chair: Maria Pour, University of Alabama in Huntsville

MO-UC.1P.1 **13:20**

MIMO 5G communication simulator considering statistical channel

Tae Hee Park, Sang Wook Nam, Seoul National University, Korea (South)

MO-UC.1P.2 **13:40**

A 3-D Non-Stationary GBSM Model to Characterize V2V Multipath MIMO Channels Employing Intelligent Reflecting Surfaces

Asad Saleem, Shurun Tan, Zhejiang University-University of Illinois at Urbana-Champaign Institute, Haining, Zhejiang 314406, China, China

MO-UC.1P.3 **14:00**

Experimental Indoor Coverage of a Commercial mm-Wave 5G Network

Javier Enrique Arévalo Peña, Universidad Nacional de Colombia, Colombia; Ariel Nuñez Lobos, Cesar Augusto Azurdia Meza, Universidad de Chile, Chile; Javier Leonardo Araque Quijano, Universidad Nacional de Colombia, Colombia; Jorge Ignacio Sandoval Arenas, Universidad de Chile, Chile

MO-UC.1P.4 **14:20**

Adopting a Flying Base Station for Connectivity Coverage of Temporary Events

Fahd Alsaleem, Fahad Alsunaydih, Khaled Alhassoon, Omar Hazim Salim, Mahmoud Shaban, Department of Electrical Engineering, College of Engineering, Qassim University, Unaizah 56452, Saudi Arabia, Saudi Arabia

Electromagnetic Source Localization

Session Co-Chairs: Qammer H Abbasi, University of Glasgow; Amit Singh, Meta-Antenna Lab

MO-A4.3P.1 **13:20**

Locating EMI Sources in Shielding Enclosures Using a Two-Step Source Reconstruction Method

Zi An Wang, Ping Li, Shanghai Jiao Tong University, China

MO-A4.3P.2 **13:40**

Estimation of High-Altitude Electromagnetic Pulse Coupling onto Power Generation Facility Equipment

DaHan Liao, Oak Ridge National Laboratory, United States; Yilu Liu, University of Tennessee, United States; Lawrence Markel, Benjamin McConnell, Oak Ridge National Laboratory, United States; David Mignardot, University of Tennessee, United States; Brian Poole, Lisa Wang, Lawrence Livermore National Laboratory, United States

MO-A4.3P.3 **14:00**

Data Collection in Ducting Conditions for Emitter Localization with a Single Receiver

Patrick Bidigare, Dan Chang, Ilana Heintz, Charlie Obranovich, David Raeman, Synoptic Engineering, United States

MO-A4.3P.4 **14:20**

A Statistical Analysis of Feature Transformation for Efficient Localisation in Urban Environments

Azad Shareef, Duhok University, Iraq; Jaspreet Kaur, MUHAMMAD IMRAN, University of Glasgow, United Kingdom; Haithem Mohammed Ali, University of Zakho, Iraq; QAMMER ABBASI, HASAN Abbas, University of Glasgow, United Kingdom

MO-A4.3P.5 **14:40**

Investigating Statistical Meteorological Solvers for Surface Duct Forecasts Using a Multi-Year Dataset in the Potomac River Test Range

Elliot Shiben, Matt Wilbanks, Victor Wiss, Naval Surface Warfare Center Dahlgren Division, United States

Biomedical Applications of Electromagnetics

Session Co-Chairs: Felix A. Miranda, NASA; Ryan Green, Mississippi State University

MO-UK.1P.1 **13:20**

A Simulation Study of Capacitive Body-Coupled Communication along Human Limbs

Arno Thielens, Ghent University - imec, Belgium

MO-UK.1P.2 **13:40**

Characterizing the Electromagnetic Properties of Photocurable PEDOT:PSS Hydrogels for Wireless Implants

Balaji Dontha, Mohammad Moulod, David Hoelzle, Jinghua Li, The Ohio State University, United States; Felix A. Miranda, NASA, United States; Asimina Kiourti, The Ohio State University, United States

MO-UK.1P.3 **14:00**

Wearable E-textile Wireless Power Transfer (WPT) Antenna Design for Implantable Medical Devices (IMDs)

Michael Nguyen, Mississippi State University, United States; Jonathan Lundquist, Lauren Linkous, Virginia Common Wealth University, United States; Ryan Green, Mississippi State University, United States; Erdem Topsakal, Virginia Common Wealth University, United States

MO-UK.1P.4 **14:20**

An Analytical and Numerical Approach to Investigate the Role of High Permittivity Materials in Magnetic Resonance Imaging

Giuseppe Carluccio, Christopher Collins, Riccardo Lattanzi, New York University, United States; Vincenzo Miranda, Daniele Riccio, Giuseppe Ruello, University of Napoli Federico II, Italy

MO-UK.1P.5 **14:40**

Feasibility Study of Identifying Blood Vessels with A Radio-Frequency Resonator

Sen Bing, Khengdauliu Chawang, J.-C. Chiao, Southern Methodist University, United States

Materials Characterization: Theory, Techniques, and Findings

Session Co-Chairs: Sameh Elnaggar, Semtech; Christopher Holloway, National Institute of Standard and Technology (NIST)

MO-UA.1P.1 **13:20**

Calibration of Electric Field Probes using a GTEM Cell at the Standards and Calibration Laboratory (SCL)

Hau Wah LAI, Chi Kin MA, Shing Lung Steven YANG, Standards and Calibration Laboratory, Hong Kong SAR of China

MO-UA.1P.2 **13:40**

Fixture Mismatch Correction for Wideband Measurements

Sameh Elnaggar, Semtech, Canada

MO-UA.1P.3 **14:00**

Comparing the Electrostatic Properties of Particles in JSC-1A Lunar Regolith Simulant with Particles from the Apollo 11 and Apollo 14 Samples

Ahmed M Hassan, University of Missouri-Kansas City (UMKC), United States; Adele P. Peskin, Orion Kafka, Newell Moser, National Institute of Standards and Technology, United States; Andrew Sharits, Air Force Research Laboratory, Wright-Patterson Air Force Base, United States; Ann N. Chiaramonti, Thomas Lafarge, National Institute of Standards and Technology, United States; Jay D. Goguen, Space Science Institute, United States; Edward J. Garboczi, National Institute of Standards and Technology, United States

MO-UA.1P.4 **14:20**

A Third 'Crosswords Based' Approach to 2-D Phase Retrieval Problems

Giada Maria Battaglia, Andrea Francesco Morabito, Università Mediterranea di Reggio Calabria, Italy; Roberta Palmeri, Istituto per il Rilevamento Elettromagnetico dell'Ambiente, Italy; Tommaso Isernia, Università Mediterranea di Reggio Calabria, Italy

MO-UA.1P.5 **14:40**

Rydberg Atom-Based Sensors: Transforming the Measurement of Time-Varying Radio-Frequency Electric Fields and Communication Signals

Christopher Holloway, National Institute of Standard and Technology (NIST), United States; Alexandra Artusio-Glimpse, Andrew Rotunno, NIST, United States; Maitreyi Jayaseelan, kaleb campbell, The University of Colorado, United States; Nikunjkumar Prajapati, Samuel Berweger, Matthew Simons, NIST, United States

Electromagnetic Theory and Modeling II

Session Co-Chairs: Yakir Hadad, Tel Aviv University; Halim Boutayeb, University of Quebec in Outaouais

MO-A2.2P.1 **13:20**

Efficiency enhancement for Dallenbach absorbers by a penetrable inductive impedance sheet

Chen Firestein, Amir Shlivinski, Ben Gurion University of the Negev, Israel; Yakir Hadad, Tel Aviv University, Israel

MO-A2.2P.2 **13:40**

Analysis of moving metallic or dielectric scattering cylinders with the FDTD method

Mohammad Marvasti, Halim Boutayeb, University of Quebec in Outaouais, Canada

MO-A2.2P.3 **14:00**

Experimental Observation of Lateral Waves Propagation Along Seabed

Takashi Kawamura, Takuma Matsushita, Yukio Kaneko, Sony Group Corporation, Japan; Nobuaki Kawai, Yasuhiro Matsui, Sony Semiconductor Solutions Corporation, Japan; Kazuhiro Hongo, Kazunobu Ohkuri, Sony Group Corporation, Japan; Akihiro Horii, Sony Semiconductor Solutions Corporation, Japan; Hiroshi Yoshida, Japan Agency for Marine-Earth Science and Technology, Japan

MO-A2.2P.4 **14:20**

A Coupling-Robust Sensing System Based on Nonlinear Parity-Time-Symmetry Circuit

Chenhui Li, Xin Yang, John S.Ho, National University of Singapore, Singapore

Target Detection and Identification

Session Chair: Branislav Notaros, Colorado State University

MO-A4.4P.1 **13:20**

Long-Range Reading of Multiple Chipless Sensors from the Isoline Processing of 3D Radar Images

Ali HADJ DJILANI, Dominique HENRY, Ahmad EL SAYED AHMAD, Patrick PONS, Hervé Aubert, LAAS-CNRS, France

MO-A4.4P.2 **13:40**

Identification of Hearing Impaired people in Crowded Environments using Wi-Fi signals

Hira Hameed, University Of Glasgow, United Kingdom; Lubna Lubna, Telecommunication Engineering Dept. UET Peshawar, Pakistan; Muhammmad Usman, University Of Glasgow, United Kingdom; Kamran Arshad, Faculty of Engineering, Ajman University, Ajman 346, UAE, United Arab Emirates; Amir Hussain, School of computing, Edinburgh Napier University, Scotland UK, United Kingdom; Khaled Assaleh, Faculty of Engineering, Ajman University, Ajman 346, UAE, United Arab Emirates; Muhammad Imran, Qammer H.Abbasi, James Watt School of Engineering, University of Glasgow, Glasgow G12 8QQ UK, United Kingdom

MO-A4.4P.3 **14:00**

Evaluation of Methods to Generate Spread Spectrum Time Domain Reflectometry

Cynthia Furse, Samuel Hansen, Evan Benoit, University of Utah, United States; Joel Harley, University of Florida, United States

MO-A4.4P.4 **14:20**

Machine Learning Classification of Snowflakes to Enhance Microphysical and Scattering Characterization of Snow

Hein Thant, Colorado State University, United States; Mikhail Zhizhin, Colorado School of Mines, United States; Branislav Notaros, Colorado State University, United States

Nano-Electromagnetics

Session Co-Chairs: Hakan Bagci, King Abdullah University of Science and Technology; Richard Ziolkowski, The University of Arizona

MO-A2.3P.1 **13:20**

A Numerical Method to Analyze Electromagnetic Scattering from Composite Plasmonic Structures Involving a Metal-Metal Interface

Doolos Aibek uulu, University of Central Asia, Kyrgyzstan; Rui Chen, Liang Chen, King Abdullah University of Science and Technology, Saudi Arabia; Ping Li, Shanghai Jiao Tong University,, China; Hakan Bagci, King Abdullah University of Science and Technology, Saudi Arabia

MO-A2.3P.2 **13:40**

Broadband Dielectric Characterization of Glasses and other Silicates up to the THz Frequencies

Rocio Rodriguez-Cano, Aalborg University/Penn State University, Denmark; Michael Lanagan, Steven Perini, Xiaojiang Li, Venkatraman Gopalan, Penn State University, United States

MO-A2.3P.3 **14:00**

Miniaturized Millimeter Wave Resonators with Self-Biased BaM Films

Qian Gao, Lap Yeung, Yuanxun Ethan Wang, University of California Los Angeles, United States

MO-A2.3P.4 **14:20**

Examinations and Modeling of Metal Mesh Surfaces for Antenna-on-Display (AoD) Technology

Hsi-Tseng Chou, Chen-Yi Chang, Chao-Yang Chou, National Taiwan University, Taiwan

Microstrip Antenna Design and Optimization

Session Co-Chairs: Mei Song Tong, Tongji University; Amir Boag, Tel Aviv University

MO-A1.3P.1 **13:20**

An invasive weed optimized parasitic-loaded 6-elements symmetric sequential array for automotive applications

Stefano Maddio, Giuseppe Pelosi, Stefano Selleri, University of Florence, Italy

MO-A1.3P.2 **13:40**

Particle Swarm Optimizer Utilization for Dual-Band Inset-Fed Microstrip Antenna Design

Agus D. Prasetyo, Institut Teknologi Bandung, Indonesia; Dhoni P. Setiawan, Telkom University, Indonesia; Achmad Munir, Institut Teknologi Bandung, Indonesia

MO-A1.3P.3 **14:00**

Recent Advancements on System-by-Design Strategies for the Synthesis of Complex Radiating Systems

Pietro Rosatti, Marco Salucci, Paolo Rocca, Lorenzo Poli, Mirko Facchinelli, Aaron Angel Salas-Sanchez, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy

MO-A1.3P.4 **14:20**

Circularly Polarized Fractal Array Carrying OAM Generated from Characteristic Modes Analysis

TALES DE BARROS, Glauco Fontgalland, Federal University of Campina Grande, Brazil; Elder Oliveira, State University of Paraiba, Brazil; Paulo Silva, Federal Institute of Paraiba, Brazil

MO-A1.3P.5 **14:40**

An Accurate Method for Modeling High-Order Mandelbrot Fractal Patch Antennas

Yuan Chu Xu, Tongji University, China; Amir Boag, Tel Aviv University, Israel; Mei Song Tong, Tongji University, China

Mitigation and Resilience to Jamming, Interference, and Noise

Session Chair: Bharath G. Kashyap, Arizona State University

MO-UC.2P.1 **13:20**

A Sub-THz Micro-Doppler Radar for Counter-Surveillance Applications

Bharath G. Kashyap, Georgios C. Trichopoulos, Arizona State University, United States

Advances in Microwave, mm and THz Imaging Systems and Technologies for Medical Applications

Session Co-Chairs: Elise Fear, University of Calgary, Calgary, CANADA; Francesca Vipiana, Politecnico di Torino, Torino, Italy

TU-SP.1A.1 **08:00**

Experimental monitoring of microwave-induced thermoacoustic signals generated during pulsed microwave ablation

Audrey Evans, Ruixi Liu, Chu Ma, Susan Hagness, University of Wisconsin-Madison, United States

TU-SP.1A.2 **08:20**

Microwave Imaging with Magnetic Nanoparticles: System and Algorithms

Vijaya Naruganahalli Channa, Cameron Kaye, Joe LoVetri, Colin Gilmore, University of Manitoba, Canada

TU-SP.1A.3 **08:40**

The Wavelia#2 Microwave Breast Imaging scanner: experimental performance analysis towards clinical investigation

Angie Fasoula, Luc Duchesne, MVG Industries, France

TU-SP.1A.4 **09:00**

Deep Feature Learning for Microwave Mammography With Convolutional Autoencoders

Seyed Hossein Mirjahanmardi, Stanford University, United States; Hamid Akbari-Chelaresi, University of Waterloo, Canada; Rasoul Sali, Stanford University, United States; Omar Ramahi, University of Waterloo, Canada

TU-SP.1A.5 **09:20**

Point-of-care microwave scanner for monitoring breast cancer treatment: an initial stability analysis

Pedram Mojabi, Jeremie Bourqui, Bryce Besler, Bobbie Docktor, Elise Fear, University of Calgary, Canada

Break **09:40**

TU-SP.1A.6 **10:00**

Realistic colon phantoms for microwave colonoscopy validation

Alejandra Garrido-Atienza, Marta Guardiola, MiWEndo Solutions SL, Spain; Jordi Romeu, Universitat Politècnica de Catalunya, Spain; Luz María Neira, MiWEndo Solutions SL, Spain

TU-SP.1A.7 **10:20**

An Ultra-Wideband Compact Planar Antenna for Wearable Microwave Medical Imaging Applications

Zheng Gong, University of Waikato, New Zealand; Caiyi Liao, Hui Zhang, Yahui Ding, University of Electronic Science and Technology of China, China; Yifan Chen, University of Waikato, New Zealand

TU-SP.1A.8 **10:40**

Brain Stroke Detection using Electromagnetic Tomography: A New Portable Scanner

Tommy Henriksson, Ramon Planas, Christian El-Salloum, Paolo Gatto, Abdolrahman Khavari, Francisco Romero-Hinrichsen, EMTensor GmbH, Austria; Stephen Pearce, EMTensor Inc., United States

TU-SP.1A.9 **11:00**

Cancer Classification of Surgical Breast Tumor Specimens using Spectral Angular Mapping Terahertz Imaging.

Nagma Vohra, Nikita Gurjar, University of Arkansas, United States; Keith Bailey, Charles River Laboratory, United States; Magda El-Shenawee, University of Arkansas, United States

Disruptive Fusion Technologies of Smart Antenna and Reconfigurable Intelligent Surface (RIS)

Session Co-Chairs: Jae-Yeong Lee, Electronics and Telecommunications Research Institute (ETRI); Youngno Youn, Pohang University of Science and Technology (POSTECH)

TU-SP.2A.1 **08:00**

Characterization of VO2-Based Reconfigurable Linear-to-Circular Polarization Converter

David West, Georgia Institute of Technology, United States; Mark Lust, The Ohio State University, United States; Nima Ghalichechian, Georgia Institute of Technology, United States

TU-SP.2A.2 **08:20**

Reconfigurable Intelligent Surface with Polarization Conversion Capability

Thai Bao Hoang, Thi Hai-Yen Nguyen, Gangil Byun, Ulsan National Institute of Science and Technology, Korea (South)

TU-SP.2A.3 **08:40**

Reconfigurable Angle-Selective Surface Based on 3-D Frequency-Selective Structures

Yujing Hong, Zhongxiang Shen, Nanyang Technological University, China

TU-SP.2A.4 **09:00**

Energy-efficient Wireless Channel Deployment using Self-Sustainable Reconfigurable Intelligent Surface with Cognitive Radio Sensors

Youngno Youn, Wonbin Hong, Pohang University of Science and Technology, Korea (South)

TU-SP.2A.5 **09:20**

Polarization Rotator Surfaces: A Review

Ahmed Omar, King Fahd University of Petroleum and Minerals, Saudi Arabia

Break **09:40**

TU-SP.2A.6 **10:00**

6G single and 2×2 MIMO Antennas Design using Substrate Integrated Waveguide Technology

Amir Altaf, Munkyo Seo, Sungkyunkwan University, Korea (South)

TU-SP.2A.7 **10:20**

Practical Considerations in Implementation of Large-Scale Reconfigurable Intelligent Surfaces

Nader Behdad, University of Wisconsin-Madison, United States

TU-SP.2A.8 **10:40**

Exploring the Potential of Wireless Controlled Unit-Cells in Metamaterials: A New Concept in Multiple Degree of Freedom

Jonas Florentin Kolb, Yang Hao, Queen Mary University of London, United Kingdom

TU-SP.2A.9 **11:00**

Design and Verification Methodologies of D-Band Antenna Modules for Security Imaging Applications

Jae-Yeong Lee, Jungsoo Kim, Dong-Young Kim, Electronics and Telecommunications Research Institute, Korea (South); Munkyo Seo, Sungkyunkwan University, Korea (South); Il-Min Lee, Kyung-Hyun Park, Electronics and Telecommunications Research Institute, Korea (South)

TU-SP.2A.10 **11:20**

Reducing the Volume of Reflectarray Antennas Using Near-field Feeding

Ji-Eun Han, Jeong woo Hur, Dongho Kim, Sejong University, Korea (South)

Electromagnetic Nondestructive Evaluation

Session Co-Chairs: Saptarshi Mukherjee, Lawrence Livermore National Laboratory; Tammy Chang, Lockheed Martin

TU-SP.3A.1 **08:00**

PCB Based Modulated Scatter with Enhanced Modulation Depth

Dylan Crocker, Amazon Web Services, United States; Kristen Donnell, Missouri University of Science and Technology, United States

TU-SP.3A.2 **08:20**

A Planar Conformal Microwave Resonator for Subcutaneous Imaging

Sen Bing, J.-C. Chiao, Southern Methodist University, United States

TU-SP.3A.3 **08:40**

Imageless Detection of Pipe Defects Using a Millimeter-Wave Dynamic Antenna Array

Daniel Chen, Jeffrey Nanzer, Michigan State University, United States

TU-SP.3A.4 **09:00**

A Comparison of Image Reconstruction Versus Array Layout in a 24-Element 38-GHz Active Incoherent Millimeter-Wave Imaging System

Jorge R. Colon-Berrios, Daniel Chen, Derek Luzano, Jeffrey A. Nanzer, Michigan State University, United States

TU-SP.3A.5 **09:20**

An in-situ eddy current diagnostic for temperature monitoring in metal additive manufacturing

Saptarshi Mukherjee, Edward Benavidez, Joseph W. Tringe, Lawrence Livermore National Laboratory, United States; Lei Peng, Yiming Deng, Michigan State University, United States; David Stobbe, Lawrence Livermore National Laboratory, United States

Break **09:40**

TU-SP.3A.6 **10:00**

In-line Microwave Nondestructive Evaluation of Packaged Food Products via the Support Vector Machine Algorithm

Ali Darwish, Politecnico di Torino/Universite Côte d'Azur, France; Marco Ricci, Politecnico di Torino/Wavision Srl, Italy; Flora Zidane, Côte d'Azur University, France; Jorge Alberto Tobon Vasquez, Mario Roberto Casu, Politecnico di Torino, Italy; Jerome Lanteri, Claire Migliaccio, Côte d'Azur University, France; Francesca Vipiana, Politecnico di Torino, Italy

TU-SP.3A.7 **10:20**

A Signal Processing Framework for Rapid Detection of Tree Defects via A Standoff Tree Radar System

Jiwei Qian, Yee Hui Lee, Nanyang Technological University, Singapore; Daryl Lee, Mohamed Lokman Mohd Yusof, National Parks Board, Singapore; Abdulkadir C. Yucel, Nanyang Technological University, Singapore

TU-SP.3A.8 **10:40**

Worst-Case Electromagnetic Coupling to an Accelerometer using an Equivalent Circuit and Experimental Co-Characterization Methodology

Mohamed Hamdalla, Thomas Ory, University of Missouri-Kansas City, United States; Aaron Harmon, Daryl Beetner, Victor Khilkevich, Missouri University of Science and Technology, United States; John McGeehan, John Willits, BAE Systems, United States; Anthony Caruso, Ahmed Hassan, University of Missouri-Kansas City, United States

TU-SP.3A.9 **11:00**

Antenna Fabrication Techniques using Multilayer Insulation Materials for Spaceborne Applications

John Anthony McVay, Sandia National Laboratories, United States

Advances in Phased Array Antennas

Session Co-Chairs: Halim Boutayeb, University of Quebec in Outaouais; Eva Rajo-Iglesias, University Carlos III of Madrid

TU-A1.1A.1 **08:00**

Active Phased Array Radar of 475-Element Yagi Antenna for Stratosphere-Troposphere Observations at University of Calcutta

Nandakumar P, Research Scholar, University of Calcutta, India; J Y Siddiqui, A Paul, University of Calcutta, India

TU-A1.1A.2 **08:20**

High-Gain, Conical-Beam Arrays with Elevation Beam-Steering

R. Henry Tillman, Johns Hopkins University Applied Physics Laboratory, United States

TU-A1.1A.3 **08:40**

Modular Phased Array Architecture Optimization for Space Antenna Systems

Nicola Anselmi, Pietro Rosatti, Luca Tosi, Francesco Zardi, Paolo Rocca, ELEDIA@UniTN - University of Trento, Italy; Giovanni Toso, Radio Frequency Payloads and Technology Division, European Space Agency, Netherlands; Andrea Massa, School of Electronic Science and Engineering, University of Electronic Science and Technology of China, China

TU-A1.1A.4 **09:00**

Phased Array Antennas with Wide-Angle Scanning: Design of Decoupling Feeding Network

Hamed Tadayon, Mansoor Dashti Ardakani, INRS University, Canada; Reza Karimian, Shahrokh Ahmadi, Mona Zaghloul, The George Washington University, United States

TU-A1.1A.5 **09:20**

A Passive Phased Array Antenna for SatCom in K- and Ka-Band with Low-Loss Power Distribution Circuit in Hollow Waveguide Technology

Engelbert Tyroller, Stefan Lindenmeier, University of Federal Armed Forces in Munich, Germany

Break **09:40**

TU-A1.1A.6 **10:00**

Phased Array Scan Widening Meta-Radome with Low Polarization Sensitivity

Nima Bayat-Makou, Mohammad Soltani, George Eleftheriades, University of Toronto, Canada

TU-A1.1A.7 **10:20**

Gap Waveguide Cruciform Couplers Nolen Matrix for Multi Beam Antenna at 38 GHz

Nelson Castro, Jose Luis Vazquez-Roy, University Carlos III of Madrid, Spain; Francisco Pizarro, Pontificia Universidad Católica de Valparaíso, Chile; Eva Rajo-Iglesias, University Carlos III of Madrid, Spain

TU-A1.1A.8 **10:40**

A Ka-Band 1 x 16 Phased Array Antenna with 4-Channel Beamforming Transceivers

Soo-Chang Chae, Chung-Geun Jang, Soo-Jeong Kim, Hyeon-Bhin Jo, Kwang-Ho Ahn, Ki-Jin Kim, Korea Electronics Technology Institute, Korea (South)

TU-A1.1A.9 **11:00**

Wireless Time and Phase Alignment for Wideband Beamforming in Distributed Phased Arrays

Jason Merlo, Jeffrey Nanzer, Michigan State University, United States

TU-A1.1A.10 **11:20**

Low-Loss Multi-Beam Large Phased Array Architecture

Mohammadali Panahi, University Of California, Los Angeles, United States; Javad Ebrahimizadeh, KU leuven, Belgium; Maziar Hedayati, Gabriel Morozowsky, Yuanxun Ethan Wang, University Of California, Los Angeles, United States

Integral Equation Methods

Session Co-Chairs: Kristof Cools, Ghent University; Francesco P. Andriulli, Politecnico di Torino; Maokun Li, Tsinghua University

TU-UB.1A.1 **08:00**

An H-Matrix Fast Direct Solver for Reflected Shield-Based Generalized Source Integral Equations

Yossi Dahan, Yaniv Brick, Ben-Gurion University of the Negev, Israel

TU-UB.1A.2 **08:20**

Code-Verification Techniques for the Method-of-Moments Implementation of the Magnetic-Field Integral Equation

Brian Freno, Neil Matula, Sandia National Laboratories, United States

TU-UB.1A.3 **08:40**

Integral Equation for neuron response analysis to non-invasive electromagnetic brain stimulation

David Czerwonky, Luis Gomez, Purdue University, United States

TU-UB.1A.4 **09:00**

Electromagnetic Modeling of 2-D Periodic Structures using Discontinuous Galerkin Surface Integral Equation Formulation

Daniel Jericó Claro, Universidad de Extremadura, Spain; Víctor Francisco Martín Martínez, Universidad de Extremadura/Politecnico di Torino, Spain; Diego Martínez Solís, Luis Landesa Porras, José Manuel Taboada Varela, Universidad de Extremadura, Spain

TU-UB.1A.5 **09:20**

Automatic MoM Source Integral Quadrature Selection via a Machine Learning Approach

Marco Ricci, Politecnico di Torino, Italy; Donald Wilton, University of Houston, United States; Victor Martin, Universidad de Extremadura, Spain; William Johnson, Consultant, United States; Francesca Vipiana, Politecnico di Torino, Italy

Break **09:40**

TU-UB.1A.6 **10:00**

A stable and well-conditioned time-domain combined field integral equation at low frequencies

Van Chien Le, Ghent University, Belgium; Pierrick Cordel, Francesco P. Andriulli, Politecnico di Torino, Italy; Kristof Cools, Ghent University, Belgium

TU-UB.1A.7 **10:20**

On the H2-Matrix Representation of PMCHWT MoM

Nash Lochner, Marinos Vouvakis, University of Massachusetts - Amherst, United States

TU-UB.1A.8 **10:40**

Fast 3D Volume Integral Equation Domain Decomposition Method for Electromagnetic Scattering Using Adaptive Cross Approximation

Dezhi Wang, Qing Huo Liu, Duke University, United States

TU-UB.1A.9 **11:00**

Solving Combined Field Integral Equations with Physics-informed Graph Residual Learning for EM Scattering of 3D PEC Targets

Tao Shan, Maokun Li, Fan Yang, Shenheng Xu, Tsinghua University, China

Antenna Design and Characterization

Session Co-Chairs: Hong Tang, University of Massachusetts, Lowell; Hualiang Zhang, University of Massachusetts, Lowell

TU-UA.1A.1 **08:00**

A Conformal Ultra-Wideband Curve Dipole Antenna Design

Siti Nailah Mastura Zainarry, David de Haaij, Black Art Tecnologies, Australia

TU-UA.1A.2 **08:20**

Wideband Circularly Polarized Fabry-Perot Antenna using Spatially Separated Superstrate Area Excitation Concept

Ratul De, Mahesh P Abegaonkar, Ananjan Basu, Indian Institute of Technology Delhi, India

TU-UA.1A.3 **08:40**

Mechanically Tunable Dual-Port X-band Helical Antenna

Tingyou Guo, Yu Huang, Yuchen Gu, Alan Bettermann, Daniel W. van der Weide, University of Wisconsin-Madison, United States

TU-UA.1A.4 **09:00**

Electromagnetic characterization of small antennas based on radar techniques and measurement of the radar cross-section (RCS) in a monostatic configuration

Sekhri Yacine, Patricia Grassin, Habiba Hafdallah Ouslimani, Paris Nanterre University, France

TU-UA.1A.5 **09:20**

Materials Characterization for 3D Printed mmWave Antennas and Systems

Hong Tang, Bowen Zheng, Yunxi Dong, Yi Huang, Mohammad Haerinia, Hualiang Zhang, University of Massachusetts, Lowell, United States

Break **09:40**

TU-UA.1A.6 **10:00**

Simulation and Measurement of Nonlinear and Time-Varying Antenna Systems

David Mitchell, Jennifer Bernhard, University of Illinois at Urbana-Champaign, United States

TU-UA.1A.7 **10:20**

Teaching the Methods for the Calculation of the Resonant Modes of Patch Antennas for Comparison to Simulated and Measured Data

Steven Weiss, The Johns Hopkins University, United States

TU-UA.1A.8 **10:40**

Difference Patterns for Monopulse Radars Using Low-Sidelobe Vortex Beams

Giada Maria Battaglia, Andrea Francesco Morabito, Università Mediterranea di Reggio Calabria, Italy; Roberta Palmeri, Istituto per il Rilevamento Elettromagnetico dell'Ambiente, Italy; Tommaso Isernia, Università Mediterranea di Reggio Calabria, Italy

TU-UA.1A.9 **11:00**

Multibeam Radiation by Multipoint Fed Apertures Based on Modulated Metasurface Technology

marco faenzi, stefano maci, university of siena, Italy

TU-UA.1A.10 **11:20**

An Overview of Latest Advancements in Phased Array Antennas with Dual-Mode Base Elements

Maria Pour, Tanzeela Mitha, Saininad Naik, University of Alabama in Huntsville, United States

Multi-Band Antennas I

Session Co-Chairs: Arpan Desai, National Yang Ming Chiao Tung University; Xun Wei, University of Electronic Science and Technology of China

TU-A1.2A.1 **08:00**

Dual-Band Branch Line Coupler-Based Circularly Polarized Antenna for Millimeter-Wave Applications

Arpan Desai, Yi-Fan Tsao, Heng-Tung Hsu, National Yang Ming Chiao Tung University, Taiwan

TU-A1.2A.2 **08:20**

A S/Ka Dual-band Shared-Aperture Circularly Polarized Antenna Combining Spiral Antenna and Substrate Integrated Waveguide Slot Antenna

Xun Wei, Yu Jian Cheng, University of Electronic Science and Technology of China, China

TU-A1.2A.3 **08:40**

Dual band, dual sense circular polarized antenna for sub-6G band

Chai-Eu Guan, Takafumi Fujimoto, Shohei Iwasaki, Nagasaki University, Japan

TU-A1.2A.4 **09:00**

Strategies for Gain Enhancement of Shared Aperture Antennas

Ryan Beneck, Penn State, United States; Eric Whiting, Lockheed Martin, United States; Sawyer Campbell, Penn State, United States; Joshua Withrow, John Barrett, James Weigner, Jeremy Bossard, Lockheed Martin, United States; Pingjuan Werner, Douglas Werner, Penn State, United States

TU-A1.2A.5 **09:20**

Dual-Band Orthogonal-Polarization Transmitarray Consisting of Stub-Loaded Ring Elements and Asterisk Elements

Syota Shimizu, Ryuichi Mitsui, Hiroyuki Deguchi, Mikio Tsuji, Doshisha University, Japan

Break **09:40**

TU-A1.2A.6 **10:00**

A Compact Dual-Polarized Antenna with Indoor/Outdoor Localization for WPAN Applications

Zhenzhen Jiang, Zhao Wang, Mark Leach, Eng Gee Lim, Jingchen Wang, Xi'an Jiaotong Liverpool University, China

TU-A1.2A.7 **10:20**

Antenna in Package with Double-Layer Parasitic Elements for 28/39 GHz Applications

Ming-Lung Kung, R.O.C. Air Force Academy, Taiwan; Yi-Hsuan Lin, Ken-Huang Lin, National Sun Yat-sen University, Taiwan; Hung-Hsiang Cheng, Cheng-Yu Wu, Yun-Hsiang Tien, Yi-Chuan Ding, Advanced Semiconductor Engineering Inc., Taiwan

TU-A1.2A.8 **10:40**

A Modified Mandelbrot Fractal Antenna with Multi-band Characteristics

Hou Yi Ding, Hao Zheng Lu, Yuan Chu Xu, Mei Song Tong, Tongji University, China

TU-A1.2A.9 **11:00**

Rx/ Tx Dual Band Integrated Multi-Layer Single Patch Antenna

Seung-Won Oh, Ye-Bon Kim, Junhyuk Cho, Han Lim Lee, CHUNG-ANG UNIVERSITY,South Korea, Korea (South)

Reconfigurable Antennas and Arrays II

Session Co-Chairs: Jessica Ruyle, University of Oklahoma, Norman; Elias Alwan, Florida International University

TU-A1.3A.1 **08:00**

Synthesis of Flat-Top Beampattern with Minimax Sidelobes and Constrained Dynamic Range Ratio

Mladen Vucic, Maja Jurisic Bellotti, Katarina Vodvarka, University of Zagreb Faculty of Electrical Engineering and Computing, Croatia (Hrvatska)

TU-A1.3A.2 **08:20**

A reconfigurable SIW antenna array for sub 6GHz 5G communication systems

siwar Louati, Halim Boutayeb, Larbi Talbi, Khelifa Hettak, Farzad Karami, UQO, Canada

TU-A1.3A.3 **08:40**

Simple 28 GHz Switched Beam Antenna with Full Coverage for Zero Shadow Area

Junhyuk Cho, Ye-Bon Kim, Seung-Won Oh, Han Lim Lee, Chung-Ang University, South Korea, Korea (South)

TU-A1.3A.4 **09:00**

Gain Optimization of Sparse Antenna Array Configurations

Michael Ortiz, Md Nazim Uddin, Elias Alwan, Florida International University, United States

TU-A1.3A.5 **09:20**

Multiple Folding Array Antenna Packed in a CubeSat and its Radiation Characteristics

TADASHI TAKANO, Daiki Hosaka, Kenji Saegusa, Nihon University, Japan

Break **09:40**

TU-A1.3A.6 **10:00**

A Wideband Reconfigurable and Dual-Polarized Transmitarray Unit Cell

Christos Exadaktylos, Constantinos Zekios, Stavros Georgakopoulos, Florida International University, United States

TU-A1.3A.7 **10:20**

Reconfigurable Linarly-Polarized UnitCell at Ka-band

Zohre Pourgholamhossein, Tayeb A. Denidni, Institut national de la recherche scientifique (INRS), Université du Québec, Canada

TU-A1.3A.8 **10:40**

A Method to Estimate Varactor Quality Factor at Microwave Frequencies

Rosalind Agasti, Hjalti Sigmarsson, Jessica Ruyle, University of Oklahoma, Norman, United States

TU-A1.3A.9 **11:00**

Mechanically Reconfigurable Helix in a Feedback Oscillator

Tingyou Guo, Yu Huang, Yuchen Gu, Alan Alan Bettermann, Daniel van der Weide, University of Wisconsin-Madison, United States

Propagation Channel Characteristics

Session Chair: Dmitry Chizhik, Nokia Bell Labs

TU-A4.1A.1 **08:00**

Validation of the ITU-R P.1546 Model in Ultrashort Wave Band in the Colorado Region of the USA

Jian Wang, Yulong Hao, Cheng Yang, Tianjin University, China

TU-A4.1A.2 **08:20**

Attenuation Statistics For Millimetre-Wave Links in Tropical Regions

Nefrisca Maaruf, Gamantyo Hendrantoro, Achmad Mauludiyanto, Institut Teknologi Sepuluh Nopember, Indonesia

TU-A4.1A.3 **08:40**

Measured and Modeled Outdoor Indoor Coverage at 28 GHz into High Thermal Efficiency Buildings

Dmitry Chizhik, Jinfeng Du, Reinaldo Valenzuela, Andrea Bedin, Mikko Uusitalo, Nokia Bell Labs, United States; Rodolfo Feick, Universidad Técnica de Federico Santa María, Chile

TU-A4.1A.4 **09:00**

Measurement and Analysis of Channel Characteristics in Tunnel Entrance Scenarios

Hailun Wang, Siyu Lin, Jianwen Ding, Beijing Jiaotong University, China

TU-A4.1A.5 **09:20**

Channel Measurement and Analysis at Emergency Frequency Band in Primeval Forest

Haoran Chen, Bo Ai, Dan Fei, Ke Guan, Hao An, Beijing Jiaotong University, China

Break **09:40**

TU-A4.1A.6 **10:00**

3D-RL MIMO capacity estimations under vegetation blockage

Fidel Alejandro Rodríguez Corbo, Tecnologico de Monterrey, Mexico; Mikel Celaya-Echarri, Public University of Navarre, Spain; Raed Shubair, New York University Abu Dhabi, United Arab Emirates; Francisco Falcone, Leyre Azpilicueta, Public University of Navarre, Spain

TU-A4.1A.7 **10:20**

Equatorial Ionospheric D-Region Characterization using Tweeks observed in Sri Lanka

Ashanthi Maxworth, Christian Booker, University of Southern Maine, United States; Janos Lichtenberger, Eötvös Loránd University, Hungary; Prasanna Liyanage, University of Peradeniya, Sri Lanka; Mark Golkowski, University of Colorado Denver, United States

TU-A4.1A.8 **10:40**

Millimeter Wave Channel Measurements and Analysis for Integrated Sensing and Communication Scenario

Zhengyu Zhang, Ruisi He, Mi Yang, State Key Laboratory of Rail Traffic Control and Safety, Beijing Jiaotong University, China; Chao Li, HUAWEI Technologies, China; Xuejian Zhang, Chenlong Wang, Yuan Yuan, Bo Ai, Zhangdui Zhong, State Key Laboratory of Rail Traffic Control and Safety, Beijing Jiaotong University, China

TU-A4.1A.9 **11:00**

Vector Vortex Wave Generation for Tunnel Communication

Md Khadimul Islam, Florida International University, United States; Pawan Gaire, Shubhendu Bhardwaj, University of Nebraska–Lincoln, United States

TU-A4.1A.10 **11:20**

Analysis of Radar Wave Propagation Error Using Parabolic Equation

Jun Heo, Ajou University, Korea (South); Dong-Yeop Na, Pohang University of Science and Technology, Korea (South); Yong Bae Park, Ajou University, Korea (South)

Waveguide and Gap Waveguide based Millimeter-Wave Antennas

Session Chair: Stavros Koulouridis, University of Patras

TU-A5.1A.1 **08:00**

140 GHz Gap Waveguide Based Slot Array Antenna Fabrication Technique by Dry Film photoresist

Sadia Farjana, Chalmers University of Technology, Sweden; Esperanza Alfonso, Gapwaves AB, Sweden; Per Lundgren, Vessen Vassilev, Chalmers University of Technology, Sweden; Peter Enoksson, Enoaviatech AB, Sweden; Ashraf Uz Zaman, Chalmers University of Technology, Sweden

TU-A5.1A.2 **08:20**

A Circular Millimeter-Wave Printed Ridge-gap-Waveguide Crossover

Zhenjiang Zhao, Tayeb Denidni, Institut National de la Recherche Scientifique, Canada

TU-A5.1A.3 **08:40**

Wideband Multi-Port Network Based on Printed-RGW for Millimeter-Wave Applications

Zahra Mousavirazi, Institut national de la recherche scientifique (INRS), Canada; Mohamed Mamdouh M. Ali, Faculty of Engineering, Assiut University, Egypt; Tayeb A. Denidni, National Institute for Scientific Research (INRS – EMT), Canada

TU-A5.1A.4 **09:00**

5G Multilayer Slot Array Antenna Fed by Integrated Substrate Groove Gap Waveguide for 26 GHz Band

Panagiotis Petroutsos, Stavros Koulouridis, University of Patras, Greece

TU-A5.1A.5 **09:20**

Enhanced Gain mm-Wave Ridge Gap Waveguide Antenna based on Two Partially Reflective Layers

Hussein Attia, King Fahd University of Petroleum and Minerals, Saudi Arabia; Lamine Mohamed Abdelghani, Institut national de la recherche scientifique, Canada; Abdelhalim Chaabane, Université 8 Mai 1945 Guelma, Algeria, Algeria; Tayeb A. Denidni, Institut national de la recherche scientifique, Canada

Break **09:40**

TU-A5.1A.6 **10:00**

Millimeter Wave Navigational Radar Antenna With Radiating Horn Aperture Fed by a Gap Waveguide

Shozab Shafiq, Yijing He, Qasim Ali, Beijing Institute of Technology, China; Syed Muzahir Abbas, Macquarie University, Australia; Houjun Sun, Beijing Institute of Technology, China

TU-A5.1A.7 **10:20**

300 GHz On-chip Horn Antenna with WR-03 to SIW Transition using Integrated Passive Device

Wei-Hung Chen, Tzyh-Ghuang Ma, National Taiwan University of Science and Technology, Taiwan; Jeng-Han Tsai, National Taiwan Normal University, Taiwan; Yu-Hsiang Cheng, National Taiwan University, Taiwan

TU-A5.1A.8 **10:40**

Circularly Polarized Leaky Wave Antenna for W Band Applications

Shilpi Singh, Indian Institute of Technology Delhi, India, India; Ananjan Basu, IIT Delhi, India, India

TU-A5.1A.9 **11:00**

A TE11 Mode Excited 3D Printed Dielectric-Filled Circular Horn Antenna for Dual-Beam Radiation

Sheng Huang, King Yuk Chan, Rodica Ramer, UNSW, Australia

Devices and Structures for Antennas, Photonics, and Terahertz Applications

Session Chair: Cody Scarborough, The University of Colorado Boulder

TU-UD.1A.1 **08:00**

Nonlocal Leaky-Wave Metasurface Antennas with Fully Customized Radiation

Gengyu Xu, Adam Overvig, City University of New York, United States; Yoshiaki Kasahara, University of Texas at Austin, United States; Enrica Martini, Stefano Maci, University of Siena, Italy; Andrea Alù, City University of New York, United States

TU-UD.1A.2 **08:20**

Deep-learning Assisted Tunable Multi-layer Metallic Metasurfaces for Wide-band Responses

Bowen Zheng, Yunxi Dong, Hong Tang, Yi Huang, Mohammad Haerinia, Sensong An, Hualiang Zhang, University of Massachusetts Lowell, United States

TU-UD.1A.3 **08:40**

Wideband FMCW Waveform Generation for Microwave Photonic Radar Using Silicon Integrated Frequency Quadrupler

Dawon Yang, Sungjun Yoo, Sunghoon Jang, Youngseok Bae, Agency for Defense Development, Korea (South)

TU-UD.1A.4 **09:00**

Design of photonic-based optical transceiver system with active phased array

Sungjun Yoo, Dawon Yang, Sunghoon Jang, Youngseok Bae, Agency for Defense Development, Korea (South)

TU-UD.1A.5 **09:20**

Quasi PT-symmetric Nonlinear System With Exceptional Point of Degeneracy Leads to Highly Sensitive Oscillatory Regime

Alireza Nikzamir, Filippo Capolino, University of California Irvine, United States

Break **09:40**

TU-UD.1A.6 **10:00**

Terahertz Wave Interactions with Crystals – Experimental Measurements.

Nikita Gurjar, Nagma Vohra, Morgan Ware, Magda El-Shenawee, University of Arkansas, United States

TU-UD.1A.7 **10:20**

Over-the-Air Noise Figure Measurement in a Reverberation Chamber for Low-Noise Devices

Tim Stek, Antennex B.V., Netherlands; Mugundhan Vijayaraghavan, Chalmers University of Technology, Sweden; Sindhu Gaddam, Anthony Walters, University of KwaZulu-Natal, South Africa; David S. Prinsloo, The Netherlands Institute for Radio Astronomy (ASTRON), Netherlands

TU-UD.1A.8 **10:40**

Toward mmWave Antenna Array Built-in Self Test Using An Enhanced Mutual Coupling Method

Mohammed Aladsani, Georgios Trichopoulos, Ferhat Ataman, Sule Ozev, Arizona State University, United States; Chethan Y.B., Texas Instruments, India

TU-UD.1A.9 **11:00**

Coupled Mode Solution for Spatially-Discrete Traveling-Wave Modulated Shunt Resonators

Cody Scarborough, The University of Colorado Boulder, United States

TU-UD.1A.10 **11:20**

Miniaturized High Directivity Norman Window Directional Coupler

Hamed Tadayon, Mansoor Dashti Ardakani, INRS University, Canada; Reza Karimian, Shahrokh Ahmadi, Mona Zaghloul, The George Washington University, United States

Propagation Modeling and Field Prediction

Session Chair: Costas Sarris, University of Toronto

TU-A4.2A.1 **08:00**

Ray Tracing Prediction for 5G Propagation Characteristics in a Modern Office Environment

Chang Liu, Durham University, United Kingdom; Mohamed Ghaddar, Princeton University, United States; mourad Nedil, University of Quebec, Canada; ISMAIL BEN MABROUK, Durham University, United Kingdom

TU-A4.2A.2 **08:20**

Hybrid PO Method in Beam Tracing for Wireless Channel Simulation

Yuxuan Li, Yifan Wu, Xirun Yin, Lizhen Yang, Hai Lin, Zhejiang University, China

TU-A4.2A.3 **08:40**

Prediction of indoor radio propagation using deep neural network

Takayuki Nakanishi, Mitsubishi Electric Corporation, Japan

TU-A4.2A.4 **09:00**

A Graph Neural Network-Based Electric-Field Prediction Model for Exposure Assessments

Sen Liu, Teruo Onishi, Masao Taki, Soichi Watanabe, NICT, Japan

TU-A4.2A.5 **09:20**

Path Loss Analysis for Array Antenna systems in underground mine at 3.5GHz

SAIF EDDINE HADJI, Mourad Nedil, Mohamed Lamine Seddiki, UQAT, Canada; Ismail Ben Mabrouk, Durham university, United Kingdom

Break **09:40**

TU-A4.2A.6 **10:00**

Deep Learning-Based Path Loss Prediction with Satellite Maps

Chenlong Wang, Bo Ai, Ruisi He, Mi Yang, Zhengyu Zhang, Yuxin Zhang, Zhangdui Zhong, Beijing Jiaotong University, China

TU-A4.2A.7 **10:20**

Simplifying Building Structures for Efficient Radio Propagation Modeling

Zhengqing Yun, Magdy Iskander, University of Hawaii, United States

TU-A4.2A.8 **10:40**

Frequency Dependence of Fixed Geometry Path Loss Forecast Error in a Near-surface Littoral Environment

Matt Wilbanks, Elliot Shiben, Victor Wiss, Naval Surface Warfare Center Dahlgren Division, United States

TU-A4.2A.9 **11:00**

Numerical Modeling and Experimental Validation of Path Loss in Realistic RIS-Enabled Links

Yuanzhi Liu, Ziqi Liu, Sean Hum, Costas Sarris, University of Toronto, Canada

TU-A4.2A.10 **11:20**

Propagation Modeling for Indoor Wireless Channels in High-Speed Train

Ruiqi Yang, Siyu Lin, Beijing Jiaotong University, China

Imaging Techniques

Session Chair: Binbin Yang, North Carolina Agricultural and Technical State University

TU-A4.3A.1 **08:00**

Multi-Resolution Multi-Physics Imaging of Free-Space Targets

Marco Salucci, ELEDIA@UniTN - University of Trento, Italy; Zhichao Lin, Maokun Li, Tsinghua University, China; Andrea Massa, ELEDIA@UniTN - University of Trento, Italy

TU-A4.3A.2 **08:20**

Improvements on Low-Loss Material Characterization Based on Wideband Radar Image Processing

Mahshid Asri, Anuththari Gamage, Northeastern University, United States; Mohammad Tajdini, Tufts University, United States; Carey Rappaport, Northeastern University, United States

TU-A4.3A.3 **08:40**

Application of Autofocus Algorithm in Millimeter-Wave Narrowband Holographic 3D Imaging

Sheng Wang, Xinyi Nie, Chaoqun MA, Tong Li, Southwest Jiaotong University, China; Yang Meng, Chongqing University of Posts and Telecommunications, China; Anyong Qing, Southwest Jiaotong University, China

TU-A4.3A.4 **09:00**

Direct Imaging of Layered Media with SISO Data Using Reduced Order Models

Zekui Jia, Maokun Li, Tsinghua University, China

TU-A4.3A.5 **09:20**

Wide-Area Spectrum Cartography

Charles Dietlein, National Telecommunications and Information Administration, United States

Break **09:40**

TU-A4.3A.6 **10:00**

New Linear Sparse Array for Holographic Millimeter Wave Imaging

Yang Meng, Haoyi Yang, Yunxia Lai, Guoping Chen, Chongqing University of Posts and Telecommunications, China; Anyong Qing, Southwest Jiaotong University, China

TU-A4.3A.7 **10:20**

Electromagnetic Imaging of Rough Dielectric Surface Profiles using a Single-Frequency Reverse Time Migration Method

Ahmet Sefer, King Abdullah University of Science and Technology (KAUST), Saudi Arabia; Ali Yapar, Department of Electronics and Communications Engineering, Turkey; Hakan Bagci, King Abdullah University of Science and Technology (KAUST), Saudi Arabia; Ahmet Sefer, Işık University, Turkey

TU-A4.3A.8 **10:40**

Microwave Imaging using Quasi-Conformal Transformed Luneburg Lens

Habeeb Adeagbo, Binbin Yang, North Carolina Agricultural and Technical State University, United States

TU-A4.3A.9 **11:00**

An Accurate Imaging Algorithm with Dual-Path Propagation Loss for Monostatic Systems

Xinyi Nie, Southwest Jiaotong University, China; Kamol Boonlom, University of Leeds, United Kingdom; Chaoqu Ma, Southwest Jiaotong University, China; Lihua Cheng, Chengdu Jincheng College, China; Ian Robertson, University of Leeds, United Kingdom; Anyong Qing, Southwest Jiaotong University, China

TU-A4.3A.10 **11:20**

The Effect of Range on Close-Range Millimeter-Wave Imaging Systems

Xinyi Nie, Southwest Jiaotong University, China; Lihua Cheng, Chengdu Jincheng College, China; Sheng Wang, Southwest Jiaotong University, China; Tim Amsdon, Ian Robertson, University of Leeds, United Kingdom; Anyong Qing, Southwest Jiaotong University, China

Microstrip Antenna Arrays and Circuits

Session Co-Chairs: Larbi Talbi, Université du Québec en Outaouais (UQO); Danilo Erricolo, UIC

TU-A1.4A.1 **08:00**

Compact broadband rate-race coupler for millimiter-wave applications

Farzad Karami, Halim Boutayeb, Ali Amn-e-Elahi, Larbi Talbi, Université du Québec en Outaouais (UQO), Canada

TU-A1.4A.2 **08:20**

A Gap Coupled Patch Array based on the Multilobate Design

Gian Guido Gentili, Polytechnic University of Milan, Italy; Giacomo Giannetti, Stefano Maddio, University of Florence, Italy; Matteo Oldoni, Polytechnic University of Milan, Italy

TU-A1.4A.3 **08:40**

Aperture Area Reduction in Planar Microstrip Phased Arrays of Small Wideband Patch Elements

Bidisha Barman, Deb Chatterjee, Anthony Caruso, University of Missouri-Kansas City, United States

TU-A1.4A.4 **09:00**

A Full-Duplex MIMO Antenna for Integrated Sensing and Communication

Ying Ma, Jiongpei Xu, Tianwei Deng, Shenzhen Campus of Sun Yat-Sen University, China

TU-A1.4A.5 **09:20**

Dual-Band, Dual-Pol Array for Ocean Salinity Measurements

Joanuel García Rivera, Rafael Rodríguez Solís, Univristy of Puerto Rico at Mayagüez, United States

Break **09:40**

TU-A1.4A.6 **10:00**

Wideband Conformal Transmitarray Employing Tightly Coupled Huygens Element at E band

Xuan Wang, Shanghai Jiao Tong University, China; Pei-Yuan Qin, University of Technology Sydney, Australia; Ronghong Jin, Shanghai Jiao Tong University, China; Y. Jay Guo, University of Technology Sydney, Australia

TU-A1.4A.7 **10:20**

A Compact Filtering Antenna Array

Zhongqian Niu, University of Electronic Science and Technology of China, China; Wei Nie, Chongqing University of Posts and Telecommunications, China; Bo Zhang, University of Electronic Science and Technology of China, China

TU-A1.4A.8 **10:40**

A low-profile dual-polarized metasurface antenna for base station development

Xiaochi Lu, University of Electronic Science and Technology of China, China; Dexin Zhao, Academy of Military Sciences PLA China, China

Slotted and Guided Wave Antennas II: Optimization and Performance Ehancement

Session Co-Chairs: Ajay K. Poddar, Synergy Microwave Corporation; Samir El-Ghazaly, University of Arknasas

TU-A1.5A.1 **08:00**

Gain Improvement of 6×26 Slotted Array Waveguide Antenna by Grid Cavity located on Radiator

You Seok Yeoh, Seung Woo Lee, Seo Jeong Jeong, Kyeong Sik Min, Korea Maritime and Ocean Univerisity, Korea (South)

TU-A1.5A.2 **08:20**

Machine Learning Approach to Determine the Characteristics of a Longitudinally Slotted Waveguide Immersed into a High Dielectric

Zayed Mohammad, Shah Md. Nehal Hasnaeen, Suman Neupane, Andrew Chrysler, Idaho State University, United States

TU-A1.5A.3 **08:40**

Double-Choke Antenna Radiation Optimization

Ibrahim N. Alquaydheb, Saleh Alfawaz, Sara Ghayouraneh, Amirreza Ghadimi Avval, Samir El-Ghazaly, University of Arknasas, United States

TU-A1.5A.4 **09:00**

A Broadband Low Profile SIW H-plane Horn Antenna With Improved Performance

Anil Kumar Nayak, University of Alberta, Canada/ IIT Roorkee, Canada; Igor M Filanovsky, Kambiz Moez, University of Alberta, Canada, Canada; Amalendu Patnaik, IIT Roorkee, India

TU-A1.5A.5 **09:20**

Beam-squint Mitigated Transverse-slot Leaky-wave Antenna for Wideband Wireless Communications

Shu-Lin Chen, Jay Guo, University of Technology Sydney, Australia

Break **09:40**

TU-A1.5A.6 **10:00**

A Novel Minkowski Fractal Antenna with Double U-Slots for Ka-band Satellite Communications

Li Zhang, Tongji University, China; Ajay K. Poddar, Ulrich L. Rohde, Synergy Microwave Corporation, United States; Mei Song Tong, Tongji University, China

TU-A1.5A.7 **10:20**

Circularly Polarized Endfire Antenna Based on Spoof Surface Plasmon Polaritons and Substrate Integrated Waveguide

Binshan Zhao, Min Tang, Junfa Mao, Shanghai Jiao Tong University, China

TU-A1.5A.8 **10:40**

Radiation Characteristics and Performance Evaluation of A Non-Uniform Slots SIW Antenna

Fadjrianah Fadjrianah, Institut Teknologi Bandung, Indonesia; Yohandri Yohandri, Universitas Negeri Padang, Indonesia; Achmad Munir, Institut Teknologi Bandung, Indonesia

Advances in Microwave, mm and THz Imaging Systems and Technologies for Medical Applications II

Session Co-Chairs: Francesca Vipiana, Politecnico di Torino, Torino, Italy; Elise Fear, University of Calgary, Calgary, CANADA

TU-SP.1P.1 **13:20**

Investigation of Fully Printed Metasurface Liners for MRI Excitation

Christopher J. M. Barker, Adam Maunder, Nicola De Zanche, Ashwin K. Iyer, University of Alberta, Canada

TU-SP.1P.2 **13:40**

Guided Thermal Therapy Monitoring via A Real-Time Multi-frequency Microwave Imaging System

Yuan Fang, Kazem Bakian-Dogaheh, Mahta Moghaddam, University of Southern California, United States

TU-SP.1P.3 **14:00**

Experimental Validation of a Microwave Scanner for Brain Stroke Monitoring in Realistic Head Models

Cristina Origlia, David Orlando Rodriguez-Duarte, Martina Gugliermino, Jorge Alberto Tobon Vasquez, Politecnico di Torino, Italy; Rosa Scapaticci, Lorenzo Crocco, Institute for Electromagnetic Sensing of the Environment, National Research Council of Italy, Italy; Francesca Vipiana, Politecnico di Torino, Italy

TU-SP.1P.4 **14:20**

Progress in microwave based stoke and trauma diagnostics

Andreas Fhager, Mikael Persson, Chalmers University of Technology, Sweden

TU-SP.1P.5 **14:40**

Recent developments in mm-wave tomographic and radar imaging for breast cancer detection

Simona Di Meo, University of Pavia, Italy; Martina Teresa Bevacqua, Università Mediterranea di Reggio Calabria, Italy; Lorenzo Crocco, CNR-IREA, Italy; Giulia Matrone, University of Pavia, Italy; Tommaso Isernia, Università Mediterranea di Reggio Calabria, Italy; Marco Pasian, University of Pavia, Italy

Break **15:00**

TU-SP.1P.6 **15:20**

Fast Nonlinear Quantitative Image Reconstruction Method for Electronically Scanned Breast Imager

Romina Kazemivala, Nooshin Valizade-Shahmirzadi, Jimmy Nguyen, Aaron D. Pitcher, Natalia K. Nikolova, McMaster University, Canada

TU-SP.1P.7 **15:40**

Deep-Learning Enabled Uncertainty Estimation Applied to Experimental Near-Field Microwave Imaging of 2-D Dielectric Cylinders

Keeley Edwards, Ben Martin, Colin Gilmore, Ian Jeffrey, University of Manitoba, Canada

TU-SP.1P.8 **16:00**

Polarimetric Terahertz Transmission Imaging of Crystal Quartz Sample.

Nikita Gurjar, Morgan Ware, Magda El-Shenawee, University of Arkansas, United States

Broadband Phased Arrays for the Next Generation of Communication Systems

Session Co-Chairs: Ifana Mahbub, The University of Texas at Dallas; Kumar Vijay Mishra, Army Research Laboratory

TU-SP.2P.1 **13:20**

A 33–101 GHz Ultra-Wideband Tightly Coupled Monopole Array (TCMA)

Muhammad Hamza, Constantinos L. Zekios, Stavros V. Georgakopoulos, Florida International University, United States

TU-SP.2P.2 **13:40**

Sub-Millimeter Ranging Accuracy for Distributed Antenna Arrays Using Two-Way Time Transfer

Naim Shandi, Jason Merlo, Jeffrey Nanzer, Michigan State University, United States

TU-SP.2P.3 **14:00**

140 GHz Wideband Array Antenna-in-package and Sub-array Structures for Scalable Phased Array

Hyunjin Kim, Jungsuek Oh, Seoul National University, Korea (South)

TU-SP.2P.4 **14:20**

Electro-mechanical Beam Steering Modeling to Enhance the Scanning Range of UWB Vivaldi Antenna Array

Adnan Basir Patwary, Ifana Mahbub, University of Texas at Dallas, United States

TU-SP.2P.5 **14:40**

Wideband Active Array Protection by Spatial Cancelling

Luke Kipfer, Marinos Vouvakis, University of Massachusetts Amherst, United States

Break **15:00**

TU-SP.2P.6 **15:20**

On-Chip 60 GHz Coplanar Folded Slot Antenna with Air Cavity and Reflector

Seung Yoon Lee, Nima Ghalichechian, Georgia Institute of Technology, United States

TU-SP.2P.7 **15:40**

Novel Wideband Beamformers for AESAs

Luke Kipfer, University of Massachusetts Amherst, United States; Rick Kindt, Naval Research Laboratory, United States; Marinos Vouvakis, University of Massachusetts Amherst, United States

TU-SP.2P.8 **16:00**

Concentric Circular Array Analysis to Overcome Divergence of Vortex Waves for 70 GHz Frequency Link

Alireza Ghayekhloo, Halim Boutayeb, Larbi Talbi, University of Quebec in Outaouais (UQO), Canada

TU-SP.2P.9 **16:20**

High-Gain, Broadband Radial Elliptical-Slot Array Antenna With Side-Lobe Mitigation for Low-Cost Satellite Communication Systems

Karthik Kakaraparty, Sunanda Roy, Ifana Mahbub, University of Texas at Dallas, United States

TU-SP.2P.10 **16:40**

Analyzing Wideband Computational Time Delay for Phased Arrays After Direct Carrier Sampling

Jakob Kunzler, Peter Curry, Ankit Joshi, Naval Information Warfare Center Atlantic, United States

Wireless Power Transfer with Metasurfaces and Metastructures

Session Chair: Nima Bayat-Makou, University of Toronto

TU-A5.1P.1 **13:20**

Near-Field Focusing Conformal Magnetic Metasurface for Wireless Power Transfer

Alessandro Dellabate, Valeria Lazzoni, Danilo Brizi, Agostino Monorchio, University of Pisa, Italy

TU-A5.1P.2 **13:40**

2D Scanning by Subwavelength Superoscillatory Focused Beams for Wireless Power Delivery

Mohammad Abdolrazzaghi, Roman Genov, George Eleftheriades, University of Toronto, Canada

TU-A5.1P.3 **14:00**

Improving Wireless Power Transfer Efficiency Using Fractal Metamaterial for Wearable Applications

Maryam Heshmatzadeh, British Columbia Institute of Technology, Canada; Abbas Ali Lotfi-Neyestanak, Medical Cytometrix Inc., 12238 New McLellan Rd., Surrey, BC, Canada, Canada; Sima Noghanian, CommScope Ruckus Networks, 350 West Java Dr., Sunnyvale, CA 94089, USA, United States

TU-A5.1P.4 **14:20**

Exploring Generalized PT-Symmetry for Efficient Wireless Power Transfer

Yuhao Wu, Lei Kang, Pingjuan Werner, Douglas Werner, Penn State University, United States

TU-A5.1P.5 **14:40**

Novel mmWave Wireless Power Transfer Systems Using Broadband Circularly Polarized Magneto-Electric Rectennas and Leaky Wave Transmitters

Chaoyun Song, King's College London, United Kingdom; Lei Wang, Heriot-Watt University, United Kingdom; Mahmoud Wagih, University of Glasgow, United Kingdom; Miguel Poveda-García, Heriot-Watt University, United Kingdom; Yi Huang, University of Liverpool, United Kingdom

Break **15:00**

TU-A5.1P.6 **15:20**

Phased Array-Free Multi-Directional 5.8 GHz Wireless Power Transmission Using A Fresnel Lens

Mahmoud Wagih, University of Glasgow, United Kingdom; Thomas Whittaker, William G. Whittow, Loughborough University, United Kingdom

TU-A5.1P.7 **15:40**

A Shifted-Beam Method for Near-Field Wireless Power Transfer using Parasitic Arrays

Fangwei Chang, George Eleftheriades, University of Toronto, Canada

TU-A5.1P.8 **16:00**

Compact Directional Button Antenna Based on Curved Metamaterial for On-Body Wireless Power Transfer

Yiying Wang, Xinglei Hou, Guilin University of Electronic Technology, China; Bo Wang, Xi'an Electronic Engineering Research Institute, China; Yonghui Qin, Wanghua Pan, Guilin University of Electronic Technology, China; Omar M. Ramahi, University of Waterloo, China

TU-A5.1P.9 **16:20**

Performance Enhancement of DGS-based WPT system Using Double Negative Metamaterial

Zhanel Kudaibergenova, Kassen Dautov, Mohammad Hashmi, Nazarbayev University, Kazakhstan

Microwave Imaging, Inverse Scattering, and Emerging Topics

Session Chair: Rui Guo, Tsinghua University

TU-UB.1P.1 **13:20**

A Topological Regularization Term for Inverse Scattering Problems

Scott Ziegler, Matthew Burfeindt, Naval Research Laboratory, United States

TU-UB.1P.2 **13:40**

Microwave Behavior of the Arctic Organic Soil a Non-Destructive Approach

Kazem Bakian-Dogaheh, Mahta Moghaddam, University of Southern California, United States

TU-UB.1P.3 **14:00**

Deep-Learning-Based Reconstruction of Patch Antenna Array on/off states at 10 GHz

Mohsen Sabbaghi, Jun Zhang, George Hanson, University of Wisconsin-Milwaukee, United States

TU-UB.1P.4 **14:20**

Deep Learning Enhanced 3D Joint Inversion

Yanyan Hu, Xiaolong Wei, Xuqing Wu, Jiajia Sun, University of Houston, United States; Yueqin Huang, Cyentech Consulting LLC, United States; Jiefu Chen, University of Houston, United States

TU-UB.1P.5 **14:40**

Radio Planning Assessment of a Golf Game Dynamics Management System based on LoRaWAN

Imanol Picallo, Public University of Navarre, Spain; Erik Aguirre, Tafco Metawireless S.L., Spain; Peio Lopez-Iturri, Public University of Navarre, Spain; Javier Guembe, Eduardo Olariaga, Tafco Metawireless S.L., Spain; Hicham Klaina, Public University of Navarre, Spain; Jose Antonio Marcotegui, Tafco Metawireless S.L., Spain; Francisco Falcone, Public University of Navarre, Spain

Break **15:00**

TU-UB.1P.6 **15:20**

Microwave Data Inversion in the Feature Space for Brain Stroke Imaging

Rui Guo, Zhichao Lin, Jingyu Xin, Maokun Li, Fan Yang, Tsinghua University, China; Aria Abubakar, SLB, United States

TU-UB.1P.7 **15:40**

Direction-of-Arrival Estimation Using an Array of Reconfigurable Scattering Antennas

Ruyu Ma, Xiuyin Zhang, South China University of Technology, China

Novel Integral Formulations and Impacting Applications

Session Co-Chairs: Andrew Peterson, Georgia Institute of Technology; Ali E. Yilmaz, Lockheed Martin Aeronautics

TU-A3.1P.1 **13:20**

Solution of the Discontinuous EFIE using Higher-Order Mortar Methods

James Dee, Georgia Tech Research Institute, United States; Andrew Peterson, Georgia Institute of Technology, United States

TU-A3.1P.2 **13:40**

An SIE Formulation with Loop Analysis for Large-Scale Arbitrarily Shaped Interconnects

Zekun Zhu, Shunchuan Yang, Beihang University, China; Ningbo Gong, Beijing Electro-mechanical Engineering Institute, China; Guijie Diao, Science and Technology on Complex System Control and Intelligent Agent Cooperation Laboratory, China

TU-A3.1P.3 **14:00**

An SIE-GSTC Solver for Simulation of Monoanisotropic Metasurfaces

Sebastian Celis, Ran Zhao, Rui Chen, Hakan Bagci, KAUST, Saudi Arabia

TU-A3.1P.4 **14:20**

An Integral-Equation Kernel for Glide Symmetric Structures

Martin Petek, Javier Rivero, Jorge Alberto Tobon Vasquez, Politecnico di Torino, Italy; Guido Valerio, Sorbonne Universite, France; Oscar Quevedo-Teruel, KTH Royal Institute of Technology, Sweden; Francesca Vipiana, Politecnico di Torino, Italy

TU-A3.1P.5 **14:40**

Traveling and Standing Wave Recognition Based on PE Basis Functions and Standing Wave Ratio

Christian Diaz-Caez, Su Yan, Howard University, United States

Break **15:00**

TU-A3.1P.6 **15:20**

Inverse Design of Wire Antennas using a Hessian- based Nonlinear Optimizer with Automatic Differentiation

Manushanker Balasubramanian, Arkaprovo Das, Pingjuan L. Werner, Douglas H. Werner, The Pennsylvania State University, United States

TU-A3.1P.7 **15:40**

Examination of Reduced Complexity of Multi-level Fast Iterative Physical Optics for Simple Target

Jeong-Un Yoo, Il-Suek Koh, Inha University, Korea (South)

TU-A3.1P.8 **16:00**

An EFIE-TD Solver for Thin-wire Structures with Time-varying Loads

Mario F. Pantoja, Department of Electromagnetics and Physics Matter, Spain; Arkaprovo Das, Department of Electrical Engineering, United States; Manushanker Balasubramanian, Ryan Beneck, Sawyer D. Campbell, The Pennsylvania State University, United States; Amelia R. Bretones, Universidad de Granada, Spain; Pingjuan L. Werner, Douglas H. Werner, The Pennsylvania State University, United States

TU-A3.1P.9 **16:20**

A Hybrid Delta-Gap Source Excitation Model in SIE for Electromagnetic Radiation Analysis

Zi-Qiang Wu, Qiang-Ming Cai, Ce-Ming Zhou, Xin Cao, Longjian Zhou, Yuyu Zhu, Southwest University of Science and Technology, China; Mulin Liu, Innovation Center of Zhongshan Torch Modern Industrial Engineering Technology Research Institute, China; Bo Pu, DeTooLIC Technology, China; Jun Fan, Southwest University of Science and Technology, China

TU-A3.1P.10 **16:40**

On the Sensitivity of RCS to Manufacturing Defects in as-built Camera Boxes with Voids

Brian A. MacKie-Mason, Jon T. Kelley, Kurtiss A. Norris, Scott Schaefer, Mark Martin, Steven M. Cox, Clifton C. Courtney, David A. Chamulak, Ali E. Yilmaz, Lockheed Martin Aeronautics, United States

Novel Phenomena in Metamaterials

Session Co-Chairs: Do-Hoon Kwon, University of Massachusetts Amherst; Stefano Vellucci, Niccolò Cusano University

TU-A2.1P.1 **13:20**

Perfect Teleporting Metasurfaces

Jordan Budhu, Virginia Tech, United States

TU-A2.1P.2 **13:40**

Engineering Thermal Radiation Using Bound States in the Continuum

Soheil Farazi, Srinivas Tadigadapa, Northeastern University, United States

TU-A2.1P.3 **14:00**

Metasurfaces for Broadband Analog Image Processing

Akshaj Arora, Michele Cotrufo, Andrea Alu, CUNY, United States

TU-A2.1P.4 **14:20**

Design of Non-Local Refractive Metasurfaces based on Cascaded Meta-Atoms

Alessio Monti, Roma Tre University, Italy; Stefano Vellucci, Michea Longhi, Mirko Barbuto, Niccolò Cusano University, Italy; Zahra Hamzavi-Zarghani, Muhammad Khalid, Davide Ramaccia, Luca Stefanini, Roma Tre University, Italy; Andrea Alù, CUNY Advanced Science Research Center, New York, USA, United States; Alessandro Toscano, Filiberto Bilotti, Roma Tre University, Italy

TU-A2.1P.5 **14:40**

Single and Multiple Actions of Short-Pulsed Temporal Metamaterials

Carlo Rizza, University of L'Aquila, Italy; Giuseppe Castaldi, University of Sannio, Italy; Nader Engheta, University of Pennsylvania, United States; Vincenzo Galdi, University of Sannio, Italy

Break **15:00**

TU-A2.1P.6 **15:20**

A Modulated Reactance Spherical Surface Cloak for 3-D Invisibility

Do-Hoon Kwon, University of Massachusetts Amherst, United States

TU-A2.1P.7 **15:40**

Anomalous Reflection or Refraction Based on Transmissive Metagratings with Few Meta-Atoms

Zhen Tan, Jianjia Yi, Xi'an Jiaotong University, China; Badreddine Ratni, Shah Nawaz Burokur, Univ Paris Nanterre, France

TU-A2.1P.8 **16:00**

Space-Time-Coding Metasurface for Direction-of-Arrival Estimation

Xiaoyi Wang, Tongji University, China; Guo-Min Yang, Fudan University, China; Mei Song Tong, Tongji University, China

TU-A2.1P.9 **16:20**

Phase-coded Magnetic Metasurfaces for Interference Free Multi-receiver Wireless Power Transfer System

Martina Falchi, Pierpaolo Usai, Danilo Brizi, Agostino Monorchio, University of Pisa/CNIT, Italy

Numerical Analysis Strategies for Applications I

Session Co-Chairs: Magnus Brandt-Møller, TICRA; Joseph Kotulski, Sandia National Laboratories

TU-A3.2P.1 **13:20**

Higher-Order Array Decomposition Method for Array Antennas with Connected Elements

Magnus Brandt-Møller, TICRA, Denmark; Michael Mattes, Technical University of Denmark, Denmark; Olav Breinbjerg, ElMaReCo, Denmark; Min Zhou, Erik Jørgensen, TICRA, Denmark

TU-A3.2P.2 **13:40**

Full-Wave Simulation of a 10,000-element Reconfigurable Intelligent Surface with a Single Workstation Computer

Qijian Lim, University of Illinois at Urbana-Champaign, United States; Hong-wei Gao, Beijing Institute of Technology, China; Zhen Peng, University of Illinois at Urbana-Champaign, United States

TU-A3.2P.3 **14:00**

Patch-Based Perfectly Matched Layer Scheme in Three-Dimensional Unstructured Meshes

Vinicius Nascimento, Dan Jiao, Purdue University, United States

TU-A3.2P.4 **14:20**

High-Frequency Asymptotic Solution for Scattered Field near Transition Region over Plane Metamaterial

Toru Kawano, National Defense Academy, Japan

TU-A3.2P.5 **14:40**

A Hybrid Predictive Model for the Spatial-Spectral Analysis of Wave Physics in Complex Enclosures

Sangrui Luo, Shen Lin, Zhen Peng, University of Illinois at Urbana-Champaign, United States

Break **15:00**

TU-A3.2P.6 **15:20**

A Distributed-Memory Implementation of Schur-complement PCA Preconditioner for Ill-conditioned Problems

Vinh Dang, Joseph Kotulski, Sandia National Laboratories, United States

TU-A3.2P.7 **15:40**

On the Large-Scale Parallel Scalability of Advanced EFIE Formulations Suitable for Multiscale Structures

Damian Marek, Piero Triverio, University of Toronto, Canada

TU-A3.2P.8 **16:00**

Stabilization of the Integral Equation for modelling Metasurfaces via Impedance Boundary Conditions

Margaux Bruliard, Politecnico di Torino, Italy; Marco Righero, LINKS Foundation, Italy; Giuseppe Vecchi, Politecnico di Torino, Italy

TU-A3.2P.9 **16:20**

A Broadband Discrete Exterior Calculus A-Phi Formulation Solver with Sparsified Nested Dissection Ordering Preconditioner

Boyuan Zhang, PURDUE UNIVERSITY, United States; Weng Cho Chew, Purdue university, United States

TU-A3.2P.10 **16:40**

Design Printed-Circuit-Board Antennas Using Image Classifier and Fixed Dimension Components

Weiping Dou, Meta Platforms Inc, United States

Multi-Band Antennas II

Session Co-Chairs: Yang Hao, Queen Mary University of London; Youssef Tawk, American University of Beirut

TU-A1.1P.1 **13:20**

Multihyperuniform shared aperture antenna arrays for multiband unidirectional emission applications

Orestis Christogeorgos, Yang Hao, Queen Mary University of London, United Kingdom

TU-A1.1P.2 **13:40**

A Low-profile Self-duplexing Antenna for Millimeter-wave and Microwave Frequency Bands

Peyman PourMohammadi, Hassan Naseri, Noureddine Melouki, Fahad Ahmed, Amjad Iqbal, Institut National de la Recherche Scientifique, Université du Québec, Montréal, Canada, Canada; Guy A. E. Vandenbosch, KU Leuven, Belgium; Tayeb Denidni, Institut National de la Recherche Scientifique, Université du Québec, Montréal, Canada, Canada

TU-A1.1P.3 **14:00**

Design of a Dual-Element Cross Dipole

Grant Evans, Georgia Southern University, United States; Kevin Leon, Georgia Tech Research Institute, United States; Jack Nemec, Sungkyun Lim, Georgia Southern University, United States

TU-A1.1P.4 **14:20**

Compact Circularly Polarized High Gain Yagi-Uda Antenna at UHF-Band

S. Meliksah Yayan, Plan-S Satellite and Space Technologies, Turkey

TU-A1.1P.5 **14:40**

Next Generation Antenna Design Synthesis Framework using k-Nearest Neighbours Algorithm

Sai Sampreeth Indharapu, Anthony Caruso, Kalyan C. Durbhakula, University of Missouri - Kansas City, United States

Break **15:00**

TU-A1.1P.6 **15:20**

High Gain Shared Aperture Antenna for Simultaneous Operation in L-Band and Ka-Band

Md Khadimul Islam, Antonio Garcia, Elias Alwan, Florida International University, United States

TU-A1.1P.7 **15:40**

A terahertz photoconductive antenna design for gain enhancement based on the Chinese Totem Tai-Chi

Ruobin Han, Abdoalbaset Abohmra, University of Glasgow, United Kingdom; Shohreh Nourinovin, Queen Mary University of London, United Kingdom; Tomas Pires, Masood Ur Rehman, University of Glasgow, United Kingdom; Akram Alomainy, Queen Mary University of London, United Kingdom; Joao Ponciano, Muhammad Imran, Qammer Abbasi, University of Glasgow, United Kingdom

TU-A1.1P.8 **16:00**

Shared Aperture Based Antenna in Package Incorporated with Connected Slot and Patch antenna

Md Rasheduzzaman Al-Amin, Mohammad S. Sharawi, Polytechnic Montreal-University of Montreal, Canada

TU-A1.1P.9 **16:20**

Dual-Band, Ultra-Thin MM-Wave Antenna with Shared Aperture on Flexible Substrate

Saeid Alamdar, Franco De Flaviis, University of California, Irvine, United States; Soheil Saadat, Multi-Fineline Electronix Inc. (MFLEX), United States

Reconfigurable Antennas and Intelligent Surfaces

Session Co-Chairs: Yang Hao, Queen Mary University of London; Marcello Zucchi, Politecnico di Torino

TU-A1.2P.1 **13:20**

Low-Profile Beam-Reconfigurable Antenna Using Multiple Parasitic Elements For UAV Applications

Min-Jae Kang, Tae-Hyeon Kim, Yu-Seong Choi, Wang-Sang Lee, Gyeongsang National University, Korea (South)

TU-A1.2P.2 **13:40**

Reconfigurable Microstructure Designs for Future Software Defined Materials

Jonas Florentin Kolb, Yang Hao, Queen Mary University of London, United Kingdom

TU-A1.2P.3 **14:00**

Radiation Pattern Reconfigurable MIMO Antenna with EBG for Improved Steering Performance

Jaya Bharath Gopalakrishnan, Thennarasan Sabapathy, Mohamed Nasrun Osman, Muzammil Jusoh, Universiti Malaysia Perlis, Malaysia; Kavitha K, Velammal College of Engineering and Technology, India

TU-A1.2P.4 **14:20**

Pattern Reconfigurable Capped Patch Antenna for mm-Wave 5G Applications

Sagiru Gaya, Ademola A. Mustapha, Mohamed A. Abou-Khousa, Khalifa University of Science and Technology, United Arab Emirates

TU-A1.2P.5 **14:40**

Reconfigurable Metasurface Antenna based on a Single Control Signal

Joaquín García-Fernández, Francesco Caminita, Cristian Della Giovampaola, Wave Up srl, Italy; Enrica Martini, Stefano Maci, University of Siena, Italy

Break **15:00**

TU-A1.2P.6 **15:20**

Radio Frequency Directed Energy Weapon Mitigation via Passive Beamforming Reconfigurable Intelligent Surface

Anim Kyei, Drexel University, United States; Md Abu Saleh Tajin, KAPIL RAMESH DANDEKAR, DRExel UNIVERSITY, United States

TU-A1.2P.7 **15:40**

2- Bit Tunable Reconfigurable Intelligent Surface for Multibeam Antenna Applications

Fabrice MFUAMBA KABONZO, University of Quebec in Abitibi-Temiscamingue, Canada; Mourad Nedil, Muhammad Zaka Ali, Universite du Quebec en Abitibi-Temiscamingue, Canada

Modeling and Simulation of Millimeter Wave Antennas

Session Chair: Rashid Mirzavand Boroujeni, University of Alberta

TU-A5.2P.1 **13:20**

Manipulation of SPPs Antenna's Radiation Pattern for Satellite and Space Communication Systems

Behnam Mazdouri, Rashid Mirzavand Boroujeni, University of Alberta, Canada

TU-A5.2P.2 **13:40**

Efficient Automotive Radar Simulations using Spherical Modes

Maruf Md Sajjad Hossain, The Ohio State University, United States; Alebel Arage, Prabin Shrestha, General Motors, United States; Niru K. Nahar, Kubilay Sertel, The Ohio State University, United States

TU-A5.2P.3 **14:00**

Design & EM Simulation of a Continuous-Dielectric Luneburg Lens Antenna using COMSOL-PyAEDT

Soumitra Biswas, Envistacom, United States

TU-A5.2P.4 **14:20**

A Broadband Dual-Polarized Metasurface Antenna for 5G mmWave Communication Using Characteristic Mode Analysis

Lintao Li, Yejun He, Long Zhang, Wenting Li, Chaoyun Song, Shenzhen University, China

TU-A5.2P.5 **14:40**

Characteristics of Terahertz low profile generalized Luneburg lens Antenna

Xinran Zeng, Chongqing University of Posts and Telecommunicationsm, China; Yihong Su, Bo Zhang, Zhongqian Niu, Zongrui He, University of Electronic Science and Technology of China, China

TU-A5.2P.6 **15:00**

On the Broadband Design of Rectangular and Quadratic Dielectric Waveguides for mmWave Operation

Christoph Baer, Ruhr University Bochum, Germany

MIMO Technology and Applications

Session Co-Chairs: Elias Alwan, Florida International University; George Shaker, University of Waterloo

TU-A5.3P.1 **15:20**

Designing the Reconfigurable Over-The-Air Chamber

Benjamin Arnold, Michael Jensen, Brigham Young University, United States

TU-A5.3P.2 **15:40**

A Near-Field 3-D Imaging Radar Using a Sparse Spotlight MIMO Array for Weapons Detection

Aditya Varma Muppala, Kamal Sarabandi, University of Michigan, Ann Arbor, United States

TU-A5.3P.3 **16:00**

UAV Classification utilizing Radar Digital Twins

Ahmed N. Sayed, Omar M. Ramahi, George Shaker, University of Waterloo, Canada

TU-A5.3P.4 **16:20**

Dual Antenna Support and Isolation Enhancer

Erin McGough, Parisa Lotfi, PCTel, Inc., United States

Frequency-Selective Surfaces II

Session Co-Chairs: Tayeb Denidni, Institut National de la Recherche Scientifique, Université du Québec, Montréal, Canada; Sean Hum, University of Toronto

TU-A2.2P.1 **13:20**

Four-layer Dual-Band Metasurface Polarizer Device for Linear-to-Circular Polarization Conversion at Ka-Band SatCom Applications

GAOUA Malik, OUSLIMANI HAFDALLAH Habiba, Paris Nanterre University, France; COLLIGNON Gérard, MALLPEYRE Vincent, INEO-DEFENSE, France; GRASSIN Patricia, Paris Nanterre University, France

TU-A2.2P.2 **13:40**

X-Band Superstrate Antenna for High Data Rate CubeSat Communication

Ratul De, Mahesh P Abegaonkar, Ananjan Basu, Indian Institute of Technology Delhi, India

TU-A2.2P.3 **14:00**

A Wideband Fabry-Perot Antenna with a Bianisotropic FSS Layer

Peyman PourMohammadi, Hassan Naseri, Noureddine Melouki, Fahad Ahmed, Mohamed Sedigh Bizan, Amjad Iqbal, Tayeb Denidni, Institut National de la Recherche Scientifique, Université du Québec, Montréal, Canada, Canada

TU-A2.2P.4 **14:20**

A Single Layer Frequency Selective Surface for Dual Communication and Localization Applications

Jeffrey Majnaric, University of Toronto, Canada; David Beach, Alon Green, Bojan Subasic, Thales Group, Canada; Sean Hum, University of Toronto, Canada

TU-A2.2P.5 **14:40**

Analysis of Transmit Piano Board Based Metasurface Illuminated by a Dual Polarized Antenna

Rasoul Ebrahimzadehchari, Halim Boutayeb, Larbi Talbi, fayez hyjazie, université du québec en outaouais, Canada; Amirsaman Nooramin, Iran University of Science and Technology, Iran

Break **15:00**

TU-A2.2P.6 **15:20**

Design Guidelines for Fishnet Frequency Selective Surfaces

Vincenzo Violi, University of Pisa/Università Mediterranea of Reggio Calabria, Italy; Danilo Brizi, University of Pisa/CNIT, Italy; Mae Almansoori, Directed Energy Research Centre, Technology Innovation Institute, Abu Dhabi/Faculty of Electrical Engineering, Helmut Schmidt University, Italy; Adamo Banelli, Felix Vega, Directed Energy Research Centre, Technology Innovation Institute, Abu Dhabi, Italy; Agostino Monorchio, University of Pisa/CNIT, Italy

TU-A2.2P.7 **15:40**

Modified H-Plane Sectoral Horn for FSS Sensing Applications

Logan Wilcox, Missouri University of Science and Technology, United States; Doyle Motes, Texas Research Institute Austin, Inc., United States; Kristen Donnell, Missouri University of Science and Technology, United States

TU-A2.2P.8 **16:00**

Embedded Aperture-Based FSS Sensor

Lauryn Morris, Swathi Muthyala Ramesh, Logan Wilcox, Missouri University of Science and Technology, United States; Doyle Motes, Texas Research Institute Austin, Inc., United States; Kristen Donnell, Missouri University of Science and Technology, United States

Radar Cross Section and Target Characterization

Session Chair: Daniel van der Weide, University of Wisconsin at Madison

TU-A4.1P.1 **13:20**

Application of Vector Radiative Transfer Theory for Real-time Chaff Cloud Simulation

Jun-Seon Kim, Dong-Yeob Lee, Dong-Wook Seo, Korea Maritime and Ocean University, Korea (South)

TU-A4.1P.2 **13:40**

Efficient Full-Wave Computation of the Monostatic Radar Cross Section

Asger Limkilde, Oscar Borries, Peter Meincke, Erik Jørgensen, TICRA, Denmark

TU-A4.1P.3 **14:00**

Free-Running X-Band Electric Field Mapping with Acoustically Modulated Scattering

Yu Huang, Tingyou Guo, Yuchen Gu, Alan Bettermann, Daniel van der Weide, University of Wisconsin at Madison, United States

TU-A4.1P.4 **14:20**

An Application of Angular Network Equations: Exact Solution of the PEC Wedge in Biaxial Media

Vito Daniele, Guido Lombardi, Politecnico di Torino, Italy

TU-A4.1P.5 **14:40**

Recovery of Missing Radar Returns with Compressive Sensing

Ismail Jouny, Lafayette College, United States

Break **15:00**

TU-A4.1P.6 **15:20**

Radar change detection in the time domain

Edwin Marengo, David Tahmoush, Northeastern University, United States

TU-A4.1P.7 **15:40**

A Comparison of Machine Learning Algorithms for Micro-Doppler Based Drone Classification

Mohammed Rashid, Jeffrey A. Nanzer, Michigan State University, United States

Power Harvesting and Sensing

Session Co-Chairs: Halim Boutayeb, Université du Québec en Outaouais; David Greve, Carnegie Mellon University

TU-A5.4P.1 **13:20**

High Efficiency and Dual-Band RF Rectifier Circuit for Energy Harvesting Systems

Meghdad Khodaei, Halim Boutayeb, Larbi Talbi, Université du Québec en Outaouais, Canada

TU-A5.4P.2 **13:40**

Miniaturization of Yagi-Uda rectenna by impedance loading

Tamami Maruyama, Hiroto Ishiguro, Noa Ebita, Akari Kamada, National Institute of Technology, Hakodate College, Japan; Masashi Nakatsugawa, NIT, Hakodate College, Japan; Masaya Tamura, Toyohashi universiy of technology, Japan

TU-A5.4P.3 **14:00**

mmWave Wireless Power Transmission to Flexible Rectennas in Absorptive and Reflective Media

Mahmoud Wagih, University of Glasgow, United Kingdom; Chaoyun Song, King's College London, United Kingdom

TU-A5.4P.4 **14:20**

RF Energy Harvesting using Complex-Conjugate Rectennas Along Single-Wire Transmission Lines

Mahmoud Wagih, University of Glasgow, United Kingdom

TU-A5.4P.5 **14:40**

Dependable Wireless Powering for the Wireless Sensor Station by Using Combination of Solar Cell and Rectenna

Satoshi Yoshida, Ryukoku Univ., Japan; Kenjiro Nishikawa, Kagoshima Univ., Japan

Break **15:00**

TU-A5.4P.6 **15:20**

Surface acoustic wave sensor interrogation using Goubau waves

David Greve, Carnegie Mellon University, United States; Jagannath Devkota, National Energy Technology Laboratory, United States; Paul Ohodnicki, University of Pittsburgh, United States; Ruishu Wright, National Energy Technology Laboratory, United States

TU-A5.4P.7 **15:40**

Novel Radio Frequency (RF) Based Wireless Gas Sensing using Polypyrrole (PPy) Smart Films

Srabana Maiti, Shuvashis Dey, North Dakota State University, United States

TU-A5.4P.8 **16:00**

A Phase Delay Line Sensor for Water Quality Monitoring Based on Spherical Conformal Reflectarray Antenna

Xiao Jie Lu, Xiao Yu Li, Mei Song Tong, Tongji University, China

Advanced Antennas for Transmission of Power or Data

Session Chair: Marco A. Antoniades, Toronto Metropolitan University

TU-A5.5P.1 **13:20**

Active Windshield Antenna for 5G Applications

Abdelhamid Nasr, university of michigan, United States; Fred Schaible, Abdel Halim Mohamed, AGC Automotive Americas, United States; Kamal Sarabandi, university of Michigan, United States

TU-A5.5P.2 **13:40**

Rear-View-Mirror Mounted Array Antenna for 5G-V2X Communication

Ye-Bon Kim, Junhyuk Cho, Seung-Won Oh, Han Lim Lee, Chung-Ang University, South Korea, Korea (South)

TU-A5.5P.3 **14:00**

A Broadband Co-Linearly Polarized Full-duplex Antenna-in-Package (AiP) for Integrated Sensing and Communication

Lina Ma, Changzhan Gu, Shanghai Jiaotong University, China

TU-A5.5P.4 **14:20**

Optically Transparent Antenna on Glass Lens for AR Applications

Calvin Chun Hin Ng, Natis Shafiq, Aykutlu Dana, Ragip Pala, Efthymios Kallos, Shimul Chandra Saha, Meta Material Inc, United Kingdom

TU-A5.5P.5 **14:40**

A Series-fed Microstrip Patch Array for Airy Beam Generation

Gopika R, Chinmoy Saha, Indian Institute of Space Science and Technology, India; Yahia M M Antar, Royal Military College, Canada

Break **15:00**

TU-A5.5P.6 **15:20**

Rotman Lens Based Wireless Power Beamforming System

Manoj Mohan, NANYANG TECHNOLOGICAL UNIVERSITY, Singapore; Boon Siew Han, Jingyuan Tan, Schaeffler Advance Research & Innovation, Schaeffler (Singapore) Pte. Ltd., Singapore; Arokiaswami Alphones, NANYANG TECHNOLOGICAL UNIVERSITY, Singapore; Mohammed Yakoob Siyal, Muhammad Faeyz Karim, School of EEE, Nanyang Technological University, Singapore 639798, Singapore

TU-A5.5P.7 **15:40**

Electric field resonant coupler for wireless power transmission using water as a transmission medium

Takanori Washiro, Nippon Telegraph and Telephone Corporation, Japan

TU-A5.5P.8 **16:00**

Development of Highly-efficient Near-field WPT and RCN-based Rectifier for IoT Sensors

Adil Karimov, Kassen Dautov, Mohammad Hashmi, Nazarbayev University, Kazakhstan

TU-A5.5P.9 **16:20**

Scattering by a Single Inhomogeneous Slot in a Thick Metallic Screen

Vito Daniele, Guido Lombardi, Politecnico di Torino, Italy

Dielectric Resonator Antennas I

Session Co-Chairs: Binbin Yang, North Carolina A&T State University; Francisco Pizarro, Pontificia Universidad Catolica de Valparaiso

TU-A1.3P.1 **13:20**

Circular Polarized 3D-printed Enclosed Twist Dielectric Resonator Antenna

Andrea Avila, Pontificia Universidad Catolica de Valparaiso, Chile; Marcos Diaz, University of Chile, Chile; Francisco Pizarro, Pontificia Universidad Catolica de Valparaiso, Chile

TU-A1.3P.2 **13:40**

Reconfigurable Dielectric Resonator OAM Antenna with Augmented Modes

Hassan Naseri Gheisanab, Peyman Pourmohammadi, Mohamed Sedigh Bizan, noureddine melouki, Fahad Ahmed, Amjad Iqbal, Tayeb Ahmed Denidni, Institut national de la recherche scientifique (INRS), Canada

TU-A1.3P.3 **14:00**

Millimeter-Wave Spherical Dielectric Resonator Antenna Array

Spandan Manna, IHF, RWTH Aachen University, Germany; Dennis Hoffmann, Jan Hesselbarth, IHF, University of Stuttgart, Germany; Adrien Guth, Dirk Heberling, IHF, RWTH Aachen University, Germany

TU-A1.3P.4 **14:20**

A Millimeter-wave Wideband Dielectric Resonator Antenna Array

King Tung Lo, State Key Laboratory of Terahertz and Millimeter Waves and the Department of Electrical Engineering, City University of Hong Kong, Hong Kong, China, Hong Kong SAR of China; Zehai Wu, Guangdong Broadradio Communication Technology Co.Ltd, Guangzhou, China, China; Hang Wong, State Key Laboratory of Terahertz and Millimeter Waves and the Department of Electrical Engineering, City University of Hong Kong, Hong Kong, China, Hong Kong SAR of China

TU-A1.3P.5 **14:40**

Highly Efficient Linear Array Antenna Implementation for 5G Internet of Things

Mansoor Dashti Ardakani, Hamed Tadayon, INRS University, Canada; Reza Karimian, Shahrokh Ahmadi, Mona Zaghloul, The George Washington University, United States

Break **15:00**

TU-A1.3P.6 **15:20**

Multi-Mode Heterogenous Dielectric Resonator Antennas with Very Wide Bandwidth

Yen Nguyen, Payam Nayeri, California Polytechnic State University, United States

TU-A1.3P.7 **15:40**

A Wideband Rectangular Dielectric Resonator Antenna with Varying Material Distributions.

Trupti Bellundagi, Binbin Yang, North Carolina A&T University, United States

TU-A1.3P.8 **16:00**

Design of A Ceramic-Based Stepped-Index Rectangular Dielectric Rod Antenna

Ewomazino Edhere, Binbin Yang, North Carolina A&T State University, United States

TU-A1.3P.9 **16:20**

Slotted Stepped Impedance Ring Resonator Embedded Multi-Resonant Filtering DRA for 5G Sub-6 GHz Applications

Partha Pratim Shome, Dr B R Ambedkar NIT Jalandhar, India; Taimoor Khan, NIT Silchar, India; Ajay Poddar, Synergy Microwave Corporation, United States

TU-A1.3P.10 **16:40**

Dielectric Resonators-based Large Frequency Ratio Antenna

Awab Muhammad, Muhammad Umar Khan, National University of Sciences and Technology, Pakistan; Reza Shamsaee Malfajani, Mohammad S. Sharawi, Polytechnique Montreal, Canada

Guided Wave Antennas and Other Complex Structures for Applications

Session Co-Chairs: Do-Hoon Kwon, University of Massachusetts Amherst; Ryan Sessions, University of Arizona

TU-A1.4P.1 **13:20**

A Dual-linear Polarized Beam-Scanning Holographic Antenna using Compact Pillbox Feeding System

Chan Yeong Park, Donghyun Kim, Seung Hun Cha, Young Joong Yoon, Yonsei University, Korea (South)

TU-A1.4P.2 **13:40**

A Spoof Surface Plasmon Polaritons-Based Dual Band Shared Aperture Antenna

Tian Liang, Yongsheng Pan, Yang Cheng, Yuandan Dong, University of Electronic Science and Technology of China, China

TU-A1.4P.3 **14:00**

An Evaluation and Modeling of Scattering Parameters of an Reconfigurable Intelligent Surface (RIS) as a Function of Incident and Reflected Angles

Sakib Reza, Sunanda Roy, Ifana Mahbub, The University of Texas at Dallas, United States

TU-A1.4P.4 **14:20**

A Single-Layer Metasurface Structure for Forward-to-Backward Scanning Applications

Hakjune Lee, Do-Hoon Kwon, University of Massachusetts Amherst, United States

TU-A1.4P.5 **14:40**

A Luneburg Lens Inspired Bessel Beam Launcher

Ryan Sessions, Hao Xin, University of Arizona, United States

Break **15:00**

TU-A1.4P.6 **15:20**

A Simple Defected Ground Structure to Reduce Backside Radiation for Biomedical Applications

Tasin Nusrat, Sayan Roy, South Dakota Mines, United States

TU-A1.4P.7 **15:40**

Bespoke Luneburg Lens for Two-Dimensional Beam-Steering Antennas for SatComms on the Move

Aakash Bansal, Harvinder Nagi, Paul Febvre, Satellite Applications Catapult, United Kingdom; William Whittow, Loughborough University, United Kingdom

TU-A1.4P.8 **16:00**

Detecting Solid Sulfur Deposition using Dual-Band Antenna

Sharif Iqbal Mitu Sheikh, Musab Magam, Hussain Attia, Qureshi Khurram, King Fahd University of Petroleum & Minerals, Saudi Arabia

The Antennas and Propagation Society in 2033 : A Decade of Opportunities for Progress in Diversity, Equity and Inclusion

Session Co-Chairs: Susan C. Hagness, University of Wisconsin - Madison; Claire Migliaccio, Université Côte d'Azur

WE-SP.1A.1 **08:00**

An understanding of terms in Diversity Equity and Inclusion (DE&I) initiatives: Perspectives from the IEEE AP-S DE&I Committee

Claire Migliaccio, Université Côte d'Azur, France

WE-SP.1A.2 **08:20**

Advancing Diversity, Equity, and Inclusion in the IEEE Antennas and Propagation Society: An Early-Career Researcher's Perspective

Hai-Han Sun, Nanyang Technological University, Singapore

WE-SP.1A.3 **08:40**

Diversity, Equity and Inclusion Perspective via the Women in Engineering Column of the IEEE Antennas and Propagation Magazine

Francesca Vipiana, Politecnico di Torino, Italy

WE-SP.1A.4 **09:00**

Progress in Diversifying the Editorial Board of the IEEE Transactions on Antennas and Propagation

Danilo Erricolo, University of Illinois Chicago, United States

WE-SP.1A.5 **09:20**

Project Connect: A Model for Immersive Professional Development to Broaden Participation of Future Microwave Engineers

Rhonda Franklin, University of Minnesota, United States; Rashaunda Henderson, University of Texas at Dallas, United States; Tom Weller, Oregon State University, United States

Break **09:40**

WE-SP.1A.6 **10:00**

An Industry Perspective of the Importance of DEI in Workforce Development

Dalma Novak, Octane Wireless, United States

WE-SP.1A.7 **10:20**

Diversifying the Engineering Faculty Hiring Pool

Kathleen Melde, David Hahn, Liesl Folks, University of Arizona, United States

WE-SP.1A.8 **10:40**

Fostering an Inclusive Applied Electromagnetics Research Group: A 25-Year Perspective in ECE at the University of Wisconsin-Madison

Susan Hagness, University of Wisconsin-Madison, United States

WE-SP.1A.9 **11:00**

The Value of "Being Present" In Achieving Diversity, Equity, Inclusion, and the Sense of Belonging

Mahta Moghaddam, University of Southern California, United States

WE-SP.1A.10 **11:20**

APS 2033: A Future for Women in Electromagnetics

Cynthia Furse, University of Utah, United States

Characterization and Deployment of Passive Sensor Arrays for Astronomy and Other Applications

Session Co-Chairs: Karl Warnick, Brigham Young University; Amit Vishwas, Cornell University; Alex Dunning, CSIRO; Dirk I. L. de Villiers, Stellenbosch University

WE-SP.2A.1 **08:00**

Assembling the Cryogenic Front-end for the ALPACA Phased Array Feed

Amit Vishwas, George Gull, Stephen Parshley, German Cortes-Medellin, Donald Campbell, Terry Herter, Cornell University, United States; Christopher Groppi, Arizona State University, United States; Mitchell Burnett, Karl Warnick, Brian Jeffs, Brigham Young University, United States

WE-SP.2A.2 **08:20**

A wideband cryogenic phased array receiver for radio astronomy

Alex Dunning, Steve Barker, Nick Carter, Paul Roberts, Aaron Chippendale, Yoon Chung, Xinping Deng, Paul Doherty, Douglas Hayman, Daniel George, Kanapathippillai Jeganathan, Natasha Maimbo, Peter Roush, Sean Severs, Robert Shaw, Stephanie Smith, Jason Van Aardt, CSIRO, Australia

WE-SP.2A.3 **08:40**

Towards Accelerating the Feed Design of a Series of Different Reflector Antennas

Tim Stek, Eindhoven University of Technology, Netherlands; Dirk I. L. de Villiers, Stellenbosch University, South Africa; Elmine Meyer, Eindhoven University of Technology, Netherlands; David S. Prinsloo, The Netherlands Institute for Radio Astronomy (ASTRON), Netherlands

WE-SP.2A.4 **09:00**

Wideband Feed and Reflector Ground Shield for the Deep Synoptic Array (DSA-2000)

Jonas Flygare, David Woody, California Institute of Technology, United States

WE-SP.2A.5 **09:20**

Performance Estimates of the 18-meter ngVLA Reflector System with Main Reflector Rim Extension

Dirk De Villiers, Stellenbosch University, South Africa; Robert Lehmensiek, National Radio Astronomy Observatory, United States

Break **09:40**

WE-SP.2A.6 **10:00**

Design Considerations for Focal-Plane Array Antennas for 6G Millimeter-Wave Backhaul Links

Viktor Chernikov, Artem Vilenskiy, Marianna Ivashina, Chalmers University of Technology, Sweden

WE-SP.2A.7 **10:20**

Array Mutual Impedances Can Be Determined From Antenna Range Pattern Measurements

Karl Warnick, David Buck, Brigham Young University, United States; Rob Maaskant, Chalmers University, Sweden; David Kelley, Bucknell University, United States; David Davidson, Curtin University, Australia

WE-SP.2A.8 **10:40**

MoM modeling of thin wires with finite conductivity for radio astronomy applications

David Davidson, Curtin University, Australia; Karl Warnick, Brigham Young University, United States

WE-SP.2A.9 **11:00**

Investigating Adverse Low-frequency Effects of Log-periodic Dipole Antenna Resonant Radiation

Georgios Kyriakou, Pietro Bolli, National Institute of Astrophysics, Italy

WE-SP.2A.10 **11:20**

Array Element Model with Improved Accuracy for LOFAR Radiotelescope

Peter Petkov, Technical University of Sofia, Bulgaria; Neda Emami, Fluidcodes LLC, United Arab Emirates

Microwave Engineering and Design for Biomedical Applications

Session Co-Chairs: Stavros Koulouridis, University of Patras; Elizaveta Motovilova, Weill Cornell Medicine; Erdem Topsakal, Virginia Commonwealth University

WE-A5.1A.1 **08:00**

Bi-directional Stretchable Capacitors for Self-tuning MRI Receive Coils

Elizaveta Motovilova, Weill Cornell Medicine, United States; Jana Vincent, Victor Taracila, Fraser Robb, GE Healthcare, United States; Ek Tsoon Tan, Darryl Sneag, Hospital for Special Surgery, United States; Simone Angela Winkler, Weill Cornell Medicine, United States

WE-A5.1A.2 **08:20**

Electromagnetic Scanning System for Pneumothorax Classification

Paschalina Foti, Stavros Koulouridis, University of Patras, Greece

WE-A5.1A.3 **08:40**

Portable Electromagnetic Multi-Band Resonator for Instantaneous SARS-CoV-2 Detection

Rayan AlSayed Ali, Nader Shafi, Fatima Asadallah, Youssef Tawk, Joseph Costantine, Rouwaida Kanj, Habib Alkalamouni, Hassan Zaraket, Rachel Njeim, Assaad Eid, American University of Beirut, Lebanon

WE-A5.1A.4 **09:00**

Wearable Flexible Body-Adaptable Frequency Reconfigurable Filter for Muscle Contraction Monitoring

Zaynab Attoun, Nader Shafi, Youssef Tawk, Joseph Costantine, Elie Shammas, American University of Beirut, Lebanon

WE-A5.1A.5 **09:20**

Tri-axial H-Field Sensor with Frequency-shaped Response in the band 400 MHz - 6 GHz

Julian Garnica, Juan Felipe González Pardo, Juan Sebastián Chávez Martinez, Universidad Nacional de Colombia, Colombia; Germán Augusto Ramírez Arroyave, EPFL, Switzerland; Javier Leonardo Araque Quijano, Universidad Nacional de Colombia, Colombia

Break **09:40**

WE-A5.1A.6 **10:00**

Alternating-Frequency Microwave Hyperthermia: Preliminary Results

Gulsah Yildiz, Istanbul Technical University, Turkey; Erdem Topsakal, Virginia Commonwealth University, United States; Tuba Yilmaz, Ibrahim Akduman, Istanbul Technical University, Turkey

WE-A5.1A.7 **10:20**

Assessing the Performance of EM-Functionalized PANI-CA Sensors for Varying Geometries

Balaji Dontha, Anthony Annerino, Pelagia-Irene Gouma, Asimina Kiourti, The Ohio State University, United States

WE-A5.1A.8 **10:40**

Factors Affecting the RF-induced Heating for the Electrodes Partially Inserted inside Human Body at 1.5T MRI

Md Zahidul Islam, Wei Hu, Ran Guo, Ji Chen, Univ of Houston, United States

Metamaterial Applications for Antennas

Session Co-Chairs: Sawyer Campbell, The Pennsylvania State University; Evangelos Vassos, University of Birmingham

WE-A2.1A.1 **08:00**

3D-Printed Conformal Metamaterial Lens with Multiple Beam Steering Functionalities

Noureddine MELOUKI, Fahad Ahmed, Peyman PourMohammadi, Hassan Naseri Gheisanab, Amjad Iqbal, Tayeb A. DENIDNI, Institut national de la recherche scientifique, Université du Québec, Canada

WE-A2.1A.2 **08:20**

3D Printed Polarisation Insensitive Wideband Metasurfaces for Dynamic Polarization Conversion and Beam Shaping

Jiexin Lai, Jianfeng Zhu, Yang Yang, University of Technology Sydney, Australia

WE-A2.1A.3 **08:40**

A Circularly Periodic Multi-band High-Impedance Surface Integrated with a Spiral Antenna

Kshitij Lele, Chris Bartone, Ohio University, United States

WE-A2.1A.4 **09:00**

Toward Hyper-Compact Rotman Lenses: Meta-Transmission Line Design and Characterization

Bharath G. Kashyap, Rodolfo Diaz, Georgios C. Trichopoulos, Arizona State University, United States

WE-A2.1A.5 **09:20**

Performance Charateristics of SIW-based BPF with Square-shaped CSRR Incorporation

Junas Haidi, Achmad Munir, Institut Teknologi Bandung, Indonesia

Break **09:40**

WE-A2.1A.6 **10:00**

Wideband All-Dielectric Reflector at 100 GHz for 6G Communications

Rocio Rodriguez-Cano, Aalborg University/Penn State University, Denmark; Michael Lanagan, Penn State University, United States

WE-A2.1A.7 **10:20**

Metamaterial Phase-Shifter Utilizing a Compliant Mechanism Approach

Galestan Mackertich-Sengerdy, Sawyer Campbell, Pingjuan Werner, Douglas Werner, The Pennsylvania State University, United States

WE-A2.1A.8 **10:40**

Electro-mechanically Tunable Low-Loss mm-wave LP to LHCP or RHCP Conversion Metasurface

Evangelos Vassos, Alexandros Feresidis, University of Birmingham, United Kingdom

WE-A2.1A.9 **11:00**

Cost-effectiveness signal compensation using modular intelligence reflecting surface

Minjae Lee, Junghun Lee, Sungjoon Lim, Chung-Ang University, Korea (South)

Hybrid Numerical Methods

Session Co-Chairs: Mei Song Tong, Tongji University; Shahid Ahmed, Ansys, Inc.

WE-A3.1A.1 **08:00**

Characteristic Basis Function Method Using Single High-Level Basis Function Per Subdomain For Efficient Analysis of Large Periodic Array Antennas

Tomislav Marinovic, Multiverse Engineering, Croatia (Hrvatska); Raj Mittra, University of Central Florida, United States

WE-A3.1A.2 **08:20**

Performance Analysis of the Lander's UHF Antenna for the Mars Sample Return Campaign

alessio mancini, joseph vacchione, sara manafi, Jet Propulsion Laboratory, United States

WE-A3.1A.3 **08:40**

Broadband Green'sFunction-Multiple Scattering Theory for Fast Band Solutions of Vector Electromagnetic Waves in 3D Perioidc Strutures

Tien-Hao Liao, National Taipei University of Technology, Taiwan; Leung Tsang, University of Michigan, United States; Shurun Tan, Zhejiang University/University of Illinois Urbana-Champaign Institute, China; Xiaolan Xu, Jet Propulsion Laboratory, United States

WE-A3.1A.4 **09:00**

Full-Spectrum Approach to Electromagnetic Coupling into Complex Enclosures

Robert Burkholder, Godfrey Kimball, David Nippa, Secil Dogan, Joel Johnson, Julio De Lima Nicolini, Indranil Nayak, Fernando Teixeixa, Christa McKelvey, Teh-Hong Lee, Richard Ridgway, The Ohio State Univesity, United States

WE-A3.1A.5 **09:20**

HFSS Hybrid Electromagnetic Simulation Accelerates Radome Design

Shahid Ahmed, Ansys, Inc., United States

Break **09:40**

WE-A3.1A.6 **10:00**

The Direct Spectral Projection Model for Electromagnetic Scattering

Dayalan Kasilingam, Anthony Fascia, Vidyasagar Sivalingam, University of Massachusetts Dartmouth, United States

WE-A3.1A.7 **10:20**

Dynamical Modeling for Electromagnetic Problems with Changeable Objects Based on a Truly-Meshless Method

Min Ye, Yu Xin Li, Qiu Ming Huo, Mei Song Tong, Tongji University, China

WE-A3.1A.8 **10:40**

A Hybrid Scheme for Solving Volume-Surface Integral Equations with Generalized Media

Min Ye, Qiu Ming Huo, Yu Xin Li, Mei Song Tong, Tongji University, China

WE-A3.1A.9 **11:00**

Efficient Electromagnetic Simulation of Large Quasi-periodic Arrays Based on FEM-BEM-DDM

Weijian Ran, Ming Jiang, Xiong Yang, University of Electronic Science and Technology of China, China; Yin Li, Peng Cheng Laboratory, China; Jun Hu, University of Electronic Science and Technology of China, China

Metasurfaces, Arrays, RIS

Session Chair: Ramakrishna Janaswamy, University of Massachusetts Amherst

WE-A2.2A.1 **08:00**

Directional Metasurface Using Transistor-Loaded Circularly Polarized Antenna Elements

David Chatzichristodoulou, Photos Vryonides, Dimitra Psychogiou, Symeon Nikolaou, Frederick Research Center, Cyprus

WE-A2.2A.2 **08:20**

Characterization of Space-Time Coding Metasurface Enabled Communication Systems from An Electromagnetic Information Perspective

Xuyang Bai, Shurun Tan, Zhejiang University, China

WE-A2.2A.3 **08:40**

Direction of arrival (DoA) estimation using irregular arrays

Sajad Eslamzaeh, Ramakrishna Janaswamy, University of Massachusetts Amherst, United States

WE-A2.2A.4 **09:00**

Enhancement of Direction-of-Arrival Estimation Accuracy With Using Antenna Arrays Composed of Diverse Elements

Ruyu Ma, Xiuyin Zhang, South China University of Technology, China

WE-A2.2A.5 **09:20**

26.5/39.5 GHz Millimeter-Wave Phased Arrays Utilizing Microstrip Patch Antenna Elements for 5G Wireless Communication Applications

Navid Naseh, Mohammad Ghaedi Bardeh, Jierui Fu, Kamran Entesari, Texas A&M University, United States

Break **09:40**

WE-A2.2A.6 **10:00**

Intelligent Polarization Reconfigurable Surface for S-Band Applications

Muhammad Sumaid, Wajeeh Hassan, Ahmad Javed, Adnan Nadeem, Nosherwan Shoaib, National University of Sciences and Technology (NUST), Pakistan; David Chatzichristodoulou, Symeon Nikolaou, Frederick Research Center (FRC), Cyprus

WE-A2.2A.7 **10:20**

Low Complexity, 1-Bit Wideband Phase Shifter for Millimeter Wave Reconfigurable Intelligent Surfaces

Tatiana Valera, Satheesh Bojja-Venkatakrishnan, Stavros Koulouridis, John Volakis, Florida International University, United States

Numerical Analysis Strategies for Applications II

Session Co-Chairs: Yaniv Brick, Ben-Gurion University of the Negev; Julio Nicolini, Ohio State University

WE-A3.2A.1 **08:00**

Reduced-Order Mode Discovery in Arbitrary Cavities via Proper Orthogonal Decomposition

Julio Nicolini, Fernando Teixeira, Robert Burkholder, Ohio State University, United States

WE-A3.2A.2 **08:20**

Characteristic Mode Decomposition of Polarizability Tensors

Ana C. Escobar, Juan D. Baena, Universidad Nacional de Colombia, Colombia; Lukas Jelinek, Czech Technical University in Prague, Czech Republic

WE-A3.2A.3 **08:40**

TM Polarized Plane Wave Scattering by a Conducting Plate with Multiple Holes

Cuong Manh Bui, Hiroshi Shirai, Chuo University, Japan

WE-A3.2A.4 **09:00**

A Differentiable Measure of Matrix Coherence

Jonathan Kelley, The University of Texas at Austin, United States; Yaniv Brick, Ben-Gurion University of the Negev, Israel; Ali Yilmaz, The University of Texas at Austin, United States

WE-A3.2A.5 **09:20**

Comparison Between the Fields Modeled by a Circular Cylinder and a Screen in the Transition Region

Xin Du, Jun-ichi Takada, Tokyo institute of technology, Japan

Break **09:40**

WE-A3.2A.6 **10:00**

Blockwise vs. and General MNA for MOR

Rasul Choupanzadeh, Ata Zadehgol, University of Idaho, United States

WE-A3.2A.7 **10:20**

Flexion Effect on the Radiofrequency-induced Heating for Modular External Fixation

Xiaolin Yang, Jianfeng Zheng, Ji Chen, University of Houston, United States

WE-A3.2A.8 **10:40**

Bunching Effects at Emitted Radiation from GeV Electrons in a Strong Laser at Future TW Experiments

Huber Nieto-Chaupis, Universidad Autónoma del Perú, Peru

WE-A3.2A.9 **11:00**

HFSS Auto Solver Combining Direct and Iterative Methods Revolutionizes Full-Wave FEM Electromagnetics

Shahid Ahmed, Ansys, Inc., United States

Phased-Array Antennas: Theory

Session Co-Chairs: Binbin Yang, North Carolina Agricultural and Technical State University; Sanghamitro Das, San Diego State University

WE-A1.1A.1 **08:00**

A New Element Pattern Model Enabling Agile Optimization of Modern Phased Arrays

Colin Mussman, Douglas Werner, The Pennsylvania State University, United States

WE-A1.1A.2 **08:20**

General Analytical EM Model for Active Impedance of 2D PAA with Equivalent Magnetic Currents

Mahmoud Mostafa, Wael Abdel-Wahab, Safieddin Safavi-Naeini, University of Waterloo, Canada

WE-A1.1A.3 **08:40**

Reduction of Phase Shifters in Planar Phased Arrays by using Random Subarray Technique

Juan L. Valle, Marco A. Panduro, Carlos A. Brizuela, David H. Covarrubias, CICESE, Mexico; Carlos Del Río Bocio, UPNA, Spain; Alberto Reyna, UAT, Mexico

WE-A1.1A.4 **09:00**

Active-Isolation Improvement Based on Phase-Only Optimization Techniques

Hui Ying Hou, Yu Jian Cheng, University of Electronic Science and Technology of China, China

WE-A1.1A.5 **09:20**

A Robust Minimum Mainlobe Low Sidelobe Beamforming Method Based on Convex Optimization

Shijia Yi, Haining Yang, Yuting Liu, Aya Li, Tingjun Li, Yujian Cheng, University of Electronic Science and Technology of China, China

Break **09:40**

WE-A1.1A.6 **10:00**

A High-Resolution Low-Sidelobe Beamforming Method for Sparse Antenna Arrays Based on CS-GA

Haining Yang, Meili She, Yutong Tian, Jiacheng Shen, Tingjun Li, Na Li, Yujian Cheng, University of Electronic Science and Technology of China, China

WE-A1.1A.7 **10:20**

Isolation between Nested OAM (Orbital Angular Momentum) Antennas

Unaiza Tariq, Duncan MacFarlane, Southern Methodist university, United States; Solyman Ashrafi, NxGen Partners, United States

WE-A1.1A.8 **10:40**

3D Phased Array Architecture for Field-of-View Enhancement in Satcom COTM Terminals

Federico Boulos, Georg Frederik Riemschneider, Stefano Caizzone, German Aerospace Center (DLR), Germany

WE-A1.1A.9 **11:00**

A New Class of 2D Scanning Planar TTD Multibeam Networks

Dimitrios Lialios, Constantinos Zekios, Stavros Georgakopoulos, Florida International University, United States

WE-A1.1A.10 **11:20**

Characterization of SPS Multiple-Beam-Scan Antenna for Wireless Platforms Emulation

Eugene Ngai, Hann-Jann, United States; Reuven Shavit, Ben-Gurion University, Israel

Reconfigurable Antennas and Unit Cell Structures

Session Co-Chairs: Jayanti Venkataraman, Rochester Institute of Technology; Eva Rajo-Iglesias, University Carlos III of Madrid; Xiulong Bao, University College Dublin

WE-A1.2A.1 **08:00**

Tunable Notch Bands UWB Antenna Based on Variable Liquid Metal Coupling Length

Vahid Sharbati, Xiulong Bao, John Healy, Nan Zhang, University College Dublin, Ireland

WE-A1.2A.2 **08:20**

Passive Reconfigurable Dual Linear and Dual Circular Polarization with CLRH-TL for Triangular Microstrip Patch Array

Alexander Dacey, Jayanti Venkataraman, Rochester Institute of Technology, United States

WE-A1.2A.3 **08:40**

A Frequency-Reconfigurable Filtenna for UWB and 5G Sub-6 GHz Band Applications

Caio Abrantes, Alexandre Serres, Juliete Souza, Alisson Cavalcanti, Georgina Serres, Federal University of Campina Grande, Brazil

WE-A1.2A.4 **09:00**

Dual Band Independent Phase Shift Control Reconfigurable Transmitarray Unit Cell

Qasim Ali, Beijing Institute of Technology, China; Xiao Yu, Yat-Sen University, Guangzhou, China; Shozab Shafiq, Beijing Institute of Technology, China; Syed Muzahir Abbas, Macquarie University, Australia; Houjun Sun, Beijing Institute of Technology, China

WE-A1.2A.5 **09:20**

Multi-Band CubeSat Antenna and Design Considerations for Space Environment

Rifaqat Hussain, Abdullah Al-Garni, Sheikh Iqbal, KFUPM, Saudi Arabia; Qammar Abbasi, University of Glasgow, United Kingdom

Printed Circuits, Antennas and Arrays

Session Co-Chairs: Rainee Simons, NASA Glenn Research Center; Satish K. Sharma, San Diego State University

WE-UB.1A.1 **08:00**

Matching and Decoupling Networks for Two-Element Antenna Arrays: Design Method and Experimental Characterization

Son Vu, Hung Luyen, The University of North Texas, United States

WE-UB.1A.2 **08:20**

Grating Lobe Cancellation by Null Steering in a Wideband Phased Array Antenna with 1λNter-Element Spacing

Sanghamitro Das, Satish K. Sharma, San Diego State University, United States; Jia-Chi S. Chieh, NIWC Pacific, United States

WE-UB.1A.3 **08:40**

Dual-Band Multi-Polarization Microstrip Patch Antenna Arrays for mm-Wave Applications

Braden Smyth, Ashwin Iyer, University of Alberta, Canada

WE-UB.1A.4 **09:00**

Effects of Nonlinearities on Multiple Transmitting Antennas

Stephen Bass, Jennifer Bernhard, The University of Illinois Urbana-Champaign, United States

WE-UB.1A.5 **09:20**

Compact Dual-Polarized UWB Antenna Optimized for UAV-based Low Frequency Software Defined Radar

Piril Nergis, Kazem Bakian-Dogaheh, Sepehr Eskandari, Mahta Moghaddam, University of Southern California, United States

Break **09:40**

WE-UB.1A.6 **10:00**

Feasibility of a quasi-isotropic radiation pattern by a millimeter-wave three-dimensional folded monopole antenna with proximity to a metal plate

Jiro Hirokawa, Renkai Zhao, Takashi Tomura, Tokyo Institute of Technology, Japan

WE-UB.1A.7 **10:20**

Pad Printing for Non-Planar RF Circuits

Andrew Luce, Yuri Piro, Guinevere Strack, Emily Lamport, University of Massachusetts Lowell, United States; Susan Trulli, Elicia Harper, Nahid Rahman, Raytheon, United States; Alkim Akyurtlu, University of Massachusetts Lowell, United States; John Lovaasen, Raytheon, United States

WE-UB.1A.8 **10:40**

Design of Broadband and High Gain Miniaturized HMSIW Antenna with Band Rejection Filter

Chia-Mei Peng, Feng Chia University, Taiwan; I-Fong Chen, Jinwen University of Science and Technology, Taiwan

WE-UB.1A.9 **11:00**

High gain 1-D Centipede-Like End-Fire Leaky wave Antenna

Vishakha , Jayanta Mukherjee, Indian Institute of Technology Bombay, India

Human Body Interactions with Electromagnetic Fields

Session Co-Chairs: Erdem Topsakal, Virginia Commonwealth University; Giuseppe Carluccio, New York University

WE-UK.1A.1 **08:00**

The Role of Skin in mm-Wave Exposure of Human Body

Gerardo Di Martino, Alessio Di Simone, Antonio Iodice, Daniele Riccio, Giuseppe Ruello, University of Napoli Federico II, Italy

WE-UK.1A.2 **08:20**

High Gain, Incognito, On-Body Passive RFID Design

Michael Suche, Erdem Topsakal, Virginia Commonwealth University, United States

WE-UK.1A.3 **08:40**

Deep Learning-Based Estimation of Specific Absorption Rate Induced by High-Field MRI RF Head Coils

Xi Wang, Xiaofan Jia, Nanyang Technological University, Singapore; Shaoying Huang, Singapore University of Technology and Design, Singapore; Abdulkadir C. Yucel, Nanyang Technological University, Singapore

WE-UK.1A.4 **09:00**

Removing Antenna Effects using an Invertible Neural Network for Improved Estimation of Multilayered Tissue Profiles using UWB Radar

Yuyi Chang, Nithin Sugavanam, Emre Ertin, The Ohio State University, United States

WE-UK.1A.5 **09:20**

Optimization of the Permittivity of the Transfer Medium in MRgFUS to Maximize SNR and Transmit Efficiency for MRI

Giuseppe Carluccio, Karthik Lakshmanan, Ryan Brown, Christopher Collins, New York University, United States

Therapeutic and Rehabilitative Applications

Session Co-Chairs: Luis J. Gomez, Purdue University; Erdem Topsakal, Virginia Commonwealth University; Ahona Bhattacharyya, Michigan State University

WE-UK.2A.1 **10:00**

Uncertainty Quantification of the tDCS-Induced Electric Fields Subjected to Inter-Subject and Inter-Session Variabilities

Xi Wang, Qianyi Xu, Xiaofan Jia, Nanyang Technological University, Singapore; Luis J. Gomez, Purdue University, United States; Abdulkadir C. Yucel, Nanyang Technological University, Singapore

WE-UK.2A.2 **10:20**

Patient-Specific Beamformer Design for Microwave Hyperthermia: Estimation of Spatially Averaged Dielectric Properties using Transmission Measurements

Tessa A. Haldes, University of Wisconsin - Madison, United States; Ahona Bhattacharyya, Jeffrey A. Nanzer, Michigan State University, United States; Susan C. Hagness, University of Wisconsin - Madison, United States

WE-UK.2A.3 **10:40**

Simulating the Effects of Electrically Stimulating the Dentate Gyrus to Enhance Hippocampus Stimulation Techniques for Memory Prosthesis

Shayan Farzad, Tianyuan Wei, Pragya Kosta, Jean-Marie Bouteiller, Ted William Berger, Gianluca Lazzi, USC, United States

WE-UK.2A.4 **11:00**

Actively Cooled, Alumina Filled Cylindrical Waveguide for Microwave Ablation

Jonathan Lundquist, Erdem Topsakal, Virginia Commonwealth University, United States

WE-UK.2A.5 **11:20**

Utilizing Convolutional Neural Networks for Damage Prediction in Electrical Stimulation of Peripheral Nerves

Jinze Du, Andres Morales, Pragya Kosta, Jean-Marie Bouteiller, Gianluca Lazzi, University of Southern California, United States

Wireless Communication and Sensor Networks

Session Chair: Leyre Azpilicueta, Unavarra

WE-UB.2A.1 **08:00**

High-Accuracy Localization Using Spectrally-Sparse Two-Way Time Transfer for Distributed Phased Arrays

Ahona Bhattacharyya, Jason Merlo, Anton Schlegel, Jeffrey Nanzer, Michigan State University, United States

WE-UB.2A.2 **08:20**

Decentralized Frequency Alignment for Distributed Beamforming Using an Interference-Tolerant Frequency Hopping Two-Tone Waveform

William Torres, Mohammed Rashid, Michigan State University, United States; Tammy Chang, Lockheed Martin, United States; Jeffrey Nanzer, Michigan State University, United States

WE-UB.2A.3 **08:40**

Assessment of a Bike to Bike Communication System for its Integration within a Smart City Platform

Anas Al-Rahamneh, José Javier Astrain, Jesús Villadangos, Hicham Klaina, Imanol Picallo, Peio Lopez-Iturri, Francisco Falcone, Public University of Navarre, Spain

WE-UB.2A.4 **09:00**

On the Partial RSS-Connectivity Based Localization in Wireless Sensor Networks

Nour Zaarour, Nahi Kandil, Nadir Hakem, Université du Québec en Abitibi-Témiscamingue, Canada

WE-UB.2A.5 **09:20**

Implementation of a Multitone Digital Predistortion Method for 5G Applications in OFDM Systems

Abdullah Eroglu, Jorhan Ordosgoitti, North Carolina A&T State University, United States

Advances in Wireless Power Transfer

Session Chair: Yahia M M Antar, Royal Military College of Canada

WE-A5.2A.1 **10:00**

Design of T/R Module for Far-Field WPT Applications with Third Harmonic Receiver Tracking System

Kundan Surse, Gopika R., Chinmoy Saha, Indian Institute of Space Science and Technology, Thiruvananthapuram, India; Yahia M M Antar, Royal Military College of Canada, Canada

WE-A5.2A.2 **10:20**

On Vehicular Model Reduction for Antenna Simulation Using Spherical Wave Expansion

Nandan Dutta Chaudhury, Volkswagen AG and Technische Universität Ilmenau, Germany; Lukas Berkelmann, Bert Jannsen, Volkswagen AG, Germany; Joerg Robert, Technische Universität Ilmenau, Germany

WE-A5.2A.3 **10:40**

Performance evaluation of the common mode noise filter for battery charging system in a vehicle

Jaehoon Kim, Altair Engineering Inc., United States; Yun-kyoung Ko, FEV Europe GmbH, Germany

Adaptive Radar and Array Signal Processing Techniques

Session Chair: Amedeo Capozzoli, University of Naples Federico II

WE-UC.1A.1 **08:00**

AN ADAPTIVE VARIATIONAL MODAL DECOMPOSITION METHOD FOR VITAL SIGNS EXTRACTION

Haoyu Li, Hongyang An, Han Jiang, Peng Chen, Zhongyu Li, Junjie Wu, University of Electronic Science and Technology of China, China

WE-UC.1A.2 **08:20**

Study of Various Polarization Effects on the Target's Extracted Resonance Features

Prajakta Sathe, Amitabha Bhattacharya, Indian Institute of Technology, Kharagpur, India

WE-UC.1A.3 **08:40**

Detection and Discrimination of Closely Located Multiple Targets Using a Down-Looking Ground Penetrating Radar in the Presence of a Dominant Conductor Target

Gönül Sayan, Furkan ŞIK, Middle East Technical University, Turkey

WE-UC.1A.4 **09:00**

Design of Low-Cost Active Reflectors for Advanced InSAR Applications: First Results

Amedeo Capozzoli, Claudio Curcio, Gerardo Di Martino, Diego Di Martire, Alessio Di Simone, Angelo Liseno, University of Naples Federico II, Italy

WE-UC.1A.5 **09:20**

Ground Penetrating Radar Techniques for Estimating the Diameter of Reinforcing Bars in Concrete

Hai-Han Sun, Weixia Cheng, Zheng Fan, Nanyang Technological University, Singapore

Near Field Imaging Methods

Session Co-Chairs: Stavros Vakalis, University of South Florida; Dipankar Mitra, UWLAX

WE-A4.1A.1 **08:00**

Microwave Nondestructive Testing Using an Array of Near-Field Sensors

Yuki Gao, Reza K. Amineh, Maryam Ravan, New York Institute of Technology, United States

WE-A4.1A.2 **08:20**

Near-Field Synthetic Aperture Radar Utilizing a Commercial V-Band MIMO Radar Sensor

Stavros Vakalis, University of South Florida, United States; Abdel Alsnayyan, Applied Research Associates, United States

WE-A4.1A.3 **08:40**

Enhancing Near-Field Microwave Holographic Imaging with Predicted Object Position

Maharshi Shah, Reza K Amineh, Maryam Ravan, New York Institute of Technology, United States

WE-A4.1A.4 **09:00**

A Hybrid DT-CNN Method for Buried Objects Profiling

Fatemeh Koohi, Maryam Hajebi, Hassan Daryanavard, University of Hormozgan, Iran; Ahmad Hoorfar, Villanova University, United States

WE-A4.1A.5 **09:20**

Object Localization Using Machine Learning

Jie Xu, Loyola Marymount University, United States

Break **09:40**

WE-A4.1A.6 **10:00**

Compact High-index Resonator Supercavity System with a Complementary Backplane Feed Element

Zahra Manzoor, Dimitrios Peroulis, Alexander Kildishev, Purdue University, United States

WE-A4.1A.7 **10:20**

Characteristic Modes Obtained Using Conventional Characteristic Mode Analysis And Singularity Expansion Method : A Comparison

Nandan Bhattacharyya, RCC Institute of Information Technology, India; Jawad Y. Siddiqui, Y.M.M. Antar, Royal Military College of Canada, Canada

WE-A4.1A.8 **10:40**

Ground Moving Target Detection Using Multi-Features under Antenna Array Crabbing

Rafi Ahmed, Hai Deng, Florida International University, United States

WE-A4.1A.9 **11:00**

An Approximate Model of Near Field RCS based on Physical Optics

Tom Malherbe, Raffaele D'ERRICO, Christophe Delaveaud, CEA-LETI, France; Philippe Pouliguen, DGA-AID, France

Microstrip Antennas II

Session Co-Chairs: Dean Arakaki, Cal Poly State University San Luis Obispo; Irene Wei Huang, Meta (Facebook)

WE-A1.3A.1 **08:00**

Compact Flexible Heart Rate Monitor Simulations

Jack Ellingson, Anritsu, United States; Dean Arakaki, Cal Poly State University San Luis Obispo, United States

WE-A1.3A.2 **08:20**

A Compact Narrow-Band Harmonic Tag for Harmonic Radar Applications

Cory Hilton, Jeffery A. Nanzer, Michigan State University, United States

WE-A1.3A.3 **08:40**

Compact Slot-Patch Antenna with Dual Circular Polarization

Chiara Scarselli, Francesca Pascarella, University of Pisa, Italy; Chiara Ciampalini, Free Space Srl, Italy; Guido Nenna, Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT), Italy; Agostino Monorchio, University of Pisa, Italy

WE-A1.3A.4 **09:00**

Electrically Small Loop Antenna with Horizontally Omnidirectional Radiation Pattern

Min Li, Yang Liu, Yuanxun Wang, University of California, Los Angeles, United States

WE-A1.3A.5 **09:20**

A Novel Dual Band Antenna for Radar and Imaging Applications

Asif Hassan, Md Nazim Uddin, Md Nurul Anwar Tarek, Elias A. Alwan, Florida International University, United States

Break **09:40**

WE-A1.3A.6 **10:00**

Design of Wideband Dual−Polarized Antenna with Comb−Shaped Patches

Rui Wang, Feng Yang, Tao Tian, Yalin Wen, Lei Li, University of Electronic Science and Technology of China, China

WE-A1.3A.7 **10:20**

Experimental Characterization of Ferrite Material Embedded Microstrip Antenna

Rheyuniarto Sahlendar Asthan, Junas Haidi, Tutun Juhana, Agustinus Agung Nugroho, Achmad Munir, Institut Teknologi Bandung, Indonesia

WE-A1.3A.8 **10:40**

Transparent Uniplanar Circular Polarized Antenna

Irene Wei Huang, Yasuo Morimoto, Sam Shiu, Jiang Zhu, Meta (Facebook), United States

WE-A1.3A.9 **11:00**

Finite Ground Plane Effects and Sensitivity Analysis of Microstrip Patch Antennas

Kimberly Taisacan, Nijo Tan, George Branner, Hung Tran, University of California, Davis, United States; B. Preetham Kumar, Sacramento State University, United States

Adaptive, Active, and Smart Antennas

Session Co-Chairs: Payam Nayeri, California Polytechnic State University; Yuandan Dong, University of Electric Science and Technology of China

WE-A1.4A.1 **08:00**

A Novel DoA Algorithm for Coherent Signals with Asymmetric Multipath Phase Delays Based on A Modified Toeplitz Matrix Reconstruction

Firas Dawod, Sayan Roy, South Dakota Mines, United States

WE-A1.4A.2 **08:20**

Digital Beamforming with Unsynchronized Arrays with Unknown Element Location Errors

Payam Nayeri, California Polytechnic State University, United States; Randy Haupt, Haupt Associates, United States

WE-A1.4A.3 **08:40**

Compact Adaptive Metamaterial-Loaded Pattern Reconfigurable Dielectric Resonator Antenna

Zhan Wang, Yuandan Dong, University of Electric Science and Technology of China, China

WE-A1.4A.4 **09:00**

Fast Inference Beamforming Prediction using Machine Learning

Sai Sampreeth Indharapu, Anthony Caruso, Kalyan C. Durbhakula, University of Missouri - Kansas City, United States

WE-A1.4A.5 **09:20**

Deep Q learning network based beamforming in the presence of a jammer

Jayakrishnan Vijayamohanan, Arjun Gupta, Christos Christodoulou, University of New Mexico, United States

Break **09:40**

WE-A1.4A.6 **10:00**

Investigation of Direction Finding Algorithms for a Circular Ring Array of Various Aperture Sizes

Kristopher Buchanan, Roanne Manzano-Roth, Sara Wheeland, Anthony Jones, Naval Information Warfare Center, Pacific, United States

WE-A1.4A.7 **10:20**

Direct Antenna Frequency Hopping and Beamsteering with Time-Modulated Arrays

Roberto Maneiro-Catoira, Julio Brégains, José Antonio García-Naya, Luis Castedo, CITIC Research Center, Universidade da Coruña, Spain

WE-A1.4A.8 **10:40**

An Effective Beamforming Method for Microstrip Linear Arrays

Abdullah Eroglu, Tamanna Islam, North Carolina A&T State University, United States

Advanced Materials and Manufacturing for Future Antenna Applications

Session Co-Chairs: Rajesh Paryani, Northrop Grumman; Sima Noghanian, CommScope Ruckus Networks

WE-SP.1P.1 **13:20**

On the Prospects of Stereolithography Method for 3D Printing of Future Microwave Devices with Low-Dk

Dipankar Mitra, University of Wisconsin-La Crosse, United States; Ryan Striker, University of North Dakota, United States; Tasin Nusrat, Venkataramana Gadhamshetty, South Dakota Mines, United States; Benjamin Braaten, North Dakota State University, United States; Sayan Roy, South Dakota Mines, United States

WE-SP.1P.2 **13:40**

Method for Tackling the Variations in the Material Properties of 3D Printed Substrates for Microstrip Antennas

Zere Iman, Zubair Akhter, Atif Shamim, King Abdullah University of Science and Technology, Saudi Arabia

WE-SP.1P.3 **14:00**

An Overview of Novel Antennas Manufactured via Charge-Programmed Multi-Material 3D Printing

Junbo Wang, Zhenpeng Xu, Zhen Wang, Ryan Hensleigh, Xiaoyu Zheng, Yahya Rahmat-Samii, University of California, Los Angeles, United States

WE-SP.1P.4 **14:20**

Materials Design for Charge-Programmed Additive Manufacturing of Antennas

Zhen Wang, Zhenpeng Xu, University of California, Berkeley, United States; Junbo Wang, Ryan Hensleigh, Yahya Rahmat-Samii, University of California, Los Angeles, United States; Xiaoyu Zheng, University of California, Berkeley, United States

WE-SP.1P.5 **14:40**

Advancements in Additively Manufactured Radio Frequency Connectors

Reena Dahle, Metamagnetics Inc., United States; Sima Noghanian, CommScope Ruckus Networks, United States

Break **15:00**

WE-SP.1P.6 **15:20**

Performance of Printed Antennas on Stretchable and Non-stretchable Textiles

Adria Kajenski, Guinevere Strack, Alkim Akyurtlu, University of Massachusetts Lowell, United States

WE-SP.1P.7 **15:40**

A J-band Fan-Beam 3-D Printed Reflector Antenna with Optimal Moment of Inertia for High Speed Scanning

Aditya Varma Muppala, Abdullah Alburadi, Kamal Sarabandi, University of Michigan, Ann Arbor, United States

WE-SP.1P.8 **16:00**

A 3D Printed One-piece Wideband Beamforming Network and Antenna Array

Wenbo Liu, Bailey Campbell, Gregory Huff, The Pennsylvania State University, United States

WE-SP.1P.9 **16:20**

Dual-Band 3D Multiferroic Antenna Stack for Passive Telemetry Sensors

Veeru Jaiswal, Ghaleb Al-Duhni, Satheesh Bojja Venkatakrishnan, Florida International University, United States; Pawan Gaire, Shubhendu Bhardwaj, University of Nebraska-Lincoln, United States; Markondeya Raj Pulugurtha, John L Volakis, Florida International University, United States

WE-SP.1P.10 **16:40**

Fully 3D Printed Antenna for C-V2X Communications

Adamantia Chletsou, Michigan State University, United States; Eric Newsom, Ford Motor Company, United States; John Papapolymerou, Michigan State University, United States

Millimeter-Wave and THz-Wave Antennas with Beam-Scanning and Multi-Beam Functions

Session Co-Chairs: Kunio Sakakibara, Nagoya Institute of Technology; Christian Waldschmidt, Ulm University; Maria Alonso-delPino, Delft University of Technology

WE-SP.2P.1 **13:20**

A Scalable 16-Element 76-to-81 GHz Phased Array Antenna-in-Package for Automotive Radar

Kevin Gu, Hadi Saedi Manesh, Neda Bathaei, Rick Heckler, Ray Haynes, Andrew Bonthron, Metawave Corporation, United States

WE-SP.2P.2 **13:40**

Time Division Duplex Beam Switching System Using a Common Multi-Port Junction Transceiver

Mansoor Dashti Ardakani, Hamed Tadayon, INRS University, Canada; Reza Karimian, Shahrokh Ahmadi, Mona Zaghloul, The George Washington University, United States

WE-SP.2P.3 **14:00**

On the Development of Scanning Lens Phased Arrays at 100 GHz

Maria Alonso-delPino, Sjoerd Bosma, Nick van Rooijen, Marco Spirito, Nuria Llombart, Delft University of Technology, Netherlands

WE-SP.2P.4 **14:20**

Improvement of beam-scanning gain of multi-beam lens antenna fed by circularly arranged horns with separated phase centers in E/H-planes

Yoshiki Sugimoto, Keiichi Hibi, Takanori Narita, Kunio Sakakibara, Nagoya Institute of Technology, Japan; Tuan Hung Nguyen, Le Quy Don Technical University, Viet Nam; Nobuyoshi Kikuma, Nagoya Institute of Technology, Japan

WE-SP.2P.5 **14:40**

Machine Learning Enhancement of a Luneburg Lens Amplitude-Only Direction-Finding Antenna

Theodore Prince, Gaeron Friedrichs, Mohamed Elmansouri, Dejan Filipovic, University of Colorado Boulder, United States

Break **15:00**

WE-SP.2P.6 **15:20**

A Flexible Measurement Setup for Far-Field Characterization of Reflectarrays above 200 GHz

Susanne Brandl, Mario Mueh, Christian Waldschmidt, Ulm University, Germany

WE-SP.2P.7 **15:40**

Millimeter-Wave Wire-Mesh Antenna Arrays for 3D-Printed Flexible Radars

Hong Tang, Bowen Zheng, Yunxi Dong, Yi Huang, Mohammad Haerinia, Hualiang Zhang, University of Massachusetts, Lowell, United States

WE-SP.2P.8 **16:00**

Dual-Port Endfire Millimeter Wave Reconfigurable Antenna with Optimized Pixel Surface

Shiwen Tang, Yujie Zhang, Junhui Rao, Tianrui Qiao, Chi-Yuk Chiu, Ross Murch, HKUST, China

WE-SP.2P.9 **16:20**

A Compact Dual-Polarized Magnetoelectric Dipole Antenna and Array with Wide Scanning Angle for 5G Millimeter Wave Applications

Chuanming Wu, Luyu Zhao, Xidian University, China

WE-SP.2P.10 **16:40**

Conformal Slot Antenna Array Fed by Metal Gap Waveguide/Cavity for Multi-Beam Radiation

Da-Wei Li, Hsi-Tseng Chou, National Taiwan University, Taiwan

Concept and Design Development of Innovative Reconfigurable Intelligent Surfaces (RIS)

Session Co-Chairs: Filippo Capolino, University of California, Irvine; Satish Sharma, San Diego State University

WE-SP.3P.1 **13:20**

A Novel Design Method of RIS Element with A Wideband Varactor-Tuned Example

Changhao Liu, Fan Yang, Shenheng Xu, Maokun Li, Tsinghua University, China

WE-SP.3P.2 **13:40**

Effects of Mismatch on IC-Equipped Programmable Metasurfaces with Multibeam Functionality

Kypros Kossifos, Julius Georgiou, Marco Antoniades, University of Cyprus, Cyprus

WE-SP.3P.3 **14:00**

Design and Integration of Control Circuitry for Reconfigurable Intelligent Surfaces

Aditya Shekhawat, Russell Raldiris Torres, Joshua Hulse, Georgios Trichopoulos, Arizona State University, United States

WE-SP.3P.4 **14:20**

Wave-Controlled RIS: a Novel Method for Reconfigurable Elements Biasing

Miguel Saavedra-Melo, Kasra Rouhi, Filippo Capolino, University of California, Irvine, United States

WE-SP.3P.5 **14:40**

Multifunctional Electronically Reconfigurable Electromagnetic Surfaces for Ka-band Antennas

Francesco Foglia Manzillo, Reda Madi, Samara Gharbieh, CEA-Leti, Univ. Grenoble-Alpes, France; Ronan Sauleau, Univ Rennes, CNRS, IETR - UMR 6164, France; Antonio Clemente, CEA-Leti, Univ. Grenoble-Alpes, France

Break **15:00**

WE-SP.3P.6 **15:20**

Metasurface-Based Reflecting Intelligence Surface for Frequency Division Multiplexing in Wireless Broadband Applications

Talha Arshed, Enrica Martini, Stefano Maci, University of Siena, Italy

WE-SP.3P.7 **15:40**

A Novel SWIPT Transmitter Based on Time-Domain-Coding Digital Metasurface

Zhen Jie Qi, Si Ran Wang, Qun Yan Zhou, Jun Yan Dai, Wankai Tang, Cheng Qiang, Tie Jun Cui, Southeast University, China

WE-SP.3P.8 **16:00**

Quaternion-Neural-Networks-Based Decoder for RIS-Aided Polarization-Space Modulation

Anders Buvarp, Kumar Vijay Mishra, Amir Zaghloul, Lamine Mili, Virginia Tech, United States

WE-SP.3P.9 **16:20**

Memory-Enhanced Evolutionary Strategy for QoS-Driven RIS Control

Francesco Zardi, Giacomo Oliveri, Marco Salucci, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy

WE-SP.3P.10 **16:40**

Transmit Reconfigurable Intelligent Surface (RIS) and Metasurface for Near-Field Integration Applications

Jungsuek Oh, Jaehoon Kim, Byeongjin Kim, Hogyeom Kim, Seoul National University, Korea (South)

Wideband and Multiband Phased Arrays

Session Co-Chairs: Ryan Green, Mississippi State University; Pedro Rodriguez-Garcia, L3Harris

WE-A1.1P.1 **13:20**

A Lightweight X-Ku Band Dual-Polarized Antipodal Vivaldi Antenna Array

Pedro Rodriguez-Garcia, Jim Pierpont, Josh Martin, Clayton Weatherly, Emily Tobar, Rob George, L3Harris, United States

WE-A1.1P.2 **13:40**

Ball Grid Array Integration of Wideband Planar Printed Array Apertures

Rick Kindt, Naval Research Laboratory, United States; Scott Nunes, Miguel Reynaga, Andy Piloto, Kyocera International, United States

WE-A1.1P.3 **14:00**

Design and Fabrication of an Ultra Wideband Millimeter-wave Array with 20:1 (2 - 40 GHz) Bandwidth.

Md Rakibul Islam, Satheesh Bojja Venkatakrishnan, Florida International University, United States; Gregory Mitchell, U.S. Army Research Laboratory, United States; John L. Volakis, Florida International University, United States

WE-A1.1P.4 **14:20**

Wideband Circularly Polarized Modular Active Phased Array for Vehicular Satellite Communication

Behzad Yektakhah, Abdelhamid Nasr, University of Michigan, United States; Abdel Halim Mohamed, AGC Automotive Americas, United States; Kamal Sarabandi, University of Michigan, United States

WE-A1.1P.5 **14:40**

An Integrated 5.8-GHz FMCW Phased Array Doppler Radar Utilizing Wideband Miniaturized TX/RX Patch Antenna Arrays

Navid Naseh, Mohammad Ghaedi Bardeh, Kamran Entesari, Texas A&M University, United States

Break **15:00**

WE-A1.1P.6 **15:20**

28-38 GHz Phased Array 5G Antenna Design for Future Smartphone Applications

Atta Ullah, University of Bradford, United Kingdom; Naser Parchin, Edinburgh Napier University, United Kingdom; Abubakar Salisu, University of Bradford, United Kingdom; Isah Musa Danjuma, Nigerian Defense Academy, Nigeria; Raed Abd-Alhameed, University of Bradford, United Kingdom

WE-A1.1P.7 **15:40**

Shared Aperture Triangular Antenna Array for Ka-band LEO Satellite Communication

Benjamin Falkner, Hengyi Zhou, Amit Mehta, Swansea University, United Kingdom

WE-A1.1P.8 **16:00**

Design and Modeling of the SuperDARN HF Log Periodic Array at the South Pole

James Breakall, Aayush Pandey, Greg Huff, William Bristow, Penn State University, United States; Ulrich Rohde, Federal University of the Armed Forces of Germany, Germany; Ajay Poddar, Synergy Microwave Corporation, United States

WE-A1.1P.9 **16:20**

Development of High Gain Reflectarray over Wide Bandwidth Using Fitting Method

Dauren Yedres, Kassen Dautov, Galymzhan Nauryzbayev, Mohammad Hashmi, Nazarbayev University, Kazakhstan

Machine Learning in Computational Electromagnetics

Session Co-Chairs: Amir Boag, Tel Aviv University; Jian-Ming Jin, University of Illinois at Urbana-Champaign

WE-A3.1P.1 **13:20**

Terahertz Antenna Design Using Machine Learning Assisted Global Optimization Techniques

Muhammad Zubair, University of Glasgow, United Kingdom; Mobayode O. Akinsolu, Wrexham Glyndŵr University, United Kingdom; Abdoalbaset Abohmra, Muhammad Imran, Bo Liu, Qammer Hussain Abbasi, University of Glasgow, United Kingdom

WE-A3.1P.2 **13:40**

Analysis of electromagnetic decoupling of an isolation barrier using machine learning

Jaeyoon Park, Jaeyul Choo, Andong National University, Korea (South)

WE-A3.1P.3 **14:00**

2X Faster Solution of Computational 2D Electrostatic Problems using Artificial Neural Network and Transfer Learning

Pawan Gaire, Shubhendu Bhardwaj, University of Nebraska-Lincoln, United States

WE-A3.1P.4 **14:20**

Hybrid Fourier Neural Network in Solving 2D Electrodynamic Equations in Multilayer Media

Botian Zhang, Yahya Rahmat-Samii, UCLA, United States

WE-A3.1P.5 **14:40**

A Hybrid Electromagnetic Optimization Method Based on Physics-Informed Machine Learning

Yanan Liu, University of Illinois at Urbana Champaign, United States; Hongliang Li, Jian-Ming Jin, University of Illinois at Urbana-Champaign, United States

Break **15:00**

WE-A3.1P.6 **15:20**

Physics-Informed Machine Learning for Efficient Modeling of High-Frequency Devices

Yanan Liu, Hongliang Li, Jian-Ming Jin, University of Illinois at Urbana-Champaign, United States

WE-A3.1P.7 **15:40**

2D Eigenmode Analysis Based on Physics Informed Neural Networks

Md Rayhan Khan, Constantinos L. Zekios, Florida International University, United States; Shubhendu Bhardwaj, University of Nebraska-Lincoln, United States; Stavros V. Georgakopoulos, Florida International University, United States

WE-A3.1P.8 **16:00**

Deep Learning Based Metasurface Synthesis from Far-Field Masks

Chen Niu, Hans Paul Schreckenbach, Puyan Mojabi, University of Manitoba, Canada

WE-A3.1P.9 **16:20**

Intelligent Phase Mapping Approach via Neural Networks on Metasurfaces

Lamei Zhang, Wuxia Miao, Bin Zou, Harbin Institute of Technology, China

WE-A3.1P.10 **16:40**

Machine Learning-Assisted Optimization Method with Self-adaptive Hyperparameter Optimization Strategy

Yajie Gong, Qi Wu, Chen Yu, Haiming Wang, Wei Hong, Southeast University, China; Weishuang Yin, ZTE Corporation, China

Metamaterial Applications

Session Co-Chairs: Douglas Werner, Penn State Univerisity; Christos Argyropoulos, Pennsylvania State University

WE-A2.1P.1 **13:20**

5.25 GHz Metamaterial Lens for Beam Focusing Applications

Tyler Midas, Ryan Adams, The University of North Dakota, United States

WE-A2.1P.2 **13:40**

Multiband Bow-tie Dipole Absorber For RF Energy Harvesting

mohammed cherif derbal, mourad nedil, UQAT, Canada

WE-A2.1P.3 **14:00**

Asymmetric Electromagnetic Absorption and Reflection Based on Transmissive Metagratings

Zhen Tan, Jianjia Yi, Xi'an Jiaotong University, China; Badreddine Ratni, Shah Nawaz Burokur, Univ Paris Nanterre, France

WE-A2.1P.4 **14:20**

Refractive Index Sensing with Plasmons in 2D Metals

Lei Kang, Yuhao Wu, Sawyer Campbell, Joshua Robinson, Douglas Werner, Penn State Univerisity, United States

WE-A2.1P.5 **14:40**

Mid-infrared Surface-enhanced Spectroscopy Enabled by 3D Printed Metamaterial Absorbers

Lei Lei Kang, Albanie Hendrickson-Stives, Yuhao Wu, Sawyer Campbell, Christine Keating, Douglas Werner, Penn State Univerisity, United States

Break **15:00**

WE-A2.1P.6 **15:20**

Mode Conversion of Spoof Surface Plasmon Polaritons Based on Boundary-Modulated Waveguide

Yuzhou Wang, Junfan Chen, Dawei Zhang, Yaxiu Sun, Tao Jiang, Harbin Engineering University, China; Badreddine Ratni, Shah Nawaz Burokur, Université Paris Nanterre, France

WE-A2.1P.7 **15:40**

Exceptional Points in Plasmonic Huygens' Metasurfaces

Andrew Butler, University of Nebraska, United States; Christos Argyropoulos, Pennsylvania State University, United States

WE-A2.1P.8 **16:00**

Dual-Band Metamaterial Absorber for Terahertz Sensitivity Applications

Isam Eddine Lamri, Mourad Nedil, Université du Québec en Abitibi-Témiscamingue, Canada; Abdellah Chehri, Royal Military College of Canada, Canada

MIMO Antennas

Session Co-Chairs: Mei Song Tong, Tongji University; Hiroyuki Arai, Yokohama National University

WE-A5.1P.1 **13:20**

Dual-Polarized Split Beam Antenna for 28GHz Multi-Sector Indoor Base Station

Hiroyuki Arai, Yokohama National University, Japan; Yuki Inoue, NTT DOCOMO, INC., Japan

WE-A5.1P.2 **13:40**

Design of a Broadband MIMO Antenna with High Isolation

Zhou Pan, Nie Wei, Chongqing University of Posts and Telecommunications, China; Niu ZhongQian, Zhang Bo, University of Electronic Science and technology, China

WE-A5.1P.3 **14:00**

Transparent MIMO Antenna for Closely Spaced Antenna Elements

Muhammad Nawaz Abbasi, Abdul Aziz, Department of Electrical Engineering, Faculty of Engineering & Technology, The Islamia University of Bahawalpur, Pakistan; Abdullah Al-Garni, Sheikh S. Iqbal, Rifaqat Hussain, Electrical Engineering Department, King Fahd University for Petroleum and Minerals (KFUPM), Dhahran., Saudi Arabia

WE-A5.1P.4 **14:20**

Breaking the Degree-of-Freedom Limit of Aperture-Constrained MIMO Communication Systems by 3-D Antenna Arrays

Shuai S. A. Yuan, Wei E. I. Sha, Zhejiang University, China

WE-A5.1P.5 **14:40**

A 4-Unit High-Isolation Broadband MIMO Antenna Used for Mobile Phone of 5G Communication

Xiao Jie Lu, Ren Yuan Liu, Peng Rui Zhang, Mei Song Tong, Tongji University, China

Break **15:00**

WE-A5.1P.6 **15:20**

Design of a high Isolation 60 GHz MIMO Antenna using a Defected Ground Structure

Abdullah Madni, Lahore University of Management Sciences (LUMS), Pakistan; Wasif Tanveer Khan, National University of Science and Technology, Pakistan

WE-A5.1P.7 **15:40**

High-Isolation Design of Dual-Polarized Aperture Antenna for Compact 60-GHz AiP Solution

Tzu-Ming Huang, Yi-Cheng Lin, National Taiwan University, Taiwan

WE-A5.1P.8 **16:00**

Four Port CP-MIMO Antenna of Triangle Slots

Syed M. Sifat, Shoukry I. Shams, Ahmed A. Kishk, Concordia University, Canada

WE-A5.1P.9 **16:20**

MIMO Antenna Array with Mutual Coupling Enhancement Using Cross-Shaped Meta-Surface Wall

Ahmed Zahran, Future University in Egypt, Egypt; Islam Eshrah, Cairo University, Egypt; Mahmoud Abdalla, Military Technical College, Egypt

Antenna Theory I

Session Co-Chairs: Carl Pfeiffer, Air Force Research Laboratory; Kai Ren, Wentworth Institute of Technology

WE-A1.2P.1 **13:20**

An Antenna with Quasi-Isotropic Radiation Pattern Designed with Bent Dipoles

Ruiqi Wang, Kirill Klionovski, Atif Shamim, King Abdullah University of Science and Technology, Saudi Arabia

WE-A1.2P.2 **13:40**

A High-Efficiency Underwater Dipole Antenna With Spherical Electrodes

Takashi Kawamura, Takuma Matsushita, Yukio Kaneko, Sony Group Corporation, Japan; Nobuaki Kawai, Yasuhiro Matsui, Sony Semiconductor Solutions Corporation, Japan; Kazuhiro Hongo, Kazunobu Ohkuri, Sony Group Corporation, Japan; Akihiro Horii, Sony Semiconductor Solutions Corporation, Japan; Hiroshi Yoshida, Japan Agency for Marine-Earth Science and Technology, Japan

WE-A1.2P.3 **14:00**

Channel Capacity of Resonant Antennas

Carl Pfeiffer, Bae-Ian Wu, Air Force Research Laboratory, United States

WE-A1.2P.4 **14:20**

Effect of Feeding Network Configuration on Power-Weighted Linear Array Characteristics

Hartuti Mistialustina, Chairunnisa Chairunnisa, Achmad Munir, Institut Teknologi Bandung, Indonesia

WE-A1.2P.5 **14:40**

HF Direction-of-Arrival Estimation Using Helicopter-Integrated Single-Antenna

Kai Ren, Wentworth Institute of Technology, United States

Break **15:00**

WE-A1.2P.6 **15:20**

Spatial Correlation of Large Antenna Transmitters based on Maximum Directivity Gain

Emmanuel Ampoma Affum, Kwame Agyemang Prempeh Agyekum, Kwame Nkrumah University of Science and Technology,, Ghana; Sunday Adeola Ajagbe, Ladoke Akintola University of Technology, Nigeria; Matthew Adigun, University of Zululand, South Africa; Emmanuel Addo, Samuel Tweneboah-Koduah, Kwame Nkrumah University of Science and Technology,, Ghana

Wideband and Multiband Reconfigurable Antennas

Session Co-Chairs: Xun Gong, University of Central Florida; Mei Song Tong, Tongji University

WE-A1.3P.1 **13:20**

A Switched-Beam Yagi-Uda Antenna Array for Dual Channel mm-Wave Communications

Ectis Velazquez, Murat Yuksel, Xun Gong, University of Central Florida, United States

WE-A1.3P.2 **13:40**

Beam Steering Leaky Wave Antenna using Capacitive Loading

Shahinshah Ali, Lakehead University, Canada; Hammad Cheema, National University of Sciences and Technology (NUST), Pakistan; Farhan Ghaffar, Lakehead University, Canada

WE-A1.3P.3 **14:00**

Mechanically Reconfigurable Multi-band Antenna on a 3D-printed Substrate for C/X Band Applications

Karen N. Olan Nuñez, Héctor N. Morales Lovera, Roberto S. Murphy Arteaga, INAOE, Mexico

WE-A1.3P.4 **14:20**

Performance Improvement of Wideband Reconfigurable Planar Antennas

Abdullah Eroglu, Jyosri M Karra, North Carolina A&T State University, United States

WE-A1.3P.5 **14:40**

A Miniaturized Tunable Programmable Reflective Metasurface Unit Based on Minkowski Fractal Geometry

Hao Zheng Lu, Zhen Wang, Xiao Yu Li, Mei Song Tong, Tongji University, China

Break **15:00**

WE-A1.3P.6 **15:20**

A Fast Radiation Performance Prediction Method for Reconfigurable Transmitarray Based on BP Neural Network

Mengkai Xi, Luyu Zhao, Xidian University, China

Microwave and Optical Devices

Session Co-Chairs: Rainee Simons, NASA Glenn Research Center; Magda El-Shenawee, University of Arkansas

WE-UB.1P.1 **13:20**

Terahertz Photoconductive Antenna Array Feed – Design and Fabrication

Zach Uttley, Bilal Pirzada, Hugh Churchill, Magda El-Shenawee, University of Arkansas, United States

WE-UB.1P.2 **13:40**

Low-cost, PCB-Based Material Characterization Fixture for mmW Radar Applications

Yagmur Ozturk, Maruf Hossein, The Ohio State University, United States; Alebel Arage, General Motors, United States; Niru K. Nahar, Kubilay Sertel, The Ohio State University, United States

WE-UB.1P.3 **14:00**

Investigation of Terahertz Black Phosphorus Photoconductive Emitters

Bilal Pirzada, Katie Welch, Zach Uttley, Jose Santos Batista, Mahmud-ul-Hasan Doha, Hugh Churchill, Magda El-Shenawee, University of Arkansas, United States

WE-UB.1P.4 **14:20**

Optical Modulation of Harmonic Levels Using PIN Photodiodes

Gabriel Muñiz-Negrón, Jennifer Bernhard, University of Illinois Urbana-Champaign, United States

WE-UB.1P.5 **14:40**

A Direct Matrix Synthesis Approach for High Selectivity In-Line Topology Dual-Band Filters

Guoqun Cao, Yulu Hu, Luanfeng Gao, Zheng Tan, Haiying Yuan, University of Electronic Science and Technology of China, China

Break **15:00**

WE-UB.1P.6 **15:20**

Digital Twin Approach to overcome Hardware variations in Transceiver Designs

Arnaldo Sans, John Volakis, Satheesh Venkatakrishnan, Florida International University, United States; Wilfredo Rivas-Torres, Keysight Technologies, United States

WE-UB.1P.7 **15:40**

Ka-Band GaN-on-SiC MMIC Balanced High Power Amplifier for NASA's Lunar Missions

Rainee Simons, Joseph Downey, Marie Piasecki, Bryan Schoenholz, NASA Glenn Research Center, United States

WE-UB.1P.8 **16:00**

Electromagnetically Unclonable Function Based on Non-Hermitian Systems

Pai-Yen Chen, Trung Ha, University of Illinois Chicago, United States; Mohamed Farhat, King Abdullah University of Science and Technology (KAUST), Saudi Arabia

WE-UB.1P.9 **16:20**

Monostatic Full Duplex System with an Adaptive, Quasi-Symmetrical Self-Interference Cancellation Architecture

Marisol Roman Guerra, Md Nurul Tarek, Elias Alwan, Florida International University, United States

WE-UB.1P.10 **16:40**

Analysis of Curved Engraved Periodic Structure Enclosed Antenna

Daeyeong Yoon, Ajou University, Korea (South); Dong-Yeop Na, Pohang University of Science and Technology, Korea (South); Yong Bae Park, Ajou University, Korea (South)

3D Printed Antennas

Session Co-Chairs: Karu Priyathama Esselle, University of Technology Sydney (UTS) and Macquarie University; Lars Foged, Microwave Vision Italy s.r.l., Pomezia (RM), Italy

WE-A5.2P.1 **13:20**

3D Printed Folded Monopole Antennas

Kevin Leong, Evan Nguyen, Jesse Tice, Vesna Radisic, Northrop Grumman, United States

WE-A5.2P.2 **13:40**

A 3D-Printed Wide-Band Wrist-Worn Wearable Antenna For 4G/5G Wireless Communication

Jayshri Kulkarni, Brian Garner, Yang Li, Baylor University, United States

WE-A5.2P.3 **14:00**

Cavity backed Metasurface Antenna for High Power Applications

Mohamed Hamdalla, Roy Allen, Peter Bland, Ahmed Hassan, University of Missouri-Kansas City, United States

WE-A5.2P.4 **14:20**

3D-printed multi-section dielectric resonator antenna with symmetric radiation pattern

Sebastian Diaz, Francisco Pizarro, Pontificia Universidad Catolica de Valparaiso, Chile

WE-A5.2P.5 **14:40**

Performance of a Class of Stacked-Disk Dielectric Lenses for Lightweight Antennas

Edoardo Baldazzi, Renato Cicchetti, Orlandino Testa, University of Rome, Italy; Lars Foged, Microwave Vision Italy s.r.l., Pomezia (RM), Italy, Italy

Break **15:00**

WE-A5.2P.6 **15:20**

Double-Ridge Horn with Sinusoidally-Modulated Profile Enabled by 3D-Printing

Benjamin Cross, Dejan Filipovic, University of Colorado Boulder, United States

WE-A5.2P.7 **15:40**

Design of a 3D Printed 4-Arm Conical Spiral Antenna

Collin Wallish, Dejan Filipovic, University of Colorado Boulder, United States

WE-A5.2P.8 **16:00**

Three Dimensional Printable Prototype to realize uniformity in Aperture Phase Distribution

Sujan Shrestha, Macquarie University, Australia; Syed Muzahir Abbas, Macquarie University and Benelec Innovative Radio Technology, Australia; Mohsen Asadniaye Fard Jahromi, Macquarie University, Australia; Karu Priyathama Esselle, University of Technology Sydney (UTS) and Macquarie University, Australia

WE-A5.2P.9 **16:20**

Wideband Dual-Polarized 3D Printed Quad-Ridge Horn for mmWave Applications

Dong-Chan Son, Ljubodrag Boskovic, Mohamed Elmansouri, Dejan Filipovic, University of Colorado Boulder, United States

WE-A5.2P.10 **16:40**

Fully Metallic 3D-Printed Omnidirectional High-Gain Array Antenna for 5G Application

Tianqi Ao, University of Electric Science and Technology of China, China; Yuandan Dong, University of Electronic Science and Technology of China, China

WE-A5.2P.11 **17:00**

Additive Manufacture of a Compact 8 x 8 Element Waveguide Array at mm-Wave Frequencies

Marcus Walden, Plextek, United Kingdom; David Eliston, Retired, United Kingdom; James Henderson, Plextek, United Kingdom

Microwave Imaging and Detection

Session Chair: Danilo Brizi, University of Pisa / Consorzio Nazionale Interuniversitario per le Telecomunicazioni (C.N.I.T.),

WE-A5.3P.1 **13:20**

Non-Invasive Target Detection Enhanced Through a Low-Frequency Passive Metasurface for Biomedical Applications

Sabrina Rotundo, Martina Falchi, Danilo Brizi, Agostino Monorchio, University of Pisa / Consorzio Nazionale Interuniversitario per le Telecomunicazioni (C.N.I.T.),, Italy

WE-A5.3P.2 **13:40**

Improved Wireless Position-Detection of Metallic Plates in Orthopaedic Applications

MILAN ILIĆ, Aleksandar Golubović, University of Belgrade, Serbia; Jakob Wolynski, Kevin Labus, Christian Puttlitz, Kirk McGilvray, Branislav Notaroš, Colorado State University, United States

WE-A5.3P.3 **14:00**

Directed high-energy radio wave exposure detection

Md Abu Saleh Tajin, Zyad Helali, Kapil Dandekar, Drexel University, United States

WE-A5.3P.4 **14:20**

Towards Real-Time Monitoring of Thermal Ablation Lesions in Liver using Microwave Imaging

Sunil Gaddam, Poulami Samaddar, Keerthy Gopalakrishnan, Devanshi Damani, Suganti Shivaram, Mayo Clinic, United States; Shuvashis Dey Dey, North Dakota State University, United States; Dipankar Mitra, University of Wisconsin-La Crosse, United States; Sayan Roy, South Dakota Mines, United States; Shivaram P. Arunachalam, Mayo Clinic, United States

WE-A5.3P.5 **14:40**

A Wearable mmWave Radar System for Continuous Cardiopulmonary Monitoring

Serene Abu-Sardanah, Omar Ramahi, George Shaker, University of Waterloo, Canada

Break **15:00**

WE-A5.3P.6 **15:20**

Design and Simulation of Two Bluetooth Antennas for Biomedical Device Using Ansys

Xiaoyan Yuan, Asim Ghalib, Jesse Shihchieh Hsin, Kyocera AVX, United States

WE-A5.3P.7 **15:40**

Broadband CP Wearable Antenna for WBAN Applications

Youcef Braham Chaouche, Mourad Nedil, Underground Communications Research Laboratory, University of Quebec at Abitibi-Temiscamingue (UQAT), Canada; Tayeb Denidni, National Institute for Scientific Research (INRS), Canada; Ismail Ben Mabrouk, Durham University, United Kingdom

WE-A5.3P.8 **16:00**

A Dual-Band Metasurface for Functional and Anatomical 1.5 T MRI

Sabrina Rotundo, Valeria Lazzoni, Alessandro Dellabate, Danilo Brizi, Agostino Monorchio, University of Pisa / Consorzio Nazionale Interuniversitario per le Telecomunicazioni (C.N.I.T.),, Italy

WE-A5.3P.9 **16:20**

Wearable Radiofrequency Metasurface for Smart-Bandages

Angelica Masi, Danilo Brizi, Agostino Monorchio, University of Pisa, Italy

WE-A5.3P.10 **16:40**

Dielectric resonance modes effect on enhancing the Rx-Sensitivity in magnetic resonance imaging (MRI) RF coil

Parisa Lotfi, Navid Gandji, College of Medicine, Pennsylvania State University, United States; Michael Lanagan, Department of Engineering Science and Mechanics, Pennsylvania state University, United States; Qing X Yang, College of Medicine, Pennsylvania State University, United States

Biomedical Applications of Fields and Waves

Session Chair: Luis J. Gomez, Purdue University

WE-UB.2P.1 **13:20**

Fast E-field Determination of Transcranial Electric Stimulation Using Probabilistic Matrix Decomposition

Dezhi Wang, Nahian Ibn Hasan, Luis Gomez, Purdue University, United States

WE-UB.2P.2 **13:40**

Subgrid Thinwires to Reduce Modelling Error in Electromagnetic Inverse Problems

Lucas Banting, University of Manitoba, Canada; Nick Geddert, AGCO Corporation (Winnipeg), Canada; Kevin Brown, Ian Jeffrey, Joe LoVetri, University of Manitoba, Canada

WE-UB.2P.3 **14:00**

Designing Non-invasive Strategies for Optic Nerve Regeneration by Applying Electric Fields: A Computational Study

Pooyan Pahlavan, Pragya Kosta, Kimberly Kinga Gokoffski, Gianluca Lazzi, University of Southern California, United States

WE-UB.2P.4 **14:20**

A deep learning model for the estimation of RF field trained from an analytical solution

Eros Montin, Giuseppe Carluccio, Christopher Collins, Riccardo Lattanzi, Bernard and Irene Schwartz Center for Biomedical Imaging, United States

WE-UB.2P.5 **14:40**

Design of an Efficient Antenna for Asian Hornet (Vespa Velutina) Tracking Using Insect Telemetry

David Toribio, Arno Thielens, Ghent University - imec, Belgium

Break **15:00**

WE-UB.2P.6 **15:20**

Application of Fast E-Field Solvers in Developing Individualized Optimal Transcranial Magnetic Stimulation and Population-level Uncertainty Quantification

Nahian Ibn Hasan, Dezhi Wang, Purdue University, United States; Luis Gomez, Wang Hall, United States

WE-UB.2P.7 **15:40**

Real Time E-Field Dosimetry Estimation in Transcranial Magnetic Stimulation via Probabilistic Matrix Decomposition (PMD) and Huygens' Principle

Nahian Hasan, Dezhi Wang, Luis Gomez, Purdue University, United States

WE-UB.2P.8 **16:00**

Dual Mode Split Ring Resonator Sensing and Hyperthermia Array for Skin Cancer

Yuchen Gu, Daniel W. van der Weide, UW_Madison ECE, United States

WE-UB.2P.9 **16:20**

A W-Band Marchand Balun in 0.1 µm GaAs pHEMT Process

Nethini Weerathunge, Sudipta Chakraborty, Macquarie University, Australia

WE-UB.2P.10 **16:40**

Directional and Omnidirectional Sources for an Elliptical Microwave Imaging Setup

Reihaneh Ahmadi Vanhari, Ahmad Bakhtafrouz, Isfahan University of Technology, Iran; Sima Noghanian, CommScope Ruckus Networks, United States

Analysis and Optimization of Reflectarray Antennas

Session Co-Chairs: Kitch Mensah-Bonsu, North Carolina A and T State University; Anton Tischenko, University of Surrey; Glauco Fontgalland

WE-A1.4P.1 **13:20**

Prediction Method for Incident Angle Characteristics of Bistatic RCS of Reflectarray

Hiroshi Hashiguchi, Naobumi Michishita, Hisashi Morishita, National Defense Academy, Japan; Hiromi Matsuno, Takuya Ohto, Masayuki Nakano, KDDI Research, Inc, Japan

WE-A1.4P.2 **13:40**

Adjoint Optimization of Reflectarray Antennas in the Presence of Failures

Ryan J. Chaky, Sawyer D. Campbell, Pingjuan L. Werner, Douglas H. Werner, The Pennsylvania State University, United States

WE-A1.4P.3 **14:00**

Fast simulations of reflectarray antennas using quasi-periodic surfaces (QUPES)

Nishanth Virushabadoss, Farhat Abbas, Rashaunda Henderson, UT Dallas, United States

WE-A1.4P.4 **14:20**

Effect of Antenna Pattern on Time-Domain Canceling of Interference from Satellites

Ramonika Sengupta, Steven Ellingson, Virginia Tech, United States

WE-A1.4P.5 **14:40**

Polarization Analysis of Reflectarray Unit Elements Using Characteristic Modes

Kitch Mensah-Bonsu, Binbin Yang, Abdullah Eroglu, North Carolina A and T State University, United States; Hao Xu, University of Nevada, United States; Lijun Qian, Prairie View A&M University, United States

Break **15:00**

WE-A1.4P.6 **15:20**

A Novel Phase Optimization Method for Sidelobe-Level Suppression of 1-Bit Reconfigurable Reflectarrays

JianJia Hu, University of Electronic Science and Technology of China, China; Pei-Ling Chi, National Yang Ming Chiao Tung University, Taiwan; Tao Yang, University of Electronic Science and Technology of China, China

WE-A1.4P.7 **15:40**

A Single Receiver Direction of Arrival Estimation using Optimized Meta-surface Reflector

Hibiki Shiiba, Ryuji Kuse, Takeshi Fukusako, Kumamoto University, Japan

WE-A1.4P.8 **16:00**

Multi-beam Reflectarray for Future High Throughput Satellites

Ali Ali, 5GIC & 6GIC, Institute for Communication Systems (ICS)/ University of Surrey, United Kingdom; Charilaos Kourogiorgas, John Yates, Atheras Analytics Ltd, United Kingdom; Tim Brown, Mohsen Khalily, 5GIC & 6GIC, Institute for Communication Systems (ICS)/ University of Surrey, United Kingdom

WE-A1.4P.9 **16:20**

Amplitude and Phase Decoupled Metasurface for Low Side-lobe Circularly Polarized Transmitarray Antenna Design

Jingwen Wang, Weidong Chen, University of Science and Technology of China, China; Jun Ding, East China Normal University, China; Chang Chen, University of Science and Technology of China, China

WE-A1.4P.10 **16:40**

Reflectarray Concept for Interference Mitigation in Radio Astronomy

Sean Hum, University of Toronto, Canada; Steven Ellingson, R. Michael Buehrer, Virginia Tech, United States

Phased Array Antennas: Technologies and Applications

Session Chair: Junming Diao, Mississippi State University

WE-A1.5P.1 **13:20**

All-Metal, High-Efficiency and Wide-Scanning Phased Array Antenna with Sparse Architecture for 6G High-Integration RF Front-End

Jian Xu Sun, Yu Jian Cheng, University of Electronic Science and Technology of China (UESTC), China

WE-A1.5P.2 **13:40**

Mechanical phase shifter with continuous beam scanning across broadside

Miguel A. Fuentes-Pascual, Jose Igancio Herranz-Herruzo, Miguel Ferrando-Rocher, Alejandro Valero-Nogueira, Mariano Baquero-Escudero, ITEAM-UPV, Spain

WE-A1.5P.3 **14:00**

A Heat Dissipating Dual-Pol Antenna Array with AMC Fins for Sub-6GHz Massive MIMO Systems

Keiichi Motoi, Toshihide Kuwabara, Shinichi Hori, Kazuaki Kunihiro, Tomoya Kaneko, NEC Corporation, Japan

WE-A1.5P.4 **14:20**

An UWB Hyperbolic Lens-Integrated Dual-Polarized Quad-Ridged Horn Antenna for UAV-Based In-situ Characterization

Syed Jehangir, Jorge Salazar, Advanced Radar Research Center, The university of oklahoma, United States

WE-A1.5P.5 **14:40**

Wullenweber Antenna for Secondary Surveillance Radar - Part 2 -

Mitsuo Taguchi, Nagasaki University, Japan; Haruo Kawakami, Kato Electric Industry, Japan

Break **15:00**

WE-A1.5P.6 **15:20**

Sub-6 Ghz Rotman Lens For Underground Mines using Machine Learning

mohamed lamine seddiki, saif eddine hadji, Mourad nedil, UQAT, Canada

WE-A1.5P.7 **15:40**

Integration of Active Circulators in STAR Phased Arrays

Laila Marzall, Zoya Popovic, University of Colorado Boulder, United States

WE-A1.5P.8 **16:00**

Design of Graphene-based Thermal Mitigation for Phase Array Antenna Systems

Qammer Abbasi, university of Glasgow, United Kingdom; Ed Totten, Malachy Devlin, Celestia Technologies Group UK, United Kingdom; Abdoalbset Abohmra, Muhammad Imran, university of Glasgow, United Kingdom

Dielectric Resonator Antennas II

Session Chair: Debatosh Guha, University of Calcutta

WE-A1.6P.1 **13:20**

Integrate Fabry–Perot Resonator into Dielectric Resonator Antenna for Microwave and Mm-wave Operations

MOHAMED BIZAN, Hassan Naseri, Peyman PourMohammadi, Tayeb Denidni, Institute National de la Recherché Scientifique (INRS), Canada

WE-A1.6P.2 **13:40**

60 GHz Perforated Dielectric Resonator Antenna Fed By Substrate Integrated Waveguide

Ehsan Rahmati, Polytechnique Montréal, Canada; Daniel N. Aloi, Oakland University, United States; Mohammad S. Sharawi, Polytechnique Montréal, Canada

WE-A1.6P.3 **14:00**

Design of a Novel Sub-THz Dielectric Resonator Antenna Fed by Substrate Integrated Image Guide (SIIG) Technology

Ehsan Rahmati, Mohammad S. Sharawi, Polytechnique Montréal, Canada

WE-A1.6P.4 **14:20**

ML-enabled Resonance Prediction for SGP-based WPT

Kassen Dautov, Gulnur Tolebi, Kozhakhmet Abdugapbar, Galymzhan Nauryzbayev, Mohammad Hashmi, Nazarbayev University, Kazakhstan

WE-A1.6P.5 **14:40**

Fully Analytical Formula for Input Impedance of Center-Fed Hemispherical Dielectric Resonator Antenna

Andrey Kobyakov, Corning Inc., United States

Break **15:00**

WE-A1.6P.6 **15:20**

Reduction in Cross-Polar Fields in a DRA: Higher Mode vs. Conduction Current Control Techniques

Sk Rafidul, Debatosh Guha, University of Calcutta, India

WE-A1.6P.7 **15:40**

A Diamond Ring Antenna

Xuewen Jiang, Zhijiao Chen, Beijing University of Posts and Telecommunications, China; Benito Sanz-Izquierdo, University of Kent, China

WE-A1.6P.8 **16:00**

Design of a Wideband Dual-Polarized Dense Dielectric Patch Antenna with High Self-Isolation

Wen-jian Sun, Hang Wong, City University of Hong Kong, Hong Kong SAR of China

WE-A1.6P.9 **16:20**

A Reconfigurable Broadband Circularly Polarized Dielectric Resonator Antenna

Kai Zhu, Yu Shao, Junjie Huang, Jie Zhang, Chongqing University of Posts and Telecommunications, China

Quantum Technology Related to Electromagnetics

Session Co-Chairs: Thomas Roth, Purdue University; Weng Chew, Purdue University

TH-SP.1A.1 **08:00**

Multi-domain Quantum Electromagnetic Interactions

Matan Shapira, Tel Aviv University, Israel; Vitaliy Lomakin, University of California San Diego, United States; Amir Boag, Amir Natan, Tel Aviv University, Israel

TH-SP.1A.2 **08:20**

Antenna Array Analysis on Real Quantum Computing Processors

Luca Tosi, Paolo Rocca, ELEDIA@UniTN - University of Trento, Italy

TH-SP.1A.3 **08:40**

Semiclassical Maxwell-Schrödinger Modeling of the Control and Readout of a Fluxonium Qubit

Thomas Roth, Purdue University, United States

TH-SP.1A.4 **09:00**

Quantum-Inspired Optimization of Beamforming with Metasurfaces

Bi-Ying Wang, Huawei Technologies, China; Hangyu Ge, Yutong Jiang, Shuai S. A. Yuan, Tianyao Chu, Zhixuan Chen, Zhejiang University, China; Shijie Pan, Hongjing Xu, Guanxi Zhang, Xiaopeng Cui, Man-Hong Yung, Huawei Technologies, China; Feng Liu, Wei E.I. Sha, Zhejiang University, China

TH-SP.1A.5 **09:20**

Numerical Verification on Connection between Huttner-Barnet Microscopic Model and Langevin Noise Formalism: Lossy Dielectric Objects inside Perfect Electric Conductor Cavity

Dong-Yeop Na, Pohang University of Science and Technology (POSTECH), Korea (South); Weng Chew, Purdue University, United States

Break **09:40**

TH-SP.1A.6 **10:00**

Fast Volume Integral Equation Based Modeling of Quantum Gate Circuitry: Capturing Local vs. Nonlocal Effects on Spin Qubits

Runwei Zhou, Sathwik Bharadwaj, Zubin Jacob, Dan Jiao, Purdue University, United States

TH-SP.1A.7 **10:20**

Efficient Numerical Analysis for Few-Atom Cavity Quantum Electrodynamics Using the Coupling Matrix Approach

Christopher J. Ryu, University of Illinois Urbana-Champaign, United States; Dong-Yeop Na, Pohang University of Science and Technology, Korea (South); Weng C. Chew, Purdue University, United States

TH-SP.1A.8 **10:40**

Energy-time Entanglement-based Quantum Key Distribution Coexisting with Classical Fiber Communication

Zichang Zhang, The Southwest Institute of Technical Physics, Chengdu, China, China; Yunru Fan, Si Shen, University of Electronic Science and Technology of China, Chengdu, China, China; Chenzhi Yuan, The Wuhan Institute of Technology, Wuhan, China, China; Guangwei Deng, University of Electronic Science and Technology of China, Chengdu, China, China; You Wang, Southwest Institute of Technical Physics, Chengdu, China, China; Haizhi Song, University of Electronic Science and Technology of China, Chengdu, China, China; Guangcan Guo, CAS Key Laboratory of Quantum Information, University of Science and Technology of China, Hefei, China, China; Qiang Zhou, University of Electronic Science and Technology of China, Chengdu, China, China

5G and WLAN Antenna Design and Integration Technology for Mobile, Laptop Systems

Session Co-Chairs: Jayprakash Thakur, Intel; Taeyoung Yang, Intel

TH-SP.2A.1 **08:00**

Antenna decoupling by wavetrap in 5G mobile phone antenna

Xiaopu Wu, Yunfan Zhang, Guangdong OPPO Mobile Telecommunication Co., Ltd, China

TH-SP.2A.2 **08:20**

5G Network Planning Optimization Using Machine Learning

Martin Vogel, C.J. Reddy, Altair, United States

TH-SP.2A.3 **08:40**

LTCC On-Ground Chip Antenna for 3.6 GHz IoT Applications

Jaime Molins-Benlliure, Eva Antonino-Daviu, Marta Cabedo-Fabrés, Miguel Ferrando-Bataller, Universitat Politècnica de València, Spain

TH-SP.2A.4 **09:00**

A UWB Millimeter-Wave Dual-polarized Large-Scanning Array Antenna for Mobile Handset

Jian Yang, Chalmers University of Technology, Sweden; Hasan Raza, Consult to Gapwaves AB, Sweden; Thomas Emanuelsson, Ericsson AB, Sweden

TH-SP.2A.5 **09:20**

A Compact High Gain WideBand MIMO Antenna for 5G Applications

Mohamed Amine Yahiaoui, Tahar Guesbaya, Zahra Hemaizia, Laboratory of Metallic and Semiconducting Materials (LMSM) University of Biskra, Algeria; Youcef Braham Chaouche, Mourad Nedil, School of Engineering, Underground Communications Research Laboratory, University of Quebec at Abitibi-Temiscamingue (UQAT), Canada

Break **09:40**

TH-SP.2A.6 **10:00**

A Dual-Polarized Beam-Steerable Antenna Utilizing Complementary Reconfigurable Parasitic Elements

Yujie Zhang, Shiwen Tang, Junhui Rao, Chi-Yuk Chiu, Ross Murch, Hong Kong University of Science and Technology, Hong Kong SAR of China

TH-SP.2A.7 **10:20**

Gain Enhancement of 3-D Printed Wideband Cavity Antenna for WLAN

SWAPNA S, KL University, India; KARTHIKEYA G S, BMS College of Engineering, India; SHIBAN K KOUL, Indian Institute of Technology Delhi, India; A K PODDAR, ULRICH ROHDE, Synergy Microwave Corporation, United States

TH-SP.2A.8 **10:40**

A Diplexer-Based Dual-Slot LTE Antenna Design for Laptops with Metal Housing

Hui-Yu Chueh, Wen-Jiao Liao, National Taiwan University of Science and Technology, Taiwan; Yuan-Chang Hou, National Ilan University, Taiwan

TH-SP.2A.9 **11:00**

A Compact and Geometrically Simple CPW Fed Antenna for 2.4/5.4 GHz ISM and WLAN Applications

Musa Hussain, Bahria University, Pakistan; Umair Rafique, University of Oulu, Finland; Hijab Zahra, Syed Muzahir Abbas, Subhas Mukhopadhyay, Macquarie University, Australia

TH-SP.2A.10 **11:20**

Demonstration of Near-Spherical Coverage using Single RF channel-based Dual Sub-Array Antenna for Short-Range Millimeter-wave Wireless

Junho Park, Beakjun Seong, Inseok Jang, Nari Cha, Wonbin Hong, Kreemo Inc., Korea (South)

Fast Integral Equations and Stable Discretizations

Session Co-Chairs: Francesco Andriulli, Politecnico di Torino; Constantine Sideris, University of Southern California

TH-A3.1A.1 **08:00**

A Multigrid Algorithm with Scaled Stencils for the Fast Scattering Analysis of Multiscale Structures

Yongzhong Li, Damian Marek, Piero Triverio, University of Toronto, Canada

TH-A3.1A.2 **08:20**

Efficient Analytical Skeleton Approximation for Compressing Electrically Large Integral Operators

Chang Yang, Dan Jiao, Purdue University, United States

TH-A3.1A.3 **08:40**

Optimizing H-Matrix Solvers' Admissability Criteria via Rapid Spectrum Estimation

Andrew Maicke, Jon Kelley, Ali Yilmaz, University of Texas at Austin, United States

TH-A3.1A.4 **09:00**

On a Time Domain Calderón Preconditioned CFIE Discretized with Convolution Quadratures

Pierrick Cordel, Politecnico di Torino, Italy; Van Chien Le, Ghent University, Belgium; Adrien Merlini, IMT Atlantique, France; Kristof Cools, Ghent University, Belgium; Francesco P. Andriulli, Politecnico di Torino, Italy

TH-A3.1A.5 **09:20**

Adaptive Quadrature for the Chebyshev-based Boundary Integral Equation Method

Davit Aslanyan, Constantine Sideris, University of Southern California, United States

Break **09:40**

TH-A3.1A.6 **10:00**

Applying a Novel Testing Scheme for the Numerical Evaluation of the Magnetic Field Integral Equation

Javier Rivero, Politecnico di Torino, Italy; Victor F. Martin, University of Extremadura/Politecnico di Torino, Spain; Donald R. Wilton, University of Houston, United States; William A. Johnson, Consultant, United States; Francesca Vipiana, Politecnico di Torino, Italy

TH-A3.1A.7 **10:20**

Towards a Self-Adaptive Frequency Normalization Scheme for the Low-Frequency Stabilized Magnetic Field Integral Equation

Bernd Hofmann, Thomas F. Eibert, Technical University of Munich, Germany; Francesco P. Andriulli, Politecnico di Torino, Italy; Simon B. Adrian, Universität Rostock, Germany

TH-A3.1A.8 **10:40**

Isogeometric Analysis for the Scattering of NURBS Surfaces with Coinciding Knots

Han Wang, Ruoming Zhang, Yuhao Shen, Ce Ding, Yuechen Zhao, Hai Lin, State Key Laboratory of CAD&CG, China

Terahertz and mm-Wave Technology

Session Chair: Christos Christodoulou, University of New Mexico

TH-A4.1A.1 **08:00**

Reflection by Random Rough Surfaces at 300 GHz

Fawad Sheikh, Aman Batra, Dien Lessy, Andreas Prokscha, Thomas Kaiser, Universität Duisburg-Essen, Germany

TH-A4.1A.2 **08:20**

Delay Spread Model for Inter-Rack Environments with Small Mesh Panel at 285GHz

Jinhyung Oh, Jong Ho Kim, Electronics and Telecommunications Research Institute, Korea (South); Jang Seok Choi, Jae Ho Seok, Radio Research Agency, Korea (South)

TH-A4.1A.3 **08:40**

Measurement of 300 GHz band Radio Propagation Characteristics in the Vicinity of Human body using Terahertz Hemispheric Scanner

Akihiko Hirata, Chiba Institute of Technology, Japan

TH-A4.1A.4 **09:00**

Peculiar Multipath Channels from THz Horn Antennas

Fawad Sheikh, Universität Duisburg-Essen, Germany; Aman Batra, Dien Lessy, Andreas Prokscha, University of Duisburg-Essen, Germany; Muath Al-Hasan, Al Ain University, United Arab Emirates; Thomas Kaiser, Universität Duisburg-Essen, Germany

TH-A4.1A.5 **09:20**

Propagation Measurement and Analysis of a Large Cubicle Office Environment at 159 GHz

Juyul Lee, Jae-Joon Park, Kyung-Won Kim, Heon Kook Kwon, Myung-Don Kim, ETRI, Korea (South)

Break **09:40**

TH-A4.1A.6 **10:00**

Evaluating NGBoost as a Model for Probabilistic Prediction for V-band Power Attenuation

Ralph Gesner, Christos Christodoulou, University of New Mexico, United States; Steven Lane, Airforce Research Laboratory, United States

TH-A4.1A.7 **10:20**

Required Orders of Interaction for Accurate Ray Tracing Simulations in mm-Wave Indoor Scenarios

Enes Aksoy, Haroon Khan, Yun Chen, Huawei, Germany; Leszek Raschkowski, Lars Thiele, Slawomir Stanczak, Fraunhofer HHI, Germany

TH-A4.1A.8 **10:40**

A Fast Indoor Coverage Prediction Scheme at 60 GHz Based on Image Processing, Geometrical Optics, and Transport Theory

Ziheng Fu, The Pennsylvania State University, United States; Swagato Mukherjee, Remcom Inc., United States; Michael Lanagan, Prasenjit Mitra, The Pennsylvania State University, United States; Tarun Chawla, Remcom Inc., United States; Ram Narayanan, The Pennsylvania State University, United States

TH-A4.1A.9 **11:00**

3D Tracking of Small Moving Targets in Cluttered Environment from the Isolines Processing of Millimeter-wave Radar Images

Etienne Dedic, Ali Hadj Djilani, Dominique Henry, LAAS, CNRS, France; Mathieu Lihoreau, CRCA-CBI, CNRS, France; Hervé Aubert, LAAS, CNRS, France

Techniques for Transient Simulation

Session Co-Chairs: Kristof Cools, Ghent University; Hakan Bagci, King Abdullah University of Science and Technology

TH-A3.2A.1 **08:00**

Time-Domain Boundary Element Method Incorporating Strongly Nonlinear Conductivity for Application in the Modeling of 2D Devices

Jay Prakash, Ghent University, Belgium; Mark T. Greenaway, Loughborough University, United Kingdom; Kristof Cools, Ghent University, Belgium

TH-A3.2A.2 **08:20**

An Explicit Discontinuous Galerkin Time-domain Scheme to Simulate Kerr Nonlinearity

Ruitao Sun, Ming Dong, Liang Chen, Hakan Bagci, King Abdullah University of Science and Technology, Saudi Arabia

TH-A3.2A.3 **08:40**

Calculating Wideband Far Fields at Wide Angles via Planar Near Fields from Time Domain Simulations

Dustin Brown, Yahya Rahmat-Samii, UCLA Department of Electrical and Computer Engineering, United States

TH-A3.2A.4 **09:00**

Dynamic Control of Dispersion in a Monopole Antenna Having a Time-Varying Switch

Ryan Westafer, Georgia Tech Research Institute, United States

Metamaterials for Antennas

Session Co-Chairs: Ariel Epstein, Technion - Israel Institute of technology; Marco A. Antoniades, Toronto Metropolitan University

TH-A2.1A.1 **08:00**

Gain of LL Metaloop-n Antennas

Hisamatsu Nakano, Tomoki Abe, Junji Yamauchi, Hosei University, Japan

TH-A2.1A.2 **08:20**

WIdeband Hybrid AMC Antenna Reflector

David Rohde, Ryan Adams, University of North Dakota, United States

TH-A2.1A.3 **08:40**

Planar mmWave Traveling Wave Amplifier on GaN/AlGaN Heterostructure

Michail Anastasiadis, Dimitris Pavlidis, John Volakis, FIU, United States

TH-A2.1A.4 **09:00**

Hybrid Genetic Programming-Based Comparative Design of Broadband Metamaterial Absorbers using Graphene, Resistive Sheets, and Carbon Fiber

Edmond Chong, Sunny Zhang, Magdy Iskander, Zhengqing Yun, University of Hawaii, United States

TH-A2.1A.5 **09:20**

Cavity-Excited Metagrating Antennas with Controlled Frequency Diverse Patterns

Fengming Hu, Ariel Epstein, Technion - Israel Institute of technology, Israel

Break **09:40**

TH-A2.1A.6 **10:00**

A Leaky-Wave Antenna Design for RF Gesture Recognition

Bharath G. Kashyap, Georgios C. Trichopoulos, Arizona State University, United States

TH-A2.1A.7 **10:20**

Ku-band Metal-only Flat Metasurface Radar Antenna for Small Platforms

Gaurangi Gupta, Adrian Tang, Nacer Chahat, Jet Propulsion Laboratory, United States

Antenna Design for Biomedical Applications

Session Chair: Jayshri Kulkarni, Baylor University

TH-A5.1A.1 **08:00**

Shared Aperture Folded Dipole Antenna for Wireless Biomedical Applications

Abdul Rehman Chishti, Abdul Aziz, The Islamia University of Bahawalpur, Pakistan; Rifaqat Hussain, KFUPM, Saudi Arabia; Farhan Hassan, The Islamia University of Bahawalpur, Pakistan; Abdullah Algarni, kfupm, Saudi Arabia; Qammer Abbasi, University of Glasgow, United Kingdom

TH-A5.1A.2 **08:20**

Self-Diplexing Implantable Antenna with Independently Controllable Bands

Amjad Iqbal, INRS, Canada; Muath Al-Hasan, Al Ain University, United Arab Emirates; Ismail Ben Mabrouk, Durham University, United Kingdom; Tayeb A. Denidni, INRS, Canada

TH-A5.1A.3 **08:40**

A miniaturized Wearable Finger-Ring Antenna For Medical Sensing at 2.45 GHz ISM Band

Rania Rabhi, University of Waterloo, Canada; Ali Gharsallah, University of El Manar, Tunisia; Omar Ramahi, University of Waterloo, Canada

TH-A5.1A.4 **09:00**

Connected FORA Array Antenna Grouping for Cost Efficiency: Study on Microwave Breast Hyperthermia

Gulsah Yildiz, Istanbul Technical University, Turkey; Iman Farhat, Lourdes Farrugia, Kristian Zarb Adami, University of Malta, Malta; Tuba Yilmaz, Ibrahim Akduman, Istanbul Technical University, Turkey

TH-A5.1A.5 **09:20**

AMC-Backed Wearable Monopole Antenna for Sub-6 GHz 5G and WLAN Applications

Jayshri Kulkarni, Brian Garner, Yang Li, Baylor University, United States

Break **09:40**

TH-A5.1A.6 **10:00**

Compact Omnidirectional Circularly-Polarized Implantable Antenna for Medical Applications

Sarosh Ahmad, Institut National de la Recherche Scientifique (INRS),, Canada; Shuvra Barua, Kingston University London, United Kingdom, United Kingdom; Isam Eddine Lamri, University of Skikda, Skikda, Algeria; Tayeb A. Denidni, Institut National de la Recherche Scientifique (INRS),, Canada

TH-A5.1A.7 **10:20**

EBG-backed Head Wearable Antenna Array For Transcranial Radio-frequency Stimulation Applications

Abdul Quddious, Asif Bilal, University of Cyprus, Cyprus; Andreani Odysseos, EPOS-Iasis, R&D, Cyprus; Constantinos Pitris, Stavros Iezekiel, University of Cyprus, Cyprus

TH-A5.1A.8 **10:40**

A V-Band Highly Directive Circularly Polarized Antenna Array for Wireless and Contactless Continuous Glucose Monitoring

Hoda Farhat, Joseph Costantine, Rouwaida Kanj, Youssef Tawk, Ali Ramadan, Assaad Eid, American University of Beirut, Lebanon

TH-A5.1A.9 **11:00**

Hyperthermia Brain Cancer Treatment Using a Wideband Antenna with an Elliptic Reflector

Noha Hassan, Mohamed Sanad, Faculty of Engineering, Cairo University, Egypt

Antenna Theory II

Session Co-Chairs: Ricardo Pereira, Institute of Telecommunications, University of Aveiro; Sree Dasari, Georgia Institute of Technology

TH-A1.1A.1 **08:00**

Exceptional Point Perspective of Periodic Leaky-Wave Antennas

Amar Al-Bassam, Dirk Heberling, RWTH Aachen University, Germany; Chirstophe Caloz, KU Leuven, Belgium

TH-A1.1A.2 **08:20**

Bandwidth Enhancement of Circularly Polarized Antenna Based on Dual Layer Metasurface

Ghulam Fatima Kakepoto, Xiao-Hua Wang, UESTC China, China; Farman Ali, Department of Physics & Electronics, Pakistan

TH-A1.1A.3 **08:40**

Antenna Circuit Model Synthesis for Circuit-Based Transient Radiation Analysis

Vikram Naidu, Kurt Schab, Santa Clara University, United States

TH-A1.1A.4 **09:00**

Improvements in Edge of Coverage Gain for S-band Sat-Com Applications using Electromagnetic Band Gap based Feeds

D. P. Buch, Nirma University, India; Dhaval Pujara, Pandit Deendayal Energy University, India; Piyush Bhatasana, Nirma University, India; Kaushik Kannan, Sravan Kumar S., Indian Space Research Organisation, India

TH-A1.1A.5 **09:20**

H-plane Sliced Stepped Patch Antenna

Yiying Wang, Xin Wang, Guilin University of Electronic Technology, China; Bo Wang, Xi'an Electronic Engineering Research Institute, China; Yonghui Qin, Jinjun Mo, Guilin University of Electronic Technology, China; Omar M. Ramahi, University of Waterloo, China

Break **09:40**

TH-A1.1A.6 **10:00**

Upper Bound on Transducer and Radiation Efficiencies of a Multiport Antenna Arrays

Miloslav Capek, Lukas Jelinek, Czech Technical University in Prague, Czech Republic

TH-A1.1A.7 **10:20**

A Compact Circularly Polarized Novel Implantable Antenna for Biomedical Applications

Sarosh Ahmad, Universidad Carlos III de Madrid, Leganes, 28911, Madrid, Spain; Syed Tamoor Shah, National University of Sciences and Technology (NUST), Pakistan, Pakistan; Bensid Chahrazad, Université Ferhat Abbas de Sétif, Setif, Algeria, Algeria; Daniel Segovia Vargas, Universidad Carlos III de Madrid, Leganes, 28911, Madrid, Spain

TH-A1.1A.8 **10:40**

Formula for Generating Gaussian Beams Using Smooth-Walled Conical Horn Antennas

Ricardo Pereira, Nuno Borges Carvalho, Institute of Telecommunications, University of Aveiro, Portugal

TH-A1.1A.9 **11:00**

Design of a Compact Reconfigurable Antenna with Hybrid Polarization and Frequency Control for Geofencing Application

Uma Dhevi Kandasamy, Thennarasan Sabapathy, Muzammil Jusoh, Mohamed Nasrun Osman, Universiti Malaysia Perlis, Malaysia

Dual-band Antennas

Session Chair: Zhong-Min Liu, Honeywell

TH-A1.2A.1 **08:00**

Design of a Dual-band, Quad-element Dipole

Grant Evans, Jack Nemec, Sungkyun Lim, Georgia Southern University, United States

TH-A1.2A.2 **08:20**

A Dual Band Printed F-antenna using a Trap with Small Band Separation

Zhong-Min Liu, Justin Jose, Amit Kulkarni, Honeywell, United States

TH-A1.2A.3 **08:40**

Dual Band Dual Polarized Electrically Small Antenna Employing a Magnetic Material

Frank Li, University of California San Diego, United States; Shailesh Pandey, Yajie Chen, Rogers Corporation, United States; John Sanford, University of California San Diego, United States

TH-A1.2A.4 **09:00**

A Dual-Band Subwavelength Reflectarray Unit Based on Minkowski Fractal Geometry

Hao Zheng Lu, Xiao Yu Li, Zhen Wang, Mei Song Tong, Tongji University, China

TH-A1.2A.5 **09:20**

A Wideband Dual-Band and Dual-Circularly Polarized Wide-Angle Scanning Phased Array Antenna with Single-Port Feed at K-/Ka-Bands

Kun Yang, Hong Bin Wang, Yu Jian Cheng, University of Electronic Scieuce and Technology of China (UESTC), China

Break **09:40**

TH-A1.2A.6 **10:00**

Dual-Band Circularly Polarized Micro-Array Synthesis Using Spherical Wave Expansion

Hussein Jaafar, Antonio Clemente, Christophe Delaveaud, CEA-Leti, France; Thierry Le Nadan, Radiall, France

TH-A1.2A.7 **10:20**

A Dual-Band Radiating System for High-Power Microwave Applications

Adamo Banelli, Luciano Prado, Felix Vega, Chaouki Kasmi, Technology Innovation Institute, United Arab Emirates

TH-A1.2A.8 **10:40**

A Dual-Band Circular Patch Antenna with a Small Frequency Ratio

Saininad Naik, Maria Pour, The University of Alabama at Huntsville, United States

TH-A1.2A.9 **11:00**

A reconfigurable dual-band switched-beam antenna for 24/28 GHz applications

Nadir Hakem, Nahi Kandil, MUKENDI LEINGTHONE MUAMBA, Université de Québec en Abitibi-Témiscamingue and underground communications research laboratory (LRTCS),, Canada

TH-A1.2A.10 **11:20**

Dual-Band GNSS L-Band Antenna with a lean Design for an Automotive Integration

Zafer Toprak, Stefan Lindenmeier, University of the German Federal Armed Forces, Germany

Localization and Estimation Techniques in Sensing and Communications

Session Chair: Haihan Sun, University of Wisconsin-Madison

TH-UC.1A.1 **08:00**

Super-Resolution Range and Velocity Fast Estimation for OFDM-Based RadCom System

Hao Wan, Wenxu Zhang, Harbin Engineering University, China; Xuefei Dai, AVIC Leihua Electronic Technology Research Institute, China; Yuxuan Zheng, Harbin Engineering University, China

TH-UC.1A.2 **08:20**

Influence of Calculation Frequencies to Improve Position Estimation Error Using Multi-Frequency in THz-TDS Synthetic Aperture Array Measurement

Keisuke Kobayashi, Keizo Cho, Hiroaki Nakabayashi, Koji Suizu, Chiba Institute of Technology, Japan

TH-UC.1A.3 **08:40**

Usage of Channel State Information for localization in a WIFI Network

Ali Khalaf, Université du Québec en Abitibi-Témiscamingue, Canada; Nadir Hakem, Laboratoire de Recherche Télébec en Communications Souterraines, Canada; Nahi Kandil, Université du Québec en Abitibi-Témiscamingue, Canada

TH-UC.1A.4 **09:00**

Location of autonomous service robot in a university campus environment

Mohamed Madi, Nahi Kandil, Université du Québec en Abitibi-Témiscamingue, Canada; Nadir Hakem, Laboratoire de Recherche Télébec en Communications Souterraines, Canada

TH-UC.1A.5 **09:20**

2D Outdoor Trilateration Localization using Supervised Learning method

Ling Ma, Yee Hui Lee, Nanyang Technological University, Singapore

Break **09:40**

TH-UC.1A.6 **10:00**

Floating-point representation of signals for radio astronomical data interchange

Omar Yeste Ojeda, National Radio Astronomy Observatory, United States

TH-UC.1A.7 **10:20**

Tree Roots Pose Reconstruction via GPR and 3D CNN

WENHAO LUO, YEE HUI LEE, Nanyang Technological University, Singapore; Mohamed Lokman Mohd Yusof, National Parks Board, Singapore; Abdulkadir C. Yucel, Nanyang Technological University, Singapore

TH-UC.1A.8 **10:40**

Radar Behavior Recognition Based on Radar Word Coding and Intelligent Dual Mode Recognition

Yunxiao Fu, Wenxu Zhang, Fosheng Zhang, Harbin Engineering University, China

TH-UC.1A.9 **11:00**

A Signal Processing Algorithms-Assisted Deep Learning Scheme for Ground-Penetrating Radar Imaging

Qiqi Dai, Yee Hui Lee, Jiwei Qian, Nanyang Technological University, Singapore; Mohamed Lokman Mohd Yusof, Daryl Lee, National Parks Board, Singapore; Abdulkadir C. Yucel, Nanyang Technological University, Singapore

Electromagnetics Education

Session Co-Chairs: Lauren Linkous, Virginia Commonwealth University; Junming Diao, Mississippi State University

TH-A2.2A.1 **08:00**

An Innovative Graduate Education Course – Lean Canvas for Invention

Cynthia Furse, Karen Tao, Donna Ziegenfuss, University of Utah, United States; Arabella Bhutto, Mehran University of Engineering and Technology, Pakistan

TH-A2.2A.2 **08:20**

Understanding Aperture Efficiency for Reflector Antennas Using the Poynting Streamline Method

Junming Diao, Mississippi State University, United States

TH-A2.2A.3 **08:40**

Teaching Link Budget with Examples from Biomedical to Space Applications

Reyhan Baktur, Utah State University, United States

TH-A2.2A.4 **09:00**

Green's Function for Pedagogical Development III: Laboratory Visualization

Thomas Wong, Xavier Crawford, Mahmoud Alashi, Illinois Institute of Technology, United States

TH-A2.2A.5 **09:20**

AntennaCAT: Automated Antenna Design and Tuning Tool

Lauren Linkous, Jonathan Lundquist, Erdem Topsakal, Virginia Commonwealth University, United States

Break **09:40**

TH-A2.2A.6 **10:00**

Calculating Power Wave S-Parameters Using Only Port Voltages or Currents

David Kelley, Bucknell University, United States

TH-A2.2A.7 **10:20**

MUSIC and Pattern Synthesis Based Anti-Jamming Software Application for Research & Education

Roby Singh, Montell Higgins-Chen, Hengyi Zhou, Benjamin Falkner, Amit Mehta, Swansea University, United Kingdom

TH-A2.2A.8 **10:40**

Waveguide Iris Filter Design via Reusable Blocks

Anil Arici, Sefa Erdogdu, Umut Bulus, Antenom Antenna Technologies, Turkey

TH-A2.2A.9 **11:00**

Study on Co-and Cross-Polarization Radiation Patterns of Dipole Antenna

Rahul Kumar Jaiswal, Ranjit Kumar Dutta, Sudeb Bhattacharya, Indian Institute of Technology Kanpur, India; Chow-Yen-Desmond Sim, Feng Chia University Taichung, Taiwan; Kumar Vaibhav Srivastava, Indian Institute of Technology Kanpur, India

Advances in Radiocommunication Systems

Session Co-Chairs: Gregory Huff, Pennsylvania State University; Payam Nayeri

TH-UC.2A.1 **08:00**

Waveform Design for Unambiguous High-Accuracy Inter-Node Range Estimation in Distributed Phased Arrays

Anton Schlegel, Jeffrey A. Nanzer, Michigan State University, United States

TH-UC.2A.2 **08:20**

A Framework for Wideband Beamforming Using a True-Time Delay Network

Nam Nicholas Mai, Gregory Huff, Pennsylvania State University, United States

TH-UC.2A.3 **08:40**

Digital Predistortion Implementation in Short-range mm-wave Six-port Transceivers

Mansoor Dashti Ardakani, Hamed Tadayon, INRS University, Canada; Reza Karimian, Shahrokh Ahmadi, Mona Zaghloul, The George Washington University, United States

TH-UC.2A.4 **09:00**

Low-probability of Intercept/Detect (LPI/LPD) Secure Communications Using 1-bit Phased-arrays Employing Side-lobe Time Modulation

Jiahao Zhao, John Booske, Nader Behdad, University of Wisconsin-Madison, United States

TH-UC.2A.5 **09:20**

Single-Chip Realization of All-Digital Transmitter Using RFSoC FPGA

Kefayet Ullah, Satheesh Bojja Venkatakrishnan, John L. Volakis, Florida International University, United States

Break **09:40**

TH-UC.2A.6 **10:00**

Leakage Suppression with Phase-Sensitive Dynamic Filtering in Transceiver Systems

Sean Chen, Yuanxun Wang, UCLA, United States

TH-UC.2A.7 **10:20**

Evaluating the Performance and Impact on Phase-Modulated Signals from Broadband Electrically Small Antenna Enable by Tightly Integrated and Co-Design of Time-Varying and Active RFICs

Richard Peterson, Syed Uddin, Michael Artlip, Emily Miller, Robert Lucas, Wooram Lee, Gregory Huff, The Pennsylvania State University, United States

EM Theory, Materials and Complex Media I

Session Chair: Ashwin K. Iyer, University of Alberta

TH-UB.1A.1 **08:00**

Pure Magnetic Dipole Radiation with Spherical Electric Current Density via Spherical Harmonic Approach

David Garren, Naval Postgraduate School, United States

TH-UB.1A.2 **08:20**

Characteristic Modes of Frequency Selective Surfaces from Network Scattering Parameters

Kurt Schab, Frederick Chen, Santa Clara University, United States; Lukas Jelinek, Miloslav Capek, Czech Technical University in Prague, Czech Republic; Johan Lundgren, Mats Gustafsson, Lund University, Sweden

TH-UB.1A.3 **08:40**

Energy Backflow in Unidirectional Spatiotemporal Localized Waves

Ioannis Besieris, Virginia Tech, United States; Peeter Saari, University of Tartu, Estonia

TH-UB.1A.4 **09:00**

Method of Modal Basis: A Tribute to Oleg A. Tretyakov

Fatih Erden, Turkish Naval Academy, National Defence University, Turkey

TH-UB.1A.5 **09:20**

Efficiency bounds on matching with time-modulated networks

Dimitrios Sounas, Wayne State University, United States; Gengyu Xu, Ahmed Mekawy, Akshaj Arora, City University of New York, United States; Leonardo Ranzani, Raytheon BBN, United States; Andrea Alu, City University of New York, United States

Break **09:40**

TH-UB.1A.6 **10:00**

Nonlocal Metasurfaces for Wavefront Shaping of Arbitrary Polarizations

Yoshiaki Kasahara, The University of Texas at Austin, United States; Adam Overvig, Gengyu Xu, Andrea Alu, City University of New York (CUNY), United States

TH-UB.1A.7 **10:20**

Static Beamforming Metasurface Radomes

Christopher J. M. Barker, Ashwin K. Iyer, University of Alberta, Canada

Wideband and Multi-band Reflector and Reflectarray Antennas

Session Chair: Kaushik Debbarma, San Diego State University

TH-A1.3A.1 **08:00**

A Wideband Low-Profile Reflectarray With Decoupled LHCP/RHCP Beams

Yu Lu Fan, Xian Qi Lin, University of Electronic Science and Technology of China, China

TH-A1.3A.2 **08:20**

Radiated Spectrum of Focal Plane Array Antennas with LINCA Array Feeds

Roel Budé, Meerten Versluis, Ulf Johannsen, Bart Smolders, Eindhoven University of Technology, Netherlands

TH-A1.3A.3 **08:40**

Tri-band Millimeter-Wave Antenna Unit Cell for a Deployable Scanning Reflectarray

Cara Kataria, William Moulder, William Blackwell, Massachusetts Institute of Technology Lincoln Laboratory, United States

TH-A1.3A.4 **09:00**

Increasing the Bandwidth of Reflectarray Antennas Using the Frequency Pulling Technique

Christos Exadaktylos, Anastasios Koutinos, Constantinos Zekios, Stavros Georgakopoulos, Florida International University, United States

TH-A1.3A.5 **09:20**

Single Layer Reflectarray Independently Controlling at 15GHz / 30GHz for Dual Polarization

Sota Tanizawa, Hiroyuki Deguchi, Doshisha University, Japan

Break **09:40**

TH-A1.3A.6 **10:00**

A Novel Dual-band Metasurface Antenna Unit Cell with Varactor Diodes

Peng Rui Zhang, Tongji University, China; Ajay K. Poddar, Ulrich L. Rohde, Synergy Microwave Corporation, United States; Mei Song Tong, Tongji University, China

TH-A1.3A.7 **10:20**

Multi-band Dual-beams Reflectarray for Mode and Polarization Multiplexing of OAM beams

Ali Ali, Mohsen Khalily, Tim Brown, Rahim Tafazolli, 5GIC & 6GIC, Institute for Communication Systems (ICS)/ University of Surrey, United Kingdom

TH-A1.3A.8 **10:40**

Novel Dual-Frequency Independent Beam-Scanning Reflectarray

Pei-Ling Chi, Yu-Heng Cheng, National Yang Ming Chiao Tung University, Taiwan; Tao Yang, University of Electronic Science and Technology of China, China

Antenna Pattern Control and Multifunction Structures

Session Co-Chairs: Yang Hao, Queen Mary University of London; A. Arif Ergin, Yeditepe University

TH-A1.4A.1 **08:00**

Impact of Bodies on Harmonic Transponder Conversion Loss and Radiation Patterns

Milan Polivka, Czech Technical University, Czech Republic; Jeff Frolik, University of Vermont, United States

TH-A1.4A.2 **08:20**

Multifunctional Intelligent Reflective Surface by Continuously Controlling Amplitude and Phase

Ratanak Phon, Sungjoon Lim, Chung-Ang University, Korea (South)

TH-A1.4A.3 **08:40**

Multiband X-Band Frequency for Reflecting Intelligence Surfaces (IRSs)

Taufiqqurrachman Taufiqqurrachman, Advanced RF and Microwave Research Group (ARFMRG) / National Research and Innovation Agency (BRIN), Indonesia; Mohamad Kamal A. Rahim, Noor Asmawati Samsuri, Advanced RF and Microwave Research Group (ARFMRG), Malaysia; Yusuf Wijayanto, National Research and Innovation Agency (BRIN), Indonesia

TH-A1.4A.4 **09:00**

Design and Development of 3D-Printed Meta-Mirror Antenna for Satellite Links at FR-2 Band of 5G Communication

Suchitra Tiwari, Indian Institute of Technology Jammu, India; Amit K. Singh, Indian Institute of Technology Patna, India; Ankit Dubey, Indian Institute of Technology Jammu, India

TH-A1.4A.5 **09:20**

Design, Optimization and Fabrication of a X-Band Septum Polarizer for Satellite Communication

Merve Güvenç, İsmail Şişman, Profen Communication Technology, Turkey; A. Arif Ergin, Yeditepe University, Turkey

Analysis, Optimization, and Calibration of Phased Array Antennas

Session Chair: Francesca Pascarella, University of Pisa

TH-A1.5A.1 **10:00**

Genetic Algorithm based Optimization for Concentric Circular Antenna Arrays Design

Francesca Pascarella, Chiara Scarselli, University of Pisa, Italy; Giuseppe Novellis, Free Space srl, Italy; Guido Nenna, CNIT, Italy; Agostino Monorchio, University of Pisa, Italy

TH-A1.5A.2 **10:20**

Input Impedance Stabilization of Finite Arrays of HIS-Backed Antenna Elements

Ian Bennett, George Eleftheriades, University of Toronto, Canada

TH-A1.5A.3 **10:40**

Comparison of Intermodulation Distortion Performance in Linear and Circular Phased Arrays

Robert Schmid, Peter Smith, Shane Impola, The Johns Hopkins Applied Physics Laboratory, United States

TH-A1.5A.4 **11:00**

Calibration of Active Electronically Scanned Arrays on Aerial Vehicles Through SAR Image Formation

Duncan Madden, Kamal Sarabandi, The University of Michigan, United States

TH-A1.5A.5 **11:20**

Digital Array Calibration Utilizing A Reduced Scale Planar Near-Field Measurement Method

John Outwater, Michael Leonard, Jose Diaz Diaz, Richard Tillman, Johns Hopkins University Applied Physics Laboratory, United States

Electrically Small Antennas

Session Co-Chairs: Jacob Adams, North Carolina State University; John Borchardt, Sandia National Laboratories

TH-A1.6A.1 **08:00**

Transient Behavior of Electrically Small Resonant Antennas for Use in Time-varying Transmitters

Joseph Dusenbury, Jacob Adams, North Carolina State University, United States

TH-A1.6A.2 **08:20**

A Plasma-Based Technique for Wideband Matching of Electrically Small Antennas

Abbas Semnani, Kushagra Singhal, Samsud Moon, The University of Toledo, United States

TH-A1.6A.3 **08:40**

Single-Fed Electrically Small Antenna with Circular Polarization

Marwan JADID, Christophe DELAVEAUD, Serge BORIES, CEA, France; Anthony BELLION, CNES, France

TH-A1.6A.4 **09:00**

A Ferromagnetic-Resonance Based Electrically Small Antenna with Circular Polarization

Shih-Ming Huang, Qian Gao, Yuanxun Ethan Wang, University of California, Los Angeles, United States

TH-A1.6A.5 **09:20**

Stability and Tolerance Analysis of Non-Foster Matched Electrically-Small Antennas

Phillip Hagen, Ting-Yen Shih, University of Idaho, United States

Break **09:40**

TH-A1.6A.6 **10:00**

Numerical Modelling of the Grimeton VLF Antenna

Marcus Walden, Plextek, United Kingdom

TH-A1.6A.7 **10:20**

A Compact MedRadio Implantable Monopole

Tomer Paley, Tel-Aviv University, Israel; Dan Kanyas, Nadav Gan, Merchavim Institute of R&D in Negev, Israel; Shadan Lalezari, Chaim Sheba Medical Center, Israel; Motti Haridim, Holon Institute of Technology, Israel

TH-A1.6A.8 **10:40**

Coupled and Characteristic Modes of a Double-Tuned Loop Antenna

John Borchardt, Sandia National Laboratories, United States

TH-A1.6A.9 **11:00**

An Ultracompact Omnidirectional Circularly Polarized Antenna

Huacheng Li, Zhenxin Hu, Guangdong University of Technology, China; Wei Lin, The Hong Kong Polytechnic University, China

TH-A1.6A.10 **11:20**

A mmWave, SiGe, 2x2 Spiral Array Design using Sequential Rotation with Dual Circular Polarization for 6G and B5G Communication Applications.

Juan M. Herrera-Martín, Universidad Carlos III de Madrid, Spain; Vicente González-Posadas, Universidad Politécnica de Madrid, Spain; Daniel Segovia-Vargas, Universidad Carlos III de Madrid, Spain

Quantum Technology Related to Electromagnetics II

Session Co-Chairs: Weng Chew, Purdue University; Thomas Roth, Purdue University

TH-SP.1P.1 **13:20**

Quantum Dipole–A Mathematical Model

Weng C. CHEW, Purdue University, United States; Dong-Yeop NA, POSTECH, Korea (South); Christopher Jayun RYU, U of Illinois, United States

TH-SP.1P.2 **13:40**

Quantum Hot Electron Generation and Non-Equilibrium Temperature Dynamics in Metasurface Absorbers

Christos Argyropoulos, The Pennsylvania State University, United States; Larousse Khosravi Khorashad, University of Nebraska-Lincoln, United States

TH-SP.1P.3 **14:00**

Full-Wave Hamiltonian Analysis of a Coaxial-Fed 3D Microwave Cavity Resonator

Soomin Moon, Thomas Roth, Purdue University, United States

TH-SP.1P.4 **14:20**

Quantum Entanglement Mediated by Surface Plasmon Polaritons Supported by Time-Varying Media

Jay Berres, University of Wisconsin-Milwaukee, United States; Seyyed Ali Hassani Gangaraj, University of Wisconsin-Madison, United States; George Hanson, University of Wisconsin-Milwaukee, United States

TH-SP.1P.5 **14:40**

Generalized Helmholtz Decomposition for Modal Analysis of Electromagnetic Problems in Inhomogeneous Media

Jie Zhu, Thomas Roth, Weng Chew, Purdue University, United States; Dong-Yeop Na, Pohang University of Science and Technology, Korea (South)

Break **15:00**

TH-SP.1P.6 **15:20**

Quantum Target Detection Based on Cell Average-Constant False Alarm Rate Detection

Qian Wang, Mu Zhou, Liangbo Xie, Jiahao Hu, Chongqing University of Posts and Telecommunications, China

TH-SP.1P.7 **15:40**

Compressive Sensing Based Entangled Optical Quantum Imaging Method

Zhongyin Hu, Mu Zhou, Yong Wang, Jingyang Cao, Chongqing University of Posts and Telecommunications, China

TH-SP.1P.8 **16:00**

A Framework for Creating Stable FDTD Schemes for the Schrödinger Equation that Conserve Probability and Energy

Fadime Bekmambetova, Piero Triverio, University of Toronto, Canada

Frontier Biomedical Theory, Experiments, Instruments and Applications

Session Co-Chairs: Johnson Wang, Wang Electro-Opto Corporation; John Volakis, Florida Atlantic University

TH-SP.2P.1 **13:20**

Cell Rover: An intracellular antenna for radio communication in 3D biological systems

Baju Joy, Deblina Sarkar, MIT, United States

TH-SP.2P.2 **13:40**

Deep-Tissue Capsule Antennas Achieving Extreme Levels of Miniaturization While Maintaining Moderate Gain

Alexander B. Murray, Ashwin K. Iyer, University of Alberta, Canada

TH-SP.2P.3 **14:00**

A Compact Self-Duplex Antenna For Wireless Capsule Endoscopic Devices

Abdullah Alshammari, Amjad Iqbal, Claudio Balocco, ISMAIL BEN MABROUK, Durham University, United Kingdom

TH-SP.2P.4 **14:20**

Metamorphosis of Traditional Chinese Medicine (TCM) into Scientific TCM (STCM)—New Visions and Principles for Human Physiology and Medicine

Johnson Wang, Wang Electro-Opto Corporation, United States

TH-SP.2P.5 **14:40**

Towards Wearable Monitoring of Muscle Atrophy: A Stretchable, Conductive Thread-Based Sensor

Allyanna Rice, Asimina Kiourti, The Ohio State University, United States

Break **15:00**

TH-SP.2P.6 **15:20**

Modeling and Optimization of the Steering Range of a Phased Array Antenna for Neuromodulation Applications in the Near-Field Region.

Nabanita Saha, Ifana Mahbub, The University of Texas at Dallas, United States

TH-SP.2P.7 **15:40**

Dielectrics of Glucose Solutions by Broadband Transmission Line Method

Yong Zhou, Wei Lin, University of Texas Rio Grande Valley, United States

TH-SP.2P.8 **16:00**

Towards Detection of Hirschsprung's Disease using Dielectric Properties: Feasibility in thin mice colon

Poulami Samaddar, Sunil Gaddam, Keerthy Gopalakrishnan, Akhila Cherukuri, Vaishnavi Modi, Mayo Clinic, United States; Shuvashis Dey, North Dakota State University, United States; Sayan Roy, South Dakota Mines, United States; Dipankar Mitra, University of Wisconsin-La Crosse, United States; Shivaram P. Arunachalam, Mayo Clinic, United States

TH-SP.2P.9 **16:20**

Microwave Imaging Based Lesion Monitoring During Infarct Ablation: Feasibility Study

Sunil Gaddam, Poulami Samaddar, Keerthy Gopalakrishnan, Keirthana Aedma, Devanshi Damani, Suganti Shivaram, Mayo Clinic, United States; Shuvashis Dey, North Dakota State University, United States; Sayan Roy, South Dakota Mines, United States; Dipankar Mitra, University of Wisconsin-La Crosse, United States; Shivaram P. Arunachalam P. Arunachalam, Mayo Clinic, United States

Millimeter Wave Antennas for 5G/6G Applications

Session Co-Chairs: Ifana Mahbub, The University of Texas at Dallas; Jiantong Li, Samsung Research America Inc

TH-A5.1P.1 **13:20**

A D-band Low-cost High-gain Phased Antenna Array for 6G Applications

Jiantong Li, Navneet Sharma, Shenggang Dong, Xinguang Xu, Yong Su, Won-Suk Choi, Gary Xu, Samsung Research America Inc, United States

TH-A5.1P.2 **13:40**

Millimeter-Wave Complementary Planar Antenna with Conical Radiation for 6G Applications

Anh Duc Pham, Sungjoon Lim, Chung-Ang University, Korea (South)

TH-A5.1P.3 **14:00**

Millimeter-wave Defected Ground Structure-based MIMO Antenna for 6G Wireless Applications

Gabriela Jana Griffiths, Aberystwyth University, United Kingdom; Shaker Alkaraki, Queen Mary University of London, United Kingdom; Muhammad Aslam, University of West of Scotland, United Kingdom; Qammer H Abbasi, University of Glasgow, United Kingdom; Andrew Evans, Syeda Fizzah Jilani, Aberystwyth University, United Kingdom

TH-A5.1P.4 **14:20**

AMC-Loaded Millimeter-Wave CPW-Fed Monopole Antenna for 5G Wearable Applications

Muhammad Zaka Ali, Fabrice Mfuamba Kabonzo, Mourad Nedil, University of Quebec in Abitibi-Temiscamingue (UQAT), LRTCS, Val-d'Or, Québec, Canada, Canada; ISMAIL BEN-MABROUK, Durham university, Durham, UK, Canada

TH-A5.1P.5 **14:40**

The Detrimental Effects Experienced by a 5G mmWave 1×4 Antenna Array when Integrated into a Smartphone

Chow-Yen-Desmond Sim, Jeng-Jr Lo, Feng Chia University, Taiwan; Horng-Dean Chen, National Kaohsiung Normal University, Taiwan

Break **15:00**

TH-A5.1P.6 **15:20**

An ultra low cost orthogonal pattern diversity antenna module for compact mmWave 5G mobile devices

Karthikeya G. S, BMS College of Engineering, India; Shiban K Koul, IIT Delhi, India; Ajay K Poddar, Ulrich Rohde, Synergy Microwave Corporation, United States

TH-A5.1P.7 **15:40**

2x2 Planar Array of X-Shaped Slot Antennas for Millimeter Wave Frequency Band

Mangseang Hor, Masanobu Hirose, 7Gaa Co Ltd, Japan; Takashi Hikage, Hokkaido University, Japan

TH-A5.1P.8 **16:00**

A shared ground economical dielectric-free dual polarized antenna system for 5G mobile devices

Karthikeya G.S, BMS College of Engineering, India; Shiban K Koul, IIT Delhi, India; Ajay K Poddar, Ulrich Rohde, Synergy Microwave Corporation, United States

Metamaterial Modeling

Session Co-Chairs: Giacomo Oliveri, University of Trento; Fikadu Dagefu, Army Research Laboratory

TH-A2.1P.1 **13:20**

Bianisotropic Susceptibility Theory of Artificial Magnetic Conductors

Oscar Céspedes Vicente, Christophe Caloz, KU LEUVEN, Belgium

TH-A2.1P.2 **13:40**

Design of Cost-Effective and Performant Electromagnetic Skins via Non-Radiating Sources

Francesco Zardi, Giacomo Oliveri, Marco Salucci, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy

TH-A2.1P.3 **14:00**

Constructing Parity Matrices for General Non-Reflecting Surfaces

Roee Geva, Raphael Kastner, Tel Aviv University, Israel

TH-A2.1P.4 **14:20**

Design of a Reflective Metasurface with Broadband Low Detectability on 3-D Targets

Wuxia Miao, Lamei Zhang, Bin Zou, Ye Ding, Harbin Institute of Technology, China

TH-A2.1P.5 **14:40**

Design of Pixelated Metasurface Using Genetic Algorithm with HFSS

Ryan Banks, Quang Nguyen, VA Tech, United States

Break **15:00**

TH-A2.1P.6 **15:20**

Broadband Metamaterial Design Using Carbon Fiber and Resistive Sheet Materials

Zion Easterbrook, Edmond Chong, Sunny Zhang, Magdy Iskander, Zhengqing Yun, University of Hawaii, United States

TH-A2.1P.7 **15:40**

Fundamental Study on Electrically Controllable Broadband and Thin Non-reciprocal Metasurface

Kazuhiro Takahagi, Alan Tennant, The University of Sheffield, United Kingdom

TH-A2.1P.8 **16:00**

A Comparison of the Bandwidth Coverage for Different Metasurface Reflector Shapes

NUR SYAHIRAH MOHD YAZIZ, MOHAMAD KAMAL A. RAHIM, FARID ZUBIR, NOOR ASMAWATI SAMSURI, UNIVERSITI TEKNOLOGI MALAYSIA, Malaysia

TH-A2.1P.9 **16:20**

A 2-Bit Reconfigurable Reflecting Metasurface for Mm-wave Applications

Fahad Ahmed, Noureddine Melouki, Peyman PourMohammadi, Hassan Naseri, Tayeb A. Denidni, National Institute for Scientific Research (INRS), University du Quebec, Montr âal, Canada

Finite Difference Time Domain Methods

Session Co-Chairs: Atef Z. Elsherbeni, Colorado School of Mines; Costas Sarris, University of Toronto

TH-A3.1P.1 **13:20**

Electromagnetic Analysis using the Temporal and Spatial Interpolated Subgridding Algorithm

Fatih Kaburcuk, Sivas Cumhuriyet University, Turkey; Atef Z. Elsherbeni, Colorado School of Mines, United States

TH-A3.1P.2 **13:40**

Edge-based Material Cell Meshing for Improved Accuracy of Laguerre-FDTD Method

Yifan Wang, Yiliang Guo, Rahul Kumar, Rohit Sharma, Georgia Institute of Technology, United States; Madhavan Swaminathan, Pennsylvania State University, United States

TH-A3.1P.3 **14:00**

Adaptive Integration Method for the Calculation Speed Improvement for the MR/FDTD

Kei Asahi, Takuji Arima, Tokyo University of Agriculture and Technology, Japan

TH-A3.1P.4 **14:20**

Full-Wave FDTD Modeling and Simulation of Nonlinear Transmission Lines

Bud Denny, Travis Garrett, James Schrock, Air Force Research Laboratory, United States

TH-A3.1P.5 **14:40**

A Provably Stable SBP-SAT FDTD Subgridding Method without Modifying Yee's Grids

Yuhui Wang, Beihang University, China; Guijie Diao, Science and Technology on Complex System Control and Intelligent Agent Cooperation Laboratory, China; Hong Ni, Beijing Electro-mechanical Engineering Institute, China; Shunchuan Yang, Beihang University, China

Break **15:00**

TH-A3.1P.6 **15:20**

A Stable and Symmetric FDTD Subgridding Method with Arbitrary Grid Ratio

Langran Deng, Beihang University, China; Ningbo Gong, Beijing Electro-mechanical Engineering Institute, China; Guijie Diao, Science and Technology on Complex System Control and Intelligent Agent Cooperation Laboratory, China; Shunchuan Yang, Beihang University, China

TH-A3.1P.7 **15:40**

Toward the Development of A Three-dimensional Stable SBP-SAT FDTD Method

Hanhong Liu, Beihang University, China; Ningbo Gong, Hong Ni, Beijing Electro-mechanical Engineering Institute, China; Shunchuan Yang, Beihang University, China

MIMO Technology: Algorithms and Designs

Session Co-Chairs: Abdelbaki Zeghdoud, University of Quebec in Abitibi-temiscamingue (UQAT); Riccardo Ozzola, TU Delft

TH-A5.2P.1 **13:20**

Generation of Independent Beams from Arbitrary Domains

Riccardo Ozzola, Roderick G. Tapia Barroso, Daniele Cavallo, Andrea Neto, TU Delft, Netherlands

TH-A5.2P.2 **13:40**

On the Spectral Efficiency of UAVs-assisted D2D Cooperative Communications Using NOMA

Widad Belaoura, Boumerdes University, Algeria; Khalida Ghanem, University of Abitibi Temiscamingue, Canada; Muhammad Zeeshan Shakir, University of the West of Scotland, United Kingdom; Mourad Nedil, University of Abitibi Temiscamingue, Canada

TH-A5.2P.3 **14:00**

Linear Frequency Modulation-based Architecture for SM systems

Chellali Slimani, Ecole militaire polytechnique, Algeria; Fadila Berrahma, Ecole Nationale Polytechnique, Algeria; Khalida Ghanem, University of Abitibi Temiscamingue, Canada; Farid Ghanem, Ministry of higher education, Algeria; Mourad Nedil, University of Abitibi Temiscamingue, Canada

TH-A5.2P.4 **14:20**

On the performance of new spatial modulation scheme for frequency selective channels

Fadila Berrahma, Ecole Nationale Polytechnique, Algeria; Khalida Ghanem, Ecole Nationale Polytech, Algeria; Mourad Nedil, University of Abitibi Temiscamingue, Canada; Abdellah Chehri, Royal Military College of Canada, Canada

TH-A5.2P.5 **14:40**

Performance of Cooperative SM-aided Multiple Access scheme with DF relaying protocol

Fadila Berrahma, Ecole Nationale Polytechnique, Algeria; Khalida Ghanem, Mourad Nedil, University of Abitibi Temiscamingue, Canada; Abdellah Chehri, Royal Military College of Canada, Canada

Break **15:00**

TH-A5.2P.6 **15:20**

Experimental Evaluation of Non-Stationary Vehicle-to-Vehicle Massive MIMO Channel Characteristics

ASAD SALEEM, SHURUN TAN, Zhejiang University-University of Illinois at Urbana-Champaign Institute, Haining, Zhejiang 314406, China, China

TH-A5.2P.7 **15:40**

A Method for Correlation Reduction of Dual-Polarized Base Station Antenna Array With Limited Angular Spread

Jiayue Jiang, Luyu Zhao, Xidian university, China

Computational Electromagnetics, Analysis, and Optimization

Session Co-Chairs: Constantine Sideris, University of Southern California; Hakan Bagci, King Abdullah University of Science and Technology (KAUST)

TH-UB.1P.1 **13:20**

Fast Radar Cross Section (RCS) Calculation with a Triangular Ray Tube Tracing (TRTT) Method

Merve Güvenç, Profen Communication Technology, Turkey; Fatih Dikmen, Gebze Technical University, Turkey; A. Arif Ergin, Yeditepe University, Turkey

TH-UB.1P.2 **13:40**

Characteristic Mode Analysis of Nanostructures using Coupled Volume Integral and Hydrodynamic Equations

Meruyert Khamitova, Ran Zhao, King Abdullah University of Science and Technology (KAUST), Saudi Arabia; Doolos Aibek Uulu, University of Central Asia (UCA), Kyrgyzstan; Hakan Bagci, King Abdullah University of Science and Technology (KAUST), Saudi Arabia

TH-UB.1P.3 **14:00**

RCS Prediction of a Dielectric Coated Large Structure Using ITD

Haeseung Lee, Soyeong Lee, Daeyeong Yoon, Yong Bae Park, Ajou Univ, Korea (South)

TH-UB.1P.4 **14:20**

Physics-Informed Graph Neural Network for Computational Electromagnetism

Shubin Zeng, Cyentech Consulting LLC, United States; Yawei Su, Xuqing Wu, University of Houston, United States; Yueqin Huang, Cyentech Consulting LLC, United States; Jiefu Chen, University of Houston, United States

TH-UB.1P.5 **14:40**

H-matrix Accelerated Locally Corrected Nystrom Method for Fast Error-Controllable CFIE Solution on PEC Targets

Omid Babazadeh, University of Manitoba, Canada; Emrah Sever, Aselsan, Turkey; Reza Gholami, Siemens EDA, Canada; Ian Jeffrey, University of Manitoba, Canada; Constantine Sideris, University of Southern California, United States; Vladimir Okhmatovski, University of Manitoba, Canada

Break **15:00**

TH-UB.1P.6 **15:20**

Harmonic balance solver for non-linear excitations of magnetic structures

Zhuonan Lin, UCSD, United States; Amir Boag, Amir Natan, TAU, Israel; Vitaliy Lomakin, UCSD, United States

TH-UB.1P.7 **15:40**

Compression-Enabled High-Order Surface Integral Equation Solutions for Complex Electromagnetic Simulations

Mark Horn, William Cole, Daniel Faircloth, IERUS Technologies, United States

TH-UB.1P.8 **16:00**

Full-Three-Dimensional FDTD Analysis of 5G Frequency Bands Propagation Prediction for Typical Indoor Multi-path Environment

Kohsuke Ushimaru, Takashi Hikage, Manabu Yamamoto, Hokkaido University, Japan; Nobuaki Kuno, Minoru Inomata, Wataru Yamada, NTT Corporation, Japan

TH-UB.1P.9 **16:20**

Applying the HHL Matrix Equation Solver to Electromagetic Scattering Problems: Challenges in the NISQ Era

Xinbo Li, Ian Jeffrey, Vladimir Okhmatovski, University of Manitoba, Canada

Mutual Coupling in Antenna Arrays I

Session Chair: Luyu Zhao, Xidian University

TH-A1.1P.1 **13:20**

Dual-layer Superstrate for Coupling Suppression of Large-Scale Dual-polarized Antenna Array

Ge Zhao, Luyu Zhao, Xidian University, China

TH-A1.1P.2 **13:40**

Mutual Coupling Reduction via Concentric SRR Wall for MIMO Antenna Systems

Ahmed Zahran, Future University in Egypt, Egypt; Mahmoud Abdalla, Military Technical College, Egypt; Islam Eshrah, Cairo University, Egypt

TH-A1.1P.3 **14:00**

Suppression of EM Coupling Between Microstrip Patch Antennas Using A Simple Meander Line Structure

Zulfi Zulfi, Institut Teknologi Bandung, Indonesia; Dharu Arseno, Telkom University, Indonesia; Achmad Munir, Institut Teknologi Bandung, Indonesia

TH-A1.1P.4 **14:20**

Decoupling of Wideband Closely-Spaced Patch Antennas for MIMO Applications

Zijian Shao, Princeton University, United States; Lina Ma, Changzhan Gu, Shanghai Jiao Tong University, China; Kaushik Sengupta, Princeton University, United States

TH-A1.1P.5 **14:40**

Optimizing Mutual Coupling Measurements for Active Phased Array Radar Calibration

Jose David Diaz Diaz, R. Henry Tillman, John M. Outwater Jr., Michael W. Leonard, JHU/APL, United States

Break **15:00**

TH-A1.1P.6 **15:20**

A Channel Decoupling Method for Digital Phased Array Beamforming Based on Chaotic Genetic Algorithm

Shijia Yi, Haining Yang, Aya Li, Jiacheng Shen, Tingjun Li, Yujian Cheng, University of Electronic Science and Technology of China, China

Antenna Feeds and Matching Circuits I

Session Chair: Guan-Long Huang, Foshan University

TH-A1.2P.1 **13:20**

A New Method for Improving Return Loss in Additively Integrated Bare Die Amplifiers

Christopher Areias, University of Massachusetts Lowell, United States; Mary Herndon, Raytheon Technologies, United States; Craig Armiento, Alkim Akyurtlu, University of Massachusetts Lowell, United States

TH-A1.2P.2 **13:40**

Band Gap Based Power Dividers in Parallel Plate Waveguide Technology

emilio arnieri, University of Calabria, Italy; francesco greco, university of calabria, Italy; luigi boccia, giandomenico amendola, University of Calabria, Italy

TH-A1.2P.3 **14:00**

Power Distributed Network for THz image system

Byo-Yen Shao, Chi-Yu Yang, Tzyh-Ghuang Ma, National Taiwan University of Science and Technology, Taiwan

TH-A1.2P.4 **14:20**

Design of 4 × 8 Filtering Butler Matrix With Unequal Power Distribution

Ning Yang, Qiang Shao, Rui-Sen Chen, Guan-Long Huang, Foshan University, China

TH-A1.2P.5 **14:40**

A Sliding Feeding Mechanism for a Bi-Stable Reconfigurable Quadrifilar Helix Antenna

Rosette Bichara, Joseph Costantine, Youssef Tawk, American University of Beirut, Lebanon; Maria Sakovsky, Stanford University, United States

Break **15:00**

TH-A1.2P.6 **15:20**

An Equation-based Method for the Design of End Couplings in Combline Microwave Cavity Filters

Enrico Boni, Giacomo Giannetti, Stefano Maddio, Giuseppe Pelosi, University of Florence, Italy

TH-A1.2P.7 **15:40**

Heterogeneously Integrated 6-12 GHz Butler Matrix

Paige Danielson, Zoya Popovic, University of Colorado Boulder, United States

TH-A1.2P.8 **16:00**

Design and Optimization of a Wide-Band Quad-Ridged Polarizer for Satellite Communications

Merve Güvenç, İsmail Şişman, Profen Communication Technology, Turkey; A. Arif Ergin, Yeditepe University, Turkey

TH-A1.2P.9 **16:20**

Broadband transition from waveguide to substrate-integrated waveguide with back-short structure in multilayer substrate at 300-GHz band

Shumpei Kishi, Yoshiki Sugimoto, Kunio Sakakibara, Nobuyoshi Kikuma, Nagoya Institute of Technology, Japan

Electromagnetic Propagation and Scattering

Session Co-Chairs: Robert Gardner, Georgia Tech Research Institute; Edwin Marengo, Northeastern University

TH-UB.2P.1 **13:20**

Radar Cross-section Prediction from Cylindrically Scanned Near-Field Samples Applicable for Differences in the Radar Range of the Transmitter and Receiver

Yoshihiko Akamine, Takashi Tomura, Jiro Hirokawa, Tokyo Institute of Technology, Japan

TH-UB.2P.2 **13:40**

Sub-GHz Radio Path Loss Model Creation and Error Analysis

Pooja Patankar, Erik Saturnino Gamez Rodriguez, Barmecha Naman, Sai Ananthanarayanan, Sriram Srinivasan, Amazon Lab126, United States

TH-UB.2P.3 **14:00**

Optical theorems for transient and broadband electromagnetic fields

Edwin Marengo, Northeastern University, United States

TH-UB.2P.4 **14:20**

Exact Solution for an Electric Dipole Located Inside a Multilayer Semi-Oblate Spheroidal Cavity that Radiates into a DNG Half-Space

Anastasiia Rozhkova, University of Illinois Chicago, United States; Ermanno Citraro, Politecnico di Torino, Italy; Danilo Erricolo, University of Illinois Chicago, United States; Francesco Andriulli, Politecnico di Torino, Italy

TH-UB.2P.5 **14:40**

Study and Analysis of Network Connectivity of robot in indoor environment

nabih allaw, Université du Québec en Abitibi-Témiscamingue, Canada; Nadir Hakem, Laboratoire de Recherche Télébec en Communications Souterraines, Canada; Nahi kandil, Université du Québec en Abitibi-Témiscamingue, Canada

Break **15:00**

TH-UB.2P.6 **15:20**

A Study on Determination Method of IRS Reflection Patterns Using Radio Environmental Map

Tomofumi Kanno, Hiromi Matsuno, Takuya Ohto, Tatsuya Nagao, Michihiro Harada, Takahiro Hayashi, KDDI Research, Inc., Japan

TH-UB.2P.7 **15:40**

Estimation of the Radio Refractive Index Based on a Deep Neural Network

Junmo Yang, Jun Heo, Ajou University, Korea (South); Dong-Yeop Na, Pohang University of Science and Technology, Korea (South); Yong Bae Park, Ajou University, Korea (South)

TH-UB.2P.8 **16:00**

Path Loss From the Perspective of Electromagnetic Information Theory

Ruifeng LI, Da LI, Er-Ping LI, Zhejiang University, China

TH-UB.2P.9 **16:20**

MULTICOMMODITY NETWORK FLOW FOR INDOOR PROGATION LOSS PREDICTION

Alexandre Oliveira, Glauco Fontgalland Filho, Nathan Bezerra Gurgel, Glauco Fontgalland, UFCG, Brazil; Humberto Dionísio de Andrade, UFERSA, Brazil

Antenna Theory, Design, and Measurements

Session Co-Chairs: Richard Ziolkowski, The University of Arizona; Satish K. Sharma, San Diego State University

TH-UB.3P.1 **13:20**

Superdirective Systems: Constrained Rayleigh Quotient Designed Dipole Arrays and Unidirectional Mixed-Multipole Antennas

Richard Ziolkowski, The University of Arizona, United States

TH-UB.3P.2 **13:40**

Enhancing the Gain-Bandwidth Product of Electrically Small Antennas with Dual-tone Time-modulation

Gengyu Xu, Ahmed Mekawy, Akshaj Arora, City University of New York, United States; Leonardo Ranzani, Raytheon BBN, United States; Dimitrios Sounas, Wayne State University, United States; Andrea Alù, City University of New York, United States

TH-UB.3P.3 **14:00**

Near Field Focused Arrays: Revisiting Transverse and Axial Resolution

Vignesh Manohar, Delart Technologies Corp, Canada; Yahya Rahmat-Samii, University of California Los Angeles, United States

TH-UB.3P.4 **14:20**

Design of a Dual-Polarized Parallel-Plate Waveguide 2×2-Slot Subarray

Yaxiang Wu, Jiro Hirokawa, Takashi Tomura, Tokyo Institute of Technology, Japan

TH-UB.3P.5 **14:40**

Frequency Characterization Of A Shielded Loop With Variable Gap Position

Kara Maurer, University of Illinois at Urbana-Champaign, United States; Christopher Nordquist, Sandia National Laboratories, United States; Jennifer Bernhard, University of Illinois at Urbana-Champaign, United States

Break **15:00**

TH-UB.3P.6 **15:20**

Investigation of Mutual Coupling between Two Collocated Electrically Small Printed Square Loop Antennas

Nhat Truong, Sanghamitro Das, Satish K. Sharma, San Diego State University, United States

TH-UB.3P.7 **15:40**

A Comparative Study of Optically Transparent Waveguide Based Antennas

Benjamin Wilkinson, Zack Stout, Ryan Green, Mississippi State University, United States

TH-UB.3P.8 **16:00**

An Electronically Steerable G-Band Leaky Wave Antenna based on the Smith-Purcell Effect

Kenneth Sherman, Jia-Chi S. Chieh, Naval Info. Warfare Center Pacific, SDSU, United States; Satish K. Sharma, SDSU, United States

TH-UB.3P.9 **16:20**

Sinusoidally Modulated Anisotropic Metasurfaces for Broadside Radiation with Open-Stopband Suppression

Federico Giusti, Joaquìn Garcìa-Fernàndez, Stefano Maci, Enrica Martini, University of Siena, Italy

Microwave Remote Sensing of the Earth

Session Co-Chairs: Vladimir Okhmatovski, University of Manitoba; Thomas Hanley, Johns Hopkins University Applied Physics Laboratory

TH-UF.1P.1 **13:20**

Estimate Microwave Emissions from Vegetated Land Surfaces Combing Radiative Transfer Theory and Full-Wave Simulations

Kaiqi Chen, Shurun Tan, Zhejiang University, China

TH-UF.1P.2 **13:40**

Electromagnetic Modeling of Scattering by Multilayered Rough Surface of Sea Ice

Shucheng Zheng, Alireza Niazi, Mahsa Shab, Dustin Isleifson, Vladimir Okhmatovski, University of Manitoba, Canada

TH-UF.1P.3 **14:00**

On the Effects of Volumetric Water Content on Antenna Reflection Coefficients in Soil

Pratik Kunkolienker, Md. Shahnewaz Tanvir, Tasin Nusrat, Sayan Roy, South Dakota Mines, United States

TH-UF.1P.4 **14:20**

Active RIS-Assisted Satellite RFI Mitigation with Location Awareness Graph Ordering Attention λAGOATλNetwork for Astronomy

Zhengjie Zhang, Hailin Cao, Junhui Peng, Chongqing Key Laboratory of Space Information Network and Intelligent Information Fusion, Chongqing University, Chongqing 400044, China, China; Jin Fan, The Key Laboratory of Radio Astronomy, National Astronomical Observatories, Chinese Academy of Sciences, Beijing 100012, China, China

TH-UF.1P.5 **14:40**

Wideband Time-delay Active Reconfigurable Intelligent surface-assisted Mainlobe Interference Cancellation for Radio Astronomy

Junhui Peng, Hailin Cao, Zhengjie Zhang, Chongqing Key Laboratory of Space Information Network and Intelligent Information Fusion, Chongqing University, China; Jin Fan, The Key Laboratory of Radio Astronomy, National Astronomical Observatories, Chinese Academy of Sciences, China

Thursday, July 27 13:20 - 15:00
TH-UB.4P C 124 (OCC)

EM Theory, Materials and Complex Media II

Session Co-Chairs: Oscar Quevedo-Teruel, KTH Royal Institute of Technology; Reuven Shavit, Ben-Gurion University of the Negev

TH-UB.4P.1 **13:20**

Multibeam Flat Antenna Based on a Metasurface with Printed Elements

Reuven Shavit, Ben-Gurion University of the Negev, Israel

TH-UB.4P.2 **13:40**

A 2D MTM-EBG Grid with a Universal Bandgap

Samuel Clark, Ashwin Iyer, University of Alberta, Canada

TH-UB.4P.3 **14:00**

Analysis and Design of Inhomogeneous Lens Antennas by using the Fast-Sweeping Method

Ilir Gashi, Anastasios Paraskevopoulos, Stefano Maci, Matteo Albani, University of Siena, Italy

TH-UB.4P.4 **14:20**

Multimodal Bloch wave analysis to retrieve constitutive parameters of metamaterials

Ana C. Escobar, Universidad Nacional de Colombia, Colombia; Francisco Mesa, Universidad de Sevilla, Spain; Oscar Quevedo-Teruel, KTH Royal Institute of Technology, Sweden; Juan D. Baena, Universidad Nacional de Colombia, Colombia

TH-UB.4P.5 **14:40**

Advanced Image Processing with Discrete-Space Metamaterials

Dimitrios Sounas, Wayne State University, United States; Mohammad Moein Moeini, Stanford University, United States

Thursday, July 27 15:20 - 16:40
TH-UD.1P C 124 (OCC)

Wireless Power Transfer and Wearable Electronics

Session Co-Chairs: Erdem Topsakal, Virginia Commonwealth University; Dipankar Mitra, University of Wisconsin-La Crosse

TH-UD.1P.1 **15:20**

Reliability Studies of Fully Integrated CMOS Power Amplifier on Thinned Substrate for Flexible Electronics

Dipankar Mitra, University of Wisconsin-La Crosse, United States; Seyyed Babak Hamidi, University of Washington-Tacoma, United States; Palash Roy, Hanwha Phasor Ltd., Cambridge, England, United Kingdom, United Kingdom; Debasis Dawn, University of Washington-Tacoma, United States

TH-UD.1P.2 **15:40**

Investigation of Enhanced Metamaterial Wireless Power Transfer Using Parity-Time Symmetry

Ngoc Hung Phi, Jong-Wook Lee, Kyung Hee University, Korea (South)

TH-UD.1P.3 **16:00**

Dual-Band FSS for WMTS and CBRS for Wearable Wireless Medical Telemetry

Amber Nunnally, Erdem Topsakal, Virginia Commonwealth University, United States

TH-UD.1P.4 **16:20**

Schottky Diode Based High RF–DC Rectifier Design in 180nm CMOS Process for Far-Field Wireless Power Transfer Applications

Rafsan Mahin, Ifana Mahbub, The University of Texas at Dallas, United States

Advances in RFID Antennas and Systems

Session Chair: KV Rao, Impinj

TH-A5.3P.1 **13:20**

Dual Sided Data Dense 25-bit Chipless RFID Tag

HAFSA ANAM, Syed Muzahir Abbas, Subhas Mukhopadhahy, Iain Collings, Macquarie University, Australia

TH-A5.3P.2 **13:40**

Design of a HF RFID Card with a Slit Structure on a Metallic Surface

Youngtae Kim, Hyounghwan Roh, Samsung Electronics Co., Ltd., Korea (South)

TH-A5.3P.3 **14:00**

Contactless Fall Detection using RFID Wall and AI

Muhammad Zakir Khan, Adnan Qayyum, University of Glasgow, United Kingdom; Kamran Arshad, Khaled Assaleh, Ajman University, United Arab Emirates; Hasan Abbas, Muhammad Ali Imran, Qammer H Abbasi, Glasgow University, United Kingdom

TH-A5.3P.4 **14:20**

Tracking Tagged Moving Objects in Cluttered Spaces Using Harmonic Micro-Doppler Radar

Cory Hilton, Jeffery A. Nanzer, Michigan State University, United States

TH-A5.3P.5 **14:40**

A Flexible Chipless RFID Sensor for Humidity Detection

Lu Yi Liu, Lan Chen, Shanghai Institute of Technology, China; Ajay K. Poddar, Ulrich L. Rohde, Synergy Microwave Corporation, United States; Mei Song Tong, Tongji University, China

Break **15:00**

TH-A5.3P.6 **15:20**

Towards Chipless RFID based Temperature Sensing for IoT Applications

Md Mirazur Rahman, North Dakota State University, United States; Dipankar Mitra, University of Wisconsin- La Crosse, United States; Shuvashis Dey, North Dakota State University, United States

TH-A5.3P.7 **15:40**

A Novel Loop Antenna Easily Matching with Radio Frequency Integrated Circuit Chips

Takumi Kanamori, Mayumi Matsunaga, Shizuoka Univerisyt, Japan

TH-A5.3P.8 **16:00**

Equivalent Circuit Analysis of an Open-Ended Slot Type RFID Tag Antenna

Pavel Nikitin, John Kim, Guilherme Berzagui, João Miguel Roehe, KVS Rao, Impinj, United States

TH-A5.3P.9 **16:20**

Development and Characterization of A Sticker-Typed Flexible Dipole RFID Tag Antenna

Achmad Munir, Rheyuniarto Sahlendar Asthan, Agus Dwi Prasetyo, Zulfi Zulfi, Institut Teknologi Bandung, Indonesia; Yohandri Yohandri, Universitas Negeri Padang, Indonesia

Reflect/Transmit Array Antennas I

Session Co-Chairs: John Volakis, Florida Atlantic University; Hong Tang, University of Massachusetts, Lowell

TH-A1.3P.1 **13:20**

Vanadium Dioxide Aperture-Coupled mmWave 1–bit Reconfigurable Dual Polarization Reflectarray

Walter Disharoon, Nima Ghalichechian, Georgia Institute of Technology, United States

TH-A1.3P.2 **13:40**

VO2-based switchable Transmit-Reflect-Array for THz applications

Suhail Asghar Qureshi, Muhammad Ramlee Kamarudin, Universiti Tun Hussein Onn Malaysia, Malaysia; Muhammad Inam Abbasi, Universiti Teknikal Malaysia Melaka, Malaysia; Zuhairiah Zainal Abidin, Universiti Tun Hussein Onn Malaysia, Malaysia; Muhammad Hashim Dahri, Dawood University of Engineering and Technology, Pakistan; Adel Yahya Isa Ashyap, Universiti Tun Hussein Onn Malaysia, Malaysia; Nordin Ramli, MIMOS Berhad, Malaysia

TH-A1.3P.3 **14:00**

Low-Cost Liquid-Crystal based Reflectarray Antenna for Indoor Wireless Localization Applications operating in the Ka-band

Gerzon Gomez-Bravo, Graz University of Technology, Austria; Robert Guirado, Universidad Politécnica de Madrid, Spain; Reinhard Teschl, Graz University of Technology, Austria; Gerardo Pérez Palomino, Eduardo Carrasco, Universidad Politécnica de Madrid, Spain; Wolfgang Bösch, Graz University of Technology, Austria

TH-A1.3P.4 **14:20**

A Novel Reflectarray Unit Based on Mandelbrot Fractal Geometry with Different Degrees and Iteration Numbers

Hao Zheng Lu, Hou Yi Ding, Yuan Chu Xu, Mei Song Tong, Tongji University, China

TH-A1.3P.5 **14:40**

Multipurpose Reconfigurable Reflectarray Antennas for Dual-Polarization Control

Gyoungdeuk Kim, Sangkil Kim, Nohgyeom Ha, Myeongha Hwang, Pusan Nation University, Korea (South)

Break **15:00**

TH-A1.3P.6 **15:20**

A Simple and High-Efficiency Dual-Band Element for Active Reflectarray Designs

Antonio Rubio, Anastasios Koutinos, Constantinos Zekios, Stavros Georgakopoulos, Florida International University, United States

TH-A1.3P.7 **15:40**

Large Reflectarray for SAR for Earth Observation: RF Design and Measurement Correlation

Pasquale Giuseppe Nicolaci, Min Zhou, Jakob Rosenkratz de Lasson, Stig Busk Sørensen, Niels Vesterdal Larsen, TICRA, Denmark; David Marote-Alvarez, Javier Herreros, Airbus Defence and Space SAU, Spain; Giovanni Toso, ESA ESTEC, Netherlands

TH-A1.3P.8 **16:00**

Dielectric screen loading for low-complexity static reflectarray prototyping

Aurélien Surier, Nadir Hakem, Nahi Kandil, Université du Québec en Abitibi-Témiscamingue, Canada

TH-A1.3P.9 **16:20**

A Ku-Band Deployable Broadband Reflectarray for CubeSat Applications

Timothy MacDonald, Brad Jackson, California State University, Northridge, United States

TH-A1.3P.10 **16:40**

Improved Reflectarray Feeds Using Gradient Index Lenses

Ryan J. Chaky, Eric B. Whiting, Colin A. Mussman, Galestan Mackertich-Sengerdy, Sawyer D. Campbell, Pingjuan L. Werner, Douglas H. Werner, The Pennsylvania State University, United States

Broadband/Ultra-wideband Antennas I

Session Co-Chairs: Wenjing Su, Meta; Constantinos L. Zekios, Florida International University

TH-A1.4P.1 **13:20**

Low Complexity Direction Finding with an 8:1 Bandwidth Amplitude-Only Spiral Antenna

Gaeron Friedrichs, Theodore Prince, Mohamed Elmansouri, Dejan Filipovic, University of Colorado Boulder, United States

TH-A1.4P.2 **13:40**

An HF Magnetoelectric Dipole Element

Anastasios G. Koutinos, Constantinos L. Zekios, Stavros V. Georgakopoulos, Florida International University, United States

TH-A1.4P.3 **14:00**

Axial Ratio (AR) Bandwidth Enhancement of a Circularly Polarized Crossed-Dipole Antenna using Tapered Vacant-Quarter Ring

Soumitra Biswas, Envistacom, United States

TH-A1.4P.4 **14:20**

Bowtie Antenna with Integrated Matching Network for Wideband and Circular Polarization

Matthew Dodd, Atef Elsherbeni, Colorado School of Mines, United States

TH-A1.4P.5 **14:40**

A Dual-Polarized Vivaldi Antenna For Tree Radar Applications

Kaixuan Cheng, Yee Hui Lee, Nanyang Technological University, Singapore; Daryl Lee, Mohamed Lokman Mohd Yusof, National Parks, Singapore; Abdulkadir C. Yucel, Nanyang Technological University, Singapore

Break **15:00**

TH-A1.4P.6 **15:20**

A Wideband Reflectarray Antenna Unit with Double-Loop Phase Delay Lines for Satellite Communication Systems

Xiao Jie Lu, Xiao Yu Li, Zhen Wang, Mei Song Tong, Tongji University, China

TH-A1.4P.7 **15:40**

Enhancement of Low Frequency Portion of Ultra-wideband Antennas through Lumped Components

Timothy Kelley, Taoglas, United States

TH-A1.4P.8 **16:00**

Wideband Circularly Polarized Slotted Multi-Port Patch Antenna for High-Precision GNSS Systems

Xiulong Bao, University College Dublin, Ireland; Arman Mirmanon, S. Seifullin Kazakh Agro Technical University, Kazakhstan; Diego Caratelli, Antenna Company, Netherlands

TH-A1.4P.9 **16:20**

Multibeam coverage optimization for broadband satellites with hybrid beamforming direct radiating arrays

Margaux Pellet, Hervé Legay, Florian Vidal, Thales Alenia Space, France; George Goussetis, Joao Mota, Heriot-Watt University, United Kingdom

Enabling Antenna Technologies for Emerging Consumer Electronic Applications

Session Co-Chairs: Wonbin Hong, POSTECH; Jiang Zhu, Meta; Junho Park, KREEMO

FR-SP.1A.1 **08:00**

A Magnetoelectric Dipole Antenna Structure for Scalable Phased Array Applications

DUIXIAN LIU, Xiaoxiong Gu, Christian Baks, IBM, United States

FR-SP.1A.2 **08:20**

Low-Cost Stackable Patch Antennas-in-Package Integration to Enhance Spherical Coverage of Millimeter-wave Wireless Applications

Junho Park, KREEMO Inc., Korea (South); Wonbin Hong, POSTECH, Korea (South)

FR-SP.1A.3 **08:40**

Component-level and system-level evaluations of metasurface on glass for 5G indoor communications

Hyengcheul Choi, Byounggwan Kang, Changhyeong Lee, Boyoung Kang, Corning Technology Center Korea,, Korea (South); Youngno Youn, Wonbin Hong, Pohang University of Science and Technology (POSTECH), Korea (South)

FR-SP.1A.4 **09:00**

Dual-band Antenna-in-Package (AiP) Front-end Module for 5G mmWave Mobile Device Applications

Gyoungdeuk Kim, Dohyun Kim, Sangkil Kim, Pusan National University, Korea (South); Kyungho Lim, Chanwoo Yang, Chisang You, LG Innotek, Korea (South)

FR-SP.1A.5 **09:20**

Integrated Millimeter-wave and Microwave Antennas for Smartphones

Jialu Xu, Dalian University of Technology, China; Huan-Chu Huang, Visionox Techology Inc., China; Hui Li, Dalian University of Technology, China; Jie Wu, Shuang Cui, Visionox Techology Inc., China

Break **09:40**

FR-SP.1A.6 **10:00**

Multi-Mode Multi-Port Antennas (M^3PA) Increasing Flexibility of Antenna Arrays for 6G Joint Communication and Sensing

Dirk Manteuffel, Leibniz University Hannover, Germany

FR-SP.1A.7 **10:20**

Noise immune antenna (NIA) – a novel approach to mitigate desense for on-board antennas

khaled Obeidat, Sumitra Dey, Nauroze Syed Abdullah, Qiaolei Huang, Amazon, United States

FR-SP.1A.8 **10:40**

Creeping Wave on Body for VR Applications

Wenjing Su, Jiang Zhu, Meta, United States

FR-SP.1A.9 **11:00**

An Optically Transparent Antenna on Glasses for 2.4GHz WiFi

Yasuo Morimoto, Sam Shiu, Irene Huang, Eric Fest, Geng Ye, Jiang Zhu, Meta Platforms Inc., United States

FR-SP.1A.10 **11:20**

Phased Array Antenna-in-Package Design for True-Wideband mmWave 5G Communication

Haoran Zhang, Atif Shamim, King Abdullah University of Science and Technology, Saudi Arabia

EM Waves in Random Media: A Tribute to Akira Ishimaru

Session Co-Chairs: Gary Brown, Virginia Tech; Saba Mudaliar, Air Force Research Laboratory

FR-SP.2A.1 **08:00**

Multiple Scattering of Waves in Numerical Simulations with Applications

Leung Tsang, University of Michigan, United States; Tien-Hao Liao, National Taipei University of Technology, Taiwan; Shurun Tan, Zhejiang University/University of Illinois Urbana-Champaign Institute, China; Xiaolan Xu, Jet Propulsion Laboratory, United States; Jongwoo Jeong, University of Michigan, United States; Chi-Hou Chan, City University of Hong Kong, Hong Kong SAR of China

FR-SP.2A.2 **08:20**

Advances of Computational Efficiency and Characterizations of Metamaterials: Tribute to Brilliant Contributions in Wave Interaction with Complex Media

Magdy Iskander, Zhengqing Yun, University of Hawaii, United States

FR-SP.2A.3 **08:40**

On the Use of the Method of Smoothing In Rough Surface Scattering

Gary Brown, ElectroMagnetic Interactions Laboratory, United States

FR-SP.2A.4 **09:00**

Analytical Expressions for Near-Specular Scattering from an Isotropic Pierson-Moskowitz Surface

Joel Johnson, The Ohio State University, United States; Jakov Toporkov, Paul Hwang, Jeffrey Ouellette, US Naval Research Laboratory, United States

FR-SP.2A.5 **09:20**

Correlation of the Fields Scattered by a Fractal Surface at Two Closely Spaced Receivers

Gerardo Di Martino, Alessio Di Simone, Antonio Iodice, Università di Napoli Federico II, Italy

Break **09:40**

FR-SP.2A.6 **10:00**

Parameter Regimes of Radiative Transfer Equations in Random Media with Large Scale Fluctuations of Permittivity

Saba Mudaliar, AIR FORCE RESEARCH LABORATORY, United States

FR-SP.2A.7 **10:20**

Modeling of Electromagnetic Wave Phase Front Aberration in Rain

Behzad Yektakhah, Kamal Sarabandi, University of Michigan, United States

FR-SP.2A.8 **10:40**

Geometric Representation of Wet Snow through A Tri-Continuous Random Composite and Its Scattering Characterization with the Discrete Dipole Approximation

Xin Lv, Shurun Tan, Zhejiang University, China

FR-SP.2A.9 **11:00**

Target Localization in Forested Environments Using the Frequency-Difference Autoproduct

Nicholas Joslyn, Sonia Gutt, David Dowling, University of Michigan, United States

FR-SP.2A.10 **11:20**

On the Coherent Scattering from an Object above a Rough Surface

Joseph Gedney, Joel Johnson, Robert Burkholder, The Ohio State University, United States

Millimeter Wave Antenna Arrays

Session Chair: Yahia M. M. Antar, Royal Military College of Canada

FR-A5.1A.1 **08:00**

Design of Efficient and Wideband 60 GHz Series-Fed Millimeter-Wave Antenna Array for Next-Generation Multi-Gigabit Industrial Applications

Abdul Jabbar, Qammer Abbasi, Muhammad Imran, Masood Ur-Rehman, University of Glasgow, United Kingdom

FR-A5.1A.2 **08:20**

60 GHz High Gain Planar Antenna Array for Millimeter-Wave Industrial Applications

Abdul Jabbar, Muhammad Ali Jamshed, Qammer Abbasi, Muhammad Imran, Masood Ur-Rehman, University of Glasgow, United Kingdom

FR-A5.1A.3 **08:40**

Antenna for Millimeter Wave High Gain Arrays using LTCC Technology

Monica Wasfy William, Queens University, Canada; Yahia M. M. Antar, Royal Military College of Canada, Canada; Alois P. Freundorfer, Queens University, Canada

FR-A5.1A.4 **09:00**

A Compact SIW Feeding Network with Arbitrary Distribution for Non-Uniformly Antenna Array Excitation

KHADIDJA MOUDJARI, University of Science and Technology Houari Bounediene, Algeria; ABDELKADER ZERFAINE, Institut National de la Recherche Scientifique (INRS), Université du Quebec, Canada; MOHAMED TELLACHE, University of Science and Technology Houari Boumediene, Algeria; TAREK DJERAFI, Institut National de la Recherche Scientifique (INRS), Université du Quebec, Canada

FR-A5.1A.5 **09:20**

High Gain Antenna for SatCom Applications in Hybrid CNC-PCB Technologies at K/Ka band

Adham Mahmoud, Ronan Sauleau, Mauro Ettorre, IETR, France

Break **09:40**

FR-A5.1A.6 **10:00**

Design and Performance Analysis of a 24 GHz Series-Fed 1×5 Antenna Array with Material Deformation for D2D Applications

Karthik Kakaraparty, Ifana Mahbub, University of Texas at Dallas, United States

FR-A5.1A.7 **10:20**

On the Development of Diffraction-Limited Focal Plane Array in CMOS at Submillimeter Wavelengths

Maria Alonso-delPino, Martijn Hoogelander, Sven van Berkel, Satoshi Malotaux, Marco Spirito, Andrea Neto, Daniele Cavallo, Nuria Llombart, Delft University of Technology, Netherlands

FR-A5.1A.8 **10:40**

Demonstration of a Transmit Lens Array with Beam-Scanning at 500GHz

Maria Alonso-delPino, Sjoerd Bosma, Delft University of Technology, Netherlands; Cecile Jung-Kubiak, Jet Propulsion Laboratory, United States; Juan Bueno, Delft University of Technology, Netherlands; Goutam Chattopadhyay, Jet Propulsion Laboratory, United States; Nuria Llombart, Delft University of Technology, Netherlands

FR-A5.1A.9 **11:00**

Modeling and Design of a Folded Transmitarray Antenna on Quartz for Radiometric Applications

Tomas Thuroczy, Orestis Koutsos, Ronan Sauleau, David González-Ovejero, Univ Rennes, France

FR-A5.1A.10 **11:20**

Compact Wideband and High Gain Microstrip Patch Antenna for Millimeter Wave Applications

Asim Ghalib, Xiaoyan Yuan, Jesse Shihchieh Hsin, Zachary Rocha, Rowland Jones, Kyocera-AVX, United States

Metamaterial Modeling II

Session Co-Chairs: Giuseppe Vecchi, Politecnico di Torino; Steve Young, University of Michigan

FR-A2.1A.1 **08:00**

Design and Characterization of Line-Waves Waveguides

Francesco Verni, Claudio Massagrande, Valentina Verri, Huawei, Italy; Alessio Monti, Filiberto Bilotti, Alessandro Toscano, Davide Ramaccia, Roma Tre University, Italy; Stefano Vellucci, Mirko Barbuto, Michela Longhi, Niccolò Cusano University, Italy; Zahra Hamzavi-Zarghani, Luca Stefanini, Muhammad Khalid, Roma Tre University, Italy

FR-A2.1A.2 **08:20**

An Ultra-Fast Method for Designing Hybrid Phase-Shifting Surfaces

Akash Biswas, Constantinos L. Zekios, Stavros V. Georgakopoulos, Florida International University, United States

FR-A2.1A.3 **08:40**

Antenna Inverse Design Using Mu-Near-Zero Isorefractive (MNZIR) Materials

Vahid Nikkhah, Brian Edwards, Nader Engheta, University of Pennsylvania, United States

FR-A2.1A.4 **09:00**

Spectral Periodic Method of Moment Analysis of Artificial Dielectrics with Vertical Metal Inclusions

Alexander van Katwijk, Andrea Neto, Daniele Cavallo, Delft University of Technology, Netherlands

FR-A2.1A.5 **09:20**

Modeling of Miniaturized 4×4 and 8×8 Butler Matrix Based on Complementary Rose Curves Resonators

siwar louati, Larbi Talbi, Khelifa Hettak, Halim Boutayeb, Alireza Ghayekhloo, Uqo, Canada

Break **09:40**

FR-A2.1A.6 **10:00**

Analytical Design of Perfectly Matched Metamaterials

Jorge Ruiz-Garcia, Shrey Thakkar, University of Michigan, United States; Gurkan Gok, Raytheon Technologies Research Center, United States; Anthony Grbic, University of Michigan, United States

FR-A2.1A.7 **10:20**

Design of Huygens' Cells for Transmit-Reflect-Arrays at 30 GHz

Alessio Berto, Francesco Foglia Manzillo, CEA - Leti, France; Guido Valerio, Sorbonne Université, France

FR-A2.1A.8 **10:40**

The Design of Realizable Cylindrical Metasurfaces

Chun-Wen Lin, Anthony Grbic, University of Michigan, United States

FR-A2.1A.9 **11:00**

Pixelated Metamaterial Determination Using Genetic Algorithm and HFSS/Matlab Integration

Ryan Banks, Quang Nguyen, VA Tech, United States; Raenita Fenner, Loyola University, United States; Amir Zaghloul, VA Tech, United States

FR-A2.1A.10 **11:20**

Numerically-Synthesized Broadside-Radiating Leaky-Wave Antenna

Lucia Teodorani, Marcello Zucchi, Giuseppe Vecchi, Politecnico di Torino, Italy

Optimization Methods in EM designs I

Session Chair: Miloslav Capek, Czech Technical University in Prague

FR-A3.1A.1 **08:00**

Single-layer Polarizing Reflectarray Unit Cell Designs Based on a PSO-driven Optimizer

Zhengzheng Wang, Sean Hum, University of Toronto, Canada

FR-A3.1A.2 **08:20**

Optimization of Non-Linear Feeds to Broadband Radiating Systems Using Transient Port-Extraction

Sean DePalma, Omkar Ramachandran, Leo Kempel, Michigan State University, United States; Balasubramaniam Shanker, The Ohio State University, United States

FR-A3.1A.3 **08:40**

Doubling the Convergence Speed of Planar Topology Optimization using the Multigradient

Ronald Jenkins, Sawyer Campbell, Pingjuan Werner, Douglas Werner, The Pennsylvania State University, United States

FR-A3.1A.4 **09:00**

Upper Bound on Instantaneous Power Flux

Lukas Jelinek, Jakub Liska, Miloslav Capek, Czech Technical University in Prague, Czech Republic

FR-A3.1A.5 **09:20**

Maximizing Pencil-Beam Pattern Performance in Metasurface Antennas Through Full-Wave Optimization

Francesco Verni, Huawei, Italy; Marcello Zucchi, Politecnico di Torino, Italy; Andrea Scarabosio, Marco Righero, Giorgio Giordanengo, Fondazione LINKS, Italy; Claudio Massagrande, Huawei, Italy; Giuseppe Vecchi, Politecnico di Torino, Italy

Break **09:40**

FR-A3.1A.6 **10:00**

Maximizing the Radiated Power of Patch Antenna using Characteristic Modes

Nicholas Cappello, The College of NewJersey, United States; Mahrukh Khan, The College of New Jersey, United States

FR-A3.1A.7 **10:20**

Joint Estimation of Mutual Coupling and Direction of Arrival for 2D Sparse Arrays using CMA-ES

Evan Beers, Ahmad Hoorfar, Moeness Amin, Villanova University, United States

FR-A3.1A.8 **10:40**

Efficient Design of Thinner Broadband MRAM Using Novel Formulation of Cost Function

Pooja Warhekar, Amitabha Bhattacharya, Swati Neogi, IIT Kharagpur, India

Advances in Numerical Simulation for Applications

Session Co-Chairs: Jon Kelley, Lockheed Martin Aeronautics; Ali Yilmaz, Lockheed Martin Aeronautics

FR-A3.2A.1 **08:00**

Using Camera Boxes to Build Reproducible CEM Benchmarks with Complex Ducts

Jon Kelley, Brian MacKie-Mason, Kurtiss Norris, Brody Barton, David Chamulak, Scott Schaefer, Mark Martin, Steve Cox, Clifton Courtney, Ali Yilmaz, Lockheed Martin Aeronautics, United States

FR-A3.2A.2 **08:20**

New Strategies for CEM Simulation of Microstrip Circuits and Antennas

Raj Mittra, University of Central Florida, United States; Tomislav Marinovic, Multiverse Engineering, Croatia (Hrvatska); Abdelkhalek Nasri, Univ. Lille, CNRS, Centrale Lille, Univ. Polytechnique Hauts-de-France, France; Prashant Chaudhary, University of Central Florida, United States

FR-A3.2A.3 **08:40**

Recent Progress in Reduced Order Models for Electromagnetic Particle-in-Cell Kinetic Plasma Simulations

Indranil Nayak, Julio Nicolini, Ohio State University, United States; Dong-Yeop Na, POSTECH, Korea (South); Fernando Teixeira, Ohio State University, United States

FR-A3.2A.4 **09:00**

Benchmarking Physics-Informed Neural Networks for Time-Domain Electromagnetic Simulations

Shutong Qi, Costas Sarris, University of Toronto, Canada

FR-A3.2A.5 **09:20**

A Hybrid Excitation Model with Plane Wave and Current Source in SIE for Electromagnetic Problems

Zi-Qiang Wu, Qiang-Ming Cai, Ce-Ming Zhou, Xin Cao, Longjian Zhou, Yuyu Zhu, Southwest University of Science and Technology, China; Mulin Liu, Innovation Center of Zhongshan Torch Modern Industrial Engineering Technology Research Institute, China; Bo Pu, DeTooLIC Technology Co, China; Jun Fan, Southwest University of Science and Technology, China

Break **09:40**

FR-A3.2A.6 **10:00**

An improved physical optics technique for multiple shielding electromagnetic scattering problems

Xing Li, Li Xu, Li Liao, Junhui Yin, Bin Li, University of Electronic Science and Technology of China, China

Mutual Coupling in Antenna Arrays II

Session Chair: Majid Manteghi, Virginia Tech

FR-A1.1A.1 **08:00**

Millimeter-wave Magneto-Electric Dipole Isolation Enhancement using Superstrate-based Decoupler

Oludayo Sokunbi, Ahmed Kishk, Concordia University, Canada, Canada

FR-A1.1A.2 **08:20**

2*2 Millimeter Wave Antenna with Simultaneous Decoupling of E-plane and H-plane

Wenliang Song, Xiao-Wei Zhu, Southeast University, China

FR-A1.1A.3 **08:40**

Performance Metrics for Biomimetic Antenna Array (BMAA) Systems

Richard Kozick, Bucknell University, United States; Fikadu Dagefu, Brian Sadler, U.S. Army Research Laboratory, United States

FR-A1.1A.4 **09:00**

Cloaking of Rectangular Patch Antenna Arrays with Coated Metasurfaces

Shefali Pawar, University of Mississippi, United States; Harry Skinner, Seong-Youp Suh, Intel Corporation, United States; Alexander Yakovlev, University of Mississippi, United States

FR-A1.1A.5 **09:20**

A Novel Cross-Interspersed Design of Multiband Antennas for Base Station Applications

Madiha Farasat, dush Thalakotuna, yang yang, University of technology sydney, Australia

Break **09:40**

FR-A1.1A.6 **10:00**

Compact E-plane Patch Antennas Using Decoupling Meander Slot Between Radiating Edges

Yiying Wang, Dun Lan, Guilin University of Electronic Technology, China; Bo Wang, Xi'an Electronic Engineering Research Institute, China; Yonghui Qin, Yannan Jiang, Guilin University of Electronic Technology, China; Ahmed A. Kishk, Concordia University, Canada

FR-A1.1A.7 **10:20**

Electrically Small Antennas in High-Density, Broadband Arrays

Majid Manteghi, Virginia Tech, United States

FR-A1.1A.8 **10:40**

Horizontally Polarized Cylindrical Inverted-F Antenna Array Enabled by Additive Manufacturing

Isaiah Pisani, Songyi Yen, Dejan Filipovic, University of Colorado Boulder, United States

Antenna Feeds and Matching Circuits II

Session Chair: Zhongxiang Shen, Nanyang Technological University

FR-A1.2A.1 **08:00**

A hybrid MSL/SIW-based feeding Network for Broadband mm-Wave Antenna Array

Tarek djerafi, Abdelkader zerfaine, inrs, Canada

FR-A1.2A.2 **08:20**

Circularly Polarized Loop Antennas with Balanced, Unbalanced, and Quasi-Balanced Feeds

Kazuhide Hirose, Tatsuya Nakada, Shibaura Institute of Technology, Japan; Hisamatsu Nakano, Hosei University, Japan

FR-A1.2A.3 **08:40**

1-Bit Reconfigurable Phase Shifter for mm-Wave Antenna Beam-Steering Applications

Asif Bilal, University of Cyprus, Cyprus; Abdul Quddious, Technische Universität Dresden, Germany; Atsushi Kanno, Nagoya Institute of Technology, Japan; Tetsuya Kawanishi, Waseda University, Japan; Marco Antoniades, Toronto Metropolitan University, Canada; Stavros Iezekiel, University of Cyprus, Cyprus

FR-A1.2A.4 **09:00**

A Planar Dual-Polarized Wideband Antenna Feed Element Design for Gradient-Index Luneburg Lens Antenna

Soumitra Biswas, Envistacom, United States

FR-A1.2A.5 **09:20**

A Low-Profile Improved Gain SIW-Based H-Plane Horn Antenna for X-Band Application

Anil Kumar Nayak, University of Alberta, Canada/ IIT Roorkee, Canada; Igor M Filanovsky, Kambiz Moez, University of Alberta, Canada, Canada; Amalendu Patnaik, IIT Roorkee, India

Break **09:40**

FR-A1.2A.6 **10:00**

Radiation Efficiency on Platform Excitation Antenna with Lossy Media

Takumi Nishime, Hiroshi Hashiguchi, Naobumi Michishita, Hisashi Morishita, National Defense Academy, Japan

FR-A1.2A.7 **10:20**

A Polarization-Mixed Antenna Array with Wide Beamwidth and Orthogonal Polarizations

FanChao Zeng, Can Ding, Jay Guo, University of Technology Sydney (UTS), Australia

FR-A1.2A.8 **10:40**

Determination of Manufacturing Tolerances of a Feed Horn using Uncertainty Quantification

Mustafa Murat Bilgic, Tonny Rubæk, Peter Meincke, TICRA, Denmark

FR-A1.2A.9 **11:00**

A Method to Reduce the Back Radiation of the Dual-Polarized Antenna With Vertical Fins

Chao Du, Zhongxiang Shen, Nanyang Technological University, Singapore

Friday, July 28	08:00 - 09:40
FR-A2.2A	C 120-122 (OCC)

Electromagnetic Bandgap Materials

Session Chair: Ahmed Kishk, Concordia University

FR-A2.2A.1 **08:00**

EBG Cell Size Reduction by Elongating Surface Current Path

Mostafa Shady, Ahmed Kishk, Concordia University, Canada

FR-A2.2A.2 **08:20**

Design of a Compact 2×2 Horn Slot Antenna Array Fed by Printed Ridge Gap Waveguide

Mahboubeh Taraji, Marco A. Antoniades, Toronto Metropolitan University, Canada

FR-A2.2A.3 **08:40**

Packaged In-Phase/Out-of-Phase Printed Multi-layer Power Dividers

Mostafa Shady, Ahmed Kishk, Concordia University, Canada

FR-A2.2A.4 **09:00**

Dual-Band Unit Cell of EBG Structure for Printed Gap Waveguide.

Mehek. M R. Mou, Ahmed A Kishk, Concordia University, Canada

FR-A2.2A.5 **09:20**

Miniaturized On-PCB RF Filter design Based on Electromagnetic Bandgap Structure

Je Kyung Lee, Anuj Modi, Tzung-I Lee, Cheol Su Kim, Amazon Lab126, United States

Friday, July 28	10:00 - 11:20
FR-A5.2A	C 120-122 (OCC)

Software-Defined and Cognitive Radio

Session Co-Chairs: Yihan Xu, New York Institute of Technology; Amit Singh, Meta-Antenna Lab

FR-A5.2A.1 **10:00**

DOA Estimation for Curved Antenna Arrays Using CRLB Analysis and SDR

Jiahao Wang, Peizhuo Yang, Koen Mouthaan, National University of Singapore, Singapore

FR-A5.2A.2 **10:20**

Wireless Sensing with Software Defined Radio

Yihan xu, Ziqian Dong, reza Amineh, Michael Kohler, Fang Li, New York Institute of Technology, United States

FR-A5.2A.3 **10:40**

FMCW radar based Position Adaptive Gesture Recognition Method

Di Wang, Yong Wang, Mu Zhou, Xiaolong Yang, Wei Nie, Chongqing University of Posts and Telecommunications, China

FR-A5.2A.4 **11:00**

LoRa-based Privacy-Aware and Contactless Surveillance in Next-generation Smart Homes

Muhammad Farooq, Adnan Qayyum, Yao Ge, Muhammad Zakir Khan, Ahmad Taha, Muhammad Ali Imran, Qammer Abbasi, Hasan Abbas, University of Glasgow, United Kingdom

Finite-Element, Finite-Difference, and Hybrid Methods

Session Co-Chairs: Jian-Ming Jin, University of Illinois at Urbana-Champaign; Damian Marek, University of Toronto

FR-UB.1A.1 **08:00**

A Hybrid Technique for Efficient Solution of Multi-scale Problems Involving Inhomogeneous Elements

Kapil Sharma, Molex LLC, United States; Chao Li, Shandong Normal University, China

FR-UB.1A.2 **08:20**

A Discontinuous Galerkin Time-Domain Scheme to Solve Coupled Maxwell and Rate Equations for Simulation of Semiconductor Lasers

Ming Dong, Liang Chen, Hakan Bagci, King Abdullah University of Science and Technology, Saudi Arabia

FR-UB.1A.3 **08:40**

Efficient 3D Modeling of Periodic Acoustic Wave Resonators by Domain Decomposition

Hongliang Li, Julius Koskela, Jackson Massey, Balam Willemsen, Resonant Inc., United States; Jian-Ming Jin, University of Illinois at Urbana-Champaign, United States

FR-UB.1A.4 **09:00**

NMM Simulation of Electromagnetic Waves in Cylindrical Geometries with an Extremely Thin Vertical Layer

Dezhi Wang, Qing Huo Liu, Duke University, United States

FR-UB.1A.5 **09:20**

Reconfigurable Intelligent Surface Modeling Based on a GSTC-FDTD Method

Yu Cheng, Xingqi Zhang, University College Dublin, Ireland

Break **09:40**

FR-UB.1A.6 **10:00**

A non-intrusive reduced basis method for electromagnetic scattering using the boundary element method

Jerome Simon, Philip Edel, Prisca Le Dily, ONERA, France

FR-UB.1A.7 **10:20**

Comparative analysis of mode excitation with the Yee-lattice finite-difference method and the electrodynamic lattice-Boltzmann method

Cael Warner, Loïc Markley, Kenneth Chau, The University of British Columbia, Canada

Electromagnetic Material Properties and Measurements I

Session Co-Chairs: Ali Farshkaran, University of Texas at Austin; Cheolbok Kim, Corning Incorporated

FR-A2.3A.1 **08:00**

Grid-Based Dielectric Mapping of Heterogeneous Tissues Using an Open-ended Coaxial Probe

Ali Farshkaran, Emily Porter, University of Texas at Austin, United States

FR-A2.3A.2 **08:20**

Measurement of the Complex Permittivity of Dry, Humidified and CO2 -Loaded Zeolite 13X at RF Frequencies

Clifton Courtney, Samuel Scott, Lockheed Martin Aeronautics, United States; Chris Delnero, Lockheed Martin, United States

FR-A2.3A.3 **08:40**

Free-Space Biological Tissue Measurement at W-band

Jin-Seob Kang, Korea Research Institute of Standards and Science (KRISS), Korea (South); Young Seung Lee, Electronics and Telecommunications Research Institute (ETRI), Korea (South); Youngcheol Park, Hankuk University of Foreign Studies, Korea (South)

FR-A2.3A.4 **09:00**

Characterization of Dielectric Materials Using Transmission Losses at W- and D-Bands for 6G

Cheolbok Kim, Ryan Cadwell, David R Peters, Anthony Ng'oma, Corning Incorporated, United States

FR-A2.3A.5 **09:20**

On the Accuracy of Dielectric Characterization of Solid Materials by Open-Ended Coaxial Cable

Eliana Canicattì, University of Pisa / Lab RaSS CNIT, Italy; Vincenzo Violi, University of Pisa / Università Mediterranea of Reggio Calabria, Italy; Danilo Brizi, University of Pisa / Lab RaSS CNIT, Italy; Francesco Flora, Francesco Acerra, Leonardo Aircraft Division, Italy; Agostino Monorchio, University of Pisa/ Lab RaSS CNIT, Italy

Break **09:40**

FR-A2.3A.6 **10:00**

An Accurate Retrieval Method for Complex Electrical Parameters of Materials Based on Partially Filled Waveguide

Bo O. Zhu, Nanjing University, China; Xiao Yu Li, Tongji University, China; Yun Jing Zhang, Soochow University, China; Mei Song Tong, Tongji University, China

FR-A2.3A.7 **10:20**

Theoretical Model of Dielectric Materials for Forensic Science in terms of Frequency

Ozlem SIMSEK, Osman CEREZCI, S. Selim SEKER, Uskudar University, Turkey

Printed Lens Antennas

Session Co-Chairs: Philip Lambert, 3D Fortify, Inc; Felix A. Miranda, NASA

FR-A5.3A.1 **08:00**

Comparative analysis of QCTO approaches for Luneburg lens antenna design

Hussain Askari, Yongduk Oh, Jacob Adams, North Carolina State University, United States

FR-A5.3A.2 **08:20**

Evaluation of Segmented 3D Printed Luneburg Lenses

Shawn Rogers, ATG, United States; Philip Lambert, Fortify, United States

FR-A5.3A.3 **08:40**

A Wideband Hybrid Metal and Dielectric Reflective Lens Antenna for Millimeter-Wave Applications

Yang Cheng, Yuandan Dong, University of Electronic Science and Technology of China, China

FR-A5.3A.4 **09:00**

A Kirigami-Inspired Foldable Spherical Fully Dielectric Luneburg Lens Antenna

Li-Wei Zhao, Ya Fei Wu, Yong-Xin Guo, National University of Singapore, Singapore

FR-A5.3A.5 **09:20**

3D-printed Inhomogeneous Graded-Index Lenses For Antenna Applications

Anastasios Paraskevopoulos, Ilir Gashi, Matteo Albani, Stefano Maci, University of Siena, Italy

Break **09:40**

FR-A5.3A.6 **10:00**

Ultrawideband Gain Enhancement using 3D Printed Dielectric Gradient Refractive Index Lens

Matthew Kunkle, University of Missouri-Kansas City, United States; Roy Allen, Kalyan Durbhakula, Missouri Institute for Defense & Energy, United States

FR-A5.3A.7 **10:20**

Machine Learning Design Approach of 3D Printed Pixelated Lens MIMO Antenna for CubeSat

Mohammed Farouk Nakmouche, Dominic Deslandes, Ghyslain Gagnon, Ecole de technologie superieure, Canada

FR-A5.3A.8 **10:40**

Novel 3D-Printed Flat, Cylindrical Lens for Beam Focusing and Higher Gain of Horn Antenna

Colby Hobart, Fortify, United States

FR-A5.3A.9 **11:00**

High-frequency Limits for 3D-Printed Gradient-index (GRIN) Lens Antennas

Wei Wang, University of Notre Dame, United States; Philip Lambert, 3D Fortify, Inc, United States; Jonathan Chisum, University of Notre Dame, United States

FR-A5.3A.10 **11:20**

Gain Enhancement of a 5G mmWave 2x2 Antenna Array Using a 3D Printed Hemispherical Lens

Adnan Nadeem, National University of Sciences and Technology (NUST), Pakistan; David Chatzichristodoulou, RF and Microwave Solutions, Cyprus; Nosherwan Shoaib, National University of Sciences and Technology (NUST) Islamabad, Pakistan; Photos Vryonides, Symeon Nikolaou, Frederick University, Cyprus

Remote Sensing and Radar Systems

Session Co-Chairs: Aditya Varma Muppala, University of Michigan, Ann Arbor; Felix Vega, Technology Innovation Institute

FR-A4.1A.1 **08:00**

An Adaptive Radio Frequency Interference Suppression Method for Multi-Functional Cognitive Radar System

Haining Yang, Yifei Hao, Aya Li, Yong Fu, Tingjun Li, Yujian Cheng, University of Electronic Science and Technology of China, China

FR-A4.1A.2 **08:20**

Comparative Analysis of Atmospheric Gradient Derived from GNSS and NWM for Tropical Stations

*Anik Naha Biswas, Yee Hui Lee, Ding Yu Heh, Nanyang Technological University, Singapore, Singapore; Shilpa Manandhar, Agency for Science, Technology and Research (A*STAR), Singapore*

FR-A4.1A.3 **08:40**

Single Transceiver 3-D Radar Imaging at 80 GHz Via Affine Phase Center Translations

Aditya Varma Muppala, Kamal Sarabandi, University of Michigan, Ann Arbor, United States

FR-A4.1A.4 **09:00**

On the Influence of the Antenna Group Delay on the Quality of Signals Obtained with GPR Systems

Alejandro Rangel, Fabian Ruiz, Cesar Pedraza, Universidad nacional de Colombia, Colombia; Felix Vega, Jhon Pantoja, Chaouki Kasmi, Technology Innovation Institute, United Arab Emirates

FR-A4.1A.5 **09:20**

Wallops Flight Facility 2021-2022 Winter Snow Events: A Case Study Using Surface Instrumentation and Radars

Hein Thant, Colorado State University, United States; David Wolff, NASA, United States; V. N. Bringi, Branislav Notaros, Colorado State University, United States

Break **09:40**

FR-A4.1A.6 **10:00**

Metamaterial antennas for RADAR and SAR

Bruno Correia, Sérgio Cunha, Faculty of Engineering of University of Porto, Portugal

FR-A4.1A.7 **10:20**

Diagnosis Method for Automotive Radar Cover using Fourier Optics and Tikhonov method

Suho Chang, POSTECH, Korea (South); Sojung Shim, Hyundai Motor Company, Korea (South); Dongseop Lee, POSTECH, Korea (South); Yerim Oh, Hyundai Motor Company, Korea (South); Wonbin Hong, POSTECH, Korea (South)

FR-A4.1A.8 **10:40**

Metasurface Tiles on Conformable Origami Platforms for Adaptive and Sparse Computational Microwave Imaging

Suresh Venkatesh, North Carolina State University, United States; Xuyang Lu, University of Michigan-Shanghai Jiao Tong University Joint Institute, China; Daniel Sturm, Kaushik Sengupta, Princeton University, United States; Robert Lang, Lang Origami, United States

FR-A4.1A.9 **11:00**

A joint AOA and TDOA 3-D Positioning Method for Single-Site in NLOS Environment

Yukun Zhang, Liangbo Xie, Xiaolong Yang, Wei Nie, Mu Zhou, Yuyang Li, Chongqing University of Posts and Telecommunications, China

Reflector Antennas

Session Co-Chairs: Christos Christodoulou, University of New Mexico; Yahya Rahmat-Samii, University of California at Los Angeles (UCLA)

FR-A1.3A.1 **08:00**

Design and Analysis of 3D Cassegrain Antenna using HFSS

Andrew Wu, Echodyne, United States; Dean Arakaki, Cal Poly State University San Luis Obispo, United States

FR-A1.3A.2 **08:20**

A C-band Dual-pol Compact Reflector Antenna with a Square Waveguide Feed

Su Yee Aye, Peng Khiang Tan, Tse Tong Chia, National University of Singapore (NUS), Singapore; Sigurd Huber, German Aerospace Center (DLR), Germany; Koen Mouthaan, National University of Singapore (NUS), Singapore

FR-A1.3A.3 **08:40**

Analysis of Offset, Shaped Reflectors Exactly Implementing the Abbe Sine Condition

Lynn Baker, Consultant, IEEE Life Member, United States

FR-A1.3A.4 **09:00**

A Large Aperture Parabolic Cylinder Deployable Mesh Reflector Antenna for Next-Generation Satellite Synthetic Aperture Radar

Yahya Rahmat-Samii, Junbo Wang, University of California at Los Angeles (UCLA), United States; Richard Hodges, Jet Propulsion Laboratory, United States; Gregg Freebury, Tendeg, LLC, Louisville, CO 80027 USA., United States

FR-A1.3A.5 **09:20**

Reflector Antenna for Lunar Crater Radio Telescope

Gaurangi Gupta, Nacer Chahat, Ashish Goel, Jet Propulsion Laboratory, United States; Manan Arya, Stanford University, United States; Dario Pisanti, Scuola Superiore Meridionale, Italy; Paul Goldsmith, Joseph Lazio, Saptarshi Bandyopadhyay, Jet Propulsion Laboratory, United States

Break **09:40**

FR-A1.3A.6 **10:00**

Far-field pattern tolerance analysis of petal antenna structure errors based on interval arithmetic

Qunbiao Wang, Peng Li, Paolo Rocca, Wanye Xu, Naigang Hu, Xidian University, China

FR-A1.3A.7 **10:20**

An Optimal Design of High-Gain Quasi-Cassegrain Antenna for Ultra-wideband Applications

Sunanda Roy, Karthik Kakaraparty, The University of Texas at Dallas, United States; Ifana Mahbub, The University of Texas at Dallas (UTD), United States

FR-A1.3A.8 **10:40**

Influence of the Impedance Profile on the Performance of the Tapered-Impedance Half-Impulse Radiating Antenna

Fernando Albarracin, Felix Vega, Abdul R. Baba, Chaouki Kasmi, Technology Innovation Institute, United Arab Emirates

Broadband/Ultra-wideband Antennas II

Session Chair: Takashi Maeda, Japan Aerospace Exploration Agency

FR-A1.4A.1 **08:00**

Impulse Radiating Antennas with Four and Six Arms Excited with Differentiated Gaussian Pulses

Milivoje Miletic, Dragan Olcan, University of Belgrade, Yugoslavia

FR-A1.4A.2 **08:20**

Wideband Circularly Polarized Low Gain Turnstile Antenna for Cube-Sat Tracking Applications at UHF-Band

S. Meliksah Yayan, Plan-S Satellite and Space Technologies, Turkey

FR-A1.4A.3 **08:40**

Wideband MIMO Antenna with Orthogonal Polarization

Tomokazu Mizutani, Naobumi Michishita, National Defense Academy of Japan, Japan; Hiroshi Sato, Yoshio Koyanagi, Panasonic Corporation, Japan; Hisashi Morishita, National Defense Academy of Japan, Japan

FR-A1.4A.4 **09:00**

A Wideband and High Gain Dual-Polarized Base Station Antenna with Parasitic Patch

Yufei Fan, Yuandan Dong, University of Electronic Science and Technology of China, China

FR-A1.4A.5 **09:20**

Superseding performance of an ordinary patch antenna – A wideband, dual-pol, and circular polarized antenna design

MD Shahidul Islam, University of Asia Pacific, Bangladesh; Mohammad Abdul HANNAN, University of Trento, Italy

Break **09:40**

FR-A1.4A.6 **10:00**

A Compact and Wide Band Dual-Sense Circularly Polarized Flexible Antenna

Basim Sadek, Ahmed Abdelreheem, Mahmoud Abdalla, Military Technical College, Egypt; Mohamed El Atrash, MSA University, Egypt

FR-A1.4A.7 **10:20**

Broadband Characteristics of Circularly Polarized Dipole Antenna with Twisted Elements

Takeshi Fukusako, Kotaro Matsumoto, Ryuji Kuse, Kumamoto University, Japan

FR-A1.4A.8 **10:40**

Development of an ultra-wideband antenna as a phased array antenna element

Takashi Maeda, Naoya Tomii, Japan Aerospace Exploration Agency, Japan; Tadashi Takano, Nihon University, Japan

Optimization Methods in EM designs II

Session Co-Chairs: Giuseppe Vecchi, Politecnico di Torino; Stefano Selleri, University of Florence

FR-A3.1P.1 **13:20**

A compact 3-way power divider based on Bagley polygon

Stefano Maddio, Monica Righini, Giuseppe Pelosi, Stefano Selleri, University of Florence, Italy

FR-A3.1P.2 **13:40**

Human- and Machine Design: Resonant-size Antennas

Leonardo Pollini, Marcello Zucchi, Giuseppe Vecchi, Politecnico di Torino, Italy

FR-A3.1P.3 **14:00**

A Novel Optimization Technique for Designing Frequency Reconfigurable Pixelated Planar Antenna

Tianrui Qiao, Shiwen Tang, Junhui Rao, Yujie Zhang, Chi-Yuk Chiu, The Hong Kong University of Science and Technology, Hong Kong SAR of China; Qingsha Cheng, Southern University of Science and Technology, China; Ross Murch, The Hong Kong University of Science and Technology, Hong Kong SAR of China

FR-A3.1P.4 **14:20**

Parameter Identification for Symmetrical Prandtl-Ishlinskii Hysteresis Model Using Gauss-Newton Method

Su Yan, Ayobami Idubor, Howard University, United States

FR-A3.1P.5 **14:40**

Simple Strategy for Multi-objective Management in Antenna Optimization

Hayden Banting, Carlos Saavedra, Queen's University, Canada

Break **15:00**

FR-A3.1P.6 **15:20**

Numerical Eigenfunction Expansions for Optimizing Arbitrarily-Shaped Patch Antennas

Ricardo E. Sendrea, Constantinos L. Zekios, Stavros V. Georgakopoulos, Florida International University, United States

FR-A3.1P.7 **15:40**

Improving Genetic Algorithm Performance using Artificial Intelligence for the First Population

Abdelbaki Zeghdoud, Mourad Nedil, University of Quebec in Abitibi-Temiscamingue, Canada

FR-A3.1P.8 **16:00**

Automated Design of a Broadside-Radiating Linearly Polarized Isotropic Metasurface Antenna

Marcello Zucchi, Politecnico di Torino, Italy; Andrea Scarabosio, Marco Righero, Giorgio Giordanengo, Fondazione LINKS, Italy; Francesco Vernì, Huawei, Italy; Giuseppe Vecchi, Politecnico di Torino, Italy

FR-A3.1P.9 **16:20**

Concurrent Dual Polarization Dielectric Waveguide Interconnect using Inverse Designed Dual-Mode Surface Antenna Launcher

Jui-Yu Huang, Andreas Molisch, Constantine Sideris, University of Southern California, United States

FR-A3.1P.10 **16:40**

DOA Using Blind Cmpressive Sensing in the Presence of Mutual Coupling

Ismail Jouny, Lafayette College, United States

Metasurface Applications

Session Co-Chairs: Gengyu Xu, The City University of New York; Karu P Esselle, University of Technology, Sydney

FR-A2.1P.1 **13:20**

Dispersion Engineered Nonlocal Metasurfaces with Customizable Wavefront-Selectivity

Yoshiaki Kasahara, The University of Texas at Austin, United States; Adam Overvig, Gengyu Xu, Andrea Alu, The City University of New York, United States

FR-A2.1P.2 **13:40**

Reconfigurable coaxial metasurface radar absorber using varactor diode tuning

Tanguy Lopez, ONERA / Université Paris Nanterre, France; Thomas Lepetit, ONERA, France; Badreddine Ratni, Nawaz Burokur, Université Paris Nanterre, France

FR-A2.1P.3 **14:00**

Steerable Dipole Antenna through Huygens Metasurface Coating

Stefano Vellucci, Michela Longhi, Niccolò Cusano University, Italy; Alessio Monti, ROMA TRE University, Italy; Mirko Barbuto, Niccolò Cusano University, Italy; Davide Ramaccia, Luca Stefanini, Zahra Hamzavi-Zarghani, Muhammad Khalid, Alessandro Toscano, Filiberto Bilotti, ROMA TRE University, Italy

FR-A2.1P.4 **14:20**

A Thin Transparent Phase Correction Surface for Patch Antenna Gain Enhancement

Maira I Nabeel, Khushboo Singh, University of Technology, Sydney, Australia; Muhammad U Afzal, University of Technology Sydney, Australia; Dushmantha N Thalakotuna, Karu P Esselle, University of Technology, Sydney, Australia

FR-A2.1P.5 **14:40**

An Anomalous Refraction Metagrating for Normal to Oblique Mode Conversion into a Dielectric Medium

Nibirh Jawad, Loïc Markley, University of British Columbia, Canada

Break **15:00**

FR-A2.1P.6 **15:20**

All-Dielectric Artificial Magnetic Conductor at Millimeter-Wave Frequencies

Guillaume François, Amar Al-Bassam, Till Max Eckroth, Dirk Heberling, RWTH Aachen University, Germany

FR-A2.1P.7 **15:40**

Dual-polarized Metasurface Unit Cell using a sub 10 µm Thin Liquid Crystal Layer at 38 GHz

Daehyeon Kim, Wonbin Hong, POSTECH, Korea (South)

FR-A2.1P.8 **16:00**

A Dual-Band Frequency Selective Surface with Reconfigurable Properties

Rabeia Alwahishi, Fahad Ahmed, Institut National de la Recherche Scient, Canada; Mohamed Mamdouh M. Ali, Assiut University, Egypt; Tayeb A. Denidni, Institut National de la Recherche Scientifique, Canada

Additively Manufactured Antennas and Structures

Session Co-Chairs: Shailesh Pandey, Rogers Corporation; Emily Lamport, University of Massachusetts, Lowell; Jori Platt, University of Colorado Boulder; Yajie Chen, Rogers Corp

FR-A5.1P.1 **13:20**

Material Selection and Process Optimizations of Additive Interconnects in Printed Circuit Boards

Emily Lamport, Yuri Piro, Andrew Luce, University of Massachusetts, Lowell, United States; Susan Trulli, Raytheon Missiles and Defense, United States; Alkim Akyurtlu, University of Massachusetts, Lowell, United States

FR-A5.1P.2 **13:40**

Design of a Monolithic Monocone and Radome with a Conical Skirt Ground

Jori Platt, Dejan Filipovic, University of Colorado Boulder, United States

FR-A5.1P.3 **14:00**

High Performance Dual-Band antenna using Rogers Magneto-Dielectric Material for GNSS Band

Shailesh Pandey, Yajie Chen, Lance Young, Rogers Corporation, United States

FR-A5.1P.4 **14:20**

Additively Manufactured K-Band Septum Polarizers: A Comparative Study

Tayla Dahms, James Cook University, Australia; Stephanie Smith, Ken Smart, CSIRO, Australia; Graham Brodie, Mohan Jacob, James Cook University, Australia

Wideband Antennas and RF Systems

Session Co-Chairs: Namit Mishra, SLAC National Accelerator Laboratory; Pooja Patankar, Amazon

FR-UD.1P.1 **15:20**

An Ultra-Wideband, Electronically Reconfigurable 0/90 Phase Shifter for High-Power Phased Array Applications

Shiva Hajitabarmarznaki, Mohammad Mahdi Honari, Halil Topozlu, John H Booske, Nader Behdad, University of Wisconsin-Madison, United States

FR-UD.1P.2 **15:40**

An RF Electronics Subsystem for Microwave Multiplexed Cryogenic Transition-Edge Sensor Readout

Namit Mishra, Dan Van Winkle, Larry Ruckman, Ryan Herbst, Shawn Henderson, Joe Frisch, Zeeshan Ahmed, SLAC National Accelerator Laboratory, United States

Antenna Arrays and Systems

Session Co-Chairs: Muhammad Mubasshir Hossain, Florida International University; David Jackson

FR-UB.1P.1 **13:20**

Ultra-thin and Wideband Vertically Polarized Tightly Coupled Monopole Array

Seongjung Kim, Sangwook Nam, seoul national univ., Korea (South)

FR-UB.1P.2 **13:40**

Design of a Center-fed Dual-polarized Parallel Plate Slot Array Antenna

Huanqian Xiong, Jiro Hirokawa, Takashi Tomura, Tokyo Institute of Technology, Japan

FR-UB.1P.3 **14:00**

A Vivaldi Phased-Array Antenna for Tree Radar Applications

Kaixuan Cheng, Yee Hui Lee, Jiwei Qian, Nanyang Technological University, Singapore; Daryl Lee, Mohamed Lokman Mohd Yusof, National Parks, Singapore; Abdulkadir C. Yucel, Nanyang Technological University, Singapore

FR-UB.1P.4 **14:20**

An Adaptive Matching and Decoupling Network for Two-Element Antenna Arrays

Yuzhang Zang, Western Washington University, United States; Hung Luyen, University of North Texas, United States; Nader Behdad, University of Wisconsin - Madison, United States

FR-UB.1P.5 **14:40**

Field Intensity Shaping via a Multi-step Procedure based on Linear Superposition of Elementary Focused Patterns

Martina Teresa Bevacqua, Università degli Studi Mediterranea di Reggio Calabria, Italy; Sabrina Zumbo, Università degli studi di Napoli Federico II, Italy; Tommaso Isernia, Università degli Studi Mediterranea di Reggio Calabria, Italy

Break **15:00**

FR-UB.1P.6 **15:20**

Dual-band Antenna Array with Stacked Rotman Lens Feeding for Beamforming

Muhammad Mubasshir Hossain, Stavros Koulouridis, Satheesh Bojja Venkatakrishnan, John Volakis, Florida International University, United States

FR-UB.1P.7 **15:40**

An Optimization-Based Design Method for Matching and Decoupling Networks for Three-Element Antenna Arrays

Son Vu, Hung Luyen, The University of North Texas, United States

FR-UB.1P.8 **16:00**

Reflection Suppression of 26-GHz-Band Beam Steering Patch Array by Parasitic Dipoles

Takashi Tomura, Takehisa Wada, Atsushi Shirane, Kenichi Okada, Tokyo Institute of Technology, Japan; Jumpei Sudo, Makoto Higaki, Soichiro Inoue, Takashi Eishima, Axelspace Corporation, Japan

FR-UB.1P.9 **16:20**

Design of a Wideband Tightly Coupled Patch Antenna Array with Compact Balun for 5G Wireless Communications

Raed Almhmadi, University of Jeddah, Saudi Arabia

Point-to-Point Propagation Effects

Session Co-Chairs: David Michelson, The University of British Columbia; Thomas Hanley, Johns Hopkins University Applied Physics Laboratory

FR-UF.1P.1 **13:20**

A Criterion for Applying the Hilbert Transform to Scalar Frequency Response Data

Sina Mashayekhi, David Michelson, The University of British Columbia, Canada

FR-UF.1P.2 **13:40**

Analysis of Impromptu Over Land Radio Frequency Electromagnetic Measurements Collected During a Coincidental Test Event

Abby Anderson, Naval Research Laboratory DC, United States; Victor Wiss, NSWCDD, United States

FR-UF.1P.3 **14:00**

Effects of the Arctic Environment on RF Propagation

Zachary Burchfield, Thomas Hanley, Benjamin Sheppard, Marshall Jose, Hayden Williams, Johns Hopkins University Applied Physics Laboratory, United States

FR-UF.1P.4 **14:20**

Scintillation Data Inversion in the Auroral and Polar Cap Regions: 2D Analytic and 3D Numerical Modeling

James Conroy, Johns Hopkins Applied Physics Lab, United States; Kshitija Deshpande, Embry-Riddle, United States; Roger Varney, UCLA, United States; Leslie Lamarche, SRI, United States; Larry Paxton, Johns Hopkins Applied Physics Lab, United States; Wayne Scales, Amir Zaghloul, Virginia Tech, United States

Computational Electromagnetics and Artificial Intelligence for Biomedical Applications

Session Chair: Negar Ebadi, Stevens Institute of Technology

FR-A5.2P.1 **15:20**

Deep Learning for Tumor Margin Identification in Electromagnetic Imaging

Amir Mirbeik, Radiosight LLC, United States; Negar Ebadi (Tavassolian), Stevens Institute of Technology, United States

FR-A5.2P.2 **15:40**

Full Wave Analysis of the Exposure of Implantable Medical Devices to Electromagnetic Fields

Jose Duque, Universidad Nacional de Colombia, Colombia; Robert Urbina, Manuel Perez, Pontificia Universidad Javeriana, Colombia; Javier Araque, Universidad Nacional de Colombia, Colombia

FR-A5.2P.3 **16:00**

An Unsupervised Learning Approach for Human Activity Recognition Based on Wave Propagation in Wireless Body Area Networks

Zhang Yanyang, Shao Yu, Xiong Lian, Chongqing University of Posts and Telecommunications China, China; Zhang Jie, University of Sheffield,Dept. of Electronic and Electrical Engineering,United Kingdom (Great Britain), United Kingdom

FR-A5.2P.4 **16:20**

Computerized Tomography with Radon Transform using Microwaves and Electrostatics

Omar Ramahi, Saleh Ba Raean, Hamid Akbari-Chelaresi, University of Waterloo, Canada; Seyed Mirjahanmardi, Stanford University, United States; Vahid Nayyeri, Iran University of Science and Technology, Iran

FR-A5.2P.5 **16:40**

High-Performance Numerical Modeling for Detection of Rotator Cuff Tear

Sahar Borzooei, Claire Migliaccio, Victorita Dolean, Côte d'Azur University, France; Pierre-Henri Tournier, Sorbonne University, France; Christian Pichot, Côte d'Azur University, France

Ultra-Wideband Systems

Session Co-Chairs: Stephen Pancrazio, UC Davis; Ehsan Hafezi, University of Michigan; Novelita Rahayu, Institut Teknologi Bandung; Ehsan Hafeziasl, University of Michigan

FR-A5.3P.1 **13:20**

The Impact of Vibration on TNR for a GPR System

Stephen Pancrazio, Tyler Kelley, Ababil Hossain, Nhat Tran, Anh-Vu Pham, UC Davis, United States

FR-A5.3P.2 **13:40**

Performance Enhancement of Filtered Low Noise Amplifier Using Square-shaped Complimentary Split Ring Resonator

Novelita Rahayu, National Research and Innovation Agency, Indonesia; Shita Herfiah, Institut Teknologi Bandung, Indonesia; Cahya Edi Santosa, Robertus Heru Triharjanto, National Research and Innovation Agency, Indonesia; Achmad Munir, Institut Teknologi Bandung, Indonesia

FR-A5.3P.3 **14:00**

Development of Monopulse Antenna Feeding System with Microstrip Line to Waveguide Transition Using SIW Technology

Shita Herfiah, Institut Teknologi Bandung, Indonesia; Novelita Rahayu, Farohaji Kurniawan, Fadilah Hasim, National Research and Innovation Agency, Indonesia; Achmad Munir, Institut Teknologi Bandung, Indonesia

FR-A5.3P.4 **14:20**

Ultra-thin Planar Reflection-less Lens Based on Miniaturized-element Frequency Selective Surfaces for a 230 GHz Polarimetric Single-Aperture Radar

Ehsan Hafezi, Kamal Sarabandi, University of Michigan, United States

EM Modeling and Machine learning for Scattering and Propagation

Session Chair: Francesco Andriulli, Politecnico di Torino

FR-A4.1P.1 **15:20**

Learning From Noise: An Unsupervised GPR Data Denoising Scheme based on Generative Adversarial Networks

Qiqi Dai, Yee Hui Lee, Nanyang Technological University, Singapore, Singapore; Mohamed Lokman Mohd Yusof, Daryl Lee, National Parks Board, Singapore; Abdulkadir C. Yucel, Nanyang Technological University, Singapore

FR-A4.1P.2 **15:40**

Bistatic Scattering Analysis of Vegetation using Fast Hybrid Method of Full Wave Simulations

Jongwoo Jeong, Leung Tsang, University of Michigan, United States; Andreas Colliander, Simon Yueh, California Institute of Technology, United States

FR-A4.1P.3 **16:00**

Embedding General Antenna Patterns in Machine Learning Based Propagation Models

Aristeidis Seretis, Costas Sarris, University of Toronto, Canada

Models for Remote Sensing and Scattering in Random and Complex Media

Session Co-Chairs: Gary Brown, Virginia Tech; Mudaliar Saba, Air Force Research Laboratory, Wright-Patterson AFB

FR-UF.2P.1 **13:20**

Uncertainty Analysis on Wall and Radar's characteristics in Through-the-Wall context

Yanisse Boudrouz, Israel Hinostroza, Mohammed Serhir, Paris-Saclay University, France; Christelle Eyraud, Aix-Marseille University, France

FR-UF.2P.2 **13:40**

AM Interrogation of Harmonic Transponders for Measuring Channel Loss

Jeff Frolik, University of Vermont, United States

FR-UF.2P.3 **14:00**

High-Speed Train Channels with Reconfigurable Intelligent Surface: Modeling and Analysis

Yuan Yuan, Ruisi He, Bo Ai, Mi Yang, Beijing Jiaotong University, China; Ruifeng Chen, China Academy of Railway Sciences Corporation Limited, China; Zhangdui Zhong, Beijing Jiaotong University, China

FR-UF.2P.4 **14:20**

A Deep-Learning-Based Borehole Radar Sparse Target Imaging Method with High Accuracy in Nonuniform Medium

Yutong Tian, Tingjun Li, Aya Li, Shijia Yi, Na Li, Haining Yang, University of Electronic Science and Technology of China, China

FR-UF.2P.5 **14:40**

A Parallel Implementation of Solving Radiative Transfer Equation Using Discontinuous Galerkin Method

Md Ershadul Haque, Wang Hang, Abedi Reza, University of Tennessee Space Institute, United States; Mudaliar Saba, Air Force Research Laboratory, Wright-Patterson AFB, United States

Break **15:00**

FR-UF.2P.6 **15:20**

Acceleration to Dense Random Media Scattering with Discrete Dipole Approximations through Physics Driven Artificial Intelligence

Chunzeng Luo, Xin Lv, Shurun Tan, Zhejiang University, China

FR-UF.2P.7 **15:40**

Preliminary Data from Phase Coherent Vertical Array during the Coastal Land-Air-Sea Interactions Mission, Florida, 2023

Joe Vinci, Caglar Yardim, Joel Johnson, Elizabeth Shi, The Ohio State University, United States

FR-UF.2P.8 **16:00**

In-Vivo MIMO Channel Characterization based on Skin-fat Model at 1 Terahertz Band

Jinghan Yin, Yu Shao, Xi Liao, Yang Wang, Chongqing University of Posts and Telecommunications, China; Jie Zhang, The University of Sheffield, China; Xianjin Li, Huawei Technologies Co., Ltd., China

FR-UF.2P.9 **16:20**

CLASI Florida Preliminary Drone Measurements

Elizabeth Shi, Caglar Yardim, Joe Vinci, Ohio State University, United States

Electromagnetic Material Properties and Measurements II

Session Chair: Matthew Rash, ViaSat, Inc

FR-A2.2P.1 **13:20**

A Dual-Resonance Frequency Selective Surface Genetically Optimized for Dielectric Characterization

Christopher Howard, Georgia Tech Research Institute, Georgia; William Hunt, Georgia Institute of Technology, Georgia; Kenneth Allen, Georgia Tech Research Institute, Georgia

FR-A2.2P.2 **13:40**

Sensorized Nozzle for Material Properties Monitoring through Electromagnetic Field

Valeria Lazzoni, Sabrina Rotundo, Angelica Masi, Danilo Brizi, Agostino Monorchio, University of Pisa / CNIT, Italy

FR-A2.2P.3 **14:00**

Impacts of Paint Color on a Honeycomb Composite Ka-Band Antenna Gain

Matthew Rash, Ray Lewis, ViaSat, Inc, United States

FR-A2.2P.4 **14:20**

Low-Dispersive Permittivity Measurement Based on Transmitted Power Only

Seyed Hossein Mirjahanmardi, Stanford University, United States; Omar Ramahi, University of Waterloo, Canada

Advances in On-Chip Antennas

Session Co-Chairs: Nima Ghalichechian, Georgia Institute of Technology; Sree Dasari, Georgia Institute of Technology

FR-A5.4P.1 **15:20**

Silicon Carbide Slot Dielectric Resonator Antenna for High Temperature and Power Applications

Sree Adinarayana Dasari, Thomas Williamson, Nima Ghalichechian, Georgia Institute of Technology, United States

FR-A5.4P.2 **15:40**

Towards a 5G n260 Band Phased Array Based on Vanadium Dioxide Switches

Thomas Williamson, Seung Yoon, Sree Dasari, Nima Ghalichechian, Georgia Institute of Technology, United States

FR-A5.4P.3 **16:00**

Design and Optimization of a GaAs Millimeter-Wave On-Chip Patch Antenna

Bernardo Lopes, Universidade de Aveiro, Instituto de Telecomunicações, Portugal; Ricardo Correia, Instituto de Telecomunicações, Sinuta SA., Portugal; João Matos, Universidade de Aveiro, Instituto de Telecomunicação, Portugal

FR-A5.4P.4 **16:20**

Design and Measurement of W-Band On-Chip Antennas for an Array IC on a Thick PCB Module

Kyu-Jong Choi, Hong-Seok Choi, Byung-Wook Min, yonsei university, Korea (South)

Integral Formulations for Penetrable Objects

Session Co-Chairs: Francesca Vipiana, Politecnico di Torino, Torino, Italy; Amir Boag, Tel Aviv University

FR-A3.2P.1 **13:20**

Single Source Volume-Surface Integral Equations for Scattering on Nonuniform Structures

Cedric Münger, Kristof Cools, Ghent University, Belgium

FR-A3.2P.2 **13:40**

A Volumetric Method of Moments for the Analysis of THz Lens Antennas

Riccardo Ozzola, Jinglin Geng, Erik Speksnijder, Daniele Cavallo, Nuria Llombart, Delft University of Technology, Netherlands; Angelo Freni, Università degli Studi di Firenze, Italy; Andrea Neto, Delft University of Technology, Netherlands

FR-A3.2P.3 **14:00**

A Surface Integral Equation Based T-Matrix Formulation for Penetrable Obstacles and Scatterers

Arkaprovo Das, Manushanker Balasubramanian, Sawyer D. Campbell, Pingjuan L. Werner, Douglas H. Werner, The Pennsylvania State University, United States

FR-A3.2P.4 **14:20**

Multi-Trace Multi-Screen Methods for Mixed Transmission/Scattering Problems

Kristof Cools, Ghent University, Belgium; Carolina Urzúa-Torres, TU Delft, Netherlands

FR-A3.2P.5 **14:40**

Spectral Projection Model Applied to Electromagnetic Scattering from Dielectric Cylinders with Arbitrary Cross-Sections

Vidyasagar Sivalingam, Dayalan Kasilingam, University of Massachusetts Dartmouth, United States

Break **15:00**

FR-A3.2P.6 **15:20**

A Multitrace Multi-Resolution Preconditioner for Solving Piecewise Homogeneous Dielectric Objects

Victor F. Martin, University of Extremadura/Politecnico di Torino, Spain; Diego M. Solis, Jose M. Taboada, University of Extremadura, Spain; Fernando Obelleiro, University of Vigo, Spain; Francesca Vipiana, Politecnico di Torino, Italy

FR-A3.2P.7 **15:40**

Unified View of Surface Integral Equation Based Sub-Structure Characteristic Mode Analysis Methods

Chao-Fu Wang, National University of Singapore, Singapore

FR-A3.2P.8 **16:00**

Multi-Trace Formulation of Internally Combined Volume-Surface Integral Equations

Cedric Münger, Kristof Cools, Ghent University, Belgium

FR-A3.2P.9 **16:20**

Effective simulation of broadband absorbers using MoM/SIE and 2D periodic Green functions

BRANKO KOLUNDZIJA, University of Belgrade, Serbia; MILAN KOSTIC, WIPL-D d.o.o., Serbia

FR-A3.2P.10 **16:40**

Augmentation of Volume-Surface Integral Equations for Low-Frequency Modeling of Interconnect Structures

Li Zhang, Yu Zhang, Tongji University, China; Amir Boag, Tel Aviv University, Israel; Mei Song Tong, Tongji University, China

Microstrip Antennas in Extreme Environments

Session Co-Chairs: Tutku Karacolak, Washington State University Vancouver; Koen Mouthaan, National University of Singapore

FR-A1.1P.1 **13:20**

A MIMO Monopole Antenna for Harsh Conditions

Aleks Mertvyy, Elesey Razumovskiy, Daniel Stelmakh, Tutku Karacolak, Washington State University Vancouver, United States

FR-A1.1P.2 **13:40**

Optimized UHF Patch Antenna for Cryospheric Communications on Europa

Jake Sahli, Albin Gasiewski, University of Colorado Boulder, United States; William Stone, Veronica Guerrero, Brian Pease, James Ralston, Vickie Siegel, Justin Smith, Stone Aerospace, Inc., United States

FR-A1.1P.3 **14:00**

Intelligent Design of Antenna for CubeSat Application Using Machine Learning Algorithm

Md Nazim Uddin, Elias A. Alwan, Florida International University, United States

FR-A1.1P.4 **14:20**

Circularly Polarized Regolith Antenna for Future Lunar Communication

Subuh Pramono, Josaphat Tetuko Sri Sumantyo, Muhammad Hamka Ibrahim, Chiba University & Universitas Sebelas Maret, Indonesia; Ayaka Takahashi, Chiba University & Teikyo University, Japan; Yuki Yoshimoto, Hisato Kashihara, Chiba University, Japan; Cahya Edy Santosa, National Research and Innovation Agency, Indonesia, Indonesia; Steven Gao, Dept. of Electronic Engineering, The Chinese University of Hong Kong, Hong Kong, Hong Kong SAR of China; Koichi Ito, Center for Environmental Remote Sensing, Chiba University, Japan, Japan

FR-A1.1P.5 **14:40**

Deployable L-band Bowtie Antenna Array for Satellite Applications

Gong Chen, National University of Singapore, Singapore; Fujiang Lin, University of Science and Technology of China, China; Koen Mouthaan, National University of Singapore, Singapore

Frequency-selective Surfaces and Structures

Session Chair: Mohamad Kamal A Rahim, Universiti Teknologi Malaysia

FR-A2.3P.1 **15:20**

Analytical Eigenstate Equivalent Circuit for Narrow-Slot Bi-Periodic Scatterers

Alberto Hernández-Escobar, Universidad de Málaga, Spain; Francisco Mesa, Universidad de Sevilla, Spain; Jaime Esteban, Universidad Politécnica de Madrid, Spain; Elena Abdo-Sánchez, Teresa Martín-Guerrero, Carlos Camacho-Peñalosa, Universidad de Málaga, Spain

FR-A2.3P.2 **15:40**

Single-Pixel Chaotic Cavity Bandwidth Control using Rotman Lens-based Multiplexer/Demultiplexer

Ilyas Saleem, Macquarie University, Australia; Muhammad Ali Babar Abbasi, Vincent Fusco, Okan Yurduseven, Queen's University, United Kingdom; Syed Muzahir Abbas, Subhas Mukhopadhyay, Macquarie University, Australia

FR-A2.3P.3 **16:00**

A Spoof Surface Plasmon Polaritons Bandpass Filter Based on Coplanar Waveguide

Zhen Wang, Tongji University, China; Ajay K. Poddar, Ulrich L. Rohde, Synergy Microwave Corporation, United States; Mei Song Tong, Tongji University, China

FR-A2.3P.4 **16:20**

Effect of Array and Substrate Configurations on Transparent Mosaic Frequency Selective Surface

Nur Biha Mohamed Nafis, Universiti Putra Malaysia, Malaysia; Mohamed Himdi, Université de Rennes 1, France; Mohamad Kamal A Rahim, Universiti Teknologi Malaysia, Malaysia

Microstrip Leaky Wave Antennas and Periodic Structures

Session Co-Chairs: Jayanta Mukherjee, Indian Institute of Technology Bombay; Oscar Quevedo-Teruel, KTH

FR-A1.2P.1 **13:20**

Metasurface-Based Low-Dispersive Leaky-Wave Antenna

Adham Mahmoud, Mauro Ettorre, IETR, France; Jorge Garcia, University of Michigan, United States; Oscar Quevedo-Teruel, KTH, Sweden; Anthony Grbic, University of Michigan, United States

FR-A1.2P.2 **13:40**

Microstrip CRLH-TL Leaky Wave Filtenna for Multiplexed Antenna Feed Applications

Jeremy Furgal, Syracuse University, United States; Jun Choi, University at Buffalo, United States; Jay Lee, Syracuse University, United States

FR-A1.2P.3 **14:00**

High gain 1-D complementary paired combline PLWA with backward to forward scanning

Vishakha , Jayanta Mukherjee, Indian Institute of Technology Bombay, India

FR-A1.2P.4 **14:20**

Gain Enhancement of a Pin-Loaded Circularly Polarized Patch Antenna using Double Negative Metamaterial Superstrates

Srabonty Soily, Md Jubaer Alam, Saeed I. Latif, university of south alabama, United States

FR-A1.2P.5 **14:40**

High Gain Meander Line Antenna for 2.4 GHz Bluetooth Applications

Mai Sallam, Mohamed Gad, Nile University, Egypt

Reflector and Reflectarray Antennas

Session Co-Chairs: Priyanka Chimmili, Amazon; Michele Beccaria, Politecnico di Torino; Cindy Furse

FR-UB.2P.1 **15:20**

Preliminary Results on Smart Conformal Electromagnetic Skins for 5G applications

Michele Beccaria, Politecnico di Torino, Italy; Agnese Mazzinghi, Università di Firenze, Italy; Andrea Massaccesi, Politecnico di Torino, Italy; Angelo Freni, Università di Firenze, Italy; Paola Pirinoli, Politecnico di Torino, Italy

FR-UB.2P.2 **15:40**

A 1-bit, Ultra-wideband, Electronically-Reconfigurable Reflectarray Using One Switch Per Unit Cell

Jinkai Wu, Mohammad Mahdi Honari, Jiahao Zhao, Halil Topözlü, Shichen (Justin) Qiao, John Booske, Nader Behdad, University of Wisconsin, Madison, United States

FR-UB.2P.3 **16:00**

Reconfigurable Reflectarray Antenna for Dual and Circular Polarization

Sun-Gyu Lee, Jeong-Hae Lee, Hongik university, Korea (South)

FR-UB.2P.4 **16:20**

Low-Loss Ultra-Wideband Feeding Network for Deployable Spaceborne Tightly Coupled Dipole Arrays

Jorge Antonio Caripidis Troccola, Satheesh B. Venkatakrishnan, John L. Volakis, Florida International University, United States

FR-UB.2P.5 **16:40**

Evaluating Impact of Assembly Line Test Fixtures on Wireless Performance Validation

Priyanka Chimmili, Nick Tyan, Peter Fang, Erik Saturnino Gamez Rodriguez, Naman Barmecha, Sai Ananthanarayanan, Liu Ming-wei, Amazon, United States

Adaptive, Active, and Smart Microstrip Antennas

Session Chair: Ali Alreshaid, King Fahd University of Petroleum and Minerals

FR-A1.3P.1 **13:20**

A Compact Millimeter Wave Polarization Reconfigurable Double Patch Antenna

Ali Alreshaid, King Fahd University of Petroleum and Minerals, Saudi Arabia; Yepu Cui, Ryan Bahr, Georgia Institute of Technology, United States; Mohammad Sharawi, University of Montréal, Canada; Manos Tentzeris, Georgia Institute of Technology, United States

FR-A1.3P.2 **13:40**

Dynamic Radiation Pattern of a Two-Element Antenna Array With Spatial Amplitude Modulation

Jacob Randall, Jeffrey Nanzer, Michigan State University, United States

FR-A1.3P.3 **14:00**

An Electronically Reconfigurable Dual-Mode Dual-Band Ring Antenna Based on CMA

Nicholas Russo, Constantinos Zekios, Stavros Georgakopoulos, Florida International University, United States

FR-A1.3P.4 **14:20**

A Switched Beam Antenna for Fiber-to-the-Room Wi-Fi Applications

Francis KESHMIRI, Hao Xiong, Xiang Wang, Huawei, France

Planar Millimeter-wave Antennas

Session Co-Chairs: Tarek djerafi, inrs; Ifana Mahbub, University of Texas at Dallas

FR-A5.5P.1 **15:20**

A High Gain SIW Elliptically Polarized Antenna for Millimeter-Wave Applications

Pallav Sah, Ifana Mahbub, University of Texas at Dallas, United States

FR-A5.5P.2 **15:40**

A Fully Integrated Planar Dielectric Rod Antenna Based on SIIG Technology for mm-Wave Applications

Faisal Farooq, Abdelkader zerfaine, Mohamed Chaker, Tarek djerafi, inrs, Canada

FR-A5.5P.3 **16:00**

Temperature Performance of Millimeter-Wave Antenna-in-Package

Oscar Medina, Aditya Jogalekar, Michael Mcgarry, Kannan Nambiar, Hongbing Lu, Mark Lee, Rashaunda Henderson, UT Dallas, United States

FR-A5.5P.4 **16:20**

Wideband THz Yagi-Uda Bond Wire Antennas

Ivan Ndip, Fraunhofer IZM/Brandenburg University of Technology (BTU) Cottbus-Senftenberg, Germany

Author and Session Chair Index

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