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Welcome Message

2019 IEEE MTT-S International Microwave Workshop Series on Advanced Materials and Processes for RF and THz Applications, IMWS-AMP 2019

Ruhr-Universität Bochum, July 16-18, 2019

Dear IMWS-AMP 2019 Delegates,

on behalf of:

- the Institute of Electrical and Electronics Engineers (IEEE), represented through its Microwave Theory and Techniques Society (MTT-S)
- the European Microwave Association (EuMA)
- and the Ruhr-Universität Bochum (RUB)

it is our great pleasure to welcome you to the **International Microwave Workshop Series on Advanced Materials and Processes for RF and THz Applications**, which is held from July 16 to 18, 2019 in Bochum.

Starting in 2015 in Suzhou (China), the success story of the conference began. In the following years, the conference moved to Cheng-Du (China) in 2016, then to Pavia (Italy) in 2017 and to Ann Arbor (USA) in 2018, so that IMWS-AMP will take place this year for the 5th time.

At first we want to thank the authors, who submitted papers from 22 different countries. Furthermore, we would like to acknowledge the work of the TPC members, which permitted to select 65 high quality papers and setup an exciting conference program including 15 oral sessions. IMWS-AMP 2019 conference will cover many relevant topics in new materials and technologies, such as additive manufacturing and printed materials, tunable and phase transition materials as well as modeling and characterization aspects of novel materials. Furthermore, emerging systems comprising of microwave sensors, millimetre wave imaging systems and Photonic THz systems will be presented.

IMWS-AMP 2019 represents a unique opportunity to bring together researchers and practitioners of different background in order to discuss and share the most recent advances in new materials and manufacturing processes, representing key technologies for the development of future devices, circuits and systems.

We are pleased to welcome Prof. Dominique Schreurs, IEEE MTT-S President, University of Leuven, Leuven, Belgium.

Furthermore the program will be enriched by three highly renowned keynote speakers:

Tuesday - Opening Session

Prof. Ke Wu, Ecole Polytechnique, University of Montréal, Québec, Canada

Wireless Revolution – Enabled by Progress in Material and Processing Technology

Wednesday – Plenary Session

Prof. Daniel Mittleman, Brown University in Providence, Rhode Island, USA

Active liquid metal components for terahertz signal processing

Thursday – Closing Session

Prof. Maurizio Bozzi, University of Pavia, Pavia, Italy

Engineering the Resonant Modes in Substrate Integrated Waveguide Technology

A further highlight will be the special session on IEEE SIGHT activities.

The **IMWS-AMP 2019 Welcome Reception** on Tuesday, July 16th, takes place in the Q-West on the campus of Ruhr-Universität. To get there, we will make a promenade through our botanical garden. During the reception you will find the opportunity for discussions of latest research results in pleasant atmosphere.

The **IMWS-AMP 2019 Conference Dinner** will take place on Wednesday, July 17th, at the industrial museum “LWL Industriemuseum Henrichshütte Hattingen”, which was established in 1854. The evening will start with a sightseeing tour on different trails, where visitors can experience the different work processes of the steel industry. Then the dinner will be served in this comfortable and historical atmosphere.

We thank the German Research Foundation (DFG) for supporting IMWS-AMP 2019.

Finally, we wish you all a successful and interesting conference in the “Ruhrgebiet”.

“Glück auf!”

Organizing Committee



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Ilona Rolfes
Ruhr-Universität Bochum, Bochum, Germany



Conference General Co-Chair, Award Chair
Ke Wu
Polytechnique Montreal, Montreal, Canada



Technical Program Chair
Nils Pohl
Ruhr-Universität Bochum, Bochum, Germany



Technical Program Co-Chair
Maurizio Bozzi
University of Pavia, Pavia, Italy



Technical Program Co-Chair
Yong Xin Guo
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Maurizio Bozzi (TPC Co-Chair), University of Pavia, Italy

Yong Xin Guo (TPC Co-Chair), National University of Singapore, Singapore

Amelie Hagelauer (TPC Co-Chair), Friedrich-Alexander-University, Germany

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Roberto Sorrentino (University of Perugia) • Umberto Anselmi Tamburini (University of Pavia) • Luciano Tarricone (University of Salento) • Cristiano Tomassoni (University of Perugia) • Martin Vossiek (LHFT, Friedrich-Alexander-Universität Erlangen-Nürnberg Erlangen) • Robert Weigel (Friedrich-Alexander Universität Erlangen-Nürnberg Erlangen) • Xiuyin Zhang (South China University of Technology)

IEEE transactions on Microwave Theory and Techniques

Please notice, that the authors of accepted papers are invited to submit an extended version of their papers, which will be selected upon a regular revision process for publication on a mini-issue of the IEEE transaction on Microwave Theory and Techniques.

Welcome Speech

Prof. Dr. Dominique Schreurs

IEEE Microwave Theory and Techniques Society President

KU Leuven, Leuven, Belgium

Welcome Speech

Tuesday

Room 1 Time: Opening Session



Dominique Schreurs (S'90-M'97-SM'02-F'12) received the M.Sc. degree in electronic engineering and Ph.D. degree from the University of Leuven (KU Leuven), Belgium. As post-doc fellow, she was visiting scientist with Agilent Technologies (USA), Eidgenössische Technische Hochschule Zürich (Switzerland), and the National Institute of Standards and Technology (USA). She is now full professor at KU Leuven. Her main research interests concern the nonlinear characterization and modelling of microwave and millimeter wave devices and circuits, as well as design for telecommunications and biomedical applications. Prof. D. Schreurs is serving as the first female MTT-S President (April 2018-2019). She signed up with IEEE as Student Member in 1990, and got elevated to Fellow in Jan. 2012. She serves on the IEEE MTT-S AdCom since 2009, after election by the membership-at-large. She has been serving in various roles, such as Chair of Education Committee, Chair of the Meetings and Symposia Committee, Chair of Budget Committee. She is also past chair of the MTT-S Technical Committee on 'Microwave Measurements' (TC-11) and vice-chair of the MTT-S Technical Committee on 'Biological Effects and Medical Applications' (TC-10). D. Schreurs served as Distinguished Microwave Lecturer (2012-2014) and assumed the position of Editor-in-Chief of the IEEE Transactions on Microwave Theory and Techniques (2014-2016), and Associate Editor of IEEE Microwave and Wireless Components Letters (2011-2013). Prof. D. Schreurs is also President of the ARFTG Organization (2018-2019). She is serving on the ARFTG Executive Committee since 2004, and has assumed various roles over the years. She was General Chair of the 2007, 2012, and 2018 Spring ARFTG Conferences. In 2002, she was one of the initiators and is now still co-organizer of the successful NVNA Users' Forum. Prof. D. Schreurs also served as co-chair (2008) and TPC chair (2020) of the European Microwave Conference. She initiated the IEEE Women in Microwaves (WiM) event at the European Microwave Week in 2008 and is ever since acting as advisor for the WiM event.

Keynote Talks

Prof. Dr. Ke Wu

Poly-Grames Research Center, Department of Electrical Engineering
Ecole Polytechnique, University of Montréal, Québec, Canada

Wireless Revolution – Enabled by Progress in Material and Processing Technology

Tuesday

Room 1 Time: 11:30 – 12:10

Chronological progress in material and processing techniques has been instrumental for scientific discovery, engineering design and technological development of MHz-through-THz devices and circuits, which have generated a significant momentum for 5G and future wireless applications. The current leap forward is being propelled by the organic fusion of multiple functions and the scalable integration of multiple technologies through heterogeneous material and innovative processing techniques. This presentation begins with the overview of wireless hardware developments and functionalities. Emerging diversity scenarios and integration solutions in wireless technologies are discussed in connection with performance and efficiency. Technological roadmap is highlighted with reference to enabling and building technological elements, ranging from current and emerging compound materials to evolving and beyond CMOS, and from developing substrate integrations to future electromagnetic techniques. The talk also provides a brief tour of the state-of-the-art wireless devices and systems. Challenging issues of wireless development are examined pertaining to future multi-physics and multi-scale material and processing research.



Ke Wu is Professor of Electrical Engineering at Polytechnique Montreal (University of Montreal). He holds the NSERC-Huawei Industrial Research Chair in Future Wireless Technologies (the first Huawei-endowed Chair in the world). He has been the Director of the Poly-Grames Research Center. He was the Canada Research Chair (2002-2016) in RF and millimeter-wave engineering and the Founding Director (2008-2014) of the Center for Radiofrequency Electronics Research of Quebec. Prof. Wu is also with the School of Information Science and Engineering, Ningbo University, on leave from his home institution, leading a future wireless research program. He has authored/co-authored over 1200 referred papers, and a number of books/book chapters and more than 50 patents. Prof. Wu was the general chair of the 2012 IEEE MTT-S International Microwave Symposium (the largest IEEE annual conference). He was the 2016 President of the IEEE Microwave Theory and

Techniques Society (MTT-S). He also serves as the inaugural North-American representative in the General Assembly of the European Microwave Association (EuMA). He was the recipient of many awards and prizes including the inaugural IEEE MTT-S Outstanding Young Engineer Award, the 2004 Fessenden Medal of the IEEE Canada, the 2009 Thomas W. Eadie Medal from the Royal Society of Canada (The Academies of Arts, Humanities and Sciences of Canada), the Queen Elizabeth II Diamond Jubilee Medal, the 2013 Award of Merit of Federation of Chinese Canadian Professionals, the 2014 IEEE MTT-S Microwave Application Award, the 2014 Marie-Victorin Prize (Prix du Québec – the highest distinction of Québec in the Natural Sciences and Engineering), the 2015 Prix d'Excellence en Recherche et Innovation of Polytechnique Montréal, the 2015 IEEE Montreal Section Gold Medal of Achievement and the 2019 IEEE MTT-S Microwave Prize. He is a Fellow of the IEEE, a Fellow of the Canadian Academy of Engineering (CAE) and a Fellow of the Royal Society of Canada. He was an IEEE MTT-S Distinguished Microwave Lecturer from Jan 2009 to Dec 2011.

Prof. Dr. Daniel M. Mittleman

Brown University, Rhode Island, USA

Active liquid metal components for terahertz signal processing

Wednesday

Room 1 Time: 13:30 – 14:10

Terahertz frequencies show promise to increase wireless communications spectral capacity and provide short-range high-bandwidth links. However, many signal processing operations which are crucial for network operation remain challenging in the terahertz range. Here, we demonstrate a novel platform for terahertz signal processing based on the combination of passive metal waveguides with reconfigurable liquid metal components. These electrically actuated devices enable dynamic control of terahertz waveguides, opening up new possibilities for active control of terahertz signals. We illustrate these capabilities with a few examples, including a switchable power splitter and a prototype channel add-drop filter for multiplexed terahertz communications.



Daniel M. Mittleman received his B.S. in physics from the Massachusetts Institute of Technology in 1988, and his M.S. in 1990 and Ph.D. in 1994, both in physics from the University of California, Berkeley, under the direction of Dr. Charles Shank. He then joined AT&T Bell Laboratories as a post-doctoral member of the technical staff, working first for Dr. Richard Freeman on a terawatt laser system, and then for Dr. Martin Nuss on terahertz spectroscopy and imaging. Dr. Mittleman joined the ECE Department at Rice University in September 1996. In 2015,

he moved to the School of Engineering at Brown University. His research interests involve the science and technology of terahertz radiation. He is a Fellow of the OSA, the APS, and the IEEE, and is a 2018 recipient of the Humboldt Research Award. He is currently serving a three-year term as Chair of the International Society for Infrared Millimeter and Terahertz Waves.

Prof. Maurizio Bozzi

University of Pavia, Pavia, Italy

Engineering the Resonant Modes in Substrate Integrated Waveguide Technology

Thursday

Room 1 Time: 12:20 – 13:00

The substrate integrated waveguide (SIW) technology has become very popular for a variety of applications, thanks to its good performance, easy fabrication, low cost, and complete shielding, which make it a perfect candidate for the development of wireless systems and sensors for the fifth generation of mobile communication (5G).

In many applications, the SIW cavity is the key element for the development of several components: in fact, cavity filters, cavity-backed antennas, oscillators, and some sensors implement the SIW cavity as their basic element. Besides the classical SIW cavity, a variety of different solutions have been proposed, ranging from different shapes, folded and half-mode/quarter-mode cavities, partially air-filled cavities and many others. Understanding and engineering the resonant mode pattern of the SIW cavity is the starting point to improve the performance of these devices.

This presentation will provide an overview of the modified versions of resonant SIW cavities, starting from the operation principles and showing several applications and design cases.



Maurizio Bozzi received the Ph.D. degree in electronics and computer science from the University of Pavia (Italy) in 2000. He held research positions with various universities worldwide (including the Technische Universität Darmstadt, Germany, the Universitat de València, Spain, and the École Polytechnique de Montréal, Canada). He was a Guest Professor at Tianjin University, China (2015-2017) and a Visiting Professor at Gdansk University of Technology, Poland (2017-2018). Currently he is a Professor at the University of Pavia.

His main research interests concern the computational electromagnetics, the substrate integrated waveguide technology, and the use of novel materials and fabrication technologies for microwave circuits.

Prof. Bozzi is an elected member of the Administrative Committee of the IEEE Microwave Theory and Techniques Society (2017-2019), and he was a member of the General Assembly of the European Microwave Association (2014–2016). He was an associate editor for the IEEE Microwave and Wireless Components Letters, the IET Electronics Letters, and the IET Microwaves, Antennas and Propagation. He was the General Chair of the IEEE MTT-S International Microwave Workshop Series-Advanced Materials and Processes (IMWS-AMP 2017), of the inaugural edition of the IEEE International Conference on Numerical Electromagnetic Modeling and Optimization (NEMO 2014), and of the IEEE MTT-S International Microwave Workshop Series on Millimeter Wave Integration Technologies in 2011.

Maurizio Bozzi is a Fellow of the IEEE (class of 2018). Moreover, he received several awards, including the 2015 Premium Award for Best Paper in IET Microwaves, Antennas & Propagation and the 2014 Premium Award for the Best Paper in Electronics Letters.

Sessions

Tuesday, 16 July 2019 (Registration 10:00-17:30)		
	Room 1 ID 04/459+471	Room 2 ID 04/445
11:00	Opening Session Welcome Addresses Welcome Speech: Dominique Schreurs Keynote: Ke Wu	
12:10		Lunch Break
13:10		
13:30	TU1.1: Additive Manufacturing Technologies	
13:50	and Development - Filters	TU1.2: Material Characterization 1
14:10		
14:30		
14:50	Coffee Break	
15:20		
15:40		
16:00	TU2.1: Additive Manufacturing Technologies	
16:20	and Development - Waveguides	TU2.2: New Materials and Technologies for RF/Microwave Filters
16:40		
17:00		
17:20		
17:30	Visit of the Botanical Garden	
18:30		Welcome Reception
21:00		

TU1.1: Additive Manufacturing Technologies and Development - Filters

Chairs: Oscar A. Peverini (National Research Council of Italy, CNR - IEIIT, Italy),

Cristiano Tomassoni (University of Perugia, Italy)

Room 1

Time: 13:10 – 14:50

Assembly-free Tunable Resonator on TE011 Mode

Aurelien Perigaud¹, Nicolas Delhote¹, Ludovic Carpentier², Olivier Tantot¹

¹ Université de Limoges, France; ²Centre National d'Etudes Spatiales, France

Time: 13:10 -13:30

3D Printed 90 GHz Frequency-Coded Chipless Wireless RFID Tag

Alejandro Jiménez-Sáez¹, Martin Schüßler¹, Damian Pandel², Niels Benson², Rolf Jakoby¹

¹Technische Universität Darmstadt, Germany; ²University of Duisburg-Essen, Germany

Time: 13:30 -13:50

Additive Manufactured Bandpass Filters at Ka-band

Paul Booth

Airbus Defence and Space Ltd., Great Britain, United Kingdom

Time: 13:50-14:10

A New Class of Doublet Based on Slotted Slant Ridge in Additive Manufacturing Technology

Cristiano Tomassoni¹, Lorenzo Silvestri², Nicolò Delmonte², Maurizio Bozzi², Luca Perregiani², Stefania Marconi², Gianluca Alaimo², Ferdinando Auricchio²

¹University of Perugia, Italy; ²University of Pavia, Italy

Time: 14:10 -14:30

Additive Manufacturing of Symmetrical X-Band Waveguide Filters for Wide-Band

Applications based on Extracted Pole Filter Design

Daniel Miek, Sebastian Simmich, Michael Höft

University of Kiel, Germany

Time: 14:30 -14:50

TU1.2: Material Characterization 1

Chairs: Amelie Hagelauer (University of Erlangen-Nuremberg, Germany),

Holger Maune (Technische Universität Darmstadt, Germany)

Room 2

Time: 13:10 – 14:50

Setup for characterization of the non-linear electric susceptibility in the microwave range applied to a glass ceramic

Florian Bergmann¹, Martin Letz², Holger Maune³, Gerhard Jakob⁴

¹SCHOTT AG & Johannes Gutenberg Universität Mainz, Germany; ²SCHOTT AG, Germany;

³Technische Universität Darmstadt, Germany; ⁴Johannes Gutenberg Universität Mainz, Germany

Time: 13:10 -13:30

Characterization of Liquid Crystals Using a Temperature-Controlled 60 GHz Resonator

Ersin Polat, Roland Reese, Henning Tesmer, Sönke Schmidt, Marc Späth, Matthias Nickel, Christian Schuster, Rolf Jakoby, Holger Maune

Technische Universität Darmstadt, Germany

Time: 13:30 -13:50

Non-Destructive Testing of 3D-printed Samples based on Machine Learning

Mostafa Elsaadouny, Jan Barowski, Ilona Rolfs

Ruhr-Universität Bochum, Germany

Time: 13:50-14:10

An Error Compensation Algorithm for Indirect Resonant Planar Relative Permittivity Sensor Principles up to 100 GHz

Isabella Lau¹, Fabian Lurz¹, Robert Weigel¹, Alexander Koelpin²

¹Friedrich-Alexander University Erlangen-Nuremberg, Germany; ²Brandenburg University of Technology, Cottbus-Senftenberg, Germany

Time: 14:10 -14:30

Indoor Material Properties Extraction from Scattering Parameters at Frequencies from 750 GHz to 1.1 THz

Fawad Sheikh¹, Ismail Mabrouk², Akram Alomainy³, Qammer H. Abbasi⁴, Thomas Kaiser¹

¹Universität Duisburg-Essen, Germany; ²Al Ain University of Science and Technology,

United Arab Emirates; ³Queen Mary University of London, Great Britain, United Kingdom;

⁴University of Glasgow, Great Britain, United Kingdom

Time: 14:30 -14:50

TU2.1: Additive Manufacturing Technologies and Development -

Waveguides

Chairs: Maurizio Bozzi (University of Pavia, Italy),

Oscar A. Peverini (National Research Council of Italy, CNR - IEIIT, Italy)

Room 1

Time: 15:20 – 17:20

Overview of Ohmic Losses Reduction and Surface Roughness Enhancement in RF Parts based on Electroless Plating

Petronilo Martin-Iglesias¹, Isabel Montero², Fernando Teberio³, Jon Percaz³, Santiago Martín Iglesias⁴, Ivan Arregui³, Israel Arnedo³, Txema Lopetegi³, Miguel Laso³

¹European Space Agency, The Netherlands; ²Consejo Superior de Investigaciones Científicas, Spain; ³Public University of Navarre, Spain; ⁴National Institute for Aerospace Technology, Spain

Time: 15:20 -15:40

Electromagnetic and Mechanical Analyses of a 3D-printed Ka-band Integrated Twist and Orthomode Transducer

Oscar A. Peverini¹, Giuseppe Addamo¹, Diego Manfredi¹, Flaviana Calignano², Fabio Paonessa¹, Giuseppe Virone¹, Mauro Lumia¹

¹National Research Council of Italy, CNR - IEIIT, Italy; ²Politecnico di Torino, Italy

Time: 15:40 -16:00

Preparation and Properties of 3D Screen-Printed RF Components

Martin Dressler¹, Oscar Peverini², Giuseppe Addamo², Hans-Ulrich Nickel³, Thomas Studnitzky⁴, Marko Stäter⁴

¹Exentis Technology GmbH, Germany; ²National Research Council of Italy, CNR - IEIIT, Italy;

³Spinner GmbH, Germany; ⁴Fraunhofer IFAM, Germany

Time: 16:00-16:20

High Gain Ka-band ALM Feed Chain

Michael Kilian¹, Philipp Kohl¹, Christian Hartwanger², Michael Schneider²

¹Airbus Defence and Space GmbH, Germany; ²Airbus, Germany

Time: 16:20 -16:40

Additive Manufacturing of 300 GHz Corrugated Horn Antennas

Alwin Reinhardt¹, Marvin Möbius-Labinski¹, Christopher Asmus¹, Andreas Bauereiss², Michael Höft¹

¹Kiel University, Germany; ²Heraeus Additive Manufacturing GmbH, Germany

Time: 16:40 -17:00

Fully 3-D Printed Tunable Microwave Subsystem

Sang-hee Shin¹, Diyar Alyasiri¹, Mario D'Auria¹, William Otter¹, Connor Myant¹, Daniel Stokes², Zhengrong Tian², Nick Ridler², Stepan Lucyszyn¹

¹Imperial College London, Great Britain, United Kingdom; ²National Physical Laboratory, Great Britain, United Kingdom

Time: 17:00 -17:20

TU2.2: New Materials and Technologies for RF/Microwave Filter

Chairs: Roberto Gómez-García (University of Alcalá, Spain),

Emiliano Pallecchi (University of Lille, France)

Room 2

Time: 15:20 – 17:20

A Tunable mmWave Band-Pass Filter Based on Ferroelectric Hafnium Zirconium Oxide Varactors

Sukhrob Abdulazhanov¹, Quang Huy Le¹, Dang Khoa Huynh¹, Defu Wang¹, Gerald Gerlach², Thomas Kämpfe¹

¹Fraunhofer Institute for Photonic Microsystems, Germany; ²Technische Universität Dresden, Germany

Time: 15:20 -15:40

Synthesis Design of Modified Wideband Balun Bandpass Filter With Compact Structure

Li Yang¹, Lei Zhu², Roberto Gómez-García¹, Runqi Zhang³, Kam-Weng Tam²

¹University of Alcalá, Spain; ²University of Macau, Macao; ³Purdue University, USA

Time: 15:40 -16:00

Resonant Frequency-dependent Coupling Elements for the Design of Microwave Filters with Multiple Transmission Zeroes

Stéphane Bila¹, Aurelien Perigaud¹, Olivier Tantot¹, Hussein Ezzeddine², Ahmad Haidar¹

¹Université de Limoges, XLIM UMR CNRS 7252, France; ²Jwaya University College, Lebanon

Time: 16:00-16:20

Double-layer Sixteenth-mode Substrate Integrated Waveguide Filter based on Defected Ground Structure

Farouk Grine, Halima Ammari, Mohamed Benhabiles, Mohamed Iahdi Riabi

Université des Frères Mentouri Constantine 1, Algeria

Time: 16:20 -16:40

Miniature Dual-Mode Ring Resonator

Mustafa Bakr, Ahmad Bader Alothmani Alterkawi, Wolfgang Boesch

Graz University of Technology, Austria

Time: 16:40 -17:00

Multiphysic Analysis of High Power Microwave Filter Using High Performance Aluminium Alloy

Petronilo Martin-Iglesias¹, Jon Percaz², Miguel Laso², Txema Lopetegi², Israel Arnedo², Ivan Arregui², Taavi Raadik³, Laurent Pambaguian⁴, Santiago Martín Iglesias⁵, Fernando Teberio⁶

¹European Space Agency, The Netherlands; ²Public University of Navarra, Spain; ³Tallinn University of Technology, Estonia; ⁴ESA European Space Research and Technology Centre, The Netherlands; ⁵National Institute for Aerospace Technology, Spain; ⁶Alter Technology, Spain

Time: 17:00 -17:20

Wednesday, 17 July 2019

(Registration 08:30-17:45)

	Room 1 ID 04/459+471	Room 2 ID 04/445
09:00		
09:20	WE1.1: Antennas and Simulation Techniques	WE1.2: Advanced Passive Components
09:40		
10:00		
10:20	Coffee Break	
10:50		
11:10		
11:30	WE2.1: Materials and Process Technologies	WE2.2: Material Characterization 2
11:50		
12:10		
12:30	Lunch Break	
13:30	Keynote: Daniel Mittleman	
14:10		
14:20		
14:40	WE3.1: Photonic THz Systems	WE3.2: Special Session of IEEE SIGHT
15:00		
15:20		
15:40	Coffee Break	
16:00		
16:20		
16:40	WE4.1: RF nanotechnology: packaging and circuits	
17:00		
17:20		
17:40		
17:50	Transfer by Coach to 'Henrichshütte Hattingen'	
18:15	Visit of 'Henrichshütte Hattingen'	
19:30	Conference Dinner	
22:00	Transfer by Coach to Bochum City Centre or Ruhr-University	
22:30		

WE1.1: Antennas and Simulation Techniques

Chairs: Isabel Montero (Consejo Superior de Investigaciones Científicas, Spain),

Christian Schulz (Ruhr-Universität Bochum, Germany)

Room 1

Time: 09:00 – 10:20

New approach for the simulation of bent and crumpled antennas on a flexible substrate

Kevin Neumann, Andreas Rennings, Daniel Erni

University of Duisburg-Essen, Germany

Time: 09:00 -09:20

A new extremely ultrathin metasurface energy harvester and its simple modelling based on resonant half-wave dipole antenna

Alireza Ghaneizadeh¹; Mojtaba Joodaki^{2,3}; Josef Boercsoek³; Khalil Mafinezhad¹

¹Sadjad University of Technology, Iran; ²Ferdowsi University of Mashhad, Iran; ³University of Kassel, Germany

Time: 09:20 -09:40

A Wearable, Low-Profile, Fractal Monopole Antenna Integrated with a Reflector for Enhancing Antenna Performance and SAR Reduction

Nikolay T Atanasov, Gabriela Atanasova, Aleksey Stefanov, Ivan Nedialkov

South-West University Neofit Rilski, Bulgaria

Time: 09:40 -10:00

Gain Enhancement of Annular Ring Patch Using Cascaded EBG

Sravya Rajamanuri Venkata¹, Runa Kumari¹, Balamati Choudhury²

¹Birla Institute of Technology & Science, Pilani, Hyderabad Campus, India; ²National Aeronautics Laboratory, India

Time: 10:00 -10:20

WE1.2: Advanced Passive Components

Chairs: Michael Höft (Kiel University, Germany),

Oscar A. Peverini (National Research Council of Italy, CNR - IEIIT, Italy)

Room 2

Time: 09:00 – 10:20

3-dB Filtering Power Dividers With Quasi-Reflectionless Behavior at All Their Ports

Roberto Gómez-García¹, José-María Muñoz-Ferreras¹, Dimitra Psychogiou²

¹University of Alcalá, Spain; ²University of Colorado Boulder, USA

Time: 09:00 -09:20

Design and Characterization of Broadband Triplexers

Florian Boes, Marius Kretschmann, Sören Marahrens, Thomas Zwick

Karlsruhe Institute of Technology (KIT), Germany

Time: 09:20 -09:40

Reconfigurable Hairpin Filter with Tunable Center Frequency, Bandwidth and Transmission Zero

Christian Schuster, Lukas Schynol, Ersin Polat, Elias Schwab, Sönke Schmidt, Rolf Jakoby, Holger Maune

Technische Universität Darmstadt, Germany

Time: 09:40 -10:00

Dual-mode Coupler with Branch-line/Rat-race Responses on Integrated Passive Device Process

Huy Nam Chu, Gao-Yi Li, Tzyh-Ghuang Ma

National Taiwan University of Science and Technology, Taiwan

Time: 10:00 -10:20

WE2.1: Materials and Process Technologies

Chairs: Jan C. Balzer (University of Duisburg-Essen, Germany),

Holger Maune (Technische Universität Darmstadt, Germany)

Room 1

Time: 10:50 – 12:30

Glasses and Glass Ceramics for Applications in High Frequency Electronics

Martin Letz

Schott AG, Germany

Time: 10:50 -11:10

Low-k LTCC Dielectrics: Novel High-Q Materials for 5G Applications

Peter Marley, Ellen Tormey, Yi Yang, Cody Gleason

Ferro Corporation, USA

Time: 11:10 -11:30

Polyurethane-Based Functionalized CNT Composites as Absorbers for Microwave Applications

Syed Jehangir¹, Mousa Hussein¹, Indu Rajmohan¹, Yousef Haik², Quentin Clement³, Vukadinovic Nicolas⁴

¹United Arab Emirates University, United Arab Emirates; ²Hamad Bin Khalifa University, United Arab Emirates; ³Dassault Aviation, France; ⁴Dassault Aviation, United Arab Emirates
Time: 11:30 -11:50

Simulation and Manufacturing of Low Loss PCB Structures with Additional Electromagnetic Field in Air

Felix Sepaintner, Andreas Scharl, Franz Röhrl, Werner Bogner, Stefan Zorn

Technische Hochschule Deggendorf, Germany

Time: 11:50 -12:10

Nanostructured coatings of low-secondary electron emission to avoid multipactor discharge in high-power microwave devices

Isabel Montero¹, Leandro Olano¹, María Dávila¹, Petronilo Martín-Iglesias², José Rojo¹

¹Instituto de Ciencia de Materiales de Madrid, Consejo Superior de Investigaciones Científicas (ICMM-CSIC), Spain; ²European Space Agency, The Netherlands
Time: 12:10 -12:30

WE2.2: Material Characterization 2

Chairs: Jan Barowski (Ruhr-Universität Bochum, Germany),

Tuami Lasri (University of Lille, France)

Room 2

Time: 10:50 – 12:30

Experimental Investigation of Terahertz Wave Scattering by Statistically Controlled Rough Surfaces

Mai Alissa, Benedikt Friederich, Kevin Kolpatzeck, Andreas Czylwik, Thomas Kaiser

University of Duisburg-Essen, Germany

Time: 10:50 -11:10

Investigations on Foam Detection Utilizing Ultra-Broadband Millimeter Wave FMCW Radar

Marcel van Delden, Stephan Westerdick, Thomas Musch

Ruhr-Universität Bochum, Germany

Time: 11:10 -11:30

A Novel Calibration Technique for FMCW Radar Systems Enabling Material Characterization in Variable Distances

Jochen Jebramcik, Ilona Rolfes, Jan Barowski

Ruhr-Universität Bochum, Germany

Time: 11:30 -11:50

Asymptotic Simulation Methods as Forward Models in Multilayer Material Characterization Applications

Steffen Vogt, Orell Garten, Jochen Jebramcik, Jan Barowski, Ilona Rolfes

Ruhr-Universität Bochum, Germany

Time: 11:50 -12:10

Wide Band (0,5-67 GHz) Dielectric Properties of Biosourced Cellulose Ester Flexible Films

Pierre-Yves Cresson¹, Ghizlane Boussatour¹, Nicolas Joly², Benoit Genestie², Tuami Lasri¹,

Shuo Li¹

¹IEMN - University of Lille, France; ²University of Artois, France

Time: 12:10 -12:30

WE3.1: Photonic THz Systems

Chair: Martin Hofmann (Ruhr-Universität Bochum, Germany)

Room 1

Time: 14:20 – 15:40

High Dynamic Range THz Systems using ErAs:In(Al)GaAs Photoconductors

Uttam Nandi¹, Fahd Faridi¹, Anuar Fernandez Olvera¹, Justin Norman², Hong Lu³, Arthur Gossard², Sascha Preu¹

¹Technische Universität Darmstadt, Germany; ²University of California, Santa Barbara, USA; ³University of Nanjing, P.R. China

Time: 14:20 -14:40

Integrated Microwave Photonics for Mobile Terahertz Spectroscopy and Imaging

Andreas Stöhr, Sebastian Dülme, Nils Schrinski, Peng Lu

University of Duisburg-Essen, Germany

Time: 14:40 -15:00

Characterization and Application of a Commercially Available Laser Diode in a THz System

Kevin Kolpatzeck, Sebastian Tonder, Xuan Liu, Andreas Czylwik, Jan C. Balzer

University of Duisburg-Essen, Germany

Time: 15:00 -15:20

High-resolution molecular spectroscopy with terahertz quantum-cascade lasers

Martin Wienold¹, Till Hagelschuer¹, Heiko Richter², Heinz-Wilhelm Huebers²

¹German Aerospace Center (DLR), Institute of Optical Sensor Systems, Berlin, Germany;

²DLR Institute of Planetary Research, Germany

Time: 15:20 -15:40

WE3.2: Special Session of IEEE SIGHT

Chairs: Christoph Baer (Ruhr-Universität Bochum, Germany),

Christian Schulz (Ruhr-Universität Bochum, Germany)

Room 2

Time: 14:20 – 15:40

IEEE Special Interest Group on Humanitarian Technology (SIGHT) provides IEEE members with the opportunity to work with a large network of volunteers around the world carrying out and/or supporting impactful humanitarian activities on the local level. Within this session, two SIGHT groups will present their current activities. Moreover, the role of SIGHT in sustainable development space will be discussed.

Activities of IEEE SIGHT Egypt Section

Mohamed Sief, IEEE Egypt Section SIGHT - Chairman

Egyptian Electricity Transmission Co, Egypt

Time: 14:20 -14:40

Agriculture, Climate & Technology in Indian Ocean Network (ACTION)

Vikass Monebhurrun, IEEE APS SIGHT

CentraleSupélec, France

Time: 14:40 -15:00

Role of IEEE SIGHT in sustainable development space

Sampathkumar Veeraraghavan, IEEE SIGHT Projects Chair

Amazon, USA

Time: 15:00 -15:40

WE4.1: RF nanotechnology: packaging and circuits

Chairs: Dominique Baillargeat (University of Limoges, CNRS, XLIM, France),

Tuami Lasri (University of Lille, France)

Room 1

Time: 16:00 – 17:40

Characterization of Carbon Fiber Reinforced Plastic for Microwave Circuit Design

Christopher M. Preddy

QinetiQ & University of Surrey, Great Britain, United Kingdom

Time: 16:00 -16:20

Millimeter-wave CNT based Resonant Cavity

Joseph de Saxcé¹, Philippe Roux-Levy¹, Jianxiong Wang², Siah Chun Fei², Dominique Baillargeat¹, Philippe Coquet², BK Tay³

¹Université de Limoges, XLIM UMR CNRS 7252, France; ²CINTRA UMI 3288

CNRS/NTU/THALES, Singapore; ³School of EEE Nanyang Technological University, Singapore

Time: 16:20 -16:40

Boron Nitride Coated Three-Dimensional Graphene as an Electrically Insulative Electromagnetic Interference Shield

Zhi Lin Ngho¹, Fei Ni Leong¹, Roland Yingjie Tay², Matthew D. Whiteside², Soon Siang Chng², Jong Jen Yu³, Siu Hon Tsang⁴, Dunlin Tan⁵, Geok Ing Ng², Edwin Hang Tong Teo²

¹Nanyang Technological University & CINTRA UMI3288, Thales Solutions Asia Pte Ltd, Singapore; ²Nanyang Technological University, Singapore; ³Thales Solutions Asia Pte Ltd, Singapore; ⁴Temasek Laboratories, Singapore; ⁵Thales Solutions Asia Pte Ltd, Singapore

Time: 16:40 -17:00

Graphene Field Effect Transistors for High Frequency applications

Emiliano Pallecchi¹, Henri Happy¹, Wei Wei², Marina Deng³, Sebastien Fregonese³, Dalal Fadil¹, Di Zhou¹, Soukaina Ben Salk¹, Wlodek Strupinski⁴

¹IEMN - University of Lille, France; ²IEMN-CNRS UMR8520, France; ³University of Bordeaux, France; ⁴Institute of Electronic Materials Technology, France

Time: 17:00 -17:20

Graphene-Diode-Based Frequency Conversion Mixers for High-Frequency Applications

Ahmed Ghareeb¹, Mohamed Saeed Elsayed¹, Zhenxing Wang², Mehrdad Shaygan², Daniel Neumaier², Renato Negra¹

¹RWTH-Aachen, Germany; ²Advanced Microelectronic Center Aachen, AMO GmbH, Germany

Time: 17:20 -17:40

Thursday, 18 July 2019

(Registration 08:30-11:00)

	Room 1 ID 04/459+471	Room 2 ID 04/445
08:40		
09:00		
09:20	TH1.1: Millimetre Wave Imaging	TH1.2: Innovative Integration Techniques
09:40		
10:00		
10:20	Coffee Break	
10:50		
11:10	TH2.1: Microwave Sensors	TH2.2: Advanced Devices and Circuits
11:30		
11:50		
12:10		
12:20	Closing Session Keynote: Maurizio Bozzi Awards Ceremony: Ke Wu, Simon Küppers Closing Remarks, Announcement next Conference	
13:30	Lunch Break	
14:30		

TH1.1: Millimeter Wave Imaging

Chair: Jan Barowski (Ruhr-Universität Bochum, Germany)

Room 1

Time: 08:40 – 10:20

Imaging Characteristics of a 24 x 24 Channel MIMO FMCW Radar based on a SiGe:C Chipset

Simon Kueppers¹, Reinhold Herschel², Siying Wang², Dirk Nüßler², Nils Pohl¹

¹Ruhr-Universität Bochum, Germany; ²Fraunhofer FHR, Germany

Time: 08:40 -09:00

Addressing Automotive Radar End-of-Line Testing Applications with a Millimeter Wave Imaging System

Tobias Koeppel

Rohde & Schwarz, Germany

Time: 09:00 -09:20

Synthetic Aperture Radar Imaging Using MIMO Frequency Modulated Continuous Wave Sensors

Jonas Wagner, Christoph Dahl, Ilona Rolfes, Jan Barowski

Ruhr-Universität Bochum, Germany

Time: 09:20 -09:40

Spatial Identification of Dielectric Properties using Synthetic Aperture Radar

Jan Barowski¹, Jochen Jebramcik¹, Jonas Wagner¹, Nils Pohl^{1,2}, Ilona Rolfes¹

¹Ruhr-Universität Bochum, Germany; ²Fraunhofer FHR, Germany

Time: 09:40 -10:00

Pulse-resolved Data Acquisition System for THz Pump Laser Probe Experiments at TELBE using Super-radiant Terahertz Sources

Mohammed Bawatna¹, Bertram Green¹, Jan-Christoph Deinert¹, Sergey Kovalev¹, Oliver Knodel¹, Rainer G. Spallek², Thomas Cowan¹

¹Helmholtz Zentrum Dresden Rossendorf, Germany; ²Technische Universität Dresden, Germany

Time: 10:00 -10:20

TH1.2: Innovative Integration Techniques

Chairs: Roberto Gómez-García (University of Alcalá, Spain),

Sven Thomas (Fraunhofer FHR, Germany)

Room 2

Time: 09:00 – 10:20

On the Design of Antennas in eWLB Package for Radar Applications above 100GHz

Faisal Ahmed¹, Muhammad Furqan², Andreas Stelzer³, Christoph Wagner⁴

¹Infineon Technologies AG & DICE GmbH & Co KG, Austria; ²DICE GmbH & Co KG - Danube Integrated Circuit Engineering, Austria; ³Johannes Kepler University Linz, Austria; ⁴Danube Integrated Circuit Engineering (DICE), Linz, Austria

Time: 09:00 -09:20

Polymer based 140 GHz Planar Gap Waveguide Array Antenna for Line of Sight (LOS) MIMO Backhaul Links

Sadia Farjana, Peter Enoksson, Ashraf Uz Zaman, Sofia Rahiminejad, Mohammad Ghaderi,

Sjoerd Haasl

Chalmers University of Technology, Sweden

Time: 09:20 -09:40

Ink-jet Implementation of Stacked-Patch Antenna for Wireless Applications

Eduardo Garcia-Marin¹, Enrique Márquez-Segura², Pablo Sanchez-Olivares¹, Jose Luis Masa-Campos¹, Jorge A. Ruiz-Cruz³, Carlos Camacho-Peñalosa²

¹Universidad Autonoma de Madrid, Spain; ²Universidad de Málaga, Spain; ³Universidad Autonoma de Madrid & Escuela Politecnica Superior, Spain

Time: 09:40 -10:00

Embedded Suspended Stripline Substrate Technology (ESSS) as a Catalyst for Low-loss PCB Structures in the Ka-Band

Sebastian Sattler¹, Ahmad Bader Alothman Alterkawi¹, Fabrizio Gentili¹, Reinhard Teschl¹, Erich Schlaffer², Bernhard Reitmaier², Wolfgang Boesch³

¹Graz University of Technology, Austria; ²AT&S AG, Germany; ³Graz University of Technology & Institute of Microwave and Photonic Engineering, Austria

Time: 10:00 -10:20

TH2.1: Microwave Sensors

Chairs: Sascha Preu (Technische Universität Darmstadt, Germany),

Cristiano Tomassoni (University of Perugia, Italy)

Room 1

Time: 10:50 – 12:10

Microwave Characterization of Liquid Mixtures with a Miniaturized Interdigital Sensor

Xiue Bao¹, Ilja Ocket², Meng Zhang², Juncheng Bao¹, Dominique Schreurs¹, Bart Nauwelaers¹

¹University of Leuven, Belgium; ²University of Leuven & TELEMIC, ESAT, Belgium

Time: 10:50 -11:10

Planar Microwave Bragg Reflector Resonant Dielectric Sensor

Abhishek K. Jha¹, Michał Mrozowski², Nicolò Delmonte³, Adam Lamecki¹, Maurizio Bozzi³

¹Gdańsk University of Technology, Poland; ²IEEE, USA; ³University of Pavia, Italy

Time: 11:10 -11:30

Minimally Invasive Supervision of Plasma-assisted Dielectric Deposition Processes

Dennis Pohle, Christian Schulz, Moritz Oberberg, Peter Awakowicz, Ilona Rolfes

Ruhr-Universität Bochum, Germany

Time: 11:30 -11:50

Emulation of Spatially Distributed Plasma Density Profiles in 3D Electromagnetic Field Simulations

Birk Hattenhorst, Dennis Pohle, Christian Schulz, Ilona Rolfes, Thomas Musch

Ruhr-Universität Bochum, Germany

Time: 11:50 -12:10

TH2.2: Advanced Devices and Circuits

Chairs: Faisal Ahmed (Infineon Technologies AG & DICE GmbH & Co KG, Austria),

Marcel van Delden (Ruhr-Universität Bochum, Germany)

Room 2

Time: 10:50 – 12:10

Analysis of stochastic Schottky barrier variations within printed high frequency rectifiers for harmonics generation

Kevin Neumann, Laura Kühnel, Fabian Langer, Andreas Niels Benson, Roland Schmeichel,
Daniel Erni

University of Duisburg-Essen, Germany

Time: 10:50 -11:10

Design and Characterisation of VO₂ Based Switches for Ultra-Fast Reconfigurable Devices

Mohammad Nikhian Sadiq¹, Marc Le Roy¹, Andre Perennec¹, Paul Laurent¹, Noham Martin¹, Damien Passerieux², Aurelian Crunteanu², Remi Boyer³, Frederic Dumas-bouchiat⁴, Marie-Blandine Martin⁵, Laurent Divay⁵, Quentin Levesque⁵, Gérard Tanné¹
¹Lab-STICC Université de Bretagne Occidentale, France; ²University of Limoges, France;
³IRCE, France; ⁴SPCTS Laboratory, France; ⁵Thales Research & Technology, France

Time: 11:10 -11:30

A mmWave Phase Shifter Based on Ferroelectric Hafnium Zirconium Oxide Varactors

Sukhrob Abdulazhanov¹, Quang Huy Le¹, Dang Khoa Huynh¹, Defu Wang¹, Gerald Gerlach², Thomas Kämpfe¹

¹Fraunhofer IPMS, Germany; ²Technische Universität Dresden, Germany

Time: 11:30 -11:50

An 8-to-20 GHz Wideband Yttrium-Iron-Garnet Tuned Oscillator Design with SRFT Integration

Huan Hui Yan¹, Narendra Aridas¹, Tarik Abd Latef¹, Amir Effendy Muhammad Afifi², Bekir Siddik Yarman³

¹University of Malaya, Malaysia; ²Keysight Technologies, Malaysia; ³Istanbul University, Algeria

Time: 11:50 -12:10

Conference venue

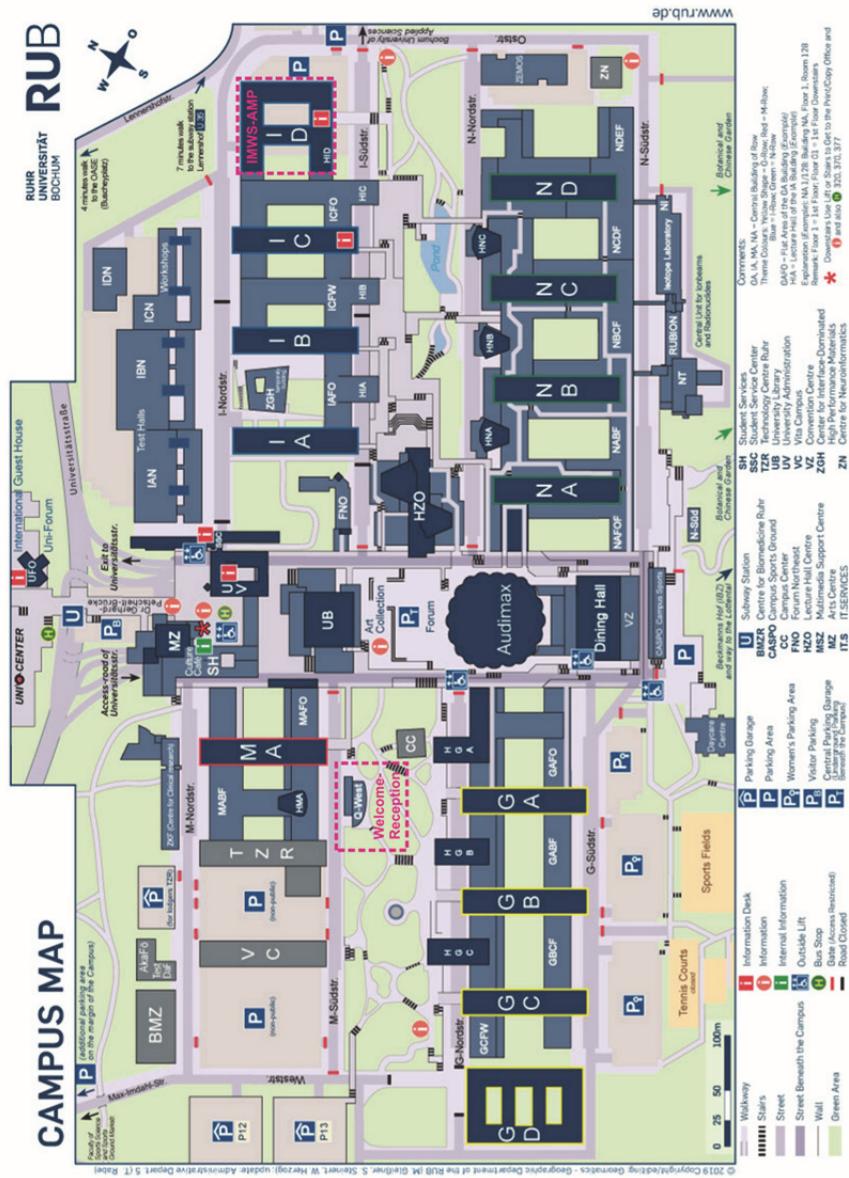
The IMWS-AMP 2019 is held at the Ruhr-Universität Bochum in the building ID. You can reach the Ruhr-Universität, which has its own station, easily from main train station (Hauptbahnhof) Bochum by taking the underground (U-Bahn) train U35 (CampusLinie). On workdays, the U35 (towards Bochum Hustadt) departs in five-minute intervals, and it takes less than 10 minutes to go from the main train station to the university station.



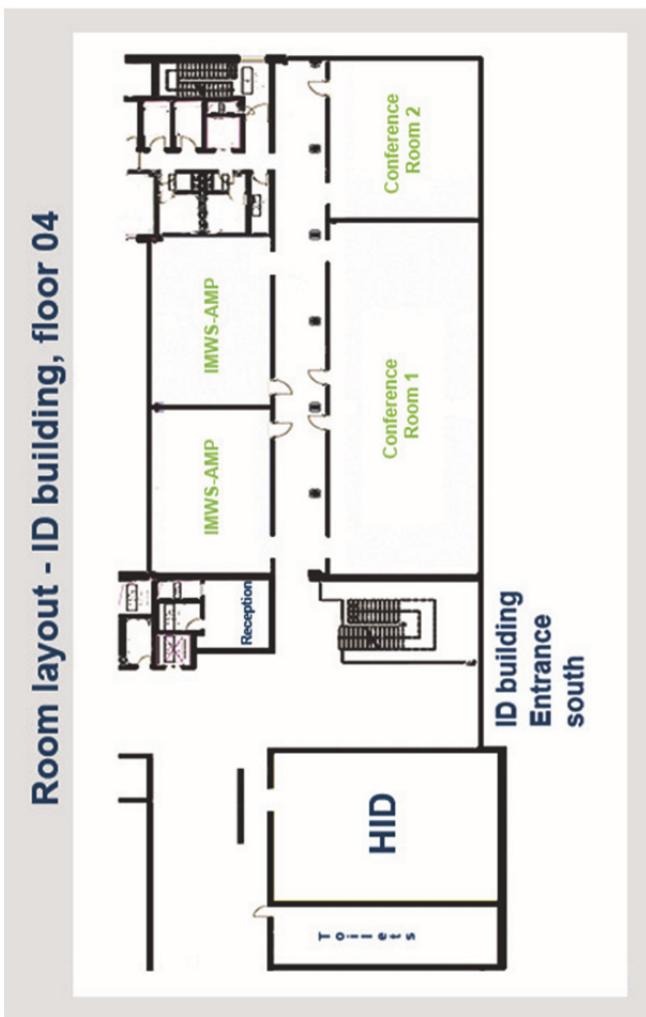
Address of the venue

Ruhr Universität Bochum
Building ID
Universitätsstraße 150
44801 Bochum
51.44688 °N, 7.26635 °E
51°26'48.8" N, 7°15'58.9" E

Map of the Ruhr-Universität Bochum



Room layout of the venue



WiFi-Access

For the IMWS-AMP 2019, two different connections are offered.

Access 1

All university buildings are covered by wireless LAN eduroam, which is used in many universities.

You can connect to this network with your standard login.

Access 2

We installed accounts for guests: Please contact the registration desk for getting information.

Welcome Reception

On Tuesday evening, IMWS-AMP 2019 welcomes you with a Reception, which offers a great opportunity to meet colleagues and to share ideas in a convenient atmosphere.

The Welcome Reception takes place in the ‘Q-West’, which is located on the Campus of the Ruhr-Universität. The exact position of the ‘Q-West’ is shown in the campus map on page 33.

The Welcome Reception starts at six and a half in the evening and ends around nine pm.

Conference dinner

Address of the conference dinner

LWL-Industriemuseum Henrichshütte Hattingen
Werksstraße 31-33
45527 Hattingen
51.40714°N, 7.18763°E
51°24'25.7" N, 7°11'15.5" E

How to get to there?

The transfer from Ruhr-Universität to the location of the conference dinner will be done by coach. The participants will be picked up at the below marked meeting point at a quarter to six.



How to get back?

After the evening event the coaches will take you back to the city centre of Bochum near main train station or to Ruhr-Universität Bochum.

Imprint

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