COST INTERACT / PEPR Future Networks

Workshop – Future of Networks

Tuesday, September 30, 2025
ENSAM "Arts et Métiers"
Campus de Lille, 8 bd Louis XIV - 59046 LILLE.

The **COST Action INTERACT** and the **French PEPR Future Networks Program** are co-organizing a one-day workshop bringing together researchers from both communities to share recent advances and discuss the future evolution of communication networks. Topics will span architecture, IoT, signal processing, propagation, and hardware.

*If you are **not** an INTERACT member but would like to attend, please email us at laurent.clavier [at] imt-nord-europe.fr with your name so we can grant you access to the workshop venue.*
If you prefer to follow the presentations online, please provide us with your email address so we can send you the connection link.

9:00 - Welcome Words		
9:15	Jean Schwoerer (Orange, FR)	The Future of Mobile Networks: an operator's perspective in a changing world
10:00 – BREAK		
10:30	Chiara Buratti (UniBo, IT)	Industrial IoT: From 5G to Goal Oriented 6G
11:00	Hamed Ahmadi (Univ. York, UK)	O-RAN as a solution for energy efficient and sustainable intelligent networking in 6G
11:30	Shanshan Wang (Télécom PARIS, FR)	Environmental Sustainability & Acceptability
12:00	Nathalie Miton (INRIA, Lille, FR)	SLICES
12:30 – LUNCH		
13:30	Arsenia Chorti (ENSEA, FR)	Physical layer security in 6G: From theory to practice
14:00	Ana Garcia Armada (UC3M, SP)	The role of channel estimation in 6G
14:30	Yang Miao (Univ. Twente, NL)	Sensing the Future, Communicating the Present
15:00	Jean-Baptiste Doré (CEA-Leti, FR)	6G Horizons: Challenges for Sustainable and Intelligent Wireless Networks
15:30 – BREAK		
16:00	Fredrik Tufvesson (Lund Univ., SE)	Ultra-reliable communication with distributed MIMO, is there a problem?
16:30	Mate Boban (Huawei, DE)	Learning the radio environment: ML-based Radio Map Generation and Channel Prediction
17:00	Guillaume Ducournau (Univ. Lille, FR)	mm and THz links enabled by RIS: specular and non-specular OTA measurements at 300 GHz
17:30	Marco Di Renzo (CentraleSupélec, Paris, France)	Stacked Intelligent Metasurfaces: Communication, Sensing and Computing in the Wave Domain

09:15 – 10:00: Keynote - Jean SCHWOERER (Orange)

Jean Schwoerer (Orange, France)

Title: The Future of Mobile Networks: an operator's perspective in a changing world

Bio: Leading Orange Research's Future Networks & Infrastructures | Senior Expert in Future Networks | NGMN Delegate and 6G-IA Board Member | Shaping Tomorrow's Connectivity. Experienced Research Engineer with a demonstrated history of working in the telecommunications industry. Strong engineering professional skilled in Mobile Telecommunications (LTE, 5G NR), as well as unlicenced technologie, especially in the IoT field (WiFi, IEEE 802.15, UWB, LoRa). Strong expertise on IoT connectivity, from technologie to uses cases and business model. Experienced in research project management as well as in international standard development (IEEE 802, 3GPP RAN)

10:30 – 12:30: Session I – Network / IoT (4 × 30')

Chiara Buratti (University of Bologna, Italy)

Title: Industrial IoT: From 5G to Goal Oriented 6G

Abstract: Industrial Internet of Things (IIoT) applications impose stringent requirements in terms of latency, energy efficiency, and reliability. Moreover, industrial environments are often characterised by heterogeneous data sources with dynamic and sometimes conflicting communication demands. While 5G was envisioned as the enabling technology for these scenarios, it has not fully delivered on its promises, leaving open challenges that must be addressed in the design of future 6G networks. A promising research direction lies in goal-oriented communication architectures, which shift the focus from transmitting raw data to delivering only the information that is most relevant for accomplishing a task. This paradigm is particularly appealing for IIoT, where efficient use of communication resources is critical. In this talk, after a brief overview of envisioned 6G IIoT applications and current research gaps, we will discuss how goal-oriented approaches can optimize resource usage and enhance performance in multi-goal scenarios.

Bio: Chiara Buratti received the Ph.D. degree in electronics, information technologies and telecommunications engineering from the University of Bologna, Bologna, Italy, in 2009. She is currently an Associate Professor with the University of Bologna. She coauthored approx. 150 papers. Her research interests include IoT and industrial IoT, with emphasis on MAC and routing protocols, and on 3D networks. She was the recipient of the 2012 Intel Early Career Faculty Honor Program Award, provided by Intel, Oregon, and 2010 National GTTI Best Ph.D. Thesis. She has been PI of the COST Innovators Grant, Immunet. She was the main proponent of the Cost Action CA20120, INTERACT. She is currently the Vice-Chair and Grant Holder of the Action.

Hamed Ahmadi (University of York, UK)

Title: O-RAN as a solution for energy efficient and sustainable intelligent networking in 6G

Abstract: The transition to 6G is expected to bring significant advancements, including much higher data rates, enhanced reliability and ultra-low latency compared to previous generations. Although 6G is anticipated to be 100 times more energy-efficient, this increased efficiency does not necessarily mean reduced energy consumption or enhanced sustainability. Network sustainability encompasses a broader scope, integrating business viability, environmental sustainability, and social responsibility. This talk presents the sustainability requirements for 6G and proposes Open RAN as a key architectural solution. By enabling network diversification, fostering open and continuous innovation, and integrating AI/ML, Open RAN can promote sustainability in 6G. The set of works presented in this talk identifies high energy consumption and e-waste generation as critical sustainability challenges and discusses how Open RAN can address these issues through softwarisation, edge computing, and AI integration.

Bio: HAMED AHMADI (Senior Member, IEEE) received the Ph.D. degree from the National University of Singapore in 2012. He is a Reader of digital engineering with the School of Physics, Engineering and Technology, University of York, U.K., where he is the Director of iTWINS Lab and the Deputy Pillar Lead for Advanced Communications with the Institute for Safe Autonomy. He was a SINGA Ph.D. Scholar with the Institute for Infocomm Research, A-STAR, National University of Singapore. Then he worked at different academic and industrial positions in the Republic of Ireland and U.K. He has published a book and more than 100 peer reviewed book chapters, journal, and conference papers. He is the ML/AI work package lead for the York-led YO-RAN and REACH, which are projects developing 6G open radio access networks in collaboration with industry and funded by U.K. Government. He has been the Networks Working Group Chair of COST Actions CA15104 (IRACON) and CA20120 (INTERACT). He had chairing roles in organizing and technical programme committee of several IEEE flagship conferences, including IEEE ICC 2024, EUCNC 2025 and 2019, respectively, and PIMRC 2024 and 2019, respectively. He is also the Treasurer of the IEEE U.K. and Ireland Diversity, Equity, and Inclusion Committee. He is an Associate Editor-in-Chief of IEEE COMMUNICATION STANDARDS MAGAZINE and a Fellow of U.K. Higher Education Academy. His current research interests include the application of machine learning in wireless networks, open radio access and networking, green and sustainable networks, airborne networks, digital twins of networks, and the Internet-of-Things

Shanshan Wang (Telecom PARIS, Paris, France)

Title: EMF Exposure constrained wireless networks

Abstract: Electromagnetic field (EMF) exposure constrained wireless communication refers to the network designed with limits on EMF emissions to ensure compliance with human safety standards and regulatory guidelines. To obtain exposure as prior information, the prediction of EMF exposure plays a crucial role. In this talk, a deep learning framework is proposed to predict EMF exposure levels in complex urban environments. First, the measurement campaign and publicly accessible databases used to construct the training dataset are introduced, with a detailed explanation provided on how these datasets are formulated and integrated to enhance their suitability for Convolutional Neural Networks (CNNs)-based models. Then, we present the proposed model, ExposNet. Its network architecture and workflow are thoroughly explained. Two variations of the network structure are proposed, and extensive experimental analyses are conducted, demonstrating that ExposNet achieves good prediction accuracy with both configurations. Furthermore, the generalization capability of the model is evaluated. The overall results indicate that, despite being trained and tested on real-world measurements, the model performs well and achieves better accuracy compared to previous studies.

Bio: Shanshan WANG is currently an assistant professor in the Telecom Paris (Institut Polytechnique de Paris), with Chair C2M since 2024. She received the Ph.D. degree from L2S, Paris-Saclay University, France, in 2019. She received Master degree (with Distinction) from University of Bristol in 2014. From 2014 to 2015, she was a research engineer with the Toshiba Telecommunication Laboratory, Bristol, U.K. After PhD, she worked as postdoctoral researcher in the chair C2M in Télécom Paris, on the topic of EMF exposure mapping using AI. From 2023 to 2024, she was assistant professor in the ETIS lab, CY Cergy Paris University. She has participated several European Horizon projects, such as, 5GWireless, SEAWave, Goliat. She received Marie-Curie PhD fellowship in 2015 in CNRS France. Her research interests include EMF exposure characterization and AI-based prediction, stochastic geometry and system-level modeling of wireless networks, machine learning. She is also an expert in IEC and CENELEC TC106x.

Nathalie Mitton (INRIA, Lille, France)

Title: SLICES - or how to run large scale experiment on the contiuum IoT / cellular / fog / cloud

Bio: Nathalie Mitton received the MSc and PhD. degrees in Computer Science from INSA Lyon in 2003 and 2006 respectively. She received her *Habilitation à diriger des recherches* (HDR) in 2011 from Université Lille 1. She is currently an Inria full researcher since 2006 and from 2012, she is the scientific head of the Inria FUN team which designs protocols for wireless communications in constrained networks. Since 2024 she is head of science at Inria center of University of Lille. Her research interests focus on self-organization and communication in wireless constrained and dynamic networks. She has been nominated as one of the 10 women stars in computer Science in 2020 by the IEEE Communication Society. She has published her research in more than 50 international revues and more than 140 international conferences. She coordinates the Horizon Europe SLICES-PP project, participates in different Horizon Europe projects (NEPHELE, UniMAAS, etc) and in several program and organization committees such as Infocom (since 2019), PerCom (since 2018), DCOSS (since 2018), ICC (since 2015), Globecom (since 2017), etc. Some words about SLICES.

13:30 – 15:30: Session II – PHY Layer / Signal Processing (4 × 30')

Arsenia Chorti (ENSEA / ETIS, Paris, France)

Title: Physical layer security in 6G: From theory to practice

Abstract: Physical layer security is being considered for 6G due to its potential to provide solutions for delay, power and computationally constrained 6G systems. Motivated by this, the aim of this talk is twofold. First, we make the case that physical awareness, attained thanks to novel 6G radio capabilities, will be an enabler of PLS. Secondly, we demonstrate how fundamental information theoretic metrics can serve as design criteria for realistic PLS systems. As a concrete use case, this talk focuses on a novel authentication and key agreement (AKA) scheme that integrates physical layer authentication (PLA) and secret key generation (SKG) to enable fast and low-footprint AKA, that is provably robust against both passive and active attacks. Looking ahead, we discuss future steps towards standardization efforts to facilitate real-world deployment and ensure interoperability in emerging 6G networks.

Bio: Arsenia Chorti is a Professor at the École Nationale Supérieure de l' Électronique et de ses Applications (ENSEA) at the ETIS Lab UMR 8051 and a Visiting Scholar at Princeton University. Her research spans the areas of wireless communications and wireless systems security for 5G and 6G, with a particular focus on physical layer security. Current research topics include: context aware security, multi-factor authentication protocols, 5G / 6G and IoT, anomaly detection, machine learning for communications, new multiple access techniques and scheduling. She is a Senior IEEE Member, IEEE ComSoc Distinguished lecturer (class 2024-25), has served as Associate Editor in Chief of the IEEE ComSoc Best Readings, of the IEEE INGR on Security and was Chair of the IEEE Focus Group on Physical Layer Security between 2021-2024, while she has also served in the IEEE P1940 Standardization Workgroup on Standard profiles for ISO 8583 authentication services and has served as a member of the IEEE Teaching Awards Committee. She is currently a Member of various ITU Working Groups and has participated in the reduction of the ITU report M.2516-0 on Future technology trends of Terrestrial International Mobile Telecommunications Systems Towards 2030 and Beyond (sections on trustworthiness).

Ana Garcia Armada (UC3M, Madrid, Spain)

Title: The role of channel estimation in 6G

Abstract: The evolution of mobile communications is expected to enable new applications and services, not only with focus on communications but including positioning and sensing capabilities as well, which will require a new radio interface. This talk focuses on the new possibilities that channel estimation offers, from a physical layer perspective, presenting alternatives that may help achieve the integrated sensing and communications (ISAC) goals of 6G.

Bio: Ana García Armada (IEEE Fellow) is a Professor at Universidad Carlos III of Madrid, Spain, where she is leading the Communications Research Group. She has been a visiting scholar at Stanford University, Bell Labs and University of Southampton. She has published more than 250 papers in international journals and conference proceedings and she holds seven granted patents. She is serving on the editorial board of IEEE Open Journal of the Communications Society (Associate Editor in Chief since 2024) and ITU Journal on Future and Evolving. She has been a member of the organizing committee of IEEE MeditCom 2024 (General Chair), IEEE MeditCom 2023, IEEE WNCN 2024, IEEE Globecom 2022, IEEE Globecom 2021 (General Chair), IEEE Globecom 2019, among others. She has received the Young Researchers Excellence Award from University Carlos III of Madrid. She was awarded the third place Bell Labs Prize 2014 for shaping the future of information and communications technology. She received the Outstanding service award from the IEEE ComSoc Signal Processing and Communications Electronics technical committee in 2019 and the Outstanding service award from the IEEE ComSoc Women in Communications Engineering Standing Committee in 2020. She received the IEEE ComSoc/KICS Exemplary Global Service Award in 2022.

Yang Miao (University of Twente, Netherlands)

Title: Sensing the Future, Communicating the Present

Bio: Yang Miao is currently an associate professor in the radio system group, university of Twente, the Netherlands. She received her master and PhD degrees from Tokyo Institute of Technology, Japan. She was a Marie Curie Individual Fellow hosted in KU Leuven. She is now the ISAC co-chair in COST action INTERACT, the PI of the Dutch research council Open Technology Program 3D-Coms (designing 3D base station for ISAC), and the PI of Horizon Europe Marie Curie Doctoral Network SMARTTEST (ISAC for remote health monitoring), etc

Jean-Baptiste Doré (CEA-Leti, Grenoble, France)

Title: 6G Horizons: Challenges for Sustainable and Intelligent Wireless Networks

Abstract: 6G represents a paradigm shift where wireless connectivity evolves into a flexible and programmable infrastructure—*radio as a function*—enabling the convergence of communication, sensing (ISAC), and computing. This keynote will explore key technological advances such as intelligent signal processing, heterogeneous network integration spanning from sub-1 GHz to sub-THz frequencies, and the sustainable design of next-generation wireless systems. It will also highlight the opportunities and challenges shaping the future of ubiquitous, adaptive, and energy-aware wireless networks.

Bio: Jean-Baptiste Doré obtained his Master's degree in 2004 from the Institut National des Sciences Appliquées (INSA) Rennes and earned his PhD in 2007 from INSA Rennes and France Telecom R&D (Orange Labs), focusing on joint code design and decoding architecture for LDPC codes. In 2025, he received his Habilitation à Diriger des Recherches (HdR). He began his career at NXP Semiconductors in Caen as a signal processing architect, working on the design of signal processing algorithms for DVB-T and DVB-T2 systems, with a focus on OFDM waveforms. In 2009, he joined the French Alternative Energies and Atomic Energy Commission (CEA-Leti) in Grenoble, where he currently serves as a Senior Expert and Co-leader of the Telecom Program Line. His research focuses on signal processing, hardware architecture optimization, and PHY/MAC layer design for wireless communication systems. Jean-Baptiste Doré has authored over 100 scientific publications and is the inventor of more than 40 patents. He is also the coordinator of the national PEPR Networks of the Future YACARI project (mmWave technologies).

16:00 – 18:00: Session III – Propagation / Hardware (4 × 30')

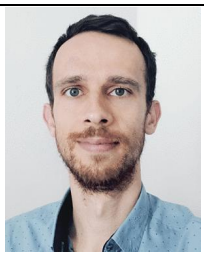
Prof. Fredrik Tufvesson (Lund University, Sweden)

Title: Ultra-reliable communication with distributed MIMO, is there a problem?

Abstract: Wireless communication systems are envisioned to support ultra-reliable low-latency communication (URLLC), to enable new applications such as compute offloading, wireless real-time control, and reliable monitoring. However, the use-cases have not really taken off yet. in this talk, we will discuss distributed multiple-input multiple-output (D-MIMO) as one of the most promising technologies for delivering URLLC and sensing functionalities. Based on indoor D-MIMO channel measurements at mid-band we will discuss channel properties, tail probabilities and channel models to highlight the potential for sensing and ultra-reliable low-latency communication with D-MIMO. We show how the technology can be implemented and highlight implementation issues.

Bio: Fredrik Tufvesson received his Ph.D. in 2000 from Lund University in Sweden. After two years at a startup company, he joined the department of Electrical and Information Technology at Lund University, where he is now professor of radio systems. His main research interest is the interplay between the radio channel and the rest of the communication system with various applications in 5G/6G systems such as massive MIMO, distributed MIMO, mm wave communication, vehicular communication and radio-based positioning.

Mate Boban (Huawei, Germany)



Title: Learning the radio environment: ML-based Radio Map Generation and Channel Prediction

Abstract: This presentation will discuss how to accurately model the radio environment using machine learning. In particular, the following topics will be addressed: radio map generation, channel state information prediction, and blockage prediction. The final part of the presentation will lay out the key challenges and promising directions for accurate and efficient radio environment reconstruction.

Bio: Mate Boban is a technical expert and team leader with Huawei Technologies, Heisenberg Research Center, Munich, Germany. He received the Ph.D. degree in ECE from Carnegie Mellon University. Currently, he is a co-chair of COST INTERACT WG1 and a vice-chair of ETSI ISG THz. He has co-chaired several IEEE conferences and workshops, was an Associate Editor of IEEE TMC, and has been actively involved in EU-funded 5G and 6G projects. He co-authored there papers that received the best paper award (IEEE VTC, IEEE VNC, EuCAP). His current research interests are in channel modeling and machine learning for radio access networks.

Guillaume Ducournau (University of Lille, France)

Title: mm and THz links enabled by RIS: specular and non-specular OTA measurements at 300 GHz

Abstract: The talk will discuss RIS measurements at 300 GHz using quasi-optic VNA approach, to assess RIS losses and bandwidth. 300 GHz links including RIS will also be shown. The analysis of the specular and non-specular behavior of the RIS will enable to enable NLoS links for the 300 GHz band.

Bio: Guillaume Ducournau is with the Institute of Electronics, Microelectronics and Nanotechnology (IEMN), UMR-CNRS 8520, University of Lille, Villeneuve d'Ascq, France, since 2007. He is the Leader of the THz wireless communications activity with IEMN using optoelectronic THz photomixers, electronic receivers, THz instrumentation, and millimeter-wave (mm-wave) characterization. He worked on several European projects: STREP ROOTHz 2010-2013, ThoR H2020, GRAPH-X, TIMES (6G SNS) as well as the Marie-Curie TERAOPTICS network. At national level he is the Coordinator of the FUNTERA project (6 partners) focusing on THz converters, while the SYSTERA project (12 partners) is dedicated to beyond 90 GHz systems for future networks. He also participates to the ST-IEMN common laboratory, and more specifically involved in the mm-wave technologies characterization part.

Marco Di Renzo (CentraleSupélec, Paris, France)

Title: Stacked Intelligent Metasurfaces: Communication, Sensing and Computing in the Wave Domain

Abstract: Future wireless networks are expected to utilize the limited radio frequency resources more efficiently with the aid of intelligent transceivers. In this talk, we propose a recent transceiver architecture that relies on stacked intelligent metasurfaces (SIM). An SIM is constructed by stacking an array of programmable metasurface layers, where each layer consists of a massive number of simple meta-atoms that individually manipulate the electromagnetic waves. We provide an overview of SIM-aided MIMO transceivers, including their novelty, hardware architecture, and potential benefits over state-of-the-art solutions for communication, sensing and computing applications.

Bio: Marco Di Renzo is a CNRS Research Director and the Head of the Intelligent Physical Communications group with the Laboratory of Signals and Systems at CentraleSupelec, Paris, France. Also, he is a Professor of Telecommunications Engineering with the Centre for Telecommunications Research at King's College London, London, UK. He is an Ordinary Member of the Academia Europaea, the European Academy of Sciences and Arts, and the Italian Academy of Technology and Engineering. He is a former Fulbright Fellow and holder of the France-Nokia Chair of Excellence in ICT. He was bestowed with the Michel Monpetit Prize by the French Academy of Sciences and the Marconi Paper Prize by the IEEE Communications Society.