



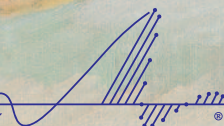
Kalamata '18

**19th IEEE INTERNATIONAL WORKSHOP
ON SIGNAL PROCESSING ADVANCES
IN WIRELESS COMMUNICATIONS**
www.spawc2018.org


**June 25-28, 2018
KALAMATA GREECE**

**FINAL
PROGRAM
GUIDE**

IEEE
Signal Processing Society



PROGRAM AT A GLANCE

Monday June 25		Tuesday June 26		Wednesday June 27		Thursday June 28	
 <p>IEEE SPAWC 2018 Kalamata, Greece</p> <p>Program-at-a-glance</p>	<p>8:30-9:00 Conference Kickoff 5G Plenary Tassilas</p>	<p>6:30-7:30 SPAWC Women Privacy Plenary Wagner</p>	<p>09:00-10:30 Poster Sessions Regular: TA-R1, TA-R2 Special: TA-S1, TA-S2, TA-S3</p>	<p>09:00-10:30 Poster Sessions Regular: THA-R1, THA-R2, THA-R3 Special: THA-S1, THA-S2, THA-S3</p>			
	<p>10:00-10:30 Coffee Break</p>	<p>10:00-10:20 Coffee Break</p>	<p>10:20-11:30 Poster Sessions Regular: WA-R1, WA-R2 Special: WA-S1, WA-S2</p>	<p>10:30-11:50 Poster Sessions Regular: TA-R1, TA-R2 Special: TA-S1, TA-S2, TA-S3</p>	<p>10:30-11:00 Coffee Break</p>		
<p>12:00-13:00 Oral Thematic Session, 5G</p>	<p>12:40-13:50 Lunch</p>	<p>11:40-12:40 Oral Thematic Session, Privacy</p>	<p>11:00-12:30 Poster Sessions Regular: THA-R4, THA-R5 Special: THA-S4, THA-S5, THA-S6, THA-S7</p>				
<p>13:00-14:30 Lunch</p>	<p>13:50-14:50 Bio Plenary Milenkovic</p>	<p>12:40-13:50 Lunch</p>					
<p>14:30-15:50 Poster Sessions Regular: TP-R1, TP-R2, TP-R3 Special: TP-S1, TP-S2</p>	<p>14:50-15:10 Industrial Keynote</p>	<p>15:10-16:00 Industrial Panel</p>					
<p>16:00-17:00 Data Analytics Plenary Willert</p>	<p>16:00-16:20 Coffee Break</p>	<p>16:20-17:20 Oral Thematic Session, Bio</p>					
<p>17:00-17:30 Coffee Break</p>	<p>17:30-18:30 Poster Sessions Regular: WP-R1, WP-R2 Special: WP-S1, WP-S2</p>	<p>17:30-18:30 Poster Sessions</p>					
<p>17:30-18:30 Oral Thematic Session, Data Analytics</p>	<p>20:00-21:00 T. Tassios "Technology in Ancient Greece" @ Filoxenia Hotel</p>	<p>15:00-23:00 Trip to Mani (optional)</p>					
<p>18:30-22:00 Trip to Ancient Messene (optional)</p>	<p>21:00-24:00 Banquet @ Filoxenia Hotel</p>						
<p>19:30 Buses depart from Elite Hotel</p>							
<p>20:00-23:00 Welcome Reception @ Messinian Bay Hotel Almyros-Verga</p>							

All technical activities at IEEE SPAWC 2018 take place in the Elite Blue Conference Center, with posters on the First floor and all presentations and talks on the Ground floor.

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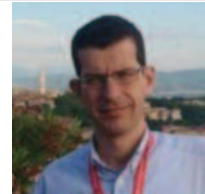
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WELCOME FROM THE CHAIRS

Dear SPAWC 2018 Participants:

On behalf of the organizing committee, it is our pleasure to extend our warmest welcome to all of you to the 19th IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC) in Kalamata, Greece, June 25-28, 2018.

SPAWC, the flagship workshop of the Signal Processing for Wireless Communications and Networking Technical Committee (SPCOM-TC) of the IEEE Signal Processing Society, brings together researchers in signal processing, wireless communications, information theory, optimization and networking from both academia and industry, and provides them the opportunity to interact and exchange ideas in a relaxed setting.

This year we have several innovations. First, we selected themes on emerging research areas around which we have focused our technical program. SPAWC 2018 centers on: (i) machine learning and data analytics, (ii) secure & adversarial systems, (iii) biological communications and signal processing, and (iv) 5G and beyond. As such, we are able to immerse our attendees in these topics at varying degrees of detail. For each theme, we have a plenary talk as well as one invited poster session. We have an excellent set of plenary speakers and we thank them for their participation: Olgica Milenkovic, Rebecca Willett, Leandros Tassioulas, and Aaron Wagner. A second innovation for the SPAWC technical program is the introduction of oral thematic talks. Each of this year's four themes has three invited speakers who will provide additional depth to these emerging topics. The technical program also includes other invited as well as contributed poster sessions. We are also happy to announce two complimentary tutorials and we look forward to engaging tutorial presentations by Lajos Hanzo on quantum signal processing and communications, and Giuseppe Caire on caching in wireless networks.

Another innovative component of SPAWC 2018 is its featured industrial program, which is meant to explore the synergies between the workshop's thematic areas and the needs and upcoming opportunities of local and international industry, with focus on wireless and digital technologies. The industrial program will start with a keynote by Gregory Yvanof, Managing Director of the Strategis Maritime Center of Excellence of Greece, on the role of digital technologies-based innovation for the shipping sector, which is currently undergoing a rapid technological transformation. An industrial panel consisting of leading technology experts representing major industrial players and academic innovation centers will follow, who will discuss the role of signal processing and communication techniques in the shaping of next generation networks. An outreach component to the Kalamata public has also been added, via a special talk, delivered by Engineering Professor and Philosopher Theodosios Tassios on the topic Technology in Ancient Greece.

This year's SPAWC will also feature a conference exhibition, consisting of a number of wireless testbed-based demos. The demos are contributed by academic / industrial research teams and are intended to showcase some advanced / emerging wireless technologies and components related to the workshop's themes.

In terms of statistics, SPAWC 2018 received a record number of 281 paper submissions and, at print time, has more than 250 registered attendees. Of the 50 papers which were eligible for the student paper award, six students were selected as finalists. We would like to acknowledge the many people who contributed to the success of the program. In particular, we would like to thank the 62 members of the technical program committee as well as the numerous ad hoc reviewers for their thoughtful reviews, our plenary speakers, our thematic speakers, our tutorial speakers, our special session organizers, and all the authors who selected SPAWC 2018 for presentation of their research work. With acceptance rate of 54% for the contributed papers, we are very pleased with the quality of the technical program.

We are also grateful for the work the organizing committee members put in, especially TPC co-chairs, Urbashi Mitra and Waheed Bajwa, special session chair, Rick Brown, plenaries chair, Qing Zhao, tutorials chair, Ioannis Krikidis, publicity chair, Eleftherios Kofidis, publications chair, Angeliki Alexiou, student program and travel grants chair, Piya Pal, and industry liaisons co-chairs, Marios Kountouris and Yupeng Liu. We would also like to acknowledge the help of IEEE staff Nicole Allen, and Albina Gegaj of Triaena.

We are also indebted to our sponsors for their important contributions which made the featured program possible, in particular, the National Science Foundation and Huawei, SPAWC's Gold sponsors, and our Silver sponsors Nokia, Intralot and Navarino. We also thank local businesses Agrovim, Epikouros, Papadimitriou, Inomessiniaki Winery, AΓAN Greektomato, ΑΦΟΙ Ι. ΛΑΜΠΟΥ and Callicounis Distilleries for sponsoring gifts for the SPAWC attendees. Special thanks are also due to the Municipality of Kalamata for its in kind contribution to the Welcome reception.

Kalamata, a city with rich history and abundant natural beauty aspires to become the backdrop for an unforgettable SPAWC experience, full of scientific treasures and human connections. We hope that you will take the opportunity to explore the city and surrounding areas.

Several locals were very excited about this conference and contributed to its success by connecting us with the right people. We are grateful to them, in particular, to Mr. Nikos Zervis, Dr. Haralampia Boleti, Mr. Konstantinos A. Petropoulos, Konstantinos Adamopoulos, and Kalamata Mayor Panagiotis Nikas and his office staff. We are very excited to welcome you in Kalamata and wish you a memorable workshop!

Athina Petropulu and Constantinos B. Papadias

General Co-Chairs

PLENARIES



Olga Milenkovic

The helix vault: Storing information in DNA macromolecules

DNA is used in countless applications that range from medical testing, forensics sciences, and population migration studies to diet and online dating recommenders. The simple to describe yet complex to understand DNA winding staircase sequences have deeply penetrated popular imagination, but very few have ever contemplated the use of DNA molecules as a solution for current data storage problems. It is hard to imagine DNA as a storage medium that can replace flash or hard disks, yet the last five years have shown that molecular storage is a completely viable, although costly, technology. We review the basics of writing information in DNA, reading and randomly accessing specific content in DNA, and then proceed to describe several system implementations and accompanying coding and signal processing methods. We also outline ongoing efforts to combine DNA storage with molecular computing, construct in memory image processing platforms, and merge DNA and synthetic polymers for increased storage capacity.

Olga Milenkovic is a professor of Electrical and Computer Engineering at the University of Illinois, Urbana-Champaign (UIUC), and Research Professor at the Coordinated Science Laboratory. She obtained her Master's Degree in Mathematics in 2001 and PhD in Electrical Engineering in 2002, both from the University of Michigan, Ann Arbor. Prof. Milenkovic heads a group focused on addressing unique interdisciplinary research challenges spanning the areas of algorithm design and computing, bioinformatics, coding theory, machine learning and signal processing. Her scholarly contributions have been recognized by multiple awards, including the NSF Faculty Early Career Development (CAREER) Award, the DARPA Young Faculty Award, the Dean's Excellence in Research Award, and several best paper awards. In 2013, she was elected a UIUC Center for Advanced Study Associate and Willett Scholar. In 2015, she became Distinguished Lecturer of the Information Theory Society. From 2007 until now, she has served as Associate Editor of the IEEE Transactions of Communications, the IEEE Transactions on Signal Processing, the IEEE Transactions on Information Theory and the IEEE Transactions on Molecular, Biological and Multi-Scale Communications. In 2009, she was the Guest Editor in Chief of a special issue of the IEEE Transactions on Information Theory on Molecular Biology and Neuroscience.



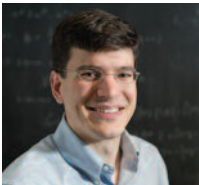
Leandros Tassioulas

Research challenges towards the 5th generation of wireless mobile networks

The next generation of wireless mobile networks is expected to provide connectivity services to a new suite of applications including augmented and virtual reality, tactile internet, driverless transportation, robotics, etc. Furthermore, the number of communicating devices is growing rapidly, as well as the amount of information exchanged. New types of service requirements are emerging like very low latency communication while at the same time computation and data storage/access move closer to the edge from the backend cloud. To meet these challenges, innovations are expected at all levels starting from device and physical layer to network and system level. In this presentation, we will concentrate on advances at the higher layers. Softwarization of network functionality is a key enabler for virtualizing network resources to provide flexible connectivity services. We will present our recent results on the controller placement of software defined wireless networks, including optimal controller replication strategies at the wireless mobile network periphery. Then we will focus on the issue of information availability and how to increase it. We will present our recent results on innovative caching approaches at the network edge that (i) leverage the broadcast nature of the wireless medium to

serve concurrent requests for content and (ii) exploit the regularity of user mobility patterns to prefetch information at the base stations that are likely to be accessed. Finally, we will present a framework and associated mechanisms that facilitate exchange of resources among the constituents of a 5G ecosystem such that service virtualization is achieved while reciprocity is ensured among the participants.

Leandros Tassiulas is the John C. Malone Professor of Electrical Engineering at Yale University. His research interests are in the field of computer and communication networks with emphasis on fundamental mathematical models and algorithms of complex networks, architectures and protocols of wireless systems, sensor networks, novel internet architectures and experimental platforms for network research. His most notable contributions include the max-weight scheduling algorithm and the back-pressure network control policy, opportunistic scheduling in wireless, the maximum lifetime approach for wireless network energy management, and the consideration of joint access control and antenna transmission management in multiple antenna wireless systems. Dr. Tassiulas is a Fellow of IEEE (2007). His research has been recognized by several awards including the IEEE Koji Kobayashi computer and communications award (2016), the inaugural INFOCOM 2007 Achievement Award «for fundamental contributions to resource allocation in communication networks,» several best paper awards including the INFOCOM 1994, 2017 and Mobihoc 2016, a National Science Foundation (NSF) Research Initiation Award (1992), an NSF CAREER Award (1995), an Office of Naval Research Young Investigator Award (1997) and a Bodossaki Foundation award (1999). He holds a Ph.D. in Electrical Engineering from the University of Maryland, College Park (1991). He has held faculty positions at Polytechnic University, New York, University of Maryland, College Park, University of Ioannina and University of Thessaly, Greece.



Aaron Wagner

How to measure information leakage

How much information is «leaked» in a wiretap channel, or a side channel more generally? Despite decades of work on these channels, including the development of many sophisticated mitigation mechanisms for specific side channels, the fundamental question of how to measure the key quantity of interest - leakage - has received surprisingly little attention. Many metrics have been used in the literature but these metrics either lack a cogent operational justification or mislabel systems that are obviously insecure as secure. Mutual information, in particular, while often used as a leakage measure, does not have a clear operational interpretation in the context of side channels.

We propose a new metric called «maximal leakage,» defined as the logarithm of the multiplicative increase, upon observing the public data, of the probability of correctly guessing a randomized function of the private information, maximized over all such randomized functions. We provide an operational justification for this definition, show how it can be computed in near-closed form, and discuss how it relates to existing metrics, including mutual information, differential privacy, and a certain under-appreciated metric in the computer science literature. We also present a solution to Shannon's cipher system under this metric, which can be applied to design optimal side channel mitigation strategies. Among other findings, we show that mutual information underestimates leakage while local differential privacy overestimates it.

Aaron Wagner is an Associate Professor in the School of Electrical and Computer Engineering at Cornell University. He received the B.S. degree from the University of Michigan, Ann Arbor, and the M.S. and Ph.D. degrees from the University of California, Berkeley. During the 2005-2006 academic year, he was a Postdoctoral Research Associate in the Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign and a Visiting Assistant Professor in the School of Electrical and Computer Engineering at Cornell. He has received the NSF CAREER award, the David J. Sakrison Memorial Prize from the U.C. Berkeley EECS Dept., the Bernard Friedman Memorial Prize in Applied Mathematics from the U.C. Berkeley Dept. of

Mathematics, the James L. Massey Research and Teaching Award for Young Scholars from the IEEE Information Theory Society, and teaching awards at the Department, College, and University level at Cornell.

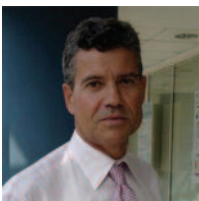


Rebecca Willett
Nonlinear Models for Matrix Completion

The past decade of research on matrix completion has shown it is possible to leverage linear dependencies to impute missing values in a low-rank matrix. However, the corresponding assumption that the data lies in or near a low-dimensional linear subspace is not always met in practice. Extending matrix completion theory and algorithms to exploit low-dimensional nonlinear structure in data will allow missing data imputation in a far richer class of problems. In this talk, I will describe several models of low-dimensional nonlinear structure and how these models can be used for matrix completion. In particular, we will explore matrix completion in the context of three different nonlinear models: single index models, in which a latent subspace model is transformed by a nonlinear mapping; unions of subspaces, in which data points lie in or near one of several subspaces; and nonlinear algebraic varieties, a polynomial generalization of classical linear subspaces. In these settings, we will explore novel and efficient algorithms for imputing missing values and new bounds on the amount of missing data that can be accurately imputed. The proposed algorithms are able to recover synthetically generated data up to predicted sample complexity bounds and outperform standard low-rank matrix completion in experiments with real recommender system and motion capture data.

Rebecca Willett is an Associate Professor of Electrical and Computer Engineering, Harvey D. Spangler Faculty Scholar, and Fellow of the Wisconsin Institutes for Discovery at the University of Wisconsin-Madison. She completed her PhD in Electrical and Computer Engineering at Rice University in 2005 and was an Assistant then tenured Associate Professor of Electrical and Computer Engineering at Duke University from 2005 to 2013. Willett received the National Science Foundation CAREER Award in 2007, is a member of the DARPA Computer Science Study Group, and received an Air Force Office of Scientific Research Young Investigator Program award in 2010. Willett has also held visiting researcher or faculty positions at the University of Nice in 2015, the Institute for Pure and Applied Mathematics at UCLA in 2004, the University of Wisconsin-Madison 2003-2005, the French National Institute for Research in Computer Science and Control (INRIA) in 2003, and the Applied Science Research and Development Laboratory at GE Healthcare in 2002.

INDUSTRIAL PROGRAM KEYNOTE



Gregory S. Yovanof
The Digital Transformation of the Shipping Industry

The transition to the Digital Age offers huge potential benefits for the shipping industry. Digital solutions based on new technologies such as 5G, Big Data analytics, AI, autonomous vessels and additive manufacturing, enable the shipping industry to accelerate innovation, improve processes, create value and attain sustainability in the new era. Digital Innovation Hubs and Clusters of Innovation have emerged as key instrumental mechanisms in shaping a regional strategy for smart, sustainable growth. Drawing on the global leadership of Greek Shipping, newly established maritime clusters in Greece help bolster shipping's role as a key growth engine of the Greek economy and propel it to become one of the leading powers in the Blue Economy.

Gregory S. Yovanof, Ph.D. is the Managing Director of «STRATEGIS - Maritime Center of Excellence» and a Professor of Innovation & Entrepreneurship at Athens Information Technology (AIT) in

Athens, Greece. His professional career includes a twenty-year tenure in the high tech industry in the greater Asia-Pacific region, where he worked at the Research Labs of Eastman Kodak and Hewlett-Packard. He has also led the development of several award-winning ICs for the DVD market as a co-founder and executive manager at two start-up companies in Silicon Valley. Dr. Yovanof has served as member of the Board of Hellas Online. He currently offers strategy consultancy services to a number of start-up companies and clusters of innovations in the ICT, Biotech and Maritime sectors.

THEMATIC TALKS

Theme: 5G Communications and Beyond



1. Giuseppe Caire

How to achieve massive MIMO gains in FDD systems

Massive MIMO is a powerful multiuser/multiantenna technology that exploits a very large number of antennas at the base station side and the knowledge of the channel matrix between base station antennas and multiple users in order to achieve large beamforming and multiplexing gain. Classical massive MIMO exploits Time-Division Duplexing (TDD) and channel reciprocity, such that the channel matrix can be learned at the base station from the incoming uplink pilot signals sent by the users. However, the large majority of cellular networks deployed today make use of Frequency Division Duplexing (FDD) where channel reciprocity does not hold and explicit downlink probing and uplink CSI feedback are required in order to achieve some spatial multiplexing gain. Unfortunately, the overhead incurred by explicit probing and feedback is very large in massive MIMO, since the channels are high-dimensional random vectors. In this paper, we present a new approach to achieve very competitive tradeoff between spatial multiplexing gain and probing/feedback overhead in FDD massive MIMO. Our approach is based on two novel concepts: 1) an efficient and mathematically rigorous technique to extrapolate the channel covariance matrix from the uplink to the downlink, such that the second order statistics of each downlink channel can be accurately learned for free from uplink pilots; 2) a novel "sparsifying precoding" approach, that introduces sparsity in the channel in a controlled form, such that for any assigned overhead (i.e., downlink pilot dimension) it is possible to set an optimal sparsity level for which the "effective" channels after sparsification can be estimated at the base station with low mean-square error. We compare our method with that of the state-of-the-art compressed sensing (CS) based method. Our results show that the proposed method is much more robust than compressed sensing methods, since it is able to "shape the channel sparsity" as desired, instead of being at the mercy of nature (i.e., at the mercy of the natural sparsity induced by the propagation environment).

Giuseppe Caire was born in Torino, Italy, in 1965. He received the B.Sc. in Electrical Engineering from Politecnico di Torino in 1990, the M.Sc. in Electrical Engineering from Princeton University in 1992 and the Ph.D. from Politecnico di Torino in 1994. He is currently an Alexander von Humboldt Professor with the Electrical Engineering and Computer Science Department of the Technical University of Berlin, Germany. He has served as Associate Editor for the IEEE Transactions on Communications and as Associate Editor for the IEEE Transactions on Information Theory. He received the Jack Neubauer Best System Paper Award from the IEEE Vehicular Technology Society in 2003, the IEEE Communications Society & Information Theory Society Joint Paper Award in 2004 and in 2011, the Okawa Research Award in 2006, the Alexander von Humboldt Professorship in 2014, and the Vodafone Innovation Prize in 2015. Giuseppe Caire is a Fellow of IEEE since 2005. He has served in the Board of Governors of the IEEE Information Theory Society from 2004

to 2007, and as officer from 2008 to 2013. He was President of the IEEE Information Theory Society in 2011. His main research interests are in the field of communications theory, information theory, channel and source coding, with particular focus on wireless communications.



2. Sundeep Rangan
Understanding channel dynamics in millimeter wave cellular

A critical challenge for wireless communications in the millimeter wave (mmWave) bands is blockage. MmWave signals suffer significant penetration losses from many common materials and objects, and small changes in the position of obstacles in the environment can cause large variations in the channel quality. This paper provides a measurement-based study of the effects of human blockage on an end-to-end application over a mmWave cellular link. A phased array system is used to measure the channel in multiple directions almost simultaneously in a realistic indoor scenario. The measurements are integrated into a detailed ns-3 simulation that models both the latest 3GPP New Radio beam search procedure as well as the internet protocol stack. The measurement-based simulation illustrates how recovery from blockage depends on the path diversity and beam search.

Sundeep Rangan received the B.A.Sc. from the University of Waterloo, Canada and the M.Sc. and Ph.D. degrees from the University of California, Berkeley, all in Electrical Engineering. In 2000, he co-founded (with four others) Flarion Technologies, a spin-off of Bell Labs that developed Flash OFDM, one of the first cellular OFDM data systems and pre-cursor to 4G systems including LTE and WiMAX. In 2006, Flarion was acquired by Qualcomm Technologies where Dr. Rangan was a Director of Engineering involved in OFDM infrastructure products. He joined the ECE department at NYU Tandon (formerly NYU Polytechnic) in 2010. He is a Fellow of the IEEE and Director of NYU WIRELESS, an academic-industry research center researching next-generation wireless systems. His research interests are in wireless communications, signal processing, information theory and control theory.



3. Anna Scaglione
Network inference and its application to the estimation of crowd dynamics from IoT sensors

In this paper, we explore the application of system identification techniques to the inference of the network dynamical model that characterizes crowd dynamics. We focus then on sensor observations of pedestrians' actions considering that wearables, smart mobile phones and other IoT devices embedded in the environment give significant insights on their expected mobility patterns. Most models for tracking mobility ignore the strong coupling between the model-agents as well as their surroundings while we capture in our problem the swarming behavior of the network, including both their social interactions and their interest in different sites in the environment. The model that captures the pedestrian dynamics is loosely based on the social force model proposed by Helbing and Molnar. This is used as a parametric system model that informs our network inference formulation.

Anna Scaglione is currently a professor in electrical and computer engineering at Arizona State University. Dr. Scaglione's expertise is in the broad area of statistical signal processing for communications, electric power systems and networks. Her current research focuses on studying and enabling decentralized learning and signal processing in networks of sensors. Dr. Scaglione is a fellow of IEEE. She served in the IEEE in many capacities, including as Associate Editor for the IEEE Transactions on Wireless Communications and on Signal Processing and Editor in Chief of the IEEE Signal Processing Letters. She was member of the Signal Processing Society Board of Governors from 2011 to 2014. She received the 2000 IEEE Signal Processing Transactions Best Paper Award

and more recently she was honored for the 2013 IEEE Donald G. Fink Prize Paper Award for the best review paper in that year in the IEEE publications. Her work with her student (Lin Li) earned the 2013 IEEE Signal Processing Society Young Author Best Paper Award.



Theme: Secure & Adversarial Systems

1. Camilla Hollanti

Analysis of some well-rounded lattices in wiretap channels

Recently, various criteria for constructing wiretap lattice coset codes have been proposed, most prominently the minimization of the so-called flatness factor. However, these criteria are not constructive per se. As explicit constructions, well-rounded lattices have been proposed as possible minimizers of the flatness factor, but no rigorous proof has been given. In this paper, we study various well-rounded lattices, including the best sphere packings, and analyze their shortest vector lengths, minimum product distances, and flatness factors, with the goal of acquiring a better understanding of the role of these invariants regarding secure communications. Simulations are carried out in dimensions four and eight, yielding the conclusion that the best sphere packing does not necessarily yield the best performance, not even when compared to other well-rounded lattices having the same superlattice. This motivates further study and construction of well-rounded lattices for physical layer security.

Camilla Hollanti received the M.Sc. and Ph.D. degrees from the University of Turku, Finland, in 2003 and 2009, respectively, both in pure mathematics. Since 2011, she has been with the Department of Mathematics and Systems Analysis at Aalto University, Finland, where she currently works as Associate Professor and leads a research group in Algebra, Number Theory, and Applications. She is also affiliated with the Institute of Advanced Studies at the Technical University of Munich, where she holds a 3-year Hans Fischer Fellowship. Dr. Hollanti is an editor of the *AIMS Journal on Advances in Mathematics of Communications*. She is a recipient of several grants, including five Academy of Finland grants in 2010-2016. In 2014, she received the World Cultural Council Special Recognition Award for young researchers, and in 2017 the Finnish Academy of Science and Letters awarded her the Väisälä Prize in Mathematics. Her research interests lie within applications of algebraic number theory to wireless communications and physical layer security, as well as in combinatorial and coding theoretic methods related to distributed storage systems.



2. Holger Boche

Foundation of physical layer security for message transmission and storage

In this survey we contrast the classical transmission theory of Shannon and the identification theory of Ahlswede and Dueck. We show that it may be useful to take a closer look at the recipient's goals. In identification theory, the recipient's goal is changed, thereby significantly increasing performance. Furthermore, there are further gains in the secure transmission of data. In this work we show the basic idea of the identification theory on the discrete memoryless channel. We review the results for robust and secure channels and jamming attacks. Furthermore, we give examples of applications. Very important for the practical application are also the analysis of the capacity function. It turns out that there may be places of discontinuity.

Holger Boche received the Dipl.-Ing. and Dr.-Ing. degrees in electrical engineering from the Technische Universität Dresden, Dresden, Germany, in 1990 and 1994, respectively. He graduated in mathematics from the Technische Universität Dresden in 1992. He received his Dr. rer. nat. degree in pure mathematics from the Technische Universität Berlin, Berlin, Germany, in 1998. Since October 2010 he has been with the Institute of Theoretical Information Technology and Full Professor at the Technische

Universität München (TUM), Munich, Germany. Since 2014 he has been a member and honorary fellow of the TUM Institute for Advanced Study, Munich, Germany. Prof. Boche is a Member of the IEEE Signal Processing Society SPCOM and SPTM Technical Committees and a fellow of the IEEE. He was elected a Member of the German Academy of Sciences (Leopoldina) in 2008 and of the Berlin Brandenburg Academy of Sciences and Humanities in 2009. He received the Research Award «Technische Kommunikation» from the Alcatel SEL Foundation in October 2003, the «Innovation Award» from the Vodafone Foundation in June 2006, and the Gottfried Wilhelm Leibniz Prize from the Deutsche Forschungsgemeinschaft (German Research Foundation) in 2008. He was co-recipient of the 2006 IEEE Signal Processing Society Best Paper Award and recipient of the 2007 IEEE Signal Processing Society Best Paper Award. He was the General Chair of the Symposium on Information Theoretic Approaches to Security and Privacy at IEEE GlobalSIP 2016. Among his publications is the recent book Information Theoretic Security and Privacy of Information Systems (Cambridge University Press).



3. Negar Kiyavash

Adversarial machine learning: The case of optimal attack strategies against recommendation systems

Learning with expert advice framework has drawn much attention in recent years especially in the context of recommendation systems. We consider two challenges that we face in broadly applying this framework in practice. One is the impact of adversarial attack strategies (malicious recommendations) and the other is lack of sufficient recommendation from quality experts (aka sleeping expert setting). In this paper, we discuss some recent results on understanding adversarial strategies and their effect on recommendation systems. In addition, in the sleeping expert setting, we discuss some novel designs for learning algorithms and the analysis of their convergence properties.

Negar Kiyavash is Willett Faculty Scholar at the University of Illinois and a joint Associate Professor of Industrial and Enterprise Engineering and Electrical and Computer Engineering. She is also affiliated with the Coordinated Science Laboratory (CSL) and the Information Trust Institute. She received her Ph.D. degree in electrical and computer engineering from the University of Illinois at Urbana-Champaign in 2006. Her research interests are in design and analysis of algorithms for network inference and security. She is a recipient of NSF CAREER and AFOSR YIP awards and the Illinois College of Engineering Dean's Award for Excellence in Research.



Theme: Machine Learning and Data Analytics

1. Georgios Giannakis

Online learning adaptive to dynamic and adversarial environments

The present contribution deals with online learning of functions, where multi-kernel approaches, among other popular methods, have well-documented merits but also face major challenges. Leveraging the random feature approximation, an online multi-kernel learning scheme is developed to infer the intended nonlinear function. To account for dynamic and possibly adversarial environments, an adaptive and scalable multi-kernel learning scheme is also introduced at affordable complexity and memory requirements. Performance guarantees are provided in terms of dynamic regret analysis, while numerical tests on a Twitter dataset are carried out to showcase the effectiveness of our approach.

Georgios B. Giannakis received his Diploma in Electrical Engineering from the National Technical University of Athens, Greece, 1981. From 1982 to 1986 he was with the Univ. of Southern California (USC), where he received his MSc. in Electrical Engineering, 1983, MSc. in Mathematics, 1986, and Ph.D. in Electrical Engineering, 1986. He was with the University of Virginia from 1987 to 1998, and

since 1999 he has been a professor with the Univ. of Minnesota, where he holds an Endowed Chair in Wireless Telecommunications, a University of Minnesota McKnight Presidential Chair in ECE, and serves as director of the Digital Technology Center. His general interests span the areas of communications, networking and statistical signal processing. His current research focuses on learning from Big Data, wireless cognitive radios, and network science with applications to social, brain, and power networks with renewables. He is the (co-) inventor of 32 patents issued, and the (co-) recipient of 9 best paper awards from the IEEE Signal Processing (SP) and Communications Societies, including the G. Marconi Prize Paper Award in Wireless Communications. He also received Technical Achievement Awards from the SP Society (2000), from EURASIP (2005), a Young Faculty Teaching Award, the G. W. Taylor Award for Distinguished Research from the University of Minnesota, and the IEEE Fourier Technical Field Award (2015). He is a Fellow of the IEEE and the EURASIP, and has served the IEEE in a number of posts, including that of a Distinguished Lecturer for the IEEE-SP Society.



2. Alfred O. Hero

Multi-layered networks

Many real-world complex systems can be described by a network structure, where a set of elementary units, e.g. human, gene, sensor, or other types of 'nodes' are connected by edges that represent dyadic relations, e.g., an observed interaction or an inferred dependence measured by correlation or mutual information. Such so-called relevance networks can be undirected or directed graphs depending on whether the relevance measure is symmetric or asymmetric. Often there are multiple ways that pairs of nodes might be related, e.g., by family ties, friendships, and professional connections in a social network. A multi-layer relevance network can be used to simultaneously capture these different types of relations. Dynamic relevance networks whose edges change over time are a type of multi-layer network, with each layer representing relations at a particular time instant. In this paper, we review and discuss multi-layer relevance network models in the context of relevance measures and node centrality for datasets with multivalent relations. We illustrate these models for dynamic gene regulatory networks and dynamic social networks.

Alfred O. Hero III is the John H. Holland Distinguished University Professor of Electrical Engineering and Computer Science and the R. Jamison and Betty Williams Professor of Engineering at the University of Michigan, Ann Arbor. He is also the Co-Director of the University's Michigan Institute for Data Science (MIDAS). His primary appointment is in the Department of Electrical Engineering and Computer Science and he also has appointments, by courtesy, in the Department of Biomedical Engineering and the Department of Statistics. He received the B.S. (summa cum laude) from Boston University (1980) and the Ph.D from Princeton University (1984), both in Electrical Engineering. He is a Fellow of the IEEE. He has served as President of the IEEE Signal Processing (SP) Society and as a member of the IEEE Board of Directors. He has received numerous awards for his scientific research and service to the profession including several best paper awards, the IEEE SP Society Technical Achievement Award in 2013 and the 2015 Society Award, which is the highest career award bestowed by the IEEE SP Society. He received a Rackham Distinguished Faculty Achievement Award in 2011 and the 2017 Stephen S. Attwood Excellence in Engineering Award, from the University of Michigan. Alfred Hero's recent research interests are in high dimensional spatio-temporal data, multimodal data integration, statistical signal processing, and machine learning. Of particular interest are applications to social networks, network security and forensics, computer vision, and personalized health.



3. Miguel Rodrigues

Multimodal image processing with coupled dictionary learning

In real-world scenarios, many data processing problems often involve heterogeneous images associated with different imaging modalities. Since these multimodal images originate from the same phenomenon, it is realistic to assume

that they share common attributes or characteristics. In this paper, we propose a multi-modal image processing framework based on coupled dictionary learning to capture similarities and disparities between different image modalities. In particular, our framework can capture favorable structure similarities across different image modalities such as edges, corners, and other elementary primitives in a learned sparse transform domain, instead of the original pixel domain, that can be used to improve a number of image processing tasks such as denoising, inpainting, or super-resolution. Practical experiments demonstrate that incorporating multimodal information using our framework brings notable benefits.

Miguel Rodrigues is a Reader in Information Theory and Processing with the Department of Electronic and Electrical Engineering, University College London, UK. He obtained his Licenciatura degree in Electrical and Computer Engineering from the University of Porto, Portugal and the Ph.D. in Electronic and Electrical Engineering from University College London, UK. Dr. Rodrigues' most relevant contributions have ranged from the information-theoretic analysis and design of communications systems, information-theoretic security, information-theoretic analysis and design of sensing systems, and, more recently, foundations of machine learning and deep learning problems. His work has also been honored with the IEEE Communications and Information Theory Societies Joint Paper Award 2011. Dr. Rodrigues is currently Co-Chairing the Conference on «Mathematics of Data: Structured Representations for Sensing, Approximation, and Learning» organized under the auspices of the Isaac Newton Institute for Mathematical Sciences programme on «Approximation, Sampling and Compression in Data Science». He serves as Associate Editor for the IEEE Communications Letters and he is co-editing (with Y. C. Eldar) a book on Information-Theoretic Methods in Data Science to be published by Cambridge University Press. Dr. Rodrigues has received the Prize Eng. Antonio de Almeida, Prize Eng. Cristiano Spratley, the Merit Prize from the University of Porto, Portugal, and fellowships from the Portuguese Foundation for Science and Technology as well as the Foundation Calouste Gulbenkian.

Theme: Signal Processing, Communications, and Biological Systems



1. Ioannis Kontoyiannis *Deep tree models for 'big' biological data*

The identification of useful temporal dependence structure in discrete time series data is an important component of algorithms applied to many tasks in statistical inference and machine learning, and used in a wide variety of problems across the spectrum of biological studies. Most of the early statistical approaches were ineffective in practice, because the amount of data required for reliable modelling grew exponentially with memory length. On the other hand, many of the more modern methodological approaches that make use of more flexible and parsimonious models result in algorithms that do not scale well and are computationally ineffective for larger data sets. In this paper we describe a class of novel methodological tools for effective Bayesian inference for general discrete time series, motivated primarily by questions regarding data originating from studies in genetics and neuroscience. Our starting point is the development of a rich class of Bayesian hierarchical models for variable-memory Markov chains. The particular prior structure we adopt makes it possible to design effective, linear-time algorithms that can compute most of the important features of the relevant posterior and predictive distributions without resorting to Markov chain Monte Carlo simulation. The origin of some of these algorithms can be traced to the family of Context Tree Weighting (CTW) algorithms developed for data compression since the mid-1990s. We have used the resulting methodological tools in numerous application-specific tasks (including prediction, segmentation, classification, anomaly detection, entropy estimation, and causality testing) on data from different areas of application. The results obtained compare quite favourably with those obtained using earlier approaches, such as Probabilistic Suffix Trees (PST), Variable-Length Markov Chains (VLMC), and the class of Markov Transition Distributions (MTD).

Ioannis Kontoyiannis received the B.Sc. degree in mathematics in 1992 from Imperial College London, UK, and in 1993 he obtained a distinction in Part III of the Cambridge University Pure Mathematics Tripos. In 1997 he received the M.S. degree in statistics and in 1998 the Ph.D. degree in electrical engineering, both from Stanford University. Since 2005 he has been with the Department of Informatics of the Athens University of Economics and Business, where he is currently a Professor. In January 2018 he joined the Information Engineering Division of the University of Cambridge, as Professor of Information and Communications. He has received a number of distinctions including the Manning endowed assistant professorship, a Sloan Foundation Research Fellowship, an honorary Master of Arts Degree Ad Eundem by Brown University, and a two-year Marie Curie Fellowship. He is a Fellow of the IEEE. He has served on the editorial board of the American Mathematical Society's Quarterly of Applied Mathematics journal, the IEEE Transactions on Information Theory, Springer-Verlag's Acta Applicandae Mathematicae, Springer-Verlag's Lecture Notes in Mathematics book series, and the online journal Entropy. He also served a short term as Editor-in-Chief of the IEEE Transactions on Information Theory. His research interests include data compression, applied probability, information theory, statistics, and mathematical biology.



2. Robert Schober

Experimental molecular communication testbed based on magnetic nanoparticles in duct flow

Simple and easy to implement testbeds are needed to further advance molecular communication research. To this end, this paper presents an in-vessel molecular communication testbed using magnetic nanoparticles dispersed in an aqueous suspension as they are also used for drug targeting in biotechnology. The transmitter is realized by an electronic pump for injection via a Y-connector. A second pump provides a background flow for signal propagation. For signal reception, we employ a susceptometer, an electronic device including a coil, where the magnetic particles move through and generate an electrical signal. We present experimental results for the transmission of a binary sequence and the system response following a single injection. For this flow-driven particle transport, we propose a simple parameterized mathematical model for evaluating the system response.

Robert Schober received the Diplom (Univ.) and the Ph.D. degrees in electrical engineering from the Friedrich-Alexander-University of Erlangen-Nuremberg (FAU), Germany, in 1997 and 2000, respectively. Since January 2012 he is an Alexander von Humboldt Professor and the Chair for Digital Communication at FAU. Dr. Schober received several awards for his work including the 2002 Heinz Maier-Leibnitz Award of the German Science Foundation (DFG), the 2004 Innovations Award of the Vodafone Foundation for Research in Mobile Communications, the 2006 UBC Killam Research Prize, the 2007 Wilhelm Friedrich Bessel Research Award of the Alexander von Humboldt Foundation, the 2008 Charles McDowell Award for Excellence in Research from UBC, a 2011 Alexander von Humboldt Professorship, a 2012 NSERC E.W.R. Stacie Fellowship, and a 2017 Wireless Communications Recognition Award. Furthermore, he has been listed as a 2017 Highly Cited Researcher by Clarivate Analytics. He is a Fellow of the Canadian Academy of Engineering, a Fellow of the Engineering Institute of Canada, and a Fellow of the IEEE. From 2012 to 2015, he served as Editor-in-Chief of the IEEE Transactions on Communications. Currently, he is the Chair of the Steering Committee of the IEEE Transactions on Molecular, Biological and Multiscale Communication and serves on the Editorial Board of the Proceedings of the IEEE. Furthermore, he is a Member at Large of the Board of Governors and a Distinguished Lecturer of the IEEE Communications Society. His research interests fall into the broad areas of Communication Theory, Wireless Communications, and Statistical Signal Processing.



3. Andrea Goldsmith

Capacity limits and design principles of molecular communication systems

We consider molecular communication systems and show it is possible to train detectors without any knowledge of the underlying channel models. In particular, we demonstrate that a technique we previously developed, which is called sliding bidirectional recurrent neural network (SBRNN), performs well for a wide range of channel states when it is trained using a dataset that contains many sample transmissions under various channel conditions. We also demonstrate that the bit error rate (BER) performance of the proposed SBRNN detector is better than that of a Viterbi detector (VD) with imperfect channel state information (CSI) and it is computationally efficient.

Andrea Goldsmith is the Stephen Harris professor in the School of Engineering and a professor of Electrical Engineering at Stanford University. She co-founded and served as Chief Technical Officer of Plume WiFi and of Quantenna (QTNA) and she currently serves on the Corporate or Technical Advisory Boards of Crown Castle Inc. (CCI), Interdigital Corp. (IDCC), Sequans (SQNS), Quantenna (QTNA) and Cohere. She has also held industry positions at Maxim Technologies, Memorylink Corporation, and AT&T Bell Laboratories. Dr. Goldsmith is a member of the National Academy of Engineering and the American Academy of Arts and Sciences, a Fellow of the IEEE and of Stanford, and has received several awards for her work, including the IEEE ComSoc Edwin H. Armstrong Achievement Award as well as Technical Achievement Awards in Communications Theory and in Wireless Communications, the National Academy of Engineering Gilbreth Lecture Award, the IEEE ComSoc and Information Theory Society Joint Paper Award, the IEEE ComSoc Best Tutorial Paper Award, the Alfred P. Sloan Fellowship, the WICE Technical Achievement Award, and the Silicon Valley/San Jose Business Journal's Women of Influence Award. She is author of the book *Wireless Communications* and co-author of the books *MIMO Wireless Communications* and *Principles of Cognitive Radio*, all published by Cambridge University Press, as well as an inventor on 28 patents. Her research interests are in information theory and communication theory, and their application to wireless communications and related fields. She received the B.S., M.S. and Ph.D. degrees in Electrical Engineering from U.C. Berkeley.

TUTORIALS



Tutorial 1: *On the Marriage of Quantum Signal Processing and Communications*

Presenter: Lajos Hanzo

The marriage of ever-more sophisticated signal processing and wireless communications has led to compelling 'tele-presence' solutions - at the touch of a dialing key... However, the 'quantum' leaps both in digital signal processing theory and in its nano-scale based implementation is set to depart from classical physics obeying the well-understood laws revealed by science. We embark on a journey into the weird and wonderful world of quantum physics, where the traveler has to obey the sometimes strange new rules of the quantum world. Hence we ask the judicious question: can the marriage of applied signal processing and communications be extended beyond the classical world into the quantum world? The quest for quantum-domain communication solutions was inspired by Feynman's revolutionary idea in 1985: information-bearing bits can be mapped to particles such as photons or to the spin as well as to the charge of electrons for encoding, processing and delivering information. Against the backdrop of numerous open research questions, this presentation will explore some of the topical problems both in quantum computing-aided as well as in quantum-domain signal processing and communications.

For example, in the *quantum computing-aided* category of wireless communications, we often encounter large-scale search problems, some of which may be efficiently solved with the aid of either bio-inspired random guided algorithms or by quantum-search techniques. These quantum-search algorithms are potentially capable of searching through an N -element search space with the aid of \sqrt{N} cost-function evaluations. Commencing with a brief historical perspective, a variety of efficient quantum-assisted solutions will be exemplified. By contrast, in the *quantum world*, the quantum channel may simply be constituted by the deleterious effects of the environmental perturbations corrupting the super-imposed quantum-state of particles representing the quantum-bits. In a philosophical - rather than engineering - context, this may be deemed reminiscent of the Brownian motion of electrons in a 'Gaussian channel' corrupting the classic information bits. Hence we will also discuss how the isomorphism of classic and quantum codes may be exploited for mitigating the hostile effects of quantum-decoherence, which results in quantum-bit flips.

Lajos Hanzo (FEng, FIEEE, FIET, RS Wolfson Fellow) received his 5-year Master degree in electronics from the Technical University of Budapest in 1976, his doctorate in 1983 and his Doctor of Sciences (DSc) degree in 2004. During his career in telecommunications he has held various research and academic posts in Hungary, Germany and the UK. Since 1986 he has been with the School of ECS, University of Southampton, UK, where he holds the Chair in Telecommunications. His current research interests are featured at <http://www-mobile.ecs.soton.ac.uk>.



Tutorial 2: Modern Trends in Caching for Wireless Networks **Presenter: Giuseppe Caire**

Caching at the wireless edge has gained a lot of traction in the research community, although it is still at its infancy in terms of applications and products. This tutorial is an attempt to present the recent research in information theory, network coding, and wireless communications, related to caching. In particular, we shall depart from the traditional approach of "dynamic caching policy" and "hit rate maximization", and focus on the stream of relatively recent papers that have characterized exact capacity and throughput scaling laws for an idealized scenario where the content library is fixed, the cache placement is performed a priori, and the goal consists of delivering the user requests in the shortest possible time. While this framework is clearly an over-simplification, it yields surprisingly clean and elegant optimality results for several network topologies and it is practically motivated by modern on-demand media delivery (streaming), where library and caches update and actual content transmission occur at very different time scales. A special emphasis shall be given to the interplay of edge-caching and physical layer schemes.

Giuseppe Caire (FIEEE) was born in Torino, Italy, in 1965. He received the B.Sc. in Electrical Engineering from Politecnico di Torino (Italy) in 1990, the M.Sc. in Electrical Engineering from Princeton University in 1992 and the Ph.D. from Politecnico di Torino in 1994. He is currently an Alexander von Humboldt Professor with the Electrical Engineering and Computer Science Department of the Technical University of Berlin, Germany. He has served as Associate Editor for the IEEE Transactions on Communications and the IEEE Transactions on Information Theory. He received the Jack Neubauer Best System Paper Award from the IEEE Vehicular Technology Society in 2003, the IEEE Communications Society & Information Theory Society Joint Paper Award in 2004 and in 2011, the Okawa Research Award in 2006, the Alexander von Humboldt Professorship in 2014, and the Vodafone Innovation Prize in 2015. Giuseppe Caire is a Fellow of IEEE since 2005. He has served in the Board of Governors of the IEEE Information Theory Society from 2004 to 2007, and as officer from 2008 to 2013. He was President of the IEEE Information Theory Society in 2011. His main research interests are in the field of communications theory, information theory, channel and source coding with particular focus on wireless communications.

SPECIAL SESSIONS

- Special Session 1:** **Information Theoretic Approaches for Security**
Organizer: **Lifeng Lai**, *UC Davis, USA*
- Special Session 2:** **Machine Learning and Signal Processing over Graphs and Networks**
Organizers: **Sergios Theodoridis**, *University of Athens, Greece*
Kostas Berberidis, *University of Patras, Greece*
- Special Session 3:** **Stochastic Modelling of Delay-Tolerant Networks**
Organizers: **Stavros Toumpis** and **Ioannis Kontoyiannis**,
Athens University of Economics and Business, Greece
- Special Session 4:** **Machine Learning for Wireless Communications**
Organizers: **Nikos Sidiropoulos**, *University of Virginia, USA*
Mingi Hong, *University of Minnesota, USA*
Xiao Fu, *Oregon State University, USA*
- Special Session 5:** **Age of Information**
Organizers: **Roy Yates**, *Rutgers University, USA*
Tony Ephremides, *University of Maryland, USA*
- Special Session 6:** **Biological Signal Processing and Communications for the Internet of Bio-Nano Things**
Organizer: **Max Pierobon**, *University of Nebraska-Lincoln, USA*
- Special Session 7:** **Millimeter Wireless Systems**
Organizers: **Akbar Sayeed**, *University of Wisconsin-Madison, USA*
Tommy Svensson, *Chalmers University of Technology, Sweden*
Nuria Gonzalez Prelcic, *University of Vigo, Spain*
- Special Session 8:** **Spectrum Sharing and Co-Existence**
Organizer: **Visa Koivunen**, *Aalto University, Finland*
- Special Session 9:** **Low Latency Communications in Cooperative Networks**
Organizers: **Themistoklis Charalambous**, *Aalto University, Finland*
Nikolaos Pappas, *Linköping University, Sweden*
Nikolaos Nomikos, *University of the Aegean, Greece*
- Special Session 10:** **Rate-Splitting in Wireless Networks: Bridging the Extremes of Fully Decode Interference and Treat Interference as Noise**
Organizers: **Bruno Clerckx**, *Imperial College London, UK*
Eduard Jorswieck, *Dresden University of Technology, Germany*

- Special Session 11: Wireless Information and Power Transmission: RF, Signal and System Design**
Organizers: **Bruno Clerckx**, *Imperial College London, UK*
Robert Schober, *University of British Columbia, Canada*
- Special Session 12: Advances in Wireless Communications through Experimentation**
Organizers: **Florian Kaltenberger**, *EURECOM, France*
Ana García Armada, *University Carlos III of Madrid, Spain*
- Special Session 13: Wireless Autonomous Systems**
Organizers: **Alejandro Ribeiro**, *University of Pennsylvania, USA*
- Special Session 14: UAV Communications and Networks**
Organizers: **Himal A. Suraweera**, *University of Peradeniya, Sri Lanka*
Chandra R. Murthy, *Indian Institute of Science, India*
Zhiguo Ding, *Lancaster University, UK*
- Special Session 15: Backscatter communications for ultra-low-power high-speed wireless networks**
Organizers: **Francesco Verde**, *University of Naples «Federico II», Italy*
Kaibin Huang, *The University of Hong Kong, Hong Kong*
- Special Session 16: Signal Processing for Latency- Constrained Communication and Computation**
Organizers: **Jie Xu**, *Guangdong University of Technology, China*
Tsung-Hui Chang, *The Chinese University of Hong Kong, Hong Kong*

Monday, June 25, 2018

13:30 - 16:30 T1: On the Marriage of Quantum Signal Processing and Communications

Tutorial presenter: **Lajos Hanzo**

Room: **Royal Cruise A+C (Lower level)**

Chair: Ioannis Krikidis (University of Cyprus, Cyprus)

13:30 - 16:30 T2: Modern Trends in Caching for Wireless Networks

Tutorial presenter: **Giuseppe Caire**

Room: **Nautilus (Upper level)**

Chair: Angeliki Alexiou (University of Piraeus, Greece)

15:00 - 15:30 Coffee Break

16:30 - 18:00 Student Paper Competition

Room: **Poster Area B-1 (Voyager Hall, Upper level)**

Chair: Piya Pal (University of California, San Diego, USA)

SPC - 1 Efficient Techniques for Broadcast of System Information in mmWave Communication Systems

Kamal Biswas and Saif Khan Mohammed (Indian Institute of Technology Delhi, India); Erik G. Larsson (Linköping University, Sweden)

SPC - 2 Spatially Oversampled Demultiplexing in mmWave LoS MIMO

Patchava Raviteja (Monash University, Australia); Upamanyu Madhow (University of California, Santa Barbara, USA)

SPC - 3 Mixed-Integer Semidefinite Relaxation of Joint Admission Control and Beamforming: An SOC-Based Outer Approximation Approach with Provable Guarantees

Sherry Xue-Ying Ni and Anthony Man-Cho So (The Chinese University of Hong Kong, Hong Kong)

SPC - 4 Mirror-Prox SCA Algorithm for Multicast Beamforming and Antenna Selection

Mohamed S. Ibrahim (University of Minnesota, USA & Alexandria University, Egypt); Aritra Konar (University of Virginia, USA); Mingyi Hong (University of Minnesota & University of Minnesota, USA); Nikolaos D Sidiropoulos (University of Virginia, USA)

SPC - 5 MMSE Detection for 1-bit Quantized Massive MIMO with Imperfect Channel Estimation

Asmaa Abdallah and Mohammad Mansour (American University of Beirut, USA); Ali Chehab (American University of Beirut, Lebanon); Louay Jalloul (Qualcomm Inc., USA)

SPC - 6 Deterministic Annealing for Hybrid Beamforming Design in Multi-Cell MU-MIMO Systems

Christo Kurisummoottil Thomas and Dirk Slock (EURECOM, France)

20:00 - 00:00 Welcome Reception

Messinian Bay Hotel, Almyros-Verga

Tuesday, June 26, 2018

08:30 - 09:00 Conference Kickoff

Welcome messages from the Organizers

Room: **Royal Cruise A+C (Lower level)**

Chairs: Constantinos B. Papadias (Athens Information Technology, Greece), Athina Petropulu (Rutgers, The State University of New Jersey, USA)

09:00 - 10:00 TA-P: Research challenges towards the 5th generation of wireless mobile networks

Plenary speaker: **Leandros Tassiulas**

Room: **Royal Cruise A+C (Lower level)**

Chair: Athina Petropulu (Rutgers, The State University of New Jersey, USA)

10:00 - 10:30 Coffee Break

10:30 - 11:50 TA-R1: Full Duplex System Design

Regular Session

Room: **Poster Area B-1 (Voyager Hall, Upper level)**

Chair: Erik G. Larsson (Linköping University, Sweden)

TA-R1.1 *Non-Linear Digital Self-Interference Cancellation for In-Band Full-Duplex Radios Using Neural Networks*

Alexios Balatsoukas-Stimming (EPFL, Switzerland)

TA-R1.2 *Two-Way Full-Duplex MIMO with Hybrid TX-RX MSE Minimization and Interference Cancellation*

Hiroki Iimori (Ritsumeikan University, Japan); Giuseppe Thadeu Freitas de Abreu (Jacobs University Bremen, Germany & Ritsumeikan University, Japan)

TA-R1.3 *Optimizing Reciprocity-Based Backscattering with a Full-Duplex Antenna Array Reader*

Deepak Mishra and Erik G. Larsson (Linköping University, Sweden)

TA-R1.4 *Full-duplex amplify-and-forward transmitter cooperations for compound multiple access channels*

Jianhao Huang, Dan Wang and Chuan Huang (University of Electronic Science and Technology of China, P.R. China)

TA-R1.5 *An Energy-Efficient Approach Towards Power Allocation in Non-Orthogonal Multiple Access Full-Duplex AF Relay Systems*

Ankit Gupta (Heriot Watt University, United Kingdom); Sudip Biswas (University of Edinburgh, United Kingdom); Keshav Singh and Tharmalingam Ratnarajah (The University of Edinburgh, United Kingdom); Mathini Sellathurai (Heriot-Watt University, United Kingdom)

Tuesday, June 26, 2018

10:30 - 11:50 TA-R2: Beamforming & Steering

Regular Session

Room: **Poster Area B-2 (Voyager Hall, Upper level)**

Chair: Dirk Slock (EURECOM, France)

TA-R2.1 LPA-SD: An Efficient First-Order Method for Single-Group Multicast Beamforming

Rujun Jiang (Fudan University, P.R. China); Huikang Liu and Anthony Man-Cho So (The Chinese University of Hong Kong, Hong Kong)

TA-R2.2 Slow Beam Steering for Indoor Multi-User Visible Light Communications

Yusuf Said Eroglu, Chethan Kumar Anjinappa and Ismail Güvenç (North Carolina State University, USA); Nezih Pala (Florida International University, USA)

TA-R2.3 Mixed-Integer Semidefinite Relaxation of Joint Admission Control and Beamforming: An SOC-Based Outer Approximation Approach with Provable Guarantees

Sherry Xue-Ying Ni and Anthony Man-Cho So (The Chinese University of Hong Kong, Hong Kong)

TA-R2.4 Efficient Beamforming with Multi-Active Multi-Passive Antenna Arrays

George K. Papageorgiou, Dimitrios Ntaikos and Constantinos B. Papadias (Athens Information Technology, Greece)

TA-R2.5 Mirror-Prox SCA Algorithm for Multicast Beamforming and Antenna Selection

Mohamed S. Ibrahim (University of Minnesota, USA & Alexandria University, Egypt); Aritra Konar (University of Virginia, USA); Mingyi Hong (University of Minnesota & University of Minnesota, USA); Nikolaos D Sidiropoulos (University of Virginia, USA)

TA-R2.6 Deterministic Annealing for Hybrid Beamforming Design in Multi-Cell MU-MIMO Systems

Christo Kurisummoottil Thomas and Dirk Slock (EURECOM, France)

10:30 - 11:50 TA-S1: Machine Learning for Wireless Communications

Special Session

Room: **Poster Area A (Upper level corridor)**

Chair: Mingyi Hong (University of Minnesota & University of Minnesota, USA)

TA-S1.1 OFDM-Autoencoder for End-to-End Learning of Communications Systems

Alexander Felix (University of Stuttgart & Institute of Telecommunications, Germany); Sebastian Cammerer and Sebastian Dörner (University of Stuttgart, Germany); Jakob Hoydis (Nokia Bell Labs, France); Stephan ten Brink (University of Stuttgart, Germany)

TA-S1.2 A Deep Learning Approach for Modulation Recognition via Exploiting Temporal Correlations

Yanlun Wu (National Key Laboratory on Communications, University of Electronic Science and Technology, P.R. China); Xingjian Li and Jun Fang (University of Electronic Science and Technology of China, P.R. China)

Tuesday, June 26, 2018

TA-S1.3 *Optimal Dynamic Proactive Caching via Reinforcement Learning*

Alireza Sadeghi (University of Minnesota, USA); Fatemeh Sheikholeslami (University of Minnesota, Twin Cities, USA); Georgios B. Giannakis (University of Minnesota, USA)

TA-S1.4 *Learning-Based Antenna Selection for Multicasting*

Mohamed S. Ibrahim (University of Minnesota, USA & Alexandria University, Egypt); Ahmed S. Zamzam (University of Minnesota, USA); Xiao Fu (Oregon State University, USA); Nikolaos D Sidiropoulos (University of Virginia, USA)

TA-S1.5 *Communication efficient coreset sampling for distributed learning*

Yawen Fan (The University of Tennessee, USA); Husheng Li (University of Tennessee, USA)

TA-S1.6 *Variable Length Joint Source-Channel Coding of Text Using Deep Neural Networks*

Milind Rao, Nariman Farsad and Andrea Goldsmith (Stanford University, USA)

TA-S1.7 *Detecting and Localizing Adversarial Nodes Using Neural Networks*

Gangqiang Li, Xiaoxiao Wu and Shengli Zhang (Shenzhen University, P.R. China); Hoi-To Wai and Anna Scaglione (Arizona State University, USA)

TA-S1.8 *Limited Feedback Double Directional Massive MIMO Channel Estimation: From Low-Rank Modeling to Deep Learning*

Haoran Sun (University of Minnesota, USA); Ziping Zhao (The Hong Kong University of Science and Technology, Hong Kong); Xiao Fu (Oregon State University, USA); Mingyi Hong (University of Minnesota & University of Minnesota, USA)

TA-S1.9 *Neural Network Aided Decoding for Physical-Layer Network Coding Random Access*

Adriano Pastore (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Paul de Kerret (EURECOM, France); Monica Navarro (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); David Gregoratti (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC/CERCA), Spain); David Gesbert (Eurecom Institute, France)

TA-S1.10 *Super-resolution for Achieving Frequency Division Duplex (FDD) Channel Reciprocity*

Wanshan Yang, Lijun Chen and Youjian Liu (University of Colorado at Boulder, USA)

10:30 - 11:50 TA-S2: Signal Processing for Latency-constrained Communication and Computation

Special Session

Room: **Poster Area B-3 (Voyager Hall, Upper level)**

Chairs: Tsung-Hui Chang (The Chinese University of Hong Kong, Shenzhen, P.R. China), Jie Xu (Guangdong University of Technology, P.R. China)

TA-S2.1 *Delay-Constrained Communication in Edge Computing Networks*

Yulin Hu and Anke Schmeink (RWTH Aachen University, Germany)

Tuesday, June 26, 2018

TA-S2.2 Mobile Edge Computing for Cellular-Connected UAV: Computation Offloading and Trajectory Optimization Xiaowen Cao and Jie Xu (Guangdong University of Technology, P.R. China); Rui Zhang (National University of Singapore, Singapore)

TA-S2.3 Minimum Energy Resource Allocation in Fog Radio Access Network with Fronthaul and Latency Constraints Jinghong Tan (Singapore University of Technology and Design, Singapore); Tsung-Hui Chang (The Chinese University of Hong Kong, Shenzhen, P.R. China); Tony Q. S. Quek (Singapore University of Technology and Design, Singapore)

TA-S2.4 Energy-Efficient UAV Deployment with Flexible Functional Split Selection Liumeng Wang and Sheng Zhou (Tsinghua University, P.R. China)

TA-S2.5 Random Access Schemes in Wireless Systems With Correlated User Activity Anders E. Kalør (Aalborg University, Denmark); Osama Hanna (Nile University, Egypt); Petar Popovski (Aalborg University, Denmark)

TA-S2.6 Statistical Analysis of EH Battery State under Noisy Energy Arrivals Kohei Sugiyama and Hiroki Iimori (Ritsumeikan University, Japan); Giuseppe Thadeu Freitas de Abreu (Jacobs University Bremen, Germany & Ritsumeikan University, Japan)

10:30 - 11:50 TA-S3: Wireless Autonomous Systems

Special Session

Room: Poster Area B-4 (Voyager Hall, Upper level)

Chair: Alejandro Ribeiro (University of Pennsylvania, USA)

TA-S3.1 Online Energy-Efficient Power Control in Wireless Networks by Deep Neural Networks

Alessio Zappone (CentraleSupélec, France); Mérouane Debbah (Huawei, France); Zwi Altman (Orange Labs, France)

TA-S3.2 A Machine Learning Assisted Cell Selection Method for Drones in Cellular Networks

Sai Qian Zhang (Harvard University, USA); Feng Xue and Nageen Himayat (Intel Corporation, USA); Shilpa Talwar (Intel, USA); Ht Kung (Harvard University, USA)

TA-S3.3 LQG Control and Scheduling Co-design for Wireless Sensor and Actuator Networks

Takuya Iwaki (KTH Royal Institute of Technology, Sweden); Karl H. Johansson (KTH, Sweden)

TA-S3.4 Optimization of Switched Linear Systems over Non-Stationary Wireless Channels

Mark Eisen and Konstantinos Gatsis (University of Pennsylvania, USA); George J. Pappas (University of Pennsylvania & Department of Electrical and Systems Engineering, USA); Alejandro Ribeiro (University of Pennsylvania, USA)

TA-S3.5 MmWave Beam Prediction with Situational Awareness: A Machine Learning Approach

Yuyang Wang (University of Texas at Austin, USA); Murali Narasimha (Huawei Technologies, USA); Robert Heath (The University of Texas at Austin, USA)

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TA-S3.6 DoA Estimation for Autonomous Systems in Complex Propagation Environments

Gunjan Verma and Fikadu Dagefu (US Army Research Laboratory, USA); Brian Sadler (Army Research Laboratory, USA); Jeffrey Twigg and Jonathan Fink (Army Research Lab, USA)

11:50 - 12:00 Break

12:00 - 13:00 TA-T: 5G Communications and Beyond

Invited Thematic Oral Session

Presenters: Giuseppe Caire, Anna Scaglione and Sundeep Rangan

Room: Royal Cruise A+C (Lower level)

Chair: Constantinos B. Papadias (Athens Information Technology, Greece)

12:00 *How to Achieve Massive MIMO Gains in FDD Systems?*

Mahdi Barzegar Khalilsarai, Saeid Haghighatshoar and Giuseppe Caire
(Technische Universität Berlin, Germany)

12:20 *Network Inference and its Application to the Estimation of Crowd Dynamics from IoT Sensors*

Nikhil Ravi, Raksha Ramakrishna, Hoi-To Wai and Anna Scaglione
(Arizona State University, USA)

12:40 *Understanding End-to-End Effects of Channel Dynamics in Millimeter Wave Cellular*

Chris Slezak (NYU, USA); Sundeep Rangan (New York University, USA);
Marco Mezzavilla (NYU Poly, USA); Menglei Zhang (New York University, USA)

13:00 - 14:30 Lunch

Room: Atherina Restaurant, Elite City Resort

14:30 - 15:50 TP-R1: Signal Processing for Communications

Regular Session

Room: Poster Area B-1 (Voyager Hall, Upper level)

Chair: Jing Yang (The Pennsylvania State University, USA)

TP-R1.1 Interference and Phase Noise Mitigation in a Dual-Polarized Faster-than-Nyquist Transmission

Mrinmoy Jana and Lutz Lampe (University of British Columbia, Canada); Jeebak Mitra (Huawei Technologies Canada, Canada)

TP-R1.2 Zero-Padded FDM-FDCP: Real-Time Signal Processing for Underwater Channels

Thomas Dean, Mainak Chowdhury and Andrea Goldsmith (Stanford University, USA)

TP-R1.3 Transient Performance of the Bidirectional LMS over Quasi-Static Wireless Networks

Yavuz Yapıcı and Ismail Güvenç (North Carolina State University, USA)

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TP-R1.4 *Training-assisted channel estimation for low-complexity squared-envelope receivers*

Hasan Celebi (KTH Royal Institute of Technology, Sweden); Antonios Pitarokoilis and Mikael Skoglund (KTH Royal Institute of Technology, Sweden)

TP-R1.5 *Bounds on Channel Parameter Estimation with 1-bit Quantization and Oversampling*

Martin Schlüter (Dresden University of Technology, Germany); Meik Dörpinghaus (TU Dresden, Germany); Gerhard P. Fettweis (Dresden University of Technology, Germany)

TP-R1.6 *On the Cramér-Rao Bound of Time-Varying Narrowband Leaked MIMO OFDM Channels*

Amr Elnakeeb and Urbashi Mitra (University of Southern California, USA)

TP-R1.7 *Distributed Frequency Offsets Estimation*

Jian Du (Carnegie Mellon University, USA); Shaodan Ma (University of Macau, P.R. China); Guanghua Yang (Jinan University, P.R. China)

14:30 - 15:50 TP-R2: Massive MIMO

Regular Session

Room: **Poster Area B-2 (Voyager Hall, Upper level)**

Chair: Emil Björnson (Linköping University, Sweden)

TP-R2.1 *Uplink Spectral Efficiency of Massive MIMO with Spatially Correlated Rician Fading*

Özgecan Özdoğan, Emil Björnson and Erik G. Larsson (Linköping University, Sweden)

TP-R2.2 *Can Hardware Distortion Correlation be Neglected When Analyzing Uplink SE in Massive MIMO?*

Emil Björnson (Linköping University, Sweden); Luca Sanguinetti (University of Pisa & CentraleSupélec, Italy); Jakob Hoydis (Nokia Bell Labs, France)

TP-R2.3 *Optimizing Pilots and Analog Processing for Channel Estimation in Cell-Free Massive MIMO With One-Bit ADCs*

Seok-Hwan Park (Chonbuk National University, Korea); Osvaldo Simeone (King's College London, United Kingdom); Yonina C. Eldar (Technion-Israel Institute of Technology, Israel); Elza Erkip (New York University, USA)

TP-R2.4 *Low-Complexity Design of Decode-Forward Relaying in Massive MIMO Heterogeneous Networks*

Ahmad Abu Al Haija (University of Toronto, Canada); Min Dong (University of Ontario Institute of Technology, Canada); Ben Liang (University of Toronto, Canada); Gary Boudreau (Ericsson, Canada)

TP-R2.5 *FDD-based Cell-Free massive MIMO Systems*

Seungnyun Kim and Byonghyo Shim (Seoul National University, Korea)

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TP-R2.6 MMSE Detection for 1-bit Quantized Massive MIMO with Imperfect Channel Estimation

Asmaa Abdallah and Mohammad Mansour (American University of Beirut, USA); Ali Chehab (American University of Beirut, Lebanon); Louay Jalloul (Qualcomm Inc., USA)

TP-R2.7 QoS-based Antenna and User Selection in Large-Scale Fading for Massive-MIMO Systems

Javed Akhtar (IIT Kanpur, India); Ketan Rajawat (Indian Institute of Technology Kanpur, India)

14:30 - 15:50 TP-R3: (Deep) Learning & Neural Networks

Regular Session

Room: **Poster Area B-3 (Voyager Hall, Upper level)**

Chair: Holger Boche (Technical University Munich, Germany)

TP-R3.1 Shift Invariance and Deformation Error Properties of Deep Convolutional Neural Networks Based on Wavelets

Johannes Großmann, Michael Koller and Ullrich J Mönich (Technische Universität München, Germany); Holger Boche (Technische Universität München)

TP-R3.2 On Deep Learning-based Massive MIMO Indoor User Localization

Maximilian Arnold, Sebastian Dörner, Sebastian Cammerer and Stephan ten Brink (University of Stuttgart, Germany)

TP-R3.3 Adversarial Training for Probabilistic Spiking Neural Networks

Alireza Bagheri (New Jersey Institute of Technology, USA); Osvaldo Simeone (King's College London, United Kingdom); Bipin Rajendran (New Jersey Institute of Technology, USA)

TP-R3.4 Matrix Exponential Learning for Resource Allocation with Low Informational Exchange

Wenjia Li (Laboratoire des Signaux et Systèmes, France); Mohamad Assaad (CentraleSupélec, France); Ghadir Ayache (Rutgers University, USA); Maialen Larranaga (CentraleSupélec, France)

TP-R3.5 Neural Successive Cancellation Decoding of Polar Codes

Nghia Doan, Seyyed Ali Hashemi and Warren Gross (McGill University, Canada)

TP-R3.6 Time Series Prediction via Recurrent Neural Networks with the Information Bottleneck Principle

Duo Xu and Faramarz Fekri (Georgia Institute of Technology, USA)

TP-R3.7 Automatic Modulation Recognition using Deep Learning Architectures

Meng Zhang, Yuan Zeng, Zidong Han and Yi Gong (Southern University of Science and Technology, P.R. China)

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14:30 - 15:50 TP-S1: Wireless Information and Power Transmission

Special Session

Room: **Poster Area B-4 (Voyager Hall, Upper level)**

Chairs: Bruno Clerckx (Imperial College London, United Kingdom),
Robert Schober (Friedrich-Alexander University Erlangen-Nuremberg, Germany)

TP-S1.1 Optimization vs. Reinforcement Learning for Wirelessly Powered Sensor Networks

Ayca Ozcelikkale (Uppsala University, Sweden); Mehmet Koseoglu (Hacettepe University, Turkey); Mani Srivastava (University of California, Los Angeles, USA)

TP-S1.2 Modulation Design for Wireless Information and Power Transfer with Nonlinear Energy Harvester Modeling

Ekaterina Bayguzina and Bruno Clerckx (Imperial College London, United Kingdom)

TP-S1.3 Nonlinear Energy Harvesting Models in Wireless Information and Power Transfer

Panos N. Alevizos, Georgios Vougioukas and Aggelos Bletsas (Technical University of Crete, Greece)

TP-S1.4 Stochastic Geometry Analysis of Receiver Diversity in Cellular Networks with SWIPT

Lam Thanh TU (CNRS, France); Marco Di Renzo (Paris-Saclay University / CNRS, France); Justin P Coon (University of Oxford, United Kingdom)

TP-S1.5 Adaptive Mode Switching Algorithm for Dual Mode SWIPT with Duty Cycle Operation

Jong Jin Park, Jong Ho Moon and Kang-Yoon Lee (Sungkyunkwan University, Korea); Dong In Kim (Sungkyunkwan University (SKKU), Korea)

TP-S1.6 Simultaneous Energy and Information Transmission: A Finite Block-Length Analysis

Samir M. Perlaza (INRIA, France); Ali Tajer (Rensselaer Polytechnic Institute, USA); H. Vincent Poor (Princeton University, USA)

TP-S1.7 Distributed Estimation in Wireless Powered mmWave Networks with Random Beamforming

Constantinos Psomas and Ioannis Krikidis (University of Cyprus, Cyprus)

TP-S1.8 Massive MIMO for SWIPT: A Measurement-based Study of Precoding

Steven Claessens, Cheng-Ming Chen, Dominique Schreurs and Sofie Pollin (KU Leuven, Belgium)

14:30 - 15:50 TP-S2: Low-latency Communications in Cooperative Networks

Special Session

Room: **Poster Area B-5 (Voyager Hall, Upper level)**

Chairs: Themistoklis Charalambous (Aalto University, Finland), Nikolaos Pappas (Linköping University, Sweden)

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TP-S2.1 A Convolutionally Encoded OSTBC System with SNR-Adaptive Constellations for Low-Latency and Low- Complexity Communications

Mehmet Ilter (Aalto University, Finland); Risto Wichman (Aalto University School of Electrical Engineering, Finland); Jyri Hämäläinen (Aalto University, Finland); Halim Yanikomeroglu (Carleton University, Canada)

TP-S2.2 Deadline-constrained Bursty Traffic in Random Access Wireless Networks

Nikolaos Nomikos (University of the Aegean, Greece); Nikolaos Pappas (Linköping University, Sweden); Themistoklis Charalambous (Aalto University, Finland); Yvonne-Anne Pignolet (ABB Corporate Research, Dättwil, Switzerland)

TP-S2.3 A General Coding Scheme for Signalling Gaussian Processes over Gaussian Decision Models

Charalambos D Charalambous and Christos K Kourtellaris (University of Cyprus, Cyprus); Themistoklis Charalambous (Aalto University, Finland)

TP-S2.4 Delay Performance of Multi-Antenna Multicasting in Wireless Networks

Marios Kountouris (Huawei Technologies, France); Apostolos Avranas (HUAWEI France, France)

TP-S2.5 Achieving Low Latency Two-Way Communication by Downlink and Uplink Decoupled Access

Dong Min Kim (Aalborg University, Denmark); Nuno K Pratas (Intel Mobile Communications, Denmark); Petar Popovski (Aalborg University, Denmark)

15:50 - 16:00 Break

16:00 - 17:00 TP-P: Nonlinear Models for Matrix Completion

Plenary speaker: **Rebecca Willett**

Room: **Royal Cruise A+C (Lower level)**

Chair: Waheed U. Bajwa (Rutgers University-New Brunswick, USA)

17:00 - 17:30 Coffee Break

17:30 - 18:30 TP-T: Machine Learning and Data Analytics

Invited Thematic Oral Session

Presenters: Georgios Giannakis, Miguel Rodrigues, and Alfred O. Hero

Room: **Royal Cruise A+C (Lower level)**

Chair: Anna Scaglione, Arizona State University, USA

17:30 ***Online Learning Adaptive to Dynamic and Adversarial Environments***
Yanning Shen, Tianyi Chen and Georgios B. Giannakis (University of Minnesota, USA)

17:50 ***Multi-modal Image Processing based on Coupled Dictionary Learning***
Pingfan Song and Miguel Raul Dias Rodrigues (University College London, United Kingdom)

18:10 ***Multi-layer Relevance Networks***
Brandon Oselio, Sijia Liu and Alfred Hero III (University of Michigan, USA)

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09:00 - 10:00 WA-P: How to measure information leakage

Plenary speaker: **Aaron Wagner**

Room: **Royal Cruise A+C (Lower level)**

Chair: Qing Zhao (Cornell University, USA)

10:00 - 10:20 Coffee Break

10:20 - 11:30 WA-R1: mmWave & MIMO Systems

Regular Session

Room: **Poster Area B-1 (Voyager Hall, Upper level)**

Chair: Upamanyu Madhow (University of California, Santa Barbara, USA)

WA-R1.1 Efficient Techniques for Broadcast of System Information in mmWave Communication Systems

Kamal Biswas and Saif Khan Mohammed (Indian Institute of Technology Delhi, India);
Erik G. Larsson (Linköping University, Sweden)

WA-R1.2 Rate Maximization for Partially Connected Hybrid Beamforming in Single-User MIMO Systems

Mohammad Majidzadeh, Jarkko Kaleva, Nuutti Tervo, Harri Pennanen, Antti Tölli and Matti Latva-aho (University of Oulu, Finland)

WA-R1.3 Spatially Oversampled Demultiplexing in mmWave LoS MIMO

Patchava Raviteja (Monash University, Australia); Upamanyu Madhow (University of California, Santa Barbara, USA)

WA-R1.4 Bayesian Learning based Millimeter-Wave Sparse Channel Estimation with Hybrid Antenna Arrays

Mubarak Aminu, Marian Codreanu and Markku Juntti (University of Oulu, Finland)

WA-R1.5 Massive MIMO mmWave Channel Estimation Using Approximate Message Passing and Laplacian Prior

Faouzi Bellili, Foad Sohrabi and Wei Yu (University of Toronto, Canada)

10:20 - 11:30 WA-R2: Structured Statistical Methods

Regular Session

Room: **Poster Area B-2 (Voyager Hall, Upper level)**

Chair: Joakim Jaldén (KTH Royal Institute of Technology, Sweden)

WA-R2.1 Stochastic Graph Filtering under Asymmetric Links in Wireless Sensor Networks

Leila Ben Saad and Baltasar Beferull-Lozano (University of Agder, Norway)

WA-R2.2 Topological Interference Alignment via Generalized Low-Rank Optimization with Sequential Convex Approximations

Fan Zhang, Qiong Wu and Hao Wang (ShanghaiTech University, P.R. China); Yuanming Shi (ShanghaiTech University, P.R. China)

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WA-R2.3 *Nesterov-based Alternating Optimization for Nonnegative Tensor Completion: Algorithm and Parallel Implementation*

Georgios Lourakis and Athanasios Liavas (Technical University of Crete, Greece)

WA-R2.4 *Seismic Signal Compression Through Delay Compensated and Entropy Constrained Dictionary Learning*

Xin Tian (Wuhan University & Georgia Institute of Technology, USA); Afshin Abdi, Entao Liu and Faramarz Fekri (Georgia Institute of Technology, USA)

WA-R2.5 *Improved LDA Classifier based on Spiked Models*

Housseem Sifaou (King Abdullah University of Science and Technology, Saudi Arabia); Abba Kammoun (Kaust, Saudi Arabia); Mohamed-Slim Alouini (King Abdullah University of Science and Technology (KAUST), Saudi Arabia)

WA-R2.6 *Dynamic Power Allocation for Smart Grids via ADMM*

Marie Maros and Joakim Jaldén (KTH Royal Institute of Technology, Sweden)

WA-R2.7 *Nonparametric Radio Maps Reconstruction via Elastic Net Regularization with Multi-Kernels*

Miguel Angel Gutierrez-Estevez and Renato L. G. Cavalcante (Fraunhofer Heinrich Hertz Institute, Germany); Slawomir Stanczak (Fraunhofer Heinrich Hertz Institute & Technische Universität Berlin, Germany)

10:20 - 11:30 WA-S1: Information Theoretic Approaches for Security

Special Session

Room: **Poster Area B-3 (Voyager Hall, Upper level)**

Chair: Lifeng Lai (University of California, Davis, USA)

WA-S1.1 *Covert Communications in a Dynamic Interference Environment*

Dennis Goeckel (University of Massachusetts, USA); Azadeh Sheikholeslami (University of Massachusetts at Amherst, USA); Tamara Sobers (University of Massachusetts, USA); Boulat Bash (Raytheon BBN Technologies, USA); Don Towsley (University of Massachusetts at Amherst, USA); Saikat Guha (University of Arizona, USA)

WA-S1.2 *On Covert Communication Over Infinite-Bandwidth Gaussian Channels*

Ligong Wang (ETIS & CNRS, France)

WA-S1.3 *On Private Lossy Function Computation*

Wenwen Tu and Lifeng Lai (University of California, Davis, USA)

WA-S1.4 *Secure Storage for Identification*

Sebastian Baur (Technische Universität München, Germany); Christian Deppe (Technical University of Munich, Germany); Holger Boche (Technical University Munich, Germany)

WA-S1.5 *Iterative Antenna Selection for Secrecy Enhancement in Massive MIMO Wiretap Channels*

Ali Beryhi (Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany); Saba Asaad

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(University of Tehran, Iran & Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany); Rafael F. Schaefer (Technische Universität Berlin, Germany); Ralf R. Müller (Friedrich-Alexander Universität Erlangen-Nürnberg, Germany)

WA-S1.6 *Beyond PKI: Enhanced Authentication in Vehicular Networks via MIMO*

Amr Abdelaziz (The Ohio State University & Military Technical College, USA); Can Emre Koksal (The Ohio State University, USA); Ron Burton (Transportation Research Center, Columbus, OH, USA); Frank Barickman, John Martin and Josh Weston (National Highway Traffic Safety Administration, USA); Ken Woodruff (Transportation Research Center, USA)

10:20 - 11:30 WA-S2: Age of Information

Special Session

Room: **Poster Area B-4 (Voyager Hall, Upper level)**

Chairs: Anthony Ephremides (University of Maryland, USA), Roy Yates (Rutgers University, USA)

WA-S2.1 *Distributed Scheduling Algorithms for Optimizing Information Freshness in Wireless Networks*

Rajat Talak, Sertac Karaman and Eytan Modiano (MIT, USA)

WA-S2.2 *On the Age of Information in Multi-Source Multi-Hop Wireless Status Update Networks*

Shahab Farazi (Worcester Polytechnic Institute, USA); Andrew G. Klein (Western Washington University, USA); John A McNeill and Donald R. Brown, III (Worcester Polytechnic Institute, USA)

WA-S2.3 *Towards an "Effective Age" Concept*

Clement Kam, Sastry Kompella and Gam Nguyen (Naval Research Laboratory, USA); Jeffrey Wieselthier (Wieselthier Research, USA); Anthony Ephremides (University of Maryland, USA)

WA-S2.4 *To Skip or to Switch? Minimizing Age of Information under Link Capacity Constraint*

Boyu Wang (Penn State University, USA); Songtao Feng and Jing Yang (The Pennsylvania State University, USA)

WA-S2.5 *Multicast With Prioritized Delivery: How Fresh is Your Data?*

Jing Zhong, Roy Yates and Emina Soljanin (Rutgers University, USA)

WA-S2.6 *Information Aging through Queues: A Mutual Information Perspective*

Yin Sun and Benjamin Cyr (Auburn University, USA)

WA-S2.7 *Age-optimal channel coding blocklength for a transmission queue with FCFS service and ARQ*

Hakan Sac, Tan Bacinoglu and Elif Uysal-Biyikoglu (METU, Turkey); Giuseppe Durisi (Chalmers University of Technology, Sweden)

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11:30 - 11:40 Break

11:40 - 12:40 **WA-T: Secure & Adversarial Systems**

Invited Thematic Oral Session

Speakers: Holger Boche, Camilla Hollanti and Negar Kiyavash

Room: Royal Cruise A+C (Lower level)

Chair: H. Vincent Poor (Princeton University, USA)

11:40 ***Secure Identification Under Jamming Attacks***

Holger Boche (Technical University Munich, Germany); Christian Deppe (Technical University of Munich, Germany)

12:00 ***Analysis of Some Well-Rounded Lattices in Wiretap Channels***

Taoufiq Damir, Oliver Gnille, Laia Amorós and Camilla Hollanti (Aalto University, Finland)

12:20 ***Adversarial machine learning: the case of recommendation systems***

Anh Truong, Negar Kiyavash and Seyed Rasoul Etesami (University of Illinois at Urbana-Champaign, USA)

12:40 - 13:50 Lunch

Room: Yiamas Restaurant, Elite City Resort

13:50 - 14:50 **WP-P: The helix vault: Storing information in DNA macromolecules**

Plenary speaker: **Olgica Milenkovic**

Room: Royal Cruise A+C (Lower level)

Chair: Urbashi Mitra (University of Southern California, USA)

14:50 - 15:10 **WP-I1: On the digital transformation of the shipping industry and clusters of innovation**

Industrial keynote speaker: **Dr. Gregory Yovanof**

Room: Royal Cruise A+C (Lower level)

Chair: Constantinos B. Papadias (Athens Information Technology, Greece)

15:10 - 16:00 **WP-I2: Wireless and signal processing-based technology Innovation: What does it take to bring it to the marketplace?**

Industry Panel Discussion

Participants: **Reinaldo Valenzuela, Marios Kountouris, Feng Xue and Andreas Spanias**

Room: Royal Cruise A+C (Lower level)

Chair: Constantinos B. Papadias (Athens Information Technology, Greece)

16:00 - 16:20 Coffee Break

Wednesday, June 27, 2018

16:20 - 17:20 WP-T: Signal Processing, Communications, and Biological Systems

Invited Thematic Oral Session

Speakers: Andrea Goldsmith, Ioannis Kontoyiannis and Robert Schober

Room: Royal Cruise A+C (Lower level)

Chair: Urbashi Mitra (University of Southern California, USA)

16:20 *Neural Network Detectors for Molecular Communication Systems*

Nariman Farsad and Andrea Goldsmith (Stanford University, USA)

16:40 *Deep Tree Models for 'Big' Biological Data*

Lambros Mertzanis (University of Maryland, USA); Athina Panotopoulou (Dartmouth College, USA); Maria Skoularidou and Ioannis Kontoyiannis (University of Cambridge, United Kingdom)

17:00 *Experimental Molecular Communication Testbed Based on Magnetic Nanoparticles in Duct Flow*

Harald Unterweger (Universitätsklinikum Erlangen, Germany); Jens Kirchner (Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany); Wayan Wicke (Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany); Arman Ahmadzadeh (University of Erlangen-Nuremberg, Germany); Doaa Ahmed (Friedrich Alexander, Germany); Vahid Jamali (Friedrich-Alexander-University Erlangen-Nürnberg, Germany); Christoph Alexiou (University Hospital Erlangen & University Hospital Erlangen, Germany); Georg Fischer (Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany); Robert Schober (Friedrich-Alexander University Erlangen-Nuremberg, Germany)

17:20 - 17:30 Break

17:30 - 18:30 WP-R1: MIMO & Radar Systems

Regular Session

Room: Poster Area B-1 (Voyager Hall, Upper level)

Chair: Tareq Y. Al-Naffouri (King Abdullah University of Science and Technology, Saudi Arabia)

WP-R1.1 *Transmit-Receive Beam pattern Optimization for Polarization-Subarray-Based Frequency*

Diverse Array Radar Shiqi Gong (Beijing Institute of Technology, P.R. China); Shaodan Ma (University of Macau, P.R. China); Xing Wei and Chengwen Xing (Beijing Institute of Technology, P.R. China); Guanghua Yang (Jinan University, P.R. China)

WP-R1.2 *Optimum Training for MIMO BPSK Transmission*

Ayed M. Alrashdi (King Abdullah University of Science and Technology (KAUST), Saudi Arabia); Ismail Ben Atitallah (Harvard University, USA); Tarig Ballal (King Abdullah University of Science and Technology (KAUST), Saudi Arabia); Christos Thrampoulidis (MIT, USA); Anas Chaaban (University of British Columbia, Canada); Tareq Y. Al-Naffouri (King Abdullah University of Science and Technology, Saudi Arabia)

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WP-R1.3 *Transceiver Design for Spectrum Sharing between FD Cellular System and MIMO Radar*

Sudip Biswas (University of Edinburgh, United Kingdom); Keshav Singh and Tharmalingam Ratnarajah (The University of Edinburgh, United Kingdom)

WP-R1.4 *Distributed Low-Complexity Multi-cell Coordinated Multicast Beamforming with Large-Scale Antennas*

Jiawei Yu and Min Dong (University of Ontario Institute of Technology, Canada)

WP-R1.5 *Capacity of the Two-User MIMO Broadcast Channel under a Shaping Constraint in Closed Form*

Christoph Hellings, Patrick Gest and Wolfgang Utschick (Technische Universität München, Germany)

WP-R1.6 *Optimal Power Allocation in MISO Cache-Aided Communication*

Soheil Mohajer (University of Minnesota, USA); Itsik Bergel (Bar Ilan University, Israel)

17:30 - 18:30 WP-R2: Clustering and Associations

Regular Session

Room: **Poster Area B-2 (Voyager Hall, Upper level)**

Chair: Piya Pal (University of California, San Diego, USA)

WP-R2.1 *Optimizing Spectrum Pooling for Multi-Tenant C-RAN Under Privacy Constraints*

Seok-Hwan Park (Chonbuk National University, Korea); Osvaldo Simeone (King's College London, United Kingdom); Shlomo (Shitz) Shamai (The Technion, Israel)

WP-R2.2 *Users Association in Ultra Dense THz Networks*

Alexandros-Apostolos A Boulogeorgos (University of Piraeus & Aristotle University of Thessaloniki, Greece); Sotirios Goudos (Aristotle University of Thessaloniki, Greece); Angeliki Alexiou (University of Piraeus, Greece)

WP-R2.3 *Enhancing Favorable Propagation in Cell-Free Massive MIMO Through Spatial User Grouping*

Salah Eddine Hajri (Laboratoire de Signaux et Systèmes (L2S, CNRS), CentraleSupélec, France); Juwendo Denis and Mohamad Assaad (CentraleSupélec, France)

WP-R2.4 *A Weighted Kernel-based Hierarchical Classification Method for Zoning of Sensors in Indoor Wireless Networks*

Daniel Alshamaa and Farah Mourad-Chehade (Université de Technologie de Troyes, France); Paul Honeine (Université de Rouen, France)

WP-R2.5 *User Scheduling in Massive MIMO*

Hong Yang (Bell Labs, USA)

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WP-R2.6 *Dynamic Search on a Tree with Information-Directed Random Walk*

Chao Wang and Qing Zhao (Cornell University, USA); Kobi Cohen (Ben-Gurion University of the Negev, Israel)

WP-R2.7 *Mobile App User Choice Engineering using Behavioral Science Models*

Merkourios Karaliopoulos and Iordanis Koutsopoulos (Athens University of Economics and Business, Greece)

WP-R2.8 *Privacy Leak Classification on Mobile Devices*

Anastasia Shuba, Evita Bakopoulou and Athina Markopoulou (University of California, Irvine, USA)

17:30 - 18:30 WP-S1: Millimeter Wireless Systems

Special Session

Room: **Poster Area B-3 (Voyager Hall, Upper level)**

Chairs: Nuria González-Prelcic (Universidad de Vigo, Spain), Tommy Svensson (Chalmers University of Technology, Sweden)

WP-S1.1 *Impact of Channel Models on the End-to-End Performance of mmWave Cellular Networks*

Michele Polese and Michele Zorzi (University of Padova, Italy)

WP-S1.2 *Coordinated Hybrid Precoding for Energy-efficient Millimeter Wave Systems*

Chao Fang and Behrooz Makki (Chalmers University of Technology, Sweden); Jingya Li (Ericsson, Sweden); Tommy Svensson (Chalmers University of Technology, Sweden)

WP-S1.3 *Impact of RF Processing and Switching Errors in Lens-Based Massive MIMO Systems*

Harsh Tataria and Michail Matthaiou (Queen's University Belfast, United Kingdom); Peter J Smith (Victoria University of Wellington, New Zealand); George C. Alexandropoulos (Huawei Technologies France, France); Vincent Fusco (Queen's University Belfast, United Kingdom)

WP-S1.4 *A distance and bandwidth dependent adaptive modulation scheme for THz communications*

Alexandros-Apostolos A Boulogeorgos (University of Piraeus & Aristotle University of Thessaloniki, Greece); Evangelos N. Papatotiriou and Angeliki Alexiou (University of Piraeus, Greece)

WP-S1.5 *Low-complexity Multiuser Hybrid Precoding and Combining for Frequency Selective Millimeter*

Wave Systems Javier Rodríguez-Fernández (The University of Texas at Austin, USA); Nuria González-Prelcic (Universidad de Vigo, Spain)

WP-S1.6 *Modeling and Combating Blockage in Millimeter Wave Systems*

Vasanthan Raghavan (Qualcomm, Inc., USA); Tianyang Bai, Ashwin Sampath, Ozge Hizir Koymen and Junyi Li (Qualcomm, USA)

Wednesday, June 27, 2018

WP-S1.7 *Tracking Sparse mmWave Channel: Performance Analysis under Intra-Cluster Angular Spread*

Han Yan and Veljko Boljanovic (University of California, Los Angeles, USA); Danijela Cabric (University of California Los Angeles, USA)

WP-S1.8 *Beam-Pattern Design for Hybrid Beamforming using Wirtinger Flow*

Ali Koochakzadeh and Piya Pal (University of California, San Diego, USA)

17:30 - 18:30 WP-S2: Machine Learning and Signal Processing over Graphs and Networks

Special Session

Room: **Poster Area B-4 (Voyager Hall, Upper level)**

Chairs: Kostas Berberidis (University of Patras, Greece), Sergios Theodoridis (University of Athens, Greece)

WP-S2.1 *Distributed Inference over Multitask Graphs under Smoothness*

Roula Nassif (EPFL, Switzerland); Stefan Vlaski and Ali H. Sayed (University of California, Los Angeles, USA)

WP-S2.2 *Collaborative Target-Localization and Information-based Control in Networks of UAVs*

Anna Guerra, Nicola Sparnacci and Davide Dardari (University of Bologna, Italy); Petar M. Djurić (Stony Brook University, USA)

WP-S2.3 *Distributed Set-Theoretic Parameter Estimation in Networks with Ambiguous Measurements*

Dimitris Ampeliotis (University of Patras & Research Academic Computer Technology Institute, Greece); Christos Mavrokefalidis and Kostas Berberidis (University of Patras, Greece); Sergios Theodoridis (University of Athens, Greece)

WP-S2.4 *Kernel-based Semi-supervised Learning over Multilayer Graphs*

Vassilis N. Ioannidis, Panagiotis A. Traganitis, Yanning Shen and Georgios B. Giannakis (University of Minnesota, USA)

WP-S2.5 *MIMO Graph Filters for Convolutional Neural Networks*

Fernando Gama (University of Pennsylvania, USA); Antonio G. Marques (Universidad Rey Juan Carlos, Spain); Alejandro Ribeiro (University of Pennsylvania, USA); Geert Leus (Delft University of Technology, The Netherlands)

WP-S2.6 *Robust Graph Signal Processing in the Presence of Uncertainties on Graph Topology*

Elena Ceci and Sergio Barbarossa (Sapienza University of Rome, Italy)

Wednesday, June 27, 2018

20:00 - 21:00 Technology in Ancient Greece

Pre-Banquet Lecture

Speaker **Prof. Theodosios Tassios**

Filoxenia Hotel

Chairs: Constantinos B. Papadias (Athens Information Technology, Greece), Athina Petropulu (Rutgers, The State University of New Jersey, USA)

21:00 - 00:00 Workshop Banquet

Filoxenia Hotel

Thursday, June 28, 2018

09:00 - 10:30 ThA-R1: Precoding Methods

Regular Session

Room: **Poster Area B-1 (Voyager Hall, Upper level)**

Chair: Danijela Cabric (University of California Los Angeles, USA)

ThA-R1.1 Cooperative MIMO Precoding with Distributed CSI: A Hierarchical Approach

Italo Atzeni (EURECOM, France); David Gesbert (Eurecom Institute, France)

ThA-R1.2 Symbol-Level Precoding Design for Max-Min SINR in Multiuser MISO Broadcast Channels

Alireza Haqiqatnejad (University of Luxembourg & Interdisciplinary Centre for Security, Reliability and Trust (SnT), Luxembourg); Farbod Kayhan (University of Luxembourg, Luxembourg); Björn Ottersten (University of Luxembourg, Luxembourg)

ThA-R1.3 Symbol-Level Precoding with Low Resolution DACs for Large-Scale Array MU-MIMO Systems

Christos G. Tsinos (University of Luxembourg, Luxembourg); Ashkan Kalantari (Linköping University, Sweden); Symeon Chatzinotas (University of Luxembourg, Luxembourg); Björn Ottersten (University of Luxembourg, Luxembourg)

ThA-R1.4 MMSE Precoding for Receive Spatial Modulation in Large MIMO Systems

Ahmed Raafat (Polytechnic University of Catalonia (UPC), Spain); Adrian Agustin (Universitat Politècnica de Catalunya (UPC), Spain); Josep Vidal (Universitat Politècnica de Catalunya, Spain)

ThA-R1.5 Interference Management via User Clustering in Two-Stage Precoder Design

Ayswarya Padmanabhan (University of Oulu & CWC - Radio Technologies, Finland); Antti Tölli (University of Oulu, Finland)

ThA-R1.6 On the tradeoff between rate and pairwise error performance of Alamouti and SP(2) space-time block codes

Salime Bameri and Ramy Gohary (Carleton University, Canada); Siamak Talebi (Bahonar University, Iran); Ioannis Lambadaris (Carleton University, Canada)

Thursday, June 28, 2018

09:30 - 10:30 ThA-R2: Analysis & Design of Physical Layers

Regular Session

Room: Poster Area B-2 (Voyager Hall, Upper level)

Chair: Petros Maragos (National Technical University of Athens, Greece)

ThA-R2.1 *Effective capacity based resource allocation for Rayleigh-fading parallel channels*

Philippe Ciblat (Telecom ParisTech, France); Ivan Stupia (Université Catholique de Louvain, Belgium); Luc Vandendorpe (Université catholique de Louvain, Belgium)

ThA-R2.2 *Adaptive PSK Modulation Scheme in the Presence of Phase Noise*

Simon Bicaïs and Jean-Baptiste Doré (CEA, France); Jose Luis Gonzalez Jimenez (CEA) LETI, France

ThA-R2.3 *Outage Probability of Equal Gain Combining for Backscatter Communication Systems over Nakagami- m Fading Channels*

Yu Zhang, Jing Qian and Feifei Gao (Tsinghua University, P.R. China); Lisheng Fan (Guangzhou University, P.R. China); Shi Jin (Southeast University, P.R. China); Hongbo Zhu (Nanjing University of Posts and Telecommunications, P.R. China)

ThA-R2.4 *Optimal Simultaneous Wireless Information and Power Transfer with Low-Complexity Receivers*

Sotiris A. Tegos and Panagiotis D. Diamantoulakis (Aristotle University of Thessaloniki, Greece); Koralia N. Pappi (Aristotle University of Thessaloniki & Intracom S.A. Telecom Solutions, Greece); George K. Karagiannidis (Aristotle University of Thessaloniki, Greece)

ThA-R2.5 *Outage Performance of Transdermal Optical Wireless Links in the Presence of Pointing Errors*

Stylianos E. Trevlakis (Aristotle University of Thessaloniki, Greece); Alexandros-Apostolos A Boulogeorgos (University of Piraeus & Aristotle University of Thessaloniki, Greece); George K. Karagiannidis (Aristotle University of Thessaloniki, Greece)

ThA-R2.6 *Analysis of the Viterbi Algorithm Using Tropical Algebra and Geometry*

Emmanouil Theodosis and Petros Maragos (National Technical University of Athens, Greece)

ThA-R2.7 *Uncoordinated Space-Frequency Pilot Design for Multi-Antenna Wideband Opportunistic Communications*

Jordi Borràs and Gregori Vazquez (Technical University of Catalonia, Spain)

Thursday, June 28, 2018

09:30 - 10:30 ThA-R3: Localization and Synchronization

Regular Session

Room: **Poster Area B-3 (Voyager Hall, Upper level)**

Chair: Waheed U. Bajwa (Rutgers University-New Brunswick, USA)

ThA-R3.1 Robust 3D Localization of Underwater Optical Wireless Sensor Networks via Low Rank Matrix Completion

Nasir Saeed (King Abdullah University of Science and Technology, Saudi Arabia); Abdulkadir Celik (KAUST, Saudi Arabia); Tareq Y. Al-Naffouri (King Abdullah University of Science and Technology, USA); Mohamed-Slim Alouini (King Abdullah University of Science and Technology (KAUST), Saudi Arabia)

ThA-R3.2 Ray-Tracing Based Fingerprinting for Indoor Localization

Olivier Renaudin (Austrian Institute of Technology, Austria); Thomas Zemen (AIT Austrian Institute of Technology GmbH, Austria); Thomas Burgess (Indoo. rs GmbH, Geyschlägergasse 14, Austria)

ThA-R3.3 Practical One-Way Time Synchronization Schemes With Experimental Evaluation

Muhammad Hafeez Chaudhary and Bart Scheers (Royal Military Academy, Belgium)

ThA-R3.4 Non-line-of-sight Positioning for mmWave Communications

Felix Fellhauer (University of Stuttgart & Sony, Germany); Jonas Lassen and Ahmed Jaber (University of Stuttgart, Germany); Nabil Loghin (Sony, Germany); Stephan ten Brink (University of Stuttgart, Germany)

ThA-R3.5 Exploiting Signals-of-Opportunity for the Synchronization of Moving Sensors

Joseph S. Picard (Tel Aviv University, Israel)

ThA-R3.6 Convex relaxation for maximum-likelihood network localization using distance and direction data

Hassan Naseri and Visa Koivunen (Aalto University, Finland)

09:30 - 10:30 ThA-S1: Spectrum Sharing and Co-existence

Special Session

Room: **Poster Area B-4 (Voyager Hall, Upper level)**

Chair: Visa Koivunen (Aalto University, Finland)

ThA-S1.1 Dual-functional Cellular and Radar Transmission: Beyond Coexistence

Fan Liu (Beijing Institute of Technology, P.R. China); Longfei Zhou (Peking University, P.R. China); Christos Masouros and Ang Li (University College London, United Kingdom); Wu Luo (Peking University, P.R. China); Athina Petropulu (Rutgers, The State University of New Jersey, USA)

Thursday, June 28, 2018

ThA-S1.2 *Interference Alignment Based Spectrum Sharing for MIMO Radar and Communication Systems*

Yuanhao Cui (Beijing University of Post and Telecommunication, P.R. China); Visa Koivunen (Aalto University, Finland); Xiaojun Jing (Beijing University of Posts and Telecommunications, P.R. China)

ThA-S1.3 *Multicarrier Phase Modulated Continuous Waveform for Automotive Joint Radar-Communication System*

Sayed Hossein Dokhanchi (University of Luxembourg, Luxembourg); Bhavani Shankar Mysore R (Interdisciplinary Centre for Security, Reliability and Trust & University of Luxembourg, Luxembourg); Thomas Stifter (IEE, Luxembourg); Björn Ottersten (University of Luxembourg, Luxembourg)

ThA-S1.4 *Power-Efficient Multi-User Dual-Function Radar-Communications*

Ammar Ahmed, Yujie Gu, Dennis Silage and Yimin D. Zhang (Temple University, USA)

ThA-S1.5 *Uplink Signaling and Receive Beamforming for Dual-Function Radar Communications*

Aboulnasr Hassanien (Wright State University, USA); Cenk Sahin (AFRL, USA); Justin G Metcalf (Air Force Research Laboratory, USA); Braham Himed (AFRL, USA)

ThA-S1.6 *Co-existence Between a Radar System and a Massive MIMO Wireless Cellular System*

Stefano Buzzi (University of Cassino and Lazio Meridionale/CNIT, Italy); Marco Lops (University of Cassino & CNIT - Consorzio Universitario Nazionale per le Telecomunicazioni, Italy); Carmen D'Andrea (University of Cassino and Lazio Meridionale, Italy); Ciro D'Elia (University of Cassino, Italy)

09:30 - 10:30 ThA-S2: Stochastic Modeling of Delay-tolerant Networks

Special Session

Room: **Poster Area C-1 (Nautilus room, Upper level)**

Chairs: Ioannis Kontoyiannis (University of Cambridge, United Kingdom), Stavros Toumpis (Research Center - Athens University of Economics and Business, Greece)

ThA-S2.1 *Estimating message transmission time over heterogeneous disrupted links*

Philip Ginzboorg (Huawei & Aalto University, Finland); Valtteri Niemi (University of Helsinki, Finland); Jörg Ott (Technische Universität München, Germany)

ThA-S2.2 *On Data-driven Network Performance Modeling for Mobile Cloud Computing*

Karin Anna Hummel and Rene Gabner (JKU Linz, Austria); Hans-Peter Schwefel (Aalborg University, Denmark)

ThA-S2.3 *Analysis of a One-Dimensional Continuous Delay-Tolerant Network Model*

Dimitrios Cheliotis (University of Athens, Greece); Ioannis Kontoyiannis (University of Cambridge, United Kingdom); Michail Loulakis (National Technical University of Athens, Greece); Stavros Toumpis (Research Center - Athens University of Economics and Business, Greece)

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ThA-S2.4 *Vehicle to Infrastructure Communications Design in Urban Hyperfractals*

Dalia Georgiana Popescu and Philippe Jacquet (Nokia Bell Labs, France)

ThA-S2.5 *A Two-Step Chunk-Based Algorithm for Offloading Streaming Traffic through a Vehicular Cloud*

Luigi Vigneri and Thrasyvoulos Spyropoulos (EURECOM, France); Chadi Barakat (INRIA Sophia Antipolis, France)

09:30 - 10:30 ThA-S3: Biological Signal Processing and Communications for the Internet of Bio-nano Things

Special Session

Room: **Poster Area C-2 (Nautilus room, Upper level)**

Chair: Massimiliano Pierobon (University of Nebraska-Lincoln, USA)

ThA-S3.1 *Redox: Electron-based Approach to Bio-Device Molecular Communication*

Mijeong Kang, Eunkyong Kim, Jinyang Li, William Bentley and Gregory Payne (University of Maryland, USA)

ThA-S3.2 *Estimating the Molecular Information Through Cell Signal Transduction Pathways*

Zahmeeth Sakkaff, Aditya Immaneni and Massimiliano Pierobon (University of Nebraska-Lincoln, USA)

ThA-S3.3 *Ultrasonically Rechargeable Platforms for Closed-Loop Distributed Sensing and Actuation in the Human Body*

Raffaele Guida and Tommaso Melodia (Northeastern University, USA)

ThA-S3.4 *Enhancing the Reliability of Large-Scale Multiuser Molecular Communication Systems*

Maheshi Buddhinee Dissanayake (Faculty of Engineering, University of Peradeniya, Sri Lanka & King's College London, United Kingdom); Yansha Deng (King's College London, United Kingdom); Arumugam Nallanathan (Queen Mary University of London, United Kingdom); Maged Elkashlan (Queen Mary, University of London, United Kingdom); Urbashi Mitra (University of Southern California, USA)

ThA-S3.5 *Selective Signal Detection with Ligand Receptors under Interference in Molecular Communications*

Giulia Muzio (University of Pavia, Italy); Murat Kuscu and Ozgur B. Akan (University of Cambridge, United Kingdom)

ThA-S3.6 *Increasing the Communication Distance between Nano-biosensing Implants and Wearable Devices*

Amit Sangwan and Honey Pandey (University at Buffalo, USA); Pedram Johari (University at Buffalo (SUNY), USA); Josep M Jornet (University at Buffalo, USA)

Thursday, June 28, 2018

10:30 - 11:00 Coffee Break

11:00 - 12:30 ThA-R4: Unmanned Vehicles & Control

Regular Session

Room: **Poster Area C-1 (Nautilus room, Upper level)**

Chair: Eirini Eleni Tsiropoulou (University of New Mexico, USA)

ThA-R4.1 *Using Spectrum Maps for Surveillance Avoiding Path Planning*

Maarit Melvasalo and Visa Koivunen (Aalto University, Finland)

ThA-R4.2 *Self-Adaptive Energy Efficient Operation in UAV-assisted Public Safety Networks*

Dimitrios Sikeridis, Eirini Eleni Tsiropoulou and Michael Devetsikiotis (University of New Mexico, USA); Symeon Papavassiliou (ICCS/National Technical University of Athens, Greece)

ThA-R4.3 *Optimal Design of a Dual-Purpose Communication-Radar System in the Presence of a Jammer*

Andrey Garnaev and Wade Trappe (WINLAB, Rutgers University, USA); Athina Petropulu (Rutgers, The State University of New Jersey, USA)

ThA-R4.4 *Power-Efficient Deployment of UAVs as Relays*

Erdem Koyuncu (University of Illinois at Chicago, USA)

ThA-R4.5 *RF Source Seeking using Frequency Measurements*

Muhammed Faruk Gencel, Upamanyu Madhow and Joao P. Hespanha (University of California, Santa Barbara, USA)

11:00 - 12:30 ThA-R5: Theoretical Network Bounds & Models

Regular Session

Room: **Poster Area C-2 (Nautilus room, Upper level)**

Chair: Philippe Ciblat (Telecom ParisTech, France)

ThA-R5.1 *Maximization of the Sum of Energy-Efficiency For Type-I HARQ Under The Rician Channel*

Xavier Leturc (Thales Communications & Security & Télécom ParisTech, France); Philippe Ciblat (Telecom ParisTech, France); Christophe J. Le Martret (Thales Communications & Security & Signal Processing and Multimedia Dept., France)

ThA-R5.2 *Artificial Interference Aided Physical Layer Security in Cache-enabled Heterogeneous Networks*

Wu Zhao, Zhiyong Chen, Kuikui Li and Bin Xia (Shanghai Jiao Tong University, P.R. China); Peng Chen (Academy of Broadcasting Science, P.R. China)

ThA-R5.3 *Limited Complexity Optimization of the Uplink Performance in Cloud Cellular Networks*

Siddharta Govindasamy (F. W. Olin College of Engineering, USA); Itsik Bergel (Bar Ilan University, Israel)

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ThA-R5.4 *Delivery Time Minimization in Cache-Assisted Broadcast-Relay Wireless Networks with Imperfect CSI*

Jaber Kakar (Ruhr-Universitaet Bochum, Germany); Anas Chaaban (University of British Columbia, Canada); Aydin Sezgin (RUB, Germany); Arogyaswami Paulraj (Stanford University, USA)

ThA-R5.5 *Effective Capacity of Fluctuating Two-Ray Channels with Arbitrary Fading Parameters*

Kostas Peppas (University of Peloponnese, Department of Informatics and Telecommunications); Anastasios Skrivanos (University of Peloponnese, Greece); Evangelos Xenos (University of Peloponnese, Greece); Jiayi Zhang (Beijing Jiaotong University, P.R. China); Ioannis Kouretas (University of Patras, Greece); Spyridon K Chronopoulos (Department of Informatics and Telecommunications Engineering, University of Western Macedonia, Kozani, Greece)

11:00 - 12:30 ThA-S4: Backscatter Communications for Ultra-low-power High-speed Wireless Networks

Special Session

Room: **Poster Area B-1 (Voyager Hall, Upper level)**

Chair: Francesco Verde (University of Napoli Federico II & National Inter-University Consortium for Telecommunications, Italy)

ThA-S4.1 *Coherent Detector for Pseudo-FSK Backscatter under Ambient Constant Envelope Illumination*

Georgios Vougioukas, Panos N. Alevizos and Aggelos Bletsas (Technical University of Crete, Greece)

ThA-S4.2 *Multistatic Narrowband Localization in Backscatter Sensor Networks*

Marios Vestakis, Panos N. Alevizos, Georgios Vougioukas and Aggelos Bletsas (Technical University of Crete, Greece)

ThA-S4.3 *Tracking of Objects in a Passive Backscattering Tag-to-Tag Network*

Matthew Dowling, Monica F. Bugallo, Samir R. Das and Petar M. Djurić (Stony Brook University, USA)

ThA-S4.4 *Multi-Antenna Receiver for Ambient Backscatter Communication Systems*

Ruifeng Duan (Aalto University, Finland); Riku Jäntti (Aalto University School of Electrical Engineering, Finland); Mohamed A ElMossallamy, Zhu Han and Miao Pan (University of Houston, USA)

ThA-S4.5 *Reflection of Modulated Radio (ReMoRa): Link Analysis of Ambient Scatter Radio Using Perfect Pulses*

Michael Varner (Georgia Institute of Technology, USA); Greg Durgin (Georgia Tech, USA)

ThA-S4.6 *Detection of Ambient Backscatter Signals from Multiple-Antenna Tags*

Chen Chen and Gongpu Wang (Beijing Jiaotong University, P.R. China); Lisheng Fan (Guangzhou

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University, P.R. China); Francesco Verde (University of Napoli Federico II & National Inter-University Consortium for Telecommunications, Italy); Hao Guan (Nokia Bell Labs, P.R. China)

ThA-S4.7 Joint channel estimation, interference cancellation, and data detection for ambient backscatter communications

Donatella Darsena (University of Napoli Parthenope, Italy); Giacinto Gelli (University of Napoli - Federico II, Italy); Francesco Verde (University of Napoli Federico II & National Inter-University Consortium for Telecommunications, Italy)

11:00 - 12:30 ThA-S5: UAV Communications and Networks

Special Session

Room: **Poster Area B-2 (Voyager Hall, Upper level)**

Chair: Anna Guerra (University of Bologna, Italy)

ThA-S5.1 Resource Allocation for Solar Powered UAV Communication Systems

Yan Sun (Friedrich-Alexander University of Erlangen-Nuremberg, Germany); Derrick Wing Kwan Ng (University of New South Wales, Australia); Dongfang Xu (Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany); Linglong Dai (Tsinghua University, P.R. China); Robert Schober (University of British Columbia, Canada)

ThA-S5.2 On the Zero-Forcing Receiver Performance for Massive MIMO Drone Communications

Prabhu Chandhar (Linköping University, Sweden); Danyo Danev (Linköping University, Sweden); Erik G. Larsson (Linköping University, Sweden)

ThA-S5.3 Cognitive UAV Communication via Joint Trajectory and Power Control

Yuwei Huang (University of Science and Technology of China, P.R. China); Jie Xu (Guangdong University of Technology, P.R. China); Ling Qiu (University of Science and Technology of China, P.R. China); Rui Zhang (National University of Singapore, Singapore)

ThA-S5.3 Comparison of Limited Feedback Schemes for NOMA Transmission in mmWave Drone Networks

Nadisanka Rupasinghe, Yavuz Yapıcı and Ismail Güvenç (North Carolina State University, USA); Yuichi Kakishima (DOCOMO Innovations, Inc., USA)

ThA-S5.4 Trajectory Optimization for Autonomous Flying Base Station via Reinforcement Learning

Harald Bayerlein and Paul de Kerret (EURECOM, France); David Gesbert (Eurecom Institute, France)

ThA-S5.5 Massive UAV-to-Ground Communication and its Stable Movement Control: A Mean Field Approach

Hyesung Kim (Yonsei University, Korea); Jihong Park (University of Oulu, Finland); Mehdi Bennis (Centre of Wireless Communications, University of Oulu, Finland); Seong-Lyun Kim (Yonsei University, Korea)

Thursday, June 28, 2018

11:00 - 12:30 ThA-S6: Rate-splitting in Wireless Networks

Special Session

Room: Poster Area B-3 (Voyager Hall, Upper level)

Chairs: Eduard Jorswieck (TU Dresden, Germany), Bruno Clerckx (Imperial College London, United Kingdom)

ThA-S6.1 Rate-Splitting for Multi-Antenna Non-Orthogonal Unicast and Multicast Transmission

Yijie Mao (University of Hong Kong, P.R. China); Bruno Clerckx (Imperial College London, United Kingdom); Victor O. K. Li (University of Hong Kong, P.R. China)

ThA-S6.2 A Constant-Gap Result on the Multi-Antenna Broadcast Channels with Linearly Precoded Rate Splitting

Sheng Yang (CentraleSupélec, France); Zheng Li (CentraleSupélec, France)

ThA-S6.3 Multigroup Multicast Beamforming and Antenna Selection with Rate-Splitting in Multicell Systems

Oskari Tervo (University of Oulu, Finland); Le-Nam Tran (University College Dublin, Ireland); Symeon Chatzinotas (University of Luxembourg, Luxembourg); Björn Ottersten (University of Luxembourg, Luxembourg); Markku Juntti (University of Oulu, Finland)

ThA-S6.4 Interference Mitigation via Rate-Splitting in Cloud Radio Access Networks

Alaa Alameer Ahmad (Ruhr-Universität Bochum, Germany); Hayssam Dahrouj (Effat University, Canada); Anas Chaaban (University of British Columbia, Canada); Aydin Sezgin (RUB, Germany); Mohamed-Slim Alouini (King Abdullah University of Science and Technology (KAUST), Saudi Arabia)

ThA-S6.5 Optimal Resource Allocation for Non-Regenerative Multiway Relaying with Rate Splitting

Bho Matthiesen (Technische Universität Dresden, Germany); Eduard Jorswieck (TU Dresden, Germany)

ThA-S6.6 Rate-Splitting for Multigroup Multicast Beamforming in Multicarrier Systems

Hongzhi Chen, De Mi, Zheng Chu, Pei Xiao and Rahim Tafazolli (University of Surrey, United Kingdom)

ThA-S6.7 Robust Downlink Transmission: An Offset-Based Single-Rate-Splitting Approach

Mostafa Medra (University of Toronto, Canada); Timothy N. Davidson (McMaster University, Canada)

ThA-S6.8 A Rate-Splitting Strategy for Multi-user Millimeter-wave Systems with Imperfect CSI

Oluwatayo Kolawole and Anastasios Papazafeiropoulos (University of Edinburgh, United Kingdom); Tharmalingam Ratnarajah (The University of Edinburgh, United Kingdom)

Thursday, June 28, 2018

**11:00 - 12:30 ThA-S7: Advances in Wireless Communications Through
Experimentation**

Special Session

Room: **Poster Area B-4 (Voyager Hall, Upper level)**

Chairs: Ana Garcia Armada (Universidad Carlos III de Madrid, Spain), Florian Kaltenberger (Eurecom, France)

**ThA-S7.1 Implementation and measurement of Power Adapted-OFDM using
OpenAirInterface**

Kun Chen-Hu (Universidad Carlos III de Madrid, Spain); Florian Kaltenberger (Eurecom, France); Ana Garcia Armada (Universidad Carlos III de Madrid, Spain)

**ThA-S7.2 Vehicle-to-Infrastructure Channel Characterization Based on LTE
Measurements**

Tomás Domínguez-Bolaño (University of A Coruña, Spain); José Rodríguez-Piñeiro (Tongji University, P.R. China); José A. García-Naya (University of A Coruña, Spain); Xuefeng Yin (Tongji University, P.R. China); Luis Castedo (University of A Coruña, Spain)

ThA-S7.3 A Fair Comparison of Virtual to Full Antenna Array Measurements

Stefan Pratschner (TU Wien, Austria); Sebastian Caban (Vienna University of Technology, Austria); Daniel Schützenhöfer (TU Wien & Institute of Telecommunications, Austria); Martin Lerch, Erich Zöchmann and Markus Rupp (TU Wien, Austria)

ThA-S7.4 Channel Hardening in Massive MIMO - A Measurement Based Analysis

Sara Gunnarsson (Lund University, Sweden & KU Leuven, Belgium); Jose Flordelis (Lund University, Sweden); Liesbet Van der Perre (KUL, Belgium); Fredrik Tufvesson (Lund University, Sweden)

**ThA-S7.5 Pilot Contamination in Massive MIMO: A Measurement-based Analysis using
2D-MUSIC**

Cheng-Ming Chen, Andrea P Guevara and Sofie Pollin (KU Leuven, Belgium)

**ThA-S7.6 Flexible Infrastructure for the Development and Integration of Access /
Fronthauling Solutions in Future Wireless Systems**

Fernando Guimar (Instituto de Telecomunicações, Portugal); Isiaka Alimi (Instituto de Telecomunicações, Universidade de Aveiro, Portugal); Paulo P Monteiro (Universidade de Aveiro & Instituto de Telecomunicações, Portugal); Atilio Gameiro (Instituto de Telecomunicações / Universidade de Aveiro, Portugal)

**ThA-S7.7 Flying Robots: First Results on an Autonomous UAV-Based LTE Relay using
OpenAirInterface**

Rajeev Gangula and Omid Esrafilian (EURECOM, France); David Gesbert (Eurecom Institute, France); Cedric Roux and Florian Kaltenberger (Eurecom, France); Raymond Knopp (Institut Eurecom, France)

SPAWC 2018 SOCIAL PROGRAM

Welcome Reception - @ Messinian Bay Hotel, Almyros-Verga

Monday June 25, 20:00-23:00



A welcome reception will be held at Messinian Bay Hotel in Almyros-Verga. We will be there in time to enjoy the sunset and panoramic views of the city of Kalamata. Buses to the reception will depart from Elite City Resort at 19:30. Upon return to the hotel, the busses will provide transportation to the city of Kalamata for those interested in getting to know the city's night vibrant night life.

Pre-banquet Lecture by acclaimed Engineering Professor and Philosopher Theodosios Tassios on the topic «Technology in Ancient Greece», @ Filoxenia Hotel, Kalamata

Wednesday June 27, 20:00-21:00



Theodosios Tassios is a Professor of the National Technical University of Athens (NTUA), Member of the Academy of Sciences of Turin (Italy), doctor honoris causa of Liege University, of University of Nanjing and the Democritus University. He served as expert and consultant of United Nations organizations and of the European Union, as well as President of international scientific organizations. He is honorary President of the Hellenic Society of Philosophy, and President of the Society for the Study of Ancient Greek Technology. He has published 370 scientific papers and 40 books in different languages. We hope that you will enjoy the talk by Prof. Tassios, who is a legendary figure in Greece and a fascinating speaker. We have opened up this talk to the public of Kalamata, so be ready to mingle with the locals during the **pre-lecture reception**, featuring a selection of local wines and soft drinks.

Banquet - @ Filoxenia Hotel, Kalamata

Wednesday June 27, 21:00-00:00



The banquet will be held at the Filoxenia Hotel (which is a short walk from the workshop venue). We hope that you will fully enjoy this poolside venue, only a few steps away from the gorgeous beach. Our request for a magnificent full moon has been granted for that night! The entertainment program is a secret. All we can tell you is that it will feature the multifaceted talent of the IEEE Signal Processing Community.

Lunches @ Elite City Resort

Tuesday June 26, 13:00-14:30 @ Atherina Restaurant

Wednesday June 27 12:40-13:50 @ Yiamas Restaurant



These excellent (per Trip Advisor and also based on recommendation of trusted locals) restaurants provide a selection of meat and vegetarian options, inspired by the local cuisine. Greeks eat lunch late. In case you are wondering how they manage to do this, please see the «coffee breaks» description below for a hint.

Coffee Breaks @ at the Worskshop site

Monday June 25 afternoon, Tuesday June 26 morning and afternoon,
Wednesday June 27 morning and afternoon, Thursday June 28 morning



Coffee breaks will be held at the foyer and entrance hall of the conference venue. The morning coffee breaks are inspired by the Greek tradition to enjoy a small bite-sized menu, named «κολατσιό» including local cheese, olives, “παστό” (smoked meats) and the local delicacy «λαλάγγια» (pronounced «lalaghia» - *Please remember to practice your Greek math symbols*). Afternoon coffee breaks will include an assortment of local sweets.

Optional Tours

Trip to Ancient Messene (Tuesday, June 26, 18:30-22:00)

Cost per person: 25 euros

For reservations please send email to info@katsiristravel.com



Ancient Messene is the most well-preserved city of ancient Greece and the Hellenistic period, and one of the largest in size. First stop of the trip, and after a 45 min drive, will be the **Arcadian Gate**, which is a fascinating monumental construction built with huge limestone slab stones, marking one of the two gates of **Ancient Messene** and part of the fortifications of the ancient city. We will then

continue to **Ancient Messene**. During that visit we will see the main monuments and attractions, such as the theater, the ancient Parliament, and the Agora place. One of the most interesting findings of ancient Messene, discovered very recently, is the ecclesia (assembly place) featuring an impressive mosaic.



Trip to Mani (Thursday June 28, 15:00-23:00)

Cost per person: 50 euros

For reservations please send email to info@katsiristravel.com



Mani is a geographical and cultural region in Greece that spans the middle of the three peninsulas of southern Peloponnese. The Mani peninsula is where mountain range Taygetos meets the sea. Its southestpoint, Cape Tainaron, is the southernmost point of mainland Greece, and according to the Greek mythology, is the entrance to Hades, or, the gate to the Underworld. Mani offers a

breathtaking landscape, combining an imposing rocky scenery and seaside villages of unique style. The area has a distinct medieval character, due to its many castles, which date back to the Byzantine Empire. We will visit the coastal villages of Mani. Our first stop will be at the «balcony of Kardamyli,» to take photos of Kardamyli and the island Meropi. Then we will drive through Kardamyli and by the house of the famous British writer Sir Patrick Leigh Fermor, and stop at the village of Stoupa for 45 minutes. On the road to Areopolis (1-hour drive) we will enjoy the landscape with the famous medieval towers and Byzantine Churches/Monasteries. We will stop at Areopolis for about an hour. On tourway back, we will stop at the picturesque, seaside village of Agios Nikolaos for dinner, at 20:00. Departure at 22:00 from Agios Nikolaos to return to the hotel after a 1-hour drive.



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Himed, Braham	ThA-S1.5	
Hollanti, Camilla	WA-T.2	
Honeine, Paul	WP-R2.4	
Hong, Mingyi	SPC.4	TA-R2.5
Hoydis, Jakob	TP-R2.2	TA-S1.1
Hu, Yulin	TA-S2.1	TA-S2.1
Huang, Chuan	TA-R1.4	TA-R1.4
Huang, Jianhao	TA-R1.4	
Huang, Yuwei	ThA-S5.3	
Hummel, Karin	ThA-S2.2	

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Ibrahim, Mohamed	TA-S1.4	SPC.4
	TA-R2.5	
Iimori, Hiroki	TA-S2.6	TA-R1.2
Ilter, Mehmet	TP-S2.1	
Immaneni, Aditya	ThA-S3.2	
Ioannidis, Vassilis	WP-S2.4	
Iwaki, Takuya	TA-S3.3	

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Jaber, Ahmed	ThA-R3.4	
Jacquet, Philippe	ThA-S2.4	
Jaldén, Joakim	WA-R2.6	
Jalloul, Louay	SPC.5	TP-R2.6
Jamali, Vahid	WP-T.3	

Jana, Mrinmoy	TP-R1.1
Jäntti, Riku	ThA-S4.4
Jiang, Rujun	TA-R2.1
Jin, Shi	ThA-R2.3
Jing, Xiaojun	ThA-S1.2
Johansson, Karl	TA-S3.3
Johari, Pedram	ThA-S3.6
Jornet, Josep	ThA-S3.6
Jorswieck, Eduard	ThA-S6.5
Juntti, Markku	WA-R1.4 ThA-S6.3

K

Kakar, Jaber	ThA-R5.5
Kakishima, Yuichi	ThA-S5.4
Kalantari, Ashkan	ThA-R1.3
Kaleva, Jarkko	WA-R1.2
Kalør, Anders	TA-S2.5
Kaltenberger, Florian	ThA-S7.7 ThA-S7.1
Kam, Clement	WA-S2.3
Kammoun, Abla	WA-R2.5
Kang, Mijeong	ThA-S3.1
Karagiannidis, George	ThA-R2.4 ThA-R2.5
Karaliopoulos, Merkourios	WP-R2.7
Karaman, Sertac	WA-S2.1
Kayhan, Farbod	ThA-R1.2
Kim, Dong In	TP-S1.5
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Kim, Eunkyoung	ThA-S3.1
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Kim, Seungnyun	TP-R2.5
Kirchner, Jens	WP-T.3
Kiyavash, Negar	WA-T.3
Klein, Andrew	WA-S2.2
Knopp, Raymond	ThA-S7.7
Koivunen, Visa	ThA-R4.1 ThA-R3.6 ThA-S1.2
Koksal, Can	WA-S1.6
Kolawole, Oluwatayo	ThA-S6.8
Koller, Michael	TP-R3.1
Kompella, Sastry	WA-S2.3
Konar, Aritra	SPC.4 TA-R2.5
Kontoyiannis, Ioannis	ThA-S2.3 WP-T.2
Koochakzadeh, Ali	WP-S1.8
Koseoglu, Mehmet	TP-S1.1
Kountouris, Marios	TP-S2.4
Kouretas, Ioannis	ThA-R5.6
Kourtellaris, Christos	TP-S2.3
Koutsopoulos, Iordanis	WP-R2.7
Koymen, Ozge	WP-S1.6
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Kursumoottil Thomas, Christo	Student Paper Competition.6 TA-R2.6
Kuscu, Murat	ThA-S3.5
Lai, Lifeng	WA-S1.3
Lambadaris, Ioannis	ThA-R1.6
Lampe, Lutz	TP-R1.1
Larranaga, Maialen	TP-R3.4
Larsson, Erik G.	WA-R1.1 TP-R2.1 ThA-S5.2 TA-R1.3 SPC.1

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Lassen, Jonas	ThA-R3.4
Latva-aho, Matti	WA-R1.2
Le Martret, Christophe	ThA-R5.1

Lee, Kang-Yoon	TP-S1.5
Lerch, Martin	ThA-S7.3
Leturc, Xavier	ThA-R5.1
Leus, Geert	WP-S2.5
Li, Ang	ThA-S1.1
Li, Gangqiang	TA-S1.7
Li, Husheng	TA-S1.5
Li, Jingya	WP-S1.2
Li, Jinyang	ThA-S3.1
Li, Junyi	WP-S1.6
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Li, Victor	ThA-S6.1
Li, Wenjie	TP-R3.4
Li, Xingjian	TA-S1.2
Li, Zheng	ThA-S6.2
Liang, Ben	TP-R2.4
Liavas, Athanasios	WA-R2.3
Liu, Entao	WA-R2.4
Liu, Fan	ThA-S1.1
Liu, Huikang	TA-R2.1
Liu, Sijia	TP-T.3
Liu, Youjian	TA-S1.10
Loghin, Nabil	ThA-R3.4
Lops, Marco	ThA-S1.6
Loulakis, Michail	ThA-S2.3
Lourakis, Georgios	WA-R2.3
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Mansour, Mohammad	SPC.5 TP-R2.6
Mao, Yijie	ThA-S6.1
Markagos, Petros	ThA-R2.6
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Maros, Marie	WA-R2.6
Marques, Antonio	WP-S2.5
Martin, John	WA-S1.6
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Matthaiou, Michail	WP-S1.3
Matthiesen, Bho	ThA-S6.5
Mavrokefalidis, Christos	WP-S2.3
McNeill, John	WA-S2.2
Medra, Mostafa	ThA-S6.7
Melodia, Tommaso	ThA-S3.3
Melvasalo, Maarit	ThA-R4.1
Mertzanis, Lambros	WP-T.2
Metcalf, Justin	ThA-S1.5
Mezzavilla, Marco	ThA-T.3
Mi, De	ThA-S6.6
Mishra, Deepak	TA-R1.3
Mitra, Jeebak	TP-R1.1
Mitra, Urbashi	ThA-S3.4 TP-R1.6
Modiano, Eytan	WA-S2.1
Mohajer, Soheil	WP-R1.6
Mohammed, Saif	WA-R1.1 SPC.1
Mönich, Ullrich	TP-R3.1
Monteiro, Paulo	ThA-S7.6
Moon, Jong Ho	TP-S1.5
Mourad-Chehade, Farah	WP-R2.4
Müller, Ralf	WA-S1.5
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Mysore R, Bhavani ShankarThA-S1.3

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 Rao, MilindTA-S1.6
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 Sangwan, AmitThA-S3.6
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 Shi, YuanmingWA-R2.2
 Shim, ByonghyoTP-R2.5
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 Sikeridis, DimitriosThA-R4.2
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 Simeone, OsvaldoWP-R2.1 TP-R3.3 TP-R2.3
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Y

Yan, HanWP-S1.7
Yang, GuanghuaWP-R1.1 TP-R1.7
Yang, HongWP-R2.5
Yang, JingWA-S2.4
Yang, ShengThA-S6.2
Yang, WanshanTA-S1.10
Yanikomeroğlu, HalimTP-S2.1
Yapıcı, YavuzThA-S5.4 TP-R1.3
Yates, RoyWA-S2.5
Yin, XuefengThA-S7.2
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Zamzam, AhmedTA-S1.4
Zappone, AlessioTA-S3.1
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Zhang, FanWA-R2.2
Zhang, JiayiThA-R5.6
Zhang, MengTP-R3.7
Zhang, MengleiTA-T.3
Zhang, RuiTA-S2.2 ThA-S5.3
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Zorzi, MicheleWP-S1.1

SPAWC 2018 EXHIBITION

Demo 1: *SDR Implementation of Narrow-Band Interference Mitigation in Wide-band OFDM Systems*

Contributors: Sumit Kumar and Florian Kaltenberger (Eurecom).

Demo 2: *PHY Based Jamming Attacks and Countermeasure: An Observation via Real-Time Test System*

Contributors: Mehmet Akif Durmaz, Hakan Alakoca, Selen Geçgel, Ozan Alp Topal, Nikolay Zhmurov, Güneş Karabulut Kurt (Istanbul Technical University) and Cem Ayyıldız (Turkcell).

Demo 3: *μWatt Batteryless Backscatter Sensor Networks*

Contributors: Georgios Vougioukas, Panos N. Alevizos and Aggelos Bletsas (Technical University of Crete).

Demo 4: *Demonstration of Real Time Bandwidth Compressed Signal Transmission at 2.4 GHz using Software Defined Radio (SDR)*

Contributors: Tongyang Xu, Hedaia Ghannam, Waseem Ozan and Izzat Darwazeh (University College London).

Demo 5: *Beamforming with Hybrid Multi-Active / Multi-Passive Antenna Arrays*

Contributors: Dimitrios Ntaikos, George Papageorgiou, Konstantinos Ntougias, Foteini Verdou and Constantinos B. Papadias (Athens Information Technology)

Exhibition Working Hours

Tuesday, June 26 th , 2018	08.30-18.30
Wednesday, June 27 th , 2018	09.00-18.30

Secretariat Working Hours

Monday, June 25 th , 2018	11.30-18.00
Tuesday, June 26 th , 2018	08.00-18.30
Wednesday, June 27 th , 2018	08.30-18.30
Thursday, June 28 th , 2018	08.30-12.30

FLOORPLAN

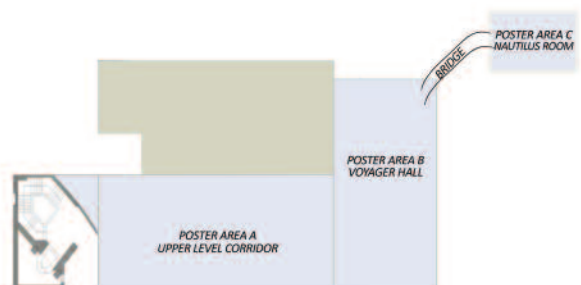


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