
# The Tenth International Symposium on Wireless Communication Systems

**August 27 – 30, 2013**
**Ilmenau, Germany**

## PROGRAM

Ilmenau University of Technology, Ilmenau, Germany

Technical Co-Sponsorship:
IEEE, ITG – Information Technology Society,
VDE – Association for Electrical, Electronic & Information Technologies,
Ilmenau University of Technology

**www.iswcs2013.org**

# Welcome Message from the General Chairs

*Andreas Mitschele-Thiel*

*Martin Haardt*

On behalf of the ISWCS 2013 Organizing Committee, it is our great pleasure to welcome you to Ilmenau, Germany, and to the International Symposium on Wireless Communication Systems 2013 (August 27-30, 2013). ISWCS 2013 is the 10th anniversary edition in the series, following the success of ISWCS'12 in Paris, ISWCS'11 in Aachen, ISWCS'10 in York, ISWCS'09 in Siena, ISWCS'08 in Reykjavik, ISWCS'07 in Trondheim, ISWCS'06 in Valencia, ISWCS'05 in Siena, and ISWCS'04 in Mauritius.

This year, we are delighted to host the conference for the first time in Ilmenau, Germany. The theme of ISWCS 2013 is

"Wireless Communications for the 2020s"

including a wide range of technical challenges in communication theory, wireless networking and protocols, signal processing, information theory, wireless sensor networks, antennas and propagation, cognitive radio as well as their applications.

ISWCS 2013 is a forum for leading wireless communication researchers and technologists to present new ideas and contributions in the form of technical papers, panel discussions as well as test-bed implementations and real-world evaluation of ideas in wireless communications. As a part of the main ISWCS 2013 event, four workshops and four tutorials on Tuesday, August 27, 2013 about various specific hot topics will be an important opportunity to focus on state-of-the-art research of this vibrant field. All of them are included in the conference registration.

The total number of submissions for ISWCS 2013 has been more than 260, based on which an excellent high quality technical program has been produced. Here, our special thanks goes to Prof. Rodrigo de Lamare, who serves as our Technical Program Chair. As in previous years, ISWCS 2013 has obtained the technical sponsorship from the IEEE Vehicular Technology Society.

Ilmenau is a mountain resort, rich of history and monuments, and renowned for its landscape. We hope you will take advantage of the local hospitality and gastronomy, the city centre, hiking tours, enjoy the conference, and visit the many historic places in Thuringia that attract visitors from everywhere. The welcome reception will take place on Tuesday evening, August 27, 2013 at the conference location on campus.

As cultural highlights, we would like to invite you to a guided city walk of Erfurt, the medieval capital of the state of Thuringia, followed by a gala dinner in Erfurt's "Kaisersaal" (Imperial hall) on Wednesday evening, August 28, 2013. On the following evening (Thursday, August 29, 2013), there will be a guided city walk through the classical city of Weimar followed by a dinner. The World Heritage Committee has designated this ensemble of buildings as being one of UNESCO's World Heritage Sites. These excursions to Erfurt and Weimar are also included in the conference registration.

After the conference on Saturday, August 31, 2013, you have the opportunity to participate in an optional guided tour (including transfer) to the medieval Wartburg Castle in Eisenach, which is considered as one of the most famous of all German castles.

The organizers would like to thank all the members of the organizing and steering committee for their constant support and valuable work. Special thanks to all the sponsors for their support. We are very pleased to invite you to attend ISWCS 2013 and are looking forward to meeting you in Ilmenau.

*Andreas Mitschele-Thiel* and *Martin Haardt*
General Chairs

Ilmenau University of Technology
Germany

# Welcome Message from the Technical Program Chair

*Rodrigo de Lamare*

Welcome to the 10th IEEE International Symposium on Wireless Communication Systems 2013 (ISWCS 2013), which will be held in the historic city of Ilmenau, Germany, from Tuesday, 27th August, until Friday, 30th August, 2013.

The aim of this symposium is to provide a forum to present new ideas and contributions in wireless communications, networking and signal processing to support the needs of the Information Society.

We are delighted to have five exceptional plenary speakers, Prof. Georgios Giannakis (University of Minnesota), Prof. Anna Scaglione (University of California, Davis), Prof. Josef A. Nossek (Munich University of Technology), Prof. H. Vincent Poor (Princeton University) and Prof. Muriel Médard (Massachusetts Institute of Technology), whose presentations will start the program every morning and early afternoon. We also have a very interesting panel discussion on the future of wireless communications, which will be chaired by Dr. Werner Mohr from Nokia Solutions and Networks.

ISWCS 2013 has been organized to provide a high quality program composed of a highly competitive selection of contributed papers, a very limited set of invited papers on important and timely topics from well-known leaders in the field, special sessions on key topics and poster sessions that are both informative and interesting for the participants. This symposium is organized into three parallel tracks:

- Communication theory, signal processing, information theory, antennas and propagation
- Networking, protocols, cognitive radio, wireless sensor networks, services and applications
- Special sessions



The program will start with instructive tutorials and topical workshops on Tuesday, 27th August, 2013 that are included in the conference registration fee.

We would like to acknowledge and thank our Technical Program Committee members for their hard work and dedication in providing detailed reviews and informative discussion within a very tight timeframe. Thanks also to the organizing committee and the authors who have submitted a large number of high quality and thought provoking papers, which has resulted in an impressive technical program that will spark off interesting discussions and promote new areas of research. Our special thanks go to Prof. Andreas Mitschele-Thiel and Prof. Martin Haardt, the General Chairs of the conference. It was a pleasure to work again with them on this project.

The response to our call for papers was very positive, thanks to a highly successful publicity phase. This year, we have received 264 submissions. We have been able to accept 166 papers in the conference program (51% acceptance rate in the open call). During the closing ceremony on Friday, 30th August, 2013, we plan to present the ISWCS 2013 Best Paper Awards.

It is our great pleasure to welcome you to ISWCS 2013 in Ilmenau. We hope that you will enjoy the technical program and that you will take advantage of the excellent group of people that have come together for the symposium. Some of the best opportunities come from the technical discussions and the chance to exchange ideas with other colleagues. We are looking forward to meeting all of you at the Welcome Reception on Tuesday, 27th August, 2013 as well as at the symposium itself.

*Rodrigo C. de Lamare*
Technical Program Chair

Pontifical Catholic University of Rio de Janeiro, Brazil and University of York, United Kingdom

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■ **Wednesday, August 28, 2013**

**09:00 – 10:00 • Room: Audimax**

*Chair: Martin Haardt (Ilmenau University of Technology, Germany)*

**Sparsity and Low Rank for Robust Social Data Analytics and Networking**
*Georgios B. Giannakis, University of Minnesota, USA*

The information explosion propelled by the advent of personal computers, the Internet, and the global communications has rendered statistical learning from ”Big Data“ increasingly important. Along with data adhering to postulated models, present in large volumes of data are also those that do not – what are referred to as outliers or anomalies. In this talk, I will start with an approach to outlier-resilient principal component analysis, which establishes a neat link between the seemingly unrelated notions of sparsity and robustness to outliers, even when the signals involved are not sparse. I will argue that controlling sparsity of model residuals leads to statistical learning algorithms that are computationally affordable and universally robust. The impact of these ideas will be demonstrated in applications as diverse as identification of aberrant responses in personality assessment surveys, and unveiling communities in social networks, as well as intruders from video surveillance data. In the second part of the talk, I will switch focus towards the important task of unveiling and mapping-out network anomalies given link-level traffic measurements. Leveraging the low intrinsic-dimensionality of end-to-end network flows and the sparse nature of anomalies, I will show how to construct an estimated map of anomalies in real time to aid in monitoring the network health state. If time allows, I will finally highlight additional application domains that include predicting network-wide path latencies, and load curve cleansing and imputation – a critical task in green grid analytics and energy management with renewables.



**Biography**

G. B. Giannakis (IEEE Fellow'97) received his Diploma in Electrical Engr. from the Ntl. Tech. Univ. 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 Engr., 1986. Since 1999 he has been a professor with the Univ. of Minnesota, where he now holds an ADC Chair in Wireless Telecommunications in the ECE Department, and serves as director of the Digital Technology Center. His general interests span the areas of communications, networking and statistical signal processing – subjects on which he has published more than 340 journal papers, 560 conference papers, 20 book chapters, two edited books and two research monographs (h-index 99). Current research focuses on compressive sensing, cognitive radios, cross-layer designs, wireless sensors, social and power grid networks. He is the (co-)inventor of 21 patents issued, and the (co-) recipient of 8 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, and the G. W. Taylor Award for Distinguished Research from the University of Minnesota. He is a Fellow of EURASIP, and has served the IEEE in a number of posts, including that of a Distinguished Lecturer for the IEEE-SP Society.

## Wednesday, August 28, 2013

**13:40 – 14:40 • Room: Audimax**

*Chair: Martin Haardt (Ilmenau University of Technology, Germany)*

**Networking Machines for Energy Management**
*Anna Scaglione, University of California at Davis, USA*

Communications for industrial automation had little luster in the past, occupying a minor role in the progress of wireless standards. This state of things lasted until recently, when the area of Machine to Machine communications gained great interest from researchers and spurred several standardization efforts. In this talk we will discuss one of the premier and most challenging applications of communications among machines, which is energy management and reliable electrical power delivery. We will define applications for sensing, controlling and scheduling electrical machines consumption. These applications will shed light on what are the truly important features and challenges that these networks have to face and what physical, access and network layer problems arise. We will discuss recent advances on decentralized synchronization and coordination of wireless networks that can address some of these design challenges.

**Biography**

Prof. Anna Scaglione (M.Sc.'95, Ph.D. '99) is currently Professor in Electrical and Computer Engineering at University of California at Davis. She joined UC Davis in 2008, after leaving Cornell University, Ithaca, NY, where she started as Assistant Professor in 2001 and became Associate Professor in 2006; prior to joining Cornell she was Assistant Professor in the year 2000-2001, at the University of New Mexico.

She is a Fellow of the IEEE since 2011 and was honored by both the Signal Processing and the Communication Societies. She is the Editor in Chief of the IEEE Signal Processing Letters, and served as Associate Editor for the IEEE Transactions on Wireless Communications from 2002 to 2005, and from 2008 to 2011 in the Editorial Board of the IEEE Transactions on Signal Processing from 2008, where she was Area Editor in 2010-11. She has been general chair of the workshop SPAWC 2005 in the Signal Processing for Communication Committee from 2004 to 2009 and is in the steering committee for the conference Smart Grid Comm since 2010 and is currently in the Board of Governors of the Signal Processing Society. Dr. Scaglione is the first author of the paper that received the 2000 IEEE Signal Processing Transactions Best Paper Award; she has also received the NSF Career Award in 2002 and she is co-recipient of the Ellersick Best Paper Award (MILCOM 2005) and of the 2013 IEEE Donald G. Fink Prize Paper Award. Her expertise is in the broad area of signal processing for communication systems and networks. Her current research focuses on studying and enabling decentralized signal processing in networks of sensors. She also focuses on sensor systems and networking models for the demand side management and reliable energy delivery.

## Thursday, August 29, 2013

**09:00 – 10:00 • Room: Audimax**

*Chair: Martin Haardt (Ilmenau University of Technology, Germany)*

**How Much Energy Needs a Bit?**
*Josef A. Nossek, Munich University of Technology, Germany*

This is an old question, which has already been answered by Shannon.

Given the noise power density, we know how much energy is necessary to detect a bit reliably. But this does not take into account the energy dissipation of all the components of a transmission link or even a communication network. For an energyefficient layout of a transmission system a holistic approach is needed, which is based on physically consistent models for the different components reflecting the interplay between the information loss due to imperfect functionality and energy dissipation. First steps in this direction will be discussed and demonstrated with simple examples.

**Biography**

Josef A. Nossek earned the Dipl.-Ing. degree and the Dr. techn. degree, both in electrical engineering, from University of Technology in Vienna, Austria in 1974 and 1980, respectively. He joined SIEMENS AG, Munich, Germany, in 1974, where he was engaged in the design of both passive and active Filters for communication systems. In 1978, he became Supervisor, and in 1980, Head of a group of labs engaged in designing monolithic filters (analog and digital). Since 1982, he has been the Head of a group of labs designing digital radio systems within the Transmission Systems Department of SIEMENS AG. In 1984, he was a Visiting Professor at the University of Capetown. From 1987 till 1989, Josef A. Nossek was Head of the Radio Systems Design Department, where he was instrumental in introducing high speed VLSI signal processing into digital microwave radio. Since April 1989, he has been a Professor of Circuit Theory and Design at the Technische Universitaet Muenchen (TUM), where he teaches undergraduate and graduate courses in the field of circuit and system theory, and he leads research on signal processing algorithms in communications, especially multiantenna communication systems.



Josef A. Nossek was President Elect, President and Past President of the IEEE Circuits and Systems Society in the years 2001, 2002, and 2003, respectively. He was vicepresident of VDE (Verband der Elektrotechnik, Elektronik und Informationstechnik e.V.) 2005, and 2006, and was President of VDE in 2007, and 2008. His awards include the ITG Best Paper Award 1988, the Mannesmann Mobilfunk (now Vodafone) Innovationsaward 1998, the Award for Excellence in Teaching from the Bavarian Ministry for Science, Research and Art in1988. From the IEEE Circuits and Systems Society he received the Golden Jubilee Medal for "Outstanding Contributions to the Society" in 1999, and the Education Award in 2008. Josef A. Nossek was awarded the "Bundesverdienstkreuz am Bande", in 2008. In 2009, he became elected member of acatech, the German National Academy of Engineering. In 2012 he received the Guillemin-Cauer Best Paper Award for the publication "Towards a Circuit Theory of Communication".

## Friday, August 30, 2013

**09:00 – 10:00 • Room: Audimax**

*Chair: Rodrigo C. de Lamare (Pontifical Catholic University of Rio de Janeiro, Brazil and University of York, United Kingdom)*

**Games, Privacy and Distributed Inference for the Smart Grid**
*Vincent Poor, Princeton University, USA*

Smart grid involves the imposition of an advanced cyber layer atop the physical layer of the electricity grid in order to improve the efficiency and lower the cost of power use and distribution, and to allow for the effective integration of variable energy sources and storage modes into the grid. This cyber-physical setting motivates the application of many techniques from the study of wireless networks to problems arising in the electricity grid, and considerable research effort has been devoted to such application in recent years. This talk will describe recent work on three aspects of this problem: applications of game theory to the modeling of the interactions of nodes on the grid; characterization of the fundamental tradeoff between privacy and utility of information sources arising in the grid; and distributed inferential algorithms that are suitable for the topological constraints imposed by the structure of the grid.

**Biography**

H. Vincent Poor is the Michael Henry Strater University Professor at Princeton University, where he is also the Dean of Engineering and Applied Science. His research interests are primarily in the areas of stochastic analysis, statistical signal processing, and information theory, and their applications in wireless networks and related fields. Among his recent publications is the book Principles of Cognitive Radio (Cambridge, 2013). Dr. Poor is an IEEE Fellow, and a member of the US National Academy of Engineering, the US National Academy of Sciences and the Royal Academy of Engineering of the UK. He received the Marconi and Armstrong Awards of the IEEE Communications Society in 2007 and 2009, respectively. Recent recognition of his work includes the 2010 IET Ambrose Fleming Medal, the 2011 IEEE Eric E. Sumner Award, and honorary doctorates from Aalborg University, the Hong Kong University of Science and Technology and the University of Edinburgh.



## Friday, August 30, 2013

**13:40 – 14:40 • Room: Audimax**

*Chair: Andreas Mitschele-Thiel (Ilmenau University of Technology, Germany)*

**On the interaction between network coding and the physical layer**
*Muriel Médard, Massachusetts Institute of Technology, USA*

While the flexibility of network coding allows us to consider its introduction in many different ways, a consensus regarding the most beneficial placement in the network, both in terms of layers and physical location in the network, has not yet emerged. In particular, the question of whether joint physical layer and network coding are beneficial remains. In this talk, we present some recent information-theoretic results and two practical applications illustrating this question. We begin by considering, from an information theoretic point of view, whether network coding at the physical layer and the network layer benefit from being integrated or not. We argue that such integration does not show benefits at low SNR regimes and marginal benefits at high SNR regimes. We then consider two examples of network coding implementation, one above the MAC in a WiMax base station, the other in a chip that also performs physical-layer coding. In these cases, we show that having both physical-layer and network coding provides benefits, even if the two codes are implemented and managed separately.

**Biography**

Muriel Médard is a Professor in EECS at MIT. She was previously an Assistant Professor at UIUC and a Staff Member at MIT Lincoln Laboratory. She received B.S. degrees in EECS, in Mathematics and in Humanities, and her M.S. and Sc. D. degrees in EE, all from MIT. She was awarded the IEEE Leon K. Kirchmayer Prize Paper Award (2002), the IEEE Communication Society and Information Theory Society Joint Paper Award (2009), and the William R. Bennett Prize in the Field of Communications Networking (2009). She received the 2004 MIT Harold E. Edgerton Faculty Achievement Award. She was named a Gilbreth Lecturer by the National Academy of Engineering in 2007. She is a Fellow of IEEE, and served as President of the IEEE Information Theory Society. Her research interests are in the areas of network coding, wireless networks and reliable communications, particularly for optical and wireless networks.

# Panel Session

**Thursday, August 29, 2013**

**13:40 – 14:40 • Room: Audimax**

**Research activities on 5G systems – What will it be?**
*Moderator:*
*Werner Mohr, Nokia Siemens Networks Management International GmbH, Munich, Germany*

*Georgios B. Giannakis, University of Minnesota, USA*

*Thomas Haustein, Fraunhofer Heinrich Hertz Institute, Berlin, Germany*

*Maziar Nekovee, Samsung Electronics, UK*

Mobile and wireless communications are the major means for communication between people and increasingly also between devices, sensors and are the key enabler for the Internet of Things (IoT). Currently, mobile broadband communication systems (LTE) are being deployed globally, which will become the major communication means for many Internet and video applications. Data traffic is expected to grow exponentially in the coming years, which will require significantly higher system capacity per area unit in the order of a factor of 1000 between 2010 and 2020. In addition, the number of subscribers for mobile and wireless communication as well as the Internet is continuing to grow globally.

Communication networks today have a share in global energy consumption in the order to 2 %. Therefore, the expected traffic growth is a huge challenge on future communication systems, which have to be much more energy efficient compared to today to avoid a major increase in energy consumption.

These trends are creating huge challenges for research, design and deployment of future communication networks. Additional challenges are significantly reduced latency for improved user experience, self-organizing networks to cope with the increased system complexity, cloud-based architectures and increased flexibility in the allocation of data rates to users by keeping the protocol overhead low. With respect to the growing capacity requirements the identification of additional frequency spectrum including the millimeter wave frequency range for mobile and wireless communications has to be supported as well as research on a more flexible spectrum usage, increased system performance by improved interference management, advanced antenna concepts, cooperative base stations as well as further developments in particular on the system level has to be performed. Heterogeneous networks with cooperating radio systems and a unified radio resource management by using different available frequency bands and the deployment of the most appropriate radio systems in given environments will play a major role. Cognitive networks are complementing future systems in order to improve reliability, quality and to reduce operational and energy cost.

In different regions research activities started on future systems to investigate future developments towards 2020 in order to understand, which technologies and system concepts will solve the challenges. However, there is still a different understanding on the capabilities, usage scenarios and major building blocks of 5G systems. This panel will discuss potential concepts for 5G and major technologies, which will be used and where major research activities will be needed.

**Invited talks**

■ **Tuesday, August 27, 2013**

**09:00 – 09:30** (see page 39 - WS1)

**Filter Banks in Communications: Challenges and Perspectives**
*M. Bellanger, CNAM (Conservatoire National des Arts et Métiers), Paris-France*

After the successful deployment of digital transmultiplexers at the interface of analogue and digital networks in the early eighties, one would have expected more applications of filter bank techniques in the communication systems to come. Instead, the multicarrier transmission concept has been implemented with OFDM in all the emerging applications: digital broadcasting, ADSL, PLC, local area wireless networks and cellular networks. Why communication equipment developers and network operators are so reluctant to use filter bank based techniques?

In the talk, three obstacles to the use of filter banks in communications are discussed, namely delay, equalization and complexity in both concept and computations. Two approaches, FBMC/OQAM and FMT/QAM, are compared and contrasted in that respect. To conclude, suggestions are offered to help get the support of standardization groups and gain acceptance by decision makers in industry and network operation.

**Biography:**

Maurice Bellanger graduated from ENST (Ecole Nationale Supérieure des Télé-communications), Paris, in 1965 and received the doctorate degree from the university of Paris in 1981. He joined the company Philips Communications in France in 1967 and, since then, he has worked on digital signal processing and applications in telecommunications.

In 1991, he joined CNAM (Conservatoire National des Arts et Métiers), a public education and research institute, as a professor of electronics. He is now emeritus professor.



From 2008 to 2010, he was the coordinator of the European Research FP7-project “Physical Layer for Dynamic Spectrum Access and Cognitive Radio”-PHYDYAS (http://www.ict-phydyas.org/).

Elected a Fellow member of the IEEE in 1984, for contributions to the theory of digital filtering and the applications to communication systems, he was the technical program chairman of the conference ICASSP’82 in Paris. He was the president of EURASIP, the European Association for Signal Processing, from 1987 to 1994 and the chairman of the France section of URSI (Union Radio Scientifique Internationale) from 2006 to 2008. He is a member of the French Academy of Technology.

**10:50 – 11:20** (see page 39 - WS1)

**FBMC: An Idea Whose Time Has Come**
*P. Siohan, Orange Lab, Rennes-France*

In the famous paper: “Multicarrier modulation for data transmission: An idea whose time has come”, the author refers to conventional OFDM and also to multicarrier modulation based on offset (or staggered) QAM. Actually, in 1990 OFDM was already there with wireless (DAB) and wired (DSL) transmission systems and, since then, has known a tremendous success. At the contrary, all OFDM variants, today known as Filter Bank Multi-Carrier (FBMC) systems, are still marginal from a standardization and industrial point of view. However, with the OFDM/OQAM/IOTA proposal, the paper by Le Floch et al. in 1995 has renewed the interest for enhanced multicarrier systems. The talk will propose an overview of the impressive progresses that are being made since that time to get very competitive FBMC systems. Then, we will focus on some features of FBMC that still deserve a particular attention. Among those, are FBMC flexibility, packet transmission and efficient equalization.

**Biography:**

Pierre Siohan (IEEE SM 1999) received the PhD degree from the École Nationale Supérieure des Télécommunications (ENST), Paris, France, in 1989. In 1977 he joined the Centre Commun d’Études de Télédiffusion et Télécommunications (CCETT), Rennes, where his activities were first concerned

with the communication theory and its application to the design of broadcasting systems. Afterwards, he was in charge of the CCETT Mathematical and Signal Processing Group. From September 2001 to September 2003, he took a two-year sabbatical leave, being directeur de recherche with the Institut National de Recherche en Informatique et Automatique (INRIA), Rennes. Now, he is Expert in Networks and Telecom at Orange. His current research interests are in signal processing for communication, especially for radio and power line communication systems. Dr. Siohan has authored 31 papers in refereed international journals, 30 patents and 90 papers in international conferences. Recently, he was a guest editor of the special issue on "Filter Banks for Cognitive Next Generation Multicarrier Wireless Communications," which appeared in EURASIP ASP journal.

**13:40 – 14:10** (see page 39 - WS1)

**What's Next and Why on Filter Bank Modulation? From Concatenated FMT to Cyclic Block FMT**

*A. M. Tonello, University of Udine, Italy*

Aiming at increasing spectral efficiency, more general architectures based on filter bank modulation (FBM) have been proposed. This talk offers an overview of some recent advances and results about FBM trying to motivate the reasons why there is still space to devise interesting FBM digital architectures for application in multiple access asynchronous channels (both wireless and power line) affected by doubly dispersive fading and various non-idealities. In particular, focus will be given to Filtered Multitone Modulation (FMT) and novel schemes, namely, concatenated OFDM-FMT, MIMO Precoded FMT, Hybrid FMT, and Cyclic Block FMT. The application of such solutions is motivated by multiple ambitious objectives: the robustness not only to channel impairments but also to hardware limitations (FMT), the orthogonalization of the uplink channel (Concatenated FMT), the high capacity in MIMO frequency selective channels (Precoded FMT), the agile use of spectrum and the flexible adaptation of available resources (Hybrid FMT), the overall reduced latency/complexity and increased performance with simple orthogonal filter bank design (Cyclic Block FMT). The main features of such schemes will be described and illustrative examples of performance will be given.



**Biography:**

Andrea M. Tonello is an Aggregate Professor at the University of Udine, Italy (since 2003) where he leads the Wireless and Power Line Communication Lab. He is also the founder and president of WiTiKee, a university spin-off company. From 1997 to 2002 he has been with Bell Labs Lucent Technologies firstly as a Member of Technical Staff and then as a Technical Manager at the Advanced Wireless Technology Laboratory, Whippany, NJ and the Managing Director of the Bell Labs Italy division. He obtained the Laurea degree (1996) and the Doctor of Research degree in electronics and telecommunications (2003) from the University of Padova, Italy. Dr. Tonello received several recognitions among which the Lucent Bell Labs Recognition of Excellence award (1999), the Distinguished Visiting Fellowship from the Royal Academy of Engineering, UK (2010) and the Distinguished Lecturer Award by the IEEE Vehicular Technology Society (2011-13 and 2013-15). He also received (as co-author) five best paper awards.

He is the Vice-chair of the IEEE Communications Society Technical Committee on Power Line Communications. He serves/ed as an Associate Editor for the IEEE Transactions on Vehicular Technology (2007-2013), for the IEEE Transactions on Communications (2012-TD) and IEEE Access (2013-TD). Web site: www.diegm.uniud.it/tonello

**15:30 – 16:10** (see page 43 - WS4)

**Energy/Performance Trade-offs in Wireless Networks**

*Tony Ephremides, University of Maryland, USA*

Anthony Ephremides holds the Cynthia Kim Chair on Information Technology at the ECE department of the University of Maryland where he is also a Distinguished University Professor. His interests span the areas of Communication Networks, Wireless Systems, Information Technology, Communication Theory, and Energy Efficiency.

## Tuesday, August 27, 2013

**09:00 – 17:00 • Room: Humboldt Hörsaal**

### WS1: Advanced Multicarrier Waveforms and Mechanisms for Future Ad-Hoc and Cell-Based Systems

*Chairs: Faouzi Bader, Supélec, France; Markku Renfors, TUT, Finland; Didier le Ruyet, CNAM, Paris-France; Philippe Mège, CASSIDIAN, France*

The workshop is supported by the EC-funded ICT-EMPhAtiC project and its main goal is to focus on the design and development of advanced multicarrier waveform for future ad-hoc and cellular systems with special attention on broadband professional mobile radio (PMR) systems and beyond. Presented contributions are centered on the use and the development of Filter bank multicarrier (FB-MC) techniques for reaching high spectral efficiency and minimizing interferences between the different services allowing the coexistence with and protection of the systems sharing the spectrum. Moreover, avant-garde solutions are provided to the strong need for flexibility in tuning the transmission frequencies and bandwidths and hence allowing multi-mode communications.

This workshop includes also prestigious line-up of invited speakers from operators and academies to debate and to create constructive discussion on what are the challenges and the perspectives and what's next and why on filter bank modulation as a key scheme for future communication systems.

## Tuesday, August 27, 2013

**09:00 – 14:20 • Room: HU 201**

### WS 2: Green Terminals for Next Generation Wireless Systems (Green-T)

*Chairs: Shahid Mumtaz, Instituto de Telecomunicações, Portugal; Ayman Radwan, Instituto de Telecomunicações, Portugal; Marcos Katz, University of Oulu, Finland; Jonathan Rodriguez, Instituto de Telecomunicações, Portugal*

This workshop, inspired by the GREEN-T (Celtic flagship project, (http://greent.av.it.pt/index.html)) research initiative, envisions contributions including different aspects on green communications ranging from radio protocols to energy efficient networking topologies, and lightweight security. This workshop will bring together academic and industrial researchers to identify and discuss technical challenges and recent results related to cognitive radios and cooperative strategies for energy savings on the mobile terminal side, as well as on the network side. 10 high quality papers were accepted for GREEN-T workshop which range from physical to application layer, including topics like Energy efficient shared Relay, Network coding, Cooperative ARQ scheme, Green handover, Frequency allocation in HetNet CoMP, Binary Decoder, WiFI traffic offloading, visible light communication, secure communication for mobile and in the end Business models. These papers mostly address the recently progress of the project and innovative results.

## Tuesday, August 27

**13:40 – 17:50 • Room: HU 129**

### WS 3: Cognitive Radio Advances, Applications and Future Emerging Technologies (CRAFT)

*Chairs: Panagiotis Demestichas, University of Piraeus, Greece; Oliver Holland, King's College of London, UK; Paulo Marques, Instituto de Telecomunicações-IT, Aveiro, Portugal; Adrian Kliks, Poznan University of Technology, Poland; Kareem Baddour, Communications Research Centre Canada*

Several research efforts are currently on-going around the world to introduce CR-related mechanisms at various OSI layers. A primary challenge being addressed is the identification of technical enablers for CR, i.e., theories, concepts, and practical algorithms to implement these mechanisms at a reasonable operational cost on flexible radio platforms. However, one can still identify challenges that have to be faced with before the CR become practically adaptable. In response to the above, the CRAFT Workshop – during which 8 papers will be discussed – aims to present the recent research outcomes in the field of cognitive radio. They are mainly focused on various aspects of efficient spectrum sensing, such as CSMA/CA algorithm taking into account sensed data, hardware implementations and compressive spectrum sensing method. Also, the influence of the RF components on the Cognitive Radio performance is included. Finally, an overview of the existing policy-frameworks is

analyzed, and the comparative study of the spectrum occupancy in two cities (Barcelona and Posen). We wish you fruitful discussions on each session and pleasant stay during the CRAFT workshop.

■ **Tuesday, August 27, 2013**

**15:30 – 18:10 • Room: HU 201**

**WS 4: Energy Efficient Wireless Networks**

*Chairs: Ulrich Barth, Alcatel-Lucent, Germany;*
*Antonio Capone, Politecnico di Milano, Italy;*
*Panagiotis Demestichas, University of Piraeus, Greece*

Wireless/mobile broadband communication networks are increasingly leveraged for minimizing the environmental impact of human activities, through applications that aim at realizing the vision of a sustainable society and world economy. Moreover, it has been recognized that the energy consumption of wireless/mobile networks can become an issue due to the rapid growth of traffic and infrastructure. Therefore, the design of "green" wireless/mobile broadband networks has become a focus for research in academia and industry. Keeping pace with network expansion requires new paradigms for energy use in mobile networks, including improving the efficiency of networking infrastructure and adapting the network energy consumption to the varying traffic load, mobility and interference conditions, and overall situations that may be encountered.



# Tutorials

■ **Tuesday, August 27 2013**

**09:00 – 12:10 • Room: HU 211/12**

**Tutorial 1:**


*T. Svensson*


*M. Sternad*


*W. Zirwas*


*M. Grieger*

**Coordinated Multi-Point in Cellular Networks: From Theoretical Gains to Realistic Solutions and Their Potentials**
*Tommy Svensson, Communication Systems at Chalmers University of Technology, Gothenburg, Sweden; Mikael Sternad, Uppsala University, Sweden; Wolfgang Zirwas, Munich, Germany; Michael Grieger, TU Dresden, Germany*

Spectral efficiency of cellular networks is impaired by inter-cell interference which is avoided in current systems by under-utilizing the time/frequency/spatial degrees of freedom. An alternative solution for combating inter-cell interference in future cellular networks is the coordination and joint signal processing of multiple base stations, referred to Coordinated Multi-Point (CoMP). The great potential of CoMP for cellular networks has been verified by theoretical research. However, its introduction into cellular communication standards has turned out to be everything but smooth. This tutorial will span the bridge from theoretical gains to practical solutions in a conceptual framework that includes all important physical and MAC layer aspects. The performance of these solutions is verified by a mix of system simulations and measurements in a large urban cellular test bed. The significance of the solutions is demonstrated by a comparison with 3GPP/LTE Release 11.

**Biographies**

***Tommy Svensson***
is Associate Professor in Communication Systems at Chalmers University of Technology, Gothenburg, Sweden. He has participated in the EU FP6 WINNER and WINNER II projects, which contributed substantially to 3GPP LTE

development, as well as in the CELTIC WINNER + project, the recently completed EU FP7 ARTIST4G project, and the emerging EU FP7 METIS project targeting solutions for the year 2020. He is also the initiator of a Swedish-Chinese project on IMT-Advanced and Beyond, involved in a national academic collaboration project on future wireless access. He has been leading a recently completed project on microwave backhauling in collaboration with national industry, and this research will continue in the emerging CELTIC + MUSIC project focusing on small cell backhauling. His main expertise is in design and analysis of physical layer algorithms, multiple access schemes, coordinated multipoint schemes, as well as moving relays for wireless access and wireless backhaul networks, but he also has industrial experience of higher layer design for wireless communication systems. He has co-authored two books and more than 70 journal and conference papers. He is a Senior Member of the IEEE, chairman of the awards winning IEEE Sweden VT/COM/IT chapter, and coordinator of the Communication Engineering Master's Program at Chalmers.

***Mikael Sternad***
is Professor of Automatic Control at Uppsala University and received a PhD degree from Uppsala University in the same field in 1987. With a background in robust and adaptive estimation, control and filtering, he has lead of the national Swedish projects Wireless IP and is at present leading the Dynamic Multipoint Wireless Access framework project funded by the Swedish Research Council. He has participated in the EU WINNER, WINNER II and ARTIST4G integrated projects, contributing to channel prediction and estimation, adaptive transmission, design of robust linear precoders, deployment concepts, multiple access techniques/concepts, MAC layer design and overall system design. Mikael Sternad has authored around 130 papers, 6 book chapters and 10 patents.

***Wolfgang Zirwas***
received his diploma degree in communication technologies in 1987 from technical university of Munich. In 1987 he started at Siemens Munich central research lab for communication. Since 1996 he has been involved – partly as project manager - in BMB+F and EU funded projects like ATMmobil, COVERAGE, 3GET, Scalenet, WINNER, ARTIST4G, etc. including topics like e.g. multihop, MIMO, cooperative antennas and OFDM. End 2004 he was project manager for the world record achieving 1Gbit/s MIMO OFDM Experimental mobile radio system extended in 2007 to a virtual MIMO demonstration. From 2006 to 2007 he joined 3GPP LTE Release 8 MIMO standardization meetings. Since 2010 he developed an interference mitigation framework for ARTIST4G resulting in a best paper award at FuNeMs 2012 for 'Interference Avoidance Techniques for Improving Ubiquitous User Experience', by N. GRESSET, H. HALBAUER, J. KOPPENBORG, W. ZIRWAS, H. KHANFIR. He is – beside many Journals and conference papers – co-author of four books. He received the Siemens and NSN 'Inventor of the year' award in 1997, 2007, 2008 and 2009. He was TCP of several conferences like European Wireless, PIMRC or WDN-CN2012 and is Editor of the Scientific World Journal.

***Michael Grieger***
received his Dipl.-Ing. from DHBW Stuttgart in 2005 and his M.Sc. from the Technische Universität Dresden in March 2009. In 2008, funded by the Herbert Quandt/ALTANA foundation, he studied at CTU, Prague. During his Master's thesis, he conducted research in Prof. John Cioffi's group at Stanford University on multi-cell signal processing, which continues to be his major research focus today as a PhD student supervised by Prof. Fettweis at the Vodafone Chair Mobile Communications Systems in Dresden. An aspect of his research is the comparison of information theoretic results to those of the "real world" using field trials. Michael Grieger led the work package on lab and field trial measurements in the integrated EU project ARTIST4G.

■ **Tuesday, August 27, 2013**

**09:00 – 12:10 • Room: HU 204**

**Tutorial 2:**

**The 4G Long-Term Evolution Concept for Cellular Networks**

*Christian Schlegel, Professor and NSERC Chair, Ultra Marine Digital Communications Center, Dalhousie University, Canada*

Joint detection and interference suppression for communications over linear multiple-access channels, such as multiple-antenna channel, code-division multiple-access, or general multitone systems will be discussed. Information theoretic results will be used to guide the evaluation of low-complexity iterative signal processing and decoding algorithms. It will be shown that universal multiuser systems based on redundant signaling and iterative cancelation-based detection exist and can be constructed with manageable computational complexity. Examples of future intended applications are given and the impact on system performance will be discussed. Extensions to wireless network, and the impact on the medium access control layer of such system will highlighted. The need for new protocol designs and examples thereof will also be discussed.

**Biography**

***Christian Schlegel***
received the Dipl. El. Ing. ETH degree from the Federal Institute of Technology, Zürich, and the M.S. and Ph.D. degrees in electrical engineering from the University of Notre Dame, Notre Dame, IN, in 1986 and 1989, respectively. He currently holds an NSERC Industrial Research Chair at Dalhousie University and directs Ultra Marine Digital Communications Centre, focusing on wireless transmission and communications technologies. From 2002–2012, Dr. Schlegel was iCORE Chair for Digital Communications at the University of Alberta, Edmonton, Canada. Prior to that, he held academic appointments at the University of Hawaii at Manoa (visiting), the University of South Australia in Adelaide, Australia, the University of Texas at San Antonio, and from 1996-2002 at the University of Utah, Salt Lake City. Professor Schlegel is the author of ”Trellis Coding” (1997, IEEE Press), ”Trellis and Turbo Coding,” (2004 Wiley/IEEE), and ”Coordinated Multiple User Communications,” (2006 Springer). Dr. Schlegel received a US National Science Foundation Career Award in 1997, a Canada Research Chair in 2001, and a Province of Alberta iCORE Chair in 2001 and 2006. He was named IEEE Distinguished Lecturer in 2007 and 2001, and is an IEEE Fellow. Dr. Schlegel served as associate editor for coding theory and techniques for the IEEE Transactions on Communications from 1999-2007, guest editor for the Proceedings of the IEEE, and currently serves on the editorial board of Editorial Board of the Journal of Electrical and Computer Engineering, Hindawi Publishing. He is also lead editor for the journal’s special issue on iterative processing, and guest editor for the Journal of Information Systems and Telecommunication Engineering, special edition on LTE/LTEadvanced.

Dr. Schlegel also served as technical program co-chair of the IEEE Information TheoryWorkshop 2001, and the IEEE International Symposium on Information Theory (ISIT’05) 2005, and as general chair of the 2005 IEEE Communication TheoryWorkshop (CTW’05), and the 2013 IEEE Conference onWireless On-Demand Network Systems and Services (WONS’13). He is also a frequent member of IEEE technical program committees.

Dr. Schlegel has published over 60 technical journal papers and received research grants for over 1 Mio US$ from the National Science Foundation, the Army Research Office, the State of Utah, and private industry, notably L3 Communications in Salt Lake City, Utah, and more than 10 Mio Can$ from iCORE, NSERC, the Canadian Foundation for Infrastructure (CFI), ASRA, the Canada Research Chair (CRC) program, and national and international industry. His work with industry has resulted in eight patents in the area of spread spectrum communication, error control coding, and digital and analog implementations. He is the president and founder of the HCDC consulting group, located in Salt Lake City, Utah.

■ **Tuesday, August 27, 2013**

**13:40 – 16:50 • Room: HU 211/12**

**Tutorial 3:**

**Wireless Communications for Smart Grid – Opportunities and Challenges**
*Yih-Fang Huang, University of Notre Dame, Notre Dame, Indiana, USA*

The objective of this tutorial is to offer an overview along with some in-depth examination of wireless communication technologies relevant to smart grid development. This tutorial will begin with an introduction to the envisioned smart grid technologies, placing some emphasis on the need for a reliable and secure communication infrastructure in the grid. It will then present the characteristics and technical requirements of smart grid communications and examine the pros and cons of various wireless communications technologies for different parts of the grid, namely, the transmission system, the distribution system, neighborhood area network, and home-area network. We will study the interoperability of suitable communication protocols concerning inter-layer as well as intra-layer communications. We shall discuss off-the-shelf versus new technologies in regards to dependability, reliability, and security of the electric power grid to ensure timely decisions and actions.

**Biography**

***Yih-Fang Huang***
is Professor of the Department of Electrical Engineering at University of Notre Dame where he started as an assistant professor upon receiving his Ph.D. in 1982 from Princeton University. He served as chair of the department from 1998 to 2006. His research interests are on theory and applications of statistical communications and adaptive signal processing with current focus on smart grid technologies. He has recently given a short course, “An Introduction to Smart Electric Power Grid”, at Aalto University, Helsinki, Finland, March 2013; and will give a tutorial on smart grid at the IEEE International Symposium on Circuits and Systems, May, 2013. In Spring 1993, Dr. Huang received the Toshiba Fellowship and was Toshiba Visiting Professor at Waseda University, Tokyo, Japan. From April to July 2007, he was a visiting professor at the Munich University of Technology, Germany. In Fall, 2007, Dr. Huang was awarded the Fulbright-Nokia scholarship for lectures/research at Helsinki University of Technology in Finland.

Dr. Huang was a Distinguished Lecturer of the IEEE Circuits and Systems Society in 2000-2001, received the Golden Jubilee Medal of the society in 1999, and served as that society’s Vice President for Publications in 1997-98. At the University of Notre Dame, he received Presidential Award in 2003, the Electrical Engineering departments Outstanding Teacher Award in 1994 and in 2011, the Rev. Edmund P. Joyce, CSC Award for Excellence in Undergraduate Teaching in 2011, and the Teacher of the Year Award in the College of Engineering in 2013. Dr. Huang is a Fellow of the IEEE.

■ **Tuesday, August 27, 2013**

**13:40 – 16:50 • Room: HU 204**

**Tutorial 4:**


*K. Stamatiou*


*D. Gunduz*


*M. Zorzi*

**Energy Harvesting Wireless Communication Networks**
*Kostas Stamatiou, CTTC, Barcelona, Spain; Deniz Gunduz, Lecturer, Dept. Electrical and Electronic Engineering, Imperial College London, London, UK; Michele Zorzi, Dept. Information Engineering, University of Padova, Italy*

Energy harvesting (EH) sensors are increasingly being deployed in place of their traditional, battery-operated counterparts, when factors such as the sheer number of nodes or inaccessibility render battery replacement difficult and cost-prohibitive. The applications of EH sensors are diverse, ranging from industrial and environmental monitoring, to smart buildings and grid asset monitoring. In contrast to battery-operated sensors, where minimizing energy consumption is crucial to prolong lifetime, in EH sensors, the objective is the intelligent management of the harvested energy to ensure long-term, uninterrupted operation. This tutorial will provide a comprehensive overview of recent developments in the design of energy management policies for EH communication systems. We focus on analytical models that capture the main challenges related to their design: the intermittent nature of harvested energy, the limited capacity and energy leakage in energy storage devices, and the constraints on sensor size and complexity.

**Biographies**

***Kostas Stamatiou***
received his Diploma in Electrical and Computer Engineering from the National Technical University of Athens in 1995 and the M.Sc. and Ph.D. degrees in Electrical Engineering in 2004 and 2009, respectively, from the University of California San Diego. From 2009 to 2010 he was a post-doctoral scholar in the Department of Electrical Engineering at the University of Notre Dame, South Bend, Indiana, and from 2010 to 2012 he held a research appointment at the Department of Information Engineering at the University of Padova, Italy. He currently holds a Research Associate position at the Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Barcelona, Spain. His research interests lie in the areas of communication theory, stochastic geometry and random networks, and stochastic control as applied to the design of energy harvesting systems.

Dr. Stamatiou received the California Institute of Telecommunications and Information Technology Fellowship (CalIT2) in 2002 and the Marie Curie Fellowship in 2010. He has served as TPC member for the Communication Theory Symposium of the IEEE International Conference on Communications (ICC), and as reviewer for the IEEE Transactions on Communications, IEEE Transactions on Wireless Communications, IEEE Journal on Selected Areas in Communications and the IEEE Communications Letters.

***Deniz Gunduz***
received the B.S. degree in electrical and electronics engineering from the Middle East Technical University in 2002, and the M.S. and Ph.D. degrees in electrical engineering from Polytechnic Institute of New York University, Brooklyn, NY in 2004 and 2007, respectively. He is a lecturer in the Electrical and Electronic Engineering Department of Imperial College London, London, UK. Previously he was a research associate at CTTC in Barcelona, Spain. He also held a visiting researcher position at Princeton University from November 2009 until November 2011. Before joining CTTC he was a consulting assistant professor at the Department of Electrical Engineering, Stanford University and a post-doctoral Research Associate at the Department of Electrical Engineering, Princeton University. He is the recipient of a Marie Curie Reintegration Grant funded by the European Union's Seventh Framework Program (FP7), the 2008 Alexander Hessel Award of Polytechnic Institute of New York University given to the best PhD Dissertation, and a recipient of the Best Student Paper Award at the 2007 IEEE International Symposium on Information Theory (ISIT). He is an Associate Editor of the IEEE TRANSACTIONS ON COMMUNICATIONS, and served as a guest editor of EURASIP Journal on Wireless Communications and Networking, Special Issue on Recent Advances in Optimization Techniques in Wireless Communication Networks. He was an organizer and the general co-chair of the 2012 European School of Information Theory (ESIT). His research interests lie in the areas of communication theory and information theory with special emphasis on joint source-channel coding, multi-user networks, energy efficient communications and 2 security.

***Michele Zorzi***
was born in Venice, Italy, on December 6th, 1966. He received the Laurea and the PhD degrees in Electrical Engineering from the University of Padova, Italy, in 1990 and 1994, respectively. During the Academic Year 1992/93, he was on leave at the University of California, San Diego (UCSD) as a visiting PhD student, working on multiple access in mobile radio networks. In 1993, he joined the faculty of the Dipartimento di Elettronica e Informazione, Politecnico di Milano, Italy. After spending three years with the Center for Wireless Communications at UCSD, in 1998 he joined the School of Engineering of the University of Ferrara, Italy, where he became a Professor in 2000. Since November 2003, he has been on the faculty at the Information Engineering Department of the University of Padova. His present research interests include performance evaluation in mobile communications systems, random access in mobile radio networks, ad hoc and sensor networks, energy constrained communications protocols, broadband wireless access and underwater acoustic communications and networking.

Dr. Zorzi was the Editor-In-Chief of the IEEE Wireless Communications Magazine from 2003 to 2005 and the Editor-In-Chief of the IEEE Transactions on Communications from 2008 to 2011, and currently serves on the Editorial Board of the Wiley Journal of Wireless Communications and Mobile Computing

He was also guest editor for special issues in the IEEE Personal Communications Magazine (Energy Management in Personal Communications Systems) IEEE Wireless Communications Magazine (Cognitive Wireless Networks) and the IEEE Journal on Selected Areas in Communications (Multimedia Network Radios, and Underwater Wireless Communications Networks). He served as a Member-at-large of the Board of Governors of the IEEE Communications Society from 2009 to 2011.





# Technical Program

## Tuesday, August 27, 2013

**09:00 – 17:00 • Room: Humboldt Hörsaal**

### WS1: Advanced Multicarrier Waveforms and Mechanisms for Future Ad-Hoc and Cell-Based Systems

**09:00 - 09:30**
**Invited talk** (see page 22)
**Filter Banks in Communications: Challenges and Perspectives**
*Maurice Bellanger (CNAM (Conservatoire National des Arts et Métiers), Paris-France)*

**09:30 - 09:50**
**Timing Offset Compensation in Fast-Convolution Filter Bank Based Waveform Processing**
*Markku K. Renfors (Tampere University of Technology, Finland); Juha Yli-Kaakinen (Tampere University of Technology, Finland)*

**09:50 - 10:10**
**Analysis of the nonlinear spectral re-growth in FBMC systems for cognitive radio context**
*Saidou Sall (Paris-Est Marne-la Valée University, France); Hmaied Shaiek (CNAM, France); Daniel Roviras (CNAM, France); Yahia Medjahdi (CNAM, France)*

**10:50 - 11:20**
**Invited talk** (see page 23)
**FBMC: An Idea Whose Time Has Come**
*P. Siohan, Orange Lab, Rennes-France*

**11:20 - 11:40**
**Preamble Design for Channel Estimation in OFDM/OQAM Cooperative Systems**
*Christos Mavrokefalidis (University of Patras, Greece); Eleftherios Kofidis (University of Piraeus, Greece); Athanasios A. Rontogiannis (National Observatory of Athens, Greece); Sergios Theodoridis (University of Athens, Greece)*

**11:40 - 12:00**
**Low feedback downlink MIMO channel estimation for distributed FBMC systems using SNR measurements**
*Jerome Louveaux (Université Catholique de Louvain, Belgium); François Horlin (Université Libre de Bruxelles, Belgium); Andre Bourdoux (IMEC, Belgium)*

**10:20 - 10:50 Coffee break**
**12:10 - 13:40 Lunch break**

13:40 - 14:10

**Invited talk** (see page 24)

**What's Next and Why on Filter Bank Modulation? From Concatenated FMT to Cyclic Block FMT**

*A. M. Tonello, University of Udine, Italy*

14:10 - 14:30

**Comparison of linear and widely linear processing in MIMO-FBMC systems**

*Màrius Caus (Universitat Politècnica de Catalunya (UPC), Spain); Ana Perez-Neira (Universitat Politècnica de Catalunya (UPC), Spain)*

14:30 - 14:50

**On interference cancellation in Alamouti coding scheme for filter bank based multicarrier systems**

*Rostom Zakaria (CNAM, France); Didier Le Ruyet (CNAM, France)*

14:50 - 15:10

**EM based Per-Subcarrier ML Channel Estimation for Filter Bank Multicarrier Systems**

*Leonardo Gomes Baltar (Technische Universität München, Germany); Amine Mezghani (Technische Universität München, Germany); Josef A. Nossek (Technische Universität München, Germany)*

15:40 -16:00

**Non-uniform FBMC - A pragmatic approach**

*Sladjana Josilo (Faculty of Technical Sciences, UNS, Serbia); Milos Pejovic (Faculty of Technical Sciences, UNS, Serbia); Slobodan Nedic (Faculty of Technical Sciences, University of Novi Sad, Serbia)*

16:00 - 16:20

**Link Performance Model for System Level Simulations of Filter Bank Multicarrier-Based Systems in PMR Networks**

*Alexandra Oborina (CTTC, Spain); Christian Ibars (Centre Tecnologic de Telecomunicacions de Catalunya - CTTC, Spain); Lorenza Giupponi (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Faouzi Bader (SUPELEC, France)*

16:20 - 16:40

**Time and frequency synchronization for downlink CoMP with FBMC**

*Nicolas Cassiau (CEA-Leti Minatec, France); Dimitri Kténas (CEA, France); Jean-Baptiste Doré (CEA, France)*

16:40 - 17:00

**Link to System Mapping for FBMC Based Systems in SISO case**

*Dmitry Petrov (Magister Solutions Ltd. & University of Juväskylä, Finland); Tobias Hidalgo Stitz (Magister Solutions Ltd., Finland); Pavel Gonchukov (University of Juväskylä, Finland)*

**12:10 - 13:40 Lunch break**
**15:10 - 15:40 Coffee break**





**09:00 – 14:20 • Room: HU 201**

## WS2: Green Terminals for Next Generation Wireless Systems (GREEN-T)

09:00 - 09:20

**An Energy Efficient Proposal in Shared Relay-Based LTE Network**

*Valdemar C. Monteiro (Instituto de Telecomunicações, Portugal); Tipu Ramrekha (Instituto de Telecomunicações, Portugal); Du Yang (Institution of Telecommunications, Portugal); Jonathan Rodriguez (Instituto de Telecomunicações, Portugal); Shahid Mumtaz (Instituto de Telecomunicações, Portugal); Christos Politis (Kingston University, United Kingdom)*

09:20 - 09:40

**Energy and Power Measurements for Network Coding in the Context of Green Mobile Clouds**

*Achuthan Paramanathan (Aalborg University, Denmark); Morten V. Pedersen (Aalborg University, Denmark); Daniel E. Lucani (Aalborg University, Denmark); Frank H.P. Fitzek (Aalborg University, Denmark); Marcos D Katz (University of Oulu, Finland)*

09:40 - 10:00

**Experimental Performance Evaluation of a Cooperative ARQ Scheme using OpenMAC**

*Francisco Vázquez-Gallego (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Danica Gajic (InnoRoute GmbH, Germany); Jesus Alonso-Zarate (Centre Tecnologic de Telecomunicacions de Catalunya - CTTC, Spain); Christian Liß (InnoRoute GmbH, Germany); Lorenzo Di Gregorio (InnoRoute GmbH & Intel Mobile Communications GmbH, Germany); Christos Verikoukis (Telecommunications Technological Centre of Catalonia, Spain)*

10:00 -10:20

**Business Model for Mobile Clouds-Based Rich Content Distribution**

*Hamidreza Bagheri (University of Oulu, Finland); Helal Chowdhury (Telecommunication laboratory, University of Oulu, Finland); Timo Bräysy (University of Oulu & Centre for Wireless Communications, Finland); Petri Ahokangas (University of Oulu, Finland); Marcos D Katz (University of Oulu, Finland)*

10:50 - 11:10

**Green Handover with a Hybrid Satisfaction Mechanism**

*Nizar Zorba (QMIC, Qatar); Hossam S. Hassanein (Queen's University, Canada); Christos Verikoukis (Telecommunications Technological Centre of Catalonia, Spain)*

**10:20 - 10:50 Coffee break**
**12:10 - 13:40 Lunch break**

**11:10 - 11:30**

**Frequency Allocation for HetNet CoMP: Energy Efficiency Analysis**
*Kazi Mohammed Saidul Huq (Instituto de Telecomunicações, Portugal); Shahid Mumtaz (Instituto de Telecomunicações, Portugal); Muhammad Alam (Instituto de Telecomunicacões, Portugal); Jonathan Rodriguez (Instituto de Telecomunicações, Portugal); Rui L Aguiar (University of Aveiro & Instituto de Telecomunicações, Portugal)*

**11:30 - 11:50**

**Soft Binary BCH Decoder Based on Statistical Selection of Test Patterns**
*Joan Bas (Centre Tecnologic de Telecomunicacions de Catalunya (CTTC), Spain)*

**11:50 - 12:10**

**Energy Consumption Impact from Wi-Fi Traffic Offload**
*José Maria Rodriguez Castillo (Huawei Technologies, Sweden); Henrik Lundqvist (Huawei Technologies, Sweden); Christer Qvarfordt (Huawei Technologies Sweden AB, Sweden)*

**13:40 - 14:00**

**Techno-Economic analysis of Visible Light Communications**
*Helal Chowdhury (Telecommunication laboratory, University of Oulu, Finland); Hamidreza Bagheri (University of Oulu, Finland); Muhammad Ikram Ashraf (Centre for Wireless Communications, Finland); Tamoor-ul-Hassan Syed (University of Oulu, Finland); Marcos D Katz (University of Oulu, Finland)*

**14:00 - 14:20**

**Secure Communications for Mobile Verification Platforms**
*Emmanouil N. Kafetzakis (NCSR Demokritos, Greece); Nikolaos Boulgouris (Brunel University, United Kingdom); Emmanouil A Panaousis (Queen Mary, University of London & Imperial College London, United Kingdom); Anastasios Kourtis (NCSR 'Demokritos', Greece)*

**13:40 – 17:50 • Room: HU 129**

## WS3: Cognitive Radio Advances, Applications and Future Emerging Technologies

**13:40 - 14:00**

**Cross-layer Design of CSMA/CA with Spectrum Sensing for CRNs**
*Fotis Foukalas (Qatar University, Qatar); George T. Karetsos (Technology Education Institute of Thessaly, Greece); Periklis Chatzimisios (Alexander TEI of Thessaloniki, Greece)*

**14:00 - 14:20**

**Real-time Implementation of a DSP-based Algorithm on USRP for Mitigating Non-linear Distortions in the Receiver RF Front-end**
*Florian Schlembach (Ilmenau University of Technology, Germany); Michael Grimm (Ilmenau University of Technology, Germany); Reiner S. Thomä (Ilmenau University of Technology, Germany)*

**12:10 - 13:40 Lunch break**
**15:10 - 15:40 Coffee break**





**14:20 - 14:40**

**Wireless Standard Classification in Cognitive Radio Networks Using Self Organising Maps**
*Shaswar Baban (King's College London, United Kingdom); Oliver D Holland (King's College London, United Kingdom); Hamid Aghvami (King's College London, United Kingdom)*

**14:40 - 15:00**

**Existing policy frameworks: an overview**
*Dionysia Triantafyllopoulou (University of Surrey, United Kingdom); Adrian Kliks (Poznan University of Technology, Poland); Valentin Rakovic (Ss. Cyril and Methodius University in Skopje, Macedonia, the former Yugoslav Republic of); Liljana Gavrilovska (Ss Cyril and Methodius University - Skopje, Macedonia, the former Yugoslav Republic of)*

**15:40 - 16:00**

**Spectrum occupancy in big cities – comparative study**
*Adrian Kliks (Poznan University of Technology, Poland); Pawel Kryszkiewicz (Poznan University of Technology, Poland); Jordi Pérez-Romero (Universitat Politècnica de Catalunya (UPC), Spain); Anna Umbert (University Politècnica of Catalunya, Spain); Ferran Casadevall (Universitat Politècnica de Catalunya, Spain)*

**16:00 - 16:20**

**Impact of Spatio-Temporal Correlation in Cooperative Spectrum Sensing for Mobile Cognitive Radio Networks**
*Giuseppe Caso (Sapienza University of Rome, Italy); Luca De Nardis (University of Rome La Sapienza, Italy); Oliver D Holland (King's College London, United Kingdom); Maria Gabriella Di Benedetto (University of Rome La Sapienza, Italy)*

**16:20 - 16:40**

**The Impact of a Dedicated Sensing Engine on a SDR Implementation of the CSMA Protocol**
*André Puschmann (Ilmenau University of Technology, Germany); Mohamed Kalil (Ilmenau University of Technology, Germany)*

**17:10 - 17:30**

**Compressive Gray Space Detection for Interweaved Cognitive Radio Systems**
*Dennis Wieruch (Fraunhofer Institute for Telecommunications, Heinrich-Hertz Institut, Germany); Peter Jung (TU Berlin)*

**17:30 - 17:50**

**Communication Technology & Fraunhofer German-Sino Lab for Mobile Communications - MCI, Germany)**
**Compressive Spectrum Sensing Based on Spectral Shape Feature Detection**
*Eva Lagunas (Universitat Politècnica de Catalunya (UPC), Spain); Montse Nájar (Universitat Politècnica de Catalunya (UPC), Spain)*

**12:10 - 13:40 Lunch break**
**15:10 - 15:40 Coffee break**
**16:50 - 17:10 Coffee break**

**15:30 – 18:10 • Room: HU 201**

## WS4: Energy Efficient Wireless Networks

**15:30 - 16:10**

**Invited talk** (see page 25)

**Energy/Performance Trade-offs in Wireless Networks**
*Tony Ephremides (University of Maryland, USA)*

**16:10 - 16:30**

**Energy Efficiency of LTE networks under traffic loads of 2020**
*Oliver Blume (Alcatel-Lucent Bell Labs, Germany); Anton Ambrosy (Alcatel-Lucent, Bell Labs, Germany); Michael Wilhelm (Alcatel-Lucent Deutschland AG, Germany); Ulrich Barth (Alcatel-Lucent, Bell Labs, Germany)*

**16:30 - 16:50**

**Energy-Efficient Assignment of User Equipment to Cooperative Base Stations**
*Matthias Herlich (University of Paderborn, Germany); Holger Karl (University of Paderborn, Germany)*

**17:10 - 17:30**

**Coverage and Capacity Optimization in Heterogeneous Networks (HetNets): A Green Approach**
*Dimitrios Karvounas (University of Piraeus, Greece); Panagiotis Vlacheas (University of Piraeus, Greece); Andreas Georgakopoulos (University of Piraeus, Greece); Marios Logothetis (University of Piraeus Research Center, Greece); Vera Stavroulaki (University of Piraeus, Greece); Kostas Tsagkaris (University of Piraeus, Greece); Panagiotis Demestichas (University of Piraeus, Greece)*

**17:30 - 17:50**

**Energy-Efficiency based Power Amplifier Selection in Two-way Relay Systems**
*Qimei Cui (Beijing University of Posts and Telecommunications, P.R. China); Jiang Han (Beijing University of Posts and Telecommunications, P.R. China); Mikko Valkama (Tampere University of Technology, Finland); Tianpeng Yuan (Beijing University of Posts and Telecommunications, P.R. China); Zhou Xiang (Beijing University of Post and Telecommunications, P.R. China)*

**17:50 - 18:10**

**Energy-Efficient Connectivity in Hybrid Radio-Optical Wireless Systems**
*Helal Chowdhury (Telecommunication Laboratory, University of Oulu, Finland); Muhammad Ikram Ashraf (Centre for Wireless Communications, Finland); Marcos Katz (University of Oulu, Finland)*

**12:10 - 13:40 Lunch break**
**15:10 - 15:40 Coffee break**
**16:50 - 17:10 Coffee break**





**09:00 – 12:10 • Room: HU 211/12**

## Tutorial 1
**Coordinated Multi-Point in Cellular Networks: From Theoretical Gains to Realistic Solutions and Their Potentials**

*Tommy Svensson, Communication Systems at Chalmers University of Technology, Gothenburg, Sweden; Mikael Sternad, Uppsala University, Sweden; Wolfgang Zirwas, Munich, Germany; Michael Grieger, TU Dresden, Germany*

**09:00 – 12:10 • Room: HU 204**

## Tutorial 2
**The 4G Long-Term Evolution Concept for Cellular Networks**

*Christian Schlegel, Professor and NSERC Chair, Ultra Marine Digital Communications Center, Dalhousie University, Canada*

**13:40 – 16:50 • Room: HU 211/12**

## Tutorial 3
**Wireless Communications for Smart Grid – Opportunities and Challenges**

*Yih-Fang Huang, University of Notre Dame, Notre Dame, Indiana, USA*

**13:40 – 16:50 • Room: HU 204**

## Tutorial 4
**Energy Harvesting Wireless Communication Networks**

*Kostas Stamatiou, CTTC, Barcelona, Spain; Deniz Gunduz, Lecturer, Dept. Electrical and Electronic Engineering, Imperial College London, London, UK; Michele Zorzi, Dept. Information Engineering, University of Padova, Italy*

**10:20 - 10:50 Coffee break**
**12:10 - 13:40 Lunch break**
**15:10 - 15:40 Coffee break**
**16:50 - 17:10 Coffee break**

## Wednesday, August 28, 2013

**08:30 – 09:00 • Room: Audimax**

### Opening Ceremony

**09:00 – 10:00 • Room: Audimax**

### Keynote:
### Sparsity and Low Rank for Robust Social Data Analytics and Networking

*Chair: Martin Haardt, Ilmenau University of Technology, Germany*

***Georgios B. Giannakis, University of Minnesota, USA***

**10:30 – 12:10 • Room: HU 201**

### W1.1: Information Theory

*Chair: Deniz Gunduz, Imperial College London, UK*

**Pairwise Key Agreement over a Generalized Multiple Access Channel: Capacity Bounds and Game-theoretic Analysis**
*Somayeh Salimi (KTH Royal Institute of Technology, Sweden); Frederic Gabry (KTH Royal Institute of Technology, Sweden); Mikael Skoglund (KTH Royal Institute of Technology, Sweden)*

**On the Transmission Strategies for the Two-User State-Dependent Gaussian Interference Channel**
*Shahab Ghasemi-Goojani (Sharif University of Technology, Iran); Hamid Behroozi (Sharif University of Technology, Iran)*

**Sparsity-Based Criteria for Entropy Measures**
*Giancarlo Pastor (Aalto University & King Juan Carlos University, Finland); Inmaculada Mora (Rey Juan Carlos University of Madrid, Spain); Riku Jäntti (Aalto University School of Electrical Engineering, Finland); Antonio J. Caamaño (Rey Juan Carlos University of Madrid, Spain)*

**The Lossless CEO Problem with Security Constraints**
*Farshad Naghibi (KTH Royal Institute of Technology, Sweden); Somayeh Salimi (KTH Royal Institute of Technology, Sweden); Ragnar Thobaben (KTH Royal Institute of Technology, Sweden); Mikael Skoglund (KTH Royal Institute of Technology, Sweden)*

**10:00 - 10:30 Coffee break**
**12:10 - 13:40 Lunch break**





**10:30 – 12:10 • Room: Humboldt Hörsaal**

### W1.2: Cognitive Radio Networking

*Chair: Andreas Mitschele-Thiel (Ilmenau University of Technology, Germany)*

**A New Relay-Assisted Spectrum Sharing Scheme for Bidirectional Communication**
*Hela Hakim (University of Carthage, Tunisia); Wessam Ajib (Université du Québec à Montréal, Canada); Hatem Boujemaa (Ecole Supérieure des Communications, Tunisia)*

**Reduced Complexity Spectrum Sensing Based on Maximum Eigenvalue and Energy**
*Sener Dikmese (Tampere University of Technology, Finland); Ahmet Gokceoglu (Tampere University of Technology, Finland); Mikko Valkama (Tampere University of Technology, Finland); Markku K. Renfors (Tampere University of Technology, Finland)*

**On the Sensing Time and Achievable Throughput in Sensor-Enabled Cognitive Radio Networks**
*Deepak GC (University of Leeds, United Kingdom); Keivan Navaie (University of Leeds, United Kingdom)*

**Cooperative Overlay Cognitive Radio with Opportunistic Link Selection**
*Ammar Zafar (King Abdullah University of Science and Technology (KAUST), Saudi Arabia); Mohammad Shaqfeh (Texas A&M University at Qatar, Qatar); Mohamed-Slim Alouini (King Abdullah University of Science and Technology (KAUST), Saudi Arabia); Hussein Alnuweiri (Texas A&M University, Qatar)*

**10:30 – 12:10 • Room: HU 129**

### W1.3: Two-way Relaying

*Chair: Tobias J. Oechtering (KTH Royal Institute of Technology & School of Electrical Engineering, EE, Sweden)*

**Multi-Cell Cooperation Using Subcarrier-Cooperative Two-Way Amplify-and-Forward Relaying**
*Raphael T. L. Rolny (ETH Zurich, Switzerland); Marc Kuhn (ETH Zurich, Switzerland); Aditya Umbu Tana Amah (ETH Zurich, Switzerland); Armin Wittneben (ETH Zurich, Switzerland)*

**12:10 - 13:40 Lunch break**

**Widely Linear Signal Processing for Two-Way Relaying with MIMO Amplify and Forward Relays**
*Jianshu Zhang (Ilmenau University of Technology, Germany); Martin Haardt (Ilmenau University of Technology, Germany)*

**Optimal Power Allocation for Three-phase Bidirectional DF Relaying with Fixed Rates**
*Zoran Hadzi-Velkov (Ss. Cyril and Methodius University, Macedonia, the former Yugoslav Republic of); Nikola Zlatanov (University of British Columbia, Canada); Robert Schober (University of British Columbia, Canada)*

**Capacity Region of the Bidirectional Broadcast Channel with Causal Channel State Information**
*Majid Nasiri Khormuji (KTH Royal Institute of Technology, Sweden); Tobias J. Oechtering (KTH Royal Institute of Technology & School of Electrical Engineering, EE, Sweden); Mikael Skoglund (KTH Royal Institute of Technology, Sweden)*

**Relay Selection Based Space-Time Coding for Two-Way Wireless Relay Networks Using Digital Network Coding**
*Samer J. Alabed (Technische Universität Darmstadt, Germany); Marius Pesavento (Technische Universität Darmstadt, Germany); Anja Klein (Technische Universität Darmstadt, Germany)*

**10:30 – 12:10 • Room: HU 211/12**

## W1.4: Equalization, Synchronization, Channel Estimation

*Chair: Raimundo Sampaio-Neto (CETUC & Puc-Rio, Brazil)*

**Multiple Shrinkage Factors (MSF) Based MC MU-MIMO Channel Estimation algorithm**
*Sheng Li (Zhejiang University of Technology, P.R. China); Rui Wang (Zhejiang University of Technology, P.R. China); Xiong Xiong He (Zhejiang University of Technology, P.R. China); Gang Li (Zhejiang University of Technology, P.R. China); Duan Zhang (Zhejiang University of Technology, P.R. China)*

**Exploiting Sparsity in Channel and Data Estimation for Sporadic Multi-User Communication**
*Henning F Schepker (University of Bremen, Germany); Carsten Bockelmann (University of Bremen, Germany); Armin Dekorsy (University of Bremen & Institute for Telecommunications and High-Frequency Techniques, Germany)*

**12:10 - 13:40 Lunch break**





**Group Maximum Likelihood Detection in Generalized Spatial Modulation**
*João Cal-Braz (Inmetro & PUC-Rio, Brazil); César A Medina (PUC-Rio, Brazil); Raimundo Sampaio-Neto (CETUC & PUC-Rio, Brazil)*

**Enhanced IEEE 1588 Time Synchronization Scheme with Variable-Length Packets**
*Jinlin Peng (University of Leeds, United Kingdom); Li Zhang (University of Leeds, United Kingdom); Desmond McLernon (University of Leeds, United Kingdom)*

**Improving the performance of nonlinear OFDM Schemes With Optimum-based Reception**
*João Guerreiro (FCT-UNL, Portugal); Rui Dinis (Instituto de Telecomunicacoes & FCT-UNL, Portugal); Paulo Montezuma (FCT-UNL, Portugal); Rodolfo Oliveira (Universidade Nova de Lisboa/Uninova, Portugal)*

**13:40 – 14:40 • Room: Audimax**

## Keynote: Networking Machines for Energy Management

*Chair: Martin Haardt, Ilmenau University of Technology, Germany*

***Anna Scaglione, University of California at Davis, USA***

**14:50 – 16:10 • Room: HU 201**

## W2.1: Wireless Access and Transmission Techniques

*Chair: Carlos Mosquera (Universidad de Vigo, Spain)*

**Analytical Characterization of the Single Frequency Network Gain Using Effective SNR Metrics**
*Alberto Rico-Alvariño (Universidad de Vigo, Spain); Carlos Mosquera (Universidad de Vigo, Spain)*

**Implementation of a low cost RF solution for LTE Pico Base Station**
*Rongrong Shang (Nokia Siemens Networks, P.R. China)*

**Device-to-Device Communication Distance Analysis in Interference Limited Cellular Networks**
*Khaled Hassan (German University in Cairo (GUC), Egypt); Engy Maher (German University in Cairo, Egypt)*

**12:10 - 13:40 Lunch break**
**16:10 - 16:40 Coffee break**

14:50 – 16:10 • Room: Humboldt Hörsaal

## W2.2: Green Networking / Energy

*Chair: Volker Kuhn (University of Rostock, Germany)*

**Sleep Mode Control for Low Power Nodes in Heterogeneous Networks**
*Laetitia Falconetti (Ericsson Research, Germany); László Hévizi (Ericsson Hungary, Hungary); István Gódor (Ericsson Hungary, Hungary)*

**A Novel Lifetime Extension Measure for Optimized Energy-Autonomous Wireless Backhaul Networks**
*Christian Mannweiler (University of Kaiserslautern, Germany); Pratip Chakraborty (University of Kaiserslautern, Germany); Hans D. Schotten (University of Kaiserslautern, Germany)*

**Energy Minimisation in Wireless Multi-Hop Networks with Mutual-Information Accumulation**
*Towfik Ali (University of Rostock, Germany); Stephan Schedler (University of Rostock, Germany); Volker Kuehn (University of Rostock, Germany)*

**Interaction Models for Profiling Assets in an Extensible and Semantic WoT Framework**
*Mohammed Amir (University of Bradford & Seven Gaming, United Kingdom); Yim-Fun Hu (University of Bradford, United Kingdom); Prashant Pillai (University of Bradford, United Kingdom); Yongqiang Cheng (University of Bradford, United Kingdom); Kirils Bibiks (University of Bradford, United Kingdom)*

14:50 – 16:10 • Room: HU 129

## W2.3: MIMO Systems

*Chair: Josef Nossek (Munich University of Technology, Germany)*

**A Tensor-Based Subspace Method for Blind Estimation of MIMO Channels**
*Bin Song (Ilmenau University of Technology, Germany); Florian Roemer (Ilmenau University of Technology, Germany); Martin Haardt (Ilmenau University of Technology, Germany)*

**Robust Transmit Beamforming Design for Full-Duplex Point-to-Point MIMO Systems**
*Jianshu Zhang (Ilmenau University of Technology, Germany); Omid Taghizadeh (Ilmenau University of Technology, Germany); Martin Haardt (Ilmenau University of Technology, Germany)*

**16:10 - 16:40 Coffee break**





**Linear Precoder Design for Correlated Partially Coherent Channels with Discrete Inputs**
*Animesh Yadav (Centre for Wireless Communications, University of Oulu, Finland); Markku Juntti (University of Oulu, Finland); Jorma Olavi Lilleberg (Renesas Mobile, Finland)*

**On the Optimal Precoding for MIMO Gaussian Wire-Tap Channels**
*Arash Khabbazibasmenj (University of Alberta, Canada); Maksym A. Girnyk (KTH Royal Institute of Technology, Sweden); Sergiy A. Vorobyov (Aalto University & University of Alberta on leave, Finland); Mikko Vehkaperä (Aalto University & KTH Royal Institute of Technology, Finland); Lars K. Rasmussen (KTH Royal Institute of Technology, Sweden)*

14:50 – 16:10 • Room: HU 211/12

## W2.4: Wireless Sensor Networks I

*Chair: Paul Mitchell (University of York, United Kingdom)*

**Practical Implementation Issues of Reinforcement Learning Based ALOHA for Wireless Sensor Networks**
*Selahattin Kosunalp (University of York, United Kingdom); David Grace (University of York, United Kingdom); Tim Clarke (University of York, United Kingdom); Paul Mitchell (University of York, United Kingdom)*

**The EuWIn Testbed for 802.15.4/Zigbee Networks: From the Simulation to the Real World**
*Melchiorre Danilo Abrignani (University of Bologna, Italy); Chiara Buratti (University of Bologna, Italy); Davide Dardari (University of Bologna, Italy); Nancy El Rachkidy (Blaise Pascal University, France); Alexandre Guitton (Clermont University, France); Flavia Martelli (University of Bologna, Italy); Andrea Stajkic (DEI, University of Bologna, Italy); Roberto Verdone (University of Bologna, Italy)*

**On Optimal Transmission Policies for Energy Harvesting Devices: the case of two users**
*Nicolò Michelusi (University of Southern California, USA); Davide Del Testa (University of Padova, Italy); Michele Zorzi (University of Padova, Italy)*

**Wireless Sensor Network Based Infrastructure for Experimentally Driven Research**
*Mihael Mohorcic (Jozef Stefan Institute, Slovenia); Miha Smolnikar (Jozef Stefan Institute, Slovenia); Tomaz Javornik (Jozef Stefan Institute, Slovenia)*

**16:10 - 16:40 Coffee break**

16:40 – 17:40 • Room: HU 201

## W3.1: Information Theory for MIMO

*Chair: Deniz Gunduz (Imperial College London, UK)*

**Large-System Analysis of MIMO Wire-Tap Channels with Randomly Located Eavesdroppers**
*Maksym A. Girnyk (KTH Royal Institute of Technology, Sweden); Frederic Gabry (KTH Royal Institute of Technology, Sweden); Mikko Vehkaperä (Aalto University & KTH Royal Institute of Technology, Finland); Lars K. Rasmussen (KTH Royal Institute of Technology, Sweden); Mikael Skoglund (KTH Royal Institute of Technology, Sweden)*

**Modelling Biological Systems using a Parallel Quantized MIMO Channel**
*Martijn Arts (RWTH Aachen University, Germany); Steven Corroy (RWTH Aachen University, Germany); Monika Gorin (RWTH Aachen University, Germany); Marc Spehr (RWTH Aachen University, Germany); Anke Schmeink (RWTH Aachen University, Germany); Rudolf Mathar (RWTH Aachen University, Germany)*

**Linear Transmission of Correlated Gaussian Sources over MIMO Channels**
*Iñaki Estella Aguerri (Centre Tecnològic de la Comunicació de Catalunya (CTTC), Spain); Deniz Gündüz (Imperial College London, United Kingdom)*

16:40 – 17:40 • Room: Humboldt Hörsaal

## W3.2: Self Organization

*Chair: Andreas Mitschele-Thiel (Ilmenau University of Technology, Germany)*

**Sensitivity of OFDMA-Based Macrocellular LTE Networks to Femtocell Deployment Density and Isolation**
*Martin Taranetz (Vienna University of Technology, Austria); Josep Colom Ikuno (Vienna University of Technology, Austria); Markus Rupp (Vienna University of Technology, Austria)*

**Evaluating ICIC Performance in LTE-A Systems**
*Dimitrios Bilios (University of Patras and CTI&P, Greece); Christos Bouras (University of Patras and RACTI, Greece); Georgios Diles (Computer Engineering and Informatics Dept., University of Patras, Greece); Vasileios Kokkinos (CTI Diophantus and University of Patras, Greece); Andreas Papazois (CTI and University of Patras, Greece)*

**18:00 Departure to Erfurt in front of the Audimax (City Tour and Conference Dinner in the Kaisersaal)**





**Autonomous antenna tilt and power configuration based on CQI for LTE cellular networks**
*Muhammad Aatiq Ismail (RWTH-Aachen University, Germany); Xiang Xu (RWTH Aachen University, Germany); Rudolf Mathar (RWTH Aachen University, Germany)*

16:40 – 17:40 • Room: HU 129

## W3.3: Coding for Block Fading Channels

*Chairs: Joseph Jean Boutros (Texas A&M University at Qatar, Qatar), Cornelius Healy (University of York, United Kingdom), André Uchoa (University of York, United Kingdom)*

**Block-Fading Channels at Finite Blocklength**
*Wei Yang (Chalmers University of Technology, Sweden); Giuseppe Durisi (Chalmers University of Technology, Sweden); Tobias Koch (Universidad Carlos III de Madrid, Spain); Yury Polyanskiy (MIT, USA)*

**Repeat Accumulate Based Constructions for LDPC Codes on Fading Channels**
*André Gustavo Degraf Uchôa (University of York, United Kingdom); Cornelius Healy (University of York, United Kingdom); Rodrigo C. de Lamare (University of York, United Kingdom)*

16:40 – 17:40 • Room: HU 211/12

## W3.4: Green Communication and Energy

*Chair: Hideki Ochiai (Yokohama National University, Japan)*

**Maximizing Energy Efficiency for Multiple DF Relay System with QoS Constraint**
*Yulin Hu (RWTH Aachen University & UMIC Research Centre, Germany); James Gross (Royal Institute of Technology (KTH), Sweden); Anke Schmeink (RWTH Aachen University, Germany); Tong Wang (RWTH Aachen University, Germany)*

**On the Optimization of ADC Resolution in Multi-antenna Systems**
*Qing Bai (Technische Universität München, Germany); Amine Mezghani (Technische Universität München); Josef A. Nossek (Technische Universität München, Germany)*

**On Modulation Selection for Energy-Efficient Band-limited Communication Systems**
*Hideki Ochiai (Yokohama National University, Japan)*

**18:00 Departure to Erfurt in front of the Audimax (City Tour and Conference Dinner in the Kaisersaal)**

**10:00 - 12:10 • Room: Foyer**

## Poster session 1: Adaptive and distributed signal processing

*Chair: Luis Castedo (University of La Coruña, Spain)*

**PW 1 Homotopy RLS-DCD adaptive filter**
*Yuriy Zakharov (University of York, United Kingdom)*

**PW 2 Generalized iterative thresholding for sparsity-aware online Volterra system identification**
*Konstantinos Slavakis (University of Minnesota, USA); Yannis Kopsinis (University of Athens, Greece); Sergios Theodoridis (University of Athens, Greece); Georgios B. Giannakis (University of Minnesota, USA); Vassilis Kekatos (University of Minnesota & University of Patras, USA)*

**PW 3 Improved least-squares-based combiners for diffusion networks**
*Jesus Fernandez-Bes (Universidad Carlos III de Madrid, Spain); Luis Azpicueta (Universidad Carlos III de Madrid, Spain); Magno T. M. Silva (University of São Paulo, Brazil); Jerónimo Arenas-García (Universidad Carlos III de Madrid, Spain)*

**PW 4 A Sparsity-Based Design of Regularization Parameter for Adaptive Proximal Forward-Backward Splitting Algorithm**
*Masahiro Yukawa (Keio University, Japan); Yuta Tawara (Niigata University, Japan); Shigenobu Sasaki (Niigata University, Japan); Isao Yamada (Tokyo Institute of Technology, Japan)*

**PW 5 Set-Membership Adaptive Constant Modulus Beamforming Based on Generalized Sidelobe Cancellation with Dynamic Bounds**
*Yunlong Cai (Zhejiang University, P.R. China); Rodrigo C. de Lamare (University of York, United Kingdom)*

**PW 6 Channel Estimation in Spatially Correlated High Mobility MIMO-OFDM Systems**
*Pedro Suárez-Casal (University of La Coruña, Spain); José A. García-Naya (University of La Coruña, Spain); Luis Castedo (University of La Coruña, Spain); Markus Rupp (Vienna University of Technology, Austria)*

**PW 7 Set-Membership Adaptive Soft Combining for Distributed Cooperative Spectrum Sensing**
*Iker Sobron (University of The Basque Country & Federal University of Rio de Janeiro, Spain); Wallace A. Martins (Federal University of Rio de Janeiro & PPEEL-CEFET/RJ, Brazil); Francisco C. Ribeiro, Jr. (Federal University of Rio de Janeiro, Brazil); Marcello Campos (Federal University of Rio de Janeiro, Brazil)*





**PW 8 Convex Combination of Three Affine Projections Adaptive Filters**
*José Arévalo García (Pontifical Catholic University of Rio de Janeiro & Center for Studies in Telecommunicatios, Brazil); José Antonio Apolinário Jr. (IME, Brazil); Marcello Campos (Federal University of Rio de Janeiro, Brazil); Raimundo Sampaio-Neto (Cetuc & PUC-Rio, Brazil)*

**PW 9 Maximizing Network Lifetime for Event-Triggered Distributed Estimation with Performance Constraint**
*Yih-Fang Huang (University of Notre Dame, USA); Amaresh Malipatil (University of Notre Dame, USA)*

## Thursday, August 29, 2013

**9:00 – 10:00 • Room: Audimax**

**Keynote:**
**How Much Energy Needs a Bit?**

*Chair: Martin Haardt, Ilmenau University of Technology, Germany*

***Josef A. Nossek, Munich University of Technology, Germany***

**10:30 – 12:10 • Room: HU 201**

### T4.1: Cooperative Communication and Relaying

*Chair: Tobias Weber (University of Rostock, Germany)*

**Interference Alignment Aided by Locally Connected Relays**
*Xiang Li (University of Rostock, Germany); Hussein A Al-Shatri (University of Rostock, Germany); Rakash SivaSiva Ganesan (TU Darmstadt, Germany); Anja Klein (TU Darmstadt, Germany); Tobias Weber (University of Rostock, Germany)*

**Robust MIMO Relay Precoder Design for Multiple Operator One-Way Relaying with Imperfect Channel State Information**
*Jianhui Li (Ilmenau University of Technology, Germany); Martin Haardt (Ilmenau University of Technology, Germany)*

**Joint Source and Relay Precoding Design for One-Way Full-Duplex MIMO Relaying Systems**
*Jianshu Zhang (Ilmenau University of Technology, Germany); Omid Taghizadeh (Ilmenau University of Technology, Germany); Martin Haardt (Ilmenau University of Technology, Germany)*

**Outage Probability Analysis of an AF Cooperative Multi-Relay Network with Best Relay Selection and Clipped OFDM Transmission**
*Masoud Eddaghel (Loughborough University, United Kingdom); Usama Mannai (Loughborough University, United Kingdom); Jonathon A Chambers (Loughborough University, United Kingdom)*

**Minimizing Flag-Collision Probability in Timer-Based Opportunistic Relaying**
*Mohammad Shaqfeh (Texas A&M University at Qatar); Hussein Alnuweiri (Texas A&M University at Qatar)*

**10:00 - 10:30 Coffee break**
**12:10 - 13:40 Lunch break**





**10:30 – 12:10 • Room: Humboldt Hörsaal**

### T4.2: Multiuser MIMO

*Chair: Armin Dekorsy (University of Bremen & Institute for Telecommunications and High-Frequency Techniques, Germany)*

**Experiments on Coordinated Multipoint Coherent Joint Transmission Using Remote Radio Heads in LTE-Advanced Downlink**
*Keisuke Saito (NTT DOCOMO, INC., Japan); Teruo Kawamura (NTT DOCOMO, INC., Japan); Hidehiro Andoh (NTT DOCOMO, INC., Japan)*

**Measurement Based Evaluation of Interference Alignment on the Vienna MIMO Testbed**
*Martin Mayer (Vienna University of Technology, Austria); Gerald Artner (Vienna University of Technology, Austria); Gabor Hannak (Vienna University of Technology, Austria); Martin Lerch (Vienna University of Technology, Austria); Maxime Guillaud (Vienna University of Technology, Austria)*

**Eigenmode Scheduling via Simulated Annealing for Multiuser MIMO Downlink with Successive Zero-Forcing Precoding**
*Marcin Misiewicz (University of Alberta / TRLabs, Canada); Robert C. Elliott (University of Alberta / TRLabs, Canada); Kevin Jacobson (University of Alberta / TRLaboratories, Canada); Witold A. Krzymień (University of Alberta / TRLabs, Canada)*

**Three Kinds of Inseparability in Parallel MIMO Broadcast Channels with Linear Transceivers**
*Christoph Hellings (Technische Universität München, Germany); Wolfgang Utschick (Technische Universität München, Germany)*

**An achievable Pre-log Region for the Non-coherent Block Fading MIMO Multiple Access Channel**
*Zoran Utkovski (Macedonian Academy of Sciences and Arts, Macedonia, the former Yugoslav Republic of); Danko Ilik (Macedonian Academy of Sciences and Arts, Macedonia, the former Yugoslav Republic of); Ljupco Kocarev (University of California San Diego, USA)*

**12:10 - 13:40 Lunch break**

10:30 – 12:10 • Room: HU 129

## T4.3: Widely-linear Processing, Cooperative Communications, Beamforming and Adaptive Filtering

*Chair: Wolfgang Gerstacker (University of Erlangen-Nuremberg, Germany)*

**Optimal Non-Regenerative Relay Processing with Improper Signals**
*Zuleita Ka Ming Ho (Dresden University of Technology, Germany); Alessio Zappone (Dresden University of Technology, Germany); Eduard Jorswieck (Dresden University of Technology, Germany)*

**Multi-Branch Interference Cancellation with Widely-Linear Processing for Multiuser Cooperative MIMO Systems**
*Thomas Hesketh (University of York, United Kingdom); Rodrigo C. de Lamare (University of York, United Kingdom); Stephen Wales (Roke Manor Research, United Kingdom)*

**Widely-Linear Distributed Beamforming for Weak-Sense Non-Circular Sources Based on Relay Power Minimization**
*Jens Steinwandt (Ilmenau University of Technology, Germany); Martin Haardt (Ilmenau University of Technology, Germany)*

**RF-Aware Widely-Linear MMSE Beamforming**
*Aki Hakkarainen (Tampere University of Technology, Finland); Janis Werner (Tampere University of Technology, Finland); Markku K. Renfors (Tampere University of Technology, Finland); Kapil Dandekar (Drexel University, USA); Mikko Valkama (Tampere University of Technology, Finland)*

**Widely-linear precoders and decoders for MIMO channels**
*Donatella Darsena (University of Napoli Parthenope, Italy); Giacinto Gelli (University of Napoli - Federico II, Italy); Francesco Verde (University of Napoli Federico II & National Laboratory for Multimedia Communications of National Inter-University Consortium for Teleco, Italy)*

**12:10 - 13:40 Lunch break**





10:30 – 12:10 • Room: HU 211/12

## T4.4: Communication Strategies for the Wireless Cloud

*Chair: Jan Sykora (Czech Technical University in Prague, Czech Republic)*

**Wireless Cloud Networks for Critical Industrial Quality Control**
*Stefano Savazzi (CNR - National Research Council of Italy & Politecnico di Milano, Italy); Umberto Spagnolini (Politecnico di Milano, Italy); Leonardo Goratti (Joint Reserach Center (JRC), Italy); Stefano Galimberti (Pepperl+Fuchs srl, Italy)*

**Multilevel Linear Network Coded Modulation for the Wireless Cloud**
*Dong Fang (University of York, United Kingdom); Alister G. Burr (University of York, United Kingdom)*

**Network connectivity through small openings**
*Orestis Georgiou (Toshiba Telecommunications Research Laboratory, United Kingdom); Carl Dettmann (University of Bristol, United Kingdom); Justin Coon (Toshiba TRL, United Kingdom)*

**Interference Leakage Neutralization in Two-Hop Wiretap Channels with Partial CSI**
*Sabrina Engelmann (Dresden University of Technology, Germany); Zuleita Ka Ming Ho (Dresden University of Technology, Germany); Eduard Jorswieck (Dresden University of Technology, Germany)*

**Wireless-aware Network Coding: Solving a Puzzle in Acyclic Multi-stage Cloud Networks**
*Tomas Uricar (Czech Technical University in Prague, Czech Republic); Tomas Hynek (Czech Technical University in Prague, Czech Republic); Pavel Prochazka (Czech Technical University in Prague, Czech Republic); Jan Sykora (Czech Technical University in Prague, Czech Republic)*

**12:10 - 13:40 Lunch break**

13:40 - 14:40 • Room: Humboldt Hörsaal

**Panel:**
**Research activities on 5G systems – What will it be?**

*Moderator: Werner Mohr, Nokia Siemens Networks Management International GmbH, Munich*

*Georgios B. Giannakis, University of Minnesota, USA*
*Thomas Haustein, Fraunhofer Heinrich Hertz Institute, Berlin, Germany*
*Maziar Nekovee, Samsung Electronics, UK*

14:50 - 16:10 • Room: HU 201

**T5.1: Adaptive and Array Signal Processing**

*Chair: Francesco Verde (University of Napoli Federico II & National Laboratory for Multimedia Communications of National Inter-University Consortium for Teleco, Italy)*

**Low-complexity time-varying frequency-shift equalization for doubly selective channels**
*Francesco Verde (University of Napoli Federico II & National Laboratory for Multimedia Communications of National Inter-University Consortium for Teleco, Italy)*

**Some Options for L1-subspace Signal Processing**
*Panos P. Markopoulos (State University of New York at Buffalo, USA); George N. Karystinos (Technical University of Crete, Greece); Dimitris A. Pados (State University of New York at Buffalo, USA)*

**Geometrically Based Statistical Model for Polarized Body Area Network Channels**
*Seok-Chul Kwon (Georgia Institute of Technology, USA); Gordon Stüber (Georgia Institute of Technology, USA); Aida Vera Lopez (Georgia Institute of Technology, USA); John Papapolymerou (Georgia Institute of Technology, USA)*

**Novel Direction-Adaptive Based Reduced-Rank Beamforming Algorithm**
*Rui Wang (Zhejiang University of Technology, P.R. China); Sheng Li (Zhejiang University of Technology, P.R. China); Xiong Xiong He (Zhejiang University of Technology, P.R. China); Gang Li (Zhejiang University of Technology, P.R. China); Duan Zhang (Zhejiang University of Technology, P.R. China)*

16:10 - 16:40 Coffee break





14:50 - 16:10 • Room: Humboldt Hörsaal

**T5.2: QoS I**

*Chair: Paul Mitchell (University of York, United Kingdom)*

**A Novel Adaptive Call Admission Control Scheme for Distributed Reinforcement Learning Based Dynamic Spectrum Access in Cellular Networks**
*Nils Morozs (University of York, United Kingdom); Tim Clarke (University of York, United Kingdom); David Grace (University of York, United Kingdom)*

**A Comparative study of AHPvsANP models for weighting the Context-awareness criteria process in the radio access network's selection**
*Sassi Maaloul (Higher School of Communication, Tunisia); Afif Mériem (SupCom Tunisia, Tunisia); Sami Tabbane (Sup Telecom, Tunisia)*

**End-to-end Delay in Mobile Networks: Does the Traffic Pattern Matter?**
*Markus Laner (Vienna University of Technology, Austria); Joachim Fabini (Vienna University of Technology, Austria); Philipp Svoboda (Vienna University of Technology, Austria); Markus Rupp (Vienna University of Technology, Austria)*

**Traffic Models for Machine Type Communications**
*Markus Laner (Vienna University of Technology, Austria); Philipp Svoboda (Vienna University of Technology, Austria); Navid Nikaein (Eurecom, France); Markus Rupp (Vienna University of Technology, Austria)*

14:50 - 16:10 • Room: HU 129

**T5.3: Space Time Coding and Processing**

*Chair: Ana Perez-Neira (Politechnic University of Catalonia, Spain)*

**Capacity Analysis of MIMO-STBC System in the Presence of Nonlinear Distortion and Neural Network Compensator**
*Oussema Belhadj Belkacem (National Engineering School of Sousse, Canada); Ridha R. Bouallegue, B. (Ecole Supérieure des Communications de Tunis, Tunisia); Mohamed Lassaad Ammari (École de technologie supérieure, Canada); Rafik Zayani (Innov'COM Lab, Sup'Com, Tunisia)*

**A Signal Constellation Design for STBC with Spatial and Temporal Modulation**
*Fumie Ono (National Institute of Information and Communications Technology, Japan); Tatsuya Muramatsu (Yokohama National University, Japan); Hideki Ochiai (Yokohama National University, Japan); Ryu Miura (NICT, Japan)*

16:10 - 16:40 Coffee break

**Improved Turbo Fixed-Complexity Sphere Detection for MIMO Communications**
*Yejian Chen (Alcatel-Lucent, Bell Laboratories, Germany); Stephan ten Brink (Alcatel-Lucent, Bell Laboratories, Germany)*

**A space-frequency coding scheme providing high level of diversity and spectrum efficiency for non-coherent frequency-selective MIMO-OFDM systems**
*Raouia Ayadi (Ecole Supérieure des Commmunications de Tunis, Tunisia); Inès Kammoun (ENIS, Tunisia); Mohamed Siala (Sup'Com, Tunisia)*

**14:50 – 17:40 • Room: HU 211/212**

## TD5.4: Demo session

*Chair: Mohamed Kalil (Ilmenau University of Technology, Germany)*

**Implementation of Real-Time Interference Reduction Techniques for Cognitive Radios**
*Ahmed Selim (Trinity College, Dublin, Ireland); Linda Doyle (Trinity College Dublin, Ireland)*

**Wireless Networks In-the-Loop: Creating a SDR Development Environment**
*Nico Otterbach (Karlsruhe Institute of Technology, Germany); Martin Braun (Karlsruhe Institute of Technology, Germany); Friedrich K. Jondral (Karlsruhe Institute of Technology, Germany)*

**Cognitive Relay: Detecting Spectrum Holes in a Dynamic Scenario**
*Ankit Kaushik (Karlsruhe Institute of Technology, Germany); Marcus Müller (Communication Engineering Lab, Karlsruhe Institute of Technology, Germany); Friedrich K. Jondral (Karlsruhe Institute of Technology, Germany)*

**SNE-ISMTV: VESNA wireless sensor node expansion for cognitive radio experiments**
*Tomaz Solc (Jozef Stefan Institute, Slovenia)*

**Database-assisted Coordinator-based Spectrum Mobility in Cognitive Radio Ad-hoc Networks**
*André Puschmann (Ilmenau University of Technology, Germany); Shah Nawaz Khan (Ilmenau University of Technology, Germany); Mohamed Kalil (Ilmenau University of Technology, Germany); Andreas Mitschele-Thiel (Ilmenau University of Technology, Germany)*

**16:10 - 16:40 Coffee break**





**16:40 – 17:40 • Room: HU 201**

## T6.1: Detection and Estimation Algorithms

*Chair: Sheng Li (Zhejiang University of Technology, P. R. China)*

**Non-Coherent Demapping for Stationary Rayleigh Fading Channels using Semidefinite Programming**
*Steven Corroy (RWTH Aachen University, Germany); Meik Dörpinghaus (TU Dresden, Germany); Rudolf Mathar (RWTH Aachen University, Germany)*

**Design of Optimal Measurement Matrix for Compressive Detection**
*Huang Bai (Zhejiang University of Technology, P.R. China); Zhihui Zhu (Zhejiang University of Technology, P.R. China); Gang Li (Zhejiang University of Technology, P.R. China); Sheng Li (Zhejiang University of Technology, P.R. China)*

**Multi-Feedback Successive Interference Cancellation with Dynamic Log-Likelihood-Ratio Based Reliability Ordering**
*Thomas Hesketh (University of York, United Kingdom); Peng Li (University of York, United Kingdom); Rodrigo C. de Lamare (University of York, United Kingdom); Stephen Wales (Roke Manor Research, United Kingdom)*

**16:40 – 17:40 • Room: Humboldt Hörsaal**

## T6.2: Resource Allocation and Performance Assessment

*Chair: Daniel Roviras (CNAM, France)*

**Queue-Aware Resource Allocation for OFDMA-Based Mobile Relay Enhanced Networks**
*İlhan Baştürk (Izmir Institute of Technology, Turkey); Berna Özbek (Izmir Institute of Technology, Turkey); Didier Le Ruyet (CNAM, France)*

**IEEE 802.11ac: A Performance Assessment of Single-User Transmit Beamforming and Multi-User MIMO Transceiver Architectures**
*Roger Fabris Hoefel (Federal University of Rio Grande do Sul, Brazil)*

**18:00 Departure to Weimar in front of the Audimax (City Tour and Dinner Snack)**

16:40 – 17:40 • Room: HU 129

## T6.3: Error Control Coding

*Chair: Joan Bas (Centre Tecnologic de Telecomunicacions de Catalunya (CTTC), Spain)*

**Defining Turbo Codes as Irregular LDPC codes**
*Joan Bas (Centre Tecnologic de Telecomunicacions de Catalunya (CTTC), Spain)*

**Full Diversity LDPC Codes with a Reduced Structure for General Block Fading Channels**
*Cornelius Healy (University of York, United Kingdom); Rodrigo C. de Lamare (University of York, United Kingdom)*

**Polar Codes for a Quadratic-Gaussian Wyner-Ziv Problem**
*Sajjad Eghbalian (Sharif University of Technology, Iran); Hamid Behroozi (Sharif University of Technology, Iran)*

**18:00 Departure to Weimar in front of the Audimax (City Tour and Dinner Snack)**

10:00 – 12:10 • Room: Foyer

## Poster session 2

*Chair: Didier Le Ruyet (Electronics and Communication Laboratory, France)*

**PT 1 Characterization of output signals for MIMO block-fading channels with imperfect CSI**
*Siyuan Zhou (Politecnico di Torino, Italy); Giuseppa Alfano (Politecnico di Torino, Italy); Carla-Fabiana Chiasserini (Politecnico di Torino, Italy); Alessandro Nordio (IEIIT CNR - Italian National Research Council, Italy)*

**PT 2 SER of Multiple-Relay Cooperative Systems with Selection Combining in Generalized-K Channels**
*Ali Karademir (Istanbul Technical University & PAVO Tasarım Üretim Elektronik Tic. AŞ., Turkey); İbrahim Altunbaş (Istanbul Technical University, Turkey)*

**PT 3 Iterative FDE Design for LDPC-coded Magnitude Modulation Schemes**
*Marco A. C. Gomes (University of Coimbra, Portugal); Rui Dinis (Instituto de Telecomunicacoes & FCT-UNL, Portugal); Vitor Silva (Institute of Telecommunications, Portugal); Francisco Cercas (ISCTE-IUL & Instituto de Telecomunicações, Portugal); Martin Tomlinson (University of Plymouth, United Kingdom)*





**PT 4 Triangular spiral resonators for the design of front-end microstrip coupled circuits**
*Lidiane S Araújo (Federal University of Pernambuco, Brazil); Antonio Belfort (Federal University of Pernambuco, Brazil)*

**PT 5 Performance Comparison of Hierarchical Modulation Receiver Concepts for Different Service Classes**
*Mathias Dehm (Rohde & Schwarz GmbH & Co. KG, Germany); Sebastian Helmle (Rohde & Schwarz GmbH & Co. KG, Germany); Fabian Hohmann (Rohde & Schwarz GmbH & Co. KG, Germany); Michael Kuhn (University of Applied Sciences Darmstadt, Germany); Christian Körner (Rohde & Schwarz GmbH & Co. KG, Germany); Dirk Pesch (Cork Institute of Technology, Ireland)*

**PT 6 Spectrum Sensing Based on Cyclostationarity Approach in Dynamic Traffic Circumstances**
*Youngpo Lee (Sungkyunkwan University, Korea); Youngseok Lee (Sungkyunkwan University, Korea); Seokho Yoon (Sungkyunkwan University, Korea)*

**PT 7 A Two-Stage Unambiguous Scheme for BOC Signal Tracking**
*Youngseok Lee (Sungkyunkwan University, Korea); Seokho Yoon (Sungkyunkwan University, Korea)*

**PT 8 Wi-Fi-Based Performance Analysis of TOA/TDOA Estimators by Stochastic Channel Simulations**
*Kristoph Keunecke (Helmut-Schmidt-University/Electrical Measurement Engineering, Germany)*

**PT 9 Low Complexity Adaptive K-Best Sphere Decoder for 2x1 MISO DVB-T2**
*Ahmad A.Aziz El-Banna (Egypt-Japan University of Science and Technology & Benha University, Egypt); Maha Elsabrouty (Egypt Japan University for Science and Technology, Egypt); Adel Abdel Rahman (Egypt-Japan University of Science & Technology, Egypt)*

**PT 10 Distributed Beamformer Construction for Successive Stream Selection on the Interference Channel**
*Mustapha Amara (CNAM, France); Mylene Pischella (CNAM, France); Didier Le Ruyet (CNAM, France)*

**PT 11 Image and Video Compression Using Easy Path Wavelet Transform**
*Syed Akbar Raza Naqvi (Military College of Signals, National University of Sciences and Technology, Pakistan); Imran Touqir (Military College of Signals, National University of Sciences and Technology, Pakistan); Adil Siddiqui (Military College of Signals, National University of Sciences and Technology, Pakistan)*

**PT 12 Optimization of Aperture Coupled Patch Antenna Arrays with U-Slotted Ground for Bandwidth Enhancement in DoA Estimation Using EADF**
*Mariana Pralon (Ilmenau University of Technology, Germany); Dominik Schulz (Ilmenau University of Technology, Germany); Reiner S. Thomä (Ilmenau University of Technology, Germany)*

**PT 13 Cooperating Set Selection for Reduced Power Consumption and Data Overhead in Downlink CoMP Transmission**
*Chinazo Unachukwu (University of Leeds, United Kingdom); Li Zhang (University of Leeds, United Kingdom); Desmond McLernon (University of Leeds, United Kingdom); Mounir Ghogho (University of Leeds & International University of Rabat, United Kingdom)*

**PT 14 Multimodal multimedia communication with link parameters optimization**
*Virgilio Rodriguez (University Paderborn, Germany)*

**PT 15 Spread spectrum-based cooperative and individual time-frequency synchronization**
*Tohru Kohda (Kyushu University, Japan); Yutaka Jitsumatsu (Kyushu University, Japan); Kazuyuki Aihara (University of Tokyo, Japan)*

**PT 16 An Early Termination Strategy for Irregular LDPC Codes with Layered Decoding - Performance Evaluation and Implementation**
*Miroslav Marinkovic (IHP, Germany); Eckhard Grass (IHP, Germany); Milos Krstic (IHP, Germany)*

**PT 17 Feasibility of DVB-T2 and DVB-NGH Pilot Patterns for Compressed Sensing Based Channel Estimation**
*Matthias Gay (University of Applied Sciences Mittweida, Germany); Alexander Lampe (University of Applied Sciences Mittweida, Germany); Marco Breiling (Fraunhofer IIS, Germany)*

**PT 18 Parametric Mesh Reconstruction Pipeline from 3D Point Clouds**
*Marco Niehaus (Ilmenau University of Technology, Germany); Lorenz Esch (Ilmenau University of Technology); Gerald Schuller (Ilmenau University of Technology & Fraunhofer Institute for Digital Media Technology, Germany)*





## Friday, August 30, 2013

**09:00 – 10:00 • Room: Audimax**

**Keynote:**
**Games, Privacy and Distributed Inference for the Smart Grid**

*Chair: Rodrigo C. de Lamare, Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Brazil and University of York, UK*

***Vincent Poor, Princeton University, USA***

**10:30 – 12:10 • Room: HU 201**

**F7.1: Multicarrier Systems**

*Chair: Markku K. Renfors (Tampere University of Technology, Finland)*

**Widely Linear Processing in MIMO FBMC/OQAM Systems**
*Yao Cheng (Ilmenau University of Technology, Germany); Martin Haardt (Ilmenau University of Technology, Germany)*

**An Improved Chip Detector for OFDM-IDMA over Fast Time-Variant Channels**
*Ji Lianghai (Technical University of Kaiserslautern, Germany); Werner G. Teich (Ulm University, Germany)*

**Practical Evaluation of NC-OFDM System Designs in Dynamic Spectrum Access with Narrow-Band Interference**
*Christoph Thein (Leibniz Universität Hannover, Germany); Martin Fuhrwerk (Leibniz Universität Hannover, Germany); Jürgen Peissig (Leibniz Universität Hannover, Germany)*

**Sum rate maximization in asynchronous ad hoc networks: comparison of multi-carrier modulations**
*Mylene Pischella (CNAM, France); Didier Le Ruyet (Electronics and Communication Laboratory, France); Yahia Medjahdi (CNAM, France)*

**BEP of Fourier Transform and Discrete Wavelet Transform based OFDM**
*Qinwei He (RWTH Aachen University, Germany); Christoph Schmitz (RWTH Aachen University, Germany); Anke Schmeink (RWTH Aachen University, Germany)*

**10:00 - 10:30 Coffee break**
**12:10 - 13:40 Lunch break**

**10:30 – 12:10 • Room: Humboldt Hörsaal**

## F7.2: QoS II

*Chair: Yuming Jiang (Norwegian University of Science and Technology (NTNU), Norway)*

**Perceived Quality of Service and Context Awareness Strategy for Heterogeneous Wireless Connectivity Management**
*Sassi Maaloul (Sup'Com, Tunisia); Afif Mériem (Sup'Com, Tunisia); Sami Tabbane (Sup'Com, Tunisia)*

**A QoE-driven Adaptation Scheme for Video Content Delivery in LTE Networks**
*Dimitrios J. Vergados (Norwegian University of Science and Technology, Norway); Angeliki Sgora (VTT Technical Research Centre of Finland & University of Piraeus, Finland); Angelos Michalas (Tecnological Educational Institute of Western Macedonia, Greece); Dimitrios D. Vergados (University of Piraeus, Greece); Jukka-Pekka Laulajainen (VTT Technical Research Centre of Finland, Finland); Yuming Jiang (Norwegian University of Science and Technology (NTNU), Norway)*

**An enhanced Quality Aware Multi path routing protocol over MANETs based on cross layer approach**
*Mariem Thaalbi (Sup'Com, Tunisia); Nabil Tabbane (Sup'Com, Tunisia); Tarek Bejaoui (University of Paris-Sud 11, France); Ahmed Meddahi (Institut Mines Telecom/Telecom Lille, France)*

**Simple Traffic Modeling Framework for Machine Type Communication**
*Navid Nikaein (Eurecom, France); Markus Laner (Vienna University of Technology, Austria); Kaijie Zhou (Eurecom, France); Philipp Svoboda (Vienna University of Technology, Austria); Dejan Drajic (Ericsson, Serbia); Milica Popovic (Telekom Srbija, Serbia); Srdjan Krco (Ericsson & University of Belgrade, Faculty of Organizational Sciences, Serbia)*

**10:30 – 12:10 • Room: HU 129**

## F7.3: Widely-linear Processing, Frequency Domain Equalization, MIMO and Scheduling

*Chairs: Wolfgang Gerstacker (University of Erlangen-Nuremberg, Germany)*

**Widely Linear Iterative Equalizers for SC-FDE Systems**
*Bruno Chang (Federal University of Technology - Paraná, Brazil); Carlos Aurélio Rocha (Federal University of Santa Catarina, Brazil); Didier Le Ruyet (CNAM, France); Daniel Roviras (CNAM, France)*

**12:10 - 13:40 Lunch break**





**Application of WLF to OFDMA MU-MIMO Systems I: Frequency-Domain Equalization**
*Pei Xiao (University of Surrey, United Kingdom); Zihuai Lin (University of Sydney, Australia); Yi Wu (Fujian normal university, P.R. China)*

**Application of WLF to OFDMA MU-MIMO Systems II: Frequency-Domain Packet Scheduling**
*Zihuai Lin (University of Sydney, Australia); Pei Xiao (University of Surrey, United Kingdom); Yi Wu (Fujian normal university, P.R. China)*

**Real Interference Alignment with Opportunistic Scheduling**
*Kiran Kuchi (IIT Hyderabad, India)*

**Exploiting Sparsity in Widely Linear Estimation**
*Dahir Dini (Imperial College London, United Kingdom); Danilo Mandic (Imperial College, London, United Kingdom)*

**10:30 – 12:10 • Room: HU 211/12**

## F7.4: Wireless Sensor Networks II

*Chair: Faouzi Bader (SUPELEC, France)*

**Distributed CS-CDMA Wireless Sensor Networks in Frequency Selective Channel**
*Rodrigo David (Inmetro & PUC-Rio, Brazil); Raimundo Sampaio-Neto (CETUC & PUC-Rio, Brazil); César A Medina (PUC-Rio, Brazil)*

**Adaptive Joint Power Allocation and Interference Suppression Algorithm Based on MSER Criterion for Wireless Sensor Networks**
*Guijie Wang (Zhejiang University, P.R. China); Yunlong Cai (Zhejiang University, P.R. China); Minjian Zhao (Zhejiang University, P.R. China); Jie Zhong (Zhejiang University, P.R. China)*

**Performance Evaluation of an Enhanced Frequency Hopping Transceiver in 5 GHz Band for Wireless Sensor Networks**
*Rafael Reinhold (TU Dortmund University, Germany); Falk-Moritz Schaefer (TU Dortmund University, Germany); Ruediger Kays (TU Dortmund University, Germany)*

**Multi-UAV Node Placement Strategies for Meshed Field Coverage**
*Thomas Dietrich (Ilmenau University of Technology, Germany); Ralph Maschotta (Ilmenau University of Technology, Germany); Armin Zimmermann (Ilmenau University of Technology, Germany)*

**Algorithm for power allocation in localization processes**
*Luca Reggiani (Politecnico di Milano, Italy); Salar Bybordi (Politecnico di Milano, Italy)*

**12:10 - 13:40 Lunch break**

13:40 – 14:40 • Room: Audimax

**Keynote:**
**On the interaction between network coding and the physical layer**

*Chair: Andreas Mitschele-Thiel, Ilmenau University of Technology, Germany*

***Muriel Médard, Massachusetts Institute of Technology, USA***

14:50 – 16:10 • Room: HU 201

**F8.1: Routing**

*Chair: Ulrich Barth (Bell Labs, Alcatel-Lucent, Germany)*

**An enhanced routing protocol for 802.11s-LTE communications**
*Mariem Thaalbi (Sup'Com, Tunisia); Nabil Tabbane (Sup'Com, Tunisia); Tarek Bejaoui (University of Paris-Sud 11, France); Ahmed Meddahi (Institut Mines Telecom/ Telecom Lille, France)*

**Multi-hop Coordination in Gossiping-based Wireless Sensor Networks**
*Zhiliang Chen (TU Darmstadt, Germany); Alexander Kuehne (TU Darmstadt, Germany); Anja Klein (TU Darmstadt, Germany)*

**Unequal Security Protection: A Unified Framework, Implementation, and Performance Evaluation of Theoretical and Practical Security**
*Apirath Limmanee (Burapha University, Thailand); Wiroon Sriborrirux (Burapha University, Thailand); Sorakrai Kraipui (Burapha University, Thailand)*

14:50 – 16:10 • Room: Humboldt Hörsaal

**F8.2: Protocols**

*Chair: Roger Fabris Hoefel (Federal University of Rio Grande do Sul, Brazil)*

**A Double Stage Random Access Scheme for Decentralized Single Radio Cognitive Networks**
*Rodolfo Oliveira (Universidade Nova de Lisboa/Uninova, Portugal); Luís M. Borges (Instituto de Telecomunicações, Portugal); Fernando J. Velez (University of Beira Interior & Instituto de Telecomunicações, Portugal)*

**Medium Access Probability in Uniform Networks with General Propagation Models**
*Giancarlo Pastor (Aalto University & King Juan Carlos University, Finland); Inmaculada Mora (Rey Juan Carlos University of Madrid, Spain); Antonio J. Caamaño (Rey Juan Carlos University of Madrid, Spain); Riku Jäntti (Aalto University School of Electrical Engineering, Finland)*

**16:10 - 16:40 Coffee break**
**16:40 - 17:40 Closing Session and Awards Ceremony (Room: Audimax)**





**Inverse Binary Exponential Backoff: Enhancing Short-term Fairness for IEEE 802.11 Networks**
*Khaled H Almotairi (Umm Al-Qura University, Saudi Arabia)*

**Analysis of the Performance Boundaries of Sub-1 GHz WLANs in the 920 MHz ISM-Band**
*Stefan Aust (NEC Communication Systems, Ltd., Japan); R Venkatesha Prasad (Delft University of Technology, The Netherlands); Ignas G.M.M. Niemegeers (Delft University of Technology, The Netherlands)*

14:50 – 16:10 • Room: HU 129

**F8.3: High Performance and Parallel Computation in Communication Systems**

*Chair: Gema Piñero (Universidad Politecnica de Valencia, Spain)*

**A Novel Scheduling Methodology Based on SDL Process Migration for the LTE Higher Layer Protocol on Multi-Core Mobile Terminals**
*Anas Showk (KROHNE Innovation GmbH, Germany); Attila Michael Bilgic (Krohne GmbH & Ruhr-Universitaet Bochum, Germany)*

**Efficient GPU implementation of Lattice-Reduction-Aided Multiuser Precoding**
*Csaba Máté Józsa (Pázmány Péter Catholic University, Hungary); Fernando Domene (Universidad Politècnica de València, Spain); Gema Piñero (Universidad Politècnica de València, Spain); Alberto Gonzalez (Universidad Politècnica de València, Spain); Antonio M. Vidal (Universidad Politècnica de València, Spain)*

**Stressing the BER simulation of LDPC codes in the error floor region using GPU clusters**
*Gabriel Falcao (Instituto de Telecomunicações, University of Coimbra, Portugal); Joao Andrade (Instituto de Telecomunicações, University of Coimbra, Portugal); Vitor Silva (Institute of Telecommunications, Portugal); Shinichi Yamagiwa (University of Tsukuba, Japan); Leonel A Sousa (INESC-ID / IST, Technical University of Lisbon, Portugal)*

**Mapping of MIMO Receiver Algorithms onto Application-Specific Multi-Core Platforms**
*Daniel Guenther (RWTH Aachen University Germany); Rainer Leupers (RWTH Aachen University, Germany); Gerd H. Ascheid (RWTH Aachen University, Germany)*

**16:10 - 16:40 Coffee break**
**16:40 - 17:40 Closing Session and Awards Ceremony (Room: Audimax)**

**14:50 – 16:10 • Room: HU 211/12**

## F8.4: Spread Spectrum Systems: UWB, CDMA

*Chair: Sheng Li (Zhejiang University of Technology, China)*

**Secure CDMA and Frequency Hop Sequences**
*Anatolii Leukhin (Volga State University of Technologies, Russia); Oscar Moreno (Gauss Research Laboratory, Puerto Rico); Andrew Z Tirkel (Scientific Technology, Australia)*

**Sparse IR-UWB Channel Identification Based on Successive Relaxations and Least Squares Estimation**
*Alexandre Torturela (PUC-Rio, Brazil); Rodrigo C. de Lamare (University of York, United Kingdom); César A Medina (PUC-Rio, Brazil); Raimundo Sampaio-Neto (CETUC & PUC-Rio, Brazil)*

**Multiuser Interference Mitigation in DS-UWB Ranging System**
*Hang Ma (CNRS-LAAS, INSA, Université de Toulouse, France); Pascal Acco (INSA, France); Marie-Laure Boucheret (Université de Toulouse IRIT Enseeiht, France); Danièle Fournier-Prunaret (Université de Toulouse, France)*

**10:00 - 12:10 • Room: Foyer**

## Poster session 3

*Chair: André Uchoa (University of York, United Kingdom)*

**PF 1 Energy consumption of the sensors of Smartphones**
*Immanuel Koenig (University of Kassel, Germany); Klaus David (University of Kassel, Germany); Abdul Memon (University of Kassel, Germany)*

**PF 2 Battery-Aware Selective Transmitters in Energy-Harvesting Sensor Networks: Optimal Solution and Stochastic Dual Approximation**
*Jesus Fernandez-Bes (Universidad Carlos III de Madrid, Spain); Antonio G. Marques (Universidad Rey Juan Carlos, Spain); Jesus Cid-Sueiro (Universidad Carlos III de Madrid, Spain)*

**PF 3 Distributed Frame Size Selection Algorithm for Q Learning based Slotted ALOHA**
*Yan Yan (University of York, United Kingdom); Paul Mitchell (University of York, United Kingdom); Tim Clarke (University of York, United Kingdom); David Grace (University of York, United Kingdom)*

**PF 4 Synchronized Wireless Local Area Networks**
*Joachim Wilharm (Technische Universität Hamburg-Harburg, Germany); Hermann Rohling (Technische Universität Hamburg-Harburg, Germany)*

**16:10 - 16:40 Coffee break**
**16:40 - 17:40 Closing Session and Awards Ceremony (Room: Audimax)**



# GENERAL INFORMATION

## ISWCS 2013 CONFERENCE SECRETARIAT

For detailed information please contact:
VDE-Conference Services
Jacqueline Born
Stresemannallee 15
60596 Frankfurt
Germany
Phone: +49-(0)69-63 08 - 229/ -477
Fax: +49-(0)69-63 08 144
E-mail: jacqueline.born@vde.com
www.vde.com

## ISWCS 2013 CONFERENCE WEB SITE

A homepage presenting the latest information related to the conference can be found at: www.iswcs2013.org

## REGISTRATION ON-SITE

The registration desk on site will be open at the following office hours:

| | |
|---|---|
| Tuesday, August 27 | 08:00 – 17:30 |
| Wednesday, August 28 | 08:00 – 17:30 |
| Thursday, August 29 | 08:30 – 17:30 |
| Friday, August 30 | 08:30 – 16:00 |

## REGISTRATION FEES

| | after July 27, 2013 |
|---|---|
| IEEE/SEE/VDE-member* | 850,- € |
| Non-member | 950,- € |
| Student** | 450,- € |
| Workshop only (IEEE/SEE/VDE-member)* | 300,- € |
| Workshop only (Non-member) | 300,- € |

* Participants applying for the membership fee must include a copy of their membership card to the registration form.

** A copy of the student's certification card has to be endorsed by a supervisor or head of department and must be attached to the registration form.

- Presenting authors, co-authors, committee members and session chairs are not exempt from paying registration fees.

**Regular Conference Registration and Student Registration**

- Member and non member registration includes admission to all plenary and technical sessions as well as the attendance in the workshops and tutorials, and to the daily coffee breaks and luncheons, the welcome reception, the banquet at the Kaisersaal and both city tours as well as one copy of the electronic proceedings (memory stick).

## PROCEEDINGS

All papers accepted and presented at the conference will be published in the proceedings (memory stick). The proceedings will be handed out to all delegates attending the event.

## BADGES

Delegates will receive badges for the conference showing their name and company. All participants are kindly requested to wear their badge throughout the conference, even at social events. Lost badges will not be replaced. A new registration will be mandatory.

## PAYMENT

Payment for registration, hotel, tours and visits, including bank charges and processing fees, must be made in Euro. The conference fee has to be fully paid in advance. The following methods of payment are accepted:

– By credit card authorisation as per registration form. The 16 digit card number, expiry date, security No. (last 3/4 digits on rear side of credit card) and holder's name must be indicated on the registration form. Signature of the card holder is mandatory.

- Cash payment on-site in EURO (€)

## CANCELLATION

In case of cancellation, provided that written notice is received at the VDE-Conference Services before July 27, 2013 (except authors registration), the registration fee will be fully refunded less a handling fee of 60,- €. After July 27, 2013 no refund will be made. Proceedings will then be sent to the registrant after the conference.

## VENUE

Ilmenau University of Technology
Humboldtbau (Conference building on the Hans-Stamm-Campus)
Ehrenbergstr. 29
98693 Ilmenau
Germany
Phone: +49-(0)3677-69-0
http://www.tu-ilmenau.de/en/international/

## OFFICIAL LANGUAGE

All sessions will be held in English only.

## MESSAGES

Incoming mail, phone calls and e-mails for participants will be displayed on a message board near the registration desk. During the conference, messages for delegates may be sent to the registration counter on-site.

Phone: +49-(0)3677 69-2790
Fax: +49-(0)3677 69-1743
E-mail: vde-conferences@vde.com

## PARKING LOT

Parking spaces are reserved for ISWCS attendees right behind the building "Arrhenius" near the conference building. From there, you can easily reach the conference building (Humboldtbau) within a few minutes walking distance.

## POSTER DISPLAY

The poster display will be open for hanging posters every day starting at 8:00 a.m. The pin walls will be numbered according to the ID number given in the program. The standard poster size is DIN A0 format. The Poster session will take place in the Foyer.

## AWARDS INFORMATION

The ISWCS 2013 Awards Committee will recognize outstanding research works presented during the conference.

## SOCIAL PROGRAMME

- The Welcome Reception will be organized at the Humboldt-Building of Ilmenau University of Technology with drinks, snacks, and jazz music on Tuesday, August, 27.
- On Wednesday, August 28, a one-hour guided City tour through Erfurt will be followed by the ISWCS Banquet at the “Kaisersaal” (Imperial Hall).
- A guided City tour through the "Classical Weimar" with subsequent dinner snack will be organised on Thursday, August 29.

The recommended dress for all social events is business casual.

- For attendees, who decide to extend their stay in Ilmenau, the ISWCS organizers offer a guided tour (including transfer) to the Wartburg Castle in Eisenach on Saturday, August 31 for additional 50,-- €/person.

## CATERING

Coffee breaks will take place in the foyer of the Humboldt-building. Lunches will be served in the Mensa 3.

## INSURANCE

The organizers may not be held responsible for any injury to participants or damage, theft and loss of personal belongings. Participants should therefore make their own insurance arrangements.

## EMERGENCY CALLS

Fire/Ambulance **112**
Police **110**

From some phones an additional "0" (0112 or 0110) might be required to place a call.



## TIPPING

Tipping is at your own discretion. In Germany all taxes and tips are included in hotel and restaurant bills. A good service may be rounded up by 5 to 10 %.

## WEATHER / CLIMATE

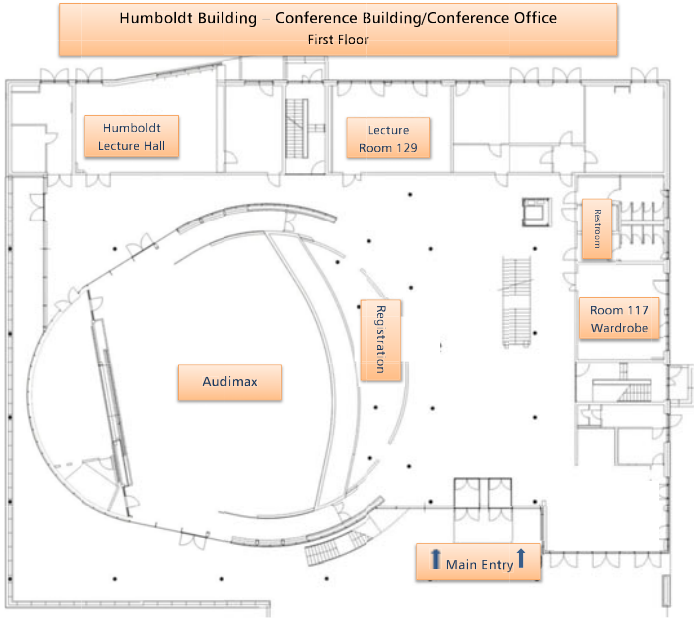
In August the weather is moderate, with daily temperatures between 15 an 25°C. However, evenings are sometimes cool. Rain is not uncommon, so be prepared!

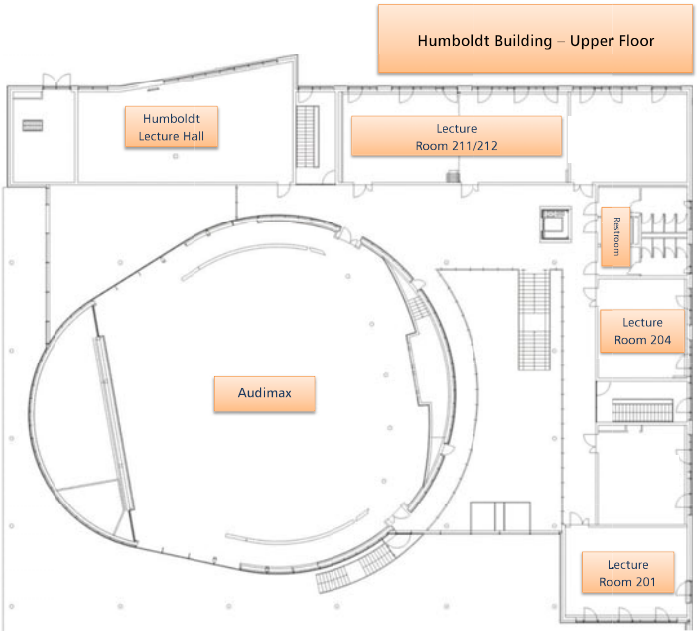
## ELECTRICITY / PHONE PATCH

The mains power supply is 230 V AC, 50 Hz. Authors presenting from their laptop are kindly asked to have connectors available for the mains and Texas or TAE 6 (German phone standard) to connect the phone grid.

Connectors are available at most international airports or department stores. Most hotels have TAE 6 or Texas plug-ins in the rooms or business centre.

## Floor plan Humboldt Building




## NOTES

## Tuesday, August 27, 2013

| Room: | Humboldt Hörsaal | HU 201 | HU 129 | HU 211/12 | HU 204 |
|---|---|---|---|---|---|
| 08:00–08:50 | Registration | | | | |
| 09:00–10:00 | **WS1** Advanced Multicarrier Waveforms and Mechanisms for Future Ad-Hoc and Cell-Based Systems | **WS2** Green Terminals for Next Generation Wireless Systems (Green-T) | | **Tutorial 1** Coordinated Multi-Point in Cellular Networks: From Theoretical Gains to Realistic Solutions and their Potentials | **Tutorial 2** The 4G Long-Term Evolution Concept for Cellular Networks |
| 10:20–10:50 | Coffee break | | | | |
| 12:10–13:40 | Lunch break | | | | |
| 13:40–14:40 | | | **WS3** Cognitive Radio Advances, Applications and Future Emerging Technologies | **Tutorial 3** Wireless Communications for Smart Grid – Opportunities and Challenges | **Tutorial 4** Energy Harvesting Wireless Communication Networks |
| 15:10–15:30 | Coffee break | | | | |
| 15:30–16:40 | | **WS4** Energy Efficient Wireless Networks | | | |
| 16:50–17:10 | Coffee break | | | | |
| 18:10–21:00 | Welcome Reception | | | | |

## Wednesday, August 28, 2013

| Room: | HU 201 | Humboldt Hörsaal | HU 129 | HU 211/12 | Foyer |
|---|---|---|---|---|---|
| 08:00–08:50 | Registration | | | | |
| 08:30–09:50 | Opening Session | | | | |
| 09:00–10:30 | Audimax: **Keynote: Sparsity and Low Rank for Robust Social Data Analytics and Networking** *Georgios B. Giannakis* | | | | |
| 10:00–10:30 | Coffee break | | | | |
| 10:30–12:10 | **W1.1** Information Theory | **W1.2** Cognitive Radio Networking | **W1.3** Two-way Relaying | **W1.4** Equalization, Synchronization, Channel Estimation | **Poster session 1** Adaptive and Distributed Signal Processing |
| 12:10–13:40 | Lunch break | | | | |
| 13:40–14:40 | Audimax: **Keynote: Networking Machines for Energy Management** *Anna Scaglione* | | | | |
| 14:50–16:10 | **W2.1** Wireless Access and Transmission Techniques | **W2.2** Green Networking / Energy | **W2.3** MIMO Systems | **W2.4** Wireless Sensor Networks I | |
| 16:10–16:40 | Coffee break | | | | |
| 16:40–17:40 | **W3.1** Information Theory for MIMO | **W3.2** Self Organization | **W3.3** Coding for Block Fading Channels | **W3.4** Green Communication and Energy | |
| 18:00 | Departure to Erfurt | | | | |

## Thursday, August 29, 2013

| Room: | HU 201 | Humboldt Hörsaal | HU 129 | HU 211/212 | Foyer |
|---|---|---|---|---|---|
| 08:30–08:50 | Registration | | | | |
| 09:00–09:50 | Audimax: **Keynote: How Much Energy Needs a Bit?** *Josef A. Nossek* | | | | |
| 10:00–10:30 | Coffee break | | | | |
| 10:30–12:10 | **T4.1** Cooperative Communication and Relaying | **T4.2** Multiuser MIMO | **T4.3** Widely-linear Processing, Cooperative Communications, Beamforming and Adaptive Filtering | **T4.4** Communication Strategies for the Wireless Cloud | **Poster session 2** |
| 12:10–13:40 | Lunch break | | | | |
| 13:40–14:40 | Audimax: **Panel: Research activities on 5G systems - What will it be?** *Werner Mohr* | | | | |
| 14:50–16:10 | **T5.1** Adaptive and Array Signal Processing | **T5.2** QoS I | **T5.3** Space Time Coding and Processing | **TD5.4** Demo session | |
| 16:10–16:40 | Coffee break | | | | |
| 16:40–17:40 | **T6.1** Detection and Estimation Algorithms | **T6.2** Resource Allocation and Performance Assessment | **T6.3** Error Control Coding | | |
| 18:00 | Departure to Weimar | | | | |

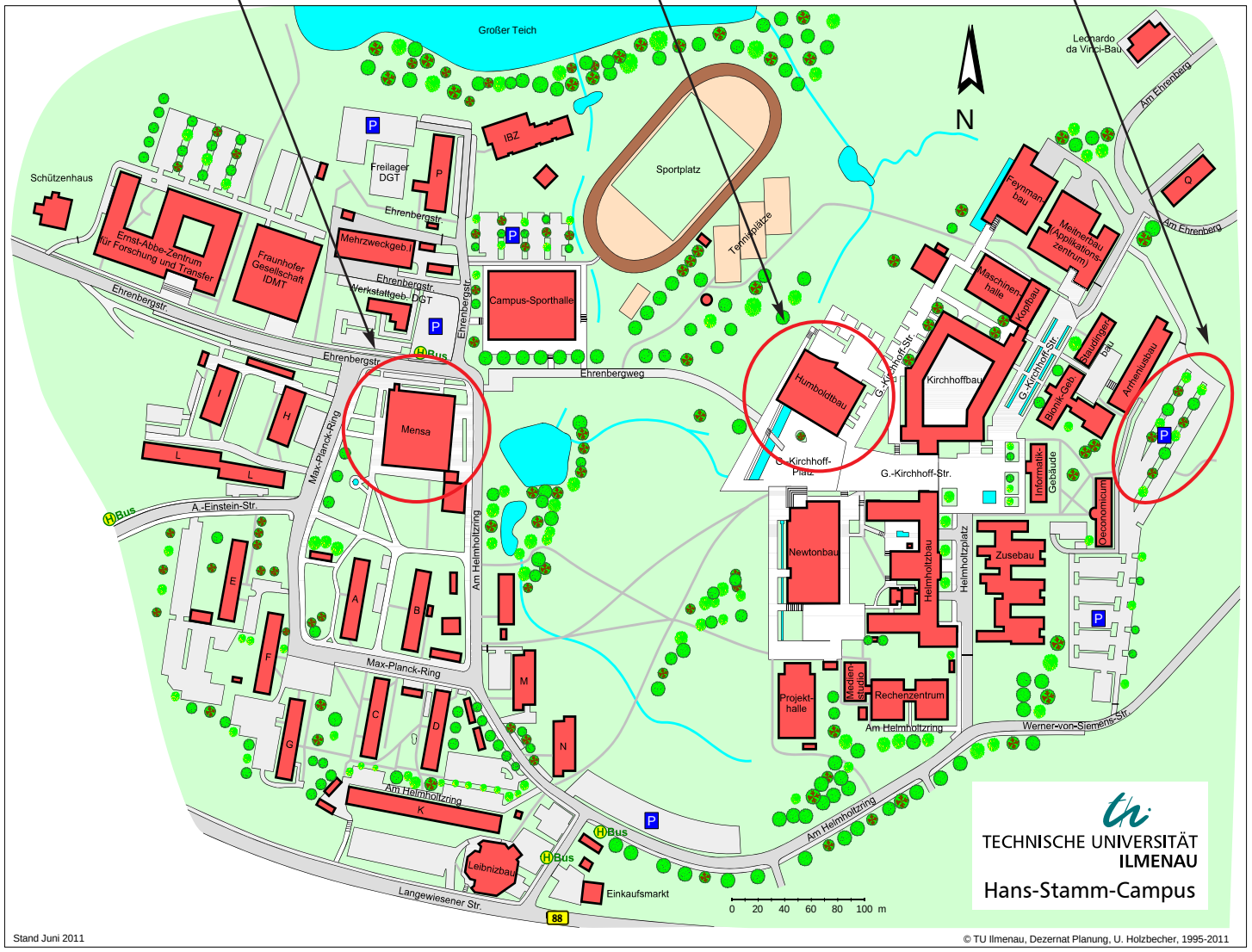
## Friday, August 30, 2013

| Room: | HU 201 | Humboldt Hörsaal | HU 129 | HU 211/12 | Foyer |
|---|---|---|---|---|---|
| 08:30–08:50 | Registration | | | | |
| 09:00–09:50 | Audimax: **Keynote: Games, Privacy and Distributed Inference for the Smart Grid** *Vincent Poor* | | | | |
| 10:00–10:30 | Coffee break | | | | |
| 10:30–12:10 | **F7.1** Multicarrier Systems | **F7.2** QoS II | **F74.3** Widely-linear Processing, Frequency Domain Equalization, MIMO and Scheduling | **F7.4** Wireless Sensor Networks II | **Poster session 3** |
| 12:10–13:40 | Lunch break | | | | |
| 13:40–14:40 | Audimax: **Keynote: On the interaction between network coding and the physical layer** *Muriel Médard* | | | | |
| 14:50–16:10 | **F8.1** Routing | **F8.2** Protocols | **F8.3** High Performance and Parallel Computation in Communication Systems | **F8.4** Spread Spectrum Systems: UWB, CDMA | |
| 16:10–16:40 | Coffee break | | | | |
| 16:40–17:40 | Audimax: **Closing Session and Awards Ceremony** | | | | |

Mensa 3

Humboldtbau
(Conference building)

Parking

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