

2021 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (APS/URSI 2021)

**Singapore
4 – 10 December 2021**

Pages 1-682



**IEEE Catalog Number: CFP21APS-POD
ISBN: 978-1-7281-4671-3**

**Copyright © 2021 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP21APS-POD
ISBN (Print-On-Demand):	978-1-7281-4671-3
ISBN (Online):	978-1-7281-4670-6

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

MO-A1.1A: ANTENNA THEORY I

MO-A1.1A.1: ANTENNA DESIGN FOR IMPROVED NON-LINEAR RADAR PERFORMANCE1

Alex Bouvy, Nader Behdad, University of Wisconsin-Madison, United States; Gregory Mazzaro, The Citadel, United States; Kelly Sherbondy, Kyle Gallagher, Army Research Lab, United States

MO-A1.1A.2: A CONCEPT OF TRANSPARENT ANTENNA ARRAY ON TOUCH SCREEN3

Kosuke Fujita, Masaharu Takahashi, University of Chiba, Japan

MO-A1.1A.3: ACCURATE CLOSED-FORM EXPRESSIONS FOR MAXIMUM RADIATED POWER AND SURFACE WAVE LOSS OF PRINTED ANTENNAS ON A THICK SUBSTRATE5

Andrey Kobaykov, Corning Inc., United States

MO-A1.1A.4: SPARSE CYLINDRICAL ARRAYS WITH LOW DISCREPANCY ELEMENT SPACING BASED ON VAN DER CORPUT SEQUENCE7

Travis Torres, Payam Nayeri, Randy Haupt, Colorado School of Mines, United States; Paolo Rocca, University of Trento, Italy

MO-A1.1A.5: A METHOD TO WIDEN THE RANGE OF DIRECTION FINDING BY TIME MODULATED ARRAY9

Yue Ma, Chen Miao, Yue Li, Wen Wu, Nanjing University of Science and Technology, China

MO-A1.1A.6: SEVERAL EFFECTIVE METHODS ON REDUCING CROSS-POLARIZATION OF A PATCH ANTENNA11

Jing-Yi Zhang, Jin-Dong Zhang, Wen Wu, Da-Gang Fang, Nanjing University of Science and Technology, China

MO-A1.1A.7: RADIATION CHARACTERISTICS OF 2-D FABRY-PEROT CAVITY ANTENNAS WITH UNIFORM SUPERSTRATE13

Yanlin Hei, Min Wang, Jia-Yan Xu, Wen Wu, Nanjing University of Science and Technology, China

MO-A1.1A.9: LONG RANGE DIPOLE WITH OMNIDIRECTIONAL PATTERN BASED ON SPOOF SURFACE PLASMON POLARITONS STRUCTURE15

Jing Zhang, Junping Geng, Kun Wang, Chaofan Ren, Jingzheng Lu, Silei Yang, Yangzhou Zhang, Da Su, Xianling Liang, Ronghong Jin, Shanghai Jiao Tong University, China

MO-A1.1A.10: OPTIMUM GAIN CONDITIONS FOR 1-D UNIDIRECTIONAL LEAKY-WAVE ANTENNAS17

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

MO-A5.1A: WIRELESS POWER TRANSMISSION I

MO-A5.1A.2: WIRELESS POWER CHARGING OF SMARTPHONE UP TO 6 FEET FROM TRANSMITTER ANTENNA AT 2.4 GHZ19

Pawan Gaire, Dieff Vital, MD Rayhan Khan, Shubhendu Bhardwaj, Florida International University, United States; Cherif Chibane, WiGL inc., United States

MO-A5.1A.3: OPTIMAL EMBROIDERED WEARABLE WPT SYSTEMS WITH LIQUID METAL NANOPARTICLES	21
<i>Juan Barreto, Abdul-Sattar Kaddour, Stavros Georgakopoulos, Florida International University, United States; Hyeon Seok An, Robert Sheperd, Cornell University, United States</i>	
MO-A5.1A.4: METASURFACE LENS DESIGN FOR HIGH-GAIN WPT SYSTEM	23
<i>Scott Clemens, Magdy Iskander, Zhengqing Yun, University of Hawaii at Manoa, United States; Hooman Kazemi, Raytheon Company, United States</i>	
MO-A5.1A.5: A SIMPLE AND RELIABLE APPROACH TO STABILIZING OUTPUT VOLTAGE OF A WIRELESS POWER TRANSFER SYSTEM FOR ACTIVE IMPLANTABLE MEDICAL DEVICES	25
<i>Cheng Peng, Jinyan Li, Zhongwei Zhao, University of Electronic Science and Technology of China, China; Zhizhang Chen, Dalhousie University, Canada</i>	
MO-A5.1A.6: TIME REVERSAL BASED MULTI-POINT FOCUSING WIRELESS POWER TRANSFER	27
<i>Zhouming Yang, Jinlong Bao, Deshuang Zhao, University of Electronic Science and Technology of China, China</i>	
MO-A5.1A.7: WIRELESS POWER TRANSFER ON HUMAN ARM FOR FUTURE BODY AREA NETWORK	29
<i>Yiyang Wang, Yuanzheng Xu, Bo Wang, Jinjun Mo, Guilin University Of Electronic Technology, China; Safeddin Safavi-Naeini, University of Waterloo, Canada</i>	
MO-A5.1A.8: ON THE EVALUATION OF WIRELESS POWER TRANSFER EFFICIENCY BETWEEN TWO ANTENNA APERTURES IN THE FRESNEL REGION OVER WIDE BANDWIDTH	31
<i>Daniele Insera, Guangjun Wen, University of Electronic Science and Technology of China, China</i>	
MO-A5.1A.9: AN ADAPTIVE MULTI BRANCH DUAL BAND RECTIFIER FOR RF ENERGY HARVESTING EFFICIENCY IMPROVEMENT	33
<i>M. Arif Hussain Ansari, Salahuddin Raju, Agency for Science, Technology and Research (A*STAR), Singapore</i>	
MO-A5.1A.10: BASIC STUDY ON TWO-DIMENSIONAL BEAM PROPAGATION CHARACTERISTICS IN PARALLEL PLATE WAVEGUIDE	35
<i>Kazuki Yukawa, Takayuki Matsumuro, Toshio Ishizaki, Ryukoku University, Japan; Yohei Ishikawa, Kyoto University, Japan</i>	
MO-SP.1A: HIGH SENSITIVITY PHASED ARRAY RECEIVERS FOR LOCATION SERVICES, 5G, RADIO ASTRONOMY, AND SATELLITE COMMUNICATIONS	
MO-SP.1A.3: FLEXIBLE AND SCALABLE ADDITIVELY MANUFACTURED ANTENNA ARRAY TILES FOR SATELLITE AND 5G APPLICATIONS USING A NOVEL RUGGED MICROSTRIP-TO-MICROSTRIP TRANSITION	37
<i>Kexin Hu, Xuanke He, Manos Tentzeris, Georgia Institute of Technology, United States</i>	
MO-SP.1A.4: WIDEBAND RFI CANCELLATION USING TRUE TIME DELAYS AND A HADAMARD PROJECTION OPERATOR	39
<i>Jakob Kunzler, Karl Warnick, Brigham Young University, United States; Mohammad Chahardori, Deukhyoun Heo, Washington State University, United States</i>	
MO-SP.1A.5: THE BLUERING ARRAY RECEIVER SYSTEM	41
<i>Grant Hampson, Wan Cheng, David Humphrey, John Bunton, Paul Roberts, Keith Bengston, Ron Beresford, Yuqing Chen, Raji Chekkala, Giles Babich, CSIRO, Australia</i>	
MO-SP.1A.6: SPECTRAL SMOOTHNESS OF EMBEDDED ELEMENT PATTERNS IN THE SKA-LOW PROTOTYPE STATION AAVS2: PRELIMINARY RESULTS	43
<i>David Davidson, Daniel Ung, Curtin University, Australia</i>	

MO-SP.1A.7: PAF APPLICATION ON A LARGE SPHERICAL REFLECTOR TO SURVEY 100 TIMES FASTER THAN THE FAST	45
<i>Chengjin Jin, Jun Wang, Bo Peng, Yan Zhu, National Astronomical Observatories Chinese Academy of Sciences, China; Stefan Heyminck, Max-Planck-Institut für Radioastronomie, Germany</i>	
MO-SP.1A.9: EXPERIMENTAL VERIFICATION OF ANOMALOUS SPECTRAL FEATURES OF SKALA4.1 ANTENNA	47
<i>Georgios Kyriakou, National Institute for Astrophysics, Italy; Ravi Subrahmanyam, Commonwealth Scientific and Industrial Research Organisation, Australia; Pietro Bolli, National Institute for Astrophysics, Italy; David Davidson, International Centre for Radioastronomy Research, Curtin University, Australia</i>	
MO-SP.1A.10: TOWARDS A NEW FIGURE OF MERIT FOR REFLECTOR ANTENNA BASED IMAGING	49
<i>Mariet Venter, Dirk de Villiers, Stellenbosch University, South Africa</i>	
MO-A1.2A: BROADBAND ANTENNAS I	
MO-A1.2A.1: A COMPACT LOW-COST AND LIGHTWEIGHT 3-D PRINTED HORN ANTENNA FOR UWB SYSTEM	51
<i>Mohammad Ababil Hossain, Samuel Wagner, Stephen Pancrazio, Anh-Vu Pham, University of California, Davis, United States</i>	
MO-A1.2A.2: WIDEBAND CIRCULAR PATCH ANTENNA EXCITED IN THE BROADSIDE TM₁₂ MODE	53
<i>Sai Radavaram, Saininad Naik, Maria Pour, University of Alabama in Huntsville, United States</i>	
MO-A1.2A.3: A WIDEBAND STACKED PATCH-PATCH ANTENNA WITH HYBRID PERTURBATIONS FOR CIRCULAR POLARIZATION	55
<i>Muhammad Mubashir Hossain, Syed Salman Kabir, Saeed Latif, Edmund Spencer, University of South Alabama, United States; Mohammad Qudrat-E-Maula, Global Skyware, United States</i>	
MO-A1.2A.4: WIDEBAND COMPACT STRIPLINE ANTENNA FOR 5GB/6G APPLICATIONS	57
<i>Mohamed Ali, Shoukry Shams, Abdelrazik Sebak, Concordia University, Canada; Mahmoud Elsaadany, Ecole de Technologie Supérieure, Canada; Ghyslain Gagnon, École de technologie supérieure,, Canada</i>	
MO-A1.2A.5: WIDEBAND, X-BAND SERIES-FED PATCH ARRAY	59
<i>Matthew Bray, Johns Hopkins Applied Physics Laboratory, United States</i>	
MO-A1.2A.6: BROADBAND ANTENNA-ON-DISPLAY APPLICABLE FOR WIFI	61
<i>Yerim Oh, Jae-Yeong Lee, Dongseop Lee, Wonbin Hong, pohang university of science and technology, Korea (South); Dongpil Park, Dongwoo Fine-Chem, Korea (South)</i>	
MO-A1.2A.7: A METASURFACE ANTENNA WITH THE CHARACTERISTIC OF BROADBAND AND STABLE HIGH GAIN	63
<i>Deqiang Yang, Mi Wan, Sihao Liu, University of Electronic Science and Technology of China, China</i>	
MO-A1.2A.8: AN FSS-LOADED PUMA ARRAY WITH 16.5:1 BANDWIDTH	65
<i>Hongmei Li, Danqi Lian, Jiaran Qi, Harbin Institute of Technology, China</i>	
MO-A1.2A.9: COMPACT AND WIDEBAND TERAHERTZ LENS INTEGRATED BOW-TIE ANTENNA FOR DETECTOR	67
<i>Bing Wang, Mingxun Li, Xin Lv, Beijing Institute of Technology, China</i>	
MO-A1.2A.10: A COMPACT DIFFERENTIAL QUASI-YAGI ANTENNA WITH BROADBAND AND UNIPLANAR CHARACTERISTICS	69
<i>Zhihao Zhu, Yaowei Hou, Shanghai Jiao Tong University, China; Yueping Zhang, Nanyang Technological University, China</i>	

MO-A1.3A: RECONFIGURABLE ANTENNAS AND ARRAYS I

MO-A1.3A.1: A RECONFIGURABLE RADIATION PATTERN MICROSTRIP PATCH ANTENNA WITH HIGH MODE PURITY71

Zabed Iqbal, Tanzeela H. Mitha, Maria Pour, University of Alabama in Huntsville, United States

MO-A1.3A.2: RECONFIGURABLE CYLINDRICAL MEFSS FOR 360 AZIMUTHAL BEAM STEERING73

Nicolas Faria, Sean Victor Hum, University of Toronto, Canada

MO-A1.3A.3: FREQUENCY TUNABILITY OF A LOW PROFILE, YAGI ANTENNA75

John Verboom, Sungkyun Lim, Georgia Southern University, United States

MO-A1.3A.4: MINIATURIZED RECONFIGURABLE SIW-BASED LEAKY-WAVE ANTENNA LOADED WITH INCLINED SLOT77

Nima Javanbakht, Rony Amaya, Barry Syrett, Carleton University, Canada; Jafar Shaker, Communication Research Center, Canada

MO-A1.3A.5: LIQUID-METAL-TUNED PATCH ELEMENT FOR FLEXIBLE AND RECONFIGURABLE REFLECTARRAYS/INTELLIGENT SURFACES79

Kevin Xu, Jun Choi, University at Buffalo, The State University of New York, United States

MO-A1.3A.6: A COMPACT RECONFIGURABLE ANTENNA FOR BOREHOLE RADAR81

Jisheng Tong, Qing Zhao, University of Electronic Science and Technology of China, China; Yongxin Guo, National University of Singapore, Singapore

MO-A1.3A.7: MINIATURIZED META-RESONATOR BASED PATTERN RECONFIGURABLE ANTENNA FOR SUB 6 GHZ APPLICATION83

Zhan Wang, Yuandan Dong, University of Electronic Science and Technology of China, China

MO-A1.3A.8: INDOOR WIFI CHANNEL MEASUREMENTS WITH PRINTED ENDFIRE BEAM-STEERING PIXEL ANTENNAS85

Chi Zhang, Charles Ng, Chi-Yuk Chiu, Ross Murch, Hong Kong University of Science and Technology, Hong Kong SAR of China

MO-A1.3A.9: DUAL-POLARIZED RECONFIGURABLE ANTENNA USING ANNULAR SLOTS FOR 2.45 GHZ ISM BAND APPLICATIONS87

Na-Rae Kwon, Sang-Min Nam, Wang-Sang Lee, Gyeongsang National University, Korea (South)

MO-A1.3A.10: DESIGN OF A RADIATION-TYPE LOW-PROFILE PROGRAMMABLE ANTENNA89

Shaopeng Pan, Lin Qi, Wanting Shen, Gaosheng Li, Hunan University, China

MO-A2.1A: METASURFACES IN BEAM STEERING AND BEAM FORMING I

MO-A2.1A.1: METASURFACE-PAIR DESIGN FOR A SCAN-ANGLE ENHANCEMENT SYSTEM91

Jaemin Kim, George Eleftheriades, University of Toronto, Canada

MO-A2.1A.2: FREQUENCY-BEAM-SCANNING NONRECIPROCAL TRANSMISSIVE POLYCHROMATIC METASURFACE93

Sajjad Taravati, George V. Eleftheriades, University of Toronto, Canada

MO-A2.1A.3: EXTREME BEAM-FORMING WITH METAGRATING-ASSISTED PLANAR ANTENNAS95

Gengyu Xu, Sean Hum, George Eleftheriades, University of Toronto, Canada

MO-A2.1A.4: A RECONFIGURABLE INTELLIGENT SURFACE USING A 2-BIT PROGRAMMABLE METASURFACE FOR COMMUNICATIONS	97
<i>John Hodge, Virginia Tech, United States; Thomas Spence, Northrop Grumman, United States; Amir Zaghloul, CCDC U.S. Army Research Lab and Virginia Tech, United States</i>	
MO-A2.1A.5: INVESTIGATING DIELECTRIC COVERS TO REDUCE UNWANTED LOBES IN NEAR-FIELD META-STEERING SYSTEMS	99
<i>Khushboo Singh, Muhammad Usman Afzal, Karu P. Esselle, University of Technology Sydney, Australia; Ali Lalbakhsh, Macquarie University, Australia</i>	
MO-A2.1A.6: WIDEBAND 1-BIT DYNAMICAL BEAM STEERING TRANSMITARRAY	101
<i>Fuheng Zhang, Fudan University and Shanghai Radio Equipment Research Institute, China; Hao Gu, Shanghai Radio Equipment Research Institute, China; Kaihua Zhang, Shanghai Academy of Spaceflight Technology, China; Guo-Min Yang, Ya-Qiu Jin, Fudan University, China</i>	
MO-A2.1A.8: BOUNDARY-SOURCE COHERENT BEAMFORMING USING METASURFACE	103
<i>Si Yu Miao, Feng Han Lin, ShanghaiTech University, China</i>	
MO-A2.1A.9: MULTI-LAYERED FLAT META-LENSES FOR CONICAL BEAM SCANNING VIA OPTIMIZATION OF GEOMETRICAL OPTICS	105
<i>Anastasios Papathanasopoulos, Yahya Rahmat-Samii, University of California, Los Angeles, Greece</i>	
MO-A2.1A.10: FIXED FREQUENCY BEAM SCANNING 5G ANTENNA ARRAY WITH SWITCHABLE MULTIPLE BEAMS AND WIDE BEAM	107
<i>Hao Xiang Li, Yong Jin Zhou, Shanghai University, China</i>	
 MO-SP.2A: 5G AND 6G ANTENNA SYSTEMS FOR MOBILE DEVICES: PRESENT CHALLENGES AND FUTURE OPPORTUNITIES	
MO-SP.2A.1: HYBRID ACTIVE-PASSIVE BEAMFORMING FOR SCALABLE SUB-TERAHERTZ ANTENNA ARRAY	109
<i>Kai-Qi Huang, Madhavan Swaminathan, Georgia Institute of Technology, United States</i>	
MO-SP.2A.2: A RECONFIGURABLE INTELLIGENT SURFACE FOR 5G WIRELESS COMMUNICATION APPLICATIONS	111
<i>Bharath Kashyap, Panagiotis Theofanopoulos, Aditya Shekhawat, Anuj Modi, Anand Sengar, Sanjay Kumar, Arkajyoti Chang, Tawfik Osman, Ahmed Alkhateeb, Georgios Trichopoulos, Arizona State University, United States</i>	
MO-SP.2A.3: POWER EFFICIENT RF SELF-INTERFERENCE CANCELLATION SYSTEM FOR SIMULTANEOUS TRANSMIT AND RECEIVE	113
<i>Md Nurul Anwar Tarek, Marisol Roman, Elias A. Alwan, Florida International University, United States</i>	
MO-SP.2A.4: FLEXIBLE QUASI-YAGI-UDA ANTENNA FOR 5G COMMUNICATION	115
<i>Behzad Ashrafi Nia, Franco De Flaviis, Soheil Saadat, University of California, Irvine, United States</i>	
MO-SP.2A.5: FAN-OUT WAFER-LEVEL PACKAGE MM-WAVE/SUB-THZ LWA WITH WIDE-ANGLE SCANNING CAPABILITY	117
<i>Jae-Yeong Lee, Yerim Oh, Suho Chang, Sungmin Cho, Ho-Jin Song, Wonbin Hong, Pohang University of Science and Technology, Korea (South)</i>	
MO-SP.2A.6: INNOVATIVE MM-WAVE AIP-BASED DESIGNS TO HANDSETS: AIPIA AND AIPAA	119
<i>Huan-Chu Huang, Etheta Communication Technology Co., Ltd., China</i>	
MO-SP.2A.7: IMPACT OF PHASE SHIFTER DESIGN ON BEAM SQUINTING IN PHASED ARRAY	121
<i>Ryan Ong, Salahuddin Raju, Muthusamy Kumarasamy Raja, IME/A*STAR, Singapore</i>	

MO-SP.2A.9: SURFACE EQUIVALENCE THEORY FOR 5G MIMO METASURFACE LENS ANTENNA DESIGN	123
<i>Amin Kianinejad, MEDs Technologies Pte Ltd, Singapore; Zhi Ning Chen, National University of Singapore, Singapore</i>	
MO-SP.2A.10: HIGH GAIN WAVEGUIDE TILTED SLOT ANTENNA FOR MILLIMETER WAVE APPLICATION	125
<i>Hatem O. Hanoosh, Mohamad Kamal Rahim, Noor Asniza Murad, Yaqdhah Mahmood Hussein, Universiti Teknologi Malaysia, Malaysia</i>	
 MO-A5.2A: BIOMEDICAL APPLICATIONS I	
MO-A5.2A.1: MICROWAVE PLANAR SENSOR ANTENNA FOR GLUCOSE SENSING IN AQUEOUS SOLUTIONS	127
<i>Mohammad Abdolrazzaghi, George Eleftheriades, Roman Genov, University of Toronto, Canada</i>	
MO-A5.2A.2: A REGENERATIVE RF SENSING SYSTEM FOR DETECTION OF WEAK ELECTROMAGNETIC RADIATION FROM BIOFILMS	129
<i>Menglou Rao, Kamal Sarabandi, University of Michigan, United States</i>	
MO-A5.2A.3: RESPIRATION MONITORING USING CAMERA-GUIDED FREQUENCY-MODULATED CONTINUOUS-WAVE RADAR	131
<i>Arash Shokouhmand, Negar Tavassolian, Stevens Institute of Technology, United States; Amir Avnit, Behnood Gholami, Autonomous Healthcare, Inc., United States</i>	
MO-A5.2A.4: MONITORING COVID-19 PATIENTS USING CARDIOPULMONARY STETHOSCOPE RF TECHNOLOGY	133
<i>Pratiksha Shukla, Magdy Iskander, Scott Clemens, Zhengqing Yun, University of Hawaii at Manoa, United States</i>	
MO-A5.2A.5: LOW COST IR-UWB RADAR FOR MULTISUBJECT NON-CONTACT VITAL SIGN DETECTION	135
<i>Abdel-Kareem Moadi, Marvin Joshi, Ozlem Kilic, Aly Fathy, University of Tennessee, Knoxville, United States</i>	
MO-A5.2A.6: WEARABLES FOR JOINT EFFUSION DETECTION: AN ANALYSIS FOR MAGNITUDE-/PHASE-ONLY VS. COMBINED READINGS	137
<i>Connor Jenkins, Vigyanshu Mishra, Asimina Kiourti, The Ohio State University, United States</i>	
MO-A5.2A.7: SHIFTED-BEAM ARRAY COIL FOR HIGHLY FOCAL TRANSCRANIAL MAGNETIC STIMULATION	139
<i>Fangwei Chang, George Eleftheriades, University of Toronto, Canada</i>	
MO-A5.2A.8: LANDMARK EFFECTS ON RF-INDUCED HEATING FOR PATIENTS WITH ARTIFICIAL SHOULDER AT 1.5T MRI	141
<i>Ran Guo, Jianfeng Zheng, Ji Chen, University of Houston, United States; Wolfgang Kainz, US Food and Drug Administration, United States</i>	
MO-A5.2A.9: IMPACTS OF PATIENT POSTURES ON THE RF-INDUCED HEATING FOR AN EXTERNAL FIXATION DEVICE	143
<i>Xiaolin Yang, Jianfeng Zheng, Ji Chen, University of Houston, United States; Wolfgang Kainz, US Food and Drug Administration, United States</i>	
MO-A5.2A.10: SIMPLIFIED HUMAN BODY MODELS WITH REDUCED TYPES OF TISSUES FOR MRI AT 1.5T	145
<i>Meiqi Xia, Ran Guo, Jianfeng Zheng, Ji Chen, University of Houston, United States; Devashish Shrivastava, Wolfgang Kainz, US Food and Drug Administration, United States</i>	

MO-A1.4A: MAGNETO-ELECTRIC DIPOLE AND MICROSTRIP ANTENNAS I

MO-A1.4A.1: PLANAR 40-PORT SLOT ANTENNA FOR HEALTHCARE APPLICATIONS 147
Parisa Lotfi Poshtgol, Saber Soltani, Yuhao Wu, Douglas H. Werner, Pennsylvania State University, United States; Nima Bayat-Makou, University of Toronto, Canada

MO-A1.4A.2: EFFECT OF DIAGONAL SLOT DIMENSIONS ON AXIAL RATIO AND S11 AT 26 GHZ DESIGN FREQUENCY 149
Brandon Starks, Andrew Chrysler, Idaho State University, United States

MO-A1.4A.3: DESIGN OF A PATCH ANTENNA USING MATERIALS OF CLOTHING: A STUDY UNDER SIMULATIONS 151
Eduardo Rodriguez, Edwin Jabonero, Maicol Cardenas, Cafam University Foundation, Colombia

MO-A1.4A.4: A MINIATURIZED MAGNETO-ELECTRIC DIPOLE ANTENNA FOR ARRAY APPLICATIONS 153
Utkarsh Deva, Alois Freundorfer, Queen's University, Canada; Gaozhi (George) Xiao, National Research Council of Canada, Canada; Yazan Al-Alem, Yahia Antar, Royal Military College, Canada

MO-A1.4A.5: WIDEBAND CPW-PS FEED FOR MILLIMETER WAVE MAGNETO-ELECTRIC DIPOLE ANTENNA 155
Aditya Singh, Carlos E. Saavedra, Queen's university, Canada

MO-A1.4A.6: MILLIMETER-WAVE PRGW ME DIPOLE ANTENNA WITH SURFACE MOUNTED CONICAL HORN FOR 5GB/6G 157
Mohamed Ali, Tayeb A. Denidni, Universite du Quebec, Canada; Osama M. Haraz, Assiut University, Egypt

MO-A1.4A.7: SUBSTRATE INTEGRATED COAXIAL LINE FED MAGNETO-ELECTRIC DIPOLE ANTENNA FOR 5G 159
Aditya Singh, Carlos E. Saavedra, Queen's university, Canada

MO-A1.4A.8: LOW RCS TRANSMITARRAY USING PHASE CONTROLLABLE RASORBER 161
Xuan Wang, Ronghong Jin, Shanghai Jiao Tong University, China; Peiyuan Qin, Can Ding, University of Technology Sydney, Australia

MO-A1.4A.9: DUAL-MODE BANDPASS FILTER BASED ON CIRCULAR FRACTAL PATCH RESONATOR FOR WLAN APPLICATIONS 163
Xiaoping Li, Xin Cao, Qiangming Cai, Yuyu Zhu, Yihong Qi, Jun Fan, Southwest University of Science and Technology, China

MO-A1.4A.10: DESIGN OF W-BAND MULTI-OAM-MODE ANTENNA WITH HIGH PURITY 165
Hongliang Wu, Xianling Liang, Weihao Qi, Yunfan Zhang, Junping Geng, Ronghong Jin, Shanghai Jiao Tong University, China

MO-A5.3A: RFID ANTENNAS AND SYSTEMS I

MO-A5.3A.1: RFID TAG ANALYSIS USING AN EQUIVALENT CIRCUIT 167
Pavel Nikitin, John Kim, KVS Rao, Impinj, United States

MO-A5.3A.2: A NARROWBAND HARMONIC TAG USING A MICROSTRIP RING ANTENNA 169
Cory Hilton, Neda Nourshamsi, Jeffery Nanzer, Michigan State University, United States

MO-A5.3A.3: 24GHZ RFID FOR ORIENTATION DETECTION AND TRACKING APPLICATIONS IN HUMAN ACTIVITY RECOGNITION AND MOTION CAPTURE 171
Ajibayo Adeyeye, Charles Lynch, Manos Tentzeris, Georgia Institute of Technology, United States; Jimmy Hester, Atheraxon, United States

MO-A5.3A.4: A SHARED NFC ANTENNA USING METAL FRAME OF SMARTPHONE	173
<i>Hyounghwan Roh, YoungTae Kim, Samsung Electronics, Korea (South)</i>	
MO-A5.3A.5: A MEANDER LINE UHF RFID READER ANTENNA WITH UNIFORM NEAR-FIELD DISTRIBUTION	175
<i>Rui Xu, Zhongxiang Shen, Nanyang Technological University, Singapore</i>	
MO-A5.3A.6: SMALL 3D-DIPOLE ANTENNA FOR RFID TAG MOUNTED ON A FULL CONTAINER OF WATER	177
<i>Chin-Cheng Chang, Hua-Ming Chen, Nguyen Minh Tan, National Kaohsiung University of Science and Technology, Taiwan; Chien-Hung Chen, R.O.C. Air Force Academy, Taiwan</i>	
MO-A5.3A.7: DOUBLE U-SLOTTED ANTENNA FOR RFID TAGS MOUNTABLE ON METALLIC SURFACES USING RECTANGULAR-LOOP FEED	179
<i>Ziwen Yang, Sitao Chen, Xiaolin Yang, University of Electronic Science and Technology of China, China</i>	
MO-A5.3A.8: CAPACITORS-LOADED DIPOLAR PATCH ANTENNA FOR UHF TAG MINIATURIZATION	181
<i>Shao-Ming Chiang, Eng-Hock Lim, Pei-Song Chee, Yong-Hong Lee, Universiti Tunku Abdul Rahman, Malaysia; Fwee-Leong Bong, Tunku Abdul Rahman University College, Malaysia</i>	
MO-A5.3A.9: STATISTICAL ANALYSIS OF ELECTRIC FIELD DISTRIBUTION IN METAL CABINET WITH BUILT-IN RFID ANTENNAS	183
<i>Guohong Du, Shun Tang, Yuan Zhao, Xiaofeng Sun, Chengdu University of Information Technology, China</i>	
MO-A5.3A.10: COPLANAR-FED PLANAR INVERTED-L ANTENNAS (PILAS) FOR MINIATURE ON-METAL RFID TAG DESIGN	185
<i>Jiun-Ian Tan, Yong-Hong Lee, Eng-Hock Lim, Universiti Tunku Abdul Rahman, Malaysia</i>	
 MO-A2.2A: METASURFACES I	
MO-A2.2A.1: EFFECT OF BENDING ON METASURFACE ANTENNA AND MICROSTRIP PATCH ANTENNA ARRAY	187
<i>Melad Olaimat, Youcef Chaouche, Omar Ramahi, University of Waterloo, Canada; Mohamed El Badawe, Soundskirt Inc., Canada; Mourad Nedil, University of Quebec at Abitibi-Temiscamingue (UQAT), Canada</i>	
MO-A2.2A.2: NON-UNIFORM GRATINGS THAT PRODUCE PRESELECTED ANOMALOUS REFLECTIONS	189
<i>Thorkild Hansen, Seknion Inc., United States</i>	
MO-A2.2A.3: NEW DESIGN TECHNIQUE FOR MM-WAVE REFLECTING ELECTROMAGNETIC SURFACES WITH VARYING PHASE SHIFTS	191
<i>Bilel Mnasri, Halim Boutayeb, Larbi Talbi, University of Quebec in Outaouais, Canada</i>	
MO-A2.2A.4: EFFICIENT 2-D PLANE WAVE-TO-SURFACE WAVE COUPLERS.....	193
<i>Hakjune Lee, Do-Hoon Kwon, University of Massachusetts Amherst, United States</i>	
MO-A2.2A.5: MILLIMETER-WAVE QUARTER-WAVE PLATE FOR DIFFUSION BONDED SLOT ARRAY ANTENNAS	195
<i>Mohamed Emara, Shulabh Gupta, Carleton University, Canada; Takashi Tomura, Jiro Hirokawa, Tokyo Institute of Technology, Japan</i>	
MO-A2.2A.6: ZERO THICKNESS SHEET MODEL OF DISPERSIVE & NONLINEAR METASURFACES	197
<i>João Guilherme Nizer Rahmeier, Tom Smy, Shulabh Gupta, Carleton University, Canada; Jeremy Upham, Robert W. Boyd, University of Ottawa, Canada</i>	

MO-A2.2A.7: MULTIPOLES THZ METAMATERIAL BIOSENSOR FOR LOW-DENSITY BIOMARKER DETECTION	199
<i>Milad Entezami, Seyed Ali Hosseini Farahabadi, Hadi Amarloo, Safeddin Safavi Naeini, University of Waterloo, Canada</i>	
MO-A2.2A.9: A FAST CALIBRATION METHOD FOR DIGITAL METASURFACE WITH PERIODIC PHASE MODULATION	201
<i>Gang Ni, Chong He, Junping Geng, Xianling Liang, Ronghong Jin, Shanghai Jiao Tong University, China</i>	
MO-A2.2A.10: DIMER DIELECTRIC HUYGENS' METASURFACE: REALIZING PERFECT ANOMALOUS REFLECTION AT 60 GHZ	203
<i>Abhishek Sharma, Alex M. H. Wong, City University of Hong Kong, Hong Kong SAR of China</i>	
 MO-A3.3A: INTEGRAL EQUATION METHODS I	
MO-A3.3A.1: ADAPTIVE REFINEMENT FOR SCATTERED FIELD QUANTITIES OF INTEREST FOR THE COUPLED EFIE-MFIE	205
<i>Jake Harmon, Branislav Notaros, Colorado State University, United States</i>	
MO-A3.3A.2: ON EVALUATION OF INCIDENT FIELDS FROM NEAR SOURCES IN METHOD OF MOMENTS LAYERED MEDIA SOLVERS	207
<i>Shucheng Zheng, Vladimir Okhmatovski, University of Manitoba, Canada</i>	
MO-A3.3A.3: STRATA: AN OPEN-SOURCE C++ LIBRARY FOR COMPUTING GREEN'S FUNCTIONS FOR LAYERED MEDIA	209
<i>Shashwat Sharma, Piero Triverio, University of Toronto, Canada</i>	
MO-A3.3A.4: IMPLEMENTATION OF DISCRETE EXTERIOR CALCULUS IN SOLVING THE A-PHI FORMULATION	211
<i>Boyuan Zhang, Dan Jiao, Weng Cho Chew, Purdue University, United States</i>	
MO-A3.3A.5: IMPROVING THE EFFICIENCY OF PARALLEL FFTS IN PARALLEL ELECTROMAGNETIC SOLVERS BASED ON THE AIM	213
<i>Damian Marek, Piero Triverio, University of Toronto, Canada</i>	
MO-A3.3A.6: GREEN'S FUNCTION FOR PEDAGOGICAL DEVELOPMENT II: INHOMOGENEOUS BOUNDARY CONDITIONS	215
<i>Mahmoud Alashi, Z. John Shen, Thomas Wong, Illinois Institute of Technology, United States</i>	
MO-A3.3A.7: FFT-ACCELERATED AND TUCKER-ENHANCED IMPEDANCE EXTRACTION FOR VOXELIZED STRUCTURES	217
<i>Mingyu Wang, Abdulkadir C. Yucel, Nanyang Technological University, Singapore</i>	
MO-A3.3A.8: ERROR ANALYSIS OF ISOSCELES TRIANGULAR INTERPOLATION FOR NON-UNIFORM GRID	219
<i>Wen Luo, Jinbo Liu, Zengrui Li, Communication University of China, China; Jiming Song, Iowa State University, United States</i>	
MO-A3.3A.9: A SINGULAR CANCELLATION METHOD INSPIRED BY DIFFERENTIAL GEOMETRY FOR EVALUATING NEARLY SINGULAR INTEGRALS	221
<i>Yi Zhou, Rayleigh R. Chang, Mei Song Tong, Tongji University, China</i>	
MO-A3.3A.10: AN EXPONENTIALLY CONVERGENT QUADRATURE METHOD FOR EVALUATING CONVOLUTIONAL INTEGRALS	223
<i>Li Zhang, Rayleigh R. Chang, Mei Song Tong, Tongji University, China</i>	

MO-A4.1A: PROPAGATION AND WIRELESS COMMUNICATIONS I

MO-A4.1A.1: ANALYSIS OF EMPIRICAL PROPAGATION MODELS IN SUBURBAN AREAS AT 800 MHZ AND 1.8 GHZ 225

Laercio Mendonca, Federal University of Rio Grande do Norte, Brazil; Bruno Cavalcanti, IFPB - Federal Institute of Education, Science and Technology of Paraíba, Brazil

MO-A4.1A.2: PHYSICS-INFORMED MACHINE LEARNING MODELS FOR INDOOR WI-FI ACCESS POINT PLACEMENT 227

Dongfang Cui, Guoli Yang, Shichen Ji, Shuyang Luo, Aristeidis Seretis, Costas Sarris, University of Toronto, Canada

MO-A4.1A.3: DETERMINISTIC-BASED 5G MMWAVE PROPAGATION CHARACTERIZATION IN URBAN ENVIRONMENTS 229

Leyre Azpilicueta, Fidel Alejandro Rodríguez-Corbo, Mikel Celaya-Echarri, Tecnológico de Monterrey, Mexico; Peio Lopez-Iturri, Public University of Navarre, Spain; David G. Michelson, Francisco Falcone, University of British Columbia, Canada

MO-A4.1A.4: PREDICTION OF 28 GHZ MILLIMETER-WAVE INDOOR PROPAGATION CHARACTERISTICS IN A RESIDENTIAL HOUSE 231

Sango Nagamoto, Manabu Omiya, Hokkaido University, Japan

MO-A4.1A.6: MACHINE-LEARNING-ASSISTED MODELING OF MILLIMETER-WAVE CHANNELS 233

Peize Zhang, Cheng Yi, Haiming Wang, Southeast University, China

MO-A4.1A.7: MEASUREMENTS OF 3.5 GHZ OAM MISALIGNED CHANNELS IN INDOOR CORRIDOR SCENARIOS 235

Yang Wang, Panpan Shi, Xi Liao, Tao Hu, Chongqing University of Posts and Telecommunications, China; Jiliang Zhang, Alan Tennant, University of Sheffield, United Kingdom

MO-A4.1A.8: PROJECTION-ASSISTED INDOOR ATTENUATION PARAMETER COMPRESSION BASED ON CURVE FITTING 237

Meng Gao, Xiaolong Yang, Mu Zhou, Chongqing University of Posts and Telecommunications, China

MO-A4.1A.9: A HIGH-SPEED RAILWAY CHANNEL MEASUREMENT SCHEME BASED ON 5G SIGNAL 239

Yabo Wang, Jianwen Ding, Jia Yu, Dan Fei, Beijing Jiaotong University, China; Zhiping Chen, Zhongxing Telecom Equipment, China

MO-A4.1A.10: INTERMEDIARY OBJECTIVE BASED OPTIMIZATION METHOD FOR FIELD FOCUSING THROUGH AN INHOMOGENEOUS MEDIUM 241

Shang Guo, Deshuang Zhao, University of Electronic Science and Technology of China, China

MO-A1.1P: ANTENNA THEORY II

MO-A1.1P.1: ROTATIONALLY SYMMETRIC ANTENNAS USING CHARACTERISTIC MODE ANALYSIS 243

Yongxin Chen, Xiuping Li, Beijing University of Posts and Telecommunications, China

MO-A1.1P.2: GUIDED AND LEAKY MODE RADIATION CHARACTERISTICS OF SOLID DIELECTRIC PYRAMIDAL HORN ANTENNA 245

Shreya Menon, Deepti Krishna, C. K. Aanandan, Cochin University of Science and Technology, India; Surya Pathak, Institute for Plasma Research, India

MO-A1.1P.3: LOW CROSS-POLARIZED PATCH ANTENNA WITH LOSSY MATERIAL 247

Jing-Yi Zhang, Jin-Dong Zhang, Wen Wu, Da-Gang Fang, Nanjing University of Science and Technology, China

MO-A1.1P.4: COMPACT CAVITY-BACKED MAGNETO-ELECTRIC DIPOLE ARRAY FILTENNA USING HYBRID COUPLED-RESONATORS	249
<i>Behrooz Rezaee, Hossein Sarbandi Farahani, Wolfgang Bösch, Graz University of Technology, Austria</i>	
MO-A1.1P.5: GAIN ENHANCEMENT OF PATCH ANTENNA ARRAY USING A METAMATERIAL SUPERSTRATE	251
<i>Priyanka Deb Sinha, Bratin Ghosh, Indian Institute of Technology Kharagpur, India; Deepa B. G., Defence Research and Development Laboratory, India</i>	
MO-A1.1P.6: CIRCULARLY POLARIZED ANTENNA WITH ISOFLUX PATTERN FOR SPACE IOT APPLICATIONS	253
<i>Manh Thao Nguyen, Le Huy Trinh, University of Information Technology, Viet Nam; Fabien Ferrero, Université Côte d'Azur, France</i>	
MO-A1.1P.7: PRE-PHASED PLANAR ARRAY WITH 1-BIT AMPLITUDE CONTROL FOR SINGLE-BEAM SCANNING	255
<i>Jiexi Yin, Zhi Ning Chen, National University of Singapore, Singapore</i>	
MO-A1.1P.8: CORRELATION ANALYSIS OF MIMO BASE STATION ANTENNA ARRAYS WITH DIFFERENT COLUMN SPACINGS	257
<i>Jiayue Jiang, Luyu Zhao, Xidian University, China</i>	
MO-A1.1P.9: ADVANCES IN ANTENNA DIAGNOSTIC TECHNIQUES THROUGH POST-PROCESSING OF ANTENNA MEASUREMENTS	259
<i>Fernando Rodríguez Varela, Celia Fontá Romero, Belen Galocha Iragüen, Manuel Sierra Castañer, Universidad Politécnica de Madrid, Spain; José Antonio López Pérez, Centro astronómico Yebes, Spain</i>	
MO-A1.1P.10: A NEW APPROACH TO PHASE RETRIEVAL AND ITS APPLICATION TO REFLECTOR ANTENNAS DIAGNOSTICS	261
<i>Roberta Palmeri, IREA-CNR, Napoli, Italy, Italy; Giada Maria Battaglia, Andrea Francesco Morabito, Tommaso Isernia, Università Mediterranea di Reggio Calabria, Italy</i>	
 MO-A5.1P: WIRELESS POWER TRANSMISSION II	
MO-A5.1P.1: DESIGN OF A HIGH GAIN AND MINIATURIZED INTER-DIGITAL CPW ANTENNA FOR ENERGY HARVESTING	263
<i>Mohamed Mansour, Torigoe Shota, Haruichi Kanaya, Kyushu University, Japan</i>	
MO-A5.1P.2: WIRELESS CHARGING OF GROUND-BASED SENSORS FROM A UAV-CARRIED TRANSMITTER	265
<i>David Chatzichristodoulou, RF and Microwave Solutions LTD, Cyprus; Abdul Quddious, KIOS Research and Innovation Center of Excellence, Cyprus; Loukia Vassiliou, Agricultural Research Institute, Nicosia, Cyprus; Photos Vryonides, Symeon Nikolaou, Frederick Research Center, Nicosia, Cyprus</i>	
MO-A5.1P.3: ANALYTICAL ANALYSIS AND SIMULATION OF STRUCTURES OF WIRELESS POWER TRANSFER SYSTEM	267
<i>Andrey Azarov, Igor Shirokov, Sevastopol State University, Russia</i>	
MO-A5.1P.4: WIRELESS POWER TRANSFER TO A VISUAL PROSTHESIS: 100 MW AT 6.78 MHZ	269
<i>Tom van Nunen, Rob Mestrom, Hubregt Visser, Eindhoven University of Technology, Netherlands</i>	
MO-A5.1P.5: A HOMOGENIZED MAGNETIC METASURFACE FOR MISALIGNMENT ROBUSTNESS ENHANCEMENT IN WIRELESS POWER TRANSFER	271
<i>Danilo Brizi, Agostino Monorchio, University of Pisa/CNIT, Italy; Valeria Lazzoni, University of Pisa, Italy</i>	

MO-UB.1P: ANTENNA ARRAYS

MO-UB.1P.1: BEAM STEERING RESOLUTION FOR LARGE ANTENNA ARRAY273
Xinyi Tang, Xianming Qing, N. Nasimuddin, Yijun Zhou, Bin Luo, Wenjiang Wang, Francois Chin, Institute for Infocomm Research, Singapore

MO-UB.1P.2: DIFFERENTIALLY FED LINEAR ANTENNA ARRAY WITH WIDEBAND275
COMMON-MODE ABSORPTION
Peng Zhou, Hongxin Zhao, Shunli Li, Xiaoxing Yin, Southeast University, China

MO-UB.1P.4: PROGRESSIVE PHASESHIFTER CONCEPT FOR BEAM-SCANNED277
WAVEGUIDE ARRAY
Jian Lu, Peng Khiang Tan, Theng Huat Gan, National University of Singapore, Singapore

MO-A1.2P: BROADBAND ANTENNAS II

MO-A1.2P.1: OPTIMAL PULSE TRANSMISSION CRITERION FOR ULTRA-WIDEBAND279
WIRELESS TRANSMISSION SYSTEM
Hongtai Chen, Yue Su, Haoyan Ma, Shunli Li, Hongxin Zhao, Xiaoxing Yin, Southeast University, China

MO-A1.2P.2: DESIGN OF A COMPACT INKJET-PRINTED WIDEBAND (4.89- 18 GHZ)281
ANTENNA ON A FLEXIBLE PET SUBSTRATE
Abdullah Madni, Subhan Zakir, Muhammad Awais, Wasif Tanveer Khan, Lahore University of Management Sciences (LUMS), Pakistan

MO-A1.2P.3: BEAM STEERABLE HF INVERTED V DIPOLE ANTENNA283
Rajesh Shukla, Idury Satya Krishna, Naman Baghel, Sourav Ghosh, Soumava Mukherjee, Sandeep Kumar Yadav, IIT Jodhpur, India

MO-A1.2P.4: DIFFERENTIALLY-FED TWO-ELEMENT LAMINATED RESONATOR285
ANTENNA ARRAY WITH LOW CROSS POLARIZATION AND BROAD BANDWIDTH
Yaowei Hou, Yueping Zhang, Junfa Mao, Shanghai Jiao Tong University, China

MO-A1.2P.5: BROADBAND L-SHAPED PROBE FED SUSPENDED METASURFACE287
ANTENNA
Wei E. I. Liu, Zhi Ning Chen, National University of Singapore, Singapore; Xiaotian Shi, The 54th Research Institute of China Electronic Technology Group Cooperation, China; Xianming Qing, Institute for Infocomm Research, Singapore

MO-A1.2P.6: PERFORMANCE ENHANCEMENT OF A COMPACT ARCHIMEDEAN SPIRAL289
ANTENNA FOR 2-18 GHZ
Aritra Roy, Vinoy K. J., Indian Institute of Science, India; Noham Martin, Cedric Quendo, Université de Bretagne Occidentale, France; Stéphane Mallégol, Thales DMS, France

MO-A1.2P.7: RADIATIVE PERFORMANCE OF A VIVALDI ANTENNA EQUIPPED WITH291
PETAL-SHAPED AND MASSIVE LENS
Renato Cicchetti, Valentina Cicchetti, Orlandino Testa, University of Rome, Italy; Lars Foged, Microwave Vision Italy s.r.l., Italy; Antonio Faraone, Motorola Solutions, Inc., United States

MO-A1.2P.9: A LOW-PROFILE BROADBAND NONUNIFORM METASURFACE ANTENNA293
FOR 5G TERMINAL APPLICATIONS
Long Qian, Xiaodong Chen, Queen Mary University of London, United Kingdom; HanYang Wang, Hai Zhou, Huawei Technologies (UK) CO., LTD, United Kingdom

MO-A1.2P.10: COMPACT ANTENNA FOR OPTIMIZED PLATFORM INSTALLATIONS295
Domenico Gaetano, Christian Canestri, Alessandro Calcaterra, Cosmo Mitrano, Pietro Bia, Antonio Manna, Elettronica SpA, Italy

MO-A1.3P: RECONFIGURABLE ANTENNAS AND ARRAYS II

MO-A1.3P.1: A MULTI-FUNCTIONAL POLARIZATION RECONFIGURABLE METASURFACE FOR C-BAND APPLICATIONS	297
<i>Hamza Abbas Kiani, Noshawan Shoaib, National University of Sciences and Technology, Pakistan; Abdul Quddious, University of Cyprus, Cyprus; Photos Vryonides, Symeon Nikolaou, Frederick University, Cyprus</i>	
MO-A1.3P.2: AN IC-ENABLED METASURFACE PRODUCING OAM AND PENCIL BEAMS	299
<i>Kypros M. Kossifos, Julius Georgiou, University of Cyprus, Cyprus; Marco A. Antoniadis, Ryerson University, Canada</i>	
MO-A1.3P.3: ACTIVE RX-TX ANTENNA	301
<i>Elena Shirokova, Igor Shirokov, Sevastopol State University, Russia</i>	
MO-A1.3P.4: MULTIPLE SCAN STATE USING MECHANICALLY RECONFIGURABLE PARASITE ANTENNAS	303
<i>Valentin Sokolow, Christophe Craeye, Paul Fissette, UCLouvain, Belgium</i>	
MO-A1.3P.5: PENCIL TO FLAT-TOP BEAMPATTERN TRANSFORM AND ITS APPLICATION IN GAUSSIAN ARRAY DESIGN	305
<i>Goran Molnar, Dorian Ljubenko, Ericsson Nikola Tesla, Inc., Croatia (Hrvatska)</i>	
MO-A1.3P.6: SYNTHESIS OF PENCIL BEAMS OPTIMUM IN L1-SENSE	307
<i>Katarina Vodvarka, Mladen Vucic, University of Zagreb Faculty of Electrical Engineering and Computing, Croatia (Hrvatska); Goran Molnar, Ericsson Nikola Tesla, Inc., Croatia (Hrvatska)</i>	
MO-A1.3P.7: PRINTED RADOME FOR RECONFIGURABLE ANTENNA RADIATION PATTERN IN 5G APPLICATIONS	309
<i>Thi-Hong-Lê Dam, Camille Delfaut, Tan-Phu Vuong, Grenoble INP, France; Grégory Houzet, Thierry Lacrevez, Université Savoie Mont Blanc, France; Alejandro Niembro-Martin, Schneider Electric, France; Quoc-Bao Duong, Nadège Reverdy-Bruas, Université Grenoble Alpes, France</i>	
MO-A1.3P.8: STACKED-PATCH MIMO ANTENNA FOR DUAL-PLANE BEAMSTEERING	311
<i>Abel Zandamela, Nicola Marchetti, Adam Narbudowicz, Trinity College Dublin, Ireland</i>	
MO-A1.3P.9: RECONFIGURABLE METAMATERIAL-INSPIRED PMC-PEC FOR WAVEGUIDE MINIATURISATION	313
<i>Vikrant Singh, Mohsen Khalily, Amir Jafarholi, Rahim Tafazolli, University of Surrey, United Kingdom</i>	
MO-A1.3P.10: RECONFIGURABLE ANTENNA USING LIQUID METAL VIAS	315
<i>Shaker Alkaraki, James Kelly, Queen Mary University of London, United Kingdom; Zhengpeng Wang, Beihang University, China</i>	
MO-A2.1P: METASURFACES IN BEAM STEERING AND BEAM FORMING II	
MO-A2.1P.1: LOW-LOSS AND LOW PROFILE METAMATERIAL LENS ANTENNA FOR 5G MILLIMETER WAVE	317
<i>Lifei Jia, Jinling Zhang, Beijing University of Posts and Telecommunications, China; Xiongzhi Zhu, Zhengzhou University, China; Zhanqi Zheng, Datang Mobile Equipment Co, China</i>	
MO-A2.1P.2: BIDIRECTIONAL FOLDED TRANSMITARRAY ANTENNA USING FULL-SPACE CHIRAL METASURFACES	319
<i>Weixu Yang, Ke Chen, Yijun Feng, Nanjing University, China</i>	
MO-A2.1P.3: SINGLE-LAYER PREPHASED 1-BIT METASURFACE USING TRUE-TIME DELAY FOR SYMMETRIC BEAM SUPPRESSION	321
<i>Xiaohua Long, Qi Wu, Haiming Wang, Wei Hong, Southeast University, China</i>	
MO-A2.1P.4: DESIGN OF A REFLECTIVE METASURFACE FOR NEAR-FIELD FOCUSING	323
<i>Guohong Du, Dongdong Wang, Xiaofeng Sun, Yuan Zhao, Chengdu University of Information Technology, China</i>	

MO-A2.1P.5: A COMPACT BEAMSTEERING METALENS ARRAY ANTENNA WITH CIRCULARLY POLARIZED PHASED ARRAY	325
<i>Ruolei Xu, Zhi Ning Chen, National University of Singapore, Singapore</i>	
MO-A2.1P.6: TAILORING AIRY BEAM FROM A TWO-DIMENSIONAL DYNAMIC METASURFACE	327
<i>Rui Feng, Hailin Zhang, Xidian University, China; Badreddine Ratni, Shah Nawaz Burokur, Université Paris Nanterre, France; Jianjia Yi, Xi'an Jiaotong University, China; André de Lustrac, Université Paris-Saclay, France</i>	
MO-A2.1P.7: MULTIBEAM 2D LENS ANTENNA BASED ON METASURFACE TECHNOLOGY	329
<i>Alex Davidov, Reuven Shavit, Ben-Gurion University of the Negev, Israel</i>	
MO-A2.1P.8: DESIGN, SIMULATION, AND MEASUREMENT OF MICROWAVE BEAM-GENERATING STRUCTURES WITH NEAR-ZERO-INDEX CHARACTERISTICS	331
<i>Ozgur Eris, Ozgur Ergul, Middle East Technical University, Turkey</i>	
MO-A2.1P.9: ENHANCING THE BEAM SCANNING CAPABILITY OF PHASED ARRAYS USING QUADRATIC-GRADIENT METASURFACE DOME	333
<i>Alessio Monti, Mirko Barbuto, Niccolò Cusano University, Italy; Claudio Massagrande, Milan Research Center – Huawei Technologies, Italy; Stefano Vellucci, Angelica Viola Marini, Davide Ramaccia, Alessandro Toscano, Filiberto Bilotti, Roma Tre University, Italy</i>	
MO-A2.1P.10: 2.75-BIT REFLECTING UNIT CELL DESIGN FOR RECONFIGURABLE INTELLIGENT SURFACES	335
<i>James Rains, Jalil ur Rehman Kazim, Lei Zhang, Qammer Abbasi, Muhammad Imran, University of Glasgow, United Kingdom; Anvar Tukmanov, British Telecommunications PLC, United Kingdom</i>	
 MO-SP.2P: 5G AND 6G ANTENNA SYSTEMS FOR MOBILE DEVICES: RELEVANT TECHNOLOGIES	
MO-SP.2P.1: A LIQUID CRYSTAL BEAM SCANNING ANTENNA BASED ON EVEN AND ODD MODES	337
<i>Jun Shu, Shanghai Jiao Tong University, China; Yueping Zhang, Nanyang Technological University, Singapore</i>	
MO-SP.2P.3: WIDEBAND AND WIDE BEAM-SCANNING PHASED ARRAY ANTENNA DESIGN FOR 5G APPLICATIONS	339
<i>Haoran Zhang, Atif Shamim, King Abdullah University of Science and Technology, Saudi Arabia</i>	
MO-SP.2P.6: DESIGN OF A 5G END-FIRE META-SURFACE ANTENNA ARRAY FOR MOBILE USER EQUIPMENT USING SIW TECHNOLOGY	341
<i>Sebastiaan Coenen, Gabriele Federico, Bart Smolders, University of Technology Eindhoven, Netherlands</i>	
MO-SP.2P.7: ANTENNA DESIGNS FOR MOBILE HANDSETS WITH CONSIDERATION OF 3GPP REQUIREMENTS IN FR2	343
<i>Kun Zhao, Zhinong Ying, Sony Research Center Lund, Sweden; Shuai Zhang, Gert Pedersen, Aalborg University, Denmark</i>	
MO-SP.2P.8: A WIDE-ANGLE SCANNING ARRAY USING A MULTI-MODE ANTENNA FOR MM-WAVE COMMUNICATIONS	345
<i>Gabriele Federico, Bart Smolders, Guilherme Theis, Eindhoven University of Technology, Netherlands; Diego Caratelli, The Antenna Company, Netherlands</i>	
MO-SP.2P.9: A NOVEL NON-ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING SCHEME FOR INTERFERENCE AVOIDANCE IN SM-STBC SYSTEMS.	347
<i>Fadila Berrahma, H Bousbia-Salah, National Polytechnical School, Algeria; Khalida Ghanem, Center for Development of Advanced Technologies, Algeria; Mourad Nedil, University of Quebec at Abitibi-Temiscamingue (UQAT), Canada</i>	

MO-SP.2P.10: DUAL U-SLOT PATCH ANTENNA FOR 5G APPLICATIONS 349
Chaker Saleh, Laghouat university, Algeria; Eqab Almajali, University of Sharjah, United Arab Emirates; Saqer Alja'afreh, Mutah University, Jordan; Jawad Yousaf, Abu Dhabi University, United Arab Emirates

MO-A5.2P: BIOMEDICAL APPLICATIONS II

MO-A5.2P.1: A MICROWAVE TOMOGRAPHY SYSTEM FOR ISCHEMIC STROKE BASED ON DISTORTED BORN ITERATIVE METHOD 351

Yahui Ding, Yifan Chen, Jun Hu, University of Electronic Science and Technology of China, China; Zheng Gong, University of Waikato, China

MO-A5.2P.2: A METASURFACE DESIGN FOR ENHANCING IN-BODY SIGNAL TRANSMISSION IN BIOMEDICAL MICROWAVE IMAGING 353

Elisa Giampietri, Danilo Brizi, Agostino Monorchio, University of Pisa / RaSS Laboratory CNIT, Italy; Maria Conte, Free Space SRL, Italy

MO-A5.2P.3: DESIGN OF A HOMOGENIZED MAGNETIC METASURFACE FOR THE RF MAGNETIC FIELD ENHANCEMENT IN 1.5 T MRI 355

Danilo Brizi, Agostino Monorchio, University of Pisa/CNIT, Italy; Elisa Di Napoli, University of Pisa, Italy

MO-A5.2P.4: ELECTROMAGNETICALLY CHARACTERIZED GELATINOUS-BASED PHANTOMS FOR BREAST MICROWAVE IMAGING 357

Giulia Monacelli, University of Pisa /UBT- Umbria Bioengineering Technologies, Italy; Eliana Canicatti', University of Pisa/RaSS National Laboratory CNIT, Italy; Alessandro Vispa, Lorenzo Sani, UBT- Umbria Bioengineering Technologies, Italy; Gianluigi Tiberi, London South Bank University/ UBT- Umbria Bioengineering Technologies, Italy; Agostino Monorchio, University of Pisa/RaSS National Laboratory, CNIT, Italy

MO-A5.2P.5: SAR EVALUATION FROM HIGH-INTENSITY AND BROADBAND SOURCES FOR DIFFERENT HUMAN BODY MODELS 359

Eliana Canicatti, Elisa Giampietri, Danilo Brizi, Nunzia Fontana, Agostino Monorchio, University of Pisa / RaSS National Laboratory, CNIT, Italy

MO-A5.2P.6: 3D PRINTED TORSO PHANTOM FOR UHF WIMD MEASUREMENTS 361

Melusine Pigeon, Brendan O'Flynn, John Barton, Tyndall National Institute, Ireland; Patricia O'Sullivan, MUT, Ireland

MO-A5.2P.7: FOLDED TERAHERTZ ANTENNA BASED ON MOS₂ AND GOLD FOR BIOMEDICAL IMAGING 363

Abdoalbaset Abohmra, University of glasgow, United Kingdom; Jalil Kazim, Hasan Abbas, Muhammad Imran, Qammer Abbasi, University of Glasgow, United Kingdom; Akram Alomainy, Queen Mary University of London, United Kingdom

MO-A5.2P.8: RECEIVE SIGNAL STRENGTH- BASED HUMAN ACTIVITY RECOGNITION 365

Wassila Dib, Khalida Ghanem, Center for Development of Advanced Technologies, Algeria; Amina Ababou, University of Sciences and Technologies Houari Boumediene, Algeria; Mourad Nedil, University of Quebec at Abitibi-Temiscamingue (UQAT), Canada; Björn Eskofier, Friedrich-Alexander University Erlangen-Nuernberg, Germany

MO-A5.2P.9: A FEASIBILITY STUDY OF A LOW-FREQUENCY WEARABLE DEVICE FOR CONTACTLESS MONITORING OF BLOOD GLUCOSE LEVEL 367

Sabrina Rotundo, University of Pisa, Italy; Danilo Brizi, Agostino Monorchio, University of Pisa\CNIT, Italy

MO-A5.2P.10: A LOW FREQUENCY DEVICE FOR NON-INVASIVE DETECTION OF PULMONARY MALIGNANCIES 369

Sabrina Rotundo, Danilo Brizi, Agostino Monorchio, University of Pisa, Italy

MO-A1.4P: MAGNETO-ELECTRIC DIPOLE AND MICROSTRIP ANTENNAS II

MO-A1.4P.1: A 2×2 DUAL-POLARIZED MAGNETO-ELECTRIC DIPOLE ANTENNA ARRAY AT 28 GHZ 371

Yinxue Zhao, Xiao-Wei Zhu, Wenliang Song, Southeast University, China

MO-A1.4P.2: BROADBAND DIRECT COUPLED STACKED MICROSTRIP ANTENNA FOR TVWS BAND	373
<i>Rajbala Solanki, Bindu K. K., Indian Institute of Technology Bombay, India</i>	
MO-A1.4P.3: OMNIDIRECTIONAL MULTIBEAM SUBSTRATE INTEGRATED HORN ARRAY FOR UNMANNED AERIAL VEHICLES	375
<i>Qingbi Liao, KTH Royal Institute of Technology, Sweden; Lei Wang, Heriot-Watt University, United Kingdom</i>	
MO-A1.4P.4: SMART USE OF VEHICLE'S EXISTING PLASTIC SUBSTRATES FOR GPS ANTENNA INTEGRATION IN AUTOMOTIVE APPLICATIONS	377
<i>Sally Alsayah, Fabien Ferrero, Robert Staraj, UCA CNRS LEAT, France; Ignacio Gimeno, Renault Software Labs, France</i>	
MO-A1.4P.5: COMPACT CIRCULARLY POLARIZED APERTURE FED PATCH ANTENNA FOR LEO SATELLITE CONSTELATIONS	379
<i>Amélia Ramos, Tiago Varum, João N. Matos, Instituto de Telecomunicações and Universidade de Aveiro, Portugal</i>	
 MO-A5.3P: RFID ANTENNAS AND SYSTEMS II	
MO-A5.3P.1: A CHIPLESS ULTRA-WIDEBAND RFID TAG BASED ON CYLINDRICAL DIELECTRIC RESONATOR	381
<i>Li Zhang, Meng Meng Li, Mei Song Tong, Tongji University, China</i>	
MO-A5.3P.2: A MINIATURIZED HF/UHF DUAL-BAND RFID TAG ANTENNA	383
<i>Hossein Sarbandi Farahani, Behrooz Rezaee, Michael Gadringer, Wolfgang Bösch, Graz University of Technology, Austria; Lukas Zöschner, Stefan Johannes Maier, Franz Amtmann, NXP Semiconductors Austria GmbH & Co KG, Austria</i>	
MO-A5.3P.3: DESIGN AND ANALYSIS OF PAPER-BASED ARABIC RFID LETTERS FOR IOT APPLICATIONS	385
<i>Jawad Yousaf, Mahmoud El najjar, Ahmed Amer, Abu Dhabi University, United Arab Emirates; Eqab Almajali, University of Sharjah, United Arab Emirates; Manzoor Elahi, Amir Altaf, Sungkyunkwan University, Korea (South); Saqer Alja'afreh, Mutah University, Jordan</i>	
MO-A5.3P.4: CHALLENGES IN DEVELOPMENT OF BENDED PASSIVE UHF RFID MOISTURE SENSORS ON A SPONGE CLOTH	387
<i>S M Musfequr Rahman, Zahangir Khan, Adnan Mehmood, Xiaochen Chen, Johanna Virkki, Tampere University, Finland</i>	
MO-A5.3P.5: CHIPLESS RFID TAG DETECTION WITH A SINGLE MEASUREMENT IN PRESENCE OF MULTIPATH	389
<i>Fatima Villa-Gonzalez, Ainhoa Rezola, Ailyn Estevez, Javier Díaz, Daniel Valderas, Universidad de Navarra, Spain</i>	
MO-A5.3P.6: PERFORMANCE ANALYSIS OF SINGLE-LANE MULTI-TAG VEHICLE IDENTIFICATION SCENARIOS WITH UHF RFID	391
<i>Alexander R. Unterhuber, Stoyan Iliev, Kathrein Solutions GmbH, Germany; Erwin Biebl, Technical University of Munich, Germany</i>	
MO-A5.3P.7: INTERCONNECT-FREE DRA-SAW RFID SENSING SYSTEM FOR HIGH TEMPERATURE MONITORING	393
<i>Tony Makdissy, Omar Elmazria, Sami Hage-Ali, Université de Lorraine, CNRS, IJL, France</i>	
MO-A5.3P.8: PASSIVE RFID-BASED INTELLIGENT GLOVES FOR ALTERNATIVE AND ASSISTIVE COMMUNICATION – A PRELIMINARY STUDY	395
<i>Adnan Mehmood, Zahangir Khan, Aleksii Vianto, Tiina Ihalainen, Johanna Virkki, Tampere University, Finland</i>	
MO-A5.3P.9: PLATFORM TOLERANT UHF RFID TAG DESIGN USING MULTI-RESONANT SURFACE FOR SUPPLY CHAIN VISIBILITY	397
<i>Abu bakar Sharif, Jaspreet Kaur, Hasan Abbas, Qammer Abbasi, Muhammad Ali Imran, University of Glasgow, United Kingdom; Kamran Arshad, Khaled Assaleh, Ajman University, United Arab Emirates</i>	

MO-A5.3P.10: COMPLEX-IMPEDANCE DIPOLE ANTENNAS AS RFID-ENABLED ICE MONITORS	399
<i>Mahmoud Wagih, Junjie Shi, University of Southapton, United Kingdom</i>	
 MO-A2.2P: METASURFACES II	
MO-A2.2P.1: TRANSMISSION PROPERTIES ANALYSIS OF HUYGENS' METASURFACE	401
<i>Fanglin Ren, Qun Lou, Zhi Ning Chen, National University of Singapore, Singapore</i>	
MO-A2.2P.2: DESIGN METHOD OF BROADBAND FLAT METASURFACE LENSES BY USING AN ONE-DIMENSIONAL DISTRIBUTED TRANSMISSION-LINE MODEL	405
<i>Tsutomu Nagayama, Seiji Fukushima, Toshio Watanabe, Kagoshima University, Japan</i>	
MO-A2.2P.3: TIME-MODULATION AS A VEHICLE FOR BYPASSING THE GAIN-BANDWIDTH BOUND OF SMALL LTI ANTENNAS	405
<i>Yakir Hadad, Tel-Aviv University, Israel; Amir Shlivinski, Ben-Gurion University, Israel</i>	
MO-A2.2P.4: MULTICHANNEL METAGRATING DIFFUSERS FOR BROAD-ANGLE RADAR CROSS SECTION (RCS) REDUCTION	407
<i>Yarden Yashno, Ariel Epstein, Technion - Israel Institute of Technology, Israel</i>	
MO-A2.2P.5: ARBITRARY PULSE SHAPING USING NONUNIFORM SPACETIME MODULATION	409
<i>Amir Bahrami, Christophe Caloz, Katholieke Universiteit Leuven, Belgium</i>	
MO-A2.2P.6: WAVE MANIPULATION THROUGH ADVANCED SMART SKINS FOR SHAPED BEAM SYNTHESIS	411
<i>Giacomo Oliveri, Marco Salucci, Francesco Zardi, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy</i>	
MO-A2.2P.7: COMPACT WAVEGUIDE SURFACE END-LAUNCHER SUITABLE FOR WEARABLE BODY AREA NETWORK TERMINALS	413
<i>Maria El Bacha, Fabien Ferrero, Leonardo Lizzi, Université Côte d'Azur, CNRS, LEAT, France</i>	
MO-A2.2P.9: DESIGN OF A METASURFACE FOR A CIRCULARLY POLARIZED ANTENNA BY USING CHARACTERISTIC MODE THEORY	415
<i>Simone Genovesi, University of Pisa, Italy; Francesco Alessio Dicandia, IDS Ingegneria dei Sistemi SpA, Italy</i>	
MO-A2.2P.10: COATING METASURFACES ENABLING ANTENNA FREQUENCY RECONFIGURABILITY FOR COGNITIVE RADIO SYSTEM	417
<i>Stefano Vellucci, Alessandro Toscano, Filiberto Bilotti, Roma Tre University, Italy; Alessio Monti, Mirko Barbuto, Niccolò Cusano University, Italy</i>	
 MO-A3.1P: INTEGRAL EQUATION METHODS II	
MO-A3.1P.1: RADIATED NEAR FIELD PREDICTION BASED ON EQUIVALENT SOURCE RECONSTRUCTION METHOD WITH TRUNCATED SINGULAR VALUE DECOMPOSITION	419
<i>Chang Liu, Huapeng Zhao, Jun Hu, University of Electronic Science and Technology of China, China</i>	
MO-A3.1P.2: MESH SHARING BASED FAST PARAMETER SWEEP FOR EM SIMULATION ACCELERATED BY H-MATRIX	421
<i>Yu Zhao, Song Zhang, Long Li, Xidian University, China; Fuyao Hou, Xidian Univerity, China</i>	
MO-A3.1P.3: A HYBRID SIE-PDE FORMULATION WITHOUT ADDITIONAL BOUNDARY CONDITIONS FOR ELECTROMAGNETIC ANALYSIS	423
<i>Aipeng Sun, Shunchuan Yang, Beihang University, China</i>	

MO-A3.1P.4: THE DYADIC GREEN'S FUNCTION FOR THE RECTANGULAR DIELECTRIC CAVITY	425
<i>Guizhen Lu, Meng Wang, Communication University of China, China</i>	
MO-A3.1P.5: COMBINED POTENTIAL-FIELD FORMULATION FOR DENSELY DISCRETIZED CONDUCTORS	427
<i>Gokhan Karaova, Ozgur Eris, Ozgur Ergul, Middle East Technical University, Turkey</i>	
MO-A3.1P.6: ACCELERATION OF THE SURFACE TEST INTEGRAL USING VERTEX FUNCTIONS	429
<i>Javier Rivero, Francesca Vipiana, Politecnico di Torino, Italy; Donald Wilton, University of Houston, United States; William Johnson, Consultant, United States</i>	
MO-A3.1P.7: ON THE LOW-FREQUENCY SCALING OF VECTOR POTENTIAL INTEGRAL EQUATION SOLUTIONS	431
<i>Rui Chen, Hakan Bagci, King Abdullah University of Science and Technology, Saudi Arabia</i>	
MO-A3.1P.8: LOW-FREQUENCY STABLE DISCRETIZATION OF THE ELECTRIC FIELD INTEGRAL EQUATION BASED ON POINCARÉ'S LEMMA	433
<i>Bernd Hofmann, Thomas F. Eibert, Technical University of Munich, Germany; Francesco P. Andriulli, Politecnico di Torino, Italy; Simon B. Adrian, Universität Rostock, Germany</i>	
 MO-A4.1P: PROPAGATION AND WIRELESS COMMUNICATIONS II	
MO-A4.1P.1: UAV POSITIONING BASED ON L-SHAPED ANTENNA ARRAY	435
<i>Zhi-Chao Han, Wei Nie, Mu Zhou, Chongqing University of Posts and Telecommunications, China</i>	
MO-A4.1P.2: OMNIDIRECTIONAL DIRECTION FINDING BASED ON TIME-MODULATED ARRAY	437
<i>Liu Yang, Jingfeng Chen, Han Liu, Chong He, Ronghong Jin, Shanghai Jiao Tong University, China</i>	
MO-A4.1P.3: CHANNEL CHARACTERIZATION OF HORIZONTAL BEAM SWITCHING IN URBAN OVERTAKING SCENARIO	439
<i>Shitong Cui, Yiming Fang, Xiaohan Chen, Beijing Jiaotong University, China</i>	
MO-A4.1P.4: DIRECTION FINDING FOR BPSK WITH IN-BAND INTERFERENCE BASED ON AMPLITUDE COMPARISON METHOD	441
<i>Han Liu, Jingfeng Chen, Ziheng Ding, Gang Ni, Chong He, Ronghong Jin, Shanghai Jiao Tong University, China</i>	
MO-A4.1P.5: MEASUREMENT AND ANALYSIS ON RADIO COVERAGE OF 5G BASED TRAIN WIRELESS COMMUNICATION NETWORK	443
<i>Xiaokang Zhang, Siyu Lin, Beijing Jiaotong University, China</i>	
MO-A4.1P.6: MEASUREMENT AND ANALYSIS OF 5G RADIO COVERAGE WITH INNER END DOOR ON ELECTRIC MULTIPLE UNITS	445
<i>Chengxiao Yu, Siyu Lin, Beijing Jiaotong University, China</i>	
MO-A4.1P.7: MEASUREMENT AND ANALYSIS OF RADIO COVERAGE IN TUNNEL BORING MACHINE	447
<i>Zhiwen Long, Chengxiao Yu, Xiaokang Zhang, Li Zhu, Hongwei Wang, Siyu Lin, Beijing Jiaotong University, China</i>	
MO-A4.1P.8: HORN ANTENNA MISALIGNMENTS AT 100, 300, 400, AND 500 GHZ IN CLOSE PROXIMITY COMMUNICATIONS	449
<i>Fawad Sheikh, Yamen Zantah, Nidal Zarifeh, Thomas Kaiser, University Duisburg-Essen, Germany; Muath Al-Hasan, Al Ain University, United Arab Emirates; Ismail Mabrouk, Durham University, United Kingdom</i>	

MO-A4.1P.9: EFFECT OF CIRCULAR POLARIZATION IN A UHF LP-WAN COMMUNICATION	451
<i>Lionel Tombakdjian, Fabien Ferrero, Université Côte d'Azur, France; Le Huy Trinh, University of Information Technology, Viet Nam</i>	
MO-A4.1P.10: DETERMINISTIC WIRELESS PROPAGATION MODEL ASSISTED INDOOR POSITIONING	453
<i>Conor Wilson, Xingqi Zhang, University College Dublin, Ireland; Hans-Dieter Lang, OST - Eastern Switzerland University of Applied Sciences, Switzerland; Yunbo Li, Southeast University, China; Costas Sarris, University of Toronto, Canada</i>	
MO-SP.1P.1: MAGNETIC COUPLING WPT EFFICIENCY IMPROVEMENT BY INSERTING RELAY COIL WITH OPTIMIZED LOAD IMPEDANCE	455
<i>Tamami Maruyama, Masashi Nakatsugawa, Tai Kimura, National Institute of Technology, Hakodate College, Japan</i>	
MO-SP.1P.2: ROTMAN LENS-BASED HIGH GAIN RETRODIRECTIVE BEAMFORMER FOR WIRELESS POWER TRANSFER AT KA-BAND	457
<i>Ha Young Hong, Hong Soo Park, Kanghyeok Lee, Sun Hong, Soongsil University, Korea (South)</i>	
MO-SP.1P.5: REMOTE DESTRUCTION OF THE CORONAVIRUS BY DUAL-POLARIZED WIRELESS POWER TRANSMISSION	459
<i>Konstantinos Kossenas, Maksim Kuznetsov, Symon Podilchak, University of Edinburgh, United Kingdom; Davide Comite, Sapienza University of Rome, Italy</i>	
 MO-UB.2P: MILLIMETER-WAVE AND TERAHERTZ ANTENNAS	
MO-UB.2P.1: DIGITALLY CODED METASURFACE LENS ANTENNA FOR MILLIMETER WAVE APPLICATIONS	461
<i>Priyanka Das, University Of Engineering and Management, Kolkata, India; Amit Kumar Singh, Indian Institute Of Technology Jammu, India</i>	
 TU-A1.1A: ANTENNA FEEDS AND MATCHING CIRCUITS I	
TU-A1.1A.1: A 230 GHZ ORTHOMODE TRANSDUCER WITH SIMPLE FABRICATION STEPS	463
<i>Tanner Douglas, Adib Nashashibi, Kamal Sarabandi, University of Michigan, United States</i>	
TU-A1.1A.2: DUAL-PORT STACKED ANNULAR RING MICROSTRIP PATCH ANTENNA WITH VERTICAL PINS FOR ISOLATION ENHANCEMENT	465
<i>Daniele Inserra, Guangjun Wen, University of Electronic Science and Technology of China, China</i>	
TU-A1.1A.4: BROADBAND MILLIMETER-WAVE FEED STRUCTURE FOR LOG-PERIODIC TOOTHED ANTENNA	467
<i>Hayden Banting, Carlos Saavedra, Queen's University, Canada</i>	
TU-A1.1A.5: EMBEDDED SPLIT RING RESONATOR TUNABLE NOTCH BAND FILTER IN TRANSMISSION LINES	469
<i>Farhad Farzami, Seiran Khaledian, Alex Stutts, Besma Smida, Danilo Erricolo, University of Illinois Chicago, United States</i>	
TU-A1.1A.6: TIGHTLY COUPLED DIPOLE ARRAY WITH IN-LINE GUANELLA TRANSFORMER AND BALUN	471
<i>Conrad Andrews, Dejan Filipovic, University of Colorado Boulder, United States; Riley Pack, Alan Brannon, CACI, United States</i>	

TU-A1.1A.7: MULTI-BAND ARRAY USING A MULTIPLEXED ANTENNA FEED COMPOSED OF CRLH TRANSMISSION LINE-BASED DUAL BAND ISOLATION CIRCUITS	473
<i>Jeremy Furgal, Jay Lee, Syracuse University, United States; Hanseung Lee, HRL Laboratories, United States; Jun Choi, University at Buffalo, The State University of New York, United States</i>	
TU-A1.1A.8: LOW-PROFILE FEEDING STRUCTURE FOR EXCITING METAL CASING AS AN ANTENNA	475
<i>Takumi Nishime, Hiroshi Hashiguchi, Naobumi Michishita, Hisashi Morishita, National Defense Academy, Japan</i>	
TU-A1.1A.9: A BROADBAND MULTILAYER MAGIC-T USING COUPLED MICROSTRIP-SLOTLINES FOR MONOPULSE ANTENNA SYSTEMS	477
<i>Xiang Zhao, Hongxin Zhao, Shunli Li, Xiaoxing Yin, Southeast University, China</i>	
TU-A1.1A.10: A BROADBAND HIGH-EFFICIENCY ELECTROMAGNETIC WAVE MODE EXCITATION FOR TERAHERTZ WAVEGUIDE USING TIGHTLY COUPLED STUB-LINES	479
<i>Bin Yuan, Peng Wu, Zhongjun Yu, Chinese Academy of Sciences, China</i>	
 TU-A1.2A: ELECTRICALLY SMALL ANTENNAS I	
TU-A1.2A.1: DESIGN OF AN ELECTRICALLY SMALL, LOW-PROFILE, PARASITIC ARRAY FOR WIRELESS ELECTROCARDIOGRAPH SYSTEM	481
<i>Mason Moore, John Verboom, Sungkyun Lim, Georgia Southern University, United States</i>	
TU-A1.2A.2: ON THE PERFORMANCE OF TREE-BASED ANTENNAS FOR SLF-VLF SIGNAL RECEPTION	483
<i>DaHan Liao, Frank Combs, Milton Ericson, Ryan Kerekes, Stephen Killough, Kyle Reed, Oak Ridge National Laboratory, United States</i>	
TU-A1.2A.3: AN ELECTRICALLY SMALLER ULTRA-WIDEBAND MONOPOLE ANTENNA FOR GROUND PENETRATING RADAR APPLICATION	485
<i>Mohammad Ababil Hossain, Samuel Wagner, Stephen Pancrazio, Anh-Vu Pham, University of California, Davis, United States</i>	
TU-A1.2A.4: ANTENNA MINIATURIZATION USING HIGH-PERMITTIVITY AND MAGNETO-DIELECTRIC SUBSTRATES IN VHF-UHF BANDS: A COMPARATIVE STUDY	487
<i>Milad Mirzaee, Yanghyo Kim, Stevens Institute of Technology, United States</i>	
TU-A1.2A.5: THE PERMANENT MAGNET BASED RELUCTANCE MODULATED VLF TRANSMITTER: AN EQUIVALENT CIRCUIT ANALYSIS	489
<i>Ali Hosseini-Fahraji, Majid Manteghi, Virginia Polytechnic Institute and State University, United States</i>	
TU-A1.2A.6: AUTOMATED SYNTHESIS OF NON-FOSTER IMPEDANCE MATCHING CIRCUITS	491
<i>Qianyi Li, Ting-Yen Shih, University of Idaho, United States</i>	
TU-A1.2A.7: A LOW-PROFILE THREE-PORT ANTENNA FOR COMPACT POLARIZATION AND PATTERN DIVERSITY SYSTEMS	493
<i>Jihun Choi, Fikadu Dagefu, US Army Research Lab, United States</i>	
TU-A1.2A.8: ANALYSIS OF A FRACTAL SMALL ANTENNA USING SHORTING POST AND THE SOCIAL SPIDER OPTIMIZATION ALGORITHM	495
<i>Eduardo Souza, Adaildo Assunção, Laercio Mendonca, Federal University of Rio Grande do Norte, Brazil</i>	
TU-A1.2A.9: ACOUSTICALLY DRIVEN VLF ANTENNAS WITH HIGH DATA RATES	497
<i>Shiwei Tian, Tianxiang Nan, Tsinghua University, China</i>	

TU-A1.2A.10: LOW FREQUENCY TRANSMISSION OF MECHANICAL ANTENNA ACROSS THE INTERFACE OF AIR-WATER	499
<i>Silei Yang, Junping Geng, Han Zhou, Kun Wang, Chaofan Ren, Jingzheng Lu, Weinan Gao, Da Su, Yangzhou Zhang, Jing Zhang, Xianling Liang, Ronghong Jin, Shanghai Jiao Tong University, China</i>	
 TU-A1.3A: PHASED ARRAY ANTENNAS I	
TU-A1.3A.1: ON THE GAIN LOSS OF WIDE-ANGLE SCANNING PHASED ARRAYS WITH NARROW- AND WIDE-BEAM ELEMENT PATTERNS	501
<i>Matthew Adams, Maria Pour, University of Alabama in Huntsville, United States</i>	
TU-A1.3A.2: 360° BEAM STEERING WITH CIRCULAR POLARIZATION BASED ON THE SUPERPOSITION OF CIRCULAR TEN₁ MODES	503
<i>Fatemeh Akbar, Behzad Yektakhah, University of Michigan, United States</i>	
TU-A1.3A.3: QUASI-OPTICAL BEAMFORMING USING HORIZONTAL DIELECTRIC WEDGES	505
<i>Pratik Ghate, Jonathan Bredow, University of Texas at Arlington, United States</i>	
TU-A1.3A.4: A CIRCULAR POLARIZED KU-BAND PHASED ARRAY USING A TRIANGULAR LATTICE	507
<i>Raif Farkouh, Jia Chi Chieh, Naval Information Warfare Center Pacific, United States</i>	
TU-A1.3A.5: A LOW-PROFILE TAPERED SLOT ANTENNA ARRAY WITH TWO-DECADE (20:1) BANDWIDTH	509
<i>Peter Moschetti, Roger Hasse, Joshua Gustafson, Thomas Hand, Joseph Torres, Lockheed Martin Space, United States</i>	
TU-A1.3A.6: KU-BAND DUAL LINEAR POLARIZED FLAT PANEL PHASED ARRAY ANTENNA WITH VERY LOW CROSS POLARIZATION	511
<i>Connor Laffey, Satish Sharma, San Diego State University, United States; Tim Gilmore, Dell Kronewitter, Fuse Integration Inc, United States</i>	
TU-A1.3A.7: DESIGN OF A CIRCULARLY-POLARIZED TIGHTLY-COUPLED MICROSTRIP PATCH ARRAY	513
<i>Dong-Chan Son, Aman Samaiyar, Mohamed Elmansouri, Dejan Filipovic, University of Colorado Boulder, United States</i>	
TU-A1.3A.8: DEPLOYABLE MIURA-ORI TIGHTLY COUPLED DIPOLE ARRAY FOR SMALL SATELLITES	515
<i>Maxence Carvalho, John L. Volakis, Florida International University, United States</i>	
TU-A1.3A.9: SINGLE-FEED MULTI-BEAM TRANSMITARRAY ANTENNA DESIGN USING PARALLEL PARTICLE SWARM OPTIMIZATION	517
<i>Xuankai Zhao, Bo Li, Nanjing University of Posts and Telecommunications, China; Lei Zhu, University of Macau, China</i>	
TU-A1.3A.10: ANALYSIS OF OPTIMIZED SUBARRAY CONFIGURATION FOR CROSS POLARIZATION REDUCTION FOR PHASED ARRAY ANTENNAS USED IN WEATHER RADAR	519
<i>Steffy Benny, Swaroop Sahoo, Indian Institute of Technology Palakkad, India</i>	
 TU-A5.1A: ULTRA-WIDEBAND ANTENNAS AND SYSTEMS I	
TU-A5.1A.1: SYNTHETIC ULTRA-WIDEBAND PHASED-ARRAY TRANSCEIVER FOR MILLIMETER-WAVE IMAGING APPLICATIONS WITH ON-CHIP ANTENNAS	521
<i>Amir Mirbeik-Sabzevari, Negar Tavassolian, Stevens Institute of Technology, United States; Laleh Najafizadeh, Rutgers University, United States</i>	

TU-A5.1A.2: ULTRA-WIDEBAND RF SELF INTERFERENCE CANCELLATION FILTER FOR STAR RADIOS	523
<i>Md Rakibur Rahman, Satheesh Bojja Venkatakrishnan, John Volakis, Florida International University, United States</i>	
TU-A5.1A.3: DIGITAL PRE-DISTORTION TO CORRECT UWB PULSES IN A BORESIGHT TEST	525
<i>Stephen Pancrazio, Phat Nguyen, Sam Wagner, Ababil Hossain, Anh-Vu Pham, University of California, Davis, United States</i>	
TU-A5.1A.4: UTILIZING A TUNABLE NON-FOSTER CIRCUIT FOR WIDEBAND MATCHING OF A RESISTIVELY LOADED DIPOLE ANTENNA	527
<i>Dojana Salama, Jay Lee, Syracuse University, United States; Harvey Schuman, SRC Inc, United States</i>	
TU-A5.1A.5: CHARACTERIZATION OF A HIGHLY EFFICIENT WAVEGUIDE FRONT-END DIRECT-CONVERSION RECEIVER FOR 60-GHZ WIRELESS SYSTEMS	529
<i>Mansoor Dashti Ardakani, Serioja Ovidiu Tatu, INRS University, Canada; Reza Karimian, Shahrokh Ahmadi, Mona Zaghoul, George Washington University, United States; Javad Pourahmadazar, Concordia University, Canada</i>	
TU-A5.1A.6: APPLICATION OF CHARACTERISTIC MODES ON HIGH GAIN UWB PLATFORM INTEGRATED MONOPOLE ANTENNA	531
<i>Mahrukh Khan, The College of New Jersey, United States; Anthony Caruso, University of Missouri-Kansas City, United States</i>	
TU-A5.1A.7: A COMPACT UWB ANTIPODAL VIVALDI ANTENNA WITH ENHANCED RADIATION PERFORMANCE	533
<i>Xiaogang Li, Kun Wang, Ziheng Li, Ronghong Jin, Shanghai Jiao Tong University, China</i>	
TU-A5.1A.8: EXPERIMENTAL RESEARCH ON PLANAR ULTRA-WIDEBAND MODULAR ANTENNA ARRAY	535
<i>Ling Zhu, Min Wang, Jia-Yan Xu, Wen Wu, Nanjing University of Science and Technology, China</i>	
TU-A5.1A.9: A WIDE-BAND INNER-WALL CONFORMAL ANTENNA FOR WIRELESS CAPSULE ENDOSCOPY	537
<i>Yongmin Luo, Jingchen Wang, Rui Pei, Mark Leach, Zhao Wang, Eng Gee Lim, Junliang Li, Xi'an Jiaotong-liverpool University (XJTLU), China</i>	
TU-A5.1A.10: ENHANCEMENT OF MIMO-UWB COMMUNICATIONS IN UNDERGROUND MINE ENVIRONMENTS	539
<i>Rym Labdaoui, Fatiha Youcef Ettoumi, University of Sciences and Technologies Houari Boumediene, Algeria; Khalida Ghanem, Center for Development of Advanced Technologies, Algeria; Mourad Nedil, University of Quebec at Abitibi-Temiscamingue (UQAT), Canada; Larbi Talbi, Université du Québec en Outaouais, Canada; Ismail Ben Mabrouk, Durham University, United Kingdom</i>	
 TU-A1.4A: RECONFIGURABLE ANTENNAS AND ARRAYS III	
TU-A1.4A.1: RADIATION CALCULATION OF WEDGE-SHAPED LEAKY-WAVE ANTENNA	541
<i>Zhenjiang Zhao, Tayeb Denidni, Institut National de la Recherche Scientifique, Canada</i>	
TU-A1.4A.2: 360-DEGREE BEAM STEERING ANTENNA BASED ON SUBSTRATE INTEGRATED FREQUENCY SELECTIVE STRUCTURE	543
<i>Xin Feng, Fayez Hyjazie, Wen Yao Zhai, David Wessel, Wen Tong, Huawei Technologies Canada, Canada; Halim Boutayeb, University of Quebec, Canada</i>	
TU-A1.4A.3: FULLY COLLAPSIBLE LIGHTWEIGHT DIPOLE ANTENNAS	545
<i>Austin Fikes, Oren Mizrahi, Alan Truong, Sergio Pellegrino, Ali Hajimiri, California Institute of Technology, United States; Fabian Wiesemüller, Imperial College London, United States</i>	

TU-A1.4A.4: HIGH-POWER-CAPABLE, ULTRA-WIDEBAND, 1-BIT, REFLECTARRAY	547
UNIT CELLS USING POLARIZATION-ROTATION REFLECTION MODES	
<i>Meng Gao, Mohammad Mahdi Honari, John Booske, Nader Behdad, University of Wisconsin-Madison, United States</i>	
TU-A1.4A.5: A RECONFIGURABLE METADEVICE FOR SOLVING EQUATIONS AND	549
INVERTING MATRICES AT RF FREQUENCIES	
<i>Dimitrios Tzarouchis, Brian Edwards, Nader Engheta, University of Pennsylvania, United States; Mario Junior Mencagli, University of North Carolina at Charlotte, United States</i>	
TU-A1.4A.6: VO2-BASED RECONFIGURABLE MEANDERLINE POLARIZER AT KA-BAND	551
<i>Mark Lust, Nima Ghalichechian, The Ohio State University, United States</i>	
TU-A1.4A.7: VO2 BASED ULTRA-RECONFIGURABLE KA-BAND REFLECTARRAYS FOR	553
NEXT-GENERATION COMMUNICATION AND RADAR SYSTEMS	
<i>Randy Matos, Abdul Sattar Kaddour, Stavros Georgakopoulos, Nezhil Pala, Florida International University, United States</i>	
TU-A1.4A.8: A NOVEL LIQUID-METAL ANTENNA WITH POLARIZATION AND	555
CONTINUOUS-FREQUENCY RECONFIGURABILITY	
<i>Yi Zhou, Mei Song Tong, Tongji University, China</i>	
TU-A1.4A.9: A PLANAR WIDE-ANGLE SCANNING ARRAY USING	557
PATTERN-RECONFIGURABLE ANTENNA	
<i>Theng Huat Gan, Peng Khiang Tan, Ankang Liu, Jian Lu, Sek Meng Sow, National University of Singapore, Singapore</i>	
TU-SP.1A: BEAM-STEERABLE ANTENNA SYSTEMS FOR MOBILE SATELLITE	
COMMUNICATIONS	
TU-SP.1A.1: ANTENNA ARRAY TIME-DELAY LOSS QUANTIFICATION FOR HIGH	559
SYMBOL RATE SATELLITE COMMUNICATIONS	
<i>Joshua Roper, Viasat, United States; Andrew Peterson, Georgia Institute of Technology, United States</i>	
TU-SP.1A.2: A 3-STATE BROADBAND CIRCULARLY-POLARIZED UNIT CELL	561
ENABLING STEERABLE REFLECTARRAYS FOR CUBESATS	
<i>Junbo Wang, Yahya Rahmat-Samii, University of California, Los Angeles, United States</i>	
TU-SP.1A.4: SWITCHED BEAM STEERING ANTENNA SYSTEM AT KA-BAND	563
<i>N. Nasimuddin, Yijun Zhou, Xianming Qing, Institute for Infocomm Research (ASTAR), Singapore</i>	
TU-SP.1A.5: A NOVEL WIDEBAND E-PLANE CROSSOVER AND ITS APPLICATION ON	565
MULTI-BEAM ANTENNA ARRAY	
<i>Yan Wang, Xiaohe Cheng, Yuan Yao, Jusheng Yu, Beijing University of Posts and Telecommunications, China; Xiaodong Chen, School of Electronic Engineering and Computer Science Queen Mary University of London, United Kingdom</i>	
TU-SP.1A.6: A HIGH-PERFORMANCE ABSORBENT FREQUENCY-SELECTIVE RADOME	567
UNIT FOR LOW-RCS KA-BAND TRANSMIT AND RECEIVE SATELLITE	
COMMUNICATION ANTENNAS	
<i>Zhiyu Xing, Feng Yang, Jianhua Yang, Huanhuan Peng, University of Electronic Science and Technology of China, China</i>	
TU-SP.1A.7: BROADBAND AND WIDE ANGULAR STABLE INDUCTIVE GRID-BASED	569
LINEAR TO CIRCULAR TRANSMISSION TYPE POLARIZER FOR SATELLITE	
COMMUNICATION APPLICATIONS	
<i>Mohammad Abdul Shukoor, Soumik Dey, Sukomal Dey, Indian Institute of Technology Palakkad, India</i>	
TU-SP.1A.8: A PHASE-CONTROLLED BEAM-STEERED 2x2 PATCH ANTENNA ARRAY	571
WITH A PARTIALLY REFLECTING SURFACE	
<i>Brajin Ghosh, Mahesh Singh, Indian Institute of Technology, Kharagpur, India</i>	

TU-SP.1A.9: A METAL-ONLY PARTIALLY REFLECTIVE SURFACE FOR METALLIC RESONANT-CAVITY ANTENNAS	573
<i>Foez Ahmed, Muhammad U. Afzal, Karu P. Esselle, University of Technology Sydney, Australia</i>	
TU-SP.1A.10: WIDEBAND RADIAL-LINE SLOT ARRAY ANTENNA TECHNOLOGY FOR NEAR-FIELD META-STEERING SYSTEMS	575
<i>Muhammad Usman Afzal, Dushmantha Thalakatuna, University of Technology Sydney, Australia; Karu Esselle, University Technology Sydney, Australia; Nishat Koli, Macquarie University, Australia</i>	
 TU-SP.2A: 5G AND 6G ANTENNA SYSTEMS FOR MOBILE DEVICES: INNOVATIVE APPROACHES	
TU-SP.2A.1: SUBSTRATE INTEGRATED WAVEGUIDE ANTENNA AT MILLIMETER WAVE FREQUENCY	577
<i>Yaqdhan Mahmood, Noor Asniza Murad, H. O. Hanoosh, Universiti Teknologi Malaysia, Malaysia; Mohamad Kamal A Rahim, Mohamad Kamal A Rahim, Malaysia</i>	
TU-SP.2A.3: A NOVEL DUAL-POLARIZED 5G BASE STATION FILTERING ANTENNA	579
<i>Xiaobing Gao, Yejun He, Li Zhang, Shenzhen University, China; Zhi Zeng, Mobi Antennas Technologies(Shenzhen) Co., Ltd., China</i>	
TU-SP.2A.4: A MONOLITHIC, SPHERICAL BEAMSTEERING STRATEGY BASED ON HETEROGENEOUS ANTENNA-ON-SURFACES (AOS) FOR BEYOND 5G MOBILE DEVICES	581
<i>Junho Park, Wonbin Hong, Pohang University of Science and Technology, Korea (South)</i>	
TU-SP.2A.5: A COMPACT DUAL-BAND DUAL-ANTENNA BUILDING BLOCK FOR 5G MOBILE COMMUNICATION APPLICATION	583
<i>Zi-Yu Pang, Shenzhen University, China; Guan-Long Huang, Foshan University, China; Chow-Yen-Desmond Sim, Feng Chia University, China</i>	
 TU-A5.2A: BIOMEDICAL APPLICATIONS III	
TU-A5.2A.1: TERAHERTZ IMAGING OF ENU INJECTED SPRAGUE DAWLEY RAT BREAST CANCER TUMORS	585
<i>Nagma Vohra, Magda El-Shenawee, University of Arkansas, United States; Keith Bailey, University of Illinois, United States</i>	
TU-A5.2A.2: FORK-SHAPE WIDEBAND MONOPOLES FOR MICROWAVE IMAGING	587
<i>Shengkai Gao, Elise Fear, University of Calgary, Canada</i>	
TU-A5.2A.3: A METASURFACE FOR BIOMEDICAL IMAGING APPLICATIONS	589
<i>Dawood Alsaedi, Omar Ramahi, University of Waterloo, Canada; Mohamed El Badawe, Soundskirt Inc., Canada</i>	
TU-A5.2A.4: MICROWAVE HEAD IMAGING SYSTEM FOR DETECTION OF BLOOD CLOTS INSIDE THE BRAIN	591
<i>Farhana Parveen, Parveen Wahid, University of Central Florida, United States</i>	
TU-A5.2A.5: IMPACT OF MICROWAVE PULSE CHARACTERISTICS ON THERMOACOUSTIC SIGNALS GENERATED DURING PULSED MICROWAVE ABLATION	593
<i>Audrey Evans, Chu Ma, Susan Hagness, University of Wisconsin-Madison, United States</i>	
TU-A5.2A.7: WEARABLE MAGNETOINDUCTIVE WAVEGUIDE WBANS: TOLERANCE TO LOOP FAILURES	595
<i>Vigyanshu Mishra, Asimina Kiourti, The Ohio State University, United States</i>	

TU-A5.2A.8: SELECTION OF SUITABLE INORGANIC/ORGANIC SUBSTRATE FOR IN-BODY ANTENNA IMPLANTS: IMPACT ON ANTENNA CHARACTERISTICS IN DEEP TISSUE ENVIRONMENT	597
<i>Debarati Ganguly, Yahia Antar, Royal Military College of Canada, Canada; Prapti Ganguly, AKCIT, University of Calcutta, India; Jawad Siddiqui, University of Calcutta, India; Debdeep Sarkar, Indian Institute of Science, India; Chinmoy Saha, Indian Institute of Space Science and Technology, India</i>	
TU-A5.2A.10: SAFETY METRICS INVESTIGATION OF AN ELECTRICALLY COUPLED PATCH ANTENNA FOR SUB-6 GHZ PORTABLE DEVICES SERVING 5G/6G SYSTEMS	599
<i>Abdullah Mahfouz, Assiut University, Egypt; Shoukry Shams, Concordia University, Canada; Mahmoud Elsaadany, Ghyslain Gagnon, Ecole Technologie Supérieure, Canada</i>	
 TU-A2.1A: ELECTROMAGNETIC THEORY, MATERIAL PROPERTIES AND MEASUREMENTS I	
TU-A2.1A.1: ON THE IMPORTANCE OF THE LOVE'S CONDITION FOR INVERSE EQUIVALENT-SOURCE METASURFACE DESIGN	601
<i>Mario Phaneuf, Tianke Qiu, Puyan Mojabi, University of Manitoba, Canada</i>	
TU-A2.1A.2: UNIAXIAL ANISOTROPIC METAMATERIAL RADOME FOR 79 GHZ AUTOMOTIVE RADARS	603
<i>Nima Bayat-Makou, George V. Eleftheriades, University of Toronto, Canada</i>	
TU-A2.1A.4: AN AUTOMATED EXPERIMENT FOR PARAMETRIC INVESTIGATION OF VOLTAGE STACKING BEHAVIOR	605
<i>Benjamin Bissen, Thomas Ory, Mohamed Z. M. Hamdalla, Ahmed M. Hassan, Anthony N. Caruso, University of Missouri Kansas City, United States</i>	
TU-A2.1A.5: REAL-TIME DIELECTRIC SENSING OF LIQUIDS USING WAVEGUIDE SUPERCOUPLING	607
<i>Aditya Varma Muppala, Adam Kaleo Roberts, Adib Nashashibi, Kamal Sarabandi, University of Michigan, Ann Arbor, United States</i>	
TU-A2.1A.6: CPW RESONATORS FOR DIELECTRIC CHARACTERIZATION OF SHEETS AT 77 GHZ	609
<i>Abdelhamid Nasr, Kamal Sarabandi, University of Michigan, United States</i>	
TU-A2.1A.7: A BROADBAND S/SSTDV-VNA FOR ENERGIZED CIRCUITS	611
<i>Evan Benoit, Cynthia Furse, University of Utah, United States</i>	
TU-A2.1A.8: NEW APPROACH ON GENERATING ELECTROMAGNETIC WAVES FOR TRANSCRANIAL MAGNETIC STIMULATION	613
<i>Ali Hosseini-Fahraji, Majid Manteghi, Virginia Polytechnic Institute and State University, United States</i>	
TU-A2.1A.10: DERIVING MAXWELL'S EQUATIONS FROM FIRST PRINCIPLES OF RELATIVISTIC CHARGE INVARIANCE AND SPACE-TIME RELATIONS	615
<i>Nirod Das, Tandon School of Engineering, New York University, United States</i>	
 TU-A2.2A: METASURFACE APPLICATIONS I	
TU-A2.2A.1: TOWARD AN END-TO-END METASURFACE DESIGN PROCEDURE FOR POWER PATTERN SYNTHESIS	617
<i>Max Kelly, Trevor Brown, Puyan Mojabi, University of Manitoba, Canada</i>	
TU-A2.2A.2: ROBUST MICROWAVE TRANSPORT VIA NONTRIVIAL DUALITY-BASED RHOMBIC UNIT CELLS	619
<i>Robert Davis, Daniel Sievenpiper, University of California, San Diego, United States</i>	

TU-A2.2A.3: SINGLE FEED DUAL BEAM ANTENNA USING METAMATERIAL SURFACES FOR NEAR-FIELD PHASE MANIPULATION	621
<i>Aditya Dave, Rhonda Franklin, University of Minnesota, Twin Cities, United States</i>	
TU-A2.2A.4: HIS BASED LOW-PROFILE DOUBLE-NEGATIVE METASTRUCTURE FOR MILLIMETER-WAVE APPLICATIONS	623
<i>Md Jubaer Alam, M.M. Reazul Haque Tanmoy, Saeed I. Latif, University of South Alabama, United States</i>	
TU-A2.2A.5: ANALYSIS OF ANGULAR STABILITY OF FSS BASED ON OPEN TRAPEZOIDAL RINGS GEOMETRY	625
<i>Juliete da Silva Souza, Alexandre Serres, Federal University of Campina Grande, Brazil; Alfredo Gomes Neto, Federal Institute of Paraíba, Brazil</i>	
TU-A2.2A.6: SMALL-AND LARGE-SCALE STRAIN SENSING USING FREQUENCY SELECTIVE SURFACES	627
<i>Swathi Muthyala Ramesh, Kristen Donnell, Missouri University of Science and Technology, United States</i>	
TU-A2.2A.7: C-SHAPED WAVEGUIDE FOR SPIN-DEPENDENT PROPAGATION	629
<i>Sara Kandil, Daniel Sievenpiper, University of California, San Diego, United States</i>	
TU-A2.2A.8: COMPACT FERROMAGNETIC WGM RESONATOR FOR SENSING APPLICATIONS AT SUB-CENTIMETER WAVELENGTHS	631
<i>Ala Eldin Omer, Afsaneh Hojjati-Firoozabad, Suren Gigoyan, George Shaker, Safieddin Safavi-Naeini, University of Waterloo, Canada</i>	
TU-A2.2A.9: TOWARD IMPROVED PREDICTION OF RCS REDUCTION BANDWIDTH OF CHECKERBOARD METASURFACES	633
<i>Akila Murugesan, Selvan Krishnasamy T, Sri Sivasubramaniya Nadar College of Engineering, India</i>	
TU-A2.2A.10: $\pm 45^\circ$ DUAL-POLARIZATION MULTI-BEAM METASURFACE LENS ANTENNA	635
<i>Yu Luo, Songjiang Zhao, Tianjin University, China; Zhi Ning Chen, National University of Singapore, Singapore</i>	
 TU-SP.4A: TOWARDS A UNIFIED VIEW OF COMPUTATIONAL ELECTROMAGNETICS (WITH A RETROSPECTIVE AT THE OCCASION OF PROF. HOEFER'S 80TH BIRTHDAY)	
TU-SP.4A.1: UNIFICATION OF NUMERICAL METHODS WITH THE METHOD OF WEIGHTED RESIDUALS AND MESHLESS METHOD	N/A
<i>Zhizhang David Chen, Dalhousie University, Canada; Juan Li, Fuzhou University, China</i>	
TU-SP.4A.3: UNIFIED SCATTERING MODEL FOR MODELLING ELECTRICALLY LARGE AND COMPLEX OBJECT ABOVE ROUGH SURFACE	639
<i>Chao-Fu Wang, National University of Singapore, Singapore</i>	
TU-SP.4A.4: GENERALIZED DESIGN CONSIDERATIONS OF LEAKY-WAVE ANTENNAS BASED ON MULTI-MODE RESONATOR (MMR) CONCEPT	641
<i>Dongze Zheng, Ke Wu, Polytechnique Montreal, Canada</i>	
TU-SP.4A.7: FUNDAMENTAL LEAPFROG ADI AND CDI FDTD METHODS	643
<i>Eng Leong Tan, Nanyang Technological University, Singapore</i>	
TU-SP.4A.8: UNITY AND DIVERSITY IN COMPUTATIONAL ELECTROMAGNETICS – A RETROSPECTIVE	645
<i>Wolfgang J. R. Hofer, University of Victoria, Canada</i>	

TU-A4.1A: PROPAGATION MODELING AND ANALYSIS I

TU-A4.1A.1: VECTOR PARABOLIC EQUATION MODELING OF SUB-6 GHZ 5G PROPAGATION IN TUNNELS 647

Zhenming Huang, Costas Sarris, University of Toronto, Canada; Xingqi Zhang, University College Dublin, Ireland

TU-A4.1A.2: FLAT-EARTH FINITE DIFFERENCE - GUIDED MODE MODEL FOR LONG WAVELENGTH PROPAGATION 649

Drew Overturf, Vitaliy Lomakin, University of California, San Diego, United States

TU-A4.1A.3: IONOSPHERIC EQUATORIAL PLASMA BUBBLE EFFECTS ON L1 SINGLE FREQUENCY CODE GPS POSITIONING USING PRECISE EPHEMERIDES 651

Clodoaldo Júnior, Bruno Vani, Instituto Federal de Educação, Ciência e Tecnologia de São Paulo, Brazil; Alison Moraes, Instituto de Aeronáutica e Espaço, Brazil; Emanuel Costa, Centro de Estudos em Telecomunicações, Pontifícia Universidade Católica do Rio de Janeiro, Brazil; João Monico, Universidade Estadual Paulista Julio de Mesquita Filho, Brazil

TU-A4.1A.4: INDOOR PROPAGATION LOSS MODEL FOR SIMULTANEOUS WIRELESS INFORMATION AND POWER TRANSFER BASED IN MULTICOMMODITY FLOW PROBLEMS 653

Alexandre Oliveira, Glauco Fontgalland, UFCG, Brazil; Humberto D. Andrade, UFERSA, Brazil

TU-A4.1A.5: WIDEBAND INDOOR CHANNEL CHARACTERIZATION OF MASSIVE MIMO SYSTEM AT 3.5 GHZ 655

Saif Eddine Hadji, Mourad Nedil, Mohamed Lamine Seddiki, University of Quebec at Abitibi-Temiscamingue (UQAT), Canada; Ismail Ben Mabrouk, Durham university, United Kingdom

TU-A4.1A.6: A GENERATIVE ADVERSARIAL NETWORK APPROACH FOR INDOOR PROPAGATION MODELING WITH RAY-TRACING 657

Aristeidis Seretis, Costas D. Sarris, University of Toronto, Canada; Takahiro Hashimoto, Mitsubishi Electric Co., Japan

TU-A4.1A.7: PHYSICS-INFORMED CONVOLUTIONAL NEURAL NETWORK FOR INDOOR LOCALIZATION 659

Farah Ashqar, Rakan Houry, Caroline Wood, Yi-Hsuan Yeh, Aristeidis Seretis, Costas D. Sarris, University of Toronto, Canada

TU-A4.1A.8: A SIMPLE GAUSSIAN MODEL FOR IONOSPHERIC SCINTILLATION IN SINGAPORE 661

Ding Yu Heh, Eng Leong Tan, Eng Kee Poh, Nanyang Technological University, Singapore

TU-A4.1A.9: FINITE-STATE MARKOV MODELING FOR THE NON-STATIONARY WIDEBAND VEHICULAR CHANNELS 663

Hailun Wang, Siyu Lin, Beijing Jiaotong University, China

TU-A4.1A.10: FINITE STATE MARKOV FREQUENCY DOMAIN CHANNEL MODEL FOR VEHICULAR COMMUNICATIONS 665

Jiaying Song, Chinese Institute of Electronics, China; Huimin Zhang, Siyu Lin, Beijing Jiaotong University, China

TU-SP.3A: LOW COST ANTENNA DESIGN AND ANALYSIS

TU-SP.3A.1: TECHNIQUE FOR EFFICIENCY EVALUATION OF VERTICAL MONOPOLES OVER IMPERFECT EARTH 667

Benjamin Dawson III, Hatfield & Dawson Consulting Engineers, LLC, United States

TU-SP.3A.2: HIGH GAIN ANTENNA USING DIELECTRIC SLABS AND ELECTROMAGNETIC BAND GAP FEEDING STRUCTURE 669

Yazan Al-Alem, Yahia Antar, The Royal Military College of Canada, Canada; Syed Sifat, Ahmed Kishk, Concordia University, Canada

TU-SP.3A.3: SCANNING REFLECTARRAY WITH EMBEDDED STRUCTURAL GRID FOR DEPLOYABLE APPLICATIONS	671
<i>William Moulder, Andrew Maccabe, Sungeun Jeon, Landen Bowen, Daniel Stromberg, Lincoln Laboratory, Massachusetts Institute of Technology, United States</i>	
TU-SP.3A.4: EXPERIMENTAL REALIZATION OF BESPOKE MULTI-BAND GRIN LENS USING MULTI-OBJECTIVE OPTIMIZATION	673
<i>Jingwei Xu, Eric Whiting, Sawyer Campbell, Pingjuan Werner, Douglas Werner, Pennsylvania State University, United States; Jeremy Bossard, John Barrett, Joshua Withrow, Lockheed Martin, United States</i>	
 TU-A1.1P: ANTENNA FEEDS AND MATCHING CIRCUITS II	
TU-A1.1P.1: STEP SUBSTRATE INTEGRATED WAVEGUIDE EQUALIZER BASED ON MICROWAVE DISCRETE RESISTORS FOR FEEDING NETWORK	675
<i>Hao Peng, Shunhua Huang, Yu Liu, Shaowei Hu, Tao Yang, University of Electronic Science and Technology of China, China</i>	
TU-A1.1P.2: CIRCULAR HORN ANTENNA WITH RING AND COAXIAL GROOVES FOR DUAL BAND	677
<i>Atsuki Takada, Shinichi Ito, Hiroyuki Deguchi, Mikio Tsuji, Doshisha University, Japan</i>	
TU-A1.1P.3: MM-WAVE PHASED ARRAYS CONSISTING OF GCPW FEEDING NETWORKS WITH HIS IN MOBILE TERMINALS	679
<i>Jae-Yeong Lee, Bumhyun Kim, Dongseop Lee, Wonbin Hong, Pohang University of Science and Technology, Korea (South); Jaehyun Choi, LG Innotek, Korea (South)</i>	
TU-A1.1P.4: LOW INSERTION AND LARGE DYNAMIC RANGE SUBSTRATE INTEGRATED WAVEGUIDE EQUALIZER ON CERAMIC FOR FEEDING NETWORK	681
<i>Yu Liu, Shunhua Huang, Hao Peng, Tao Yang, University of Electronic Science and Technology of China, China</i>	
TU-A1.1P.5: STABILIZING IMPEDANCE MATCHING FOR DIFFERENTIALLY FED BASE STATION ANTENNA	683
<i>JinWen Guo, Qing-Xin Chu, South China University of Technology, China</i>	
TU-A1.1P.6: A NOVEL COAXIAL BALUN FOR HIGH POWER ELECTROMAGNETIC APPLICATIONS	685
<i>Felix Vega, Adamo Banelli, Abdul Rouf Baba, Ahmed Alebri, Chaouki Kasmi, Technology Innovation Institute, United Arab Emirates</i>	
TU-A1.1P.7: A WIDEBAND STRIPLINE-TO-STRIPLINE TRANSITION FOR K/KA-BANDS	687
<i>Amélia Ramos, Tiago Varum, João N. Matos, Instituto de Telecomunicações and Universidade de Aveiro, Portugal</i>	
TU-A1.1P.8: COMPACT ANTENNA WITH ENHANCED FILTERING CAPABILITIES BY USING A NOVEL STRUCTURE	689
<i>Murat Emre Ermutlu, Efstratios Doumanis, Nokia, Finland</i>	
TU-A1.1P.9: DUAL BAND TOPSIDE WAVEGUIDE-TO-STRIPLINE TRANSITION IN MULTILAYER SUBSTRATE	691
<i>Emilio Arnieri, Francesco Greco, Luigi Boccia, Carmine Mustacchio, Giandomenico Amendola, University of Calabria, Italy</i>	
TU-A1.1P.10: A WIDEBAND MINIATURIZED 3 DB HYBRID COUPLER FOR PASSIVE BEAM SWITCHING APPLICATION	693
<i>Jalil Ur Rehman Kazim, Hassan Abbas, Masood Ur Rehman, Muhammad Ali Imran, Qammer H Abbasi, University of Glasgow, United Kingdom</i>	

TU-A1.2P: ELECTRICALLY SMALL ANTENNAS II

TU-A1.2P.1: A COMPACT WIDEBAND FLEXIBLE CIRCULARLY POLARIZED 695 IMPLANTABLE ANTENNA FOR BIOTELEMETRY APPLICATIONS

Sarosh Ahmad, Government College University, Faisalabad, Pakistan; Asma Khabba, Cadi Ayyad University Marrakesh, Morocco; Adnan Ghaffar, Xue Jun Li, Auckland University of Technology Auckland, New Zealand

TU-A1.2P.2: A HIGHLY MINIATURIZED 3D ANTENNA IN PACKAGE FOR UHF RFID 697 APPLICATION

Zulma Lopez Reyes, Zubair Akhter, Atif Shamim, King Abdullah University of Science and Technology, Saudi Arabia

TU-A1.2P.4: A 3D DUAL-BAND ELECTRICALLY SMALL MONOPOLE ANTENNA FOR 699 INTERNET OF SEA APPLICATIONS

Hanguang Liao, Rana Muhammad Bilal, Atif Shamim, King Abdullah University of Science and Technology, Saudi Arabia

TU-A1.2P.5: CAN WE IMPROVE ON THE DIPOLE ANTENNA FOR SPACE-BASED LOW 701 FREQUENCY RADIO ASTRONOMY?

Cornelis Versteeg, Mark Bentum, Hamid Pourshaghghi, Eindhoven University of Technology, Netherlands

TU-A1.2P.6: PIFA ANTENNA FOR SMART WATCH APPLICATION IN THE 2.4GHZ BAND 703

Abdelhakim Adli, Marta Cabedo-Fabrés, Miguel Ferrando Bataller, Universitat Politècnica de València, Spain

TU-A1.2P.7: MINIATURIZED 3D MULTI-SEGMENT WIRE ANTENNA FOR 5G..... 705

Fateh Benmahmoud, Military Polytechnique School, Algeria; Smail Tedjini, Univ. Grenoble Alpes, Grenoble INP, France

TU-A1.2P.8: DUAL-BAND DUALY-POLARIZED COMPACT FOLDED-SHORTED PATCH 707 ARRAY FOR SMALL SATELLITES

Bandar Alshammari, Khalid Alrushud, Maksim Kuznetsov, Yuepei Li, Symon. K Podilchak, Institution of Digital Communication, The University of Edinburgh, United Kingdom

TU-A1.2P.9: BANDWIDTH INVESTIGATION OF UHF ANTENNA FULLY INTEGRATED 709 INTO 2U CUBESAT BODY

Adam Narbudowicz, Trinity College Dublin, Ireland; Robert Borowiec, Wrocław University of Science and Technology, Poland; Suramate Chalermwisutkul, King Mongkut's University of Technology North Bangkok, Thailand

TU-A1.2P.10: A DUAL-BAND MICROSTRIP PATCH ANTENNA FOR 5G MOBILE 711 COMMUNICATIONS

Gurkan Kalinay, Erzurum Technical University, Turkey; Fatih Kaburcuk, Sivas Cumhuriyet University, Turkey; Yiming Chen, Atef Z. Elsherbeni, Colorado School of Mines, United States; Veysel Demir, Northern Illinois University, United States

TU-A1.3P: PHASED ARRAY ANTENNAS II

TU-A1.3P.1: DUAL-POLARIZED CIRCULAR HORN ANTENNA INTEGRATED IN 713 MULTILAYER PCB

Yasushi Iitsuka, Kazuo Saitoh, Waka Manufacturing Co., Ltd., Japan

TU-A1.3P.2: A NOTCH-BAND UWB TIGHTLY COUPLED ANTENNA ARRAY 715

Xin Quan, Zhenxin Cao, Zihao Xu, Mengjiang Sun, Southeast University, China

TU-A1.3P.3: REFLECTOR BACKED DIPOLE ANTENNA ARRAY EMPLOYING SIDE 717 REFLECTORS FOR NULL DEPTH IMPROVEMENT

Jo Tamura, Hiroyuki Arai, Yokohama National University, Japan

TU-A1.3P.4: BROADBAND E-PLANE WIDE-ANGLE SCANNING PHASED ARRAY BASE 719 ON V-SHAPED STRUCTURE ABOVE CAVITY

Han Zhou, Junping Geng, Chaofan Ren, Kun Wang, Silei Yang, Jingzheng Lu, Xianling Liang, Ronghong Jin, Shanghai Jiao Tong University, China

TU-A1.3P.5: CORRECTION OF THE EXCITATION COEFFICIENTS OF KU-BAND PHASED ARRAYS WITH A ROTATABLE POLARIZATION PLANE	721
<i>Makoto Sano, Koh Hashimoto, Makoto Higaki, Kentaro Wada, Toshiba Corporation, Japan</i>	
TU-A1.3P.6: DISTRIBUTED AMPLITUDE WEIGHTING AND SYSTEM NOISE FIGURE IN ACTIVE PHASED ARRAY	723
<i>Virendra Kumar, Rahul Agrawal, Upendra Shankar Pandey, Beenamole K.S, DRDO, India; Ravi Kumar Gangwar, IIT(ISM), India</i>	
TU-A1.3P.7: WIDE-ANGLE SCANNING METASURFACE-ENHANCED ARRAY FOR NEXT-GENERATION COMMUNICATIONS	725
<i>Giacomo Oliveri, Marco Salucci, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy; Renato Lombardi, Roberto Flamini, Christian Mazzucco, Stefano Verzura, Huawei Technologies, Segrate, Italy</i>	
TU-A1.3P.8: BEAMFORMING COMPARISON OF A MULTI-MODE ARRAY WITH A DIPOLE ARRAY OF THE SAME APERTURE SIZE	727
<i>Leonardo Mörlein, Nikolai Peitzmeier, Dirk Manteuffel, Leibniz University Hannover, Germany</i>	
TU-A1.3P.9: GRADIENT METASURFACE DOME FOR PHASED ARRAYS ABLE REDUCING THE GRATING LOBES WITHIN SINGLE-SIDE SCANNING REGION	729
<i>Alessio Monti, Mirko Barbuto, Niccolò Cusano university, Italy; Davide Ramaccia, Angelica Viola Marini, Stefano Vellucci, Alessandro Toscano, Filiberto Bilotti, Roma Tre University, Italy</i>	
TU-A1.3P.10: EIRP ENHANCEMENT OF MULTI-FACET PHASED ANTENNA ARRAYS FOR FULL-AZIMUTH RADIO COVERAGE	731
<i>Stanislav Ogurtsov, Diego Caratelli, Zhe Song, The Antenna Company, Netherlands</i>	
 TU-A1.4P: ULTRA-WIDEBAND ANTENNAS AND SYSTEMS II	
TU-A1.4P.2: ULTRA WIDE BAND ANTENNA FOR TRUE WIRELESS STEREO EARPHONES	733
<i>Tae Hyun Woo, Young Joong Yoon, Yonsei University, Korea (South); Hyungrak Kim, Daelim University College, Korea (South)</i>	
TU-A1.4P.3: HIGHLY EFFICIENT ULTRA-WIDEBAND PLANAR FOLDED DIPOLE ANTENNA FOR MOBILE APPLICATIONS	735
<i>Sheng-Sen You, Shenzhen University, China; Guan-Long Huang, Foshan University, China</i>	
TU-A1.4P.4: A 3-9 GHZ UWB HIGH-GAIN CONFORMAL END-FIRE VIVALDI ANTENNA ARRAY	737
<i>Yaling Chen, Yejun He, Wenting Li, Long Zhang, Sai-Wai Wong, Shenzhen University, China; Amir Boag, Tel-Aviv University, Israel</i>	
TU-A1.4P.5: A MINIATURIZED SURPERSHAPE UWB MICROSTRIP PATCH ANTENNA DESIGN	739
<i>Ismail Shittu, Mousa Hussein, United Arab Emirates University, United Arab Emirates; Othman Al Aidaros, Carleton University, Canada</i>	
TU-A1.4P.6: UWB ANTIPODAL ANTENNA WITH PARASITIC PATCH AND ELLIPTICAL CYLINDRICAL DIELECTRIC FOR CONCEALED OBJECT DETECTION WITH MICROWAVE IMAGING	741
<i>Athul O Asok, Sukomal Dey, IIT Palakkad, India</i>	
TU-A1.4P.7: AN ULTRA-WIDEBAND AND HIGH-EFFICIENCY SINGLE-SIDEBAND TIME-MODULATOR WITH 2-BIT PHASE SHIFTER	743
<i>Ruihua Chen, Chong He, Junping Geng, Xianling Liang, Ronghong Jin, Shanghai Jiao Tong University, China</i>	

TU-A1.4P.8: MACHINE LEARNING BASED FULLY DIGITAL UWB ANTENNA FOR DIRECTION FINDING SYSTEMS	745
<i>Antonio Manna, Rosa Altilio, Marco Bartocci, Pietro Bia, Christian Canestri, Domenico Gaetano, Riccardo Ardoino, Elettronica SpA, Italy</i>	
TU-A1.4P.9: BROADBAND MMWAVE FILTERS USING DIELECTRIC WAVEGUIDE BENDS	747
<i>Christoph Baer, Ruhr University Bochum, Germany</i>	
TU-A1.4P.10: UWB SUPERSHAPED DIELECTRIC LENS FOR BEAM CONTROL	749
<i>Christian Canestri, Alessandro Calcaterra, Domenico Gaetano, Cosmo Mitrano, Pietro Bia, Antonio Manna, Elettronica S.p.A., Italy</i>	
 TU-SP.1P: RECONFIGURABLE ANTENNAS FOR COMPACT DEVICES	
TU-SP.1P.1: POP-UP CARD INSPIRED, 3D-PRINTED CORNER REFLECTOR ANTENNA—A NOVEL DEPLOYABLE ANTENNA	751
<i>Madeline Holda, Yepu Cui, Syed Abdullah Nauroze, Manos Tentzeris, Georgia Institute of Technology, United States; Peter Dahmen, Grafikdesign, Germany</i>	
TU-SP.1P.2: POLARIZATION RECONFIGURABLE CIRCULAR PATCH	753
<i>Marios Patriotis, Firas N. Ayoub, Christos G. Christodoulou, University of New Mexico, United States; Sudharman K. Jayaweera, Bluecom Systems and Consulting LLC, United States</i>	
TU-SP.1P.3: DUAL-POLARIZED END-FIRE AND \pmBROADSIDE MILLIMETER-WAVE ANTENNA ARRAY	755
<i>Ahmed Omar, Junho Park, Wonbin Hong, Pohang University of Science and Technology, Korea (South); Beakjun Seong, Jongwoo Lee, Kreemo Inc., Korea (South)</i>	
TU-SP.1P.5: A COMPACT WIDEBAND FREQUENCY RECONFIGURABLE ANTENNA FOR COGNITIVE RADIO APPLICATIONS	757
<i>Meini Wang, Min Tang, Junfa Mao, Shanghai Jiao Tong University, China</i>	
TU-SP.1P.6: DESIGN AND TESTING OF A SIW-RECONFIGURABLE ANTENNA WITH IMPROVED PERFORMANCE	759
<i>Anil Kumar Nayak, Amalendu Patnaik, IIT Roorkee, India</i>	
TU-SP.1P.7: INTEGRATED MULTI-STANDARD MIMO ANTENNAS FOR 5G N-RNA APPLICATIONS	761
<i>Rifaqat Hussain, King Fahd University of Petroleum and Minerals, Saudi Arabia; Ali Raza, UET Lahore, Faisalabad Campus, Pakistan; Muhammad Umar Khan, RIMMS, National University of Sciences and Technology (NUST), Pakistan; Mohamed Abou-Khousa, Khalifa University of Science and Technology, United Arab Emirates; Mohammad Sharawi, Polytechnique Montr'ea, Canada</i>	
TU-SP.1P.8: A MINIATURIZED RECONFIGURABLE ANTENNA USING QUANTUM GENETIC ALGORITHM OPTIMIZATION	763
<i>Rosette Bichara, Fatima Asadallah, Mariette Awad, Joseph Costantine, American University of Beirut, Lebanon</i>	
TU-SP.1P.9: COMPACT ANTENNA APPROACHING THE LOWER Q-FACTOR THEORETICAL BOUND SUITABLE FOR IOT APPLICATIONS	765
<i>Luca Santamaria, Tran Quang Khai Nguyen, Fabien Ferrero, Robert Staraj, Leonardo Lizzi, Université Côte d'Azur, CNRS, LEAT, France</i>	
TU-SP.1P.10: MULTIPORT BROADBAND 5G MIMO ANTENNA WITH VERY HIGH ISOLATION	767
<i>Aníbal Llanga-Vargas, Marta Cabedo-Fabrés, Miguel Ferrando-Bataller, Universitat Politècnica de València, Spain; Carlos Ramiro Peñafiel-Ojeda, Universidad Nacional de Chimborazo, Ecuador</i>	

TU-SP.2P: BEAM-STEERABLE ANTENNA SYSTEMS FOR COMMUNICATIONS

TU-SP.2P.1: A MODULAR MICROSTRIP PHASED-ARRAY ANTENNA FOR LOW-COST, BEAM-STEERABLE APPLICATION769

Lu Yin, Peng Yang, ZaiPing Nie, University of Electronic Science and Technology of China, China

TU-SP.2P.3: HIGH GAIN LOW PROFILE CTS ANTENNA ARRAY FOR SATCOM APPLICATIONS771

Adham Mahmoud, Michele Del Mastro, Thomas Potelon, Ronan Sauleau, Mauro Ettorre, IETR, France

TU-SP.2P.4: CONTINUOUS TRANSVERSE STUB ARRAY FED BY STRIPLINE PORTS773

Emilio Arnieri, Francesco Greco, Luigi Boccia, Giandomenico Amendola, University of Calabria, Italy

TU-SP.2P.5: GRADIENT METASURFACE DOME IMPLEMENTS A MATRIX BEAMFORMING NETWORK FOR 2D ANTENNA ARRAYS775

Luca Stefanini, Davide Ramaccia, Filiberto Bilotti, Alessandro Toscano, Roma Tre University, Italy

TU-SP.2P.7: FLAT PANEL INTERLACED SHARED APERTURE ANTENNA ARRAY FOR LEO KA-BAND HIGH THROUGHPUT SATELLITE COMMUNICATION APPLICATIONS777

Benjamin Falkner, Hengyi Zhou, Amit Mehta, Swansea University, United Kingdom; Alessandro Modigliana, Satellite Applications Catapult, United Kingdom

TU-SP.2P.8: PATCH ANTENNA ARRAY DESIGN THROUGH BOTTOM-UP AND BAYESIAN OPTIMIZATIONS779

Lida Kouhalvandi, Farzad Mir, Ladislau Matekovits, Politecnico di Torino, Italy

TU-SP.2P.9: ENHANCING WAVE PROPAGATION VIA CONTEXTUAL BEAMFORMING.....781

Jaspreet Kaur, Qammer H Abbasi, Abu Bakar Sharif, Olaoluwa Popoola, Muhammad Ali Imran, Hasan T Abbas, University of Glasgow, United Kingdom

TU-SP.3P: UNCONVENTIONAL DESIGN APPROACHES FOR LOW COST ANTENNAS

TU-SP.3P.1: A PHASE COMPENSATION TECHNIQUE FOR THE TRADEOFF DESIGN OF IRREGULAR PHASED ARRAY783

Yankai Ma, Shiwen Yang, University of Electronic Science and Technology of China, China

TU-SP.3P.2: A NOVEL METHOD FOR THE SYNTHESIS OF HIGH DIRECTIVITY WIDE-ANGLE SCANNING IRREGULAR PHASED ARRAYS785

Feng Yang, Shiwen Yang, University of Electronic Science and Technology of China, China; Chao Sun, China Electronics Technology Group Corporation, China

TU-SP.3P.3: CIRCULARLY POLARIZED RAMPART SLOTLINE TERMINATED WITH PATCH FOR LOW-COST APPLICATIONS787

Yang Cheng, Yuandan Dong, University of Electronic Science and Technology of China, China

TU-SP.3P.4: A LOW-PROFILE OMNIDIRECTIONAL ANTENNA FOR WAIC SYSTEM APPLICATION789

Xiao-Yu Ma, Sai-Wai Wong, Shenzhen University, China; Guan-Long Huang, Foshan University, China

TU-SP.3P.5: A LOW-COST COMBINATION FOR PHASED ARRAY AND ESPAR ANTENNAS791

Shambhu Nath Jha, Thales Belgium, Belgium; Francis Keshmiri, Agile Antenna Services, France; Maxime Drouguet, Christophe Craeye, Université catholique de Louvain, Belgium

TU-SP.3P.6: IRREGULARLY CLUSTERED ANTENNA ARRAY: A PROTOTYPE FOR MMW 5G BASE STATION793

Laura Resteghini, Roberto Flamini, Claudio Massagrande, Valentina Verri, Christian Mazzucco, Renato Lombardi, Huawei Technologies, Italy

TU-SP.3P.7: SHAPED ELEVATION PATTERNS FOR 5G BASE STATIONS	795
<i>Antoine Roederer, Yanki Aslan, Alex Yarovoy, Delft University of Technology, Netherlands; Jan Puskely, TU Delft, Netherlands</i>	
TU-SP.3P.8: LOW-COST ANTENNA ARCHITECTURES WITH CONTROL OF THE LOCAL ENVIRONMENT FOR 5G AND BEYOND 5G	797
<i>Daniele Pinchera, Marco Donald Migliore, University of Cassino and Southern Lazio, Italy</i>	
TU-SP.3P.9: CAPACITY-DRIVEN OPTIMIZATION OF TILED ARRAYS FOR MULTI-USER MIMO COMMUNICATION BASE STATIONS	799
<i>Nicola Anselmi, Paolo Rocca, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy; Bruno Biscontini, Alejandro Murillo Barrera, Huawei Technologies Duesseldorf GmbH, Germany</i>	
TU-SP.3P.10: IMPLANTABLE ANTENNA DESIGN USING IMPROVED GREY WOLF OPTIMIZER ALGORITHM	801
<i>Achilles Boursianis, Sotirios Goudos, Aristotle University of Thessaloniki, Greece; Maria Matthaïou, Stavros Koulouridis, University of Patras, Greece; Marco Salucci, University of Trento, Italy</i>	
TU-A5.1P: WEARABLE AND IMPLANTABLE ANTENNAS I	
TU-A5.1P.1: A VASCULATURE ANATOMY INSPIRED FLEXIBLE SLOT ANTENNA FOR CONTINUOUS NON-INVASIVE GLUCOSE MONITORING	803
<i>Jessica Hanna, Joseph Costantine, Rouwaida Kanj, Youssef Tawk, Ali Ramadan, Assaad Eid, American University of Beirut, Lebanon</i>	
TU-A5.1P.2: A TUNABLE WEARABLE BAND REJECT SENSOR FOR ENHANCED GLUCOSE MONITORING SENSITIVITY	805
<i>Moussa Bteich, Joseph Costantine, Rouwaida Kanj, Youssef Tawk, Ali Ramadan, Assaad Eid, American University of Beirut, Lebanon</i>	
TU-A5.1P.3: APPLICATION OF DIELECTRIC RESONATOR ANTENNA IN IMPLANTABLE MEDICAL DEVICES	807
<i>Sumer Singh Singhwal, Ladislau Matekovits, Politecnico di Torino, Italy; Ildiko Peter, University of Medicine, Pharmacy, Science and Technology, Romania; Binod Kumar Kanaujia, Jawaharlal Nehru University, India</i>	
TU-A5.1P.4: IMPLANTABLE ANTENNA DESIGN FOR SURFACE-WAVE BASED IN-BODY TO ON-BODY COMMUNICATIONS	809
<i>Lukas Berkelmann, Dirk Manteuffel, Leibniz University Hannover, Germany</i>	
TU-A5.1P.5: A CIRCULARLY POLARIZED PATCH ANTENNA MATCHED TO LIVER SURFACE WITH TX COUPLING MEDIUM	811
<i>Muhammad Saad Khan, Bernd Schweizer, Andreas Brensing, RheinMain University of Applied Sciences, Germany; Georg Rose, Otto Von Guericke University, Germany</i>	
TU-A5.1P.6: MINIATURIZATION OF A WIDEBAND IMPLANTABLE PEANO ANTENNA FOR MEDICAL APPLICATIONS	813
<i>Abdenasser Lamkaddem, Ahmed El Yousfi, Daniel Segovia-Vargas, Carlos III University of Madrid, Spain; Vicente González Posadas, Polytechnic University of Madrid, Spain</i>	
TU-A5.1P.7: A CONFORMAL AND WEARABLE METASURFACE FOR NON-INVASIVE SKIN INFLAMMATION MONITORING	815
<i>Danilo Brizi, Agostino Monorchio, University of Pisa/CNIT, Italy; Francesco Marino, University of Pisa, Italy</i>	
TU-A5.1P.8: FLEXIBLE ANTENNA ON POLYMER-CONDUCTIVE TEXTILE COMPOSITE FOR EPIDERMAL ELECTRONICS	817
<i>Roy B. V. B. Simorangkir, Brendan O'Flynn, Dinesh R. Gawade, John L. Buckley, Tyndall National Institute, Ireland; Tim Hannon, Paul Donovan, Robert Newberry, Sanmina Corporation, United States</i>	

TU-A5.1P.9: SCREEN PRINTING RELIABLE WEARABLE MICROSTRIP ANTENNAS ON ROUGH TEXTILE SUBSTRATES	819
<i>Mahmoud Wagih, Abiodun Komolafe, Russel Torah, Alex Weddell, University of Southapton, United Kingdom; Steve Beeby, University of Southampton, United Kingdom</i>	
TU-A5.1P.10: THE CHALLENGES IN IMPLEMENTING WEARABLE ANTENNAS FOR LARGE-SCALE HEALTH MONITORING	821
<i>Sagar Suresh Kumar, Kia Dashtipour, Qammer H Abbasi, Muhammad Ali Imran, Wasim Ahmad, University of Glasgow, United Kingdom</i>	
TU-A5.2P: MILLIMETER-WAVE ANTENNAS I	
TU-A5.2P.1: A NOVEL BROADBAND PARTIALLY REFLECTIVE SURFACE SUPERSTRATE FOR MM-WAVE PRINTED ANTENNAS	823
<i>Lamine Mohamed Abdelghani, Institut national de recherches Scienifques, Canada; Abdelhalim Chaabane, Université 8 Mai 1945 Guelma, Algeria; Hussein Attia, King Fahd University of Petroleum and Minerals, Saudi Arabia</i>	
TU-A5.2P.2: MILLIMETER WAVE WIDE-ANGLE SCANNING WAVEGUIDE SLOT FILTENNA ARRAY FOR 5G APPLICATIONS	825
<i>Rong Lu, Chao Yu, Wei Hong, Southeast University, China</i>	
TU-A5.2P.3: DESIGN OF A DUAL-BRANCH DUAL-BAND MONOPOLE BASED MIMO ANTENNA FOR 5G MM-WAVE SMARTPHONE APPLICATIONS	827
<i>Prajwal Patnaik, Chinmoy Saha, Indian Institute of Space Science and Technology, India; Jogesh Chandra Dash, Debdeep Sarkar, Indian Institute of Science, India; Yahia M. M. Antar, The Royal Military College of Canada, Canada</i>	
TU-A5.2P.4: HIGH GAIN TILTED BEAM SIW HORN ANTENNA FOR 5G MILLIMETER WAVE COMMUNICATION	829
<i>Sourav Ghosh, Naman Baghel, Satya Krishna Idury, Rajesh Shukla, Soumava Mukherjee, Indian Institute of technology Jodhpur, India</i>	
TU-A5.2P.5: A WIDEBAND SLOTTED MICROSTRIP PATCH ANTENNA FOR MM-WAVE 5G APPLICATIONS	831
<i>Ademola Mustapha, Mohamed Abou-Khousa, Khalifa University of Science and Technology, United Arab Emirates</i>	
TU-A5.2P.6: A LOW-COST SUB-TERAHERTZ CIRCULARLY POLARIZED ANTENNA FOR 6G WIRELESS COMMUNICATIONS	833
<i>Basem Aqlan, Hamsakutty Vettikalladi, King Saud University, Saudi Arabia; Mohamed Himdi, Université of Rennes 1, France</i>	
TU-A5.2P.7: CHAMBER-DECAY TIME IN A MM-WAVE REVERBERATION CHAMBER	835
<i>Anouk Hubrechen, Ad Reniers, Bart Smolders, Sander Bronckers, Eindhoven University of Technology, Netherlands</i>	
TU-A5.2P.8: DESIGN OF A COMPACT ULTRA-WIDEBAND MICROSTRIP ANTENNA FOR MILLIMETER-WAVE COMMUNICATION	837
<i>Abdul Jabbar, Jalil Ur Rehman Kazim, Muhammad Ali Imran, Qammer Hussain Abbasi, Masood Ur Rehman, University of Glasgow, United Kingdom</i>	
TU-A5.2P.9: EIGHT-PORT WIDEBAND MIMO ANTENNA FOR SUB-6 GHZ 5G BASE STATIONS	839
<i>Jaime Molins-Benlliure, Marta Cabedo-Fabrés, Eva Antonino-Daviu, Miguel Ferrando-Bataller, Universitat Politècnica de València, Spain</i>	
TU-A5.2P.10: SUBSTRATE INTEGRATED WAVEGUIDE SERIES FEED PATCH ANTENNA AT MILLIMETER WAVE FOR 5G APPLICATION	841
<i>Mohamad Kamal A Rahim, Osman Ayop, Abd Menam Azzawi, Universiti Teknologi Malaysia, Malaysia</i>	

TU-A2.1P: ELECTROMAGNETIC THEORY, MATERIAL PROPERTIES AND MEASUREMENTS II

TU-A2.1P.1: RESEARCH ON OPEN RESONATOR AT 35 GHZ FOR PLASMA DIAGNOSIS 843
Yihang Tu, En Li, Lin Qin, Yang Qiu, University of Electronic Science and Technology of China, China

TU-A2.1P.2: SCATTERING ANALYSIS OF METALLIC NANOWIRES WITH NONLOCAL RESPONSE BASED ON GNOR 845
Bingqi Liu, Li Xu, Liang Li, Siyi Yang, Shucheng Huang, Bin Li, University of Electronic Science and Technology of China, China

TU-A2.1P.3: MULTIPHYSICS ANALYSIS AND IMPLEMENTATION OF A HIGH POWER Y-JUNCTION WAVEGUIDE CIRCULATOR 847
Muhammad Atayyab Shahid, Tariq Mairaj Khan, Muhammad Waseem Khaliq, Qamar ul Hassan, Wahab Zarin, National University of Sciences and Technology, Pakistan

TU-A2.1P.4: PARTIAL ARC SAMPLING RECEIVING SCHEME FOR DEMULTIPLEXING OF ORBITAL ANGULAR MOMENTUM VORTEX BEAM 849
Yanming Zhang, Lijun Jiang, University of Hong Kong, Hong Kong SAR of China

TU-A2.1P.5: REPLACEMENT OF THE TD WAVE EQUATION BY A FIRST ORDER EQUATION WITH ALTERNATIVE FIELD CONSTITUENTS 851
Raphael Kastner, Tel-Aviv University, Israel

TU-A2.1P.6: ANTENNA'S RADAR CROSS SECTION (RCS) MEASUREMENTS 853
Habiba Oslimani, Patricia Grassin Leze, Yacine Sekhri, Malik Gaoua, Frédérique Gadot, University paris Nanterre Paris Lumières, France

TU-A2.1P.7: USING CHARACTERISTIC MODES FOR DETERMINING THE INCIDENT FIELD IN A SCATTERING PROBLEM 855
Lukas Grundmann, Dirk Manteuffel, Leibniz University Hannover, Germany

TU-A2.1P.8: A NOVEL APPROACH FOR THE CONTACTLESS ESTIMATION OF THE SURFACE IMPEDANCE 857
Sandra Rodini, Simone Genovesi, Giuliano Manara, Filippo Costa, University of Pisa, Italy

TU-A2.1P.10: BRIDGING THE MATERIALS' PERMITTIVITY TRACEABILITY GAP FOR 5G APPLICATIONS 859
Malgorzata Celuch, Marzena Olszewska-Placha, QWED Sp. z o.o., Poland; Michael Hill, Intel Corp., United States; Tomasz Karpisz, Bartłomiej Salski, Warsaw University of Technology/QWED Sp. z o.o., Poland; Say Phommakesone, Keysight Technologies, United States; Urmi Ray, The International Electronics Manufacturing Initiative, United States

TU-A2.2P: METASURFACE APPLICATIONS II

TU-A2.2P.1: PROGRAMMABLE METASURFACE-BASED DOA ESTIMATION USING ATOMIC NORM MINIMIZATION 861
Yangying Zhao, Peng Chen, Zhenxin Cao, Yu Zhang, State Key Laboratory of Millimeter Waves, Southeast University, China

TU-A2.2P.2: INVERSE DESIGN OF METASURFACE POLARIZATION CONVERTOR WITH CONTROLLABLE BANDWIDTH 863
Kai Qu, Ke Chen, Yijun Feng, Nanjing University, China

TU-A2.2P.3: GAIN ENHANCEMENT OF H-PLANE SCANNING PHASED ARRAY ANTENNA USING HUYGENS METASURFACE 865
Zi-Hao Fu, Xue-Song Yang, University of Electronic Science and Technology of China, China

TU-A2.2P.4: GAIN ENHANCEMENT OF PATCH ANTENNA USING METASURFACE LENS.....	867
<i>Huanhuan Peng, Jianhua Yang, Zhiyu Xing, Shaolong Huang, Feng Yang, University of Electronic Science and Technology of China, China</i>	
TU-A2.2P.5: A WIDE-BAND METASURFACE FOR ASYMMETRIC MICROWAVE TRANSMISSION WITH CIRCULAR POLARIZATION CONVERSION FOR SATELLITE COMMUNICATIONS	869
<i>Sahar Bibi, Noshawan Shoaib, National University of Sciences and Technology, Islamabad, Pakistan; Abdul Quddious, University of Cyprus, Cyprus; Symeon Nikolaou, Frederick Research Center, Nicosia, Cyprus</i>	
TU-A2.2P.6: SQUARE RING ELEMENT FOR TILTED BEAM RADIATION UTILIZING METASURFACES	871
<i>Mohammed Alharbi, Meshaal Alyahya, Saad Alhuwaimel, King Abdulaziz City for Science and Technology, Saudi Arabia; Saud Saeed, Prince Sattam bin Abdulaziz University, Saudi Arabia; Ibrahim Alsaif, Smart Measure Company, Saudi Arabia</i>	
TU-A2.2P.7: A SELF-FILTERING HORN ANTENNA BASED ON MULTIPOLAR ALL-DIELECTRIC METASURFACES	873
<i>Alessio Monti, Niccolò Cusano University, Italy; Andrea Alù, CUNY Advanced Science Research Center, United States; Alessandro Toscano, Filiberto Bilotti, Roma Tre University, Italy</i>	
TU-A2.2P.8: A HYBRID RFID/LOCALIZATION ANTENNA WITH HIS AND 3D-PRINTED INCLUSIONS	875
<i>Shobit Agarwal, Alessandra Costanzo, Universita di Bologna, Italy; David Chadzichristodoulou, RF and Microwave Solutions LTD, Cyprus; Abdul Quddious, University of Cyprus, Cyprus; Diego Masotti, University of Bologna, Italy; Symeon Nikolaou, Frederick University, Cyprus</i>	
TU-A2.2P.9: DESIGNING REFLECTIVE METASURFACES BY EXPLOITING COMPOSITE VORTEX THEORY	877
<i>Mirko Barbuto, Andrea Bassotti, Niccolò Cusano University, Italy; Andrea Alù, CUNY Advanced Science Research Center, United States; Filiberto Bilotti, Alessandro Toscano, Roma Tre University, Italy</i>	
TU-A2.2P.10: DESIGN OF A SLOTTED SUBSTRATE INTEGRATED WAVEGUIDE ANTENNA USING A METASURFACE	879
<i>Javier Chocarro, Iñigo Ederra, Public University of Navarre, Spain</i>	
 TU-A3.1P: COMPUTATIONAL ELECTROMAGNETICS I	
TU-A3.1P.1: NON-CONFORMAL SS-SIE FORMULATION WITHOUT TREATMENTS ON JUNCTIONS FOR COMPOSITE OBJECTS	881
<i>Zekun Zhu, Shunchuan Yang, Beihang University, China; Zhizhang (David) Chen, Fuzhou University, China</i>	
TU-A3.1P.2: ANALYSIS OF ELECTROMAGNETIC SCATTERING FROM DIELECTRIC PROBLEMS BY PMCHWT-SASF	883
<i>Ming Jiang, Zhi Rong, Jun Hu, University of Electronic Science and Technology of China, China</i>	
TU-A3.1P.3: ANALYSIS OF ELECTROMAGNETIC SCATTERING FROM COMPOSITE OBJECTS USING A MULTI-TRACE SURFACE INTEGRAL EQUATION METHOD	885
<i>Ran Zhao, Hakan Bagci, King Abdullah University of Science and Technology, Saudi Arabia; Jun Hu, University of Electronic Science and Technology, China</i>	
TU-A3.1P.4: A NFFF APPROACH USING SPHEROIDAL WAVE FUNCTIONS IN A CYLINDRICAL SCANNING GEOMETRY	887
<i>Francesca Borrelli, Amedeo Capozzoli, Claudio Curcio, Angelo Liseno, Università di Napoli Federico II, Italy</i>	
TU-A3.1P.5: EFFICIENT MODELLING OF ANTENNA MEASUREMENTS INCLUDING THE IMPACT OF THE ANECHOIC CHAMBER	889
<i>Francesco Saccardi, Maria Alberica Saporetti, Rubén Tena Sánchez, Lars Jacob Foged, MVI, Italy</i>	

TU-A3.1P.6: AN INTEGRAL-EQUATION-BASED METHOD FOR EFFICIENT AND ACCURATE SOLUTIONS OF SCATTERING PROBLEMS WITH HIGHLY NONUNIFORM DISCRETIZATIONS	891
<i>Bahram Khalichi, Vakur Behcet Erturk, Bilkent University, Turkey; Ozgur Ergul, Middle East Technical University, Turkey</i>	
TU-A3.1P.7: UNIFIED APPROACH TO CHARACTERISTIC MODES	893
<i>Miloslav Capek, Lukas Jelinek, Vit Losenicky, Czech Technical University in Prague, Czech Republic; Mats Gustafsson, Lund University, Sweden; Kurt Schab, Santa Clara University, United States</i>	
TU-A3.1P.9: WIENER-HOPF SOLUTION OF E-POLARIZED PLANE WAVE DIFFRACTION BY A DIELECTRIC SLIT IN A THICK SCREEN	895
<i>Vito Daniele, Guido Lombardi, Politecnico di Torino, Italy</i>	
TU-A3.1P.10: ANALYSIS OF ELECTROMAGNETIC SCATTERING CHARACTERISTICS OF A RESONANT TARGET	N/A
<i>Dihia Sidi Ahmed, Laetitia Thirion-Lefèvre, Régis Guinvarc'h, Giovanni Manfredi, SONDRRA / CENTRALESUPELEC, France; Graziano Cerri, Paola Russo, Università Politecnica delle Marche, Italy</i>	
 TU-A4.1P: PROPAGATION MODELING AND ANALYSIS II	
TU-A4.1P.1: MEASURED-BASED CHANNEL CAPACITY OF MULTIMODE OAM SYSTEM WITH DUAL-LOOP RECEIVER	899
<i>Xi Liao, Changwen He, School of Communication and Information Engineering Chongqing University of Posts and Telecommunications, China</i>	
TU-A4.1P.2: PERFORMANCE ANALYSIS OF DOPPLER EFFECT SUPPRESSION BY SUBCARRIER SPACING IN ULTRA-HIGH-SPEED ENVIRONMENT	901
<i>Jia Yu, Bo Ai, Dan Fei, Beijing Jiaotong University, China; Ning Wang, Zhengzhou University, China; Zhiping Chen, Zhongxing Telecom Equipment, China</i>	
TU-A4.1P.3: ANALYSIS OF FOF2 OBSERVATIONS AND PREDICTIONS OF MODIFIED IONOSPHERE MODEL IN EAST-ASIA	903
<i>Cheng Yang, Jian Wang, Tianjin University, China</i>	
TU-A4.1P.4: URBAN AND SUBURBAN BAY AREA RADIO ENVIRONMENT FOR THE UAV COMMUNICATIONS	905
<i>Mio Taniguchi, Erina Sasaki, Shoichi Kitazawa, Muroran Insitute of Technology, Japan</i>	
TU-A4.1P.5: POWER DELAY PROFILE ANALYSIS OF 28 GHZ INDOOR CHANNEL USING MASSIVE 3D-MIMO ARRAYS	907
<i>Qiongyang Guo, Yang Wang, Xi Liao, Chun Jin, Chongqing University of Posts and Telecommunications, China</i>	
TU-A4.1P.6: RECONFIGURABLE SURFACE WAVE PLATFORM USING FLUIDIC CONDUCTIVE STRUCTURES	909
<i>Zhiyuan Chu, Kai-Kit Wong, Kin-Fai Tong, University College London, United Kingdom</i>	
TU-A4.1P.7: ON PROPAGATION GRAPH MODEL FOR INDUSTRIAL UWB CHANNELS	911
<i>Ramoni Adeogun, Aalborg University, Denmark</i>	
TU-A4.1P.8: COMPARATIVE ANALYSIS IN RADAR CROSS SECTION OF LOW PROFILE AND CONVENTIONALLY SIZED UHF SATCOM ANTENNA	913
<i>Enez Furkan Cihan, Mehmet Kopar, ASELSAN Inc., Turkey; Cumali Sabah, Middle East Technical University - Northern Cyprus Campus, Turkey</i>	
TU-A4.1P.9: A STUDY OF HUMAN BODY SHADOWING AT 300 GHZ IN A SCATTERING INDOOR CORRIDOR ENVIRONMENT	915
<i>Andreas Prokscha, Fawad Sheikh, Yamen Zantah, Thomas Kaiser, University of Duisburg-Essen, Germany; Muath Al-Hasan, Al Ain University, Germany</i>	

TU-A4.1P.10: AN INVERSE SOURCE APPROACH FOR DESIGNING SMART ELECTROMAGNETIC ENVIORNMENTS	917
<i>Marco Salucci, Arianna Benoni, Mohammad Abdul Hannan, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy</i>	
 WE-A1.1A: MUTUAL COUPLING IN ANTENNA ARRAYS I	
WE-A1.1A.1: MUTUAL COUPLING REDUCTION IN DUAL DIFFERENTIAL-FED 2×1 PHASED ARRAY WITH POLARIZATION AND PATTERN DIVERSITY	919
<i>Wenyu Zhou, Jorden Labossiere, Nima Javanbakht, Shakeeb Abdullah, Rony Amaya, Carleton University, Canada</i>	
WE-A1.1A.2: HIGH ISOLATION MIMO ANTENNA USING DIELECTRICALLY LOADED PRINTED DIPOLE FOR 5G APPLICATIONS	921
<i>Jamal Zaid, Peiwei Wang, Huawei, Canada; Halim Boutayeb, Quebec University, Canada</i>	
WE-A1.1A.3: ORBITAL ANGULAR MOMENTUM BASED ISOLATION IN FULL DUPLEX SYSTEMS	923
<i>Unaiza Tariq, Hiva Shahoei, Guang Yang, Duncan Macfarlane, Southern Methodist University, United States</i>	
WE-A1.1A.4: COMMON MODE SUPPRESSION TECHNIQUE FOR DUAL-BAND ARRAY ENVIRONMENT	925
<i>Evan Wayton, Wengang Chen, Niranjan Sundararajan, JMA Wireless, United States; Jay Lee, Syracuse University, United States</i>	
WE-A1.1A.5: ARRAY ANTENNA DECOUPLING AND LOW-SIDELobe BEAMFORMING BASED ON ACTIVE ELEMENT PATTERN SYNTHESIS IN 5G APPLICATION	927
<i>Xiaohui Li, Jinling Zhang, Beijing University of Posts and Telecommunications, China; Zhanqi Zheng, Datang Mobile Equipment Co., China</i>	
WE-A1.1A.6: DECOUPLING OF HORN ANTENNAS USING METAMATERIALS	929
<i>Zengdi Bao, Yong Yang, Peng Khiang Tan, Jian Lu, National University of Singapore, Singapore</i>	
WE-A1.1A.7: DESIGN OF DUAL-BAND DECOUPLING NETWORK FOR TWO ANTENNAS	931
<i>Min Li, Hong Kong University of Science and Technology, China; Lijun Jiang, Kwan Lawrence Yeung, University of Hong Kong, China</i>	
WE-A1.1A.8: A T-SHAPED DEFECTED GROUND STRUCTURE FOR DECOUPLING CIRCULARLY POLARIZATION MICROSTRIP ANTENNA ARRAY	933
<i>Zi-Liang Li, Zi-Jian Xing, Jian-Ying Li, Northwestern Polytechnical University, China</i>	
WE-A1.1A.9: A COMPACT LARGE-SCALE ANTENNA WITH HIGH ISOLATION FOR BASE STATION APPLICATIONS	935
<i>Ting Liu, Luyu Zhao, Xidian University, China</i>	
 WE-A1.2A: ELECTRICALLY SMALL ANTENNAS III	
WE-A1.2A.1: COMPACT, SMALL, CHIP-INDUCTOR-LOADED WI-FI 6E MONOPOLE ANTENNA	937
<i>Saou-Wen Su, ASUSTek Compter Inc., Taiwan</i>	
WE-A1.2A.2: A COMPACT SERIES-FED TWO-ELEMENT DIPOLE ANTENNA	939
<i>Heesu Wang, Ikmo Park, Ajou University, Korea (South)</i>	
WE-A1.2A.3: FEASIBLE STUDY OF MACKAY II TYPE R WITH ENHANCED ROBUSTNESS ON METAL	941
<i>Keisuke Miyashita, Shigeru Makino, Kenji Itoh, Kanazawa Institute of Technology, Japan</i>	

WE-A1.2A.4: A MINIATURIZED DUAL-POLARIZED PATCH ANTENNA WITH L-SHAPED FEEDS FOR C-BAND APPLICATIONS	943
<i>Xi Gu, Qing-Xin Chu, South China University of Technology, China</i>	
WE-A1.2A.5: ULTRA-THIN UNIFORM LINEAR ARRAY OF ELECTRICALLY SMALL HUYGENS DIPOLE ANTENNAS	945
<i>Wei Lin, Richard Ziolkowski, University of Technology Sydney, Australia</i>	
WE-A1.2A.6: A COMPACT OMNIDIRECTIONAL CIRCULARLY POLARIZED ANTENNA	947
<i>Yang Xiao, Qiang Liu, Hunan University, China</i>	
WE-A1.2A.7: DEVELOPMENT OF MACKAY II TYPE M MINIATURIZED USING MULTIPLE SLITS	949
<i>Kota Hakamata, Keisuke Miyashita, Shigeru Makino, Kenji Itoh, Kanazawa Institute of Technology, Japan</i>	
WE-A1.2A.8: NEW CONCEPT FOR BAW ANTENNA INDUCED BY MAGNON-PHONON COUPLING	951
<i>Yahui Ji, Tianxiang Nan, School of Integrated Circuits, Tsinghua University, China; Yue Li, Tsinghua University, China</i>	
WE-A1.2A.9: A MINIATURIZED MONOPOLE ELEMENT PRINTED QUASI-YAGI ANTENNA USING A MEANDERED DRIVEN ELEMENT	953
<i>Amar Chaudhari, Kamla Prasan Ray, Defence Institute of Advanced Technology (DIAT), India</i>	
 WE-A1.3A: PHASED ARRAY ANTENNAS III	
WE-A1.3A.1: WIDE ANGLE ESA FED REFLECTOR ACTIVE RANGE DEMONSTRATION	955
<i>Carlos Romero, Aaron Rothlisberger, Thomas Hand, Joseph Torres, Joshua Gustafson, Mark Winebrand, Peter Moschetti, Lockheed Martin Space, United States</i>	
WE-A1.3A.2: PROXIMITY FEATURE BASED TARGET DETECTION FOR AIRBORNE RADAR WITH MISALIGNED ANTENNA ARRAY	957
<i>Rafi Ahmed, Hai Deng, Florida International University, United States</i>	
WE-A1.3A.3: RECEPTION OPTIMIZATION STRATEGIES FOR UHF MOBILE BEACONS	959
<i>Nolan Pearce, Kate Duncan, Gerald Popko, United States Military Academy, United States</i>	
WE-A1.3A.4: A COMPACT MMWAVE SIW BLASS MATRIX	961
<i>Dimitrios Lialios, Constantinos Zekios, Stavros Georgakopoulos, Florida International University, United States</i>	
WE-A1.3A.5: A PASSIVE PHASED-ARRAY ANTENNA MODULE	963
<i>Amir Raeesi, Wael Abdel-Wahab, Suren Gigoyan, Safieddin Safavi-Naeini, University of Waterloo, Canada</i>	
WE-A1.3A.6: COLLIMATION OF EXPERIMENTAL ANTENNA ARRAY USING EMBEDDED CALIBRATION LINES	965
<i>Virendra Kumar, Shreeshail ., Beenamole K.S, Upendra Shankar Pandey, Beenamole K.S, DRDO, India; Ravi Kumar Gangwar, IIT(ISM), India</i>	
WE-A1.3A.8: PERFORMANCE ANALYSIS OF FREQUENCY DIVERSE ARRAY WITH FREQUENCY OFFSET ERRORS	967
<i>Hu Tang, Yi Liao, Wen-qin Wang, University of Electronic Science and Technology of China, China</i>	
WE-A1.3A.9: SYNTHESIS OF SPARSE ARRAYS WITH A MORE EFFICIENT REWEIGHTED L1-NORM MINIMIZATION ALGORITHM	969
<i>Shaolong Huang, Feng Yang, Jianhua Yang, Zhiyu Xing, Huanhuan Peng, University of Electronic Science and Technology of China, China</i>	

WE-A1.3A.10: SYNTHESIS OF WIDE-ANGLE DIFFERENCE PATTERN WITH LOW SIDE-LOBE LEVEL ON ASYMMETRIC APERTURE OF HEMISPHERICAL CONFORMAL ARRAY ANTENNAS 971
Hong Sheng Lin, Yu Jian Cheng, Hai Ning Yang, University of Electronic Science and Technology of China, China

WE-A1.4A: WIDEBAND ANTENNAS

WE-A1.4A.1: WIDEBAND DESIGN OF A CIRCULARLY POLARIZED FABRY-PEROT CAVITY ANTENNA 973
Koushik Dutta, Raj Mittra, University of Central Florida, United States; Anirban Chatterjee, Netaji Subhash Engineering College, India

WE-A1.4A.2: A HIGH APERTURE EFFICIENCY SWITCHED-BEAM LENS-BASED SYSTEM WITH TIGHTLY-COUPLED ARRAY FEED 975
Theodore Prince, Mohamed Elmansouri, Dejan Filipovic, University of Colorado Boulder, United States

WE-A1.4A.3: A PLANAR ULTRA-WIDEBAND DUAL POLARIZED REFLECTARRAY 977
Muhammad Hamza, Constantinos L. Zekios, Stavros V. Georgakopoulos, Florida International University, United States

WE-A1.4A.4: COMPACT SLANT 45° DUAL-POLARIZED BUTLER-BASED OMNI-DIRECTIONAL MIMO ANTENNAS 979
Lin-Ping Shen, Hamid Jamali, Communication Components Antenna Inc (CCAI), Canada; Xiaoqing Wu, Soochow University, China

WE-A1.4A.5: ULTRA-WIDEBAND DUAL-POLARIZED 4X4 MIMO MULTI-BEAM RET ANTENNAS 981
Lin-Ping Shen, Hua Wang, Erik Willis, Nasrin Hojjat, Hamid Jamali, Communication Components Antenna Inc (CCAI), Canada; Xiaoqing Wu, Soochow University, China

WE-A1.4A.6: ULTRA-WIDE BAND VARIABLE LINEAR POLARIZATION ROTATOR WITH HIGH CROSS-POLARIZATION DISCRIMINATION FOR SCANNED BEAMS 983
Kwok Kee Chan, Kwok Kee Chan Holdings Inc., Canada

WE-A1.4A.7: BROADBAND DUAL-POLARIZED ANTENNA ELEMENT FOR 5G BASE STATION USING CHARACTERISTIC MODE ANALYSIS 985
Thi Anh Vu, Minh Thuy Le, Hanoi University of Science and Technology, Viet Nam; Trong Toan Do, Duc Nhat Nguyen, Vu Xuan Trung Nguyen, Thi Them Truong, Dinh Hai Truyen Hoang, Viettel Group, Viet Nam

WE-A1.4A.8: A BROADBAND DUAL-POLARIZED BASED STATION ANTENNA WITH NOTCH BAND 987
Xinwei Chen, Yuewei Zhang, Wenmei Zhang, Shanxi University, China

WE-A1.4A.9: DESIGN OF BROADBAND DUAL-POLARIZED CONFORMAL PHASED ANTENNA 989
Xun-Peng Long, Song-Zhao Zhou, Zhi-Yuan Zong, Wen Wu, Nanjing University of Science and Technology, China

WE-A1.4A.10: A COMPACT ULTRA-WIDEBAND ANTENNA AND ITS APPLICATION IN MIMO SYSTEMS 991
Hong-yu Huang, Qing-xin Chu, South China University of Technology, China

WE-A1.5A: ADAPTIVE, RECONFIGURABLE AND ACTIVE ANTENNAS

WE-A1.5A.1: GENERALIZED EIGENVALUE PROBLEM FOR SPATIALLY-DISCRETE TRAVELING-WAVE-MODULATED CIRCUIT NETWORKS 993
Cody Scarborough, Anthony Grbic, University of Michigan, United States

WE-A1.5A.3: BEAM STEERING CIRCULAR ARRAYS IN ELEVATION AND AZIMUTH PLANES FOR AUTOMOTIVE RADAR APPLICATIONS	995
<i>Connor Devitt, Jayanti Venkataraman, Rochester Institute of Technology, United States</i>	
WE-A1.5A.4: A NOVEL POLARIZATION RECONFIGURABLE ANTENNA BASED ON ELECTROCHEMICALLY-CONTROLLED LIQUID METAL	997
<i>Yi Zhou, Xiao Jia Huang, Mei Song Tong, Tongji University, China</i>	
WE-A1.5A.5: EXPERIMENTAL VERIFICATION OF HARMONIC CHARACTERISTIC ANALYSIS OF DIRECTION-FINDING SYSTEM USING MULTI-ELEMENT TIME-MODULATED ARRAYS	999
<i>Jaisy M A, Aswathi P, Deepti Das Krishna, Cochin University of Science and Technology, India</i>	
WE-A1.5A.6: ON THE PHASE AND AMPLITUDE COVERAGES OF THE PHASE MODULATION ANTENNA ARRAY	1001
<i>Qianwei Zeng, Peng Yang, Lu Yin, Hao Lin, Qiang Li, Liang Chen, Fei Zhang, Chuan Wu, Feng Yang, Shiwen Yang, University of Electronic Science and Technology of China, China</i>	
WE-A1.5A.7: BEAMFORMING EXPERIMENT OF TIME-MODULATED ARRAY USING PHASE SHIFTER	1003
<i>Kazunari Kihira, Makoto Matsuki, Toru Fukasawa, Yoshio Inasawa, Mitsubishi Electric Corporation, Japan</i>	
WE-A1.5A.8: BEAM STEERABLE LEAKY WAVE ANTENNA USING FPMS	1005
<i>Shahinshah Ali, Hammad M. Cheema, National University of Sciences and Technology, Pakistan; Farhan A. Ghaffar, Lakehead University, Canada</i>	
WE-A1.5A.10: BAND SWITCHABLE MONOPOLE ANTENNA FOR UWB, 5G AND COGNITIVE RADIO APPLICATIONS	1007
<i>Rushiraj Jawale, Awanish Kumar, G Shrikanth Reddy, Indian Institute of Technology Mandi, India</i>	
 WE-A5.1A: MIMO IMPLEMENTATIONS AND APPLICATIONS	
WE-A5.1A.1: SYSTEM SIMULATIONS FOR MIMO ANTENNA DESIGNS	1009
<i>Mehrbod Mohajer, Seyed Yahya Mortazavi, Essam Elkhoully, Chen Chen, Amazon Lab126, United States</i>	
WE-A5.1A.2: IMPLEMENTATION OF DORT TO A MIMO RADAR WITH PLANAR TRANSMIT AND RECEIVE ARRAYS	1011
<i>Zhelin Cao, Kamal Sarabandi, University of Michigan, United States</i>	
WE-A5.1A.3: EXPERIMENTAL VERIFICATION OF MAXIMIZED SNR AGAINST RCS FROM OVERREPRESENTED MIMO VIRTUAL ARRAY	1013
<i>Richard Tanski, Syracuse University, Qualcomm Inc., United States; Jay Lee, Syracuse University, United States</i>	
WE-A5.1A.4: 28 GHZ MILLIMETER-WAVE DIGITAL BEAMFORMER : DESIGN AND EXPERIMENTAL EVALUATION	1015
<i>Kefayet Ullah, Sathesh Bojja Venkatakrishnan, John L. Volakis, Florida International University, United States</i>	
WE-A5.1A.5: CONTENTION BASED MEDIUM ACCESS CONTROL PROTOCOL FOR POINT-TO-MULTIPOINT BACKHAUL NETWORKS IN THE 3.65 GHZ BAND	1017
<i>Abdellah Chehri, University of Quebec in Chicoutimi, Canada</i>	
WE-A5.1A.6: A FOUR-PORT MIMO ANTENNA WITH HIGH ISOLATION FOR SUB-6GHZ 5G COMMUNICATION	1019
<i>Wen Jie Liu, Kai Kai Guan, Mei Song Tong, Tongji University, China</i>	

WE-A5.1A.7: MULTIBAND 4-PORT DGS MIMO ANTENNA WITH DR ISOLATING ELEMENT FOR WIRELESS APPLICATIONS	1021
<i>Jayshri Kulkarni, Vishwakarma Institute of Information Technology, India; Tuan-Yung Han, National Taitung Junior College, Taiwan; Jeen-Sheen Row, National Changhua University of Education, Taiwan; Chow-Yen-Desmond Sim, Feng Chia University, Taiwan</i>	
WE-A5.1A.8: ELECTRICALLY SMALL VHF MIMO ANTENNA FOR UNDERGROUND COAL MINE APPLICATION	1023
<i>Jogesh Chandra Dash, Nagalakshmaiah Kalva, Jayanta Mukherjee, Indian Institute of Technology Bombay, India</i>	
WE-A5.1A.9: WIDEBAND MIMO ANTENNA BASED ON QUARTER-MODE SIW AND 90-DEGREE BENT PLANAR DIPOLE	1025
<i>Mahesh Kumar Busineni, Ayaz Ahmad, Jayanta Mukherjee, Indian Institute of Technology Bombay, India</i>	
WE-A5.1A.10: DESIGN OF SERIES-FED PATCH ARRAY WITH MODIFIED BINOMIAL COEFFICIENTS FOR MIMO RADAR APPLICATION	1027
<i>Jogesh Chandra Dash, Debdeep Sarkar, Indian Institute of Science, Bangalore, India; Yahia Antar, Royal Military College of Canada, Canada</i>	
 WE-SP.1A: WORKSHOP: QUANTUM TECHNOLOGY RELATED TO ELECTROMAGNETICS	
WE-SP.1A.1: MULTIMODE CORRELATED LIGHT FOR QUANTUM IMAGING	N/A
<i>Haechan An, Ali Shakouri, Mahdi Hosseini, Purdue University, United States</i>	
WE-SP.1A.7: CHARACTERISTIC MODE-BASED QUANTIZATION FOR MODELING OF LOSSLESS SCATTERING	N/A
<i>Gregory Slepian, Ilay Levie, Amir Boag, Tel-Aviv University, Israel; Dmitri Mogilevtsev, Belarus National Academy of Sciences, Belarus</i>	
 WE-SP.2A: FUTURE TECHNOLOGIES FOR BIOMEDICAL APPLICATIONS	
WE-SP.2A.1: REAL-TIME HUMAN ACTIVITY RECOGNITION SYSTEM EXPLOITING UBIQUITOUS WI-FI SIGNALS	1033
<i>Yao Ge, Kia Dashtipour, Jonathan Cooper, Muhammad Imran, Qammer Abbasi, University of Glasgow, United Kingdom; Syed Shah, Coventry University, United Kingdom</i>	
WE-SP.2A.2: DUAL-BAND MICROSTRIP PATCH ANTENNA FOR FULLY-WIRELESS SMART STENT	1035
<i>Jungang Zhang, Rupam Das, Hadi Heidari, Qammer Abbasi, John Mercer, Nosrat Mirzai, University of Glasgow, United Kingdom</i>	
WE-SP.2A.3: UHF TAGS ARRAY FOR HOLOGRAPHIC TARGET LOCALIZATION AND WIRELESS HEALTH MONITORING	1037
<i>Aline Eid, Manos Tentzeris, Georgia Institute of Technology, United States; Jiang Zhu, Luzhou Xu, Google LLC, United States; Jimmy Hester, Atheraxon/Georgia Institute of Technology, United States</i>	
WE-SP.2A.4: WEARABLE PLANAR MAGNETOINDUCTIVE WAVEGUIDE WBANS: BENDING AROUND ANATOMICAL CURVATURES	1039
<i>Vigyanshu Mishra, Asimina Kiourti, The Ohio State University, United States</i>	
WE-SP.2A.5: RF-INDUCED HEATING FOR ACTIVE IMPLANTABLE MEDICAL DEVICE WITH DUAL PARALLEL LEADS UNDER MRI	1041
<i>Wei Hu, Yu Wang, Qingyan Wang, Zahidul Islam, Ji Chen, University of Houston, United States; Jeffrey Tsang, Saluda Medical, Australia; Wolfgang Kainz, US Food and Drug Administration, United States</i>	

WE-SP.2A.6: MINIMALLY INVASIVE DEEP BRAIN STIMULATION USING INTRACRANIAL STENTS	1043
<i>Kaitlin L. Hall, Cynthia M. Furse, University of Utah, United States; David Hasan, University of Iowa, United States</i>	
WE-SP.2A.7: MINIATURIZATION OF IMPLANTABLE ANTENNA AND DISCUSSION OF CONCENTRATION OF FIELDS	1045
<i>Tara Spafford, Kaitlin L. Hall, Cynthia M. Furse, University of Utah, United States</i>	
WE-SP.2A.9: A NONCONTACT RF SENSOR WITH LOOP ANTENNAS BASED ON PT-SYMMETRY	1047
<i>Yunjing Zhang, Xingli He, Peng Li, Soochow University, China</i>	
WE-SP.2A.10: SMALL TRIPLE-BAND MEANDERED PIFA FOR BRAIN-IMPLANTABLE BIO-TELEMETRIC SYSTEMS: OPTIMIZATION OF SUBSTRATE/SUPERSTRATE EFFECTIVENESS	1049
<i>Nikta Pournoori, Lauri Sydänheimo, Leena Ukkonen, Toni Björninen, Tampere University, Finland; Yahya Rahmat-Samii, University of California, Los Angeles, United States</i>	
 WE-A5.2A: MILLIMETER-WAVE ANTENNAS II	
WE-A5.2A.1: A MILLIMETER WAVE TRI-POLARIZED PATCH ANTENNA WITH A BANDWIDTH-ENHANCING PARASITIC ELEMENT	1051
<i>Ali Alreshaid, Yepu Cui, Ryan Bahr, Manos Tentzeris, Georgia Institute of Technology, United States; Mohammad Sharawi, University of Montréal, Canada</i>	
WE-A5.2A.2: DUAL-POLARIZED MM-WAVE ANTENNA INTEGRATED WITHIN MICROSTRIP PMC PACKAGING CAVITY ENVIRONMENT	1053
<i>Nadeem Ashraf, Marco Antoniadis, Ryerson University, Canada; Abdel Sebak, Ahmed Kishk, Concordia University, Canada</i>	
WE-A5.2A.3: A KAPTON-BASED FLEXIBLE WIDEBAND ANTENNA WITH METAMATERIAL RESONATORS FOR MILLIMETER-WAVE WIRELESS APPLICATIONS	1055
<i>Mohammad Faridani, Gaozhi Xiao, National Research Council of Canada, Canada; Rony E Amaya, Nima Javanbakht, Carleton University, Canada; Mustapha C.E Yagoub, University of Ottawa, Canada</i>	
WE-A5.2A.4: FREQUENCY RECONFIGURABLE ANTENNA FOR 5G MILLIMETER-WAVE APPLICATIONS	1057
<i>Zohre Pourgholamhossein, Tayeb A. Denidni, National Institute of Scientific Research (INRS), Canada</i>	
WE-A5.2A.5: A PATTERN RECONFIGURABLE CONFORMAL MMWAVE ANTENNA FOR 5G APPLICATIONS	1059
<i>Antonio Stroh, Matthew Sigda, Kevin Carbone, Dillon Baun, Md Abu Saleh Tajin, Oday Bshara, Vasil Pano, Kapil Dandekar, Drexel University, United States</i>	
WE-A5.2A.6: OPTIMIZING ROTMEN LENS TOPOLOGIES FOR 5G WIRELESS GRIDS	1061
<i>Aline Eid, Manos Tentzeris, Georgia Institute of Technology, United States; Jimmy Hester, Atheraxon/Georgia Institute of Technology, United States</i>	
WE-A5.2A.7: A WIDEBAND MILLIMETER-WAVE 3-DB HYBRID COUPLER BASED ON PRINTED-RGW TECHNOLOGY	1063
<i>Zahra Mousavirazi, Mohamed Mamdouh M. Ali, Tayeb A. Denidni, Institut national de la recherche scientifique (INRS), Canada</i>	
WE-A5.2A.8: WIDEBAND SUBSTRATE-INTEGRATED-COAXIAL-LINE-FED MAGNETO-ELECTRIC DIPOLE ANTENNA WITH END-FIRE RADIATION	1065
<i>Jingxue Wang, Hohai University, China; Fan Wu, Southeast University, China</i>	

WE-A5.2A.9: DESIGN OF SICL FED DUAL POLARIZED DIPOLE ANTENNA FOR MILLIMETER WAVE APPLICATION	1067
<i>Naman Baghel, Satya Krishna Idury, Sourav Ghosh, Rajesh Shukla, Soumava Mukherjee, Indian Institute of Technology Jodhpur, India</i>	
WE-A5.2A.10: SURFACE WAVE LAUNCHER BASED MULTI-BEAM ANTENNA FOR 5G APPLICATIONS	1069
<i>Fahad Imran Khattak, Muhammad Umar Khan, National University of Sciences and Technology, Pakistan; Rifaqat Hussain, King Fahd University of Petroleum and Minerals, Saudi Arabia; Mohammad S. Sharawi, Polytechnique Montréal, Canada</i>	
 WE-A2.1A: METASURFACES, FSS AND EBG MATERIALS I	
WE-A2.1A.1: WIDEBAND FSS AS REFLECTOR FOR CIRCULARLY POLARIZED MILLIMETER-WAVE ANTENNA	1071
<i>Arun Kesavan, Tayeb A. Denidni, Institut national de la recherche scientifique (INRS), Canada</i>	
WE-A2.1A.2: NONUNIFORM METASURFACES FOR GAIN ENHANCEMENT OF DUAL AND CIRCULARLY POLARIZED ANTENNAS	1073
<i>Ahmad Hoorfar, Christopher Israel, Villanova University, United States</i>	
WE-A2.1A.3: CONFORMAL MINIATURIZED ANTENNA WITH ENHANCED BANDWIDTH AND EFFICIENCY USING PERIODIC MAGNETO-DIELECTRIC ANISOTROPIC META-SUBSTRATE	1075
<i>Milad Mirzaee, Yanghyo Kim, Stevens Institute of Technology, United States</i>	
WE-A2.1A.4: DUAL BAND FSS BASED ON FOUR ARMS STAR GEOMETRY FOR 5G APPLICATIONS	1077
<i>Caio Vasconcelos Benigno de Abrantes, Thamyris da Silva Evangelista, Federal University of Campina Grande, Brazil; Alexandre Serres, Federal University of Campina Grande, Brazil; Alfredo Gomes Neto, Federal Institute of Paraíba, Brazil</i>	
WE-A2.1A.5: LOW-PROFILE TRANSMITARRAY FOR WIDE-ANGLE CONICAL SCANNING: CONCEPT, OPTIMIZATION AND VALIDATION	1079
<i>Anastasios Papathanasopoulos, Yahya Rahmat-Samii, University of California, Los Angeles, United States</i>	
WE-A2.1A.6: ON THE EFFECT OF DESIGN PARAMETERS ON FRINGING FIELDS OF A LOOP-BASED FSS	1081
<i>Swathi Muthyala Ramesh, Mahboobeh Mahmoodi, Kristen Donnell, Missouri University of Science and Technology, United States</i>	
WE-A2.1A.7: SQUARE PLATE ACTIVE LIMITING FREQUENCY SELECTIVE SURFACE AT X-BAND	1083
<i>Patrick Bay, Payam Nayeri, Colorado School of Mines, United States</i>	
WE-A2.1A.8: MTM-EBG-BASED MICROSTRIP BANDSTOP FILTER FOR THE 900 MHZ ISM BAND	1085
<i>Samuel Clark, Ashwin Iyer, University of Alberta, Canada</i>	
WE-A2.1A.10: MINIATURIZED LPF DESIGN ON A DOUBLE-LAYERED DEFECTED GROUND STRUCTURE	1087
<i>Young Joo Kim, Dongho Seo, Dal Ahn, Sang-Min Han, Soonchunhyang University, Korea (South); Won-Sang Yoon, Hoseo University, Korea (South)</i>	
 WE-A3.1A: COMPUTATIONAL ELECTROMAGNETICS II	
WE-A3.1A.1: INVESTIGATION OF PHOTOCONDUCTIVE ANTENNA ELECTRODES ON TERAHERTZ SIGNAL GENERATION	1089
<i>Jose Santos Batista, Magda El-Shenawee, University of Arkansas, United States</i>	

WE-A3.1A.2: PREDICTING RF COUPLING TO A UAV WIRING SYSTEM USING THE EQUIVALENT CIRCUIT APPROACH	1091
<i>Mohamed Hamdalla, Anthony Caruso, Ahmed Hassan, University of Missouri-Kansas City, United States</i>	
WE-A3.1A.3: THE HYBRID EMBEDDED DOMAIN DECOMPOSITION METHOD FOR SCATTERING BY BI-ANISOTROPIC OBJECTS	1093
<i>Xiong Yang, Lin Lei, Jun Hu, University of Electronic Science and Technology of China, China</i>	
WE-A3.1A.4: EFFICIENT IMPLEMENTATION OF ADJOINT VARIATION METHOD FOR FINITE ELEMENT WITH 3D EDGE ELEMENTS	1095
<i>Botian Zhang, Yahya Rahmat-Samii, University of California, Los Angeles, United States</i>	
WE-A3.1A.5: HIGHLY PARALLELIZED HYBRID FDTD SOLVER FOR SIMULATING ELECTROMAGNETIC WAVE PROPAGATION IN DENSE URBAN ENVIRONMENTS	1097
<i>Kazem Sabet, Anca Stefan, EMAG Technologies Inc., United States; Kamal Sarabandi, University of Michigan, United States; Brian Sadler, Fikadu Dagefu, Army Research Laboratory, United States</i>	
WE-A3.1A.6: A ONE-STAGE $O(N \log N)$ ALGORITHM FOR GENERATING NESTED LOW-RANK REPRESENTATION OF ELECTRICALLY LARGE VOLUME INTEGRAL EQUATIONS	1099
<i>Yifan Wang, Dan Jiao, Purdue University, United States</i>	
WE-A3.1A.7: A SIMPLE AND EFFECTIVE METHOD FOR COMPRESSING ELECTRICALLY LARGE INTEGRAL OPERATORS	1101
<i>Chang Yang, Dan Jiao, Purdue University, United States</i>	
WE-A3.1A.8: COMPARISON OF ELECTROMAGNETIC FORCE DENSITIES EVALUATED IN THE ELECTRODYNAMIC LATTICE-BOLTZMANN METHOD AND FINITE-DIFFERENCE TIME-DOMAIN METHOD	1103
<i>Cael Warner, Loïc Markley, Kenneth Chau, University of British Columbia, Canada</i>	
WE-A3.1A.9: BROADBAND GREEN'S FUNCTION-KKR-MULTIPLE SCATTERING METHOD FOR THE CALCULATIONS OF BAND STRUCTURES IN TOPOLOGICAL ACOUSTICS	1105
<i>Tien-Hao Liao, California Institute of Technology, United States; Leung Tsang, University of Michigan, United States; Shurun Tan, Zhejiang University, China</i>	
WE-A3.1A.10: AN EFFICIENT APPROACH FOR EVALUATION OF MULTILAYERED MEDIA GREEN'S FUNCTIONS	1107
<i>Ozlem Ozgun, Hacettepe University, Turkey; Chao Li, Ecole Polytechnique de Montreal, Canada; Mustafa Kuzuoglu, Middle East Technical University, Turkey; Raj Mittra, University of Central Florida, United States</i>	
 WE-A4.2A: REMOTE SENSING I	
WE-A4.2A.1: HIGH-ACCURACY RANGING USING A DUAL-CHANNEL IEEE 802.11 LEGACY PREAMBLE	1109
<i>Anton Schlegel, Jeffrey A. Nanzer, Michigan State University, United States</i>	
WE-A4.2A.2: A DYNAMIC ANTENNA ARRAY FOR IMAGELESS CONTRABAND DETECTION	1111
<i>Daniel Chen, Jeffrey Nanzer, Michigan State University, United States</i>	
WE-A4.2A.3: MULTI-FREQUENCIES FULL-WAVE SIMULATIONS OF WAVE PROPAGATION IN VEGETATION FOR REMOTE SENSING OF SOIL MOISTURE	1113
<i>Weihui Gu, Leung Tsang, University of Michigan, United States</i>	

WE-A4.2A.4: SCATTERING FROM RANDOM ROUGH SURFACES AT X AND KU BAND	1115
FOR GLOBAL REMOTE SENSING OF TERRESTRIAL SNOW	
<i>Jiyue Zhu, Leung Tsang, University of Michigan, United States; Tien-Hao Liao, California Institute of Technology, United States</i>	
WE-A4.2A.5: AIRBORNE RADAR CLUTTER SUPPRESSION IN ANGLE-DOPPLER	1117
DOMAIN USING CLUTTER-PROXIMITY FEATURE	
<i>Rafi Ahmed, Hai Deng, Florida International University, United States</i>	
WE-A4.2A.6: HIGH-RESOLUTION RANGE-DOPPLER MAPS OF MOVING TARGETS IN	1119
TRAFFIC SCENE	
<i>Adib Nashashibi, Mani Kashanianfard, Tanner Douglas, Kamal Sarabandi, University of Michigan, United States; Stephen Decker, General Motors, United States</i>	
WE-A4.2A.7: LOCATION AND IDENTIFICATION OF LINEAR AND NONLINEAR	1121
TARGETS IN 3D USING PI-DORT AND TIME OF FLIGHT	
<i>Enyi Dong, Coleman Weaver, Chuhan Feng, Jacob Back, Zhengshan Fang, Michael Lee, Edward Wheeler, Rose-Hulman Institute of Technology, United States; Sun K. Hong, Soongsil University, Korea (South)</i>	
WE-A4.2A.8: FLEXIBLE PASSIVE SMART SKIN TEMPERATURE SENSOR FOR REMOTE	1123
SENSING IN STRUCTURAL HEALTH MONITORING APPLICATIONS	
<i>Charles Lynch, Ajibayo Adeyeye, Bijan Tehrani, Manos Tentzeris, Georgia Institute of Technology, United States</i>	
WE-A4.2A.9: EXTENDED GHI-LFM ALGORITHM FOR SPARSE ARRAY	1125
<i>Yang Meng, Chongqing University of Posts and Telecommunications, China; Chuan Lin, Anyong Qing, Southwest Jiaotong University, China; Natalia Nikolova, McMaster University, Canada</i>	
WE-A4.2A.10: EXPERIMENTAL VERIFICATION FOR PIPELINE DETECTION USING A	1127
3-D BISTATIC IMAGING RADAR	
<i>Abdulrahman Aljurbua, King Abdulaziz City for Science and Technology, Saudi Arabia; Kamal Sarabandi, University of Michigan, United States</i>	
 WE-A4.1A: PROPAGATION AND SCATTERING IN RANDOM OR COMPLEX MEDIA	
WE-A4.1A.1: LINK-QUALITY MEASUREMENT AND PERFORMANCE OF	1129
WIRELESSHART IN INDUSTRIAL ENVIRONMENTS	
<i>Abdellah Chehri, University of Quebec in Chicoutimi, Canada</i>	
WE-A4.1A.2: EFFECTIVE ACOUSTIC MEDIA FOR GHZ ULTRASONIC LENS FOCUSING	1131
IN FOURIER TRANSFORM APPLICATION	
<i>Zaw Oo Zaw, Viet Phuong Bui, Zaifeng Yang, Ching Eng Png, A*STAR Institute of High Performance Computing, Singapore</i>	
WE-A4.1A.3: RESPONSE OF LAMINATED COMPOSITES TO GUIDED MICROWAVE	1133
PULSE	
<i>Kang An, Changyou Li, Jun Ding, Northwestern Polytechnical University, China</i>	
WE-A4.1A.4: DIRECTION FINDING WITH CYCLOSTATIONARITY FOR MULTIPLE	1135
SIGNALS BASED ON TIME-MODULATED ARRAY	
<i>Liu Han, Jingfeng Chen, Gang Ni, Chong He, Ronghong Jin, Shanghai Jiao Tong University, China</i>	
WE-A4.1A.5: A SUPER RESOLUTION ALGORITHMS FOR TIME DELAY MEASUREMENT	1137
<i>Vasantha Chandrasegar, Gyutae Park, Jinhwan Koh, Gyeongsang National University, Korea (South)</i>	

WE-A1.1P: MUTUAL COUPLING IN ANTENNA ARRAYS II

WE-A1.1P.1: DECOUPLING METHOD FOR TWO PLANAR INVERTED-F ANTENNAS 1139 USING CHARACTERISTIC MODE ANALYSIS

Quan Phung Quang, Naobumi Michishita, Hisashi Morishita, National Defense Academy, Japan; Hiroshi Sato, Yoshio Koyanagi, Panasonic Corporation, Japan

WE-A1.1P.2: ISOLATION IMPROVEMENT OF 5G MIMO ANTENNA BASED ON THE 1141 THEORY OF CHARACTERISTIC MODES

Danting He, Yantao Yu, Shenshen Mao, Chongqing University, China

WE-A1.1P.3: CHARACTERISTIC MODE ANALYSIS OF A MIMO ANTENNA WITH DGS..... 1143

Danting He, Yantao Yu, Shenshen Mao, Chongqing University, China

WE-A1.1P.4: COMPACT DUAL-FREQUENCY MIMO ANTENNA WITH HIGH PORT 1145 ISOLATION

Shenshen Mao, Yantao Yu, Danting He, Chongqing University, China

WE-A1.1P.5: A SELF-ISOLATED WIDEBAND CIRCULARLY POLARIZED MIMO 1147 ANTENNA FOR 5G COMMUNICATIONS

Qian Li, Xi'an University of Posts and Telecommunications, China; Yanyu Wei, University of Electronic Science and Technology of China, China

WE-A1.1P.6: VERTICAL-WALL BETWEEN TIGHTLY SPACED PATCH ANTENNAS FOR 1149 DECOUPLING AND RADIATION PATTERN CORRECTION

Yiying Wang, Shengfei Zhang, Xinhua Yu, Guilin University Of Electronic Technology, China; Yuntao Yan, EM Technologies Research Test Center Xi'an Electronic Engineering Research Institute, China; Ahmed A Kishk, Concordia University, Canada

WE-A1.1P.7: ISOLATION IMPROVEMENT IN MIMO DIELECTRIC RESONATOR 1151 ANTENNAS

Manzoor Elahi, Amir Altaf, Sungkyunkwan University, Korea (South); Jawad Yousaf, Abu Dhabi University, United Arab Emirates; Eqab Almajali, University of Sharjah, United Arab Emirates

WE-A1.1P.8: SYNTHESIS OF THINNED PLANAR ARRAYS WITH ACCURATE MUTUAL 1153 COUPLING MODELING

Lorenzo Poli, Alessandro Polo, Paolo Rocca, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy; A-Min Yao, Erni Zhu, Shanghai Huawei Technologies Co., Ltd., China

WE-A1.1P.9: GLIDE-SYMMETRIC PLANAR EBG STRUCTURE FOR MUTUAL COUPLING 1155 REDUCTION BETWEEN MICROSTRIP PATCH ANTENNAS

Boules A. Mouris, Ragnar Thobaben, Oscar Quevedo-Teruel, KTH Royal Institute of Technology, Sweden

WE-A1.1P.10: MUTUAL COUPLING REDUCTION FOR COMPACT WIDEBAND 1157 TWO-ELEMENT DUAL-POLARIZED ARRAY BY UTILIZING H-SHAPED INTERDIGITAL STRUCTURE

Zhiyuan Chen, Mei Li, Ming-Chun Tang, Chongqing University, China

WE-A1.2P: DIELECTRIC RESONATOR ANTENNAS

WE-A1.2P.1: CP GAIN ENHANCEMENT OF MM-WAVE SIW-INTEGRATED DRA ARRAY 1159 ANTENNA

Heba El-Sawaf, Wael Abdel-Wahab, Safieddin Safavi-Naeini, University of Waterloo, Canada; Hussam Al-Saedi, University of Technology, Iraq

WE-A1.2P.2: COMPACT AND WIDEBAND DESIGN OF SUBSTRATE INTEGRATED 1161 WAVEGUIDE FED DIELECTRIC RESONATOR ANTENNA ARRAY

Koushik Dutta, Raj Mittra, University of Central Florida, United States

WE-A1.2P.3: STUDY ON HOMOGENIZATION METHODS OF STACKED RECTANGULAR DIELECTRIC RESONATOR ANTENNAS	1163
<i>Boyuan Ma, University of Electronic Science and Technology of China; National University of Singapore, Singapore; Jin Pan, University of Electronic Science and Technology of China, China</i>	
WE-A1.2P.4: A NEAR-FIELD FOCUSED CIRCULAR ARRAY BASED ON DIELECTRIC RESONATOR ANTENNA	1165
<i>Runze Huang, Beijia Liu, Qi Tan, Harbin Institute of Technology, China</i>	
WE-A1.2P.5: A NEW AND WIDEBAND CIRCULARLY POLARIZED ANTENNA USING CRLH-TL AND CDRA LOADING FOR S AND C-BAND APPLICATIONS	1167
<i>Mohammad Ameen, Raghvendra Kumar Chaudhary, Indian Institute of Technology (Indian School of Mines), Dhanbad, India</i>	
WE-A1.2P.6: A FREQUENCY-TUNABLE BROADBAND DIELECTRIC RESONATOR ANTENNA WITH METASURFACE	1169
<i>Ge Zhao, Mei Song Tong, Tongji University, China</i>	
WE-A1.2P.7: A BIDIRECTIONAL PATTERN OF DRA BY EMPLOYING CYLINDRICAL SPOOF SURFACE PLASMON POLARITON STRUCTURE	1171
<i>Sonu Kumar, Abhishek Maganbhai Sonagara, Rakesh Singh Kshetrimayum, IIT Guwahati, India</i>	
WE-A1.2P.8: DIELECTRIC RESONATOR ANTENNA FOR COMPACT HIGH-POWER MESOBAND GENERATION	1173
<i>Luciano Prado Oliveira, Felix Vega, Chaouki Kasmi, Mae Almansoori, Technology Innovation Institute, United Arab Emirates</i>	
WE-A1.2P.9: A CLASS OF DIELECTRIC RESONATOR ANTENNAS WITH THERMALLY ENHANCED PERFORMANCE	1175
<i>Guilherme Theis, A.Bart Smolders, Gabriele Federico, Eindhoven University of Technology, Netherlands; Diego Caratelli, The Antenna Company, Netherlands</i>	
WE-A1.2P.10: A DUAL-BAND HOLLOW DIELECTRIC RESONATOR ANTENNA FOR GPS APPLICATIONS	1177
<i>José Bruno de Araújo, Carlos David Morales, Christophe Morlaas, Alexandre Chabory, ENAC - Université de Toulouse, France; Romain Pascaud, Marjorie Grzeskowiak, ISAE SUPAERO - Université de Toulouse, France; Gautier Mazingue, Anywaves, France</i>	
 WE-A1.3P: WIDEBAND PHASED ARRAY ANTENNAS I	
WE-A1.3P.1: WIDEBAND CIRCULARLY POLARIZED LTCC MODULAR PHASED ARRAY ANTENNA AT KA-BAND	1179
<i>Bo Shi, Nasimuddin Nasimuddin, Xianming Qing, Francois Chin, Institute for Infocomm Research, Singapore</i>	
WE-A1.3P.2: A MINIATURIZED END-FIRE ANTENNA PLANAR ARRAY WITH WIDE-ANGLE SCANNING PERFORMANCE FOR BASE-STATION APPLICATIONS	1181
<i>Shilin Yang, Jianyi Zhou, Southeast University, China</i>	
WE-A1.3P.3: DESIGN OF A COMPACT PHASED ARRAY USING 16 SURFACE-WAVE ANTENNA ELEMENTS	1183
<i>Zhenting Chen, Zhongxiang Shen, Nanyang Technological University, Singapore</i>	
WE-A1.3P.5: A WIDEBAND DUAL-POLARIZED WIDE-ANGLE SCANNING ARRAY WITH LOW SIDELobe LEVELS AND LOW CROSS-POLARIZATION	1185
<i>Fu-Long Jin, Wei Shao, University of Electronic Science and Technology of China, China; Zhi Ning Chen, National University of Singapore, Singapore</i>	

WE-A1.3P.6: A W-BAND, MICROFABRICATED, TILED PHASED ARRAY REALIZED BY BRICKED TAPERED SLOT ANTENNA ELEMENT	1187
<i>Jian Xu Sun, Yu Jian Cheng, Yong Fan, University of Electronic Science and Technology of China, China</i>	
WE-A1.3P.7: KU/KA WIDE-BAND DUAL-BAND DUAL-POLARIZED SHARED-APERTURE PHASED ARRAY ANTENNA WITH HIGH APERTURE EFFICIENCY	1189
<i>Yan Ran Ding, Yu Jian Cheng, University of Electronic Science and Technology of China, China</i>	
WE-A1.3P.8: A CIRCULARLY-POLARIZED MECHANICALLY BEAM-STEERABLE ANTENNA	1191
<i>Jingru Wang, Huaqiao University, China; Yuehe Ge, Fuzhou University, China; Zhizhang Chen, Dalhousie University, China</i>	
WE-A1.3P.10: AN ULTRA-WIDEBAND DUAL-POLARIZED LOW-PROFILE TIGHTLY COUPLED DIPOLE ARRAY	1193
<i>Bingjun Wang, Shiwen Yang, Yikai Chen, Shiwei Qu, University of Electronic Science and Technology of China, China</i>	
WE-A1.4P: WIDEBAND CIRCULARLY POLARIZED ANTENNAS	
WE-A1.4P.1: A NOVEL MINIATURIZED BROADBAND DUAL-POLARIZATION ANTENNA FOR 2G/3G/LTE BASE STATION	1195
<i>Tang Chen, Qiang-Ming Cai, Xin Cao, Yu-yu Zhu, Jun Fan, Southwest University of Science and Technology, China; Mu-lin Liu, Innovation Center of Zhongshan Torch Modern Industrial Engineering Technology Research Institute, China; Lei Han, Air Force Engineering University, China; Tao Liu, Sichuan Jiuzhou Electric Group Co., Ltd, China; Li Gu, China Academy of Engineering Physics, China</i>	
WE-A1.4P.2: A WIDEBAND CIRCULARLY POLARIZED RIDGE SUBSTRATE INTEGRATED WAVEGUIDE (RSIW) ENDFIRE ANTENNA	1197
<i>Huakang Chen, Yu Shao, Jiao Xiang, Zhangjian He, Changhong Zhang, Chongqing University of Posts and Telecommunications, China</i>	
WE-A1.4P.4: A COMPACT BROADBAND CIRCULARLY POLARIZED SPIRAL ANTENNA FOR CONFORMAL APPLICATIONS	1199
<i>Wei Huang, Yejun He, Wenting Li, Long Zhang, Sai-Wai Wong, Shenzhen University, China</i>	
WE-A1.4P.5: MINIATURIZED DIFFERENTIALLY-FED CIRCULARLY POLARIZED ANTENNA BASED ON SRR	1201
<i>Shuxuan Liu, Yuandan Dong, University of Electronic Science and Technology of China, China</i>	
WE-A1.4P.6: DESIGN OF A BROADBAND CIRCULARLY POLARIZED PATCH ANTENNA WITH DIFFERENTIAL FEEDING	1203
<i>Sheng-Jie Guo, Yan Cheng, Nanjing Research Institute of Electronics Technology, China</i>	
WE-A1.4P.7: ELLIPTIC STRIPLINE RESONATOR ANTENNA ON GLASS-EPOXY SUBSTRATES FOR X-BAND CIRCULAR POLARIZATION SYSTEMS	1205
<i>Yumi Takizawa, The Institute of Statistical Mathematics, Japan; Atsushi Fukasawa, Cahya Edi Santosa, Josaphat Tetuko Sri Sumantyo, Chiba University, Japan</i>	
WE-A1.4P.8: A WIDEBAND CIRCULARLY POLARIZED LEAKY WAVE ANTENNA BASED ON ISGW	1207
<i>Dechao Meng, Dongya Shen, Yunnan University, China; Xiupu Zhang, Concordia University, Canada</i>	
WE-A1.4P.9: A BROADBAND DUAL-POLARIZED BASE STATION ANTENNA FOR LTE/5G APPLICATION	1209
<i>Qiang-Ming Cai, Tang Chen, Xin Cao, Yu-yu Zhu, Jun Fan, Southwest University of Science and Technology, China; Lei Han, Air Force Engineering University, China; Tao Liu, Sichuan Jiuzhou Electric Group Co., Ltd, China; Mu-lin Liu, Innovation Center of Zhongshan Torch Modern Industrial Engineering Technology Research Institute, China; Li Gu, China Academy of Engineering Physics, China</i>	

WE-A1.4P.10: CIRCULARLY POLARIZED HUYGENS SOURCE ANTENNA BASED ON TWO STACKED DIELECTRIC RESONATORS	1211
<i>Carlos David Morales, José Bruno de Araújo, Christophe Morlaas, Alexandre Chabory, ENAC - Université de Toulouse, France; Romain Pascaud, Marjorie Grzeskowiak, ISAE SUPAERO - Université de Toulouse, France; Gautier Mazingue, Anywaves, France</i>	
 WE-A2.1P: RECONFIGURABLE METASURFACES AND ANTENNAS	
WE-A2.1P.1: A DUAL-PORT ANTENNA WITH RECONFIGURABLE METASURFACE	1213
<i>Chaofan Ren, Junping Geng, Han Zhou, Kun Wang, Jingzheng Lu, Da Su, Yangzhou Zhang, Silei Yang, Chong He, Xianling Liang, Ronghong Jin, Shanghai Jiao Tong University, China</i>	
WE-A2.1P.2: DESIGN OF RECONFIGURABLE TRANSMIT-REFLECT UNIT CELL	1215
<i>Pan Li, Jianxun Su, Zengrui Li, Communication University of China, China; Guanghong Liu, Information Science Academy of China Electronic, China</i>	
WE-A2.1P.3: A PURE-WATER INVERTED-L ANTENNA WITH FREQUENCY RECONFIGURABILITY	1217
<i>Fei Fan, Shiyang Wang, Gang Zhang, Nanjing Normal University, China; Yin Li, Southern University of Science and Technology, China</i>	
WE-A2.1P.4: COLLAPSIBLE, WIDEBAND, DUAL-POLARIZATION PATCH ANTENNA	1219
<i>Jian Lu, Peng Kiang Tan, Ankang Liu, Sek Meng Sow, Theng Huat Gan, National University of Singapore, Singapore</i>	
WE-A2.1P.5: RECONFIGURABLE METASURFACE FOR DYNAMICAL MODULATION OF REFLECTION, TRANSMISSION, AND ABSORPTION	1221
<i>Xinyun Song, Weiren Zhu, Shanghai Jiao Tong University, China</i>	
WE-A2.1P.6: POLARIZATION-INSENSITIVE ABSORPTIVE MICROWAVE DEVICE WITH ELECTRONICALLY-CONTROLLABLE REFLECTANCE	1223
<i>Jing Tian, Huizhen Wang, Xianlu Zeng, Jifei Zou, Hongtao Zhong, University of Electronic Science and Technology of China, China</i>	
WE-A2.1P.7: ENHANCED MICROWAVE HEATING UNIFORMITY USING RECONFIGURABLE FRESNEL ZONE PLATE	1225
<i>Daehyeon Kim, Minhyeock Kim, Youngno Youn, Suho Chang, Wonbin Hong, Pohang University of Science and Technology, Korea (South); Jeongwon Kim, Bukuk Oh, LG Electronics, Korea (South)</i>	
WE-A2.1P.8: DESIGN OF RECONFIGURABLE TRANSMISSION UNIT CELL WITH INDEPENDENT AND CONTINUOUS MANIPULATIONS OF AMPLITUDE AND PHASE	1227
<i>He Li, Yun Bo Li, Tie Jun Cui, Southeast University, China</i>	
WE-A2.1P.9: A BROADBAND METASURFACE WITH VOLTAGE-CONTROLLED TRANSMISSION PHASE	1229
<i>Jing Rui Wang, Mei Song Tong, Tongji University, China; Yun Jing Zhang, Soochow University, China</i>	
WE-A2.1P.10: RECONFIGURABLE WIDEBAND-NARROWBAND VIVALDI ANTENNA	1231
<i>Sahar Chagharvand, Mohamad Rijal Hamid, UTM-MIMOS Centre of Excellence in Telecommunication Technology, Faculty of Electrical Engineering, Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia, Iran; Muhammad Ramlee Kamarudin, Universiti Tun Hussein Onn Malaysia, Malaysia</i>	
 WE-A5.1P: MIMO IMPLEMENTATIONS AND APPLICATIONS II	
WE-A5.1P.1: A COMPACT FOUR-ELEMENT SELF DECOUPLED MIMO ANTENNA FOR SUB-6 GHZ 5G APPLICATIONS	1233
<i>Shameena V A, Anila P V, Mohanan P, Cochin University of Science and Technology, India</i>	

WE-A5.1P.2: A PATTERN/POLARIZATION DIVERSITY ANTENNA BASED ON THREE-MODE COMPOSITE TRANSMISSION LINE	1235
<i>Kai Sun, Boning Wang, Sihao Liu, Yanwen Zhao, Deqiang Yang, University of Electronic Science and Technology of China, China</i>	
WE-A5.1P.3: GENERALIZED CRAMER-RAO BOUND FOR PASSIVE MIMO RADAR MULTI-TARGET PARAMETER ESTIMATION	1237
<i>Liming Wang, Qian He, Huiyong Li, University of Electronic Science and Technology of China, China</i>	
WE-A5.1P.4: MEASUREMENT OF COMPACT MIMO ANTENNAS WITH 0.3 λ SPACING UNDER DIFFERENT POLARIZATION AND COUPLING	1239
<i>Meng Wang, Dazhi Piao, Communication University of China, China</i>	
WE-A5.1P.6: ANTENNA DESIGNS FOR A MILIMETER WAVE MASSIVE MIMO TESTBED WITH HYBRID BEAMFORMING	1241
<i>Zhinong Ying, Sony, Sweden; Olof Zander, Sony Nordic, Sweden; Minkeun Chung, Liang Liu, Fredrik Tufvesson, Lund University, Sweden</i>	
WE-A5.1P.7: SBD-SYNTHESIS OF ELECTROMAGNETIC SMART SKINS ENABLING OPTIMAL WIRELESS CITY COVERAGE	1243
<i>Marco Salucci, Arianna Benoni, Alessandro Polo, Mohammad Abdul Hannan, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy</i>	
WE-A5.1P.8: ON USER EFFECTS OF A LOW-PROFILE MIMO TERMINAL ANTENNA WITH WIDEBAND MULTIMODAL EXCITATION	1245
<i>Hanieh Aliakbari, Buon Kiong Lau, Lund University, Sweden</i>	
WE-A5.1P.9: IMPROVING THE 5G MASSIVE MIMO PERFORMANCE FOR AERIAL BASE STATIONS BY EXPLOITING TRIANGULAR LATTICE ARRAYS	1247
<i>Francesco Alessio Dicandia, IDS Ingegneria dei Sistemi SpA, Italy; Simone Genovesi, University of Pisa, Italy</i>	
WE-A5.1P.10: EFFICIENCY ANGLE AS FIGURE OF MERIT FOR RECIPROCAL MIMO NETWORKS	1249
<i>Ben Minnaert, Odisee University College of Applied Sciences, Belgium</i>	
 WE-SP.1P: INNOVATIVE TRENDS IN ANTENNA TOLERANCE ANALYSIS AND ROBUST DESIGN	
WE-SP.1P.1: FAR FIELD EVM CHARACTERIZATION OF ANTENNA FREQUENCY RESPONSE VIA FULL-WAVE ANALYSIS	1251
<i>Dustin Brown, Yahya Rahmat-Samii, University of California, Los Angeles, United States</i>	
WE-SP.1P.2: MONTE CARLO TOLERANCE ANALYSIS OF ANTENNAS/RADOMES WITH MESH/ELEMENT STRIP GROUPING	1253
<i>Wanye Xu, Kai Wu, Peng Li, Xidian University, China</i>	
WE-SP.1P.3: ROBUST SIMULATION-DRIVEN ANTENNA DESIGN USING PARALLEL BAYESIAN OPTIMIZATION	1255
<i>Jialu Li, Jinzhu Zhou, Yu Si, Nongding Wen, Xidian University, China</i>	
WE-SP.1P.4: TOLERANCE ANALYSIS OF SPHERICAL CONFORMAL ARRAY ANTENNA BASED ON INTERVAL ARITHMETIC	1257
<i>Guangda Ding, Peng Li, Chao Wang, Xidian University, China</i>	
WE-SP.1P.5: TOLERANCE ANALYSIS OF CONTINUOUS AND DISCRETE APERTURES THROUGH A NOVEL PROBABILISTIC INTERVAL ARITHMETIC METHOD	1259
<i>Nicola Anselmi, Arianna Benoni, Paolo Rocca, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy</i>	

WE-A5.2P: WEARABLE AND IMPLANTABLE ANTENNAS II

WE-A5.2P.1: WEARABLE RADIO-FREQUENCY PLASMONIC RESONANCE SENSOR FOR 1261 NON-CONTACT VITAL SIGN MONITORING

Xin Yang, Xi Tian, John Ho, National University of Singapore, Singapore

WE-A5.2P.2: A FEED-THROUGH SHARING STRUCTURE OF A WIRELESS POWER 1263 TRANSFER COIL AND STIMULATION ELECTRODES FOR IMPLANTABLE MEDICAL DEVICES

Jaechun Lee, Chisung Bae, Sang Joon Kim, Samsung Advanced Institute of Technology, Korea (South)

WE-A5.2P.4: WIRELESS PROPAGATION AND FOCUSING INTO THE HUMAN BODY 1265 WITH WEARABLE METAMATERIALS

Qihang Zeng, Xi Tian, John Ho, National University of Singapore, Singapore

WE-A5.2P.5: DEIONIZED WATER INSULATOR LOADED BRAIN-IMPLANTED UWB 1267 ANTENNA

Geonyeong Shin, Ick-Jae Yoon, Chungnam National University, Korea (South)

WE-A5.2P.6: STUDY OF TIME-DOMAIN CHARACTERISTICS FOR LIVER-IMPLANT 1269 ULTRAWIDEBAND COMMUNICATIONS

Pongphan Leelatien, Thammasat University, Thailand

WE-A5.2P.7: BODY-TO-ANTENNA GAP EFFECT ON A UHF WEARABLE TEXTILE 1271 ANTENNA PERFORMANCE

Quoc Hung Dang, Shengjian Jammy Chen, Damith Chinthana Ranasinghe, Christophe Fumeaux, University of Adelaide, Australia

WE-A5.2P.8: WEARABLE MICROSTRIP CIRCULAR PATCH ANTENNA FOR BREAST 1273 CANCER DETECTION

S Bhavani, Research Scholar, India

WE-A5.2P.9: A DUAL-BAND DUAL MODE ANTENNA FOR ON/OFF-BODY 1275 COMMUNICATIONS

Sarosh Ahmad, Kashif Nisar Paracha, Yawar Ali Sheikh, Government College University, Faisalabad, Pakistan; Adnan Ghaffar, Xue Jun Li, Auckland University of Technology Auckland, New Zealand

WE-A5.2P.10: COMPACT MAGNETICALLY SYMMETRIC ANTENNA DESIGN FOR 1277 IMPLANTABLE BIOMEDICAL APPLICATIONS

Lin-mei Yan, University of Electronic Science and Technology of China, China; Abdoalbaset Abohmra, Jalil Ur Rehman Kazim, Abu bakar Sharif, Muhammad Ali Imran, Masood Ur Rahman, Qammer Abbasi, University of Glasgow, United Kingdom

WE-A5.3P: MILLIMETER-WAVE ANTENNAS III

WE-A5.3P.1: DESIGN OF STUB LOADED TRANSMISSION LINE MATCHING CIRCUIT 1279 FOR SERIES FED PATCH ARRAY

M. P Mohan, A Alphones, M. Y. Siyal, M Faeyz Karim, Nanyang Technological University, Singapore; L Zhao, J. Jimeno, NCS, Singapore

WE-A5.3P.2: WIDEBAND STAR-SHAPED MMWAVE PLANAR ARRAY ANTENNA WITH 1281 LIQUID CRYSTAL

Divya Krishnan, A. Alphones, Nanyang Technological University, Singapore; Nasimuddin ., I2R A-STAR, Singapore

WE-A5.3P.3: DESIGN AND MODELING OF A 77-GHZ TIME-MODULATED 1283 TRANSMITTER ARRAY FOR ENHANCED BACKOFF EFFICIENCY

Zhehao Yu, Xuyang Lu, Chong Han, University of Michigan- Shanghai Jiao tong University Joint Institute, China; Suresh Venkatesh, Princeton University, United States

WE-A5.3P.4: A YAGI-UDA ARRAY OF BOND WIRE ANTENNAS WITH HIGH FRONT-TO-BACK RATIO	1285
<i>Binshan Zhao, Zheng Gao, Min Tang, Shanghai Jiao Tong University, China</i>	
WE-A5.3P.5: DESIGN OF WIDEBAND DUAL-POLARIZED METASURFACE ANTENNA USING CHARACTERISTIC MODE ANALYSIS	1287
<i>Teng Li, Wenbin Dou, Southeast University, China; Akanksha Bhutani, Thomas Zwick, Karlsruhe Institute of Technology, Germany; Yuanyan Su, École Polytechnique Fédérale de Lausanne, Switzerland</i>	
WE-A5.3P.6: CO-DESIGN OF A SUBSTRATE INTEGRATED COAXIAL LINE FILTER-ANTENNA FOR MILLIMETER-WAVE APPLICATIONS	1289
<i>Satya Krishna Idury, Naman Baghel, Rajesh Shukla, Sourav Ghosh, Soumava Mukherjee, Indian Institute of Technology Jodhpur, India</i>	
WE-A5.3P.7: DUAL-FUNCTION DIELECTRIC LAYER ENABLING COMPACT WIDEBAND END-FIRE MILLIMETER-WAVE ANTENNA	1291
<i>Ahmed Omar, Wonbin Hong, Pohang University of Science and Technology, Korea (South)</i>	
WE-A5.3P.8: WIDEBAND MILLIMETER-WAVE SLOT ANTENNA USING DIELECTRIC COVER FOR GAIN ENHANCEMENT	1293
<i>Wei Song, Zhijiao Chen, Limei Qi, Yuan Yao, Junsheng Yu, Beijing University of Posts and Telecommunications, China; Xiaodong Chen, Queen Mary University of London, United Kingdom</i>	
WE-A5.3P.9: INCORPORATION OF SPATIAL MODULATION IN IN VIVO FREQUENCY SELECTIVE NANO NETWORKS.	1295
<i>Fadila Berrahma, Hicham Bousbia-Salah, National Polytechnical School, Algeria; Khalida Ghanem, Center for Development of Advanced Technologies, Algeria; Mourad Nedil, University of Quebec at Abitibi-Temiscamingue (UQAT), Canada</i>	
WE-A5.3P.10: MICROMACHINED RIDGE GAP WAVEGUIDE TRANSMISSION LINE AND TRANSITION AT 220–310 GHZ	1297
<i>Sadia Farjana, Per Lundgren, Peter Enoksson, Ashraf Uz Zaman, Chalmers University of Technology, Sweden</i>	
WE-A4.1P: SCATTERING, DIFFRACTION AND RCS	
WE-A4.1P.2: STUDY ON SCATTERED MAGNETIC FIELD FROM A METAL CYLINDER COVERED WITH A LOSSLESS MEDIUM	1299
<i>Toru Kawano, Keiji Goto, Takumi Nagasawa, Takahiro Fujita, Masashi Yamazaki, National Defense Academy, Japan</i>	
WE-A4.1P.3: CHARACTERIZATION OF RECTANGULAR PLATES USING COMPLEX NATURAL RESONANCE	1301
<i>Siyuan Li, University of Queensland, Australia; Chad Hargrave, Commonwealth Scientific and Industrial Research Organisation, Australia; Hoi-Shun Lui, University of Technology Sydney, Australia</i>	
WE-A4.1P.4: ANALYSIS OF SCATTERED FIELDS BY AN IMPEDANCE SPHERE COATED WITH MULTILAYERED DIELECTRIC	1303
<i>Mahesh Singh, Bratin Ghosh, Indian Institute of Technology, Kharagpur, India; Kamal Sarabandi, University of Michigan, Ann Arbor, United States</i>	
WE-A4.1P.6: A LOW-SCATTERING CONFORMAL PHASED ARRAY BASED ON RESISTOR-LOADED METASURFACE	1305
<i>Zhechen Zhang, Shiwen Yang, Yikai Chen, Shi-Wei Qu, University of Electronic Science and Technology of China, China</i>	
WE-A4.1P.7: RCS REDUCTION FOR WIDEBAND ANTENNA ARRAY	1307
<i>Yuewen Gou, Yikai Chen, Shiwen Yang, University of Electronic Science and Technology of China, China</i>	

WE-A4.1P.9: ONE-WAY GUIDING BY ACOUSTIC SUB-DIFFRACTION CHAIN UNDER TRANSVERSE MEAN FLOW 1309

Ohad Silbiger, Yakir Hadad, Tel-Aviv University, Israel

WE-A4.1P.10: CLUTTER REMOVAL FOR DETECTION OF SLOW-MOVING TARGETS WITH A MM-WAVE FMCW RADAR 1311

Walid Chekkar, Jérôme Lanteri, Claire Migliaccio, Université Côte d'Azur, France

WE-A2.2P: METASURFACES, FSS AND EBG MATERIALS II

WE-A2.2P.1: RADIATION PATTERN ROUNDNESS IMPROVEMENT OF OFF-CENTER MONOPOLE ANTENNA USING ELECTROMAGNETIC BAND-GAP (EBG) STRUCTURE 1313

Bo Zhang, Zhi Ning Chen, National University of Singapore, Singapore

WE-A2.2P.2: STUDY OF LOW-PROFILE BROADBAND CIRCULARLY POLARIZED PATCH ANTENNA-BASED ON METASURFACE STRUCTURE 1315

Jinping Zhang, Zijian Xing, Jianying Li, Northwestern Polytechnical University, China

WE-A2.2P.3: A MINIATURIZED WIDEBAND FILTERING METASURFACE ANTENNA WITH IMPROVED FREQUENCY SELECTIVITY 1317

Bing-Jie Chen, Xue-Song Yang, Shun Zhang, Bing-Zhong Wang, University of Electronic Science and Technology of China, China

WE-A2.2P.4: PHASE OF RADIATION FROM A SQUARE PRINCIPAL SOURCE REGION 1319

Hisamatsu Nakano, Tomoki Abe, Junji Yamauchi, Hosei University, Japan

WE-A2.2P.5: A METASURFACE-BASED STACKED PATCH ANTENNA FOR WIDEBAND CIRCULARLY-POLARIZED RADIATION 1321

Nasimuddin ., Xianming Qing, I2R A-STAR, Singapore

WE-A2.2P.6: VIVALDI ARRAY ANTENNA WITH LOW IN-BAND RCS AND LOW CROSS-POLARIZATION PROPERTIES BY LOADING SPOOF SURFACE PLASMON POLARITON ABSORBER 1323

Peng Jiang, Wen Jiang, Shuxi Gong, Xidian University, China

WE-A2.2P.7: CAVITY ANTENNA BASED ON AMC-REFLECTOR AND FSS SUPERSTRATE FOR GAIN IMPROVEMENT 1325

Boukern Dounya, Abdelhafid Bouacha, Tlemcen Telecommunication Laboratory, University of Tlemcen, Algeria; Djelloul Aissaoui, Tlemcen Telecommunication Laboratory, Algeria; Tayeb A. Denidni, EMT-INRS, Institut national de la recherche scientifique,, Canada

WE-A2.2P.8: MINIATURIZED CIRCULARLY POLARIZED SINGLE-LAYER METASURFACE ANTENNA USING CHARACTERISTIC MODES 1327

Ahmed El Yousfi, Abdenasser Lamkaddem, Kerlos Atia Abdalmalak, Luis Enrique Garcia Munoz, Daniel Segovia Vargas, Carlos III University of Madrid, Spain

WE-A2.2P.9: ELECTROMAGNETIC BAND-GAP LEAKY-WAVE ANTENNAS BASED ON GROUNDED DIELECTRIC LATTICES 1329

Ludovica Tognolatti, Paolo Baccarelli, Silvio Ceccuzzi, Cristina Ponti, Giuseppe Schettini, Roma Tre University, Italy; Vakhtang Jandieri, University of Duisburg-Essen, Germany

WE-A3.1P: COMPUTATIONAL ELECTROMAGNETICS III

WE-A3.1P.1: AN EFFICIENT HIGHER ORDER MOM-PO METHOD FOR EM SCATTERING FROM ELECTRICALLY LARGE OBJECTS 1331

Chao Zhang, Qiang-Ming Cai, Xin Cao, Yuyu Zhu, Jun Fan, Southwest University of Science and Technology, China; Lei Han, Air Force Engineering University, China; Yan-Wen Zhao, University of Electronic Science and Technology of China, China; Tao Liu, Sichuan Jiuzhou Electric Group Co, China

WE-A3.1P.3: A TIME-DOMAIN CARRIER GENERATION RATE MODEL FOR OPTOELECTRONIC DEVICE SIMULATIONS	1333
<i>Liang Chen, Hakan Bagci, King Abdullah University of Science and Technology, Saudi Arabia</i>	
WE-A3.1P.4: NEAR-FIELD-BASED PRECONDITIONING TECHNIQUE IN THE INCOMPLETE-LEAF MLFMA FOR NONUNIFORMLY DISCRETIZED ELECTROMAGNETIC SCATTERING PROBLEMS	1335
<i>Bahram Khalichi, Vakur Behcet Erturk, Bilkent University, Turkey; Ozgur Ergul, Middle East Technical University, Turkey</i>	
WE-A3.1P.5: SOLVING 4,000 WAVELENGTHS 2-D TM SCATTERER USING ENTIRE-DOMAIN HIGH-PRECISION MOM	1337
<i>Jovana Petrović, Dragan Olćan, University of Belgrade, School of Electrical Engineering, Serbia</i>	
WE-A3.1P.10: MAXIMUM RADIATION EFFICIENCY OF IMPLANTED ANTENNAS EMPLOYING A NOVEL HYBRID METHOD	1339
<i>Lukas Jelinek, Jakub Liska, Miloslav Capek, Vit Losenicky, Czech Technical University in Prague, Czech Republic; Mats Gustafsson, Lund University, Sweden</i>	
 WE-A4.2P: REMOTE SENSING II	
WE-A4.2P.1: RESONANCE-BASED RADAR TARGET CLASSIFICATION USING THE MATRIX PENCIL METHOD AND THE CAUCHY METHOD	1341
<i>Siyuan Li, University of Queensland, Australia; Chad Hargrave, Commonwealth Scientific and Industrial Research Organisation, Australia; Hoi-Shun Lui, University of Technology Sydney, Australia</i>	
WE-A4.2P.2: USE OF UHF COMPACT CIRCULARLY POLARIZED ANTENNA FOR FOOD ANALYSIS	1343
<i>Lic Tran Van, University of Danang - University of Science and Technology, Viet Nam; Canh Doan Thi Ngoc, University of Danang - University of Economics, Viet Nam; Huy Trinh Le, University of Information Technology - Vietnam National University, Viet Nam; Fabien Ferrero, Nhan Le-Thanh, Université Côte d'Azur, France</i>	
WE-A4.2P.3: SINGLE-MODE WIRELESS SENSING BY NONLINEAR PARITY-TIME-SYMMETRIC CIRCUITS	1345
<i>Zhipeng Li, John Ho, National University of Singapore, Singapore</i>	
WE-A4.2P.4: HAND GESTURE RECOGNITION USING DEEP LEARNING METHOD	1347
<i>Gyutae Park, Vasantha Chandrasegar, Jinhwan Koh, Gyeongsang National University, Korea (South)</i>	
WE-A4.2P.5: CLOUD MONITORING IN SINGAPORE USING GPS RESIDUALS	1349
<i>Ding Yu Heh, Yee Hui Lee, Liang Mong Koh, Nanyang Technological University, Singapore</i>	
WE-A4.2P.6: NUMERICAL EVALUATION OF IMPACTS OF DUST AND WATER VAPOR ON INDOOR CHANNEL CHARACTERISTICS	1351
<i>Hao Qin, Xingqi Zhang, University College Dublin, Ireland; Weibin Hou, Jiadong Du, China Academy of Information and Communications Technology, China; Shunchuan Yang, Beihang University, China</i>	
WE-A4.2P.7: A METHOD FOR SENSING THE LIQUID IN INFUSION BAG	1353
<i>Haixin Jiang, Zhijiao Chen, Limei Qi, Yuan Yao, Junsheng Yu, Beijing University of Posts and Telecommunications, China; Xiaodong Chen, Queen Mary University of London, United Kingdom</i>	
WE-A4.2P.8: A FULLY ANALOG POWER-BASED DIRECTION-OF-ARRIVAL SENSOR	1355
<i>Nga Vu, Minh Q. Dinh, Minh Thuy Le, Hanoi University of Science and Technology, Viet Nam</i>	
WE-A4.2P.9: PLANAR SPIRAL RESONATORS FOR REMOTE TRACKING OF DISPLACEMENT	1357
<i>Mahmoud Elgeziry, Filippo Costa, Simone Genovesi, University of Pisa, Italy</i>	

WE-A4.2P.10: STATISTICAL CHARACTERIZATION OF SIGNALS BACKSCATTERED FROM STATIONARY GROUND TARGETS FOR RADAR REFRACTIVITY ESTIMATION	1359
<i>Brais Sánchez-Rama, Rubén Nocelo López, Verónica Santalla del Río, University of Vigo, Spain</i>	
 WE-SP.2P: MATERIAL INTELLIGENCE FOR NEXT GENERATION WIRELESS SYSTEMS	
WE-SP.2P.1: FROM TUNABLE AND RECONFIGURABLE TO SPACE-TIME MODULATED MULTIFUNCTIONAL METASURFACES	1361
<i>Xuchen Wang, Sergei Tretyakov, Aalto University, Finland</i>	
 TH-A1.1A: SLOTTED AND GUIDED WAVE ANTENNAS I	
TH-A1.1A.1: COMPACT COAXIAL WAVEGUIDE-BASED ANTENNA	1363
<i>Roshanak Zabihi, Christopher G. Hynes, Rodney G. Vaughan, Simon Fraser University, Canada</i>	
TH-A1.1A.2: ORBITAL ANGULAR MOMENTUM (OAM) CARRYING VORTEX WAVE GENERATION IN DIELECTRIC FILLED CIRCULAR WAVEGUIDE	1365
<i>Md Khadimul Islam, Arjuna Madanayake, Shubhendu Bhardwaj, Florida International University, United States</i>	
TH-A1.1A.3: DISPERSION RELATION EXTRACTION OF PERIODIC LEAKY-WAVE ANTENNAS USING COMPLEX EIGENMODES	1367
<i>João Guilherme Nizer Rahmeier, Mohamed K. Emara, Shulabh Gupta, Carleton University, Canada</i>	
TH-A1.1A.4: CONFORMAL MODULATED REACTANCE SURFACE SYNTHESIS FOR LEAKY-WAVE RADIATION	1369
<i>Hakjune Lee, Do-Hoon Kwon, University of Massachusetts Amherst, United States</i>	
TH-A1.1A.5: SINGLE-RIDGED WAVEGUIDE ANTENNA FOR X-BAND APPLICATIONS	1371
<i>Shilu Deng, Qiang-Ming Cai, Xin Cao, Yuyu Zhu, Feng Guo, Jun Fan, Southwest University of Science and Technology, China; Lei Han, Air Force Engineering University, China; Tao Liu, Sichuan Jiuzhou Electric Group Co., Ltd, China</i>	
TH-A1.1A.6: DESIGN OF RECTANGULAR WAVEGUIDE SLOT ARRAY ANTENNA	1373
<i>Tao Liu, Sichuan Jiuzhou Electric Group Co., Ltd, China; Shilu Deng, Qiang-Ming Cai, Xin Cao, Southwest University of Science and Technology, China; Lei Han, Air Force Engineering University, China</i>	
TH-A1.1A.7: NEAR-FIELD-FOCUSED 2-D FREQUENCY SCANNING RIDGE-GAP WAVEGUIDE SLOT ARRAY ANTENNA	1375
<i>Ya Fei Wu, Yu Jian Cheng, Hong Bin Wang, Yong Fan, University of Electronic Science and Technology of China, China</i>	
TH-A1.1A.8: NOVEL OFFSET COMPLEMENTARY SPLIT RING RESONATORS ON NARROW-WALL OF WAVEGUIDES FOR HPM APPLICATIONS	1377
<i>Mohammad Saif ur Rehman, Meiqin Liu, Chun Liang Liu, Xi'an Jiaotong University, China; Edl Schamiloglu, University of New Mexico, United States</i>	
TH-A1.1A.9: DESIGN OF RECTANGULAR WAVEGUIDE SLOT ANTENNA FOR ANTI-INTERFERENCE APPLICATIONS	1379
<i>Xuemeng Chen, Xianling Liang, Shanghai Jiao Tong University, China; Chong He, Shanghai Jiao Tong University, China; Qian Chen, Anhui University, China</i>	
TH-A1.1A.10: NOVEL PLANAR FIXED-BEAM LEAKY-WAVE ANTENNA WITH DUAL-BEAM RADIATION	1381
<i>Yongsheng Pan, Tianqi Ao, Yuandan Dong, University of Electronic Science and Technology of China, China</i>	

TH-A1.2A: MICROSTRIP ANTENNAS AND ARRAYS I

TH-A1.2A.1: A NOVEL MINIATURIZED MIMO MICROSTRIP PATCH ANTENNA ARRAY 1383 WITH EBG- AND SLOT-LOADING

DaHan Liao, Jin Dong, Teja Kuruganti, Oak Ridge National Laboratory, United States

TH-A1.2A.2: A FIRST IMPLEMENTATION OF A SINGLE-LAYER 4X4 BUTLER MATRIX 1385 ON FLEXIBLE PET USING PRINTED SILVER

Shakeeb Abdullah, NRC & Carleton University, Canada; George (Gaozhi) Xiao, NRC, Canada; Joseph Hyland Hyland, Wenyu Zhou, Rony Amaya, Carleton University, Canada

TH-A1.2A.3: A COMPACT MULTI-BAND MIMO ANTENNA..... 1387

Nicholas Russo, Constantinos Zekios, Stavros Georgakopoulos, Florida International University, United States

TH-A1.2A.4: NEW TOPOLOGY OF 8 X 8 COMPACT SINGLE-LAYER BUTLER MATRIX 1389 WITHOUT CROSSOVERS FOR MULTIBEAM ARRAY ANTENNA

Siwar Louati, Larbi Talbi, Khelifa Hettak, Halim Boutayeb, University of Quebec in Outaouais, Canada

TH-A1.2A.5: COMPACT PARALLEL COUPLED-LINE BANDPASS FILTER DEDICATED TO 1391 E-BAND HOMODYNE FRONT-END RADARS

Mansoor Dashti Ardakani, Serioja Ovidiu Tatu, INRS University, Canada; Reza Karimian, Shahrokh Ahmadi, Mona Zaghoul, George Washington University, United States; Javad Pourahmadazar, Concordia University, Canada

TH-A1.2A.6: MAGNETICALLY TUNABLE 28 GHZ ARRAY ANTENNA USING BAM/PDMS 1393 COMPOSITE

Renuka Bowrothu, Hae-in Kim, Connor Smith, David Arnold, Yong Kyu Yoon, University of Florida, United States

TH-A1.2A.7: COMPACT CIRCULARLY POLARIZED CPW-FED ANTENNA FOR GNSS 1395 APPLICATIONS

Alireza Gharaati, Azita Goudarzi, Rashid Mirzavand, University of Alberta, Canada

TH-A1.2A.8: CIRCUMFERENTIALLY SHORT-CIRCUITED CIRCULAR SECTOR PATCH 1397 ANTENNA WITH BROADENED BEAMWIDTH

Xiao-Hui Mao, Fei-Yan Ji, Shan-Shan Gu, Jian Yu, Wen-Jun Lu, Nanjing University of Posts and Telecommunications, China

TH-A1.2A.10: ANTENNA FOR SATELLITE AND UAV COMMUNICATIONS..... 1399

Diana Veronica Navarro-Mendez, Luis Fernando Carrera, Escuela Politécnica Nacional, Ecuador; Mariano Baquero-Escudero, Universitat Politècnica de Valencia, Spain

TH-A1.3A: WIDEBAND PHASED ARRAY ANTENNAS II

TH-A1.3A.1: TWO-WAY PASSIVE PHASED ARRAY ANTENNA FOR SIMULTANEOUS 1401 TRANSMIT AND RECEIVE SIGNALS

Zahra Rahimian Omam, Wael M. Abdel-Wahab, Naimeh Ghafarian, Suren Gigoyan, Safeddin Safavi-Naeini, University of Waterloo, Canada

TH-A1.3A.2: AN INHOMOGENEOUS 3D BLOCK LENS FOR HEMISPHERICAL SCAN 1403 COVERAGE IN PHASED ARRAYS

Pramod Srinivas Bhat, Amrithaa Seshadri, John Sanford, University of California, San Diego, United States

TH-A1.3A.3: HIGH GAIN 6X6 PATCH PHASED ARRAY ANTENNA FOR 1405 MILLIMETER-WAVE 5G APPLICATIONS AT 28 GHZ

Mohamed Lamine Seddiki, Mourad Nedil, University of Quebec at Abitibi-Temiscamingue (UQAT), Canada

TH-A1.3A.4: A MILLIMETER-WAVE WIDE BAND, WIDE SCANNING PHASED 1407 ARRAY-FED REFLECTOR ARCHITECTURE

Thomas Hand, Joseph Torres, Tonya Nielsen, Joshua Gustafson, Peter Moschetti, Lockheed Martin Space, United States

TH-A1.3A.5: ULTRA-WIDEBAND CRLH MAGNETO-ELECTRIC PHASED ARRAY	1409
<i>Senglee Foo, Huawei Technologies Canada, Canada</i>	
TH-A1.3A.6: DESIGN OF AN ULTRA-BROADBAND PHASED ARRAY USING SELF-SIMILAR ELEMENTS	1411
<i>Amrithaa Seshadri, Pramod Srinivas Bhat, John R. Sanford, University of California, San Diego, United States</i>	
TH-A1.3A.7: A WIDEBAND PHASED ARRAY ANTENNA WITH GRATING LOBE CANCELLATION	1413
<i>Jia-Chi Chieh, Naval Information Warfare Center Pacific, United States; Satish Sharma, Sanghmitro Das, San Diego State University, United States</i>	
TH-A1.3A.8: COMPACT PLANAR DESIGN OF 2-D BUTLER MATRIX FOR PASSIVE BEAMFORMING OF 2x2 PATCH ARRAY IN D-BAND	1415
<i>Kai-Qi Huang, Madhavan Swaminathan, Georgia Institute of Technology, United States</i>	
TH-A1.3A.10: A SYMMETRICALLY STACKED PHASED ARRAY EXHIBITING ENHANCED SPHERICAL COVERAGE CDF FOR MMWAVE CELLULAR HANDSETS WITH METALLIC FRAME	1417
<i>Junho Park, Ahmed Abdelmottaleb Omar, Jonghyun Kim, Jaehyun Choi, Wonbin Hong, Pohang University of Science and Technology, Korea (South); Beakjun Seong, Jongwoo Lee, Kreemo Inc, Korea (South)</i>	
 TH-UB.1A: FREQUENCY-DOMAIN METHODS	
TH-UB.1A.8: AUGMENTATION OF HYBRID INTEGRAL EQUATIONS FOR LOW-FREQUENCY ANALYSIS OF DIELECTRIC OBJECTS	1419
<i>Li Zhang, Mei Song Tong, Tongji University, China</i>	
TH-UB.1A.9: ACCURACY IMPROVEMENT OF THE ALGEBRAIC FAST METHODS FOR THE VOLUME-SURFACE INTEGRAL EQUATION	1421
<i>Han Wang, Mingjie Pang, Hai Lin, State Key Laboratory of CAD&CG, China</i>	
TH-UB.1A.10: FAST CHARACTERISTIC MODE ANALYSIS FOR MATERIAL BODY WITH MULTILEVEL FAST MULTIPOLE ALGORITHM	1423
<i>Jihong Gu, Chao-Fu Wang, National University of Singapore, Singapore</i>	
 TH-A5.1A: 3D PRINTED ANTENNAS AND STRUCTURES	
TH-A5.1A.1: LOW-COST CIRCULARLY POLARIZED MILLIMETER-WAVE ANTENNA USING 3D ADDITIVE MANUFACTURING DIELECTRIC POLARIZER	1425
<i>Yazan Al-Alem, Yahia Antar, The Royal Military College of Canada, Canada; Syed Sifat, Ahmed Kishk, Concordia University, Canada; Gaozhi (George) Xiao, National Research Council of Canada, Canada</i>	
TH-A5.1A.2: 3D PRINTED WIDEBAND MONOPOLE ANTENNAS	1427
<i>Kevin Leong, Evan Nguyen, Jesse Tice, Vesna Radisic, Northrop Grumman, United States</i>	
TH-A5.1A.3: 3D METAL PRINTED BROADBAND X-BAND SEPTUM POLARIZER.....	1429
<i>Avinash Sharma, The Johns Hopkins University Applied Physics Laboratory, United States</i>	
TH-A5.1A.4: DESIGN OF 3D-PRINTED AIR-LIKE STRUCTURAL SUPPORTS FOR MEANDERLINE POLARIZERS AT L-BAND	1431
<i>Songyi Yen, Gaeron R. Friedrichs, Ljubodrag Boskovic, Dejan Filipovic, University of Colorado Boulder, United States; Erik Lier, Tom Hand, Neill Kefauver, Lockheed Martin Space, United States</i>	
TH-A5.1A.5: ON THE EFFECT OF VARIABLE THICKNESS OF CONDUCTIVE TRACE FOR 3D PRINTED ANTENNAS	1433
<i>Sagar Hossain, Pratik Sinai K., Sayan Roy, South Dakora School of Mines & Technology, United States</i>	

TH-A5.1A.6: ON THE MANUFACTURING PROCESS OF A 3D PRINTED PATCH ANTENNA WITH VARIABLE TRACE HEIGHT	1435
<i>Pratik Sinai K., Sagar Hossain, Sayan Roy, South Dakota School of Mines & Technology, United States</i>	
TH-A5.1A.7: ON THE COUPLING BETWEEN A TRANSMISSION LINE ADDITIVELY MANUFACTURED WITH ELECTRIFIED FILAMENT AND A COPPER STEPPED IMPEDANCE FILTER IN THE S-BAND	1437
<i>Henry Wolf, Dipankar Mitra, Ryan Striker, Jerika Cleveland, Benjamin Braaten, North Dakota State University, United States</i>	
TH-A5.1A.8: APERTURE-COUPLED FEED FOR SURFACE-MOUNTED ADDITIVELY MANUFACTURED ARRAYS	1439
<i>Brian Gibbons, R. Henry Tillman, Jason Jones, Michael Presley, Johns Hopkins Applied Physics Laboratory, United States</i>	
TH-A5.1A.9: ON CHANGING THE PHASE OF THE RADIATED FIELD FROM A MICROSTRIP PATCH ANTENNA USING A 3D-PRINTED CONFORMAL METASURFACE	1441
<i>Ruisi Ge, Ryan Striker, Benjamin Braaten, North Dakota State University, United States</i>	
TH-A5.1A.10: DESIGN METHOD FOR BOWTIE ANTENNA WITH ENHANCED BANDWIDTH AND CONTROLLABLE GAIN USING 3D-PRINTING TECHNOLOGY	1443
<i>Milad Mirzaee, Yanghyo Kim, Stevens Institute of Technology, United States</i>	
 TH-A3.1A: OPTIMIZATION METHODS IN EM DESIGNS I	
TH-A3.1A.1: PERFORMANCE OF RANDOM FOREST ALGORITHM IN HIGH-DIMENSIONAL SURROGATE MODELING OF ANTENNAS	1445
<i>Md Rayhan Khan, Constantinos L. Zekios, Shubhendu Bhardwaj, Stavros V. Georgakopoulos, Florida International University, United States</i>	
TH-A3.1A.2: SOME NUMERICAL EXPERIMENTS ON ENHANCED-DIRECTIVITY DIELECTRIC RESONATOR ANTENNAS	1447
<i>Mohammed Nassor, Derek McNamara, Mustapha Yagoub, University of Ottawa, Canada; Hamad Alroughani, Kuwait University, Kuwait</i>	
TH-A3.1A.3: CHOICE OF OPTIMIZATION PARAMETERS IN AN INVERSE METASURFACE DESIGN ALGORITHM	1449
<i>Tianke Qiu, Trevor Brown, Puyan Mojabi, University of Manitoba, Canada</i>	
TH-A3.1A.4: ADAPTIVE MOMENT (ADAM) ESTIMATION OPTIMIZATION APPLIED TO AVM-FEM FOR RAPID CONVERGENCE	1451
<i>Botian Zhang, Yahya Rahmat-Samii, University of California, Los Angeles, United States</i>	
TH-A3.1A.5: NONUNIFORM PLANAR ARRAY SYNTHESIS INCLUDING MUTUAL COUPLING EFFECTS BASED ON ANN	1453
<i>Yu Gong, Shaoqiu Xiao, Yu Zheng, Bingzhong Wang, University of Electronic Science and Technology of China, China</i>	
TH-A3.1A.6: NEAR FIELD SAMPLING COMPRESSION BASED ON MATRIX CUR DECOMPOSITION	1455
<i>Chunhua Wu, Huapeng Zhao, Jun Hu, University of Electronic Science and Technology of China, China</i>	
TH-A3.1A.7: AN IMPROVED PARTICLE SWARM OPTIMIZATION FOR ANTENNA DESIGN	1457
<i>Ruoyu Cui, Zhonglei Mei, Tiaoming Niu, Lanzhou University, China</i>	
TH-A3.1A.8: FEEDLESS MODE TRACKING OPTIMIZATION OF METASURFACE ANTENNA USING CHARACTERISTIC MODE ANALYSIS	1459
<i>Yu Kuang, Zhi Ning Chen, National University of Singapore, Singapore; Qingsha S. Cheng, Southern University of Science and Technology, China</i>	

TH-A3.1A.9: THE EDGE DIFFRACTION EFFECT ON THE RADIATION PATTERN OF ELEMENTS FOR ANTENNA ARRAY SYNTHESIS	1461
<i>Xianjie Liu, Huapeng Zhao, Jun Hu, University of Electronic Science and Technology of China, China</i>	
 TH-SP.1A: TRANSFORMING ELECTROMAGNETICS EDUCATION AFTER COVID	
TH-SP.1A.1: COVID-19 WAKE-UP CALL: TECHNOLOGY-BASED ELECTROMAGNETIC EDUCATION REVISITED	1463
<i>Magdy F. Iskander, Zhengqing Yun, University of Hawaii at Manoa, United States</i>	
TH-SP.1A.2: MAINTAINING AN ACTIVE LEARNING ENVIRONMENT DURING A PANDEMIC	1465
<i>Andrew Chrysler, Idaho State University, United States</i>	
TH-SP.1A.3: UNIVERSITY OF UTAH HYBRID-FLEXIBLE EDUCATION	1467
<i>Cynthia M. Furse, James Nagel, Berardi Sensale-Rodriguez, Jamesina Simpson, University of Utah, United States</i>	
TH-SP.1A.4: EVALUATING ORAL EXAMS IN LARGE UNDERGRADUATE ENGINEERING COURSES	1469
<i>Curt Schurgers, Saharnaz Baghdadchi, Marko Lubarda, Maziar Ghazinejad, Alex Phan, Huihui Qi, University of California, San Diego, United States</i>	
TH-SP.1A.5: CONVERSION OF ELECTROMAGNETICS COURSES TO SYNCHRONOUS ONLINE DELIVERY USING ACTIVE AND PROBLEM-BASED LEARNING	1471
<i>Branislav Notaras, Colorado State University, United States</i>	
TH-SP.1A.8: MOBILE APPS, ONLINE ASSESSMENTS AND EXAMINATION FOR ELECTROMAGNETICS EDUCATION	1473
<i>Eng Leong Tan, Nanyang Technological University, Singapore</i>	
TH-SP.1A.9: EFFECTIVE ELECTROMAGNETICS TEACHING, NO MATTER WHAT!	1475
<i>Hugo G. Espinosa, Griffith University, Australia; Levent Sevgi, Istanbul OKAN University, Turkey</i>	
TH-SP.1A.10: ONLINE EM TEACHING: E-XAM TOOL FOR STUDENTS' SELF-EVALUATION AND FINAL ASSESSMENT	1477
<i>Alessandro Polo, Nicola Anselmi, Renzo Azaro, Giorgio Gottardi, Mohammad Abdul Hannan, Giacomo Oliveri, Lorenzo Poli, Paolo Rocca, Marco Salucci, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy; Hanen Ahmadi, ELEDIA@Innov'COM - Sup'COM, Italy; Jin Huang, Peng Li, ELEDIA@XIDIAN - Xidian University, Italy; Maokun Li, ELEDIA@TSINGHUA - Tsinghua University, Italy; Sotirios Goudos, ELEDIA@AUTH - Aristotle University of Thessaloniki, Italy; Shiwen Yang, ELEDIA@UESTC - UESTC, Italy</i>	
 TH-A5.2A: SOFTWARE DEFINED/COGNITIVE RADIO	
TH-A5.2A.1: A MACHINE LEARNING ENHANCED SMALL CIRCULAR ARRAY FOR AMPLITUDE ONLY DIRECTION FINDING	1479
<i>Gaeron Friedrichs, Mohamed Elmansouri, Dejan Filipovic, University of Colorado Boulder, United States</i>	
TH-A5.2A.2: STEALTH COMMUNICATION (SC) FOR 5G/6G WIRELESS TO ENSURE SPECTRAL EFFICIENCY AND PRIVACY/CYBERSECURITY	1481
<i>Johnson Wang, Wang Electro-Opto Corporation (weo.com), United States</i>	
TH-A5.2A.3: PHYSICAL LAYER WIRELESS SECURITY THROUGH THE ROTATION OF POLARIZED ANTENNAS	1483
<i>Brandon Starks, Karsen Robinson, Binod Sitaula, Andrew Chrysler, Idaho State University, United States</i>	
TH-A5.2A.4: ROBUST BEAMFORMING FOR CONFORMAL ANTENNA ARRAYS USING SOFTWARE DEFINED RADIO	1485
<i>Jiahao Wang, Koenraad Mouthaan, National University of Singapore, Singapore</i>	

TH-A5.2A.5: A RECONFIGURABLE PHASED ARRAY ARCHITECTURE WITH REDUCED RF PORTS BASED ON SOFTWARE-DEFINED RADIO FOR BEYOND 5G APPLICATIONS 1487
Bumhyun Kim, Junho Park, Dongkwon Choi, Wonbin Hong, Pohang University of Science and Technology, Korea (South); Sumin Yun, JaeHoon Jo, Hosaeng Kim, Samsung Electronics, Korea (South)

TH-SP.2A: ARTIFICIAL INTELLIGENCE AND DEEP LEARNING: A NEW ERA IN IMAGING AND INVERSE SCATTERING

TH-SP.2A.1: DEEP LEARNING ENHANCED JOINT INVERSION OF MULTIPHYSICS DATA WITH NONCONFORMING DISCRETIZATION 1489
Yanyan Hu, Jiefu Chen, Xuqing Wu, University of Houston, United States; Yueqin Huang, Cyentech Consulting LLC, United States

TH-SP.2A.2: CONVOLUTIONAL NEURAL NETWORKS FOR RADIO SOURCE DETECTION 1491
Jayakrishnan Vijayamohanan, Arjun Gupta, Oameed Noakoasteen,, Christos Christodoulou, University of New Mexico, United States

TH-SP.2A.3: PREDICTING MRI RF EXPOSURE FOR PASSIVE IMPLANTABLE MEDICAL DEVICES USING A MESH-BASED CONVOLUTIONAL NEURAL NETWORK 1493
Qianlong Lan, Jianfeng Zheng, Jiajun Chang, Ran Guo, Ji Chen, University of Houston, United States; Wolfgang Kainz, US Food and Drug Administration, United States

TH-SP.2A.4: PREDICTION OF ACTIVE IMPLANTABLE MEDICAL DEVICE ELECTROMAGNETIC MODELS USING A NEURAL NETWORK 1495
Jiajun Chang, Qianlong Lan, Ran Guo, Jianfeng Zheng, Ji Chen, University of Houston, United States; Wolfgang Kainz, US Food and Drug Administration, United States

TH-SP.2A.6: DATA-DRIVEN ELECTROMAGNETIC SCALAR FIELD ESTIMATION OF A PATCH ANTENNA USING DEEP CONVOLUTIONAL NEURAL NETWORK 1497
Md Rayhan Khan, Constantinos L. Zekios, Shubhendu Bhardwaj, Stavros V. Georgakopoulos, Florida International University, United States

TH-SP.2A.7: SEQUENTIAL DEEP LEARNING FOR IN-HOME ACTIVITY MONITORING USING MM-WAVE FMCW RADAR 1499
Hajar Abedi, Ahmad Ansariyan, Plinio Morita, Jennifer Boger, Alexander Wong, George Shaker, University of Waterloo, Canada

TH-SP.2A.8: A MACHINE LEARNING-BASED MODEL FOR FAST RECOGNITION OF ORBITAL ANGULAR MOMENTUM MODES 1501
Jia-jing Sun, Sheng Sun, Jun Hu, University of Electronic Science and Technology of China, China

TH-SP.2A.10: ELECTROMAGNETIC INVERSE SCATTERING BASED ON DEEP LEARNING..... 1503
Renzhou Gui, Tianyu Tang, Juan Li, Huilin Zheng, Xiaohong Ji, Jun Zhao, Xiaomeng Zhao, Tongji University, China

TH-SP.3A: RECENT ADVANCES IN GENERALIZED SHEET TRANSITION CONDITIONS (GSTCS): THEORY, CAPABILITIES, REALIZATIONS, AND APPLICATIONS

TH-SP.3A.1: ADVANCES IN BIANISOTROPIC GSTC-BASED METASURFACES 1505
Guillaume Lavigne, Polytechnique Montreal, Canada; Christophe Caloz, KU Leuven, Belgium

TH-SP.3A.2: STATIC AND DYNAMIC BEAMFORMING WITH HUYGENS' METASURFACE ANTENNAS 1507
Vasileios Ataloglou, Minseok Kim, George Eleftheriades, University of Toronto, Canada

TH-SP.3A.3: INTERFACE FIELD OPTIMIZATION FOR WIDE-ANGLE METASURFACE REFRACTORS IN TM POLARIZATION	1509
<i>Do-Hoon Kwon, University of Massachusetts Amherst, United States</i>	
TH-SP.3A.4: APPLYING GSTCS IN ELECTROMAGNETIC SURFACE INVERSE DESIGN USING OPTIMIZATION AND MACHINE LEARNING	1511
<i>Stewart Pearson, Parinaz Naseri, Zhengzheng Wang, Sean Hum, University of Toronto, Canada</i>	
TH-SP.3A.5: ACCURATE MODELING AND RAPID SYNTHESIS METHODS FOR BEAMFORMING METASURFACES	1513
<i>Jordan Budhu, Luke Szymanski, Anthony Grbic, University of Michigan, United States</i>	
TH-SP.3A.6: INVESTIGATION INTO CURVILINEAR METASURFACES USING IE-GSTCS WITH NORMAL SURFACE POLARIZABILITIES	1515
<i>Ville Tiukuvaara, Tom Smy, Shulabh Gupta, Carleton University, Canada</i>	
TH-SP.3A.7: PRIMARY SURFACE TRANSITION MODULES FOR METASURFACE DESIGNS	1517
<i>Xiao Jia, Fan Yang, Tsinghua University, China; Yinghong Wen, Beijing Jiaotong University, China</i>	
TH-SP.3A.8: STRAIGHTFORWARD EMULATION OF GENERALIZED SHEET TRANSITION CONDITIONS (GSTCS) IN COMMERCIAL SOLVERS USING ELECTRICALLY-THICK FABRY-PEROT METASURFACES	1519
<i>Sherman W. Marcus, Ariel Epstein, Technion - Israel Institute of Technology, Israel</i>	
TH-SP.3A.9: CALCULATION OF FAR-FIELD SCATTERING FROM NONUNIFORM REFLECTIVE METASURFACES: A CRITICAL PERSPECTIVE	1521
<i>Ana Díaz-Rubio, Sergei Tretyakov, Aalto University, Finland</i>	
TH-SP.3A.10: SIMULATION OF SHAPED METASURFACE ANTENNAS, INCLUDING THE FEEDER COUPLING	1523
<i>Jean Cavillot, Modeste Bodehou, Christophe Craeye, Université catholique de Louvain, Belgium</i>	
 TH-UB.3A: PROPAGATION, SCATTERING, IMAGING AND REMOTE SENSING I	
TH-UB.3A.8: GROUND SURFACE CLUTTER SUPPRESSION FOR GPR	1525
<i>Motoyuki Sato, Yoshitada Morita, Tohoku University, Japan</i>	
TH-UB.3A.9: DEPOLARIZATION CHARACTERISTICS OF ROUGH MATERIALS AT MM-WAVE FREQUENCIES	1527
<i>Minghao Ren, Xi Liao, Yang Wang, School of Communication and Information Engineering Chongqing University of Posts and Telecommunications, China; Jie Zhang, University of Sheffield, China</i>	
TH-UB.3A.10: AN ANALYTICAL APPROACH FOR THE GENERATION OF SECOND-ORDER FLOQUET-BLOCH MODE FOR ANOMALOUS REFLECTION USING METAGRATINGS	1529
<i>Dhrubajyoti Bhattacharya, Indian Institute of Information Technology Bhagalpur, India; Debidas Kundu, Indian Institute of Technology Roorkee, India</i>	
 TH-A5.3A: MILLIMETER-WAVE WAVEGUIDE AND CAVITY ANTENNAS I	
TH-A5.3A.1: A WIDEBAND CP CAVITY-BACKED SIW ANTENNA FED BY PRINTED-RGW TECHNOLOGY	1531
<i>Zahra Mousavirazi, Mohamed Mamdouh M. Ali, Tayeb A. Denidni, Institut national de la recherche scientifique (INRS), Canada; Vahid Rafei, GraphenePI company, Turkey</i>	
TH-A5.3A.2: A HIGH-ORDER MODE LEAKY WAVE ANTENNA	1533
<i>Gian P. Carrara, Constantinos L. Zekios, Stavros V. Georgakopoulos, Florida International University, United States</i>	

TH-A5.3A.3: A DUAL HIGH-ORDER MODE LEAKY WAVE ANTENNA	1535
<i>Gian P. Carrara, Constantinos L. Zekios, Stavros V. Georgakopoulos, Florida International University, United States</i>	
TH-A5.3A.4: METAL-COATED FLEXIBLE DIELECTRIC WAVEGUIDES FOR	1537
MILLIMETER-WAVE MULTI-LANE WIRELINE COMMUNICATIONS	
<i>Milad Mirzaee, Yanghyo Kim, Stevens Institute of Technology, United States</i>	
TH-A5.3A.5: MILLIMETER-WAVE QUADRUPLLET FILTERING-ANTENNA	1539
<i>Matthew Brown, Carlos Saavedra, Queen's University, Canada</i>	
 TH-A3.2A: TIME-DOMAIN METHODS II	
TH-A3.2A.1: CONFORMAL PERFECTLY MATCHED LAYER FOR MATRIX-FREE	1541
TIME-DOMAIN METHOD IN UNSTRUCTURED MESHES	
<i>Vinicius C. do Nascimento, Dan Jiao, Purdue University, United States</i>	
TH-A3.2A.2: FDTD MODELING OF TRANSPARENT CONDUCTING OXIDE	1543
METASURFACES FOR NEAR INFRARED REFLECTION CONTROL	
<i>Rosmin Elsa Mohan, Thomas Ang, Eng Huat Khoo, Agency for Science, Technology and Research (A*STAR), Singapore</i>	
TH-A3.2A.3: MULTI-GPU BASED LEAPFROG CDI-FDTD METHOD FOR LARGE-SCALE	1545
ELECTROMAGNETIC PROBLEMS	
<i>Shuo Liu, Bin Zou, Harbin Institute of Technology, China; Eng Leong Tan, Nanyang Technological University, Singapore</i>	
TH-A3.2A.4: WAVEFRONT COMPUTING IN SOLIDS: THE DESIGN PARAMETERS AND	1547
THE IDEAL LENS	
<i>Zaifeng Yang, Bui Viet Phuong Bui, Zaw Zaw Oo Oo, Png Ching Eng Png, Institute of High Performance Computing, Singapore; Eldwin Jiaqiang Ng, Kevin Chai Tshun Chuan Chai, Institute of Microelectronics, Singapore; Amit Lal, Cornell University, United States</i>	
TH-A3.2A.5: MONOCHROMATIC NEAR FIELD CALCULATION OF APERTURE	1549
ANTENNA AND ITS ACCURACY	
<i>Vladislav Kopytin, Nikolay Lysenko, Grigory Uskov, Voronezh State University, Russia; Sergey Skulkin, National Research University Higher School of Economics, Russia</i>	
 TH-A1.1P: SLOTTED AND GUIDED WAVE ANTENNAS II	
TH-A1.1P.1: LOW-PROFILE HIGH-GAIN LEAKY-WAVE ANTENNA WITH A	1551
PHASE-CORRECTING METASURFACE	
<i>Xiaolei Ren, Huaqiao University, China; Yuehe Ge, Zhizhang Chen, Fuzhou University, China</i>	
TH-A1.1P.2: A RECTANGULAR WAVEGUIDE SLOT FILTERING LINEAR ARRAY	1553
ANTENNA	
<i>Xuemeng Chen, Xianling Liang, Shanghai Jiao Tong University, China</i>	
TH-A1.1P.3: A WIDEBAND SLOT PAIR ARRAY BASED ON SIDL TECHNOLOGY FOR 5G	1555
MILLIMETER-WAVE APPLICATION	
<i>Zi-Jun Guo, Zhang-Cheng Hao, Southeast University, China</i>	
TH-A1.1P.4: HIGH-APERTURE-EFFICIENCY AND SHORT-LONGITUDINAL LENGTH 2×2	1557
SQUARE HORN ANTENNA ARRAY	
<i>Weihua Tan, Rui Xu, Zhongxiang Shen, Nanyang Technological University, Singapore; Jian Lu, National University of Singapore, Singapore</i>	
TH-A1.1P.5: COMPACT HOLOGRAPHIC ANTENNA USING PILLBOX FEEDING	1559
STRUCTURE	
<i>Chan Yeong Park, Donghyun Kim, Seung Hun Cha, Young Joong Yoon, Yonsei University, Korea (South)</i>	

**TH-A1.1P.6: BOW-TIE SLOT ANTENNA LOADED WITH SUPERSTRATE LAYERS FOR 1561
5G/6G APPLICATIONS**

Mohamed Salah El-Din, Hadia El Hennawy, Ain Shams University, Egypt; Shoukry Shams, Concordia University, Egypt; Abdelmegid Allam, German University in Cairo, Egypt; Mohamed Fathy, Abdelhamid Gafaar, Arab Academy for Science and Technology, Egypt

**TH-A1.1P.7: ONE-SIDED LEAKY-WAVE ANTENNA WITH TM SURFACE WAVE 1563
FEEDING AND OPEN-STOPBAND SUPPRESSION**

Maksim Kuznetsov, Symon Podilchak, Edinburgh University, United Kingdom; Davide Comite, Paolo Burghignoli, Alessandro Galli, Sapienza University of Rome, Italy; Paolo Baccarelli, Roma Tre University, Italy; Alois Freundorfer, Yahia Antar, The Royal Military College of Canada, Canada

**TH-A1.1P.9: A DUAL CIRCULARLY POLARIZED ANTENNA ARRAY WITH COMPACT 1565
FEEDING NETWORK**

Wenyu Zhao, Xiuping Li, Zihang Qi, Beijing University of Posts and Telecommunications, China

**TH-A1.1P.10: A HORIZONTALLY POLARIZED OMNIDIRECTIONAL ANTENNA FOR 1567
LTE APPLICATIONS**

Sichao Wen, Yizhen Xu, Yuandan Dong, University of Electronic Science and Technology of China, China

TH-A1.2P: MICROSTRIP ANTENNAS AND ARRAYS II

**TH-A1.2P.1: COMPACT FILTERING PLANAR INVERTED-F ANTENNA WITH TWO 1569
RADIATION NULLS**

Qun Li, Shaoqiu Xiao, Sun Yat-sen University, China

**TH-A1.2P.2: ENG-TL BASED TWO-ELEMENT DIVERSITY ANTENNA WITH 1571
METASURFACE SHIELDING FOR HIGH ISOLATION**

Mohammad Ameen, Raghvendra Kumar Chaudhary, Indian Institute of Technology (Indian School of Mines), Dhanbad, India

**TH-A1.2P.3: METAMATERIAL-BASED DUAL-MODE MONOPOLE-LIKE 1573
MULTIFUNCTIONAL ANTENNA**

Liyong Nie, Zhaoneng Jiang, Meibin Qi, Hefei University of Technology, China

**TH-A1.2P.4: DUAL-RESONANT PATCH ANTENNA WITH TILTED CIRCULARLY 1575
POLARIZED BEAM**

Jian Yu, Shan-Shan Gu, Xiao-Hui Mao, Wen-Jun Lu, Nanjing University of Posts and Telecommunications, China

**TH-A1.2P.5: IMPROVEMENT OF RECTANGULAR MICROSTRIP ANTENNA BY MODE 1577
SPECIFIC META ELEMENT CONCEPT**

Debi Dutta, Debatosh Guha, University of Calcutta, India; Chandrakanta Kumar, U. R. Rao Satellite Centre, India

**TH-A1.2P.6: A COMPACT SERIES ARRAY FOR INTELLIGENT TRANSPORTATION 1579
SYSTEM IN C-BAND**

Alessandro Cidronali, Giovanni Collodi, Stefano Maddio, Giuseppe Pelosi, Stefano Selleri, University of Florence, Italy

**TH-A1.2P.7: SIZE OPTIMIZED ANTENNA-IN-PACKAGE WITH QUASI-ISOTROPIC 1581
RADIATION PATTERN**

Maria Bermudez Arboleda, Kirill Klionovski, Atif Shamim, King Abdullah University of Science and Technology, Saudi Arabia

**TH-A1.2P.8: A BIODEGRADABLE TEXTILE-BASED GRAPHENE ANTENNA FOR 5G 1583
WEARABLE APPLICATIONS**

Anikó Németh, Syeda Fizzah Jilani, Aberystwyth University, United Kingdom; Shaker Alkaraki, Queen Mary University of London, United Kingdom; Qammer H. Abbasi, University of Glasgow, United Kingdom

TH-A1.2P.9: LOW-SCS PHASED ARRAY BASED ON OPTIMIZED RLC CIRCUIT 1585

Peng-Fa Li, Shi-Wei Qu, Shiwen Yang, University of Electronic Science and Technology of China, China

TH-A1.2P.10: A VERY LOW PROFILE WIDEBAND PATCH ARRAY WITH WIDE SCAN ABILITY	1587
<i>Tutku Abanuzoğlu, Burak Alptuğ Yılmaz, ASELSAN Incorporated, Turkey</i>	
 TH-A1.3P: REFLECTOR AND REFLECTARRAY ANTENNAS I	
TH-A1.3P.1: A WIDEBAND REFLECTARRAY ADOPTING QUASI-SELF-COMPLEMENTARY ELEMENTS	1589
<i>Peng Ning, Hong Zhu, Lu Guo, Nanjing University of Science and Technology, China</i>	
TH-A1.3P.2: ANALYSIS AND DESIGN OF THZ 1-BIT RRA ELEMENT WITH SERIES INDUCTANCE	1591
<i>Xiaotian Pan, Xiaochu Nie, Beijing Institute of Radio Measurement, China; Fan Yang, Tsinghua University, China</i>	
TH-A1.3P.3: DESIGN, SIMULATION, AND MEASUREMENT OF PASSIVE MICROWAVE REFLECTORS OPTIMIZED FOR FIELD COVERAGE	1593
<i>Gokhan Karaova, Ozgur Ergul, Middle East Technical University, Turkey</i>	
TH-A1.3P.4: HIGH-EFFICIENCY REFLECTARRAY USING DIELECTRIC RESONATOR ELEMENTS	1595
<i>Andrea Massaccesi, Michele Beccaria, Paola Pirinoli, Politecnico di Torino, Italy</i>	
TH-A1.3P.5: E-BAND POINT-TO-MULTIPOINT ANTENNAS BASED ON WIDE-SCAN FOCAL PLANE ARRAYS	1597
<i>Roel Budé, Amr Elsakka, Meerten Versluis, Ulf Johannsen, Bart Smolders, Eindhoven University of Technology, Netherlands</i>	
TH-A1.3P.7: A CIRCULAR REFLECTARRAY FOR OAM GENERATION AT TERAHERTZ REGIME FOR 6G APPLICATIONS	1599
<i>Ali Ali, Mohsen Khalily, Ali Araghi, Seyed Ehsan Hosseinejad, Rahim Tafazolli, University of Surrey, United Kingdom</i>	
TH-A1.3P.8: NON-RADIATING SOURCES: A NEW POWERFUL RECIPE FOR DESIGNING REFLECTARRAY ANTENNAS	1601
<i>Giacomo Oliveri, Francesco Zardi, Marco Salucci, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy</i>	
TH-A1.3P.9: BEAM RECONFIGURABLE REFLECTIVE METASURFACE FOR INDOOR WIRELESS COMMUNICATIONS	1603
<i>Qiuyan Liang, Buon Kiong Lau, Lund University, Sweden</i>	
TH-A1.3P.10: GRAPHENE-BASED RECONFIGURABLE REFLECTING SURFACE FOR FUTURE COMMUNICATIONS	1605
<i>Salman Behboudi Amlashi, Mohsen Khalily, Tim Brown, Pei Xiao, Rahim Tafazolli, University of Surrey, United Kingdom</i>	
 TH-A1.4P: MULTI-BAND ANTENNAS I	
TH-A1.4P.1: A COMPACT, DUAL-BAND, POLARIZATION-RECONFIGURABLE ANTENNA FOR PHASED ARRAY APPLICATIONS	1607
<i>Aoyun Meng, Xiaoming Chen, Ming-Chun Tang, Chongqing University, China</i>	
TH-A1.4P.2: INTEGRATED LOOP ANTENNA FOR SMARTWATCH	1609
<i>Junliang Li, Zhao Wang, Jingchen Wang, Mark Leach, Rui Pei, Eng Gee Lim, Yongmin Luo, Xi'an-jiaotong Liverpool University, China</i>	
TH-A1.4P.3: DUAL-BAND SHARED-APERTURE MICROSTRIP ANTENNA ARRAY FOR 4G/5G APPLICATIONS	1611
<i>Shuyu Wang, Wangyu Sun, Yuxin Ren, Yuhang Zhang, Yue Li, Tsinghua University, China</i>	

TH-A1.4P.4: A MULTIBAND QUASI-YAGI ANTENNA FOR WIFI/BLUETOOTH/WIMAX/ZIGBEE APPLICATIONS	1613
<i>Goksel Turan, Hayrettin Odabasi, Eskisehir Osmangazi University, Turkey</i>	
TH-A1.4P.5: A LOW PROFILE DUAL BAND (28/38GHZ) AND DUAL POLARIZED ANTENNA FOR 5G MIMO APPLICATIONS	1615
<i>Panagiotis Petroutsos, Stavros Koulouridis, University of Patras, Greece</i>	
TH-A1.4P.6: A COMPACT TRI-PORT ANTENNA SYSTEM FOR COGNITIVE RADIO APPLICATIONS	1617
<i>Naveen Kumar, Institut de Recherche Technologique Railenium, France; Divitha Seetharamdoo, M. Hassanein Rabah, Universite Gustave Eiffel, France</i>	
TH-A1.4P.7: A FOUR-BAND CIRCULARLY POLARIZED PATCH ANTENNA FOR APPLICATIONS IN S- AND C-BAND	1619
<i>Stefano Maddio, Giuseppe Pelosi, Monica Righini, Stefano Selleri, University of Florence, Italy</i>	
TH-A1.4P.8: GRAPHENE PRINTED ANTENNA ARRAY FOR WIRELESS COMMUNICATION APPLICATIONS	1621
<i>Xinyao Zhou, Ting Leng, Kewen Pan, Zhirun Hu, University of Manchester, United Kingdom; Mahmoud Abdalla, Military Technical College, Egypt</i>	
TH-A1.4P.9: DUAL-BAND PLANAR ANTENNA WITH AMC SCREEN FOR ON-BODY APPLICATIONS	1623
<i>Eva Antonino-Daviu, Carlos Alexander Chuquitarco-Jimenez, Ferdaous Abderrazak, Ferdaous Ferrando-Bataller, Universitat Politecnica de Valencia, Spain</i>	
TH-A1.4P.10: DESIGN OF A DUAL-POLARIZED DUAL-BAND AND WIDEBAND MULTI-RING MICROSTRIP ANTENNA FED BY TWO L-PROBES WITH A CAVITY STRUCTURE FOR STABLE GAIN CHARACTERISTICS	1625
<i>Yuki Kimura, Sakuyoshi Saito, Yuichi Kimura, Saitama University, Japan</i>	
 TH-A5.1P: PRINTED AND CHIP ANTENNAS	
TH-A5.1P.4: 3D PRINTED WIDEBAND DIELECTRIC ROD ANTENNA WITH SURFACE WAVE MANIPULATION AT A LOW COST	1627
<i>Sheng Huang, King Yuk Chan, Rodica Ramer, University of New South Wales, Australia</i>	
TH-A5.1P.5: A W-BAND DIELECTRIC LOADED ANTENNA WITH SUM AND DIFFERENCE BEAMS FOR UNMANNED AERIAL VEHICLE	1629
<i>Zhijiao Chen, Wei Song, Limei Qi, Yuan Yao, Junsheng Yu, Beijing University of Posts and Telecommunications, China; Xiaodong Chen, Queen Mary University of London, United Kingdom</i>	
TH-A5.1P.6: KA-BAND 3D PRINTED WIDEBAND DUAL-POLARIZED ANTENNA ARRAY FED BY DIFFERENTIAL FEEDING CAVITY	1631
<i>Fanqi Sun, Yujian Li, Junhong Wang, Beijing Jiaotong University, China</i>	
TH-A5.1P.7: A COMPACT WAVEGUIDE-BASED REFLECTION-TYPE PHASE SHIFTER	1633
<i>Ankang Liu, Jian Lu, Peng Khiang Tan, Theng Huat Gan, Sek Meng Sow, National University of Singapore, Singapore</i>	
TH-A5.1P.8: ELECTRICALLY SMALL SURFACE MOUNTABLE CHIP ANTENNA FOR 5G WIMAX / WLAN APPLICATIONS	1635
<i>Jyotibhusan Padhi, Shrikanth Reddy, Indian Institute of Technology Mandi, India</i>	
TH-A5.1P.9: A D-BAND STACKED PATCH ANTENNA WITH AIR TRENCHES IN BICMOS TECHNOLOGY	1637
<i>Wael Ahmad, IHP, Germany; Sebastian Schmitz, Rohde & Schwarz, Germany; Herman Ng, Karlsruhe University of Applied Sciences, Germany; Dietmar Kissinger, Ulm University, Germany</i>	

TH-A5.1P.10: A FOLDED WAVEGUIDE REFLECTARRAY ANTENNA.....	1639
<i>Ankang Liu, Jian Lu, Peng Khiang Tan, Theng Huat Gan, Sek Meng Sow, National University of Singapore, Singapore</i>	
 TH-A3.1P: OPTIMIZATION METHODS IN EM DESIGNS II	
TH-A3.1P.1: FAST REDUCED ORDER MODEL OF LOW FREQUENCY INTEGRAL SOLVER FOR WIRELESS POWER TRANSFER SYSTEM	1641
<i>Wen-jing Chen, Sheng Sun, Jun Hu, School of Electronic Science and Engineering, University of Electronic Science and Technology of China, China</i>	
TH-A3.1P.2: OPTIMAL DESIGN OF 90°-BEND IN NRD GUIDE USING DBS ALGORITHM AND 2D-FVFEM	1643
<i>Tahir Bashir, Keita Morimoto, Akito Iguchi, Yasuhide Tsuji, Muroran Institute of Technology, Japan; Tatsuya Kashiwa, Kitami Institute of Technology, Japan</i>	
TH-A3.1P.3: CONSTRAINED SEMIDEFINITE OPTIMIZATION OF REACTIVELY LOADED ANTENNA ARRAYS: VERIFICATION AND TOLERANCES	1645
<i>Michel Nyffenegger, Hans-Dieter Lang, OST - Eastern Switzerland University of Applied Sciences, Switzerland; Costas Sarris, University of Toronto, Canada</i>	
TH-A3.1P.5: SYNTHESIS OF UNCONVENTIONAL FEASIBLE SOURCES FOR SMART ELECTROMAGNETIC ENVIORNMENTS	1647
<i>Marco Salucci, Mohammad Abdul Hannan, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy</i>	
TH-A3.1P.6: REAL-TIME CSI-BASED WIRELESS IMAGING FOR HUMAN-MACHINE INTERACTION	1649
<i>Alessandro Polo, Marco Salucci, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy; Stefano Verzura, Huawei Technologies, Segrate, Italy</i>	
TH-A3.1P.7: PLANAR SIW HORN AND APERTURE DESIGN FOR SURFACE-WAVE CONTROL AND POWER ROUTING BY GENETIC ALGORITHM OPTIMIZATION	1651
<i>Maksim Kuznetcov, Symon Podilchak, Edinburgh University, United Kingdom</i>	
TH-A3.1P.8: TWO-LEVEL ANTENNA MODELING WITH DOMAIN CONFINEMENT AND EXPLICIT DIMENSIONALITY REDUCTION	1653
<i>Slawomir Koziel, Reykjavik University, Iceland; Anna Pietrenko-Dabrowska, Gdansk University of Technology, Poland</i>	
TH-A3.1P.9: LOW-COST ANTENNA MODELING USING CONSTRAINED DOMAINS WITH ADAPTIVE LATERAL DIMENSIONS	1655
<i>Slawomir Koziel, Reykjavik University, Iceland; Anna Pietrenko-Dabrowska, Gdansk University of Technology, Iceland</i>	
TH-A3.1P.12: OPTIMIZATION OF 2D HETEROGENEOUS LENSES VIABFGS AND VOLUME INTEGRAL EQUATION METHOD	1657
<i>Felipe Vico, Marta Cabedo-Fabrés, Miguel Ferrando-Bataller, Eva Antonino-Daviu, Universitat Politècnica de València, Spain</i>	
 TH-SP.1P: ELECTROMAGNETICS EDUCATION	
TH-SP.1P.1: CUBESAT LINK BUDGET AS ANTENNAS CLASS PROJECT.....	1659
<i>Reyhan Baktur, Rakib Hasan, Utah State University, United States</i>	
TH-SP.1P.2: TEN FUNDAMENTAL ANTENNA-THEORY PUZZLES SOLVED BY THE ANTENNA EQUATION	1661
<i>Everett Farr, Farr Fields, LC, United States</i>	

TH-SP.1P.3: EXPERIENCES FROM TEACHING AN ONLINE SHORT-TERM COURSE ON BIOELECTRICITY DURING THE PANDEMIC	1663
<i>Esther Sundarsingh, Selvan T. Krishnasamy, Sri Sivasubramaniya Nadar College of Engineering, India; Hugo G. Espinosa, Griffith University, Australia; Cynthia Furse, University of Utah, United States</i>	
TH-SP.1P.4: INTERVENTION TO ENHANCE PSYCAP IN EM COURSES	1665
<i>Amanda Biggs, Hugo G. Espinosa, Griffith University, Australia</i>	
TH-SP.1P.5: MICROSTRIP BAND-STOP FILTER DESIGN VIA BRICK-BASED MICROWAVE TRAINING KIT	1667
<i>Anil Arici, Umut Bulus, Antenom Antenna Technologies, Turkey</i>	
 TH-UK.1P: ELECTROMAGNETICS IN BIOLOGY AND MEDICINE II	
TH-UK.1P.8: COMPARATIVE ANALYSIS OF RF COILS FOR LOW-FIELD PORTABLE MRI	1669
<i>Meena Rajendran, Shao Ying Huang, Singapore University of Technology, Singapore</i>	
 TH-A5.2P: MILLIMETER-WAVE WAVEGUIDE AND CAVITY ANTENNAS II	
TH-A5.2P.1: HIGH GAIN SLOT ANTENNA ARRAY BASED ON SUBSTRATE INTEGRATED WAVEGUIDE AT KA BAND	1671
<i>Jinghui Qiu, Xu Han, Nannan Wang, Alexander Denisov, Harbin Institute of Technology, China; Geer Teni, Beijing Xibao Electronic Technology Co., Ltd, China</i>	
TH-A5.2P.2: TERAHERTZ SCANNING LEAKY WAVE ANTENNA	1673
<i>Hongjian Wang, NSSC, China</i>	
TH-A5.2P.7: A DIFFERENTIAL DUAL-POLARIZED LAMINATED RESONATOR ANTENNA WITH BACKED SIW CAVITY EXCITATION	1675
<i>Yaowei Hou, Yueping Zhang, Junfa Mao, Shanghai Jiao Tong University, China</i>	
TH-A5.2P.8: BROADBAND PATCH LOADED SUBSTRATE-INTEGRATED CAVITY BACKED SLOT ARRAY FOR MILLIMETER-WAVE APPLICATIONS	1677
<i>Qianshuai Li, Yan Zhang, Wei Hong, Southeast University, China</i>	
 TH-SP.3P: MACHINE LEARNING FOR INVERSE SCATTERING AND IMAGING	
TH-SP.3P.1: A DEEP LEARNING SCHEME FOR RAPIDLY RECONSTRUCTING 3D PERMITTIVITY MAPS FROM GPR C-SCANS	1679
<i>Qiqi Dai, Yee Hui Lee, Hai-Han Sun, Abdulkadir C. Yucel, Nanyang Technological University, Singapore; Genevieve Ow, Mohamed Lokman, National Parks Board, Singapore</i>	
TH-SP.3P.3: MULTI-DOMAIN LEARNING SCHEME FOR FULL-WAVE NONLINEAR INVERSE SCATTERING PROBLEMS	1681
<i>Yusong Wang, Zhun Wei, Zhejiang University, China</i>	
TH-SP.3P.5: FAST FULL-WAVE MICROWAVE IMAGING WITH PHYSICS EMBEDDED DEEP NEURAL NETWORK	1683
<i>Rui Guo, Maokun Li, Fan Yang, Shenheng Xu, Aria Abubakar, Tsinghua University, China</i>	
TH-SP.3P.7: MODEL-BASED DATA GENERATION FOR SUPPORT VECTOR MACHINE STROKE CLASSIFICATION	1685
<i>Valeria Mariano, Jorge Alberto Tobon Vasquez, Mario Roberto Casu, Francesca Vipiana, Politecnico di Torino, Italy</i>	

TH-SP.3P.9: AI-ASSISTED COMPUTATIONALLY-EFFICIENT GLOBAL OPTIMIZATION FOR INVERSE SCATTERING	1687
<i>Marco Salucci, Mohammad Abdul Hannan, Alessandro Polo, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy</i>	
TH-SP.3P.10: NEURAL NETWORK AND MICROWAVE SENSING FOR FOOD CONTAMINATION MONITORING	1689
<i>Marco Ricci, Mario Roberto Casu, Francesca Vipiana, Politecnico di Torino, Italy</i>	
 TH-A2.1P: METASURFACES, FSS AND EBG MATERIALS III	
TH-A2.1P.1: FLEXIBLE FREQUENCY SELECTIVE SURFACES WITH ULTRA-LARGE INCIDENCE ANGLE	1691
<i>Qian Wang, Sihong Chen, Taisong Pan, Guang Yao, Min Gao, Yuan Lin, University of Electronic Science and Technology of China, China</i>	
TH-A2.1P.2: A TRI-BAND HIGHLY SELECTIVE PASSBAND FREQUENCY SELECTIVE SURFACE BASED ON MULTI-LAYER COUPLING	1693
<i>Zhangjian He, Yu Shao, Junjie Huang, Changhong Zhang, Jie Zhang, Chongqing University of Posts and Telecommunications, China</i>	
TH-A2.1P.3: MINIATURIZED ANGULARLY STABLE SINGLE AND DUAL BANDS BANDPASS FREQUENCY SELECTIVE SURFACES WITH TRANSMISSION ZEROS NEAR THE SIDEBANDS	1695
<i>Soumik Dey, Mohammad Abdul Shukoor, Sukomal Dey, IIT Palakkad, India</i>	
TH-A2.1P.4: A NOVEL ALMOST ALL-ANGLE-INSENSITIVE FSS STRUCTURE FOR HIGH-PERFORMANCE RADOME	1697
<i>Tianwu Li, Da Li, Er-ping Li, Zhejiang University, China</i>	
TH-A2.1P.5: A NOVEL FREQUENCY SELECTIVE SURFACE FOR THE RCS REDUCTION OF ANTENNA ARRAY	1699
<i>Zihao Zhang, Tianle Xing, Hao Luo, Wenhao Tan, Houjun Sun, Beijing Institute of Technology, China</i>	
TH-A2.1P.6: HIGH GAIN AND HIGH EFFICIENCY UHF TAG WITH ENHANCED COMPLEMENTARY SPLIT RING RESONATOR METAMATERIALS	1701
<i>Lifeng Duan, Jinling Zhang, Beijing University of Posts and Telecommunications, China; Xiongzhi Zhu, Zhengzhou University, China; Zhanqi Zheng, Datang Mobile Equipment Co., China</i>	
TH-A2.1P.7: MODELING OF FINITE-SIZE FABRY-PEROT ANTENNAS WITH ARRAY FEEDS	1703
<i>Shih-Wei Liu, Yi-Cheng Lin, National Taiwan University, Taiwan</i>	
TH-A2.1P.8: A WIDEBAND LOW-PROFILE FABRY-PEROT ANTENNA EMPLOYING A MULTI-RESONANT METASURFACE BASED SUPERSTRATE	1705
<i>Alpha O. Bah, Y. Jay Guo, Pei-Yuan Qin, Trevor S. Bird, University of Technology, Sydney, Australia</i>	
TH-A2.1P.9: MINIATURIZED SELF-COMPLEMENTARY FREQUENCY SELECTIVE SURFACE FOR GNSS APPLICATIONS	1707
<i>Assia Boularas, Laboratoire d'Ingénierie des Systèmes et Télécommunications, Université de M'hamed Bougara Boumerdes, Algeria, Algeria; Khaled Rouabah, Mustapha Flissi, University of Mohamed El Bachir El-Ibrahimi, Bordj Bou Arreridj, Algeria</i>	
TH-A2.1P.10: TOPOLOGICAL EDGE-MODE CHARACTERIZATION USING FOLDY-LAX MULTIPLE SCATTERING THEORY AND INTERPRETATION WITH CLASSICAL EM THEORY	1709
<i>Zhaoyang Feng, Shurun Tan, Zhejiang University, China</i>	

TH-UB.1P: ANTENNA THEORY, DESIGN AND MEASUREMENTS

TH-UB.1P.1: MACHINE LEARNING ASSISTED ARRAY SYNTHESIS UNDER MUTUAL COUPLING AND PLATFORM EFFECTS 1711

Qi Wu, Chen Yu, Haiming Wang, Wei Hong, Southeast University, China

TH-UB.1P.2: MULTIPATH MACHINE LEARNING ASSISTED OPTIMIZATION AND ITS APPLICATION FOR ANTENNA DESIGN 1713

Wei qi Chen, Qi Wu, Chen Yu, Haiming Wang, Wei Hong, Southeast University, China; Weishuang Yin, Zhongxing Telecom Equipment Corporation, China

TH-UB.1P.3: DUAL-POLARIZED BASE STATION ANTENNA DESIGN USING MACHINE LEARNING-ASSISTED OPTIMIZATION METHOD 1715

Subin Wang, Qi Wu, Chen Yu, Haiming Wang, Wei Hong, Southeast University, China; Weishuang Yin, Zhongxing Telecommunication Equipment Corporation, China

TH-SP.2P: INTERNATIONAL STANDARDS DEVELOPMENT AND APPLICATIONS

TH-SP.2P.1: REFERENCE SOLUTIONS FOR THIN-WIRE MOM CODES..... 1717

David Davidson, Curtin University, Australia

TH-SP.2P.2: PARAMETER UNCERTAINTY QUANTIFICATION OF COMPONENTS OF A CAD MOBILE PHONE MODEL 1719

Runze Hu, Xiu Li, Tsinghua University, China; Vikass Monebhurrn, Université Paris-Saclay, Sorbonne Université, France; Fumie Costen, University of Manchester, United Kingdom

TH-SP.2P.3: A MULTI-BAND CAD MOBILE PHONE MODEL FOR SPECIFIC ABSORPTION RATE CALCULATION BENCHMARKING 1721

Vikass Monebhurrn, CentraleSupélec, France; Alexander Prokop, Dassault Systèmes, France

TH-SP.2P.4: RECENTLY REVISED IEEE STD 1502™-2020 1723

Eric Mokole, The MITRE Corporation, United States; William (Mark) Dorsey, U.S. Naval Research Laboratory, United States; Vikass Monebhurrn, UMR CNRS – CentraleSupélec – Université Paris-Saclay – Sorbonne Université, France

TH-SP.2P.5: BICONICAL ANTENNA: A WIDEBAND BENCHMARK ANTENNA FOR IEEE P2816 1725

Ramakrishna Janaswamy, University of Massachusetts Amherst, United States

FR-A3.1A: PRACTICAL AND HIGH-PERFORMANCE COMPUTING

FR-A3.1A.1: MINIMAL-ORDER MODEL FOR FAST ELECTROMAGNETIC ANALYSIS OF ON-CHIP POWER GRID 1727

Yuhang Dou, Dan Jiao, Purdue University, United States

FR-A3.1A.3: ANALYSIS OF THE QUIET ZONE OF TAPERED CHAMBERS..... 1729

Vince Rodriguez, NSI-MI, United States

FR-A3.1A.4: A COMPUTATIONAL STUDY OF COVID-19 DETECTION USING COLORIMETRIC PLASMONIC SENSORS 1731

Somen Baidya, Graduate Research Assistant, United States; Ahmed M. Hassan, Associate Professor, Director of the Multiscale Multidisciplinary Electromagnetics Lab (MMEL), United States

FR-A3.1A.5: MULTI-POLARIZATION PHASE RETRIEVAL IN NEAR FIELD FARFIELD TRANSFORMATION 1733

Ping Yuan, Lijun Jiang, University of Hong Kong, Hong Kong SAR of China

FR-A1.1A: MICROSTRIP ANTENNAS AND CIRCUITS I

FR-A1.1A.1: DESIGN OF A SHAPE OPTIMIZED PRINTED-CIRCUIT BEAMFORMER 1735
Luke Szymanski, Anthony Grbic, University of Michigan, United States; Gurkan Gok, Raytheon Technologies Research Center, United States

FR-A1.1A.2: CAVITY-BACKED ANTENNA WITH A TILTED DIRECTIVE BEAM FOR 5G 1737
APPLICATIONS
Azita Goudarzi, Mohammad Mahdi Honari, Alireza Gharaati, Rashid Mirzavand, University of Alberta, Canada

FR-A1.1A.3: COMPACT AND WIDEBAND 4×4 BUTLER MATRIX FOR 1739
MILLIMETER-WAVE 5G APPLICATIONS
Mehri Borhani Kakhki, Fayez Hyjazie, Ahmed Shehata Abdellatif, David Wessel, Huawei Technologies Canada Co., Canada

FR-A1.1A.4: A MINIATURIZED MICROSTRIP BRANCH-LINE HYBRID COUPLER USING 1741
TWO SECTIONS AND COUPLED-LINES
Xiaoqing Wu, Soochow University, China; Lin-Ping Shen, Communication Components Antenna Inc, Canada

FR-A1.1A.5: MODIFIED SQUARE LOOP ANTENNAS WITH AN INCREASED 1743
AXIAL-RATIO BANDWIDTH
Kazuhide Hirose, Keijiro Ishii, Shibaura Institute of Technology, Japan; Hisamatsu Nakano, Hosei University, Japan

FR-A1.1A.6: A WIDEBAND CIRCULARLY POLARIZED SIW CAVITY-BACKED PATCHES 1745
ANTENNA WITH AIR CAVITY
Hao Liu, Ziqiang Xu, University of Electronic Science and Technology of China, China; Anyong Qing, Southwest Jiaotong University, China

FR-A1.1A.7: A LOW-PROFILE COMPACT CIRCULAR PATCH ANTENNA WITH 1747
MONOPOLE-LIKE RADIATION PATTERN
Neelakantam Venkatarayalu, Woei Seng How, Singapore Institute of Technology, Singapore

FR-A1.1A.8: A WIDEBAND CONCURRENTLY DUAL-CIRCULARLY POLARIZED 1749
SIMULTANEOUS TRANSMIT AND RECEIVE (STAR) ANTENNA
Lina Ma, Jingyun Lu, Changzhan Gu, Junfa Mao, MoE Key Laboratory of High-Speed Electronic System Design and EMC, China

FR-A1.1A.9: DESIGN OF MINIATURIZED DIFFERENTIAL ANTENNA USING GRADIENT 1751
PLANAR SLOW-WAVE STRUCTURE
Meini Wang, Min Tang, Zijian Shao, Junfa Mao, Shanghai Jiao Tong University, China

FR-A1.2A: REFLECTOR AND REFLECTARRAY ANTENNAS II

FR-A1.2A.1: NONRECIPROCAL-BEAMSTEERING REFLECTIVE METASURFACE 1753
Sajjad Taravati, George V. Eleftheriades, University of Toronto, Canada

FR-A1.2A.2: A NEW CURVATURE BASED SHAPED REFLECTOR ANTENNA DESIGN 1755
METHODOLOGY
Manushanker Balasubramanian, Colin Mussman, Ping L. Werner, Douglas H. Werner, Pennsylvania State University, United States

FR-A1.2A.3: DYNAMIC DUAL-REFLECTOR ANTENNAS FOR HIGH-RESOLUTION 1757
REAL-TIME SAR IMAGING
Aditya Varma Muppala, Kamal Sarabandi, University of Michigan, Ann Arbor, United States

FR-A1.2A.4: A NOVEL MIURA-ORI ORIGAMI REFLECTARRAY ANTENNA FOR CUBESAT 1759
APPLICATIONS
Carlos Velez, Abdul-Sattar Kaddour, Stavros Georgakopoulos, Florida International University, United States; Collin Ynchausti, Spencer Magleby, Larry Howell, Brigham Young University, United States

FR-A1.2A.5: GAIN ENHANCEMENT OF COMPACT AMC-DUAL-BAND ANTENNA FOR WBAN APPLICATIONS	1761
<i>Youcef Braham Chaouche, Sirine Ouni, Mourad Nedil, Underground Communications Research Laboratory / University of Quebec at Abitibi-Temiscamingue (UQAT), Canada; Ismail Ben Mabrouk, Durham University, United Kingdom</i>	
FR-A1.2A.6: RECONFIGURABLE REFLECTARRAY UNIT CELL USING VANADIUM DIOXIDE	1763
<i>Jordan Ramsey, Kendrick Henderson, Nima Ghalichechian, The Ohio State University, United States</i>	
FR-A1.2A.7: A COMPACT LOW SAR ANTENNA AMC-BACKED FOR WLAN/WBAN APPLICATIONS	1765
<i>Sirine Ouni, Youcef Braham Chaouche, Mourad Nedil, Underground Communications Research Laboratory / University of Quebec at Abitibi-Temiscamingue (UQAT), Canada; Ismail Ben Mabrouk, Durham University, United Kingdom</i>	
FR-A1.2A.8: COUPLING EFFECTS IN AN L-BAND REFLECTOR ANTENNA WITH DUAL-POLARIZATION STACKED PATCH FEED ARRAY	1767
<i>Su Yee Aye, Koen Mouthaan, National University of Singapore, Singapore; Sigurd Huber, Gerhard Krieger, German Aerospace Center (DLR), Germany</i>	
FR-A1.2A.9: ARRAY FAILURE DIAGNOSIS AND ACTIVE COMPENSATION FOR INTELLIGENT REFLECTING SURFACES	1769
<i>Xiao Yu Li, Mei Song Tong, Tongji University, China</i>	
FR-A1.2A.10: DUAL-BAND REFLECT-TRANSMIT-ARRAY ANTENNA WITH HIGH-GAIN AND LOW-PROFILE	1771
<i>Xiaosong Liu, Enlin Wang, Zehong Yan, Xidian University, China</i>	
 FR-A1.3A: MULTI-BAND ANTENNAS II	
FR-A1.3A.1: QUAD BAND CORRUGATED HORN AND SMOOTH-WALL PROFILED HORN AS REFLECTOR ANTENNA FEEDS	1773
<i>Kwok Kee Chan, Kwok Kee Chan Holdings Inc., Canada</i>	
FR-A1.3A.2: NOVEL SLOT ARRAY MECHANICAL RECONFIGURATION APPROACH BASED ON ACCORDION STRUCTURE AND MICRO-ACTUATOR	1775
<i>Jack Eichenberger, Nima Ghalichechian, The Ohio State University Electroscience Lab, United States</i>	
FR-A1.3A.3: A STRETCHABLE LIQUID METAL ANTENNA ARRAY	1777
<i>David Hensley, Christos Christodoulou, Nathan Jackson, University of New Mexico, United States</i>	
FR-A1.3A.4: COMPACT MULTI-FREQUENCY FEED HORN FOR RADIOMETER	1779
<i>Hongjian Wang, NSSC, China</i>	
FR-A1.3A.5: DESIGN OF A DUAL-BAND FOLDED PATCH PIFA ANTENNA USING CHARACTERISTIC MODE ANALYSIS	1781
<i>Sheng-Lin Rao, Qiang-Ming Cai, Xin Cao, Yuyu Zhu, Jun Fan, Southwest University of Science and Technology, China; Mulin Liu, Tongyu Communication Company, China; Lei Han, Air Force Engineering University, China</i>	
FR-A1.3A.6: OPTIMIZED DESIGN OF A DUAL-BAND PIFA ANTENNA BASED ON GENETIC ALGORITHM	1783
<i>Wen Jie Liu, Jing Rui Wang, Mei Song Tong, Tongji University, China; Yun Jing Zhang, Soochow University, China</i>	
FR-A1.3A.7: A COMPACT AND DUAL-BAND CRLH BASED MONOPOLE ANTENNA	1785
<i>Xu Xu Yuanheng, Manoj Prabhakar Mohan, M Faeyz Karim, Nanyang Technological University, Singapore</i>	
FR-A1.3A.8: COMPACT DUAL-BAND MICROSTRIP PATCH ANTENNA WITH SUPPRESSION OF PARASITIC HIGH ORDER MODES	1787
<i>Qun Li, Shaoqiu Xiao, Sun Yat-sen University, China</i>	

FR-A1.3A.9: DUAL-BAND APERTURE-SHARED ANTENNA ARRAY WITH LOW BLOCKAGE EFFECT 1789

Sheng Jie Yang, Xiu Yin Zhang, South China University of Technology, China

FR-A1.3A.10: A MULTIBAND DUAL-POLARIZED SHARED-APERTURE ANTENNA ARRAY 1791

Donglin He, Yikai Chen, Shiwen Yang, University of Electronic Science and Technology of China, China

FR-UB.1A: MICROSTRIP ANTENNAS AND PRINTED DEVICES

FR-UB.1A.7: RADAR ANTENNA GAIN IMPROVEMENT USING AN INTEGRATED IN-PACKAGE DIELECTRIC ROD SUPERSTRATE 1793

Mohammad Omid Bagheri, Hajar Abedi, George Shaker, University of Waterloo, Canada

FR-UB.1A.8: IN-PACKAGE INTEGRATED DIELECTRIC LENS PAIRED WITH A MIMO MM-WAVE RADAR FOR CORRIDOR GAIT MONITORING 1795

Hajar Abedi, Plinio Morita, Jennifer Boger, Alexander Wong, George Shaker, University of Waterloo, Canada

FR-UB.1A.9: AN EFFICIENT WIDEBAND 94 GHZ ON-CHIP AIR-CAVITY BACKED PLANAR INVERTED-F ANTENNA 1797

Sanghoon Lee, John Cressler, Georgia Institute of Technology, United States; Kirti Dhawaj, India Institute of Technology, Delhi, India

FR-SP.1A.1: THE VALIDITY OF RADIATION GAUGE 1799

Jie Zhu, Dong-Yeop Na, Thomas Roth, Weng Chew, Purdue University, United States

FR-SP.1A.3: FULL-WAVE COMPUTATION OF THE SPONTANEOUS EMISSION RATE OF A TRANSMON QUBIT 1801

Thomas Roth, Weng Chew, Purdue University, United States

FR-SP.1A.4: DIAGONALIZATION OF THE HAMILTONIAN FOR EM FIELDS IN ABSORBING/DISPERSIVE/INHOMOGENEOUS MEDIA 1803

Dong-Yeop Na, Weng Cho Chew, Purdue University, United States

FR-SP.1A.6: TOWARDS SOLUTION OF INTEGRAL EQUATIONS IN ELECTROMAGNETICS ON QUANTUM COMPUTERS 1805

Christopher Phillips, Vladimir Okhmatovski, University of Manitoba, Canada

FR-SP.1A.8: PLANAR PHASED ARRAY DESIGN FOR QUANTUM FREE SPACE OPTICAL COMMUNICATIONS 1807

Nicola Anselmi, Paolo Rocca, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy; Francesco Morichetti, Andrea Melloni, Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Italy

FR-SP.1A.9: QUANTUM INVERSE SCATTERING – A PROOF-OF-CONCEPT 1809

Giacomo Oliveri, Alessandro Polo, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy

FR-SP.1A.10: THINNED ANTENNA ARRAY SYNTHESIS THROUGH QUANTUM FOURIER TRANSFORM 1811

Paolo Rocca, Alessandro Polo, Andrea Massa, ELEDIA@UniTN - University of Trento, Italy

FR-SP.2A: NOVEL METHODS AND ALGORITHMS FOR MICROWAVE BIOMEDICAL APPLICATIONS

FR-SP.2A.4: IDENTIFICATION OF INDIVIDUALS THROUGH A NEW GAIT RECOGNITION METHOD 1813

Wassila Dib, Khalida Ghanem, Center for Development of Advanced Technologies, Algeria; Amina Ababou, University of Sciences and Technologies Houari Boumediene, Algeria; Mourad Nedil, University of Quebec at Abitibi-Temiscamingue (UQAT), Canada; Björn Eskofier, Friedrich-Alexander University Erlangen-Nuernberg, Germany

FR-SP.2A.6: MULTIPLICATIVE-REGULARIZED BASES-EXPANSION SUBSPACE	1815
OPTIMIZATION METHOD FOR ELECTRICAL IMPEDANCE TOMOGRAPHY	
<i>Zheng Zong, Zhun Wei, Zhejiang University, China</i>	
FR-SP.2A.7: ENHANCED BORN APPROXIMATION FOR WAVE EQUATIONS	1817
<i>Zekui Jia, Rui Guo, Maokun Li, Fan Yang, Sheng Xu, Tsinghua University, China</i>	
 FR-A5.1A: MILLIMETER-WAVE, TERAHERTZ AND OPTICAL ANTENNAS I	
FR-A5.1A.1: COMPOUND GRIN LENS FANBEAM ANTENNA FOR WIDE-ANGLE	1819
SCANNING	
<i>Nicolas Garcia, Jonathan Chisum, University of Notre Dame, United States</i>	
FR-A5.1A.2: TRUNCATED PHASE REVERSAL FRESNEL LENS ANTENNA FOR MM-WAVE	1821
APPLICATIONS	
<i>Yazan Al-Alem, Yahia Antar, The Royal Military College of Canada, Canada; Syed Sifat, Ahmed Kishk, Concordia University, Canada</i>	
FR-A5.1A.3: TERAHERTZ DIELECTRIC WAVEGUIDE BASED ON	1823
SILICON-ON-INSULATOR TECHNOLOGY	
<i>Seyed Ali Hosseini Farahabadi, Milad Entezami, Hadi Amarloo, Safieddin Safavi-Naeini, University of Waterloo, Canada</i>	
FR-A5.1A.4: TERAHERTZ SIGNAL GENERATION MEASUREMENTS IN	1825
PHOTOCONDUCTIVE ANTENNAS USING TIME DOMAIN SPECTROSCOPY SYSTEM	
<i>Jose Santos Batista, Magda El-Shenawee, University of Arkansas, United States</i>	
FR-A5.1A.5: COMPACT HIGH-GAIN DUAL-BAND ANTENNA FOR FULL-DUPLEX	1827
TERAHERTZ COMMUNICATION IN CUBESAT MEGA-CONSTELLATIONS	
<i>Ali Alqaraghuli, Arjun Singh, Josep Jornet, Northeastern University, United States</i>	
FR-A5.1A.6: A GSG-EXCITED ULTRA-WIDEBAND 103-147 GHZ STACKED PATCH	1829
ANTENNA ON FLEXIBLE PRINTED CIRCUIT	
<i>Md Hedayatullah Maktoomi, Zisong Wang, Payam Heydari, Hamidreza Aghasi, University of California, Irvine, United States; Huan Wang, Qualcomm Inc, United States; Soheil Saadat, MFLEX Inc., United States</i>	
FR-A5.1A.8: A STUDY OF PLASMONS IN OPTICAL NANO-ANTENNAS	1831
<i>Maicol Cárdenas Hernández, Eduardo Rodríguez Araque, Cafam University Foundation, Colombia</i>	
FR-A5.1A.10: HEMISPHERICAL LUNEBURG LENS FOR WIDE ANGLE BEAM SCANNING	1833
IN THE KA-BAND	
<i>Ravi Kumar Arya, National Institute of Technology Delhi, India; Prashant Chaudhary, University of Delhi South Campus, India; Abdelkhalek Nasri, Raj Mittra, University of Central Florida, United States</i>	
 FR-A4.1A: INVERSE SCATTERING AND IMAGING I	
FR-A4.1A.1: IMPACT OF TIME-BANDWIDTH PRODUCT ON ACTIVE INCOHERENT	1835
MILLIMETER-WAVE IMAGING	
<i>Stavros Vakalis, Jeffrey Nanzer, Michigan State University, United States</i>	
FR-A4.1A.2: INVESTIGATING THE USE OF MATCHING METASURFACES IN	1837
MICROWAVE IMAGING	
<i>Ziqi Liu, Puyan Mojabi, University of Manitoba, Canada</i>	
FR-A4.1A.3: APPLICATION OF MICROWAVE IMAGING IN DETECTING VALUABLE	1839
ORES	
<i>Beichen Duan, Erin Bobicki, Sean Hum, University of Toronto, Canada</i>	

FR-A4.1A.4: FEASIBILITY ANALYSIS FOR ACTIVE MANIPULATION OF ELECTROMAGNETIC FIELDS IN FREE SPACE	1841
<i>Chaoxian Qi, Jiefu Chen, Neil Jerome Egarguin, Daniel Onofrei, University of Houston, United States</i>	
FR-A4.1A.5: AN EFFICIENT ESM WITH FOCUS STACKING TECHNIQUE FOR 3D RADIATION SOURCE LOCALIZATION	1843
<i>Bowen Luo, Qiang-Ming Cai, Shuaihua Ren, Xin Cao, Yuyu Zhu, Yi Yu, Jun Fan, Southwest University of Science and Technology, China; Lei Han, Air Force Engineering University, China</i>	
FR-A4.1A.6: STUDY ON THE DEGREES OF FREEDOM OF SCATTERED FIELDS IN NONLINEAR INVERSE SCATTERING PROBLEMS	1845
<i>Zhichao Lin, Rui Guo, Maokun Li, Fan Yang, Shenheng Xu, Tsinghua University, China; Aria Abubakar, Schlumberger, United States</i>	
FR-A4.1A.7: A SCALABLE DEEP LEARNING MODEL FOR ARBITRARY TRANSMITTER CONFIGURATIONS IN INVERSE SCATTERING	1847
<i>Karthik Girija Ramesan, Prasanta Kumar Ghosh, Indian Institute of Science, India</i>	
FR-A4.1A.8: A HYBRID STRUCTURAL CONSTRAINT APPROACH FOR ENHANCING ELECTROMAGNETIC INVERSION THROUGH ACOUSTIC INVERSION	1849
<i>Yuyue Zhang, Zhiqin Zhao, Zaiping Nie, University of Electronic Science and Technology of China, China</i>	
FR-A4.1A.9: COHERENCE FACTOR-BASED DELAY-MULTIPLY-AND-SUM IMAGE RECONSTRUCTION ALGORITHM	1851
<i>Sisi Hao, Jianying Li, Xujing Yu, Yao Feng, Northwestern Polytechnical University, China</i>	
FR-A4.1A.10: USE OF COMPRESSIVE SENSING IN QUANTITATIVE PROFILING OF NON-SPARSE SUBSURFACE SCENARIOS	1853
<i>Maryam Hajebi, University of Hormozgan, Iran; Ahmad Hoorfar, Villanova University, United States</i>	
 FR-A2.1A: METAMATERIAL ABSORBERS, RCS REDUCTION AND CLOAKING I	
FR-A2.1A.1: SCATTERING REDUCTION METASURFACES USING CIRCULAR INTER-DIGITATED SELF-PHASED ELEMENTS	1855
<i>Quang Nguyen, Theodore Anthony, U.S. CCDC Army Research Lab, United States; John Hodge, Virginia Tech, United States; Amir Zaghoul, U.S. CCDC Army Research Lab and Virginia Tech, United States</i>	
FR-A2.1A.2: A WAVE MATRIX APPROACH TO DESIGNING AZIMUTHALLY-VARYING CYLINDRICAL METASURFACES	1857
<i>Chun-Wen Lin, Anthony Grbic, University of Michigan, United States</i>	
FR-A2.1A.3: A LOW-RCS AND LOW-ECC TRANSPARENT META-RADOMES BASED ON A CONDUCTIVE NANOCOMPOSITE	1859
<i>Liang Zhu, Pai-Yen Chen, university of illinois at Chicago, United States</i>	
FR-A2.1A.4: MODELING AND ANALYSIS OF CARBON NANOTUBE DIMER EMBEDDED IN A LOSSY DIELECTRIC SLAB	1861
<i>Sumitra Dey, Ahmed M Hassan, University of Missouri-Kansas City, United States</i>	
FR-A2.1A.5: ULTRA-THIN BROADBAND ABSORBER USING ACTIVE NON-FOSTER DEVICES AND FSS-MAGNETIC MATERIAL	1863
<i>Wei Hu, Southwest Minzu University, University of Electronic Science and Technology of China, China; Weiwei Gu, Daniele Inserra, Yongjun Huang, Guangjun Wen, University of Electronic Science and Technology of China, China</i>	
FR-A2.1A.6: FREQUENCY-SELECTIVE STRUCTURE WITH ONE REFLECTION BAND AND TWO-SIDED ABSORPTION BANDS	1865
<i>Yifei Gao, Huixian Liu, Qingxin Guo, Communication university of China, China</i>	

FR-A2.1A.7: AN OPTICALLY TRANSPARENT GLASS ABSORBER USING A MULTI-FRACTAL RING STRUCTURE FOR KA-BAND	1867
<i>Suho Chang, Youngno Youn, Cheonga Lee, Daehyeon Kim, Wonbin Hong, Pohang University of Science and Technology, Korea (South); Byounggwan Kang, Hyengcheul Choi, Choonkon Kim, Corning Precision Materials, Korea (South)</i>	
FR-A2.1A.8: DUAL-POLARIZATION BROADBAND RECONFIGURABLE RASORBER WITH HIGH SELECTIVE PASSBAND	1869
<i>Wenyu Li, Jianxun Su, Zengrui Li, Communication University of China, China; Guanghong Liu, Information Science Academy of China Electronic, China</i>	
FR-A2.1A.9: A NOVEL MINIATURIZED DUAL-POLARIZED DUAL-PASSBAND FREQUENCY SELECTIVE RABSORBER	1871
<i>Jiangcheng Ge, Wen Jiang, Tao Hong, Shuxi Gong, Xidian University, China</i>	
FR-A2.1A.10: A NOVEL DESIGN OF WIDE-BAND DUAL-POLARIZATION RECONFIGURABLE FREQUENCY SELECTIVE SURFACE	1873
<i>Hai-Ruo Cao, Xiao-Han Yang, Zhi-Yuan Zong, Wen Wu, Nanjing University of Science and Technology, China</i>	
FR-A3.3A: MODELING, OPTIMIZATION AND MACHINE LEARNING I	
FR-A3.3A.1: NON-INVASIVE AQUEOUS GLUCOSE MONITORING USING MICROWAVE SENSOR WITH MACHINE LEARNING	1875
<i>Saeed Bamatraf, Omar Ramahi, University of Waterloo, Canada; Maged Aldhaeabi, Hadhramout University, Yemen</i>	
FR-A3.3A.2: GENERATIVE ADVERSARIAL NETWORK-BASED DESIGN OF DIELECTRIC RESONATOR ANTENNA FOR MMWAVE 5G APPLICATIONS	1877
<i>Mingdian Liu, Meng Lu, Jiming Song, Iowa State University, United States; Hui Zhang, Communication University of China, China</i>	
FR-A3.3A.6: DEVELOPMENT OF A PRACTICAL RAY-TRACING PROGRAM FOR PROPAGATION MODELING	1879
<i>Zhengqing Yun, Magdy F. Iskander, University of Hawaii at Manoa, United States</i>	
FR-A3.3A.9: MACHINE LEARNING BASED DESIGN OF KU BAND RIDGE GAP WAVEGUIDE SLOT ANTENNA LOADED WITH FSS FOR SATELLITE INTERNET APPLICATIONS	1881
<i>Mohammed Farouk Nakmouche, Dina E.Fawzy, Izmir University of Economics, Turkey; Mohammed Cherif Derbal, Mourad Nedil, Université du Québec en Abitibi-Témiscamingue, Canada; A.M.M.A Allam, German University in Cairo, Egypt; Shoukry I Shams, Concordia University, Canada; Mahmoud Elsaadany, Ghyslain Gagnon, Ecole de Technologie Supérieure, Canada</i>	
FR-A3.2A: PARALLEL AND SPECIAL-PROCESSOR-BASED NUMERICAL METHODS	
FR-A3.2A.1: 3D MODEL OF TERAHERTZ PHOTOCONDUCTIVE ANTENNA USING COMSOL MULTIPHYSICS	1883
<i>Jose Santos Batista, Magda El-Shenawee, University of Arkansas, United States</i>	
FR-A3.2A.2: SPLIT-FIELD DOMAIN DECOMPOSITION ALGORITHM WITH FAST CONVERGENCE FOR ELECTROMAGNETIC ANALYSIS	1885
<i>Shuzhan Sun, Dan Jiao, Purdue University, United States</i>	
FR-A3.2A.3: SCALABLE ACCELERATION OF CHARACTERISTIC MODE ANALYSIS USING BIG DATA TECHNIQUES	1887
<i>Khulud Alsultan, Ahmed M. Hassan, University of Missouri-Kansas City, United States; Praveen Rao, University of Missouri - Columbia, United States</i>	

FR-A3.2A.4: REAL TIME CORRECTION OF MULTIPATH ERROR IN SATELLITE POSITIONING USING FPGA-ACCELERATED RAY TRACING	1889
<i>Gaosong Lv, Huapeng Zhao, Jun Hu, University of Electronic Science and Technology of China, China</i>	
FR-A3.2A.5: UNIFIED GPU PARALLEL FRAMEWORK BASED ON DISCONTINUOUS GALERKIN METHOD	1891
<i>Shu-Cheng Huang, Li Xu, Bing-Qi Liu, Zhong-Hai Yang, Bin Li, University of Electronic Science and Technology of China, China</i>	
FR-UA.1P: ELECTROMAGNETIC METROLOGY AND ANTENNA APPLICATIONS	
FR-UA.1P.1: DUAL-COMPONENTS MAGNETIC PROBE FOR ELECTROMAGNETIC INTERFERENCE MEASUREMENT	1893
<i>Ze-Kai Hu, Xing-Chang Wei, Zhejiang University, China</i>	
FR-A1.1P: MICROSTRIP ANTENNAS AND CIRCUITS II	
FR-A1.1P.1: E-BAND WIDE-ANGLE MULTI-BEAM SHAPED TRANSMITARRAY	1895
<i>Lizhao Song, Peiyuan Qin, Yingjie (Jay) Guo, University of Technology Sydney, Australia</i>	
FR-A1.1P.2: COMPACT THIRD-ORDER DUAL-BAND BANDPASS FILTER WITH HIGH SELECTIVITY AND INDEPENDENTLY CONTROLLABLE BANDWIDTHS	1897
<i>Xiaodong Cui, Fan Zhang, Yi Zhang, Zhipeng Wang, Yuege Xiao, Jun Xu, University of Electronic Science and Technology of China, China</i>	
FR-A1.1P.3: A FLUSH-SURFACE ANTENNA FOR THE 5G MMW BAND	1899
<i>Yasuo Morimoto, Takeshi Motegi, AGC Inc., Japan; Hirohito Hattori, Toyota Motor Corporation, Japan</i>	
FR-A1.1P.4: EFFECTS DUE TO CORPORATE FEED NETWORK IN A 16×16 ELEMENT 24GHZ PATCH ANTENNA ARRAY	1901
<i>Neelakantam Venkatarayalu, Jun Wei Wong, Singapore Institute of Technology, Singapore; Hongzhao Ray Fang, ST Engineering, Singapore; Geok-Ting Toh, Technical University of Munich, TUM Asia, Singapore</i>	
FR-A1.1P.5: COMPACT SINGLE-LAYER DUAL-PATCH ANTENNA FED BY DUAL STRIPS FOR 5G MILLIMETER-WAVE APPLICATIONS	1903
<i>Lei Wang, Jin Shi, Nantong University, China</i>	
FR-A1.1P.6: A NOVEL PARTIALLY REFLECTIVE LAYER FOR IMPROVING THE PERFORMANCE OF X-BAND PRINTED ANTENNAS	1905
<i>Abdelhalim Chaabane, Université 8 Mai 1945 Guelma, Algeria; Lamine Mohamed Abdelghani, CEMT INRS, Canada; Hussein Attia, King Fahd University of Petroleum and Minerals, Saudi Arabia</i>	
FR-A1.1P.7: CIRCULAR COMPLEMENTARY SPLIT RING RESONATOR ROTATION FOR MILLIMETER WAVE MICROSTRIP PATCH ANTENNA	N/A
<i>Norsaidah Muhamad Nadzir, Mohamad Kamal A. Rahim, Noor Asniza Murad, UTM, Malaysia; Himdi Mohamed, University of Rennes 1, France</i>	
FR-A1.1P.8: DESIGN AND SIMULATION STUDY OF E SHAPED SLOTTED MICROSTRIP PATCH ANTENNA BY HFSS FOR 5G APPLICATIONS	1909
<i>Azzama Talukder, Ehtesanul Islam, Ahsanullah University of Science and Technology, Bangladesh</i>	
FR-A1.1P.9: A HIGH GAIN SWITCHABLE DUAL CP WIDEBAND RECTANGULAR SPIRAL MICROSTRIP ANTENNA FOR MMWAVE APPLICATIONS	1911
<i>Mazen Almalki, Saad Alhuwaimel, King Abdulaziz for Science and Technology, Saudi Arabia</i>	
FR-A1.1P.10: STAR-SHAPED SUPERSHAPED PATCH ANTENNA FOR 5G	1913
<i>Guilherme Martins, Pedro Pinho, Instituto Superior de Engenharia de Lisboa, Portugal; Caroline Loss, FibEnTech Research Unit, Portugal</i>	

FR-A1.2P: REFLECTOR AND REFLECTARRAY ANTENNAS III

FR-A1.2P.1: A 12 M2 KA-BAND REFLECTOR ANTENNA FOR SAR EARTH OBSERVATION MISSIONS 1915

Su Yee Aye, Koen Mouthaan, National University of Singapore, Singapore; Sigurd Huber, Gerhard Krieger, German Aerospace Center (DLR), Germany

FR-A1.2P.2: A MULTIFUNCTIONAL TRANSMISSION/REFLECTION ELEMENT WITH TWO TRANSMISSION BANDS 1917

Bing Wang, Zhiyuan Zong, Wen Wu, Dagang Fang, Nanjing University of Science and Technology, China

FR-A1.2P.3: REFLECTARRAY ANTENNA WITH HIGH EFFICIENCY AND LOW SIDE LOBE 1919

Shota Takino, Sanshiro Shigemitsu, Shigeru Makino, Kanazawa Institute of Technology, Japan; Hiromasa Nakajima, Michio Takikawa, Mitsubishi Electric Corporation, Japan

FR-A1.2P.4: NEW SCANNING-SPOT BEAM REFLECTARRAY ANTENNA DESIGN..... 1921

Yusuke Kaimori, Shota Takino, Sanshiro Shigemitsu, Shigeru Makino, Kanazawa Institute of Technology, Japan; Hiromasa Nakajima, Michio Takikawa, Mitsubishi Electric Corporation, Japan

FR-A1.2P.5: SHAPED-BEAM REFLECTARRAY ANTENNA OPTIMIZED AT MULTIPLE FREQUENCY 1923

Sanshiro Shigemitsu, Syota Takino, Shigeru Makino, Kanazawa Institute of Technology, Japan; Hiromasa Nakajima, Michio Takikawa, Mitsubishi Electric Corporation, Japan

FR-A1.2P.6: A DUAL-LAYER KU/KA DUAL-BAND SHARED-APERTURE REFLECTARRAY ANTENNA BASED ON STRUCTURE-REUSE TECHNIQUE 1925

Yan Liu, Yu Jian Cheng, Yong Fan, University of Electronic Science and Technology of China, China

FR-A1.2P.7: VAN ATTA ARRAYS EXPLOITED TOWARDS FLYING UAV POSITION DETECTION 1927

Adnan Nadeem, Noshawan Shoaib, National University of Sciences and Technology, Pakistan; David Chatzichristodoulou, RF and Microwave Solutions LTD, Cyprus; Loukia Vassiliou, Agricultural Research Institute, Nicosia, Cyprus; Photos Vryonides, Symeon Nikolaou, Frederick Research Center, Nicosia, Cyprus

FR-A1.2P.8: SOME OBSERVED OUTCOMES OF THE SHAPE SYNTHESIS OF DUAL-BAND TRANSMITARRAY ELEMENTS 1929

Abdullah Aljanah, Prince Sattam University, Saudi Arabia; Eqab Almajali, University of Sharjah, United Arab Emirates; Derek McNamara, University of Ottawa, Canada

FR-A1.2P.9: POLARIZATION-INSENSITIVE CIRCULAR REFLECTARRAY FOR SATELLITE APPLICATIONS IN KA-BAND 1931

Ali Ali, Mohsen Khalily, Ali Araghi, Rahim Tafazoli, University of Surrey, United Kingdom

FR-A1.2P.10: LARGE EUROPEAN DEPLOYABLE REFLECTOR: RF MODELING AND MEASUREMENT CORRELATION 1933

Jakob R. de Lasson, Cecilia Cappellin, TICRA, Denmark; Maurizio Lori, HPS, Germany; Alexander Geise, Christian Hunscher, Airbus, Germany; Leri Datashvili, Nikoloz Maghaldadze, LSS, Germany; Jean-Christophe Angevain, Martin Suess, Alexander Ihle, Gonçalo Rodrigues, ESA-ESTEC, Netherlands

FR-A1.3P: MULTI-BAND ANTENNAS III

FR-A1.3P.1: DUAL-BAND TRANSMITARRAY CONSISTING OF UNIT CELLS WITH ASTERISK AND CROSS DIPOLE ELEMENTS SEPARATED BY RING ELEMENTS 1935

Shiro Okuno, Syota Shimizu, Hiroyuki Deguchi, Mikio Tsuji, Doshisha University, Japan

FR-A1.3P.2: DESIGN OF AN L/S BAND CO-APERTURE ANTENNA ARRAY WITH HIGH ISOLATION N/A

Xiaoming Chen, Aoyun Meng, Dajiang Li, Ming-Chun Tang, Chongqing University, China

FR-A1.3P.3: DUAL-BAND BASE STATION ANTENNA ARRAY WITH SUPPRESSED CROSS-BAND MUTUAL SCATTERING	1939
<i>Hai-Han Sun, Yee Hui Lee, Nanyang Technological University, Singapore; Bevan Jones, Jay Guo, University of Technology Sydney, Australia</i>	
FR-A1.3P.4: DUAL BAND 4-PORT MIMO ANTENNA FOR BLUETOOTH/5G APPLICATIONS	1941
<i>Rakesh N. Tiwari, Binod Kumar Kanaujia, Jawaharlal Nehru University, India; Prabhakar Singh, Galgotias University, India; Pradeep Kumar, University of KwaZulu-Natal, South Africa</i>	
FR-A1.3P.5: WIDEBAND LOW-PROFILE PATCH ANTENNAS USING HIGHDIELECTRIC FLUIDS AND HYBRID METAL STRUCTURE	1943
<i>Chaoyun Song, Lei Wang, George Goussetis, Heriot-Watt University, United Kingdom; Xiantao Yang, Yi Huang, University of Liverpool, United Kingdom</i>	
 FR-A5.1P: MOBILE, PCS AND VEHICULAR ANTENNAS	
FR-A5.1P.1: SHOULD SAR GUIDELINES INCLUDE VARIABILITY?	1945
<i>Khadijeh Masumnia-Bisheh, Tarbiat Modares University, Iran; Cynthia M. Furse, University of Utah, United States</i>	
FR-A5.1P.2: SPARSE COMPOSITE ARRAY WITH ENHANCED ANGULAR RESOLUTION FOR AUTOMOTIVE RADAR APPLICATIONS	1947
<i>Yingchu Xu, Yilong Lu, Nanyang Technological University, Singapore</i>	
FR-A5.1P.4: FINITE ELEMENT ANALYSIS BASED OPTIMIZED VEHICLE MOUNTED ANTENNA DEPLOYMENT	1950
<i>Siyuan Liang, Xian Jiaotong University, China; Yishun Li, Beijing Information Science and Technology University, China; Chuang Gao, Jinan Communication Section of China Railway Jinan Group Co.,Ltd., China</i>	
FR-A5.1P.5: DESIGN OF CIRCULARLY POLARIZED END-FIRE ANTENNA ON GAP WAVEGUIDE FOR AUTOMOTIVE RADAR APPLICATION	1952
<i>Jin Huang, Marianna Ivashina, Jian Yang, Chalmers University of Technology, Sweden</i>	
FR-A5.1P.6: EVALUATION OF INTEGRAL QUANTITIES OF OVER THE AIR AUTOMOTIVE ANTENNA MEASUREMENTS	1954
<i>Mathieu Mercier, Francesca Mioc, Kim Rutkowski, Alessandro Scannavini, Microwave Vision Group (MVG), Hong Kong SAR of China; Tobias Nowack, Christian Bornkessel, Matthias Hein, Technische Universität Ilmenau, Germany</i>	
FR-A5.1P.7: AN OMNIDIRECTIONAL VERTICAL-POLARIZED C-V2X ANTENNA WITH HIGH GAIN AND LOW PROFILE	1956
<i>Yi Zhou, Ge Zhao, Mei Song Tong, Tongji University, China; Yun Jing Zhang, Soochow University, China</i>	
FR-A5.1P.8: SMALL FOOTPRINT TRIANGULAR SHAPED HF BAND NVIS ANTENNA BASED ON NOISE RELATED PARAMETRIC STUDIES	1958
<i>Shambhu Nath Jha, Thales Belgium, Belgium; Remy Lamey, Thales LAS France SAS, France; Jean-Yves Bernier, Thales Six GTS France, France</i>	
FR-A5.1P.9: STUDY OF DIFFERENT CANONICAL UHF ANTENNAS INTEGRATED IN THE VEHICLE	1960
<i>Sally Alsayah, Fabien Ferrero, Robert Staraj, UCA CNRS LEAT, France; Ignacio Gimeno, Renault Software Labs, France</i>	
FR-A5.1P.10: A COMPACT ANNULAR RING MICROSTRIP ANTENNA FOR UNMANNED AERIAL VEHICLES (UAVS) APPLICATIONS	1962
<i>Elisa Giampietri, Agostino Monorchio, University of Pisa / RaSS Laboratory CNIT, Italy; Francesco Molesti, Guido Nenna, Free Space SRL, Italy</i>	

FR-UB.1P: METAMATERIALS AND WAVE-GUIDING STRUCTURES

FR-UB.1P.2: METAMATERIAL SIERPINSKI CARPET ANTENNA WITH CROSS-SLOT 1964 SUPERSTRATE FOR 5G APPLICATIONS

*Arshad Karimbu Vallappil, Mohamad Kamal A. Rahim, Noor Asniza Murad, Universiti Teknologi Malaysia, Malaysia;
Bilal A. Khawaja, Islamic University of Madinah, Saudi Arabia*

FR-A2.1P: METAMATERIALS AND PERIODIC STRUCTURES

FR-A2.1P.1: WIDEBAND HIGH-GAIN OPEN RESONATOR ANTENNA USING A FLAT 1966 IMPEDANCE SURFACE

Tayyab Ali Khan, Alex Man Hon Wong, City University of Hong Kong, Hong Kong SAR of China

FR-A2.1P.2: TERAHERTZ VALLEY TRANSPORT IN PHOTONIC CRYSTAL SLAB 1968

Yulin Zhao, Feng Liang, University of Electronic Science and Technology of China, China

FR-A2.1P.3: AN ACCURATE SOLUTION TO PERIODIC GRATING STRUCTURE 1970 SCATTERING USING NYSTROM METHOD WITH AN OVER-DETERMINED TESTING SCHEME

Xuyang Bai, Shurun Tan, Zhejiang University, China

FR-A2.1P.4: RCS REDUCTION OF SLOT ANTENNA ARRAY USING CODING 1972 METASURFACES

Mengyao Li, Zhongxiang Shen, Nanyang Technological University, Singapore

FR-A2.1P.5: ORBITAL ANGULAR MOMENTUM MULTIPLEXING BASED ON 1974 ANGLE-DISPERSIVE METASURFACE

Lijin Xu, Zhiping Yin, Jun Yang, Ying Li, Hefei University of Technology, China

FR-A2.1P.6: DESIGN OF METASURFACE FOR PERFORMANCE IMPROVEMENT OF FEED 1976 SOURCE

Sujan Shrestha, Hijab Zahra, Syed Muzahir Abbas, Mohsen Asadnia, Macquarie University, Australia

FR-A2.1P.7: INTERFACE WAVES IN PARALLEL-PLATE METASURFACE WAVEGUIDES 1978 WITH DUALITY SYMMETRY

Zhixia Xu, Southeast University, China; Daniel F. Sievenpiper, University of California, San Diego, United States

FR-A2.1P.8: MULTIPLEXING DUAL CIRCULAR-POLARIZED VORTEX BEAMS BY 1980 SPIN-DECOUPLED METASURFACE

*Jianhua Lin, Xiang Zhang, Qingyuan Zhang, Di Cheng, Weidong Chen, Chang Chen, University of Science and
Technology of China, China*

FR-A2.1P.9: HOMOGENIZATION AND EXTREME FRESNEL DRAG IN 1982 SPATIOTEMPORALLY MODULATED WIRE MEDIUM

Michael Kreitzer, Yakir Hadad, Tel-Aviv University, Israel

FR-A2.1P.10: MODE PROPAGATION IN GLIDE-SYMMETRIC DIELECTRIC-FILLED 1984 CORRUGATED WAVEGUIDES

*Pilar Castillo-Tapia, David Anguiano-Sanjurjo, Oscar Quevedo-Teruel, KTH Royal Institute of Technology, Sweden;
Francisco Mesa, Universidad de Sevilla, Spain; Alexander Yakovlev, University of Mississippi, United States; Guido
Valerio, Sorbonne universite, France*

FR-A5.2P: MILLIMETER-WAVE, TERAHERTZ AND OPTICAL ANTENNAS II

FR-A5.2P.1: ENHANCEMENT OF THZ PHOTOCONDUCTIVE ANTENNA GAIN BASED 1986 ON A PHOTONIC CRYSTAL FIBER SUBSTRATE

Haowei Mao, Guizhen Lu, Communication University of China, China

FR-A5.2P.2: RIPPLE SUPPRESSION IN 300GHZ BAND CYLINDRICAL LENS.....	1988
<i>Derek Gray, Kunio Sakakibara, Shuya Suzuki, Ryota Ishihara, Yoshiki Sugimoto, Nobuyoshi Kikuma, Nagoya Institute of Technology, Japan; Yoshihide Yamada, Malaysia-Japan International Institute of Technology, Malaysia; Nurul Huda Abd Rahman, Universiti Teknologi MARA, Malaysia</i>	
FR-A5.2P.3: ACHIEVING HEMISPHERICAL BEAM COVERAGE FOR A 39 GHZ INTEGRATED LENS FEATURING DOUBLE-ELLIPTICAL BOUNDARIES THROUGH SEQUENTIAL GO AND MULTIPLE SCATTERING	1990
<i>Youngno Youn, Wonbin Hong, Pohang University of Science and Technology, Korea (South)</i>	
FR-A5.2P.4: COMPACT POLARIZATION TRANSFORMATION IN A GEODESIC LUNEBURG LENS ANTENNA	1992
<i>Astrid Algaba-Brazález, Lars Manholm, Martin Johansson, Ericsson AB, Sweden; Freysteinn Viðar Viðarsson, Oskar Zetterstrom, Oscar Quevedo-Teruel, KTH Royal Institute of Technology, Sweden; Nelson J. G. Fonseca, European Space Agency, Netherlands</i>	
FR-A5.2P.7: STUDY OF BONDWIRE INTERCONNECT FOR ANTENNA APPLICATIONS IN W-BAND	1994
<i>Grzegorz Bogdan, Yevhen Yashchyshyn, Warsaw University of Technology, Poland</i>	
FR-A5.2P.9: A MILLIMETER-WAVE MULTILAYER LENS ANTENNA FOR CIRCULARLY POLARIZED APPLICATIONS	1996
<i>Samaneh Sadeghi-Marasht, Anding Zhu, University College Dublin, Ireland; Mohammad S. Sharawi, Polytechnique Montreal, Canada</i>	
 FR-A4.1P: INVERSE SCATTERING AND IMAGING II	
FR-A4.1P.1: ELONGATED OBJECT ORIENTATION ESTIMATION BASED ON DEEP NEURAL NETWORKS	1998
<i>Hai-Han Sun, Yee Hui Lee, Abdulkadir C. Yucel, Nanyang Technological University, Singapore; Genevieve Ow, Mohamed Lokman Mohd Yusof, National Parks Board, Singapore</i>	
FR-A4.1P.2: PIXEL-BASED INVERSION OF INDUCTION LOGGING DATA IN ANISOTROPIC MEDIA WITH SUPERVISED DESCENT METHOD	2000
<i>Xiangyang Sun, Peng Hao, Jun Hu, University of Electronic Science and Technology of China, China</i>	
FR-A4.1P.3: ANALYSIS OF MODELS TO REDUCE COMPLEXITY AND SIMULATION TIME OF MULTILAYERED MEDIA FOR AUTOMOTIVE RADAR APPLICATIONS	2002
<i>Nancy Modi, Jayanta Mukherjee, IIT BOMBAY, India</i>	
FR-A4.1P.5: RECONSTRUCTION OF PENETRABLE OBJECTS WITH MAGNETIC MATERIALS BASED ON INTEGRAL EQUATION METHOD	2004
<i>Ze Yuan Lu, Mei Song Tong, Tongji University, China</i>	
FR-A4.1P.6: EMBEDDING A PRIORI INFORMATION IN INVERSE SCATTERING PROBLEMS USING DEEP LEARNING	2006
<i>Leila Ahmadi, Amir Ahmad Shishegar, Sharif University of Technology, Iran</i>	
FR-A4.1P.7: DEEP LEARNING: A POWERFUL FRAMEWORK FOR THE REAL-TIME SOLUTION OF INVERSE SCATTERING PROBLEMS	2008
<i>Andrea Massa, Alessandro Polo, Pietro Rosatti, Marco Salucci, ELEDIA@UniTN - University of Trento, Italy; Xudong Chen, National University of Singapore, Singapore; Maokun Li, ELEDIA@TSINGHUA - Tsinghua University, China</i>	
FR-A4.1P.8: EARLY DETECTION OF DAMAGES IN FRUITS WITH AMPLITUDE-ONLY MEASUREMENTS	2010
<i>Flora Zidane, Jérôme Lanteri, Claire Migliaccio, Université côte d'azur, France; Julien Marot, Aix-Marseille Université, France</i>	

FR-A4.1P.9: TACKLING NONLINEARITY IN INVERSE SCATTERING BY SUITABLE REWRITINGS OF THE BASIC EQUATIONS: RECENT RESULTS AND POSSIBLE DEVELOPMENT	2012
<i>Martina T. Bevacqua, Tommaso Isernia, Università Mediterranea, Italy</i>	
FR-A4.1P.10: HYBRID RESOLVENT KERNEL CALIBRATION TECHNIQUE FOR MICROWAVE IMAGING SYSTEMS	2014
<i>David Rodriguez-Duarte, Cristina Origlia, Jorge Alberto Tobon Vasquez, Francesca Vipiana, Politecnico di Torino, Italy</i>	
FR-A2.2P: METAMATERIAL ABSORBERS, RCS REDUCTION AND CLOAKING II	
FR-A2.2P.1: ELECTROMAGNETIC CLOAK USING PHASE GRADIENT METASURFACES	2016
<i>Yufang Wang, Huaqiao University, China; Yuehe Ge, Fuzhou University, China; Zhizhang Chen, Dalhousie University, China</i>	
FR-A2.2P.2: MANTLE CLOAK ANTENNA WITH REJECTION BAND AT LOWER FREQUENCY SIDE OF OPERATING FREQUENCY	2018
<i>Thanh Binh Nguyen, Hiroshi Hashiguchi, Naobumi Michishita, Hisashi Morishita, National Defense Academy, Japan; Teruki Miyazaki, Masato Tadokoro, Yokohama Rubber Co., Ltd., Japan</i>	
FR-A2.2P.3: A NOVEL MINIATURIZED METAMATERIAL MICROWAVE ABSORBER WITH QUASI-FULL-ANGLE STABILITY	2020
<i>Yu-di Fan, Er-Ping Li, Tian-wu Li, Zhejiang University, China</i>	
FR-A2.2P.4: AN ULTRABROAD BAND ABSORBER BASED ON MAGNETIC ABSORBING MATERIAL FOR SOLVING EMC PROBLEMS IN CHIP-PACKAGES	2022
<i>Jiaqi Xing, Xinglei Liang, Tianwu Li, Hang Jin, Shiyun Zhou, Er-ping Li, Zhejiang University, China</i>	
FR-A2.2P.5: A NEAR-OMNIDIRECTIONAL, LOW-PROFILE, BROADBAND, METAMATERIAL ABSORBER BASED ON CHARACTERISTIC MODE ANALYSIS	2024
<i>Ting Shi, Xuesong Yuan, University of Electronic Science and Technology of China, China; Ming-Chun Tang, Chongqing University, China</i>	
FR-A2.2P.6: INVESTIGATION OF MODAL STORED ENERGY APPROACH TO MANTLE CLOAKING OF ACTIVE ANTENNA	2026
<i>Ozuem Chukwuka, IFSTTAR, France; Divitha Seetharamdoo, IFSTTAR / University of Lille, France</i>	
FR-A2.2P.7: SMART CLOAKING METASURFACES FOR NEXT-GENERATION ANTENNA SYSTEMS	2028
<i>Stefano Vellucci, Alessandro Toscano, Filiberto Bilotti, Roma Tre University, Italy; Alessio Monti, Mirko Barbuto, Niccolò Cusano University, Italy</i>	
FR-A2.2P.8: ELECTROMAGNETIC SCATTERING REDUCTION USING SPARSE METASURFACES	2030
<i>François Villamizar, Cédric Martel, Sylvain Bolioli, ONERA / DEMR, Université de Toulouse, France; Fabrice Boust, DEMR, ONERA, Université Paris Saclay, France; Shah Nawaz Burokur, LEME, UPL, Univ Paris Nanterre, France</i>	
FR-A2.2P.9: BYPASSING ROZANOV'S BOUND FOR SHORT-TIME PULSES	2032
<i>Chen Firestein, Amir Shlivinski, Ben-Gurion University, Israel; Yakir Hadad, Tel-Aviv University, Israel</i>	
FR-A2.2P.10: JAUMANN-LIKE TUNEABLE RASORBER WITH ENHANCED ANGULAR STABILITY AND POLARISATION INSENSITIVITY	2034
<i>Callum Hodgkinson, Symon Podilchak, Univerisy of Edinburgh, United Kingdom; Dimitris Anagnostou, Heriot-Watt University, United Kingdom</i>	

FR-UB.2P: MODELING, OPTIMIZATION AND MACHINE LEARNING II

FR-UB.2P.1: DEEPTDCS: REAL-TIME ESTIMATION OF CURRENTS INDUCED DURING TRANSCRANIAL DIRECT CURRENT STIMULATION VIA DEEP LEARNING 2036

Xiaofan Jia, Sadeed Bin Sayed, Guang-Bin Huang, Abdulkadir C. Yucel, Nanyang Technological University, Singapore; Luis J. Gomez, Purdue University, United States

FR-UB.2P.2: MACHINE-LEARNING-BASED OPTIMIZATION METHOD IN METASURFACE MOSAIC ANTENNAS 2038

Peiqin Liu, Ziqi Zhu, Zhi Ning Chen, National University of Singapore, Singapore

FR-UB.2P.4: A MACHINE LEARNING BASED TRAVELING WAVE ANTENNA DEVELOPMENT METHODOLOGY 2040

Benjamin Falkner, Hengyi Zhou, Amit Mehra, Swansea University, United Kingdom

FR-UC.1P: RADIO COMMUNICATION AND SIGNAL PROCESSING SYSTEMS II

FR-UC.1P.1: A DUAL POWER WEIGHTED CLUSTERING ALGORITHM FOR INDOOR MILLIMETER-WAVE 3D MIMO CHANNEL 2042

Xi Liao, Chenxi Huang, Yang Wang, School of Communication and Information Engineering Chongqing University of Posts and Telecommunications, China; Jie Zhang, University of Sheffield, United Kingdom

FR-A1.4P: ANTENNA ARRAYS AND CIRCUITS

FR-A1.4P.2: RF BASED REAL TIME HUMAN MOTION SENSING 2044

William Taylor, Ahmad Taha, Kia Dashtipour, Qammer H Abbasi, Muhammad Ali Imran, University of Glasgow, United Kingdom; Syed Aziz Shah, Coventry University, United Kingdom

FR-A1.4P.3: RECONFIGURABLE BEAMFORMING ARRAY FOR FAR FIELD WIRELESS POWER TRANSFER APPLICATIONS 2046

Adnan Nadeem, Noshawan Shoaib, National University of Sciences and Technology, Pakistan, Pakistan; David Chatzichristodoulou, RF and Microwave Solutions LTD, Cyprus; Chris Loakimidis, Open University of Cyprus, Cyprus; Photos Vryonides, Symeon Nikolaou, Frederick Research Center, Nicosia, Cyprus

FR-A1.4P.4: CIRCULARLY POLARIZED DIPOLE ANTENNA FED BY DUAL QUADRATURE HYBRID COUPLERS 2048

Heesu Wang, Ikmo Park, Ajou University, Korea (South)

FR-A1.4P.5: COEXISTENCE-MODE COMPOSITE RIGHT/LEFT-HANDED TRANSMISSION LINE AND ITS APPLICATION FOR FOLDED C-TYPE SIW BUTLER MATRIX 2050

Qiang Sun, Yong-Ling Ban, University of Electronic Science and Technology of China, China