

2019 53rd Asilomar Conference on Signals, Systems, and Computers

**Pacific Grove, California, USA
3 – 6 November 2019**

Pages 1-740



**IEEE Catalog Number: CFP19431-POD
ISBN: 978-1-7281-4301-9**

**Copyright © 2019 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:	CFP19431-POD
ISBN (Print-On-Demand):	978-1-7281-4301-9
ISBN (Online):	978-1-7281-4300-2
ISSN:	1058-6393

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

Student Paper Contest	xxxiii
Foreword	xxxiv

MAb-1: Beyond Massive MIMO (Invited)

MAB-1.1: Super-Directive Antenna Arrays: Fundamentals and New Perspectives	1
<i>Thomas Marzetta, New York University, United States</i>	
MAB-1.2: Using Massive MIMO Arrays for Joint Communication and Sensing	5
<i>Stefano Buzzi, Carmen D'Andrea, University of Cassino and Lazio Meridionale, Italy; Marco Lops, University "Federico II" of Naples, Italy</i>	
MAB-1.3: Cramér-Rao Lower Bounds for Positioning with Large Intelligent Surfaces using Quantized Amplitude and Phase	10
<i>Juan Vidal Alegria, Fredrik Rusek, Lund University, Sweden</i>	
MAB-1.4: RadioWeaves for Efficient Connectivity: Analysis and Impact of Constraints in Actual Deployments	15
<i>Liesbet Van der Perre, KU Leuven, Belgium; Erik G. Larsson, Linköping University, Sweden; Fredrik Tufvesson, Lund University, Sweden; Lieven De Strycker, KU Leuven, Belgium; Emil Björnson, Linköping University, Sweden; Ove Edfors, Lund University, Sweden</i>	

MAB-2: Advances in Sequential Estimation, Sampling, and Testing (Invited)

MAB-3: New Perspectives on Multiple Access (Invited)

MAB-3.1: Grant-Free Massive Random Access with a Massive MIMO Receiver	23
<i>Alexander Fengler, Giuseppe Caire, Saeid Haghighatshoar, Peter Jung, Technical University of Berlin, Germany</i>	
MAB-3.2: Coded Slotted Aloha over the On-Off Fading Channel: Performance Bounds	31
<i>Gianluigi Liva, German Aerospace Center (DLR), Germany; Enrico Paolini, University of Bologna, Italy; Cedomir Stefanovic, Aalborg University, Denmark; Alexandre Graell i Amat, Chalmers University of Technology, Sweden</i>	
MAB-3.4: Phase Transition Analysis for Covariance Based Massive Random Access with Massive MIMO	36
<i>Zhilin Chen, Wei Yu, University of Toronto, Canada</i>	

MAB-4: Deep Learning for Inverse Problems (Invited)

MAB-5: Graph Signal Processing: Advances in Sampling, Filtering, Reconstruction (Invited)

MAB-5.1: Distributed Adaptive Learning of Graph Processes via In-Network Subspace Projections	41
<i>Paolo Di Lorenzo, Sergio Barbarossa, Stefania Sardellitti, Sapienza University of Rome, Italy</i>	
MAB-5.2: On Distributed Consensus by a Cascade of Generalized Graph Filters.....	46
<i>Mario Coutino, Geert Leus, Delft University of Technology, Netherlands</i>	
MAB-5.3: An Efficient Algorithm for Graph Laplacian Optimization Based on Effective Resistances	51
<i>Eduardo Pavez, Antonio Ortega, University of Southern California, United States</i>	
MAB-5.4: Network Reconstruction from Graph-stationary Signals with Hidden Variables	56
<i>Andrei Buciualea, Cristobal Cabrera, Antonio Marques, King Juan Carlos University, Spain</i>	

MAB-6: Compilation for Spatial Computing Architectures (Invited)

MAB-7: Modeling, Optimization, and Machine Learning for Computational Imaging (Invited)

MAB-7.2: Model-Based Iterative Reconstruction for Echo Planar Imaging: Methods and Applications61

Uten Yarach, Matt Bernstein, John Huston III, Myung-Ho In, Daehun Kang, Yunhong Shu, Erin Gray, Nolan Meyer, Joshua Trzasko, Mayo Clinic, United States

MAB-7.4: Low-Rank Modeling of Local Sinogram Neighborhoods with Tomographic Applications65

Rodrigo A. Lobos, Richard M. Leahy, Justin P. Haldar, University of Southern California, United States

MAB-8: Audio, Video, and Speech Processing

MAB-8.1: Variety-Based Background Subtraction for Nonlinear Trajectory Tracking69

Amr Elnakeeb, Urbashi Mitra, University of Southern California, United States

MAB-8.2: Automated Augmentation with Reinforcement Learning and GANs for Robust Identification of Traffic Signs using Front Camera Images79

Sohini Roychowdhury, Volvocars USA, United States; Lars Tornberg, Volvocars, Sweden; Robin Halfvordsson, Jonatan Nordh, Adam Suhren Gustafsson, Joel Wall, Mattias Westerberg, Adam Wirehed, Chalmers University of Technology, Sweden; Zhanying Hu, Meng Pan, Louis Tilloy, University of California, Berkeley, United States

MAB-8.3: Video-Based Wetting Detection for Blended Fabrics89

Xianpeng Liu, Chau-Wai Wong, North Carolina State University, United States

MAB-8.4: Adaptive Video Subsampling for Energy-Efficient Object Detection103

Divya Mohan, University of California, Berkeley, United States; Sameeksha Katoch, Suren Jayasuriya, Pavan Turaga, Andreas Spanias, Arizona State University, United States

MAB-8.6: Adaptive Feedback Cancellation for Hearing Aids using the Prediction-Error Method with Orthonormal Basis Functions128

Sahar Hashemgloogardi, Mark Bocko, University of Rochester, United States

MAB-8.7: Voice Transformation using Two-Level Dynamic Warping143

Al-Waleed Al-Dulaimi, Todd Moon, Jacob Gunther, Utah State University, United States

MAB-8.8: Dilated convolutional recurrent neural network for monaural speech enhancement.....158

Shadi Pirhosseinloo, Jonathan Scott Brumberg, University of Kansas, United States

MAB-8: DOA Estimation, Beamforming, and Localization

MAB-8.2: Near-Field Localization using Antenna Arrays84

Benjamin Friedlander, University of California, Santa Cruz, United States

MAB-8.3: General First-Order Framework for Passive Detection with Two Sensor Arrays.....94

Louis Scharf, Colorado State University, United States; L. Todd McWhorter, Brooks Canyon, LLC, United States; James Given, Naval Research LaB, United States; Margaret Cheney, Colorado State University, United States

MAB-8.4: 1-bit Sparse Gridless Super-Resolution DOA Estimation for Coprime Arrays108

Anupama Govinda Raj, James McClellan, Georgia Institute of Technology, United States

MAB-8.5: Blind Co-Channel Source Separation for Pulse-On-Pulse Interference118

Douglas Schuyler, Ben Johnson, Mitchel McGough, Lockheed Martin Corporation, United States

MAB-8.6: Compressive Beamforming and Directional Sound Reconstruction using the Kronecker Array Transform133

Marcelo Abdala Daher, Carlos A. Prete Jr., Vitor Heloz Nascimento, University of São Paulo, Brazil; Bruno S. Masiero, University of Campinas, Brazil

MAB-8.7: On ESPRIT with Multiple Coprime-Invariances148

Po-Chih Chen, P. P. Vaidyanathan, California Institute of Technology, United States

MAB-8.8: Doppler-Aided Position Estimation for HS-GNSS163

Francois Vincent, Eric Chaumette, Jordi Vila-Valls, University of Toulouse, France

MAb-8: Array Processing for Signal Detection and Classification	
MAb-8.1: Adaptive Signal Detection in Subspace Interference with Uncertain Prior Knowledge.....	74
<i>Yuan Jiang, Hongbin Li, Stevens Institute of Technology, United States; Muralidhar Rangaswamy, Air Force Research Laboratory / RYAR, United States</i>	
MAb-8.3: Quickest Detection of a Dynamic Anomaly in a Sensor Network.....	98
<i>Georgios Rovatsos, University of Illinois at Urbana-Champaign, United States; George Moustakides, University of Patras, Greece; Venugopal Veeravalli, University of Illinois at Urbana-Champaign, United States</i>	
MAb-8.4: Multichannel Target Detection for Maritime Radar.....	113
<i>Elias Abouta, University of New South Wales, Australia; Luke Rosenberg, DST Group, Australia</i>	
MAb-8.5: Clutter Cancellation in Passive Radar As a Dual Basis Projection.....	123
<i>Stephen Searle, University of South Australia, Australia; Stephen Howard, Defence Science and Technology Group, Australia</i>	
MAb-8.6: Probability of Detection for Unambiguous Doppler Frequencies in Pulsed Radars	138
Using the Chinese Remainder Theorem and Subpulse Processing	
<i>Fernando Darío Almeida García, André Saito Guerreiro, Gustavo Rodrigues de Lima Tejerina, José Cândido Silveira Santos Filho, Gustavo Fraidenaich, Michel Daoud Yacoub, State University of Campinas, Brazil; Marco Antonio Miguel Miranda, Higor Cioqueta, Bradar - Embraer Defense and Security, Brazil</i>	
MAb-8.7: Fractional Spectrogram for Characterizing and Classifying Vibrating Objects in	153
SAR Images	
<i>Francisco Perez, Balu Santhanam, Bipesh Shrestha, Walter Gerstle, University of New Mexico, United States; Majeed M. Hayat, Marquette University, United States</i>	
MPa-1: MIMO for mmWave and THz (Invited)	
MPa-1.2: Managing Hardware Impairments in Hybrid Millimeter Wave MIMO Systems: A	168
Dictionary Learning-based Approach	
<i>Joan Palacios, Imdea Networks, United States; Nuria Gonzalez Prelcic, University of Texas at Austin, United States; Joerg Widmer, Imdea Networks, Spain</i>	
MPa-1.3: A Machine Learning Solution for Beam Tracking in mmWave Systems	173
<i>Daoud Burghal, Naveed A. Abbasi, University of Southern California, United States; Andreas F. Molisch, Collaborator, United States</i>	
MPa-1.4: Finite-Alphabet Wiener Filter Precoding for mmWave Massive MU-MIMO	178
Systems	
<i>Oscar Castañeda, Cornell University, United States; Sven Jacobsson, Giuseppe Durisi, Chalmers University of Technology, Sweden; Tom Goldstein, University of Maryland, United States; Christoph Studer, Cornell University, United States</i>	
MPa-2: Distributed Learning in Multi-Agent Environments (Invited)	
MPa-2.1: Design Strategies for Sparse Control of Random Time-Varying Networks	184
<i>Mario Coutino, Delft University of Technology, Netherlands; Elvin Isufi, Fernando Gama, Alejandro Ribeiro, University of Pennsylvania, United States; Geert Leus, Delft University of Technology, Netherlands</i>	
MPa-2.3: Distributed Empirical Risk Minimization over Directed Graphs	189
<i>Ran Xin, Tufts University, United States; Anit Kumar Sahu, The Bosch Center for Artificial Intelligence, United States; Soumya Kar, Carnegie Mellon University, United States; Usman Khan, Tufts University, United States</i>	
MPa-2.4: Distributed Learning over Networks under Subspace Constraints	194
<i>Roula Nassif, Stefan Vlaski, Ali Sayed, Ecole polytechnique fédérale de Lausanne (EPFL), Switzerland</i>	
MPa-3: Optimization Methods for Wireless Communications (Invited)	
MPa-3.1: Uplink-Downlink Channel Covariance Transformations and Precoding Design for	199
FDD Massive MIMO	
<i>Mahdi Barzegar Khalilsarai, Saeid Haghighatshoar, Giuseppe Caire, Technical University of Berlin, Germany</i>	

MPa-3.2: Zero Crossing Modulation for Communication with Temporally Oversampled 1-Bit Quantization	207
<i>Gerhard Fettweis, Meik Dörpinghaus, Sandra Bender, Martin Schlüter, Technische Universität Dresden, Germany</i>	
MPa-3.3: Optimization for Data-Driven Wireless Sensor Scheduling	215
<i>Marcos Vasconcelos, Urbashi Mitra, University of Southern California, United States</i>	
MPa-4: Geometric Deep Learning 1 (Invited)	
MPa-4.3: HodgeNet: Graph Neural Networks for Edge Data	220
<i>T. Mitchell Roddenberry, Santiago Segarra, Rice University, United States</i>	
MPa-4.4: Deep Encoder-Decoder Neural Network Architectures for Graph Output Signals	225
<i>Samuel Rey-Escudero, Victor Manuel Tenorio, Luca Martino, Antonio Marques, King Juan Carlos University, Spain</i>	
MPa-5: Compressive Sensing and Line Spectral Estimation (Invited)	
MPa-5.1: Self-Calibrated Super Resolution	230
<i>Maxime Ferreira Da Costa, Yuejie Chi, Carnegie Mellon University, United States</i>	
MPa-5.3: Support Recovery for Sparse Recovery and Non-stationary Blind Demodulation	235
<i>Youye Xie, Michael Wakin, Gongguo Tang, Colorado School of Mines, United States</i>	
MPa-6: Signal Processing Advances in Neural Modeling (Invited)	
MPa-6.1: A State-Space Model for Dynamic Functional Connectivity	240
<i>Sourish Chakravarty, Massachusetts Institute of Technology, United States; Brian Edlow, Massachusetts General Hospital, United States; Emery Brown, Massachusetts Institute of Technology, United States</i>	
MPa-6.2: Characterizing hippocampal replay using hybrid point process state space models	245
<i>Eric Denovellis, Boston University, United States; Loren Frank, University of California, San Francisco, United States; Uri Eden, Boston University, United States</i>	
MPa-6.3: Modularity-Based Detection of Ripples in Scalp EEG.....	250
<i>Stefan Sumsky, Farrell Brown, Tanya Dimitrov, University of Connecticut, United States; Taylor Somma, Mark Schomer, Connecticut Children Medical Center, United States; Sabato Santaniello, University of Connecticut, United States</i>	
MPa-6.4: A Wearable Brain Machine Interface Architecture for Regulation of Energy in Hypercortisolism	254
<i>Hamid Fekri Azgomi, Rose T. Faghil, University of Houston, United States</i>	
MPa-7: Mathematical Data Science (Invited)	
MPa-7.1: Manifold Proximal Point Algorithms for Dual Principal Component Pursuit and Orthogonal Dictionary Learning	259
<i>Shixiang Chen, Zengde Deng, Chinese University of Hong Kong, Hong Kong SAR of China; Shiqian Ma, University of California, Davis, United States; Anthony Man-Cho So, Chinese University of Hong Kong, Hong Kong SAR of China</i>	
MPa-7.2: Bundle Methods for Dual Atomic Pursuit	264
<i>Zhenan Fan, Yifan Sun, Michael Friedlander, University of British Columbia, Canada</i>	
MPa-7.3: Sketching for Motzkin's Iterative Method for Linear Systems	271
<i>Elizaveta Rebrova, Deanna Needell, University of California, Los Angeles, United States</i>	
MPa-7.4: Convergence of Iterative Hard Thresholding Variants with Application to Asynchronous Parallel Methods for Sparse Recovery	276
<i>Jamie Haddock, Deanna Needell, University of California, Los Angeles, United States; Alireza Zaeemzadeh, Nazanin Rahnavard, University of Central Florida, United States</i>	
MPa-8: Networks: Models and Systems	
MPa-8.1: Decentralized Information Filtering under Skew-Laplace Noise	291
<i>Jordi Vilà-Valls, François Vincent, ISAE-SUPAERO - University of Toulouse, France; Pau Closas, Northeastern University, United States</i>	

MPa-8.2: A Mathematical Framework for Interconnected Systems Operating in a 1-D Network.....	306
<i>Jean E. Piou, Massachusetts Institute of Technology, United States</i>	
MPa-8.3: Bipartite Structured Gaussian Graphical Modeling via Adjacency Spectral Priors	322
<i>Sandeep Kumar, Jiayi Ying Ying, Hong Kong University of Science and Technology, Hong Kong SAR of China; José Vinícius de M. Cardoso, Universidade Federal de Campina Grande, Brazil; Daniel Palomar, Hong Kong University of Science and Technology, Hong Kong SAR of China</i>	
MPa-8.4: Online Learning Models for Content Popularity Prediction in Wireless Edge	337
Caching	
<i>Navneet Garg, Heriot-Watt University, United Kingdom; Bharath Bettagere, Indian Institute of Technology, Dharwad, India; Vimal Bhatia, Indian Institute of Technology, Indore, India; Mathini Sellathurai, Tharmalingam Ratnarajah, Heriot-Watt University, India</i>	
MPa-8.5: On the Lower Bound of Modularity for Graph Fission	353
<i>John Roth, Naval Postgraduate School, United States</i>	
MPa-8.6: Fire Frontline Monitoring by Enabling UAV-Based Virtual Reality with	368
Adaptive Imaging Rate	
<i>Shafkat Islam, Qiyuan Huang, Fatemeh Afghah, Peter Fule, Abolfazl Razi, Northern Arizona University, United States</i>	
MPa-8.7: Energy-Aware Multi-Server Mobile Edge Computing: A Deep Reinforcement	383
Learning Approach	
<i>Navid Naderializadeh, Intel Corporation, United States; Morteza Hashemi, University of Kansas, United States</i>	
MPa-8.8: Competitive Information Spread with Confirmation Bias.....	391
<i>Yanbing Mao, Emrah Akyol, Binghamton University, United States</i>	
MPa-8.9: A Truthful Mechanism for Mobility Management in Unmanned Aerial Vehicles	401
Networks	
<i>Baocheng Geng, Syracuse University, United States; Swastik Brahma, Tennessee State University, United States; Pramod Varshney, Syracuse University, United States</i>	
MPa-8.10: Power Minimization in Wireless Sensor Networks with Constrained AoI Using	406
Stochastic Optimization	
<i>Mohammad Moltafet, Markus Leinonen, University of Oulu, Finland; Marian Codreanu, Nikolaos Pappas, Linköping University, Finland</i>	
MPa-8: Wireless Networks	
MPa-8.1: Bipartite Matching Mechanism for Fractional Frequency Reuse-Based D2D	286
Multicast Communications	
<i>Devarani Devi Ningombam, Jae-Young Pyun, Suk-Seung Hwang, Seokjoo Shin, Chosun University, Republic of Korea</i>	
MPa-8.2: Active Content Popularity Learning via Query-By-Committee for Edge Caching	301
<i>Srikanth Bommaraveni, Thang X. Vu, University of Luxembourg, Luxembourg; Satyanarayana Vuppala, United Technologies Research Centre, Ireland; Symeon Chatzinotas, Björn Ottersten, University of Luxembourg, Luxembourg</i>	
MPa-8.3: Joint Positioning-Communications System : Optimal Distributed Coherence and	317
Positioning Estimators	
<i>Sharanya Srinivas, Andrew Herschfelt, Daniel Bliss, Arizona State University, United States</i>	
MPa-8.4: On the Capacity Region of the Deterministic Y-Channel with Common and Private	332
Messages	
<i>Mohamed Salah Ibrahim, University of Virginia, United States; Yahya Mohasseb, Military Technical College, Egypt; Mohammed Nafie, Cairo University, Egypt</i>	
MPa-8.5: Energy-Efficient Trajectory Design for UAV-Enabled Wireless Communications	347
with Latency Constraints	
<i>Hieu Dinh-Tran, Thang X. Vu, Symeon Chatzinotas, Ottersten Björn, University of Luxembourg, Luxembourg</i>	
MPa-8.6: Self-Organized Scheme for Unique Cell ID Assignment During Femtocell	363
Deployment	
<i>Sinan Khwandah, Solent University, United Kingdom; John Cosmas, Brunel University, United Kingdom; Zaharias Zaharis, Aristotle University of Thessaloniki, Greece; Pavlos Lazaridis, University of Huddersfield, United Kingdom; Alben Mihovska, Aarhus University, Denmark</i>	

MPa-8.7: On Multi-User Binary Computation Offloading in the Finite-Block-Length Regime	378
<i>Mahsa Salmani, Timothy N. Davidson, McMaster University, Canada</i>	
MPa-8.8: Increasing Reliable Coverage for Maritime Communications	388
<i>Ronald Raulefs, German Aerospace Center (DLR), Germany; Wei Wang, Chian'in University, China</i>	
MPa-8.9: Average Age of Information in Multi-Source Self-Preemptive Status Update Systems with Packet Delivery Errors	396
<i>Shahab Farazi, Worcester Polytechnic Institute, United States; Andrew Klein, Western Washington University, United States; Donald Brown, Worcester Polytechnic Institute, United States</i>	
 MPa-8: Architectures and Implementations	
MPa-8.1: Asynchronous Stochastic Computing	280
<i>Patricia Gonzalez-Guerrero, Mircea Stan, University of Virginia, United States</i>	
MPa-8.2: Implementing First-Order Optimization Methods: Algorithmic Considerations and Bespoke Microcontrollers	296
<i>Xinwei Zhang, John Sartori, Mingyi Hong, Sairaj Dhople, University of Minnesota, United States</i>	
MPa-8.3: A Design Framework for Invertible Logic	312
<i>Naoya Onizawa, Kaito Nishino, Tohoku University, Japan; Sean Smithson, Brett Meyer, Warren Gross, McGill University, Canada; Hitoshi Yamagata, Hiroyuki Fujita, Canon Medical Systems Corp., Japan; Takahiro Hanyu, Tohoku University, Japan</i>	
MPa-8.4: Converting Unstable Challenges to Stable in MUX-Based Physical Unclonable Functions by Bit-Flipping	327
<i>Anoop Koyily, Keshab Parhi, University of Minnesota, United States</i>	
MPa-8.5: First-Then-Second Extrema Selection	342
<i>Ali Al Ghouwayel, Lebanese International University (LIU), Lebanon; Hassan Harb, University of South Brittany / Lebanese University, France; Emmanuel Boutillon, University of South Brittany, France</i>	
MPa-8.6: Neural Network DPD via Backpropagation Through a Neural Network Model of the PA	358
<i>Chance Tarver, Liwen Jiang, Joseph Cavallaro, Aryan Sefidi, Rice University, United States</i>	
MPa-8.7: Fourier-Based Error Analysis for Computing with Asynchronous Sigma-Delta Streams	373
<i>Stephen Wilson, Patricia Gonzalez-Guerrero, Mircea Stan, University of Virginia, United States</i>	
 MPb-1: Millimeter-Wave MIMO Systems with Low-Complexity Processing (Invited)	
MPb-1.1: Kolmogorov Model for Large Millimeter-Wave Antenna Arrays: Learning-based Beam-Alignment	411
<i>Wai Ming Chan, City University of Hong Kong, Hong Kong SAR of China; Hadi Ghauch, Télécom ParisTech, France; Taejoon Kim, University of Kansas, United States; Gabor Fodor, Ericsson Research / KTH Royal Institute of Technology, Sweden</i>	
MPb-1.2: All-Digital Massive MIMO Uplink and Downlink Rates under a Fronthaul Constraint	416
<i>Yasaman Etefagh, Sven Jacobsson, Giuseppe Durisi, Chalmers University of Technology, Sweden; Christoph Studer, Cornell University, United States</i>	
MPb-1.3: Structured Tensor Decomposition-Based Channel Estimation for Wideband Millimeter Wave MIMO	421
<i>Yuxing Lin, Shi Jin, Southeast University, China; Michail Matthaiou, Queen's University Belfast, United Kingdom; Xiaohu You, Southeast University, China</i>	
MPb-1.4: Short Range 3D MIMO mmWave Channel Reconstruction via Geometry-aided AoA Estimation	427
<i>Jarkko Kaleva, University of Oulu, Finland; Nitin Jonathan Myers, University of Texas at Austin, United States; Antti Tolli, University of Oulu, Finland; Robert Heath, University of Texas at Austin, United States; Upamanyu Madhow, University of California, Santa Barbara, United States</i>	

MPb-2: Distributed Optimization in Networked Settings (Invited)	
MPb-2.2: On Maintaining Linear Convergence of Distributed Learning and Optimization under Limited Communication	432
<i>Sindri Magnusson, Hossein Shokri-Ghadikolaei, KTH Royal Institute of Technology, Sweden; Na Li, Harvard University, United States</i>	
MPb-3: Tensor Modeling and Processing (Invited)	
MPb-3.1: Low Multilinear Rank Updating.....	437
<i>Stijn Hendriks, Michiel Vandecappelle, Lieven De Lathauwer, KU Leuven, Belgium</i>	
MPb-3.2: On the Role of Sampling in Underdetermined Tensor Decomposition with Kronecker and Khatri-Rao Structured Factors	442
<i>Mehmet Can Hucumenoglu, Piya Pal, University of California, San Diego, United States</i>	
MPb-3.4: Channel Estimation for Hybrid Multi-Carrier mmWave MIMO Systems Using 3-D Unitary Tensor-ESPRIT in DFT beamspace	447
<i>Damir Rakhimov, Jianshu Zhang, Ilmenau University of Technology, Germany; Andre de Almeida, Federal University of Ceara, Brazil; Adel Nadeev, Kazan National Research Technical University, Russian Federation; Martin Haardt, Ilmenau University of Technology, Germany</i>	
MPb-4: Geometric Deep Learning 2 (Invited)	
MPb-4.1: Convolutional Graph Neural Networks	452
<i>Fernando Gama, University of Pennsylvania, United States; Antonio Marques, King Juan Carlos University, Spain; Geert Leus, Delft University of Technology, Netherlands; Alejandro Ribeiro, University of Pennsylvania, United States</i>	
MPb-4.2: Topics in Graph Signal Processing: Convolution and Modulation.....	457
<i>John Shi, Jose Moura, Carnegie Mellon University, United States</i>	
MPb-4.3: Pooling in Graph Convolutional Neural Networks	462
<i>Mark Cheung, John Shi, Oren Wright, Yao Jiang, Jose Moura, Carnegie Mellon University, United States</i>	
MPb-4.4: Fast Graph Convolutional Recurrent Neural Networks.....	467
<i>Sai Kiran Kadambari, Sundeep Prabhakar Chepuri, Indian Institute of Science, India</i>	
MPb-5: Advances in Bayesian Machine Learning (Invited)	
MPb-5.1: Detecting Causality using Deep Gaussian Processes	472
<i>Guanhao Feng, J. Gerald Quirk, Petar Djuric, Stony Brook University, United States</i>	
MPb-5.2: Compressed Streaming Importance Sampling for Efficient Representations of Localization Distributions	477
<i>Amrit Singh Bedi, Alec Koppel, Brian Sadler, US Army Research Laboratory, United States; Victor Elvira, IMT Lille Douai, France</i>	
MPb-5.3: Learning Gaussian Processes with Bayesian Posterior Optimization	482
<i>Luiz Chamon, Santiago Paternain, Alejandro Ribeiro, University of Pennsylvania, United States</i>	
MPb-5.4: The Lévy State Space Model	487
<i>Simon Godsill, Marina Riabiz, Ioannis Kontoyiannis, University of Cambridge, United Kingdom</i>	
MPb-6: Neuromorphic Computing (Invited)	
MPb-6.2: Effect of Asymmetric Nonlinearity Dynamics in RRAMs on Spiking Neural Network Performance	495
<i>Mohammed Fouda, Emre Neftci, Ahmed Eltawil, Fadi Kurdahi, University of California, Irvine, United States</i>	
MPb-6.4: Data-Driven Neuromorphic DRAM-Based CNN and RNN Accelerators	500
<i>Tobi Delbruck, Shih-Chii Liu, University of Zurich / ETH Zurich, Switzerland</i>	
MPb-7: Geometric and Topological Methods (Invited)	
MPb-7.1: Estimation of Sparsely Observed Signals with an Empirical Bayesian Model	507
<i>James Matuk, Oksana Chkrebti, Sebastian Kurtek, Ohio State University, United States</i>	

MPb-7.3: An inexact matching approach for the comparison of plane curves with general elastic metrics	512
<i>Nicolas Charon, Johns Hopkins University, United States</i>	
MPb-7.4: Approximate Log-Determinant Divergences Between Covariance Operators and Applications	517
<i>Minh Ha Quang, RIKEN Center for Advanced Intelligence Project, Japan</i>	
TAa-1: Machine Learning for Channel Coding (Invited)	
TAa-1.1: On the Efficient Design of Neural Networks in Communication Systems	522
<i>Weihong Xu, Xiaosi Tan, Yuxing Lin, Xiaohu You, Chuan Zhang, Southeast University, Nanjing, China; Yair Be'ery, Tel Aviv University, Israel</i>	
TAa-1.2: On Robust Deep Neural Decoders	527
<i>Meryem Benammar, ISAE Supaero, France; Pablo Piantanida, CentraleSupélec - UdeM, France</i>	
TAa-1.3: Deep-Learning-Aided Successive-Cancellation Decoding of Polar Codes	532
<i>Seyyed Ali Hashemi, Stanford University, United States; Nghia Doan, Warren Gross, McGill University, Canada</i>	
TAa-1.4: On Recurrent Neural Networks for Sequence-based Processing in Communications	537
<i>Sebastian Doerner, Sebastian Cammerer, Stephan ten Brink, University of Stuttgart, Germany</i>	
TAa-2: Spectrum Sharing (Invited)	
TAa-2.1: Simultaneous Track and Search Multiple-Channel Multiple-User Receiver (MCMUR) for Joint Radar-Communications Systems	544
<i>Alex Chiriyath, Christ Richmond, Daniel Bliss, Arizona State University, United States</i>	
TAa-2.2: Mismatched Filtering for Non-Cooperative Radar Spectrum Sharing	550
<i>Tuomas Aittomäki, Visa Koivunen, Aalto University, Finland</i>	
TAa-2.3: Automotive radar radiations as signals of opportunity for millimeter wave V2I links	554
<i>Anum Ali, University of Texas at Austin, United States; Nuria Gonzalez Prelcic, University of Vigo, Spain; Robert Heath, University of Texas at Austin, United States; Amitava Ghosh, Nokia Bell Labs, United States</i>	
TAa-2.4: OFDM-based Joint Radar-Communication System: Optimal Sub-carrier Allocation and Power Distribution by Exploiting Mutual Information	559
<i>Ammar Ahmed, Yimin Zhang, Temple University, United States</i>	
TAa-3: Distributed MIMO (Invited)	
TAa-3.1: Real-Time Performance Evaluation of Relative Calibration on the OAI 5G Testbed	564
<i>Theoni Magounaki, Orange, France; Florian Kaltenberger, Raymond Knopp, EURECOM, France</i>	
TAa-3.2: Dynamic Distributed Antenna Systems with Wireless mmWave Fronthaul	569
<i>Stefan Schwarz, Stefan Pratschner, Technische Universität Wien, Austria</i>	
TAa-3.4: Centralized and Distributed Power Allocation for Max-Min Fairness in Cell-Free Massive MIMO	576
<i>Sucharita Chakraborty, Emil Bjornson, Linköping University, Sweden; Luca Sanguinetti, University of Pisa, Italy</i>	
TAa-4: Statistical Signal Processing and Big Data Analysis (Invited)	
TAa-4.2: Generalization, Adaptation and Low-Rank Representation in Neural Networks	581
<i>Samet Oymak, University of California, Riverside, United States</i>	
TAa-4.4: A Sequential Approach for Sparse Support Recovery using Correlation Priors	586
<i>Ali Koochakzadeh, Piya Pal, University of California, San Diego, United States</i>	
TAa-5: Signal Processing Advances in Neuroimaging I (Invited)	
TAa-5.3: Detecting Structural Brain Connectivity differences in Dementia through a Conductance Model	591
<i>Aina Frau-Pascual, Jean Augustinack, Bruce Fischl, Iman Aganj, Massachusetts General Hospital / Harvard Medical School, United States</i>	

TAa-6: Computer Arithmetic (Invited)

TAa-6.1: A Probabilistic Approach to Floating-Point Arithmetic.....	596
<i>George Constantinides, Fredrik Dahlqvist, Imperial College London, United Kingdom</i>	
TAa-6.2: Conditional Estimation of Residuals with Prescaling for use in Low-Energy Division Units	603
<i>Milos Ercegovac, University of California, Los Angeles, United States; James Stine, Oklahoma State University, United States</i>	
TAa-6.3: A Variable-Latency Architecture for Accelerating Deterministic Approaches to Stochastic Computing	608
<i>Alexander Groszewski, Earl Swartzlander, University of Texas at Austin, United States</i>	
TAa-6.4: Training DNA Perceptrons via Fractional Coding.....	614
<i>Xingyi Liu, Keshab Parhi, University of Minnesota, United States</i>	

TAa-7: Adaptive Beamforming and Interference Mitigation (Invited)

TAa-7.1: Adaptive Beamforming Based on Interference Covariance Matrix Estimation	619
<i>Yujie Gu, Yimin Zhang, Temple University, United States</i>	
TAa-7.2: Moving Target Detection Using Fast Iterative Interpolated Beamforming for Distributed MIMO Radar in Non-Homogeneous Clutter	624
<i>Aboulnasr Hassani, Wright State University, United States; Braham Himed, Air Force Research Laboratory, United States; Brian Rigling, Wright State University, United States</i>	
TAa-7.3: On the Convergence of the Fast Iterative Interpolated Beamformer.....	630
<i>Elias Aboutanios, University of New South Wales, Australia</i>	
TAa-7.4: Algebraic Geometry Based Design for Generalized Sidelobe Canceler	635
<i>Matthew W. Morency, Delft University of Technology, Netherlands; Sergiy A. Vorobyov, Aalto University, Finland</i>	

TAa-8: Convex and Non-Convex Optimization and Phase Retrieval

TAa-8.1: Exact and Efficient Multi-Channel Sparse Blind Deconvolution - A Nonconvex Approach	640
<i>Qing Qu, New York University, United States; Xiao Li, Chinese University of Hong Kong, China; Zhihui Zhu, Johns Hopkins University, United States</i>	
TAa-8.2: Block Successive Convex Approximation Algorithms for Nonsmooth Nonconvex Optimization	660
<i>Yang Yang, Fraunhofer Institute for Applied Mathematics, Germany; Marius Pesavento, Technische Universität Darmstadt, Germany; Zhi-Quan Luo, Chinese University of Hong Kong, Shenzhen, China; Björn Ottersten, University of Luxembourg, Luxembourg</i>	
TAa-8.3: Alternating Gradient Descent Ascent for Nonconvex Min-Max Problems in Robust Learning and GANs	680
<i>Songtao Lu, University of Minnesota, Twin-Cities, United States; Rahul Singh, Georgia Institute of Technology, United States; Xiangyi Chen, University of Minnesota, Twin-Cities, United States; Yongxin Chen, Georgia Institute of Technology, United States; Mingyi Hong, University of Minnesota, Twin-Cities, United States</i>	
TAa-8.4: Sketching Dictionary Based Robust PCA in Large Matrices	702
<i>Xingguo Li, Princeton University, United States; Jarvis Haupt, University of Minnesota, United States</i>	
TAa-8.5: Beyond Procrustes: Balancing-Free Gradient Descent for Asymmetric Low-Rank Matrix Sensing	721
<i>Cong Ma, Princeton University, United States; Yuanxin Li, Yuejie Chi, Carnegie Mellon University, United States</i>	
TAa-8.7: Fourier Phase Retrieval with Side Information	759
<i>Rakib Hyder, University of California, Riverside, United States; Chinmay Hegde, Iowa State University, United States; Salman Asif, University of California, Riverside, United States</i>	

TAa-8: Transmission and Beamforming Schemes

TAa-8.1: Orthogonal Cover Code Design for 802.11be Extremely High Throughput WLANs	655
<i>Miguel M. López, Leif R. Wilhelmsson, Ericsson AB, Sweden</i>	

TAa-8.2: D2D-Aided Multi-Antenna Multicasting in a Dense Network.....	675
<i>Placido Mursia, EURECOM, France; Italo Atzeni, University of Oulu, Finland; Mari Kobayashi, Technical University of Munich, Germany; David Gesbert, EURECOM, France</i>	
TAa-8.3: Monostatic Backscattering Detection by Multiantenna Reader	697
<i>Deepak Mishra, Erik G. Larsson, Linköping University, Sweden</i>	
TAa-8.4: Zero-Forcing Precoder: A Special Constructive Interference Precoder	717
<i>Yanwu Ding, Wichita state university, United States; Khanh Pham, Air Force Research Laboratory, United States</i>	
TAa-8.5: Total Power Minimization: Joint Antenna Selection and Beamforming Design.....	736
<i>Mostafa Medra, University of Toronto, Canada; Andrew Eckford, York University, Canada; Raviraj Adve, University of Toronto, Canada</i>	
TAa-8.6: One-Bit Precoding Constellation Design via Autoencoder-Based Deep Learning	754
<i>Foad Sohrobi, Wei Yu, University of Toronto, Canada</i>	
TAa-8.7: Synthetic Diversity To Mitigate Out-of-Band Interference in Widely Tunable	774
Wireless Receivers	
<i>Alyosha Molnar, Zachariah Boynton, Cornell University, United States</i>	
TAa-8.8: Analysis of RSRP Prediction in Millimeter Wave Systems.....	789
<i>Tianyang Bai, Juergen Cezanne, Hua Wang, Vasanthan Raghavan, Ozge H. Koymen, Junyi Li, Qualcomm Flarion Technologies, Inc, United States</i>	
TAa-8.9: Deep Learning for Direct Hybrid Precoding in Millimeter Wave Massive MIMO	800
Systems	
<i>Xiaofeng Li, Ahmed Alkhateeb, Arizona State University, United States</i>	
 TAa-8: Compressive Sensing and Sparsity	
TAa-8.1: Jointly Sparse Signal Recovery with Prior Info	645
<i>Natalie Durgin, Spiceworks, United States; Rachel Grotheer, Goucher College, United States; Chenxi Huang, Yale University, United States; Shuang Li, Colorado School of Mines, United States; Anna Ma, University of California, San Diego, United States; Deanna Needell, University of California, Los Angeles, United States; Jing Qin, University of Kentucky, United States</i>	
TAa-8.2: Near Sensor Decision Making via Compressed Measurements for Highly Constrained	665
Hardware	
<i>Wissam Benjilali, William Guicquero, Univ. Grenoble Alpes, CEA, LETI, F-38000 Grenoble, France; Laurent Jacques, ISPGROUP, ICTEAM/ELEN, UCLouvain, Louvain-la-Neuve, Belgium, Belgium; Gilles Sicard, Univ. Grenoble Alpes, CEA, LETI, F-38000 Grenoble, France</i>	
TAa-8.3: Low Complexity Static and Dynamic Sparse Bayesian Learning Combining BP, VB	685
and EP Message Passing	
<i>Christo Kurisummoottil Thomas, Dirk Slock, Eurecom, France</i>	
TAa-8.4: C-SBL(VB): A Variational Bayes Algorithm for Sparse Recovery of Signals with	707
Unknown Clustering Pattern	
<i>Mohammad Shekaramiz, Todd Moon, Jacob Gunther, Utah State University, United States</i>	
TAa-8.5: Lp Quasi-Norm Minimization	726
<i>Mahmoud Ashour, Constantino Lagoa, Necdet Aybat, Pennsylvania State University, United States</i>	
TAa-8.6: Driving Markov Chains to Desired Equilibria via Linear Programming	741
<i>Harish S. Bhat, Li-Hsuan Huang, University of California, Merced, United States; Sebastian Rodriguez, Northwestern University, United States</i>	
TAa-8.7: Convergence Analysis of Sparse Bayesian Learning under Approximate Inference	764
Techniques	
<i>Christo Kurisummoottil Thomas, Dirk Slock, Eurecom, France</i>	
TAa-8.8: $L_{\{1-2\}}$ Regularized Logistic Regression	779
<i>Jing Qin, University of Kentucky, United States; Yifei Lou, University of Texas at Dallas, United States</i>	
 TAa-8: Estimation and Adaptive Filtering	
TAa-8.1: On Constrained Modified Cramer-Rao Lower Bounds for Non-Standard	650
Deterministic Estimation	
<i>Jerome Galy, University of Montpellier 2, France; Lucien Bacharrach, Eric Chaumette, Francois Vincent, University of Toulouse, France</i>	

TAa-8.2: On Stability of Linear Estimators in Poisson Noise	670
<i>Alex Dytso, H. Vincen Poor, Princeton University, United States</i>	
TAa-8.3: Estimating Kullback-Leibler Divergence using Kernel Machines	690
<i>Kartik Ahuja, University of California, Los Angeles, United States</i>	
TAa-8.4: Efficient SER Estimation for MIMO Detectors via Importance Sampling Schemes.....	712
<i>Víctor Elvira, IMT Lille Douai, France; Ignacio Santamaría, Universidad de Cantabria, Spain</i>	
TAa-8.5: Entropy-Based Non-Data-Aided SNR Estimation	731
<i>Ferran de Cabrera, Jaume Riba, Technical University of Catalonia (UPC), Spain</i>	
TAa-8.6: A Generalized Proportionate-Type Normalized Subband Adaptive Filter.....	749
<i>Kuan-Lin Chen, Ching-Hua Lee, Harinath Garudadri, University of California, San Diego, United States</i>	
TAa-8.7: Proportionate Adaptive Filters Based on Minimizing Diversity Measures for	769
Promoting Sparsity	
<i>Ching-Hua Lee, Bhaskar D. Rao, Harinath Garudadri, University of California, San Diego, United States</i>	
TAa-8.8: Adaptive Filtering in In-Memory-Based Architectures	784
<i>Chandrasekhar Radhakrishnan, Sujan Gonugondla, University of Illinois, United States</i>	
TAa-8.9: Convex Combination of LMF and ZA-LMF for Variable Sparse System	794
Identification	
<i>Naveed Iqbal, Murwan Bashir, Azzedine Zerguine, King Fahd University of Petroleum & Minerals, Saudi Arabia</i>	
TAa-8.10: Feature Normalized LMS Algorithms	806
<i>Hamed Yazdanpanah, José Antonio Apolinário Jr., Military Institute of Engineering, Brazil</i>	
TAAb-1: Short-Packet Communications (Invited)	
TAAb-1.1: List Decoding of Short Codes for Communication over Unknown Fading Channels.....	810
<i>Marvin Xhemrishi, Mustafa Cemil Coşkun, Gianluigi Liva, German Aerospace Center (DLR), Germany; Johan Östman, Giuseppe Durisi, Chalmers University of Technology, Sweden</i>	
TAAb-1.2: Finite-Blocklength Approximations for Noncoherent Rayleigh Block-Fading Channels	815
<i>Alejandro Lancho, Universidad Carlos III de Madrid, Spain; Johan Östman, Chalmers University of Technology, Sweden; Tobias Koch, Gonzalo Vazquez-Vilar, Universidad Carlos III de Madrid, Spain</i>	
TAAb-1.3: Coding Performance Modeling for Short-Packet Communications.....	820
<i>Wei Yang, Ying Wang, Joseph Soriaga, Tingfang Ji, Kiran Mukkavilli, Qualcomm Technologies, Inc, United States</i>	
TAAb-1.4: Short-Packet Low-Power Coded Access for Massive MAC	827
<i>Suhas Kowshik, Massachusetts Institute of Technology, United States; Kirill Andreev, Alexey Frolov, Skolkovo Institute of Science and Technology, Russian Federation; Yury Polyanskiy, Massachusetts Institute of Technology, United States</i>	
TAAb-2: Signal Processing for Multiple-Antenna Systems with Coarsely Quantized Signals (Invited)	
TAAb-2.2: Spatial Sigma-Delta Modulation for the Massive MIMO Downlink.....	833
<i>Mingjie Shao, Wing-Kin Ma, Chinese University of Hong Kong, Hong Kong SAR of China; Qiang Li, University of Electronic Science and Technology of China, China; Lee Swindlehurst, University of California, Irvine, United States</i>	
TAAb-2.3: Linear Transmit Precoding with Optimized Dithering.....	838
<i>Amodh Kant Saxena, Amine Mezghani, Robert W. Heath Jr., Jeffrey Andrews, University of Texas at Austin, United States</i>	
TAAb-2.4: Joint AGC and Receiver Design for Quantized Large-Scale MU-MIMO Systems	843
with C-RANs	
<i>Thiago Cunha, Rodrigo de Lamare, Pontifical Catholic University of Rio de Janeiro, Brazil; Tadeu Ferreira, Fluminense Federal University, Brazil</i>	
TAAb-3: Optimization of MIMO Systems (Invited)	
TAAb-3.1: First-Order Methods for Energy-Efficient Power Control in Cell-Free Massive	848
MIMO	
<i>Hien Quoc Ngo, Queen's University Belfast, United Kingdom; Le-Nam Tran, University College Dublin, Ireland</i>	

Tab-3.2: MaMIMO User Grouping Strategies: How much does it matter?	853
<i>Andrea P. Guevara, Cheng-Ming Chen, Sofie Pollin, KU Leuven, Belgium</i>	
Tab-3.3: Two-Stage Beamformer Design via Deterministic Equivalents.....	858
<i>Hossein Asgharimoghaddam, Antti Tolli, University of Oulu, Finland</i>	
Tab-3.4: Utility-Based Precoding Optimization Framework for Large Intelligent Surfaces.....	863
<i>Emil Björnson, Linköping University, Sweden; Luca Sanguinetti, University of Pisa, Italy</i>	
TAAb-4: Theory of Deep Learning (Invited)	
TAAb-4.5: Do ImageNet Classifiers Generalize to ImageNet?.....	N/A
<i>Ludwig Schmidt, University of California, Berkeley, United States</i>	
TAAb-5: Neuroscience-inspired Machine Learning (Invited)	
TAAb-5.1: Inference in Probabilistic Graphical Models by Graph Neural Networks	868
<i>KiJung Yoon, Hanyang University, Republic of Korea; Renjie Liao, Yuwen Xiong, University of Toronto, Canada; Lisa Zhang, University of Toronto Mississauga, Canada; Ethan Fetaya, Raquel Urtasun, Richard Zemel, University of Toronto, Canada; Xaq Pitkow, Baylor College of Medicine, United States</i>	
TAAb-5.2: Unsupervised learning by a “softened” correlation game: duality and convergence	876
<i>Kyle Luther, Runzhe Yang, Sebastian Seung, Princeton University, United States</i>	
TAAb-5.3: Adjoint Dynamics of Stable Limit Cycle Neural Networks	884
<i>Piotr Sokol, Ian Jordan, Eben Kadile, Il Memming Park, Stony Brook University, United States</i>	
TAAb-5.4: A Closer Look at Disentangling in β -VAE	888
<i>Harshvardhan Sikka, Harvard University, United States; Weishun Zhong, Massachusetts Institute of Technology, United States; Jun Yin, Cengiz Pehlevan, Harvard University, United States</i>	
TAAb-6: VLSI Systems for Communications (Invited)	
TAAb-6.1: A Low-Power Scalable Signal Processing Chip Platform for 5G and Beyond - Kachel	896
<i>Gerhard Fettweis, Emil Matus, Robert Wittig, Mattis Hassler, Stefan Damjancevic, Sebastian Haas, Friedrich Pauls, Seungseok Nam, Nairuhi Grigoryan, Technical University of Dresden, Germany</i>	
TAAb-6.2: An Architecture for Grant-Free Massive MIMO MTC Based on Compressive	901
Sensing <i>Markus Tran, Oscar Gustafsson, Petter Källström, Kamil Senel, Erik G. Larsson, Linköping University, Sweden</i>	
TAAb-6.4: Design Trade-Offs for Decentralized Baseband Processing in Massive	906
MU-MIMO Systems <i>Kaipeng Li, James McNaney, Rice University, United States; Oscar Castaneda, Cornell University, United States; Chance Tarver, Rice University, United States; Charles Jeon, Intel Labs, United States; Joseph R. Cavallaro, Rice University, United States; Christoph Studer, Cornell University, United States</i>	
TAAb-7: Automotive Radar (Invited)	
TAAb-7.1: Optimum Design for Sparse FDA-MIMO Automotive Radar	913
<i>Saeid Sedighi, Bhavani Shankar Mysore R, Kumar Vijay Mishra, Björn Ottersten, University of Luxembourg, Luxembourg</i>	
TAAb-7.2: Robust and Adaptive Radar Elliptical Density-Based Spatial Clustering and	919
Labelling for mmWave Radar Point Cloud Data <i>Renyuan Zhang, Siyang Cao, University of Arizona, United States</i>	
TAAb-7.3: Measuring radar and communication congruence at millimeter wave frequencies	925
<i>Andrew Graff, Anum Ali, University of Texas at Austin, United States; Nuria Gonzalez-Prelcic, University of Texas at Austin / University of Vigo, United States</i>	
TAAb-7.4: Experiments with mmWave Automotive Radar Test-bed	930
<i>Xiangyu Gao, Guanbin Xing, Weihua Jiang, Sumit Roy, Hui Liu, University of Washington, United States</i>	

TA8-8: System Analysis, Performance Evaluation, and Optimization

TA8-8.1: Empirical and Simulated Performance Evaluation of Distributed Massive MIMO.....	952
<i>David Löschenbrand, Markus Hofer, Benjamin Rainer, Thomas Zemen, AIT Austrian Institute of Technology, Austria</i>	
TA8-8.3: The Effect of Channel Uncertainty on Max-Min Goodput	989
<i>Mostafa Medra, University of Toronto, Canada; Andrew Eckford, York University, Canada; Raviraj Adve, University of Toronto, Canada</i>	
TA8-8.4: Throughput and Delay Driven Access Point Placement.....	1010
<i>Govind R. Gopal, Bhaskar D. Rao, University of California, San Diego, United States</i>	
TA8-8.5: Off-Grid Aware Spatial Covariance Estimation in mmWave Communications.....	1030
<i>Chethan Kumar Anjinappa, North Carolina State University, United States; Ali Cafer Gurbuz, Mississippi State University, United States; Yavuz Yapici, Ismail Guvenc, North Carolina State University, United States</i>	
TA8-8.6: Fundamental Limitations of Large Antenna Arrays for Millimeter Wave Systems	1049
<i>Vasanthan Raghavan, Ali Tassoudji, Yu-Chin Ou, Kobi Ravid, Ozge Koymen, Junyi Li, Qualcomm, United States</i>	
TA8-8.7: On a Fundamental Predictability-Distortion Trade-Off in Decentralized	1071
Decisional Networks <i>Lorenzo Miretti, Paul de Kerret, David Gesbert, EURECOM, France</i>	
TA8-8.8: Multi-User Massive MIMO Properties in Urban-Macro Channel Measurements.....	1091
<i>Lars Thiele, Martin Kurras, Moritz Lossow, Leszek Raschkowski, Stephan Jaeckel, Fraunhofer Heinrich Hertz Institute, Germany</i>	
TA8-8.9: Characterization of the MSE Region under a Total Power Budget for Asynchronous	1103
Two-Way Relay Networks <i>Razgar Rahimi, Shahram ShahbazPanahi, University of Ontario Institute of Technology, Canada; Bjorn Ottersten, University of Luxembourg, Luxembourg</i>	
TA8-8.10: A Comparative Study of Analog/digital Self-Interference Cancellation for Full	1114
Duplex Radios <i>Jong Woo Kwak, Min Soo Sim, Yonsei University, Republic of Korea; In-Woong Kang, Jong Sung Park, Jaedon Park, Agency for Defense Development, Republic of Korea; Chan-Byoung Chae, Yonsei University, Republic of Korea</i>	

TA8-8: Cognitive Radio, Spectrum Sharing, Localization, and Radar

TA8-8.1: Detection and Localization of Multiple Targets in IEEE 802.11ad Networks	947
<i>Emanuele Grossi, Università degli Studi di Cassino e del Lazio Meridionale, Italy; Marco Lops, Università degli Studi di Napoli, Italy; Luca Venturino, Università degli Studi di Cassino e del Lazio Meridionale, Italy</i>	
TA8-8.2: Multi-User MABs with User Dependent Rewards for Uncoordinated Spectrum Access.....	969
<i>Akshayaa Magesh, Venugopal Veeravalli, University of Illinois at Urbana-Champaign, United States</i>	
TA8-8.3: Sparse Code-Domain Non-Orthogonal Random Access with Peeling Decoder	984
<i>Johannes Dommel, Zoran Utkovski, Lars Thiele, Slawomir Stanczak, Fraunhofer Heinrich Hertz Institute, Germany</i>	
TA8-8.4: Multi-Mode Autonomous Communication Systems	1005
<i>Miguel Calvo-Fullana, University of Pennsylvania, United States; Fikadu T. Dagefu, Brian M. Sadler, US Army Research Laboratory, United States; Alejandro Ribeiro, University of Pennsylvania, United States</i>	
TA8-8.5: High-Performance Deep Learning Classification for Radio Signals	1026
<i>Ahsen Uppal, George Washington University, United States; Philip Sallee, Raytheon, United States; Michael Hegarty, William Haftel, Howie Huang, George Washington University, United States; Brown Cribbs, Raytheon, United States</i>	
TA8-8.6: Deep Modulation Recognition in an Unknown Environment.....	1045
<i>Lei Li, Qihang Peng, University of Electronic Science and Technology of China, China; Pamela Cosman, Laurence Milstein, University of California, San Diego, United States</i>	
TA8-8.7: UWB Radar Vibrometry: An RF Microphone.....	1066
<i>Yu Rong, Sharanya Srinivas, Adarsh Venkataramani, Daniel Bliss, Arizona State University, United States</i>	

Tab-8.8: Reducing the Complexity of Fingerprinting-Based Positioning using Locality-Sensitive Hashing <i>Larry Tang, Ramina Ghods, Christoph Studer, Cornell University, United States</i>	1086
Tab-8: Communication Systems	
Tab-8.1: Probabilistic Shadowing Model for Indoor Optical Wireless Communication Systems <i>Hamid Hosseinianfar, Jie Lian, Maite Brandt-Pearce, University of Virginia, United States</i>	936
Tab-8.2: Optimal Replay-Based Channel Simulation via Dithering Methods <i>Sijung Yang, Andrew C. Singer, University of Illinois at Urbana-Champaign, United States</i>	957
Tab-8.3: Millimeter Wave Massive MIMO Downlink Per-Group Communications with Hybrid Linear Precoding <i>Thomas Ketsseoglou, California State Polytechnic University, Pomona, United States; Matthew Valenti, West Virginia University, United States; Ender Ayanoglu, University of California, Irvine, United States</i>	973
Tab-8.4: Joint Power and Resource Allocation for D2D Communication with Low-Resolution ADC <i>Muralikrishnan Srinivasan, Athira Subhash, Sheetal Kalyani, Indian Institute of Technology, Madras, India</i>	995
Tab-8.5: Near-Optimal Quantization for LoS MIMO with QPSK Modulation <i>Ahmet Dundar Sezer, Upamanyu Madhow, University of California, Santa Barbara, United States</i>	1015
Tab-8.6: Comparison-Limited Vector Quantization <i>Joseph Chataignon, Université Jean Monnet, Saint-Étienne, France; Stefano Rini, National Chiao Tung University, Taiwan</i>	1035
Tab-8.7: Spatial Properties of Industrial Wireless Ultra-Reliable Low-Latency Communication MIMO Links <i>Stefan Zelenbaba, Markus Hofer, David Löschenbrand, Austrian Institute of Technology, Austria; Georg Kail, Martin Schiefer, Siemens Aktiengesellschaft Österreich, Austria; Thomas Zemen, Austrian Institute of Technology, Austria</i>	1054
Tab-8.8: Learning-Based Delay Optimization for Self-Backhauled Millimeter Wave Cellular Networks <i>Manan Gupta, University of Texas at Austin, United States; Anil Rao, Eugene Visotsky, Mark C. Cudak, Amitava Ghosh, Nokia, United States; Jeffrey G. Andrews, University of Texas at Austin, United States</i>	1076
Tab-8.9: Energy Optimization for Incremental Redundancy Hybrid-ARQ <i>Bentao Zhang, Pamela Cosman, Larry Milstein, University of California, San Diego, United States</i>	1098
Tab-8.10: Secure Regularized Zero Forcing for Multiuser MIMOME Channels <i>Saba Asaad, Ali Bereyhi, Ralf R. Müller, Friedrich-Alexander Universität Erlangen-Nürnberg, Germany; Rafael F. Schaefer, Technical University of Berlin, Germany</i>	1108
Tab-8: Learning and Estimation in Imaging	
Tab-8.1: Rank-Regularized Measurement Operators for Compressive Imaging <i>Suhas Lohit, Rajhans Singh, Arizona State University, United States; Kuldeep Kulkarni, Adobe Research, United States; Pavan Turaga, Arizona State University, United States</i>	942
Tab-8.2: Selecting Parameters for Image Processing Algorithms: A Case Study using Retinal Image Segmentation <i>Chandrika Kamath, Lawrence Livermore National Laboratory, United States</i>	964
Tab-8.3: Crystal Centering using Deep Learning in X-Ray Crystallography <i>Jonathan Schurmann, Isaak Lindhe, Jorn W. Janneck, Gustavo Lima, Zdenek Matej, Lund University, Sweden</i>	978
Tab-8.4: Optimizing a Compressive Imager for Machine Learning Tasks <i>Brian Redman, Meghan Galiardi, Tu-Thack Quach, Charles LaCasse, Amber Dagel, Gabriel Birch, Sandia National Laboratories, United States</i>	1000
Tab-8.5: Computer Graphics Meets Estimation Theory: Parameter Estimation Lower Bounds for Plenoptic Imaging Systems <i>Abhinav V. Sambasivan, University of Minnesota, Twin-Cities, United States; Richard Paxman, Maxar, United States; Jarvis Haupt, University of Minnesota, Twin-Cities, United States</i>	1021

TA8-8.6: Unsupervised Learning of Nonlinear Mixtures: Identifiability and Algorithm.....	1040
<i>Bo Yang, University of Minnesota, United States; Xiao Fu, Oregon State University, United States; Nicholas D. Sidiropoulos, University of Virginia, United States; Kejun Huang, University of Florida, United States</i>	
TA8-8.7: Low-Rank Matrix Completion for Distributed Ambient Noise Imaging Systems.....	1059
<i>Danye Xu, Bingqing Song, University of Science and Technology of China, China; Rui Zhang, Yao Xie, Georgia Institute of Technology, United States; Sin-Mei Wu, Fan-Chi Lin, University of Utah, United States; WenZhan Song, University of Georgia, United States</i>	
TA8-8.8: Compressive SAR Image Recovery and Classification via CNNs	1081
<i>Michael Wharton, Edward Reehorst, Philip Schniter, Ohio State University, United States</i>	
TPa-1: Vehicle-to-Everything (V2X) Communication for Emerging Applications (Invited)	
TPa-1.1: V2X Connectivity: From LTE to Joint Millimeter Wave Vehicular	1120
Communications and Radar Sensing	
<i>Vitaly Petrov, Tampere University of Technology, Finland; Gabor Fodor, Ericsson Research, Sweden; Sergey Andreev, Tampere University of Technology, Finland; Hieu Do, Henrik Sahlin, Ericsson Research, Sweden</i>	
TPa-1.2: Congestion Control Mechanisms in IEEE 802.11p and Sidelink C-V2X	1125
<i>Alessandro Bazzi, CNR, Italy</i>	
TPa-1.3: Optimal Deception Attack on Networked Vehicular Cyber Physical Systems	1131
<i>Arpan Chattopadhyay, Indian Institute of Technology, Delhi, India; Urbashi Mitra, University of Southern California, United States; Erik Strom, Chalmers University of Technology, Sweden</i>	
TPa-1.4: A Hybrid Sensing and Reinforcement Learning Scheduler for Vehicle-to-Vehicle	1136
Communications	
<i>Taylan Sahin, Mate Boban, Ramin Khalili, Huawei, Germany; Adam Wolisz, Technical University of Berlin, Germany</i>	
TPa-2: Self-Interference Cancellation in Radio Frequency Transceivers (Invited)	
TPa-2.1: A Neural Network Approach for the Cancellation of the	1144
Second-Order-Intermodulation Distortion in Future Cellular RF Transceivers	
<i>Oliver Ploder, Christian Motz, Thomas Paireder, Mario Huemer, Johannes Kepler University Linz, Austria</i>	
TPa-2.2: Advanced Machine Learning Techniques for Self-Interference Cancellation in	1149
Full-Duplex Radios	
<i>Andreas Toftegaard Kristensen, Andreas Burg, Alexios Balatsoukas-Stimming, Ecole polytechnique fédérale de Lausanne (EPFL), Switzerland</i>	
TPa-2.3: Self-Interference Channel Characterization for Reconfigurable Antenna Based	1154
Systems	
<i>Sergey Shaboyan, Alireza Behbahani, Ahmed Eltawil, University of California, Irvine, United States</i>	
TPa-2.4: High-Accuracy Radio Sensing in 5G New Radio Networks: Prospects and	1159
Self-Interference Challenge	
<i>Carlos Baquero Barneto, Matias Turunen, Sahan Liyanaarachchi, Lauri Anttila, Alberto Brihuega, Taneli Riihonen, Mikko Valkama, Tampere University, Finland</i>	
TPa-3: MIMO and Cognitive Radar (Invited)	
TPa-3.1: Waveform Design for One-Bit Radar Systems Under Uncertain Interference	1167
Statistics	
<i>Aria Ameri, Arindam Bose, Mojtaba Soltanalian, University of Illinois at Chicago, United States</i>	
TPa-3.2: Periodic Binary Waveform Design for MIMO Radar	1172
<i>Ronghao Lin, University of Science and Technology of China, China; Jian Li, University of Florida, United States</i>	
TPa-3.3: Joint Communications and MIMO GMTI Radar Processing	1177
<i>Owen Ma, Alex Chiriyath, Daniel Bliss, Arizona State University, United States</i>	
TPa-3.4: Optimal Antenna Selection Sequence for MIMO Radar	1182
<i>Shahar Villeval, Ben-Gurion University of the Negev, Israel; Igal Bilik, General Motors, Israel; Joseph Tabrikian, Ben Gurion University of the Negev, Israel</i>	

TPa-4: Machine Learning and Inverse Problems (Invited)

TPa-5: Deep Learning and Neuroscience (Invited)

- TPa-5.1: Modeling Variability in Brain Architecture with Deep Feature Learning..... 1186
Aishwarya Balwani, Eva Dyer, Georgia Institute of Technology, United States; ,
- TPa-5.3: Synthetic Power Analyses: Empirical Evaluation and Application to Cognitive Neuroimaging 1192
Peiye Zhuang, Bliss Chapman, Ran Li, Sanmi Koyejo, University of Illinois at Urbana-Champaign, United States
- TPa-5.4: Transfer Learning Analysis of Image Processing Workflows for Electron Microscopy Datasets 1197
Erik Johnson, Luis Rodriguez, Raphael Norman-Tenazas, William Gray-Roncal, Johns Hopkins University Applied Physics Laboratory, United States

TPa-6: Sparse Arrays, Non-convex Inverse Problems, and Fundamental Limits (Invited)

- TPa-6.1: Analog Beamforming for Active Imaging using Sparse Arrays 1202
Robin Rajamäki, Aalto University, Finland; Sundeep Chopuri, Indian Institute of Science, India; Visa Koivunen, Aalto University, Finland
- TPa-6.2: Sparse Array Design Utilizing Matrix Completion..... 1207
Syed Ali Hamza, Moeness Amin, Villanova University, United States
- TPa-6.3: Reduced Dimension Beamspace Design Incorporating Nested Array for mmWave Channel Estimation 1212
Rohan R Pote, Bhaskar D Rao, University of California, San Diego, United States
- TPa-6.4: The Local Geometry of Orthogonal Dictionary Learning using L1 Minimization 1217
Qiuwei Li, Colorado School of Mines, United States; Zhihui Zhu, Johns Hopkins University, United States; Michael Wakin, Gongguo Tang, Colorado School of Mines, United States

TPa-7: Machine Learning and Optimization in Distributed Networks (Invited)

- TPa-7.3: Federated Learning with Autotuned Communication-Efficient Secure Aggregation 1222
Keith Bonawitz, Google, United States; Fariborz Salehi, California Institute of Technology / Google, United States; Jakub Konečný, Brendan McMahan, Marco Gruteser, Google, United States
- TPa-7.4: FedDANE: A Federated Newton-Type Method..... 1227
Anit Kumar Sahu, Bosch Center for Artificial Intelligence, United States; Virginia Smith, Carnegie Mellon University, United States

TPa-8: Coding and Caching

- TPa-8.1: An Optimization Framework for Secure Delivery in Heterogeneous Coded Caching Systems 1232
Ahmed A. Zewail, Abdelrahman M. Ibrahim, Aylin Yener, Pennsylvania State University, United States
- TPa-8.2: ENHANCED PROACTIVE CACHING THROUGH CONTENT RECOMMENDATION 1252
Youssef Ahmed, Sameh Hosny, Wireless Intelligent Networks Center (WINC), Nile University, Egypt; John Tadrous, Gonzaga University, ; Mohammed Nafie, Wireless Intelligent Networks Center (WINC), Nile University, Egypt; Mohamed Salah Ibrahim, University of Virginia, United States
- TPa-8.3: Bridging the Gap Between Multiplexing and Diversity in Finite SNR Multiple Antenna Coded Caching 1272
Eleftherios Lampiris, Petros Elia, Eurecom, France; Giuseppe Caire, Technical University of Berlin, Germany
- TPa-8.4: Subpacketization Level in Optimal Placement for Coded Caching with Nonuniform File Popularities 1294
Yong Deng, Min Dong, University of Ontario Institute of Technology, Canada
- TPa-8.5: Joint User Clustering and Content Caching with Heterogeneous User Content Preferences 1314
Feng Chiu, Ting-Yu Kuo, Feng-Tsun Chien, National Chiao Tung University, Taiwan; Wan-Jen Huang, National Sun Yat-sen University, Taiwan; Min-Kuan Chang, National Chung Hsing University, Taiwan

TPa-8.6: HARQ Strategies for Relay Systems with Limited Feedback	1328
<i>Mai Zhang, Borja Peleato, Purdue University, United States</i>	
TPa-8.7: Correcting Deletions in Probabilistic Non-Binary Segmented Burst Deletion	1349
Channels	
<i>Chen Yi, Joerg Kliewer, New Jersey Institute of Technology, United States</i>	
TPa-8.8: Efficient Information Reconciliation for Energy-Time Entanglement Quantum Key	1364
Distribution	
<i>Siyi Yang, Murat Can Sarihan, Kai-Chi Chang, Chee Wei Wong, Lara Dolecek, University of California, Los Angeles, United States</i>	
TPa-8.9: Online Caching Policy with User Preferences and Time-Dependent Requests: A	1384
Reinforcement Learning Approach	
<i>Mohammad Hatami, Markus Leinonen, University of Oulu, Finland; Marian Codreanu, Linköping University, Finland</i>	
TPa-8: Multi-Sensor Parameter Estimation	
TPa-8.1: Time Delay Estimation from Multiband Radio Channel Samples in Nonuniform	1237
Noise	
<i>Tarik Kazaz, Gerard Janssen, Alle-Jan van der Veen, Delft University of Technology, Netherlands</i>	
TPa-8.2: Source Enumeration and Robust Voice Activity Detection in Wireless Acoustic	1257
Sensor Networks	
<i>Tanuj Hasija, Universitaet Paderborn, Germany; Martin Gözl, Michael Muma, Universitaet Darmstadt, Germany; Peter Schreier, Universitaet Paderborn, Germany; Abdelhak Zoubir, Universitaet Darmstadt, Germany</i>	
TPa-8.3: Sequential Learning of CSI for MmWave Initial Alignment	1278
<i>Nancy Ronquillo, Sung-En Chiu, Tara Javidi, University of California, San Diego, United States</i>	
TPa-8.4: Non-Iterative Subspace-Based Method for Estimating AR Model Parameters in the	1299
Presence of White Noise with Unknown Variance	
<i>Majdoddin Esfandiari, Sergiy A. Vorobyov, Aalto University, Finland; Mahmood Karimi, Shiraz University, Iran</i>	
TPa-8.5: Asymptotically Efficient Estimation of Sea Clutter Intensity Model Parameters	1318
Using Log-Based Moments	
<i>Judith Northrop, Northrop Grumman, United States; Antonia Papandreou-Suppappola, Arizona State University, United States</i>	
TPa-8.6: Two-channel passive detection of cyclostationary signals in noise with spatio-temporal	1333
structure	
<i>Stefanie Horstmann, University of Paderborn, Germany; David Ramirez, Universidad Carlos III de Madrid, Spain; Peter J. Schreier, Aaron Pries, University of Paderborn, Germany</i>	
TPa-8.8: Hyperspectral Image Compression and Super-Resolution using Tensor Decomposition	1369
Learning	
<i>Anastasia Aidini, Michalis Giannopoulos, Anastasia Pentari, Konstantina Fotiadou, Grigorios Tsagkatakis, Panagiotis Tsakalides, Foundation for Research and Technology-Hellas, Greece</i>	
TPa-8: Array Signaling, Calibration, and Processing	
TPa-8.1: In-Field Calibration of Antennas or Antenna Arrays using Wavefield Modeling	1242
<i>Robert Pöhlmann, Siwei Zhang, Armin Dammann, German Aerospace Center (DLR), Germany</i>	
TPa-8.2: The Extended Manifold for Diversely Polarized Antenna Arrays	1262
<i>Benjamin Friedlander, University of California, Santa Cruz, United States</i>	
TPa-8.3: Antenna Array Calibration with Model Mismatch.....	1284
<i>Benjamin Friedlander, University of California, Santa Cruz, United States</i>	
TPa-8.4: Blind Sensor Array Calibration and DOA Estimation of Broadband Sources.....	1304
<i>Krishnaprasad Nambur Ramamohan, Delft University of Technology, Netherlands; Sundeep Prabhakar Chepuri, Indian Institute of Science, India; Daniel Fernandez Comesana, Microflown Technologies, Netherlands; Geert Leus, Delft University of Technology, Netherlands</i>	
TPa-8.6: Coherent Jammer Mitigation with Target Signatures using LFM and Frank-Coded	1338
Waveforms	
<i>Heitor Albuquerque, Ric Romero, Naval Postgraduate School, United States</i>	

TPa-8.7: Novel Neighborhood Blanker Processing of Radar Signals for Enhanced Delay-Doppler Resolution	1354
<i>I-Fan Lin, Mark R. Bell, Purdue University, United States</i>	
TPa-8.8: A Multi-Channel Feedforward ANC with FXLMS Algorithm for Aviation-Noise Suppression	1374
<i>Chadaporn Sookpuwong, Chow Chompoo-Inwai, King Mongkut's Institute of Technology Ladkrabang, Thailand</i>	
TPa-8: Biomedical Imaging and Signal Processing	
TPa-8.1: An Optimal Spatiotemporal Noise Filter for NI/OCT Imaging	1247
<i>James Glenn-Anderson, Ying Yu, Supercomputer Systems, Inc., United States</i>	
TPa-8.2: Perceptually Driven Conditional GAN for Fourier Ptychography	1267
<i>Abhinav Kumar V, Shashank Gupta, Sumohana Channappayya, Indian Institute of Technology, Hyderabad, India</i>	
TPa-8.3: Imaging with Distributed Lensless Line Sensors.....	1289
<i>Yucheng Zheng, Salman Asif, University of California, Riverside, United States</i>	
TPa-8.4: Bradycardia Prediction in Preterm Infants using Nonparametric Kernel Density Estimation	1309
<i>Subhasish Das, Bahman Moraffah, Sandeep K.S. Gupta, Antonia Papandreou-Suppappola, Arizona State University, United States</i>	
TPa-8.5: Modified Time Delay of Arrival for Biomedical and Environmental Applications	1323
<i>Chinmay Sahu, Mahesh Banavar, Jie Sun, Clarkson University, United States</i>	
TPa-8.6: Offline Fault Detection in Gene Regulatory Networks using Next-Generation Sequencing Data	1344
<i>Seyede Fatemeh Ghoreishi, Texas A&M University, United States; Mahdi Imani, George Washington University, United States</i>	
TPa-8.7: Towards Estimation of Three-Dimensional Knee Rotations.....	1359
<i>April McPherson, Christopher Felton, Barry Gilbert, Rena Hale, Nathan Schilaty, Mayo Clinic, United States; Timothy Hewett, Ohio State University, United States; David Holmes, III, Clifton Haider, Mayo Clinic, United States</i>	
TPa-8.8: Finite-Time Behavior of k-mer Frequencies and Waiting Times in Noisy-Duplication Systems	1379
<i>Hao Lou, Farzad Farnoud, University of Virginia, United States</i>	
TPa-8.9: Complete Fix-Free Codes for the Statistical Dictionary-Based String Matching Problem	1389
<i>Meer Suri, Stefano Rini, National Chiao Tung University, Taiwan</i>	
TPb-1: Reliable and Low-Latency MIMO Communication (Invited)	
TPb-1.1: Outage Analysis of Downlink URLLC in Massive MIMO systems with Power Allocation	1394
<i>Alexandru-Sabin Bana, Aalborg University, Denmark; Luca Sanguinetti, University of Pisa, Italy; Elisabeth de Carvalho, Petar Popovski, Aalborg University, Denmark</i>	
TPb-1.2: Short-Packet Transmission over a Bidirectional Massive MIMO Link	1399
<i>Yasaman Etefagh, Johan Östman, Giuseppe Durisi, Chalmers University of Technology, Sweden</i>	
TPb-1.3: Large Aperture Antenna Array Design for Cellular LOS Massive MIMO.....	1404
<i>Stefan Pratschner, Technische Universitaet Wien, Austria; David Löschenbrand, AIT Austrian Institute of Technology GmbH, Austria; Stefan Schwarz, Technische Universitaet Wien, Austria; Thomas Zemen, AIT Austrian Institute of Technology GmbH, Austria; Markus Rupp, Technische Universitaet Wien, Austria</i>	
TPb-1.4: Enhancing Performance of Uplink URLLC Systems via Shared Diversity in Transmissions and Multiple Antenna Processing	1409
<i>Radosław Kotaba, Intel Mobile Communications / Aalborg University, Denmark; Carles Navarro Manchón, Petar Popovski, Aalborg University, Denmark</i>	

TPb-2: Signal Processing for UAV/UGV Sensing (Invited)

- TPb-2.1: Radar Beampattern Design for a Drone Swarm1416
Mohammad Alaaee-Kerahroodi, SnT, University of Luxembourg, Luxembourg; Kumar Vijay Mishra, University of Iowa, United States; M. R. Bhavani Shankar, SnT, University of Luxembourg, Luxembourg
- TPb-2.2: A Combined Waveform-Beamforming Design for Millimeter-Wave Joint1422
Communication-Radar
Preeti Kumari, Nitin Jonathan Myers, University of Texas at Austin, United States; Sergiy Vorobyov, Aalto University, Finland; Robert Heath, University of Texas at Austin, United States
- TPb-2.3: ReMCW: Reduced Bandwidth FMCW Radar for Autonomous Driving1427
Kumar Vijay Mishra, University of Iowa, United States; Zora Slavik, FZI Research Center for Information Technology, Germany; Oliver Bringmann, Eberhard Karls University of Tuebingen, Germany
- TPb-2.4: A Reinforcement Learning Approach for Mobile Beamforming.....1432
Anastasios Dimas, Rutgers, The State University of New Jersey, United States; Kostas Diamantaras, TEI of Thessaloniki, Greece; Athina Petropulu, Rutgers, The State University of New Jersey, United States
- TPb-2.5: Robust Source Localization Exploiting Collaborative UAV Network1437
Shuimei Zhang, Ammar Ahmed, Yimin Zhang, Temple University, United States

TPb-3: MIMO Beamforming and Beamtracking (Invited)

- TPb-3.1: User-Exposure-Cancelling Beamforming for Multi-Antenna Systems.....1442
Miguel Castellanos, Borja Peleato, David Love, Purdue University, United States
- TPb-3.2: Wideband Millimeter-Wave Beam Training with True-Time-Delay Array1447
Architecture
Han Yan, Veljko Boljanovic, Danijela Cabric, University of California, Los Angeles, United States
- TPb-3.3: Joint Position, Orientation and Channel Estimation in Hybrid mMWave MIMO1453
Systems
Wenqing Zheng, Javier Rodriguez-Fernandez, University of Texas at Austin, United States; Nuria Gonzalez-Prelcic, University of Texas at Austin / University of Vigo, United States
- TPb-3.4: Efficient Beamspace Downlink Precoding for mmWave Massive MIMO.....1459
Mohammed Abdelghany, Upamanyu Madhoo, University of California, Santa Barbara, United States; Antti Tolli, University of Oulu, Finland
- TPb-3.5: Deep Learning for TDD and FDD Massive MIMO: Mapping Channels in Space1465
and Frequency
Muhammad Alrabeiah, Ahmed Alkhateeb, Arizona State University, United States

TPb-4: Machine Learning Advances in Computational Imaging (Invited)

- TPb-4.1: Learning How to Interpolate Fourier Data with Unknown Autoregressive Structure:1471
An Ensemble-Based Approach
Tae Hyung Kim, Justin Haldar, University of Southern California, United States
- TPb-4.3: Scan-Specific Residual Convolutional Neural Networks for Fast MRI using1476
Residual RAKI
Chi Zhang, Seyed Amir Hossein Hosseini, Steen Moeller, Sebastian Weingartner, Kamil Ugurbil, Mehmet Akcakaya, University of Minnesota, United States
- TPb-4.4: Deep Learning for Musculoskeletal Image Analysis.....1481
Ismail Irmakci, Ege University, Turkey; Neslisah Torosdagli, National Institutes of Health, United States; Drew Torigian, University of Pennsylvania, United States; Syed M. Anwar, University of Central Florida, United States; Ulas Bagci, Ulas Bagci, United States

TPb-5: Inference and Learning in Graphs

- TPb-5.1: Opinion Dynamics with Random Actions and a Stubborn Agent1486
Olle Abrahamsson, Danyo Danev, Erik G. Larsson, Linköping University, Sweden
- TPb-5.2: Randomized Asynchronous Recursions with a Sinusoidal Input1491
Oguzhan Teke, P. P. Vaidyanathan, California Institute of Technology, United States

TPb-5.3: Decentralized Dynamic ADMM with Quantized and Censored Communications	1496
<i>Yaohua Liu, Gang Wu, University of Science and Technology of China, China; Zhi Tian, George Mason University, United States; Qing Ling, Sun Yat-Sen University, China</i>	
TPb-5.4: On the Comparison between Primal and Primal-dual Methods in Decentralized Dynamic Optimization	1501
<i>Wei Xu, University of Science and Technology of China, China; Kun Yuan, Wotao Yin, University of California, Los Angeles, United States; Qing Ling, Sun Yat-Sen University, Chile</i>	
TPb-5.5: Distributed Spectral Radius Estimation in Wireless Sensor Networks.....	1506
<i>Gowtham Muniraju, Cihan Tepedelenlioglu, Andreas Spanias, Arizona State University, United States</i>	
 TPb-6: AI/Machine Learning Architectures (Invited)	
TPb-6.1: RRAM-Based In-Memory Computing for Embedded Deep Neural Networks	1511
<i>Daniel Bankman, Boris Murmann, Stanford University, United States</i>	
TPb-6.2: Vesti: An In-Memory Computing Processor for Deep Neural Networks Acceleration	1516
<i>Zhewei Jiang, Columbia University, United States; Shihui Yin, Minkyoo Kim, Tushar Gupta, Arizona State University, United States; Mingoo Seok, Columbia University, United States; Jae-sun Seo, Arizona State University, United States</i>	
TPb-6.4: Is my Neural Network Neuromorphic? Taxonomy, Recent Trends and Future	1522
Directions in Neuromorphic Engineering <i>Arindam Basu, Jyotibdha Acharya, Sumon Bose, Nanyang Technological University, Singapore</i>	
 TPb-7: Optimization Methods in Array Processing	
TPb-7.1: Impact of Spatial Correlation in MIMO Radar.....	1528
<i>Aya Mostafa Ahmed, Aydin Sezgin, Ruhr-Universität Bochum, Germany; Eduard A. Jorswieck, Technical University of Dresden, Germany</i>	
TPb-7.2: Joint Optimization of Waveform Covariance Matrix and Antenna Selection for MIMO Radar	1534
<i>Arindam Bose, Shahin Khobahi, Mojtaba Soltanalian, University of Illinois at Chicago, United States</i>	
TPb-7.3: Practically Constrained Waveform Design for MIMO Radar in the Presence of Multiple Targets	1539
<i>Xianxiang Yu, University of Electronic Science and Technology of China, China; Khaled Alhujaili, Pennsylvania State University, University Park, Saudi Arabia; Guolong Cui, University of Electronic Science and Technology of China, China; Vishal Monga, Pennsylvania State University, University Park, United States</i>	
TPb-7.4: RFI Mitigation for One-Bit UWB Radar Systems.....	1545
<i>Tianyi Zhang, Jiaying Ren, Christopher Gianelli, Jian Li, University of Florida, United States</i>	
TPb-7.5: Resource Management for Multifunction Multichannel Cognitive Radars.....	1550
<i>Mahdi Shaghghi, Complementary AI Systems Corp., Canada; Raviraj S. Adve, University of Toronto, Canada; Zhen Ding, Defence R&D Canada, Canada</i>	
 TPb-8: Architectures for Arithmetic and Signal Processing Systems	
TPb-8.1: FPGA Fabric Conscious Design and Implementation of Speed-Area Efficient Signed Digit Add-Subtract Logic Through Primitive Instantiation	1555
<i>Ayan Palchoudhuri, Anindya Sundar Dhar, Indian Institute of Technology, Kharagpur, India</i>	
TPb-8.2: The Effects of Arithmetic Roundoff Error on the Lévy Fire Fly Algorithm When Used in Coupled Form Adaptive Filter Structures	1573
<i>Magni Hussain, William Jenkins, Pennsylvania State University, United States; Chandraseekar Radhakrishnan, University of Illinois, United States</i>	
TPb-8.3: Hardware Implementation of Discrete Hirschman Transform Convolution using Distributed Arithmetic	1587
<i>Dingli Xue, Linda DeBrunner, Victor DeBrunner, Florida State University, United States</i>	
TPb-8.4: A Parameterized and Minimal Resource Soft Processor for Programmable Logic	1601
<i>Christopher Felton, Barry Gilbert, Clifton Haider, Mayo Clinic, United States</i>	
TPb-8.5: Approximated Canonical Signed Digit for Error Resilient Intelligent Computation	1616
<i>Gian Carlo Cardarilli, Luca Di Nunzio, Rocco Fazzolari, University of Rome Tor Vergata, Italy; Alberto Nannarelli, Technical University of Denmark, Denmark; Marco Re, University of Rome Tor Vergata, Italy</i>	

TPb-8.6: A Common Recursive Form for Multiple Fundamental Arithmetic Operators and its Automated Synthesis	1631
<i>Sébastien Roy, Frédéric Mailhot, Université de Sherbrooke, Canada</i>	
TPb-8.7: Low-Power, Adaptive Digital Pre-Distortion Linearization of Ultra-Wideband RF Power Amplifiers	1649
<i>Scott Velazquez, Yujia Wang, Innovation Digital, LLC, United States</i>	
TPb-8: Online and Active Learning and Adaptive and Cognitive Systems	
TPb-8.1: An Online Stochastic Kernel Machine for Robust Signal Classification	1560
<i>Raghu Raj, US Naval Research Laboratory, United States</i>	
TPb-8.2: Impact of Delays on Constrained Online Convex Optimization	1578
<i>Xuanyu Cao, University of Illinois at Urbana-Champaign, United States; Junshan Zhang, Arizona State University, United States; H. Vincent Poor, Princeton University, United States</i>	
TPb-8.3: Automated Optimal Online Civil Issue Classification using Multiple Feature Sets	1591
<i>Imara Nazar, Yasitha Warahena Liyanage, Daphney-Stavroula Zois, Charalampos Chelmis, University at Albany, SUNY, United States</i>	
TPb-8.4: Active and Adaptive Sequential Learning with Per Time-Step Excess Risk Guarantees	1606
<i>Yuheng Bu, University of Illinois at Urbana Champaign, United States; JiaXun Lu, Tsinghua University, China; Venugopal V. Veeravalli, University of Illinois at Urbana Champaign, United States</i>	
TPb-8.5: Optimal Adaptive Sampling for Boundary Estimation with Mobile Sensors	1621
<i>Phillip Kearns, John Lipor, Bruno Jedynak, Portland State University, United States</i>	
TPb-8.6: Online Bounded Component Analysis: A Simple Recurrent Neural Network with Local Update Rule for Unsupervised Separation of Dependent and Independent Sources	1639
<i>Alper T. Erdogan, Koc University, Turkey; Berfin Simsek, EPFL, Switzerland</i>	
TPb-8.7: Reinforcement Learning for Cognitive Radar Task Scheduling	1653
<i>Mohamed Gaafar, University of Toronto, Canada; Mahdi Shaghghi, ComplimentAI, Canada; Raviraj Adve, University of Toronto, Canada; Zhen Ding, Defence Research and Development Canada, Canada</i>	
TPb-8.8: Application of POMDPs to Cognitive Radar	1662
<i>Charles Topliff, William Melvin, Douglas Williams, Georgia Institute of Technology, United States</i>	
TPb-8.9: End-To-End Learning of Waveform Generation and Detection for Radar Systems	1672
<i>Wei Jiang, Alexander Haimovich, New Jersey Institute of Technology, United States; Osvaldo Simeone, King's College London, United Kingdom</i>	
TPb-8.10: Exploration Versus Data Refinement via Multiple Mobile Sensors Based on Epistemic Utility Controller	1677
<i>Mohammad Shekaramiz, Todd Moon, Jacob Gunther, Utah State University, United States</i>	
TPb-8: Matrix and Tensor Methods	
TPb-8.1: The Role of Subspace Estimation in Array Signal Processing	1566
<i>Richard Vaccaro, University of Rhode Island, United States</i>	
TPb-8.2: Tensor Data Conformity Evaluation for Interference-Resistant Localization	1582
<i>Konstantinos Tountas, George Sklivanitis, Dimitris A. Pados, Florida Atlantic University, United States; Michael J. Medley, US Air Force Research Laboratory, United States</i>	
TPb-8.3: Autocorrelation Complementary Matrices	1596
<i>Yi Jiang, Fengjie Li, Xin Wang, Fudan University, China; Jian Li, University of Florida, United States</i>	
TPb-8.4: COMBINATORIAL SEARCH FOR THE L_p -NORM PRINCIPAL COMPONENT OF A MATRIX	1611
<i>Dimitris Chachlakis, Panos Markopoulos, Rochester Institute of Technology, United States</i>	
TPb-8.5: Efficient Computation of the PARAFAC2 Decomposition	1626
<i>Yao Cheng, Martin Haardt, Ilmenau University of Technology, Germany</i>	
TPb-8.6: Coupled Block-Term Tensor Decomposition Based Blind Spectrum Cartography	1644
<i>Guoyong Zhang, Oregon State University; University of Electronic Science and Technology of China, United States; Xiao Fu, Oregon State University, United States; Jun Wang, University of Electronic Science and Technology of China, China; Mingyi Hong, University of Minnesota, United States</i>	

TPb-8.7: Iteratively Re-Weighted L1-PCA of Tensor Data	1658
<i>Konstantinos Tountas, Florida Atlantic University, United States; Dimitris Chachlakis, Panos Markopoulos, Rochester Institute of Technology, United States; Dimitris Pados, Florida Atlantic University, United States</i>	
TPb-8.8: Fast Sparse Subspace Tracking Algorithm Based on Shear and Givens Rotations	1667
<i>Nacerredine Lassami, Abdeldjalil Aissa-El-Bey, IMT Atlantique Bretagne-Pays de la Loire, France; Karim Abed-Meraim, Université d'Orléans, France</i>	
WAa-1: Hardware-Aware MIMO Transmission Strategies	
WAa-1.1: Closed-Loop DPD for Digital MIMO Transmitters under Antenna Crosstalk.....	1682
<i>Alberto Brihuega, Mahmoud Abdelaziz, Lauri Anttila, Carlos Baquero Barneto, Mikko Valkama, Tampere University, Finland</i>	
WAa-1.2: PAPR-Limited Precoding in Massive MIMO Systems with Reflect- and	1690
Transmit-Array Antennas	
<i>Ali Bereyhi, Vahid Jamali, Ralf R. Müller, Georg Fischer, Robert Schober, Friedrich-Alexander Universität Erlangen-Nürnberg, Germany; Antonia M. Tulino, Nokia Bell Labs / University degli Studi di Napoli Federico II, United States</i>	
WAa-1.3: Bit Allocation Strategies for Generalised Spatial Modulation	1695
<i>Nilab Ismailoglu, Baptiste Cavarec, Mats Bengtsson, KTH Royal Institute of Technology, Sweden</i>	
WAa-1.4: Mitigation of Jamming Attack in Massive MIMO With One-Bit FBB	1700
Sigma-Delta ADCs	
<i>Hessam Pirzadeh, A. Lee Swindlehurst, University of California, Irvine, United States</i>	
WAa-2: Advances in Neural Modeling	
WAa-2.1: Application of Embedded Dynamic Mode Decomposition on Epileptic Data for	1705
Seizure Prediction	
<i>Negar Erfanian Taghvayi, Behnaam Aazhang, Rice University, United States</i>	
WAa-2.2: Localization of Emotional Affect in Electroencephalography using a Model Based	1709
Discrimination Measure	
<i>Alan Kaplan, Piyush Karande, Piyush Karande, Elizabeth Tran, Lawrence Livermore National Laboratory, United States; Maryam Bijanzadeh, Heather Dawes, Edward Chang, University of California, San Francisco, United States</i>	
WAa-2.3: Analyzing the Computational Complexity of a Dynamic Model of the Time-varying	1714
Spatiotemporal Sensitivity of Neurons in the Visual Cortex	
<i>Yasin Zamani, Neda Nategh, University of Utah, United States</i>	
WAa-2.4: A Statistical Approach to Dynamic Synchrony Analysis of Neuronal Ensemble Spiking	1719
<i>Shoutik Mukherjee, Behtash Babadi, University of Maryland, College Park, United States</i>	
WAa-3: Modulation and Coding	
WAa-3.1: Ternary Quantized Polar Code Decoders: Analysis and Design	1724
<i>Joachim Neu, Stanford University, United States; Mustafa Cemil Coşkun, Gianluigi Liva, German Aerospace Center (DLR), Germany</i>	
WAa-3.2: Continuous Phase Modulation with 1-Bit Quantization and Oversampling using	1729
Iterative Detection and Decoding	
<i>Rodrigo Alencar, Lukas Landau, Rodrigo de Lamare, Pontifícia Universidade Católica do Rio de Janeiro, Brazil</i>	
WAa-3.3: Patterned Erasure Correcting Codes for Low Storage-Overhead Blockchain Systems	1734
<i>Debarbab Mitra, Lara Dolecek, University of California, Los Angeles, United States</i>	
WAa-4: Deep Learning Theory (Invited)	
WAa-5: Game-Theoretic Learning in Networks (Invited)	
WAa-5.1: Smooth Fictitious Play in N by 2 Potential Games	1739
<i>Brian Swenson, H. Vincent Poor, Princeton University, United States</i>	

WAA-5.2: Decentralized Q-Learning with Constant Aspirations in Stochastic Games	1744
<i>Bora Yongacoglu, Queen's University, Canada; Gurdal Arslan, University of Hawaii, United States;</i>	
<i>Serdar Yuksel, Queen's University, Canada</i>	
WAA-5.3: On the Role of Information in Learning in Games over Networks	1750
<i>Lacra Pavel, University of Toronto, Canada</i>	
WAA-5.4: Distributed Fictitious Play in Potential Games with Time Varying Communication	1755
Networks	
<i>Sina Arefizadeh, Ceyhun Eksin, Texas A&M University, United States</i>	
WAA-6: Machine Learning in Communications	
WAA-6.1: Deep Learning for the Degraded Broadcast Channel.....	1760
<i>Erik Stauffer, Andy Wang, Nihar Jindal, Google, United States</i>	
WAA-6.2: Two-Stage Learning for Uplink Channel Estimation in One-Bit Massive MIMO	1764
<i>Eren Balevi, Jeffrey Andrews, University of Texas at Austin, United States</i>	
WAA-6.3: Linear Approximation based Q-Learning for Edge Caching in Massive MIMO	1769
Networks	
<i>Navneet Garg, Mathini Sellathurai, Heriot-Watt University, United Kingdom; Tharmalingam</i>	
<i>Ratnarajah, University of Edinburgh, United Kingdom</i>	
WAA-6.4: Learning to Code: Coded Caching via Deep Reinforcement Learning.....	1774
<i>Navid Naderializadeh, Intel Corporation, United States; Seyed Mohammad Asghari, University of</i>	
<i>Southern California, United States</i>	
WAA-7: Imaging and Multimedia (Invited)	
WAA-7.1: 3D Surface Measurement and Analysis of Works of Art.....	1779
<i>Bingjie (Jenny) Xu, Florian Willomitzer, Chia-Kai Yeh, Fengqiang Li, Vikas Gupta, Jack Tumblin,</i>	
<i>Marc Walton, Oliver Cossairt, Northwestern University, United States</i>	
WAA-8: Image Processing and Applications	
WAA-8.1: Perceptually Inspired Normalized Conditional Compression Distance	1788
<i>Nima Nikvand, Ryerson University, Canada; Zhou Wang, University of Waterloo, Canada; Xavier</i>	
<i>Fernando, Ryerson University, Canada; Wisam Farjow, Adjunct Professor, Canada</i>	
WAA-8.2: Fast Color-Guided Depth Denoising for RGB-D Images by Graph Filtering.....	1811
<i>Qiwei Huang, Ruikang Li, Sijie Lin, Hui Feng, Bo Hu, Fudan University, China</i>	
WAA-8.3: FPGA Prototyping of a High-Resolution TerraSAR-X Image Processor for Iceberg	1832
Detection	
<i>Daniel Gregorek, Dominik Günzel, Jochen Rust, Steffen Paul, University of Bremen, Germany;</i>	
<i>Domico Velotto, James Imber, Björn Tings, Anja Frost, German Aerospace Center (DLR), Germany</i>	
WAA-8.5: Domain-Enriched Deep Network for Micro-CT Image Segmentation	1867
<i>Amirsaeed Yazdani, Nicholas B Stephens, Venkateswararao Cherukuri, Timothy Ryan, Vishal Monga,</i>	
<i>Pennsylvania State University, United States</i>	
WAA-8.6: Efficient Banding-Alleviating Inverse Tone Mapping for High Dynamic Range	1885
Video	
<i>Neeraj Gadgil, Qing Song, Guan-Ming Su, Dolby Laboratories Inc., United States</i>	
WAA-8.7: Deep No-Reference Tone Mapped Image Quality Assessment.....	1906
<i>Chandra Sekhar Ravuri, Indian Institute of Technology, Gandhinagar, India; Rajesh Sureddi, Sathya</i>	
<i>Veera Reddy Dendi, Indian Institute of Technology, Hyderabad, India; Shanmuganathan Raman,</i>	
<i>Indian Institute of Technology, Gandhinagar, India; Sumohana S. Channappayya, Indian Institute of</i>	
<i>Technology, Hyderabad, India</i>	
WAA-8.8: 3D Sensor-Based UAV Localization for Bridge Inspection	1926
<i>Burak Kakillioglu, Syracuse University, United States; Alireza Janani, Automodality Inc., United</i>	
<i>States; Jiyang Wang, Senem Velipasalar, Syracuse University, United States; Edward Koch,</i>	
<i>Automodality Inc., United States</i>	

WAa-8: Signal Processing and Applications

WAa-8.1: Music Source Separation with Generative Adversarial Network and Waveform Averaging	1796
<i>Ryosuke Tanabe, Yuto Ichikawa, Takanori Fujisawa, Masaaki Ikehara, Keio University, Japan</i>	
WAa-8.2: Design Options for Audio Frequency Shifting System for Unique and Interesting Sound Effects	1816
<i>fred harris, University of California, San Diego, United States; Nicholas Gregorich, San Diego State University, United States; Chris Dick, Xilinx, United States</i>	
WAa-8.3: Multi-Pitch Estimation using NHF with Multi-Dictionary Distinguishing Attack and Reverberation of Sounds	1836
<i>Takanori Fujisawa, Sora Harada, Masaaki Ikehara, Keio University, Japan</i>	
WAa-8.4: Clustering-Aware Structure-Constrained Low-Rank Submodule Clustering	1852
<i>Tong Wu, Rutgers University, United States</i>	
WAa-8.5: A Brazilian Portuguese Real-Time Voice Recognition to deal with sensitive data	1872
<i>Felipe Abreu Pinna, Joao Carlos Neto, Wilson Ruggiero, University of Sao Paulo, Brazil</i>	
WAa-8.6: Temporal Frequency Analysis: Target Isolation and Signal Optimization	1890
<i>Jaclynn Stubbs, Bryana Woo, Gabriel Birch, Camron Kouhestani, David Novick, Sandia National Laboratories, United States</i>	
WAa-8.7: Ultra-Fast Saliency Detection using QR Factorization	1911
<i>Tariq Alshawi, King Saud University, Saudi Arabia</i>	
WAa-8.8: A Fast Stereo Audio Source Separation for Moving Sources.....	1931
<i>Oleg Golokolenko, Gerald Schuller, Technische Universität Ilmenau, Germany</i>	

WAa-8: 5G and Beyond

WAa-8.1: Spatial Modulation Link Adaptation: a Deep Learning Approach.....	1801
<i>Anxo Tato, Carlos Mosquera, Universidade de Vigo, Spain</i>	
WAa-8.2: Sparsely-structured Multiuser Detection for Large Massively Concurrent NOMA Systems	1821
<i>Razvan-Andrei Stoica, Hiroki Iimori, Giuseppe Thadeu Freitas de Abreu, Jacobs University Bremen, Germany</i>	
WAa-8.3: Interference-Aware Offloading of Deadline-Constrained Traffic in High Density Cellular Systems	1842
<i>Ahmed Ewaisha, Cihan Tepedelenlioglu, Arizona State University, United States</i>	
WAa-8.4: Increasing the Bandwidth Efficiency in UW-OFDM.....	1857
<i>Oliver Lang, Carl Böck, Mario Huemer, Johannes Kepler University Linz, Austria; Christian Hofbauer, Linz Center of Mechatronics GmbH, Austria</i>	
WAa-8.5: Low Complexity Uplink Grant-Free NOMA Based on Boosted Approximate Message Passing	1877
<i>Takanori Hara, Koji Ishibashi, University of Electro-Communications, Japan</i>	
WAa-8.6: Simultaneous Wireless Information and Power Transfer: An S-Parameter Approach	1896
<i>Tomohiro Arakawa, James Krogmeier, David Love, Purdue University, United States</i>	
WAa-8.7: Key Generation for Secure Distributed Detection in IoT using Polar Quantization	1916
<i>Henri Hentilä, Visa Koivunen, Aalto University, Finland; Vincent Poor, Princeton University, United States</i>	
WAa-8.8: Dynamic UL/DL Mode Selection and Resource Allocation in Multi-Cell MIMO TDD Systems	1936
<i>Antti Arvola, Satya Joshi, Antti Tölli, University of Oulu, Finland</i>	

WAa-8: Estimation, Inference, and Learning

WAa-8.1: Learning Graph Processes with Multiple Dynamical Models.....	1783
<i>Qin Lu, Vassilis N. Ioannidis, Georgios B. Giannakis, University of Minnesota, United States</i>	
WAa-8.2: Adversarially Robust Hypothesis Testing.....	1806
<i>Yulu Jin, Lifeng Lai, University of California, Davis, United States</i>	
WAa-8.3: Separating an Outlier from a Change	1827
<i>Deniz Sargun Sargun, C. Emre Koksak, Ohio State University, United States</i>	

WAA-8.4: Tracking Multiple Objects with Multimodal Dependent Measurements: Bayesian Nonparametric Modeling	1847
<i>Bahman Moraffah, Cesar Brito, Bindya Venkatesh, Antonia Papandreou-Suppappola, Arizona State University, United States</i>	
WAA-8.5: Distributed Sequential Hypothesis Testing with Dependent Sensor Observations	1862
<i>Shan Zhang, Prashant Khanduri, Pramod Varshney, Syracuse University, United States</i>	
WAA-8.6: A Consensus-Based Approach for Distributed Quickest Detection of Significant Events in Networks	1881
<i>Jian Li, Don Towsley, University of Massachusetts, Amherst, United States; Shaofeng Zou, University at Buffalo, United States; Venugopal V. Veeravalli, University of Illinois at Urbana-Champaign, United States; Gabriela Ciocarlie, SRI International, United States</i>	
WAA-8.7: Sequential Time-Frequency Signature Estimation of Multi-Component FM Signals	1901
<i>Vaishali Amin, Yimin Zhang, Temple University, United States; Braham Himed, Air Force Research Laboratory, United States</i>	
WAA-8.8: The Relationship Between Temporal and Spectral Coherence in the Detection of Cyclostationary Processes	1921
<i>Stephen Howard, Songsri Sirianunpiboon, Defence Science & Technology Group, Australia; Douglas Cochran, Arizona State University, United States</i>	
WAA-8.9: Predictive Distribution Estimation for Bayesian Machine Learning using a Dirichlet Process Prior	1941
<i>Paul Rademacher, US Naval Research Laboratory, United States; Milos Doroslovacki, George Washington University, United States</i>	
WAb-1: IoT and Cell-Free Massive MIMO	
WAb-1.1: Internet of Things Based on Cell-Free Massive MIMO.....	1946
<i>Shilpa Rao, University of California, Irvine, United States; Alexei Ashikhmin, Hong Yang, Nokia Bell Labs, United States</i>	
WAb-1.2: Taking Cellular IoT Energy Efficiency to the Next Level	1951
<i>Nafiseh Mazloum, Sony Research Center Lund, Sweden; Dripta Ray, Ratna Pavan Kumar Ponna, Ove Edfors, Lund University, Sweden</i>	
WAb-1.3: LoRa Symbol Error Rate Under Non-Aligned Interference	1957
<i>Orion Afisiadis, Matthieu Cotting, Andreas Burg, Alexios Balatsoukas-Stimming, Ecole polytechnique fédérale de Lausanne (EPFL), Switzerland</i>	
WAb-2: Estimation, Optimization, and Learning	
WAb-2.1: A Novel Riemannian Optimization Approach and Algorithm for Solving the Phase Retrieval Problem	1962
<i>Ahmed Douik, Fariborz Salehi, Babak Hassibi, California Institute of Technology, United States</i>	
WAb-2.2: Decentralized Massive MIMO Uplink Signal Estimation by Binary Multistep Synthesis	1967
<i>Pascal Seidel, Steffen Paul, Jochen Rust, University of Bremen, Germany</i>	
WAb-2.3: Towards Practical FDD Massive MIMO: CSI Extrapolation Driven by Deep Learning and Actual Channel Measurements	1972
<i>Maximilian Arnold, Sebastian Dörner, Sebastian Cammerer, Jakob Hoydis, Stephan Ten Brink, University of Stuttgart, Germany</i>	
WAb-3: Ultra-Reliable and Low-Latency Communication	
WAb-3.1: Age of Information in Multicast Networks with Multiple Update Streams	1977
<i>Baturalp Buyukates, University of Maryland, United States; Alkan Soysal, Bahcesehir University, Turkey; Sennur Ulukus, University of Maryland, United States</i>	
WAb-3.2: Control and Data Channel Combining in Ultra-Reliable Low-Latency Communication	1982
<i>Trung-Kien Le, EURECOM, France; Umer Salim, TCL, France; Florian Kaltenberger, EURECOM, France</i>	
WAb-3.3: Multi-TP Transmission Schemes for Factory Automation.....	1987
<i>Fatemeh Hamidi-Sepehr, Debdeep Chatterjee, Bishwarup Mondal, Sergey Panteleev, Alexei Davydov, Avik Sengupta, Toufiqul Islam, Intel Corporation, United States</i>	

WAb-4: Machine Learning

- WAb-4.1: Optimal Piecewise Approximations for Model Interpretation1992
Kartik Ahuja, William Zame, Mihaela van der Schaar, University of California, Los Angeles, United States
- WAb-4.2: Convex Hierarchical Clustering for Graph-Structured Data1999
Claire Donnat, Susan Holmes, Stanford University, United States
- WAb-4.3: A Modified Logistic Regression for Positive and Unlabeled Learning2007
Kristen Jaskie, Arizona State University, United States; Charles Elkan, University of California, San Diego, United States; Andreas Spanias, Arizona State University, United States

WAb-5: Age of Information: Advances

- WAb-5.1: Optimal Transmission Policies for Energy Harvesting Age of Information Systems2012
with Battery Recovery
Caglar Tunc, Shivendra Panwar, New York University, United States
- WAb-5.2: Age of Information with Unreliable Transmissions in Multi-Source Multi-Hop2017
Status Update Systems
Shahab Farazi, Worcester Polytechnic Institute, United States; Andrew Klein, Western Washington University, United States; Donald Brown, Worcester Polytechnic Institute, United States
- WAb-5.3: Age of Information in G/G/1/1 Systems2022
Alkan Soysal, Bahcesehir University, Turkey; Sennur Ulukus, University of Maryland, United States

WAb-6: Signal Processing Advances in Neuroimaging II

- WAb-6.1: Efficient Blinking Component Estimation in Subspace-Based EEG and MEG2028
Analysis
Younes Sadat-Nejad, Soosan Beheshti, Ryerson University, Canada
- WAb-6.2: Real-Time Seizure State Tracking using Two Channels: A Mixed-Filter Approach2033
Mohammad Badri Ahmadi, Alexander Craik, Hamid Fekri Azgomi, Joseph T. Francis, Jose L. Contreras-Vidal, Rose T. Faghieh, University of Houston, United States
- WAb-6.3: Hardware-Efficient Seizure Detection2040
Bingzhao Zhu, Mahsa Shoaran, Cornell University, United States

WAb-7: Signal Processing Methods for Radar

- WAb-7.1: Deep CNN for Extraction of Sidelobes from SAR Imagery in Spectrally2044
Restricted Environment
Lam Nguyen, US Army Research Laboratory, United States; Trac Tran, Johns Hopkins University, United States
- WAb-7.3: Reduced PMEPR Multicarrier Radar Waveform Design2048
Salil Sharma, Marian Bica, Visa Koivunen, Aalto University, Finland

WAb-8: Neural Signal Processing

- WAb-8.1: Enhanced Classification of Individual Finger Movements with ECoG2063
Lin Yao, Mahsa Shoaran, Cornell University, United States
- WAb-8.3: Block-Sparse Modeling for Compressed Sensing of Neural Action Potentials and2097
Local Field Potentials
Wenfeng Zhao, Tong Wu, Jian Xu, Qi Zhao, Zhi Yang, University of Minnesota, Twin-Cities, United States
- WAb-8.4: Emotional Valence Tracking and Classification via State-Space Analysis of Facial2116
Electromyography
Taruna Yadav, Md Moin Uddin Atique, Hamid Fekri Azgomi, Joseph T. Francis, Rose T. Faghieh, University of Houston, United States
- WAb-8.5: Emotion Discrimination Through Electrode Network Connectivity Pattern2139
Recognition
Qi Cheng, Alan Kaplan, Piyush Karande, Lawrence Livermore National Lab, United States; Maryam Bijanzadeh, Heather Dawes, Edward Chang, University of California, San Francisco, United States
- WAb-8.6: Head Harmonics Based EEG Dipole Source Localization2149
Amrita Giri, Lalan Kumar, Tapan Gandhi, Indian Institute of Technology, India

WAb-8.7: Reduced-Rank Beamforming for Brain Source Localization in Presence of High Background Activity	2166
<i>Eduardo Jiménez-Cruz, David Gutiérrez, Center for Research and Advanced Studies, Mexico</i>	
WAb-8.8: A 2.5D YOLO-Based Fusion Algorithm for 3D Localization of Cells	2185
<i>Amir Ziabari, Derek C. Rose, Oak Ridge National Laboratory, United States; Matthew Eicholtz, Florida Southern College, United States; David Solecki, Abbas Shirinifard, St. Jude Children's Research Hospital, United States</i>	
WAb-8.9: Predicting Tasks from Task-fMRI using Blind Source Separation	2201
<i>Bhaskar Sen, Keshab Parhi, University of Minnesota, United States</i>	
WAb-8: Machine Learning	
WAb-8.1: Deep Kernel Coherence Encoder	2067
<i>Haitao Liu, Randy Paffenroth, Worcester Polytechnic Institute, United States; Louis Scharf, Colorado State University, United States; Fangzheng Sun, Worcester Polytechnic Institute, United States</i>	
WAb-8.2: Global Optimization of Graph Filters with Multiple Shift Matrices.....	2082
<i>Jie Fan, Cihan Tepedelenlioglu, Andreas Spanias, Arizona State University, United States</i>	
WAb-8.3: Simple Iterative Algorithms for Approximate and Bounded Parameter Orthonormality	2101
<i>Scott Douglas, Southern Methodist University, United States</i>	
WAb-8.4: Critical Points to Determine Persistence Homology	2121
<i>Charmin Asirimath, University of Oulu, Finland; Jayampathy Ratnayake, University of Colombo, Sri Lanka; Chathuranga Weeraddana, University of Moratuwa, Sri Lanka; Nandana Rajatheva, University of Oulu, Finland</i>	
WAb-8.5: Machine Learning Bluetooth Profile Operation Verification via Monitoring the Transmission Pattern	2144
<i>Abdelrahman Elkanishy, Abdel-Hameed Badawy, Paul Furth, Laura Boucheron, New Mexico State University, United States; Christopher Michaely, Sandia National Laboratories, United States</i>	
WAb-8.6: Multi-Message Gradient Coding for Utilizing Non-Persistent Stragglers	2154
<i>Lev Tauz, Lara Dolecek, University of California, Los Angeles, United States</i>	
WAb-8.7: Distributed Sub-gradient Algorithms with Limited Communications	2171
<i>Stefano Rini, National Chiao Tung University, Taiwan; Milind Rao, Andrea Goldsmith, Stanford University, United States</i>	
WAb-8.8: Network Dissensus via Distributed ADMM	2191
<i>Chirag Kumar, Ketan Rajawat, IIT Kanpur, India</i>	
WAb-8.9: Joint Concordance Index.....	2206
<i>Kartik Ahuja, Mihaela van der Schaar, University of California, Los Angeles, United States</i>	
WAb-8.10: PT-MMD: A Novel Statistical Framework for the Evaluation of Generative Systems	2219
<i>Alexander Potapov, Ian Colbert, Alexander Cloninger, Ken Kreutz-Delgado, Srinjoy Das, University of California, San Diego, United States</i>	
WAb-8: Detection and Estimation Algorithms	
WAb-8.1: Joint Detection in Massive Overloaded Wireless Systems via Mixed-Norm Discrete Vector Decoding	2058
<i>Hiroki Iimori, Giuseppe Abreu, Jacobs University Bremen, Germany; David González G., Osvaldo Gonsa, Continental Teves AG & Co. oHG, Germany</i>	
WAb-8.2: Channel Estimation for Massive MIMO: A Semiblind Algorithm Exploiting QAM Structure	2077
<i>Baki Berkay Yilmaz, Georgia Institute of Technology, United States; Alper Tunga Erdogan, Koc University, Turkey</i>	
WAb-8.3: Non-Coherent Multi-User Detection Based on Expectation Propagation	2092
<i>Khac-Hoang Ngo, Maxime Guillaud, Alexis Decurninge, Huawei Technologies France, Paris Research Center, France; Sheng Yang, Laboratory of Signals and Systems, CentraleSupélec, France; Subrata Sarkar, Philip Schniter, Ohio State University, France</i>	
WAb-8.4: Adaptive Activity-Aware Constellation List-Based Decision Feedback Detection for Massive Machine-Type Communications	2111
<i>Roberto Di Renna, Rodrigo de Lamare, Pontifical Catholic University of Rio de Janeiro, Brazil</i>	

WAb-8.5: Channel Estimation for Filtered OFDM Transceiver Systems.....	2132
<i>Ali Baghaki, Benoit Champagne, McGill University, Canada</i>	
WAb-8.8: Variational Bayesian Inference Based Soft-Symbol Decoding for Uplink Massive MIMO Systems with Low Resolution ADCs	2180
<i>Sai Subramanyam Thoota, Chandra Ramabhadra Murthy, Indian Institute of Science, India</i>	
WAb-8.9: Diversity Combining Techniques for FD AF MIMO Relays	2196
<i>Geeta Sankar Kalyan Jonnalagadda, Litepoint Corporation, United States; Xiaofeng Li, Cihan Tepedelenlioglu, Arizona State University, United States</i>	
WAb-8.10: Cloud-Aided Max-Link Relay Selection for Two-Way Cooperative Multi-Antenna Systems	2214
<i>Flavio Duarte, Rodrigo De Lamare, Pontifical Catholic University of Rio de Janeiro, Brazil</i>	
WAb-8: Deep Learning	
WAb-8.1: Counting Lattice Points in the Sphere using Deep Neural Networks	2053
<i>Aymen Askri, Ghaya Rekaya-Ben Othman, Hadi Ghauch, Télécom ParisTech, France</i>	
WAb-8.2: DSP-Inspired Deep Learning: A Case Study using Ramanujan Subspaces	2072
<i>Srikanth Tenneti, Amazon Web Services, United States; P. P. Vaidyanathan, California Institute of Technology, United States</i>	
WAb-8.3: MEDA: Multi-Output Encoder-Decoder for Spatial Attention in Convolutional Neural Networks	2087
<i>Huayu Li, Abolfazl Razi, Northern Arizona University, United States</i>	
WAb-8.4: Loss Functions Forcing Cluster Separations for Multi-Class Classification using Deep Neural Networks	2106
<i>Li Li, Milos Doroslovacki, Murray Loew, George Washington University, United States</i>	
WAb-8.5: Learning Structured Signals using GANs with Applications in Denoising and Demixing	2127
<i>Mohammadreza Soltani, Iowa State university, United States; Chinmay Hegde, Iowa State University, United States</i>	
WAb-8.7: Wave equation extraction from a video using sparse modeling	2160
<i>Ruixian Liu, Michael Bianco, Peter Gerstoft, University of California, San Diego, United States</i>	
WAb-8.8: The Autoencoder-Kalman Filter: Theory and Practice	2176
<i>Matthew Weiss, Worcester Polytechnic Institute, United States; Joshua Uzarski, Natick Solider Research, Development and Engineering, United States; Randy Paffenroth, Worcester Polytechnic Institute, United States</i>	