

**COST CA20120 - INTERACT Training School:
DolCom 2023
Summer School & Workshop on
*Radio Communications in the Dolomites***

26th – 29th June 2023

Campitello di Fassa, Trentino-Alto Adige, Italy

Scope

The School & Workshop features a program of lectures delivered by leading experts in the area of 6G radio and networks, from both academia and industry. The objective of the School & Workshop is to give Ph.D. students and researchers an opportunity to catch up on the “hottest topics” related to radio communications, but including networking as well, related to 6G. Attendees will have an opportunity to participate in stimulating discussions with lecturers, obtain useful feedback, and initiate new collaborations. Lectures will provide the background on 6G wireless communications radio and networks concepts, ranging from the more fundamental ones related to concepts and mathematical modelling to experimental and applied ones connected to incoming standardisation features.

Targeted Audience

The School & Workshop is aimed at Ph.D. students, targeting COST institutions participating in Action CA20120 (INTERACT), but open to other institutions as well. Moreover, participation is also open to other researchers and students, who actively work on or are interested in future mobile networks.

Dates

The School & Workshop will take place from Monday, June 26th, to Thursday, June 29th, 2023.

Speakers

The list of speakers is as follows:

- Alessandro Bazzi (WiLab/U. Bologna, IT)
- Bruno Clerckx (ICL, UK)
- Marco Chiani (WiLab/U. Bologna, IT)
- Marco Di Renzo (CentraleSupélec, FR)
- Moe Win (MIT, US)
- Luis M. Correia (IST/U. Lisbon, PT)
- Riccardo Trivisonno (Huawei, DE)
- Roberto Verdone and Marco Skocaj (WiLab/U. Bologna, IT)

In addition, there will be panels and a Ph.D. contest moderated by:

- Luis M. Correia (IST/U. Lisbon, PT)
- Roberto Verdone (WiLab/U. Bologna, IT)

General Programme

The programme is composed of the following lectures and lecturers (a detailed description is provided at the end of this document):

- *“Our Cars are Eager to Collaborate: State of the Art and Future Developments of V2X”*: Alessandro Bazzi (WiLab/U. Bologna, IT)
- *“Beyond Diagonal Reconfigurable Intelligent Surfaces”*: Bruno Clerckx (ICL, UK)
- *“Basic Ideas in Quantum Communication and Computing”*: Marco Chiani (WiLab/U. Bologna, IT)
- *“Intelligent Surfaces for Wireless Communications: Living at the Interface of Electromagnetic and Communication Theories”*: Marco Di Renzo (CentraleSupélec, FR)
- *“Localisation-of-Things: from Foundation to Operation in B5G/6G Ecosystem”*: Moe Win (MIT, US)
- *“Body Area Networks: from Applications to Radio Channel Models”*: Luis M. Correia (IST/U. Lisbon, PT)
- *“5G and 5G Advanced Network Architecture”*: Riccardo Trivisonno (Huawei, DE)
- *“Towards Data-Driven Zero Touch 5G Networks: Trends and Challenges”*: Roberto Verdone and Marco Skocaj (CNIT-WiLab/U. Bologna, IT)

The programme also includes 2 panels

- *“Dialogue with the Speakers”*: panels moderated by Luis M. Correia (IST/U. Lisbon, PT) and Roberto Verdone (CNIT-WiLab/U. Bologna, IT), where, in a very informal environment, technical themes will be discussed with the speakers, aiming at getting views and visions in research around 6G,

a contest

- *“Ph.D. Contest”*: Ph.D. students should prepare a pitch to be given before a committee (composed of speakers and panel moderators), the winners being the most innovative themes,

and outdoor networking activities

- *“Walk in the Dolomites”*: hiking on trails around the venue, in groups composed of Ph.D. students and speakers, aiming at reinforcing the networking among participants and lecturers, and getting in touch with Nature.

Credits

The Ph.D. students wanting to get credits (ECTS) from this School / Workshop will have to deliver a report (guidelines will be circulated) with the state of the art in one of the addressed topics by 29th July 2023. Reports will be evaluated and graded.

The number of credits will be 2 ECTS, for those that are evaluated successfully.

General Schedule

The overall schedule is given below:

Day	Monday, Jun. 26th	Time	Tuesday, Jun. 27th	Time	Wednesday, Jun. 28th	Time	Thursday, Jun. 29th	Time	Friday, Jun. 30th
09:00		09:00		09:00		09:00		09:00	
09:30		09:30		09:30	Ph.D. Contest	09:30		09:30	
10:00		10:00		10:00		10:00		10:00	
10:30		10:30		10:30	Networking Break	10:30		10:30	
11:00		11:00		11:00		11:00		11:00	
11:30		11:30	Walk in the Dolomites	11:30	Ph.D. Contest	11:30	Walk in the Dolomites	11:30	Walk in the Dolomites
12:00		12:00		12:00		12:00		12:00	
12:30		12:30		12:30		12:30		12:30	
13:00		13:00		13:00	Networking Lunch @Hotel Diamant	13:00		13:00	
13:30	Opening	13:30		13:30		13:30		13:30	
14:00	Attendees Presentation	14:00		14:00		14:00		14:00	
14:30		14:30		14:30		14:30		14:30	
15:00		15:00		15:00		15:00		15:00	
15:30	Luis M. Correlá's Talk	15:30	Riccardo Trivisonno's Talk	15:30	Alessandro Bazzi's Talk	15:30	Marco Di Renzo's Talk	15:30	
16:00		16:00		16:00		16:00		16:00	
16:30		16:30		16:30		16:30		16:30	
17:00	Networking Break	17:00	Networking Break	17:00	Networking Break	17:00	Networking Break	17:00	
17:30		17:30		17:30		17:30		17:30	
18:00	Bruno Clerckx's Talk	18:00	Moe Win's Talk	18:00	Marco Chiani's Talk	18:00	Roberto Verdone and Marco Skoca's Talk	18:00	
18:30		18:30		18:30		18:30		18:30	
19:00		19:00		19:00		19:00		19:00	
19:30		19:30		19:30		19:30		19:30	
20:00	Networking Dinner	20:00	Networking Dinner	20:00	Social Dinner	20:00	Networking Dinner	20:00	
20:30		20:30		20:30		20:30		20:30	
21:00		21:00		21:00		21:00		21:00	
21:30		21:30		21:30		21:30		21:30	
22:00	Dialogue with the Speakers	22:00	Dialogue with the Speakers	22:00	Networking Activity	22:00	Closing Awards	22:00	
22:30		22:30		22:30		22:30		22:30	
23:00		23:00		23:00		23:00		23:00	

Supporting Texts

Attendees will get an electronic version of all presentations, during the School & Workshop.

Language

The School & Workshop will be entirely held in English.

Location

The School & Workshop will take place at Hotel Rubino, Campitello di Fassa, Trentino-Alto Adige, Italy.

[Hotel Rubino](#), is located in the heart of the Dolomites, which have been declared a UNESCO World Heritage site. It offers a comfortable and luxurious setting with its elegant atmosphere and cherry tree panelling. This 4-star deluxe hotel is equipped with a swimming pool, and is situated in a peaceful and sunny position, next to the woods near to the town centre and to the Col Rodella cable car. You can explore its location on [Google Maps](#).

Visa

Italy is a member of the [Schengen Area](#). Attendees requiring a visa should contact the School & Workshop organisers (dolcom@wilab.org) as soon as possible, for obtaining an Invitation Letter, indicating the following information:

- Full name:
- Gender:
- Title:
- Birthday:
- Nationality:
- Passport No.:
- Date of expiry:
- Affiliation:

Travel

How to arrive:

By car: Leave the **A22** Highway (connecting Italy to Austria at the Brennero border) at exit “**Egna-Ora**” and drive in the direction of Cavalese (first), Moena (later), and Canazei (finally). From the highway, it is approximately 1 hour of driving over a very good and large road.

By train: coming from the South, you can arrive at **Trento station** (Trentino’s capital) or at **Ora** (no IC, EC, and Eurostar trains); coming from the North, you must get off in **Bolzano**.

Here’s the link to [Trenitalia](#) to buy the train tickets and check the schedules.

Bus: An efficient public bus service connects the Valleys with the main train station.

[Trentino trasporti](#) Lines: info and timetable from **Trento**.

[SAD Lines](#): info and timetable from **Ora**.

By plane: the nearest airports are Bolzano (42 km), Verona (160 km), Innsbruck (164 km), and Venezia (220 km). From these airports, the Fassa Valley is easy to get off the motorways (in each airport you’ll find car rental services) or use rail transport and public buses.

Accommodation

Besides [Hotel Rubino](#), there’s quite a wide choice of hotels within walking distance, ranging from 3 to 4 stars, besides other types of accommodation, which you can explore [here](#).

However, **participants are warmly and strongly invited to stay at Hotel Rubino**, because this will make networking much easier, with activities planned until after dinner, and no other hotels will offer a rate lower than the one negotiated for this event nearby, even of lower category.

Reduced rates have been agreed with Hotel Rubino as follows (including breakfast):

- double room for 1 person: 115 € per night per person
- double room for 2 persons: 78 € per night per person
- quadruple room for 4 persons: 69 € per night per person

In order to take advantage of these rates, you need to select your preferences while registering via the [Google Form](#), by **May 31st at 12 pm**. Payment will be done at the hotel.

Grants

There are a limited number of grants available, with priority given to Ph.D. students, to attend the School & Workshop. Rules and general information are available [here](#).

Applicants should send their application (the form is available [here](#)) to Krzysztof Cichon (krzysztof.cichon@put.poznan.pl) and the School & Workshop organisers (dolcom@wilab.org) **by 31st May 2023**, with an email with the subject “CA20120 – 3rd Training School Application”, attaching one full document in PDF format, with the name 3rdTS_Surname_Name.

Registration

The Registration Guidelines are available at [this link](#). To register for the event, please fill in the [Google Form](#) by **31st May at 12 pm**.

Social Events

A social dinner will be offered to attendees and lecturers.

Contacts

If you need any information or help, please contact:
dolcom@wilab.org

Organisation and Scientific Programme Committee

The School & Workshop is organised jointly by:

- Luis M. Correia (IST/U. Lisbon, PT)
- Roberto Verdone (WiLab/U. Bologna, IT)

The School & Workshop is jointly organised by COST Action CA20120 INTERACT and EURACON.

Detailed Programme



Alessandro Bazzi (WiLab/U. Bologna, IT): Alessandro Bazzi is an Associate Professor at the University of Bologna, Italy, and an associated member of WiLab in the Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT). He received a Laurea degree (2002) and a PhD degree (2006) in Telecommunications from the University of Bologna. From 2002 to 2019 he was a researcher of the National Research Council of Italy (CNR) and since the academic year 2006/2007 he holds courses at the University of Bologna on wireless systems and networks. He is a senior member of IEEE. He is currently in the Editorial board of Hindawi Wireless Communications and Mobile Computing and MDPI Vehicles, and Chief Editor of

Hindawi Mobile Information Systems. He published more than 100 papers in conferences and journals and contributed to major international conferences with keynotes (ICUMT'20), panels (ISWCS'17, PIMRC'21), tutorials (ICC'21, Globecom'21), and the organization of workshops and special sessions (PIMRC'18, PIMRC'19). His research interests include wireless systems and networks, with focus on the wireless communications technologies for autonomous and connected vehicles. On these topics, he coordinated and coordinates various activities within national and international projects, including collaborations with major companies active in the field of automotive such as NXP, FEV, and Huawei. He is also the referent for CNIT in the Car2Car Communications Consortium. From 2020 to 2022, he was part of an ETSI specialist task force defining a set of standards for the use of multiple channels for direct V2X communications in the 5.9 GHz band in Europe.

"Our cars are eager to collaborate: state of the art and future developments of V2": The transportation system is entering a revolutionary phase that will completely change the way we think about mobility and after which drivers will no longer be necessary. The goal is not only to achieve the "vision zero" whereby there will be no more deaths on the roads, but also to achieve highly efficient mobility that reduces emissions and saves people time. To do this, vehicles will not only be increasingly autonomous, but will start to cooperate with each other and with the infrastructure. Cooperation means communication, and communication between cars and other road devices means vehicle-to-everything (V2X). Based on the speaker's active contribution in research and standardization, this lecture will review the current status of V2X standardization and deployment, and discuss the currently most relevant research directions. On the one hand, the focus will be on functional aspects that go beyond the current day-1 where cars exchange messages to improve awareness, towards the more visionary day-3 where cars will cooperate and cross intersections seamlessly. On the other hand, an overview of the latest advances in wireless technologies enabling communication will be provided, including those related to the WiFi family (i.e. IEEE 802.11p/bd) and those from the cellular ecosystem (i.e., 5G NR-V2X sidelink and beyond).



Bruno Clerckx (ICL, UK): Bruno Clerckx is a (Full) Professor, the Head of the Wireless Communications and Signal Processing Lab, and the Deputy Head of the Communications and Signal Processing Group, within the Electrical and Electronic Engineering Department, Imperial College London, London, U.K. He is also the Chief Technology Officer (CTO) of Silicon Austria Labs (SAL) where he is responsible for all research areas of Austria's top research center for electronic based systems. He received the MSc and Ph.D. degrees in Electrical Engineering from Université Catholique de Louvain, Belgium, and the Doctor of Science (DSc) degree from Imperial College London, U.K. Prior to joining Imperial College in 2011, he was with Samsung Electronics, Suwon, South Korea, where he actively contributed to 4G (3GPP LTE/LTE-A and IEEE 802.16m). He has authored two books on "MIMO Wireless Communications" and "MIMO Wireless Networks", 250 peer-reviewed international research papers, and 150 standards contributions, and is the inventor of 80 issued or pending patents among which several have been adopted in the specifications of 4G standards and are used by billions of devices worldwide. His research spans the general area of wireless communications and signal processing for wireless networks. He received the prestigious Blondel Medal 2021 from France for exceptional work contributing to the progress of Science and Electrical and Electronic Industries, the 2021 Adolphe Wetrems Prize in mathematical and physical sciences from Royal Academy of Belgium, multiple

awards from Samsung, IEEE best student paper award, and the EURASIP (European Association for Signal Processing) best paper award 2022. He is a Fellow of the IEEE and the IET, and an IEEE Communications Society Distinguished Lecturer.

“Beyond Diagonal Reconfigurable Intelligent Surfaces”: Reconfigurable intelligent surface (RIS) has gained much traction due to its potential to manipulate the propagation environment via nearly-passive reconfigurable elements. Attention has been drawn to the use of RIS architectures based on diagonal phase shift matrices where each element of the RIS is connected to a load disconnected from the other elements. This enables simple RIS architectures to control the phase of the impinging wave and reflect the wave in the desired direction. This lecture argues that to truly exploit the benefits of RIS in 6G, RIS need to explore architectures beyond conventional diagonal phase shift matrices. This lecture bridges microwave theory and RIS communications, introduces the audience to Beyond Diagonal (BD) RIS, and show the benefits of BD RIS architectures in terms of controlling both phases and magnitudes of reflected waves (hence, high flexibility in wave manipulation), enabling simultaneous transmission and reflection, increasing reflected power, boosting sum-rate and flexibility in various deployments, enabling highly directional full-space wireless coverage, etc.



Marco Chiani (WiLab/U. Bologna, IT): Marco Chiani is a Full Professor of telecommunications at the University of Bologna, a position he has held since 2001. He received his Dr. Ing. degree (summa cum laude) in electronic engineering and his Ph.D. degree in electronic and computer engineering from the University of Bologna, Italy, in 1989 and 1993, respectively. Since 2003, he has been a frequent visitor at the Massachusetts Institute of Technology (MIT) in Cambridge, MA, USA, where he currently holds a Research Affiliate appointment. In 2011, he was named a Fellow of the IEEE for his contributions to wireless communication systems. He was also appointed a Distinguished Visiting Fellow of the Royal Academy of Engineering in the UK in 2012. Dr. Chiani has received several prestigious awards, including the 2011 IEEE Abraham Prize, the 2012 IEEE Ellersick Prize, and the 2012 IEEE Rice Prize in the Field of Communications Theory. He has also served as the Chair of the Radio Communications Committee of IEEE CommSoc from 2002-2004. His research interests include information theory, wireless systems, statistical signal processing, and quantum information. He has made contributions in several areas, including exponential bounds for the Gaussian error function and the statistical distribution of the eigenvalues of random matrices.

“Basic Ideas in Quantum Communication and Computing”: We explore the fundamental concepts and principles that underpin the rapidly growing field of quantum information processing. We begin by introducing the basic principles of quantum mechanics, including superposition, entanglement, and measurement, and how they differ from classical physics. We then delve into the applications of these principles in quantum communication, including quantum key distribution and teleportation. We also discuss the basic ideas of quantum computing, which uses quantum mechanics to perform computations that are infeasible on classical computers. We introduce the concept of qubits, the fundamental building blocks of quantum computation, and explain how quantum algorithms can solve problems such as factoring large numbers and searching large databases exponentially faster than classical algorithms. Throughout the talk, we emphasize the importance of quantum communication and computing in both theoretical and practical settings, including its potential to revolutionize fields such as cryptography, drug design, and machine learning. We also highlight the current challenges and

limitations in realizing practical quantum technologies, including the need for error correction and fault-tolerant quantum systems. Overall, this talk provides a comprehensive introduction to the basic ideas of quantum communication and computing, suitable for anyone interested in learning about this exciting and rapidly evolving field.



Marco Di Renzo (CentraleSupélec, FR): Marco Di Renzo is a CNRS Research Director (Professor) and the Head of the Intelligent Physical Communications group in the Laboratory of Signals and Systems at Paris-Saclay University - CNRS and CentraleSupélec. He serves as the Coordinator of the Communications and Networks Area of the Laboratory of Excellence DigiCosme, and as a Member of the Admission and Evaluation Committee of the Ph.D. School of Paris-Saclay University. He is a Fulbright Fellow at City University of New York, USA; a Fellow of IEEE, IET, AAIA, Vebleo; an Ordinary Member of the European Academy of Sciences and Arts, and the Academia Europaea; as well as a Highly Cited Researcher. He serves as the Editor-in-Chief of IEEE Communications Letters. He is a founding member and the Academic Vice Chair of the Industry Specification Group on Reconfigurable Intelligent Surfaces within the European Telecommunications Standards Institute, where he serves as the Rapporteur for the work item on communication models, channel models, and evaluation methodologies. He is the recipient of the 2022 Michel Monpetit Prize conferred by the French Academy of Sciences.

"Intelligent Surfaces for Wireless Communications: Living at the Interface of Electromagnetic and Communication Theories": In wireless communications, the term intelligent surface is referred to a planar metamaterial structure that is capable of generating an arbitrary current density distribution, so as to ensure the highest flexibility in generating a specified electromagnetic field and in shaping the propagation of the electromagnetic waves in large-scale networks. This presentation is aimed to report the latest research advances on analytical modeling, evaluating the ultimate performance limits, and optimizing intelligent surfaces for application to wireless communications, with focus on the synergies between electromagnetic and communication theories.



Moe Win (MIT, US): Moe Win is a Professor at the Massachusetts Institute of Technology (MIT) and the founding director of the Wireless Information and Network Sciences Laboratory. Prior to joining MIT, he was with AT&T Research Laboratories and NASA Jet Propulsion Laboratory. His research encompasses theoretical foundation, algorithm design, and network experimentation for a broad range of real-world problems. His current research topics include network localization and navigation, network interference exploitation, and quantum information science. Professor Win has served the IEEE Communications Society as an elected Member-at-Large on the Board of Governors, as elected Chair of the Radio Communications Committee, and as an IEEE Distinguished Lecturer. He was honored with two IEEE Technical Field Awards: the IEEE Kiyo Tomiyasu Award and the IEEE Eric E. Sumner Award. His publications, co-authored with students and colleagues, have received several awards. Other recognitions include the MIT Everett Moore Baker Award, the IEEE Vehicular Technology Society James Evans Avant Garde Award, the IEEE Communications Society Edwin H. Armstrong Achievement Award, the Cristoforo Colombo International Prize for Communications, the Copernicus Fellowship and the Laurea Honoris Causa from the Università degli Studi di Ferrara, and the U.S. Presidential Early

Career Award for Scientists and Engineers. Professor Win is elected Fellow of the AAAS, the EURASIP, the IEEE, and the IET. He is an ISI Highly Cited Researcher.

“Localization-of-Things: from Foundation to Operation in B5G/6G Ecosystem”: The availability of real-time and high-accuracy location awareness is essential for current and future wireless applications, particularly those involving Internet-of-Things and 5G toward 6G ecosystem. The coming years will see the emergence of network localization and navigation in challenging environments with sub-meter accuracy, low latency, and minimal infrastructure requirements as the wireless ecosystem evolves beyond 5G networks. This will call for the Localization-of-Things (LoT), a new paradigm referring to locating, tracking, and navigating collaborative and non-collaborative nodes (e.g., sensors, vehicles, and objects). Our work, relying on statistical inference, network optimization, and communication theory, approaches LoT from different perspectives. This talk will give an overview of LoT, examining our recent research results in this exciting new field, from the perspectives of theoretical framework, cooperative algorithms, network operations, and network experimentation. We will also present LoT enablers, including 5G New Radio and reconfigurable intelligent surfaces, which promise to provide dramatic gains in terms of localization accuracy and system robustness in next generation networks.



Luis M. Correia (IST / INESC-ID, Univ. Lisbon, Portugal): Luis M. Correia was born in Portugal, in 1958. He received the Ph.D. in Electrical and Computer Engineering from IST (Univ. Lisbon) in 1991, where he is currently a Professor in Telecommunications, with his work focused on Wireless & Mobile Communications, with the research activities developed in the INESC-ID institute. He has acted as a consultant for the

Portuguese telecommunications operators and regulator, besides other public and private entities, and has been in the Board of Directors of a telecommunications company. He has participated in 33 projects within European frameworks, having coordinated 6 and taken leadership responsibilities at various levels in many others, besides national ones. He has lectured 76 advanced training courses for industry and academia at the national and international levels. He has supervised over 230 M.Sc./Ph.D. students, having edited 6 books, contribute to European strategic documents, and authored over 550 papers in international and national journals and conferences, for which served also as a reviewer, editor and board member. Internationally, he was part of 40 Ph.D. juries, and over 80 research projects and institutions evaluation committees for funding agencies in 12 countries, and the European Commission and COST. He has been the Chairman of Conference, of the Technical Programme Committee and of the Steering Committee of 25 major conferences, besides other several duties. He was a National Delegate to the COST Domain Committee on ICT. He has launched and served as Chairman of the IEEE Communications Society Portugal Chapter, besides being involved in several other duties in this society at the global level. He is an Honorary Professor of the Gdańsk University of Technology (Poland) and a recipient of the 2021 EurAAP Propagation Award “for leadership in the field of propagation for wireless and mobile communications”.

“Body Area Networks: from Applications to Radio Channel Models”: The talk starts by presenting a look into already existing technologies, which enables to establish a perspective for future user interface devices and services (e.g., information access, Internet of Things and geo-location). Then, potential services are identified, after which research challenges for mobile and wireless communications networks are addressed. Afterwards, Body Area Networks (BANs) are introduced, addressing their applications. The modelling of bodies, antennas and other devices is then discussed.

Some issues regarding channel models are addressed, namely those concerning dynamic bodies. Models and results are shown for some key parameters in several example scenarios. Conclusions are presented at the end.



Riccardo Trivisonno (Huawei, DE): Riccardo Trivisonno (Senior Member, IEEE) joined Huawei Technologies in 2011 and is currently serving as Head of Network Architecture – Research and Standardisation – for the Advanced Wireless Technologies Laboratory, at Munich Research Center. Over the past ten years, his team strongly contributed to the definition and the standardisation of 5G network architecture and technologies for 3GPP Releases 15, 16, 17 and 18 – in the areas of architecture modularization, network slicing, network analytics and QoS for verticals, filing ~100 Standard Essential Patent applications. The research team has been focusing on 6G enabling technologies since 2020. He has been Chairman of 6G-IA Pre-standardization WG since 2020 and Board Member of One6G Association since its foundation, in 2021. He received his Ph.D. and M.Sc. degrees in telecommunications engineering from the University of Bologna in 2005 and 2000.

“5G and 5G Advanced Network Architecture”: The lecture, of an approximate two hour duration, introduces the basics of 5G system architecture. After a brief review of earlier generation networks, the lecture addresses the rationale and the enabling technologies upon which 5G system was conceived. The cornerstones of 5G architecture are then introduced (i.e. modularization, network slicing, service-based interface), the architectural options are presented (e.g. Standalone, Non Standalone) and the main functioning principles are discussed. Particular attention is devoted to the architectural enhancements relating to the support of Vertical industries. Finally, the key enhancements introduced in 5G Advanced, also sometimes referred as 5.5G, are briefly outlined.



Roberto Verdone (WiLab, IT) is Full Professor at the University of Bologna since 2001. In 2020 he was among the co-founders of WiLab, the Italian Lab. of Wireless Communications of CNIT. He acts since then as Director of WiLab, which gathers resources from ten Universities in Italy. His research interests span from radio resource management to 5G/6G and the IoT. He was Chairman of the COST Action on Wireless and Mobile Communications COST2100. He is Co-Chair of the WiLab-Huawei Joint Innovation Center on “Intelligent IoT for 6G”. He published about 200 research papers.

Marco Skocaj (WiLab, IT) is currently working toward the Ph.D. degree with the University of Bologna and WiLab, CNIT. He is chair of HA1 (Datasets) working group in COST action 20120 INTERACT. His research interests include Radio Resource Management, Machine Learning, Distributed Learning, Autonomous Networks and Optimization.

“Towards Data - Driven Zero Touch 5G Networks: Trends and Challenges.” The paradigms of Machine Learning (ML)-based Automation and Predictive QoS (PQoS) are thoroughly considered by Mobile Network Operators (MNOs), as tools for offering improved QoS to subscribers while maximizing the utilisation of network radio resources. In this lecture we delve into the topic of data-driven optimization of 5G mobile radio networks leveraging on emerging domains within the field of ML and real-world network data available to MNOs. Real-world datasets, such as MDT data, will be used to

show their potential impact on network optimisation. In particular, we will explore research directions and future challenges related to Reinforcement Learning (RL)-based optimization of network procedures, distributed optimization, generative machine learning and uncertainty estimation using Bayesian Learning.