

# **2023 IEEE 24th International Workshop on Signal Processing Advances in Wireless Communications (SPAWC 2023)**

**Shanghai, China  
25-28 September 2023**



**IEEE Catalog Number: CFP23AWC-POD  
ISBN: 978-1-6654-9627-8**

**Copyright © 2023 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:	CFP23AWC-POD
ISBN (Print-On-Demand):	978-1-6654-9627-8
ISBN (Online):	978-1-6654-9626-1
ISSN:	1948-3244

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# TABLE OF CONTENTS

## TU1.P: MIMO SYSTEMS I

<b>TU1.P.1: LINEAR ONE-BIT PRECODING IN MASSIVE MIMO: ASYMPTOTIC SEP ANALYSIS AND OPTIMIZATION</b> .....	11
<i>Zheyu Wu, Junjie Ma, Ya-Feng Liu, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, China; A. Lee Swindlehurst, University of California, United States of America</i>	
<b>TU1.P.2: EXPLOITING CONSTRUCTIVE POWER AMPLIFIER NONLINEARITIES THROUGH SYMBOL-LEVEL PRECODING</b> .....	41
<i>Guorui Wei, Ang Li, Xi'an Jiaotong University, China; Christos Masouros, University College London, China</i>	
<b>TU1.P.3: DESIGNING GROUP-LEVEL MULTI-USER PRECODING IN MULTI-SUBCARRIER NETWORKS: IS EESM THE SOLUTION?</b> .....	61
<i>Xin Guan, Qingjiang Shi, Tongji University, China</i>	
<b>TU1.P.4: LEARNING BY OVER-THE-AIR TRAINING: DISTRIBUTED PRECODING FOR CELL-FREE MASSIVE MIMO</b> .....	76
<i>Weijie Dai, Junkai Liu, Rui Wang, Yi Jiang, Fudan University, China</i>	
<b>TU1.P.5: INTERFERENCE EXPLOITATION MU-MISO PRECODING UNDER PER-ANTENNA POWER CONSTRAINT</b> .....	111
<i>Yunsi Wen, Haonan Wang, Ang Li, Xuewen Liao, Xi'an Jiaotong University, China; Christos Masouros, University College London, United Kingdom of Great Britain and Northern Ireland</i>	
<b>TU1.P.6: CSI TYPE-II CODEBOOK OF CODEBOOKS</b> .....	116
<i>Ryan Dreifuerst, Robert Heath, North Carolina State University, United States of America</i>	

## WE1.P: MIMO SYSTEMS II

<b>WE1.P.1: BLIND MIMO DETECTION FOR DOUBLY-SELECTIVE FADING CHANNELS</b> .....	326
<i>Yi Yao, Shengsong Luo, Chongbin Xu, Die Hu, Xin Wang, Fudan University, China</i>	
<b>WE1.P.2: CLOSED-FORM DETECTION ERROR RATE ANALYSIS IN PHYSICAL LAYER ANONYMOUS COMMUNICATIONS</b> .....	341
<i>Yifan Cui, Zhongxiang Wei, Tongji University, China; Dawei Wang, Northwestern Polytechnical University, China; Christos Masouros, University College London, United Kingdom of Great Britain and Northern Ireland; Qinbo Wang, China Mobile Group Co., Ltd., China</i>	
<b>WE1.P.3: AN EFFICIENT ALGORITHM DESIGN OF MIMO-OFDM SYSTEMS FOR CO-CHANNEL INTERFERENCE MITIGATION</b> .....	361
<i>Junkai Liu, Ziyu Wen, Wei Zhang, Yi Jiang, Fudan University, China</i>	
<b>WE1.P.4: JOINT ACTIVE USER DETECTION, CHANNEL ESTIMATION, AND DATA DETECTION FOR MASSIVE GRANT-FREE TRANSMISSION IN CELL-FREE SYSTEMS</b> .....	406
<i>Gangle Sun, Mengyao Cao, Wenjin Wang, Wei Xu, Southeast University, China; Christoph Studer, Eidgenössische Technische Hochschule Zürich, Switzerland</i>	
<b>WE1.P.5: LEVERAGING USER-WISE SVD FOR ACCELERATED CONVERGENCE IN ITERATIVE ELAA-MIMO DETECTIONS</b> .....	411
<i>Jiuyu Liu, Yi Ma, Rahim Tafazolli, University of Surrey, United Kingdom of Great Britain and Northern Ireland</i>	

<b>WE1.P.6: RANDOM PROJECTION BASED EFFICIENT DETECTORS IN MASSIVE MIMO COMMUNICATION NETWORKS</b>	<b>426</b>
<i>Gopal Chamarthi, Adarsh Patel, Indian institute of Technology Mandi, India; Rameshwar Pratap, Indian institute of Technology Hyderabad, India</i>	
<b>WE1.P.7: EXPLOITING CHANNEL SPARSITY IN MASSIVE MIMO BLIND SIGNAL DETECTION VIA L2 - L1 OPTIMIZATION OVER THE STIEFEL MANIFOLD</b>	<b>441</b>
<i>Yuchen Feng, Fan Fei, Jinyan Fan, Shanghai Jiao Tong University, China; Ying Zhang, Jin Wu, Yixin Wu, Songyan Xue, Huawei Technologies Co., Ltd., China</i>	
 <b>TH1.P: MIMO SYSTEMS III</b>	
<b>TH1.P.1: MULTIUSER COMMUNICATION AIDED BY MOVABLE ANTENNA</b>	<b>531</b>
<i>Lipeng Zhu, Wenyan Ma, National University of Singapore, Singapore; Boyu Ning, University of Electronic Science and Technology of China, China; Rui Zhang, National University of Singapore &amp; The Chinese University of Hong Kong, Singapore</i>	
<b>TH1.P.2: A RATE-SPLITTING APPROACH FOR RIS-AIDED MASSIVE MIMO NETWORKS WITH TRANSCEIVER DESIGN</b>	<b>541</b>
<i>Hanxiao Ge, Navneet Garg, Tharmalingam Ratnarajah, The University of Edinburgh, United Kingdom of Great Britain and Northern Ireland; Anastasios Papazafeiropoulos, University of Hertfordshire, United Kingdom of Great Britain and Northern Ireland</i>	
<b>TH1.P.3: JOINT DESIGN OF ENERGY-BASED CONSTELLATIONS FOR TWO-USER NONCOHERENT MASSIVE SIMO SYSTEMS</b>	<b>576</b>
<i>Mengdi Liu, Zheng Dong, Hongji Xu, Zhi Liu, Shandong University, China; He (Henry) Chen, The Chinese University of Hong Kong, China</i>	
<b>TH1.P.4: HOW RESILIENT ARE CELL-FREE MASSIVE MIMO OFDM SYSTEMS TO PROPAGATION DELAYS?</b>	<b>581</b>
<i>Anubhab Chowdhury, Chandra Murthy, Indian Institute of Science, Bangalore, India</i>	
<b>TH1.P.5: A ROBUST APPROACH TO DYNAMIC PILOT ASSIGNMENT IN DISTRIBUTED MASSIVE MIMO NETWORKS</b>	<b>606</b>
<i>han yu, hao guo, Tommy Svensson, Chalmers university of technology, Sweden; xinping Yi, University of Liverpool, United Kingdom of Great Britain and Northern Ireland</i>	
<b>TH1.P.6: ANALYSIS OF OVERSAMPLING IN UPLINK MASSIVE MIMO-OFDM WITH LOW-RESOLUTION ADCS</b>	<b>626</b>
<i>Mengyuan Ma, Nhan Thanh Nguyen, Italo Atzeni, Markku Juntti, University of Oulu, Finland</i>	
<b>TH1.P.7: UNICAST BEAMFORMING IN THE PRESENCE OF A SMART REACTIVE JAMMER: A STACKELBERG GAME APPROACH</b>	<b>631</b>
<i>Bai Shi, Huaizong Shao, Jingran Lin, Zhikai Zhai, University of Electronic Science and Technology of China, China</i>	
 <b>TU1.P: MACHINE LEARNING FOR WIRELESS COMMUNICATIONS AND NETWORKING I</b>	
<b>TU1.P.1: ENHANCING CNN-BASED CHANNEL ESTIMATION USING TRANSFER LEARNING IN OFDM SYSTEMS</b>	<b>21</b>
<i>Lingrui Zhu, Carsten Bockelmann, Armin Dekorsy, University of Bremen, Germany; Thorsten Schier, Salah Eddine Hajri, Technologies Sweden AB, Sweden</i>	
<b>TU1.P.2: RECEIVER-AGNOSTIC RADIO FREQUENCY FINGERPRINT IDENTIFICATION VIA FEATURE DISENTANGLEMENT</b>	<b>46</b>
<i>Hongli Liu, Shaoxian Zhu, Liu Yang, Qiang Li, Jingran Lin, School of Information and Communication Engineering, University of Electronic Science and Technology of China, China</i>	

<b>TU1.P.3: RADIO FREQUENCY FINGERPRINTS IDENTIFICATION BASED ON GAN NETWORKS</b>	<b>51</b>
<i>Weilin Zhu, Ziyang Wang, Peng Cheng Laboratory, China; Jiaying Li, Hong Kong University of Science and Technology (Guangzhou), China; Qiang Li, Jingran Lin, University of Electronic Science and Technology of China, China; Sissi Xiaoxiao Wu, Shenzhen University, China</i>	
<b>TU1.P.4: CHANNEL ESTIMATION BASED ON CONTRASTIVE FEATURE LEARNING WITH FEW LABELED SAMPLES</b>	<b>91</b>
<i>Yihan Xu, Lixiang Lian, School of Information Science and Technology, ShanghaiTech University, China</i>	
<b>TU1.P.5: SPECTRUM TRANSFORMER: WIDEBAND SPECTRUM SENSING USING MULTI-HEAD SELF-ATTENTION</b>	<b>101</b>
<i>Weishan Zhang, Yue Wang, Xiang Chen, Zhi Tian, George Mason University, United States of America</i>	
<b>TU1.P.6: FEW-SHOT MODULATION RECOGNITION WITH FEATURE TRANSFORMATION AND META-LEARNING</b>	<b>121</b>
<i>Wendi Xiao, Yuan Zeng, Yi Gong, Southern University of Science and Technology, China</i>	
<b>TU1.P.7: A WEIGHTED AUTOENCODER-BASED APPROACH TO DOWNLINK NOMA CONSTELLATION DESIGN</b>	<b>126</b>
<i>Vukan Ninkovic, Dejan Vukobratovic, Faculty of Technical Sciences, University of Novi Sad, Serbia; Adriano Pastore, Carles Anton-Haro, Centre Tecnologic de Telecomunicacions de Catalunya (CTTC/iCERCA), Spain</i>	
 <b>WE1.P: MACHINE LEARNING FOR WIRELESS COMMUNICATIONS AND NETWORKING II</b>	
<b>WE1.P.2: FEDGSM: EFFICIENT FEDERATED LEARNING FOR LEO CONSTELLATIONS WITH GRADIENT STALENESS MITIGATION</b>	<b>356</b>
<i>Lingling Wu, Jingjing Zhang, Fudan University, China</i>	
<b>WE1.P.3: ATTRI-FED: A GIB FRAMEWORK FOR ATTRIBUTE-BASED PRIVACY AND COMMUNICATION-EFFICIENT FEDERATED LEARNING</b>	<b>366</b>
<i>Ahmet Faruk Saz, Faramarz Fekri, Yashas Malur Saidutta, Georgia Institute of Technology, United States of America; Mustafa Riza Akdeniz, Brandon Edwards, Nageen Himayat, Intel Corporation, United States of America</i>	
<b>WE1.P.4: APPROXIMATE MESSAGE PASSING FOR NOT SO LARGE NIID GENERALIZED LINEAR MODELS</b>	<b>386</b>
<i>Zilu Zhao, Fangqing Xiao, Dirk Slock, EURECOM, France</i>	
<b>WE1.P.5: WIRELESS MODEL SPLITTING FOR COMMUNICATION-EFFICIENT PERSONALIZED FEDERATED LEARNING WITH PIPELINE PARALLELISM</b>	<b>421</b>
<i>Luya Wang, Yanjie Dong, Lei Zhang, Laizhong Cui, Shenzhen University, China; Xiping Hu, Beijing Institute of Technology, China; Victor Leung, Shenzhen University/UBC, China</i>	
<b>WE1.P.7: COMMUNICATION CHANNEL-AWARE FEDERATED DISTILLATION FOR MASSIVE MIMO SYSTEMS</b>	<b>436</b>
<i>Yuchen Mu, Navneet Garg, Tharmalingam Ratnarajah, The University of Edinburgh, United Kingdom of Great Britain and Northern Ireland</i>	
 <b>TH1.P: MACHINE LEARNING FOR WIRELESS COMMUNICATIONS AND NETWORKING III</b>	
<b>TH1.P.1: LEARNING BEAMS ADAPTIVE TO THE ENVIRONMENT: AN RSRP-BASED CODEBOOK DESIGN</b>	<b>521</b>
<i>Xinzhi Ning, Qingjiang Shi, Tongji University, China; Shutao Zhang, Tsung-Hui Chang, The Chinese University of Hong Kong, Shenzhen, China; Ye Xue, Shenzhen Research Institute of Big Data, China; Xi Zheng, Huawei Technologies, China</i>	

<b>TH1.P.2: CELLULAR NETWORK OPTIMIZATION USING UNFOLDING-BASED GRAPH</b> .....	<b>551</b>
<b>NEURAL NETWORKS</b>	
<i>Pengcheng He, Yijia Tang, Qingjiang Shi, Tongji University, China; Fan Xu, Peng Cheng Laboratory, China</i>	
<b>TH1.P.3: UNSUPERVISED PARAMETER ESTIMATION USING MODEL-BASED DECODER</b> .....	<b>571</b>
<i>Franz Weißer, Michael Baur, Wolfgang Utschick, Technical University Munich, Germany</i>	
<b>TH1.P.4: MODEL ORDER SELECTION WITH VARIATIONAL AUTOENCODING</b> .....	<b>586</b>
<i>Michael Baur, Franz Weißer, Benedikt Böck, Wolfgang Utschick, Technical University of Munich, Germany</i>	
<b>TH1.P.5: SEMI-SUPERVISED VARIATIONAL INFERENCE OVER NONLINEAR CHANNELS</b> .....	<b>611</b>
<i>David Burshtein, Eli Bery, Tel Aviv University, Israel</i>	
<b>TH1.P.6: SPACE-TIME DESIGN FOR DEEP JOINT SOURCE CHANNEL CODING OF IMAGES OVER MIMO CHANNELS</b> .....	<b>616</b>
<i>Chenghong Bian, yulin shao, haotian wu, Deniz Gunduz, Imperial College London, United Kingdom of Great Britain and Northern Ireland</i>	
<b>TH1.P.7: A TRANSFORMER BASED APPROACH FOR WIRELESS RESOURCE ALLOCATION PROBLEMS INVOLVING MIXED DISCRETE AND CONTINUOUS VARIABLES</b> .....	<b>636</b>
<i>Bingqing Song, Zhicheng Zhou, Mingyi Hong, University of Minnesota, United States of America; Chenliang Li, The Chinese University of Hong Kong, Shenzhen, China; Xiao Fu, Oregon State University, China; Dongning Guo, Northwestern University, United States of America</i>	
<b>TH1.P.8: LEARNING BASED COMPRESSIVE BEAM DETECTION USING REAL-VALUED BEAMSPACE COVARIANCE PROCESSING FOR MMWAVE COMMUNICATIONS</b> .....	<b>641</b>
<i>Zhibin Yu, Ahmed Abdelkader, Xiaofeng Wu, Huawei Technologies Duesseldorf GmbH, Germany; Martin Haardt, Ilmenau University of Technology, Germany</i>	
<b>TU2.P: RESOURCE ALLOCATION</b>	
<b>TU2.P.1: MAX-AND-MIN FRACTIONAL PROGRAMMING FOR COMMUNICATIONS AND SENSING</b> .....	<b>141</b>
<i>Yannan Chen, Kaiming Shen, Chinese University of Hong Kong, Shenzhen, China; Licheng Zhao, Shenzhen Research Institute of Big Data, China</i>	
<b>TU2.P.2: AN EFFICIENT DECOMPOSITION ALGORITHM FOR LARGE-SCALE NETWORK SLICING</b> .....	<b>171</b>
<i>Wei-Kun Chen, Beijing Institute of Technology, China; Ya-Feng Liu, Rui-Jin Zhang, Yu-Hong Dai, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, China; Zhi-Quan Luo, Shenzhen Research Institute of Big Data and The Chinese University of Hong Kong, China</i>	
<b>TU2.P.3: NON-ORTHOGONAL MULTIPLEXING IN THE FBL REGIME ENHANCES PHYSICAL LAYER SECURITY WITH DECEPTION</b> .....	<b>211</b>
<i>Bin Han, Hans Dieter Schotten, Rheinland-Pfälzische Technische Universität Kaiserslautern-Landau, Germany; Yao Zhu, Anke Schmeink, Rheinisch-Westfälische Technische Hochschule Aachen, Germany</i>	
<b>TU2.P.4: QMIX-BASED CROSS-DOMAIN TRANSMISSION ROUTING FOR TIME-SENSITIVE AND DETERMINISTIC NETWORKS</b> .....	<b>226</b>
<i>Wenxuan Wang, Wenyong Wang, University of Electronic Science and Technology of China, China; Bochun Wu, Fudan University, China; Sai Zou, Guizhou University, China; Haisheng Yu, Macau University of Science and Technology, China; Wei Ni, CSIRO, Australia; Ji Zhang, China Telecom Co. LTD, China</i>	
<b>TU2.P.5: ROBUST AND RELIABLE STOCHASTIC RESOURCE ALLOCATION VIA TAIL WATERFILLING</b> .....	<b>256</b>
<i>Gokberk Yaylali, Dionysios Kalogieras, Yale University, United States of America</i>	

<b>TU2.P.6: DISTRIBUTED COMPUTING OF FUNCTIONS OF STRUCTURED SOURCES WITH HELPER SIDE INFORMATION</b>	276
<i>Derya Malak, EURECOM, France</i>	
<b>TU2.P.7: OPTIMIZATION OF HIERARCHICAL-QAM BASED DOWNLINK MULTIPLE ACCESS WITH STATISTICAL CSI</b>	291
<i>Jinkang Zhu, Ming Zhao, University of Science &amp; Technology of China, China; Shengli Zhou, University of Connecticut, United States of America</i>	
<b>TU2.P.8: RATE-COMPATIBLE PUNCTURING AND SHORTENING OF SHORT PAC CODES FOR 6G URLLC</b>	301
<i>Xianwen Zhang, Ming Jiang, Mingyang Zhu, Chunming Zhao, Southeast university, China; Lijie Hu, China Mobile Research Institute, China</i>	
<b>TU2.P.9: RF-BASED SIMULTANEOUS LOCALIZATION AND SOURCE SEEKING FOR MULTI-ROBOT SYSTEMS</b>	311
<i>Ke Xu, Rui Zhang, He (Henry) Chen, The Chinese University of Hong Kong, Hong Kong</i>	
 <b>TU1.P: INTEGRATED COMMUNICATIONS AND SENSING</b>	
<b>TU1.P.1: JOINT PRECODING AND ARTIFICIAL NOISE DESIGN FOR SECURE TRANSMISSION IN ISAC SYSTEM</b>	16
<i>Ruiwei Yang, Huiqin Du, Jinan University, China</i>	
<b>TU1.P.2: TWO-STAGE ON-GRID RADAR PARAMETER ESTIMATION IN OTFS BASED DUAL-FUNCTION RADAR-COMMUNICATIONS</b>	36
<i>Xinyu Gong, Jianping Zheng, Xidian University, China</i>	
<b>TU1.P.3: SPATIAL BEAMFORMING DESIGN FOR ISAC SYSTEMS UNDER PER ANTENNA POWER CONSTRAINT</b>	56
<i>Kaixin Li, Tian Lin, Qiucen Wu, Yu Zhu, Fudan University, China</i>	
<b>TU1.P.4: BEAMFORMING DESIGN FOR IRS-ASSISTED INTEGRATED SENSING AND COMMUNICATION SYSTEMS IN CLUTTER ENVIRONMENTS</b>	96
<i>Chikun Liao, Feng Wang, Guangdong University of Technology, China</i>	
 <b>TU2.P: RECONFIGURABLE INTELLIGENT SURFACES</b>	
<b>TU2.P.1: SUM RATE MAXIMIZATION WITH DISCRETE PHASE SHIFT FOR RECONFIGURABLE INTELLIGENT SURFACE AIDED BROADCAST CHANNEL</b>	151
<i>Kaimin Wang, Cong Sun, Beijing University of Posts and Telecommunications, China</i>	
<b>TU2.P.2: CHANNEL ESTIMATION WITH REDUCED PHASE ALLOCATIONS IN RIS-AIDED SYSTEMS</b>	161
<i>Benedikt Fesl, Andreas Faika, Nurettin Turan, Michael Joham, Wolfgang Utschick, Technical University of Munich, Germany</i>	
<b>TU2.P.3: DOES AN IRS DEGRADE OUT-OF-BAND PERFORMANCE?</b>	216
<i>Yashvanth L, Chandra Murthy, Indian Institute of Science, India</i>	
<b>TU2.P.4: HIGH SNR ANALYSIS OF RIS-AIDED MIMO BROADCAST CHANNELS</b>	221
<i>Dominik Semmler, Michael Joham, Wolfgang Utschick, Technische Universität München, Germany</i>	
<b>TU2.P.5: JOINT ACTIVE AND PASSIVE BEAMFORMING FOR IRS-AIDED MULTIUSER SYSTEMS WITH LOW-RESOLUTION DACS</b>	271
<i>Hongwei Wang, Yujun Luo, Jun Fang, University of Electronic Science and Technology of China, China</i>	



**TU2.P.6: MULTIUSER TRACKING FOR RECONFIGURABLE INTELLIGENT SURFACE ..... 281**  
**AIDED MIMO-OFDM SYSTEMS: A VARIATIONAL BAYESIAN APPROACH**  
*Boyu Teng, Xiaojun Yuan, The National Key Lab. on Wireless Commun., UESTC, China; Rui Wang, The College of Electronics and Information Engineering, Tongji University, China*

**TU2.P.7: HYBRID ACTIVE-PASSIVE IRS-ASSISTED FRAMEWORK IN UPLINK NOMA ..... 286**  
**COMMUNICATION**  
*Chi-Wei Chen, Wen-Chiao Tsai, An-Yeu Wu, National Taiwan University, Taiwan*

**TU2.P.8: THZCONDENSER: BEAMFORMING DESIGN FOR RIS-AIDED THZ WIDEBAND ..... 296**  
**COMMUNICATION SYSTEMS**  
*Yihang Jiang, Ziqin Zhou, Yi Gong, Southern University of Science and Technology, China; Xiaoyang Li, Shenzhen Research Institute of Big Data, China*

**TU2.P.9: ACHIEVABLE RATE MAXIMIZATION FOR RIS-UAV ASSISTED VEHICULAR ..... 306**  
**COMMUNICATION NETWORK**  
*Sun Wenxue, Xu Zhuoran, Zhu Mingkai, Li Longze, Ni Yiyang, Zhao Haitao, Nanjing University of Posts and Telecommunications, China*

## **TU2.P: CHANNEL MODELING AND EQUALIZATION**

**TU2.P.1: AN EXPLORATION-ESTIMATION BEAMFORMING SCHEME FOR 5GNR FDD ..... 146**  
**MASSIVE MIMO COMMUNICATIONS**  
*Kai Li, Zhi-Quan Luo, The Chinese University of Hong Kong, Shenzhen, China; Wenqiang Pu, Shenzhen Research Insitute of Big Data, China*

**TU2.P.2: PULSE SHAPE-AIDED MULTIPATH DELAY ESTIMATION FOR FINE-GRAINED ..... 181**  
**WIFI SENSING**  
*Ke Xu, He (Henry) Chen, The Chinese University of Hong Kong, Hong Kong; Chenshu Wu, The University of Hong Kong, Hong Kong*

**TU2.P.3: PARAMETERIZED CHANNEL ESTIMATION CONSIDERING PHASE ..... 206**  
**DEVIATIONS OF THE MULTI-ANTENNA ARRAY**  
*YiFei Zhang, TianYi Zhang, Yi Jiang, Fudan University, China*

**TU2.P.4: DELAY-DOPPLER DOMAIN CHANNEL ESTIMATION FOR DZT-BASED OTFS ..... 236**  
**SYSTEMS**  
*Sai Pradeep Muppaneni, Sandesh Rao Mattu, Ananthanarayanan Chockalingam, Indian Institute of Science, India*

**TU2.P.5: COMPRESSED SENSING BASED CHANNEL ESTIMATION FOR GFDM SYSTEMS ..... 266**  
**IN HIGH MOBILITY SCENARIO**  
*Hamidreza Shayanfar, Wei-Ping Zhu, M.N.S Swamy, Concordia University, Canada*

## **WE2.P: SIGNAL PROCESSING FOR OPTICAL, SATELLITE, AND UNDERWATER COMMUNICATIONS**

**WE2.P.1: JOINT CHANNEL SELECTION AND SPECTRUM SENSING IN INTEGRATED ..... 451**  
**SATELLITE-TERRESTRIAL NETWORKS**  
*Mengying Zhang, Xiumei Yang, Zhiyong Bu, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences; University of Chinese Academy of Sciences, China*

**WE2.P.2: WEAK SIGNAL DETECTION BASED ON BETA DIVERGENCE..... 461**  
*Jiahao Liu, Haoxuan Liu, Wenqiang Pu, Rui Zhou, Shenzhen Research Institute of Big Data, China; Ming-Yi You, Science and Technology on Communication Information Security Control Laboratory, China; Qingjiang Shi, Tongji University, China*



<b>WE2.P.3: OPTIMALITY ANALYSIS AND EFFICIENT SCHEDULING FOR MASSIVE IOT-LEO SATELLITE NETWORKS</b>	<b>476</b>
<i>Xiaohui Zhao, Tong-Xing Zheng, Lei Lei, Xi'an Jiaotong University, China; Yaxiong Yuan, Anyue Wang, University of Luxembourg, China</i>	
<b>WE2.P.4: INTER-VECTOR INTERFERENCE SELF-CANCELLATION SCHEME FOR DIFFERENTIAL OSDM IN UNDERWATER ACOUSTIC COMMUNICATIONS</b>	<b>501</b>
<i>Yujie Wang, Qunfei Zhang, Shengqian Ma, Lingling Zhang, Jing Han, Northwestern Polytechnical University, China; Geert Leus, Delft University of Technology, China</i>	
<b>TH1.P: ENERGY EFFICIENCY AND HARVESTING</b>	
<b>TH1.P.1: TRANSMITTER ROTATION FOR FIELD OF VIEW ENHANCEMENT IN RESONANT BEAM WIRELESS POWER TRANSFER</b>	<b>526</b>
<i>Shun Han, Mengyuan Xu, Mingqing Liu, Shuaifan Xia, Qingwen Liu, tongji, China</i>	
<b>TH1.P.2: SECRECY ENERGY EFFICIENCY MAXIMIZATION FOR UAV-ENABLED FDMA SYSTEMS</b>	<b>556</b>
<i>Jie Sun, Zhichao Sheng, Yanzan Sun, Yong Fang, Shanghai University, China; Ali Arshad Nasir, King Fahd University of Petroleum and Minerals, Saudi Arabia</i>	
<b>TH1.P.3: ENERGY-EFFICIENT TRANSMIT BEAMFORMING AND ANTENNA SELECTION WITH NON-LINEAR PA EFFICIENCY</b>	<b>566</b>
<i>Yuan Fang, Gaoyuan Cheng, Guanlin Wu, Jie Xu, The Chinese University of Hong Kong, Shenzhen, China; Yi Huang, Tongji University, China; Chuan Ma, Yinghao Jin, Huawei Technologies Co., Ltd., Shanghai, China</i>	
<b>TH1.P.4: PV PANEL/BATTERY SIZING AND RESOURCE ALLOCATION FOR SMART-GRID POWERED C-RAN</b>	<b>591</b>
<i>Xiaojing Chen, Xiaomei Zhang, Shunqing Zhang, Yanzan Sun, Shugong Xu, Shanghai University, China; Wei Ni, Commonwealth Scientific and Industrial Research Organization, Australia; Xin Wang, Fudan University, China</i>	
<b>TH1.P.5: TWO-SCALE STOCHASTIC OPTIMIZATION OF MOBILE EDGE COMPUTING SYSTEMS POWERED BY SMART GRID</b>	<b>601</b>
<i>Xiaojing Chen, Si Chen, Shunqing Zhang, Yanzan Sun, Shugong Xu, Shanghai University, China; Wei Ni, Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia; Xin Wang, Fudan University, China</i>	
<b>TH1.P.6: AOI MINIMIZATION FOR SENSOR NETWORKS WITH ADAPTIVE PACKET AND ENERGY ARRIVAL</b>	<b>621</b>
<i>Ruiqi Zheng, Mengyuan Li, Yuyang Xia, Yonghao Ji, Xiaoli Xu, Southeast University, China</i>	
<b>WE2.P: INTERNET OF THINGS</b>	
<b>WE2.P.1: LONG RANGE BARCODE SCAN USING RESONANT BEAM</b>	<b>456</b>
<i>Xiaozhe Li, Shuaifan Xia, Qingwen Liu, Yunfeng Bai, Tongji University, China</i>	
<b>WE2.P.2: LASER RANGEFINDER-BASED MULTI-ROBOT COOPERATIVE LOCALIZATION USING CLOUD COMPUTING</b>	<b>471</b>
<i>Yihan Zhu, Mingqing Liu, Haoming Liu, Shuze Shen, Shuaifan Xia, Qingwen Liu, Hai Lu, Qunhui Yang, Tongji University, China</i>	
<b>WE2.P.3: PHYSICAL-LAYER AUTHENTICATION OF COMMODITY WI-FI DEVICES VIA MICRO-SIGNALS ON CSI CURVES</b>	<b>486</b>
<i>Ruiqi Kong, He (Henry) Chen, The Chinese University of Hong Kong, Hong Kong</i>	

<b>WE2.P.4: HARNESSING THE POWER OF REPETITION STRUCTURE IN ULTRA-NARROWBAND IOT</b>	<b>496</b>
<i>Spyridon Peppas, Paris Karakasis, Nicholas Sidiropoulos, University of Virginia, United States of America; Danijela Cabric, University of California, United States of America</i>	
<b>WE2.P.5: ULA-BASED ANALOG BEAMFORMING AND MODE DESIGN FOR LAP-ASSISTED MULTICASTING COMMUNICATION</b>	<b>506</b>
<i>Xiaopeng Yuan, Anke Achmeink, RWTH Aachen University, Germany; Peng Wu, Yulin Hu, Wuhan University, China</i>	
<b>WE2.P.6: LOW COMPLEXITY AND HIGH ACCURACY POSITIONING FOR IIOT APPLICATIONS</b>	<b>511</b>
<i>Mengting Liu, Xin Gao, Jianghua Liu, Huawei, HiSilicon, China</i>	
<b>WE2.P.7: LORA PREAMBLE DETECTION ROBUST TO INTER-CHANNEL INTERFERENCE</b>	<b>516</b>
<i>Joachim Tapparel, Andreas Burg, École polytechnique fédérale de Lausanne, Switzerland; Alexios Balatsoukas-Stimming, Eindhoven University of Technology, Netherlands</i>	
 <b>TU1.P: OVER-THE-AIR COMPUTATION AND LEARNING</b>	
<b>TU1.P.1: COMMUNICATION-EFFICIENT VERTICALLY SPLIT INFERENCE VIA OVER-THE-AIR COMPUTATION</b>	<b>1</b>
<i>Peng Yang, Ting Wang, East China Normal University, China; Dingzhu Wen, Yuanming Shi, ShanghaiTech University, China; Qunsong Zeng, The University of Hong Kong, Hong Kong</i>	
<b>TU1.P.2: ROBUST OVER-THE-AIR AGGREGATION FOR UPLINK OFDM SYSTEM UNDER BURST SPARSE INTERFERENCE</b>	<b>31</b>
<i>Nilesh Kumar Jha, Huayan Guo, Vincent K N Lau, Hong Kong University of Science and Technology, Hong Kong</i>	
<b>TU1.P.3: OVER-THE-AIR VIEW-POOLING FOR LOW-LATENCY DISTRIBUTED SENSING</b>	<b>71</b>
<i>Zhiyan Liu, Qiao Lan, Kaibin Huang, The University of Hong Kong, Hong Kong; Anders Kalør, Petar Popovski, Aalborg University, Denmark</i>	
<b>TU1.P.4: ASYNCHRONOUS PERSONALIZED LEARNING FOR HETEROGENEOUS WIRELESS NETWORKS</b>	<b>81</b>
<i>Xiaolan Liu, Loughborough University, United Kingdom of Great Britain and Northern Ireland; Jackson Ross, Independent, United Kingdom of Great Britain and Northern Ireland; Yue Liu, Macao Polytechnic University, China; Yuanwei Liu, Queen Mary University of London, United Kingdom of Great Britain and Northern Ireland</i>	
 <b>TU1.P: SEMANTIC-AWARE COMMUNICATION</b>	
<b>TU1.P.1: SEMANTIC COMMUNICATION BASED ON ENTITY INFORMATION ENHANCEMENT</b>	<b>6</b>
<i>Xi Zhang, Dan Song, Congduan Li, Sun Yat-sen University, China; Linqi Song, City University of Hong Kong, Hong Kong</i>	
<b>TU1.P.2: COMMUNICATION-EFFICIENT MULTIUSER AI DOWNLOADING VIA REUSABLE KNOWLEDGE BROADCASTING</b>	<b>26</b>
<i>Hai Wu, Qunsong Zeng, Kaibin Huang, The University of Hong Kong, Hong Kong</i>	
<b>TU1.P.3: IMAGE SEMANTIC COMMUNICATION OVER FADING CHANNEL: A LEARNED BROADCAST APPROACH</b>	<b>66</b>
<i>Kangning Ma, Shuo Shao, Meixia Tao, Shanghai Jiao Tong University, China</i>	

<b>TU1.P.4: A HYBRID WIRELESS IMAGE TRANSMISSION SCHEME WITH DIFFUSION .....</b>	<b>86</b>
<i>Xueyan Niu, Bo Bai, Weichao Chen, Guohua Zhou, Huawei Technologies Co. Ltd., Hong Kong; Xu Wang, City University of Hong Kong, Hong Kong; Deniz Gündüz, Imperial College London, United Kingdom of Great Britain and Northern Ireland</i>	
<b>TU1.P.5: SEMANTIC KNOWLEDGE BASE SYNCHRONIZATION BY LIMITED FEEDBACK ASSISTANCE .....</b>	<b>106</b>
<i>Qi Cao, Fei Wan, Yameng Du, Baoming Bai, Xidian University, China</i>	
<b>TU2.P: RATE-SPLITTING MULTIPLE ACCESS FOR 6G</b>	
<b>TU2.P.1: DATA-DRIVEN DEEP LEARNING-BASED RATE-SPLITTING MULTIPLE ACCESS FOR FDD MASSIVE MIMO-OFDM SYSTEMS WITH IMPLICIT CSI .....</b>	<b>156</b>
<i>Minghui Wu, Zhen Gao, Chun Hu, Zhongxiang Li, Beijing Institute of Technology, China</i>	
<b>TU2.P.2: ENHANCING SECURITY IN RSMA NETWORKS WITH COOPERATIVE JAMMING AND RELAYING .....</b>	<b>176</b>
<i>Haoran Pang, Fei Ji, Jian Zhao, Miaowen Wen, South China University of Technology, China; Zhaolong Ning, Chongqing University of Posts and Telecommunications, China</i>	
<b>TU2.P.3: MULTI-FUNCTIONAL RIS FOR SUM-RATE MAXIMIZATION IN RATE-SPLITTING MULTIPLE ACCESS NETWORKS .....</b>	<b>201</b>
<i>Wen Wang, Wanli Ni, Hui Tian, Beijing University of Posts and Telecommunications, China; Zhaohui Yang, Zhejiang University, China; Changsheng You, Southern University of Science and Technology, China; Dusit Niyato, Nanyang Technological University, Singapore</i>	
<b>TU2.P.4: UNDER WHOSE UMBRELLA: THE COLLABORATIVE BENEFITS OF RS AND RIS IN COVERT COMMUNICATIONS .....</b>	<b>241</b>
<i>Fatemeh Lotfi, Kevin Weinberger, Stefan Roth, Aydin Sezgin, Ruhr University Bochum, Germany</i>	
<b>TU2.P.5: RSMA-ENABLED MULTIGROUP MULTICAST RATE-MATCHING FOR MULTIBEAM SATELLITE SYSTEMS .....</b>	<b>251</b>
<i>Juhwan Lee, Jungwoo Lee, Seoul National University, Korea, Republic of; Jaehyup Seong, Wonjae Shin, Ajou University, Korea, Republic of; Didier Le Ruyet, Conservatoire National des Arts et Metiers, France; Longfei Yin, Bruno Clerckx, Imperial College London, United Kingdom of Great Britain and Northern Ireland</i>	
<b>TU2.P: OPTIMIZATION THEORY AND ALGORITHMS FOR 5G AND BEYOND</b>	
<b>TU2.P.1: BLIND BEAMFORMING FOR MULTIPLE-IRS ASSISTED WIRELESS TRANSMISSION .....</b>	<b>136</b>
<i>Fan Xu, Peng Cheng Laboratory, China; Jiawei Yao, Wenhai Lai, Kaiming Shen, Zhi-Quan Luo, The Chinese University of Hong Kong (Shenzhen), China; Xin Li, Xin Chen, Huawei Technologies, China</i>	
<b>TU2.P.2: ACTIVE SENSING FOR RECIPROCAL MIMO CHANNELS.....</b>	<b>166</b>
<i>Tao Jiang, Wei Yu, University of Toronto, Canada</i>	
<b>TU2.P.3: BEAM SCANNING FOR INTEGRATED SENSING AND COMMUNICATION IN IRS-AIDED MMWAVE SYSTEMS .....</b>	<b>196</b>
<i>Renwang Li, Shu Sun, Meixia Tao, Shanghai Jiao Tong University, Chile; Xiaodan Shao, Rui Zhang, The Chinese University of Hong Kong, Shenzhen, China</i>	
<b>TU2.P.4: AN EFFICIENT GLOBAL ALGORITHM FOR ONE-BIT MAXIMUM-LIKELIHOOD MIMO DETECTION .....</b>	<b>231</b>
<i>Cheng-Yang Yu, Wei-Kun Chen, Beijing Institute of Technology, China; Mingjie Shao, Shandong University, China; Ya-Feng Liu, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, China; Wing-Kin Ma, The Chinese University of Hong Kong, Hong Kong</i>	

<b>TU2.P.5: ITERATIVE DELAY-SCALE SPREAD CHANNEL ESTIMATION AND VARIATIONAL SOFT SYMBOL DECODING</b>	<b>261</b>
<i>Niladri Halder, Arunkumar K. P., Chandra R. Murthy, Indian Institute of Science, India</i>	
 <b>WE1.P: TIMELY AND PRIVATE MACHINE LEARNING OVER NETWORKS</b>	
<b>WE1.P.1: DECENTRALIZED LEARNING OVER WIRELESS NETWORKS: THE EFFECT OF BROADCAST WITH RANDOM ACCESS</b>	<b>316</b>
<i>Zheng Chen, Martin Dahl, Erik G. Larsson, Linköping University, Sweden</i>	
<b>WE1.P.2: ADAPTIVE GRADIENT METHODS FOR OVER-THE-AIR FEDERATED LEARNING</b>	<b>351</b>
<i>Chenhao Wang, Howard Hao Yang, Zhejiang University, China; Zihan Chen, Singapore University of Technology and Design, China; Nikolaos Pappas, Linköping University, Sweden</i>	
<b>WE1.P.3: DELAYED RANDOM PARTIAL GRADIENT AVERAGING FOR FEDERATED LEARNING</b>	<b>376</b>
<i>Xinyi Hu, Zhejiang University, China</i>	
<b>WE1.P.4: JOINT SPARSIFICATION AND QUANTIZATION FOR WIRELESS FEDERATED LEARNING UNDER COMMUNICATION CONSTRAINTS</b>	<b>401</b>
<i>Junshen Su, Xijun Wang, Xiang Chen, Sun Yat-sen University, China; Ray-Guang Cheng, National Taiwan University of Science and Technology, Taiwan</i>	
 <b>WE1.P: PRACTICAL EVALUATION OF INTEGRATED COMMUNICATION AND SENSING IN 6G</b>	
<b>WE1.P.1: OVERHEAD-FREE CHANNEL ESTIMATION BASED ON PHASE-DOMAIN INJECTED TRAINING FOR FM-OFDM</b>	<b>331</b>
<i>Kun Chen Hu, Maria Julia Fernandez-Getino Garcia, Ana Garcia Armada, Universidad Carlos III de Madrid, Spain</i>	
<b>WE1.P.2: PROPAGATION CHARACTERIZATION BASED ON RAY-TRACING AT 60 GHZ BAND: A TYPICAL OFFICE SCENARIO AND VALIDATION MEASUREMENTS</b>	<b>346</b>
<i>Randy Verdecia Peña, Andres E. Grases-Valenzuela, José I. Alonso Montes, Universidad Politécnica de Madrid, Spain</i>	
<b>WE1.P.3: MEASUREMENT ENVIRONMENT FOR RIS ENHANCED WIRELESS CHANNELS</b>	<b>381</b>
<i>Florian Kiss, Robert Langwieser, Richard Prüller, Herbert Groll, Shengya Zhao, Markus Rupp, TU Wien, Austria</i>	
<b>WE1.P.4: 300 GHZ EXPERIMENT-BASED RANGING AND MAPPING IN INDOOR ENVIRONMENTS</b>	<b>396</b>
<i>Yuanbo Li, Yiqin Wang, Chong Han, Shanghai Jiao Tong University, China; Yi Chen, Ziming Yu, Huawei Technologies Co., Ltd, China</i>	
<b>WE1.P.5: A NOVEL GEOMETRY-BASED SPATIO-TEMPORAL CLUSTER TRACKING ALGORITHM</b>	<b>416</b>
<i>Pengqi Zhu, José Rodríguez-Piñero, Tongji, China</i>	
<b>WE1.P.6: TERAHERTZ CHANNEL MODELING FOR INTEGRATED SENSING AND COMMUNICATION</b>	<b>651</b>
<i>Jiayue Han, Danping He, Beijing Jiaotong university, China</i>	
<b>WE1.P.7: VORTEX WAVEFRONT FMCW ISAC MODEL: A BLENDER-BASED EVALUATION</b>	<b>431</b>
<i>Yuan Liu, Linlong Wu, Bhavani M. R. Shankar, University of Luxembourg, Luxembourg; Wen-Xuan Long, Rui Chen, Xidian University, China</i>	

## **WE1.P: EFFICIENT SIGNAL PROCESSING FOR LEO SATELLITE COMMUNICATIONS**

### **WE1.P.1: BEAM POSITION DESIGN FOR LOW-LATENCY LEO SATELLITE COMMUNICATIONS WITH BEAM HOPPING ..... 321**

*Leyi Lv, Chenhao Qi, Southeast University, China; Fu-Chun Zheng, Harbin Institute of Technology, China*

### **WE1.P.2: OUTAGE ANALYSIS OF NOMA-BASED COGNITIVE HYBRID SATELLITE TERRESTRIAL NETWORK WITH INTERFERENCE CONSTRAINTS ..... 336**

*Xinyu Wang, Min Jia, Qing Guo, Harbin Institute of Technology, China*

### **WE1.P.3: ON THE PERFORMANCE OF RIS-AIDED OFDM-BASED LEO SATELLITE NETWORKS WITH DOPPLER EFFECTS ..... 371**

*Mesut Toka, Wonjae Shin, Ajou University, Korea, Republic of; Aryan Kaushik, University of Sussex, United Kingdom of Great Britain and Northern Ireland; Ana García Armada, Universidad Carlos III de Madrid, Spain*

### **WE1.P.4: A SPARSE BAYESIAN LEARNING METHOD OF JOINT ACTIVITY DETECTION AND CHANNEL ESTIMATION FOR LEO GRANT-FREE RANDOM ACCESS ..... 391**

*Chong Xu, Feng Liu, Junyi Yang, Zhenyu Xiao, Zhu Han, Beihang University, China*

## **WE2.P: LEARNING FOR INTEGRATED SENSING AND COMMUNICATION**

### **WE2.P.1: UPLINK AND DOWNLINK COMMUNICATIONS FUSION FOR ENHANCED RADAR SENSING ..... 446**

*Akhileswar Chowdary, NYU Tandon School of Engineering, United States of America; Ahmad Bazzi, NYU Abu Dhabi, United Arab Emirates; Marwa Chafii, NYU Abu Dhabi and NYU Tandon School of Engineering, United Arab Emirates*

### **WE2.P.2: TIME-FREQUENCY-SPACE SIGNAL DESIGN WITH DYNAMIC SUBARRAY FOR TERAHERTZ INTEGRATED SENSING AND COMMUNICATION ..... 466**

*Yongzhi Wu, Chong Han, Shanghai Jiao Tong University, China*

### **WE2.P.3: DEEP LEARNING-BASED CRAMÉR-RAO BOUND OPTIMIZATION FOR INTEGRATED SENSING AND COMMUNICATION IN VEHICULAR NETWORKS ..... 646**

*Xiaoqi Zhang, Weijie Yuan, Jun Wu, Zhongjie Li, Southern University of Science and Technology, China; Chang Liu, The Hong Kong Polytechnic University, China*

### **WE2.P.4: SPARSE RECOVERY WITH ATTENTION: A HYBRID DATA/MODEL DRIVEN SOLUTION FOR HIGH ACCURACY POSITION AND CHANNEL TRACKING AT MMWAVE ..... 491**

*Yun Chen, Nuria Gonzalez-Prelcic, North Carolina State University, United States of America; Takayuki Shimizu, Hongsheng Lu, Chinmay Mahabal, Toyota Motor North America, United States of America*

## **TH1.P: DELAY DOPPLER SIGNAL PROCESSING FOR RADAR AND COMMUNICATIONS**

### **TH1.P.1: JOINT RADAR-COMMUNICATIONS VIA LAGUERRE-GAUSSIAN VORTEX BEAMS ..... 536**

*Wanghan Lv, Nanjing Tech University, China; Kumar Vijay Mishra, The University of Iowa, United States of America; Jinsong Hu, Fuzhou University, China*

### **TH1.P.2: REDUCED-COMPLEXITY CROSS-DOMAIN ITERATIVE DETECTION FOR OTFS MODULATION VIA DELAY-DOPPLER DECOUPLING ..... 546**

*Mengmeng Liu, Baoming Bai, Xidian University, China; Shuangyang Li, Giuseppe Caire, Technical University of Berlin, Germany*

### **TH1.P.3: PERFORMANCE OF ODDM WITH IMPERFECT CHANNEL ESTIMATION ..... 561**

*Kehan Huang, Min Qiu, Jinhong Yuan, University of New South Wales, Australia; Jun Tong, University of Wollongong, Australia; Hai Lin, Osaka Metropolitan University, Australia*

<b>TH1.P.4: DISTRIBUTED SENSING AND CENTRIC COMPUTING VIA FMCW WAVEFORM IN WIRELESS SENSOR NETWORK</b>	<b>596</b>
<i>Linlong Wu, Kunwar Pritiraj Rajput, Yuan Liu, Bhavani Shankar, University of Luxembourg, Luxembourg</i>	
 <b>TU2.P: COMMUNICATION AND COMPUTATION COOPERATION FOR WIRELESS EDGE INTELLIGENCE</b>	
<b>TU2.P.1: NOMA-ENABLED DELAY MINIMIZATION FOR MARINE MULTI-ACCESS EDGE COMPUTING NETWORKS: A CONTRACT INCENTIVE SCHEME</b>	<b>131</b>
<i>Zhishen Luo, Minghui Dai, University of Macao, Macao; Yuan WU, University of Macao, Macao; Liping QIAN, Zhejiang University of Technology, China; Bin Lin, Dalian Maritime University, China; Zhou Su, Xi'an Jiaotong University, China</i>	
<b>TU2.P.2: FAST OPTIMAL ANTENNA SELECTION FOR MASSIVE MIMO</b>	<b>186</b>
<i>Ke He, Thang Vu, Symeon Chatzinotas, Bjorn Ottersten, University of Luxembourg, Luxembourg</i>	
<b>TU2.P.3: V2V-ASSISTED TIMELY HIERARCHICAL FEDERATED LEARNING</b>	<b>191</b>
<i>Jintao Yan, Zhaojun Nan, Sheng Zhou, Tsinghua univeristy, China</i>	
<b>TU2.P.4: AN FPGA-BASED LOW LATENCY SENSING AND COMMUNICATION PLATFORM FOR COLLABORATIVE AUTONOMOUS DRIVING</b>	<b>246</b>
<i>Wei Zhang, Yuhang Gu, Yi Shi, Limin Jiang, Shan Li, Yijie Huang, Shan Cao, Zhiyuan Jiang, Shanghai University, China; Ruiqing Mao, Sheng Zhou, Tsinghua University, China</i>	