



Around the Globe

The 26th European Microwave Week, in Berlin, Germany

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The 26th European Microwave Week (EuMW) took place in Berlin, Germany, on 17–22 September 2023. After events in Munich and Nuremberg, this was the first time that the German edition of EuMW had taken place in the capital city of Berlin. Berlin, Germany’s capital and largest city, is a fascinating European city that is renowned not only for its landmarks and museums but also for a rich cultural life, vibrant party scene, and urban art. EuMW took place in the new building “hub27” at the exhibition center Berlin Messe, which offered very modern conference and meeting rooms in connection with a large exhibition hall. For all conference



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delegates, free public transportation was included in their badges. The EuMW conference team comprised Thomas Zwick (Karlsruhe Institute of Technology) as the general chair, Ingmar Kallfass (University of Stuttgart) as the general technical program committee (TPC) chair, and Vadim Issakov

(Technical University Braunschweig) as the general cochair.

As in previous years, EuMW 2023 combined the three sister conferences—the European Microwave Conference (EuMC), European Microwave Integrated Circuits Conference (EuMIC), and European Radar Conference (EuRAD)—with the Defense, Security, and Space Forum (DSS); the Automotive Forum (AF); the 5G to 6G Forum; a large number of workshops covering a wide range of topics; focused and special sessions; and special events, such as Women in Microwaves (WiM) and two Inter-Society Technology Panels by the IEEE Microwave Theory and Technology Society (MTT-S). The structure of the

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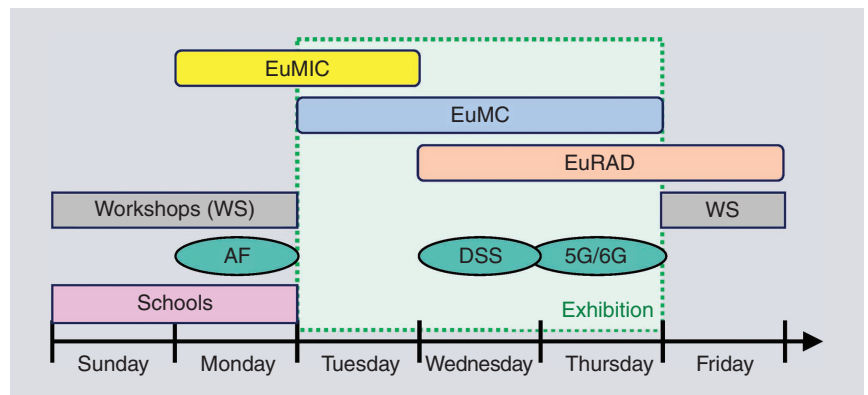


Figure 1. EuMW in a nutshell.



Figure 2. *The EuMW 2023 exhibition.*



Figure 3. *The student volunteers.*

week as a whole can be seen in Figure 1. A total of 1,638 unique conference delegates enjoyed the 432 peer-reviewed papers, which were presented in oral presentations and interactive posters. To round off the scientific program, the presentations on the peer-reviewed papers were supplemented by 10 plenary talks and 24 industrial keynote speeches. The 23 workshops and short courses also provided further technical training. From Tuesday to Thursday, the scientific conference was complemented by the Microwave Exhibition (see Figure 2). With 332 international exhibitors spread over more than 8,000 m², it was the largest exhibition at an EuMW to date. To help with registration, admission control at the conference rooms, microphones, and many other meeting details, we had more than 150 student volunteers at EuMW 2023 who did an amazing job (see Figure 3).

On Sunday, the 13th Tom Brazil Doctoral School of Microwaves gave students a fascinating journey into the fusion of artificial intelligence (AI) and radar technology. This year the school's focus was all about building and training artificial neural networks for radar-based gesture recognition. The journey started with a deep dive into frequency-modulated continuous wave radar, radar signal processing, and gesture recognition. With that foundation, the 29 participants learned the basics of deep learning and network architectures and were able to build and train their own neural networks for radar-based hand gesture recognition using interactive Jupyter notebooks. The seventh European Microwave Student School took place on Sunday and Monday with 93 participants. The focal point of this educational forum was an exploration of "Microwave Measurement Techniques," offering a comprehensive two-day program brimming with enlightening lectures across diverse domains, such as metrology, spectrum and signal analysis, network analysis, calibration, and on-wafer measurement techniques. On Monday evening, our Young Professionals Get-Together brought 250 young microwave engineers, mainly

from the two host schools, into the Hofbräu Wirtshaus Berlin, which is an offshoot of the famous Hofbräuhaus in Munich (see Figure 4).

The three forums at EuMW were a great success. The AF on Monday, with its industrial presentation around “Innovations and Trends for Automotive Radar Frontends and Imaging Radars” and a networking dinner in a trendy Berlin restaurant (see Figure 5), attracted close to 200 experts, mostly from industry. The DSS on Wednesday brought nearly 200 interested delegates together on “Boosting Connectivity for Moving Platforms.” In the 5G to 6G Forum on Thursday, experts from well-known companies in the field, several start-ups, and several universities presented new insights into novel mobile communication systems.

A joint MTT-S WiM and Young Professionals event occurred on Tuesday afternoon, 19 September 2023. The main event was a moderated panel session with female industry representatives (see Figure 6). The panelists shared valuable insights into their careers, companies, and industries and provided tips for young professionals pursuing a career in industry. Following the panel, the participants enjoyed a unique sight-seeing tour of Berlin’s history, exploring flak towers and bunkers in Berlin’s underground. In keeping with our slogan, “Waves beyond walls,” every plenary speaker and the industry panelists at the WiM event were presented with an original piece of the Berlin Wall with a certificate of authenticity. We hope that this will be a fitting souvenir of EuMW 2023 in Berlin.

Supported by our platinum sponsor Keysight, the big welcome reception took place on Tuesday evening in the Palais on the exhibition grounds in keeping with EuMW tradition. In Berlin’s largest ballroom, everyone enjoyed the varied buffet and good conversations with colleagues (see Figure 7).

To be more efficient and to reduce the carbon footprint of EuMW, the TPC members did their work preparing for the conference completely online. In appreciation of their great work, a TPC



Figure 4. *The Young Professionals Get-Together in Hofbräu Wirtshaus Berlin.*



Figure 5. *Frank Gruson plays the trumpet at the AF networking dinner in Berlin’s trendy Sage restaurant.*

lunch was organized on Wednesday in the tower of Messe Berlin with a great view over the city (see Figure 8).

On Wednesday evening, the exclusive EuMW gala dinner took place in the Tipi am Kanzleramt (see Figure 9), the largest stationary tent stage in Europe, which has been located opposite the German Chancellery since 2002. Thanks in part to the generous sponsorship of Rohde & Schwarz, the almost 500 guests were able to enjoy the singer Mareeka and pianist Bastian as

well as an excellent three-course menu. Later in the evening, we were thrilled by the gala show “Swinging Breakdance” by the DDC Entertainment Group.

To complete the range of offerings for young engineers, a student career event was organized on Wednesday. It consisted of two parts. From noon to 3 p.m., students were provided information about career possibilities with 11 companies, which presented themselves in minibooths (see Figure 10). At the same time, these companies,

which also sponsored the whole event, distributed tickets for the career party to the crowd. On Wednesday evening, the young engineers met again in a club in Berlin (Kulturbrauerei) for the career party, where networking between students and companies continued, mixed with drinks, food, and dancing until 2 a.m.

EuMC 2023

This year, the 53rd edition of EuMC took place with more than 900 delegates. The EuMC team was composed of Ilona Rolfes (Ruhr-University Bochum) as conference chair, Amelie Hagelauer (Fraunhofer Institute for Electronic Microsystems and Solid State Technologies) as TPC chair, and Jan Barowski (Ruhr-University Bochum) as conference cochair. With more than 375 submissions from across 40 countries, a rich conference program could be produced, covering a broad range of high-frequency-related topics, from materials and technologies to integrated circuits, systems, and applications, addressing all aspects from theory to simulation, design, and measurement. The program included more than 40 sessions and was enriched by contributions from keynote speakers and focused sessions. For example, the Asia-Pacific focused session offered the latest highlights on technological advancements, providing insight into the field of terahertz (THz) antennas and systems as well as addressing new developments in 6G technologies that extended from THz communications to aspects of joint communication and radar sensing.

To give you an impression of some of the highlights of the conference, we want to draw your attention to the EuMW/EuMC plenary opening session on Tuesday morning (see Figure 11). We were happy that our session was enriched by greetings from Luca Perregrini, vice president of EuMA; Nuno Borges Carvalho, MTT-S president; and Joel Dunsmore, a representative of our platinum sponsor. Furthermore, an inspiring plenary talk by Daniel Mittleman of Brown University, USA, gave us insights



Figure 6. The WiM industry panelists and event organizers (from left): Cristina Andrei (Brandenburg University of Technology), Sherry Hess (Cadence), Juliane Handschuh (Moderator), Irene Selvanathan (NEUROSPACE), Anouk Hubrechen (ANTENNEX), Mayazzurra Ruggiano (Thales), Wendy Shu (Eravant), Anna Miskiewicz (Apple), Ana Ines Inacio (TNO), and Jasmin Grosinger (Graz University of Technology).



Figure 7. The welcome reception in the Palais on the exhibition grounds.

on “Near-Field Terahertz Networking” (see Figure 12). Furthermore, several prestigious awards were presented: the EuMA Distinguished Service Award to Lorenz-Peter Schmidt (Friedrich-Alexander-Universität Erlangen-Nuernberg, Germany), the EuMA Outstanding Career Award to Werner Wiesbeck (Karlsruhe Institute of Technology, Germany), and the Roberto Sorrentino Prize to Maria Garcia-Vigueras (Institut National des Sciences Appliquées Rennes, France).

On Thursday afternoon, during our EuMC closing session, Jean-Dominique Coste from Airbus, Germany, gave his illustrative plenary talk, “Beams From Space: The Future of Energy?” followed by Heike Riel of IBM Research, Switzerland, with her inspiring plenary talk on “Quantum Computing—Building a New Computing Technology” (see Figure 13). During the awards ceremony, the EuMC Microwave Prize, sponsored by IMA e.V., was presented to J. Dittmer, J. Tebart, C. Füllner, C. Koos, A. Stöhr, and S. Randel for their paper “200 Gbit/s Wireless THz Transmission Over 52 m Using Optoelectronic Signal Generation.” The two Young Engineer Prizes, sponsored by Krohne and 2 pilots, were awarded for the papers “Sub-THz Silicon-Micromachined Reconfigurable Beam-Steering Frontend,” by A. Karimi, U. Shah, and J. Oberhammer, and “Backscatter Tag Based on an Actively Controlled Reflection Amplifier,” by M. Lazaro, A. Lazaro, R. Villarino, and D. Girbau.

EuMIC 2023

The 18th EuMIC was, as usual, jointly organized by the GAAS Association and EuMA, representing the premier European technical conference for all topics ranging from RF, microwave, and THz electronics; to ultrafast mixed-signal circuits and systems; to optoelectronics. Established as the largest scientific event in Europe related to microwave integrated circuits, EuMIC 2023 had 450 conference participants and the submission of more than 150 papers, significantly surpassing the figures from even years before the pandemic.

Friedel Gerfers (Technical University of Berlin) and Corrado Carta (IHP and Technical University of Berlin) served as the EuMIC general chair and co-chair, respectively, while Ulrich Lewark (IMST) was the TPC chair.

The 18th EuMIC conference addressed emerging mega trends, such as 6G and THz connectivity, connected and environmental-aware vehicles, smart and intelligent sensing, panglobal satellite coverage, and smart city and

smart factory developments, all of which rely on high-frequency devices and solutions. It showcased recent achievements and innovative trends covering a broad range of high-frequency-related topics in integrated circuits, ranging from devices and technologies to monolithic integrated circuits dedicated to system-in-package and system-on-chip applications, encompassing all relevant aspects, such as theory, modeling, simulation, design, and measurement.



Figure 8. The TPC appreciation lunch took place in the tower of Berlin Messe.

The EuMIC opening session featured two keynote addresses by eminent speakers. Dr. Ludger Verweyen of Infineon, Germany, proposed new RF, power, and sensor solutions for greener information and communications technology networks, while Christian Zelger from Bosch, Germany, provided the latest trends in transceivers for automotive radar sensors. The start-up company IC4X kindly sponsored a traditional German snack—a salted pretzel. The traditional EuMIC dinner took place in the famous and historic Meistersaal, at Potsdamer Platz, kindly

sponsored by Infineon, NXP, and the GAAS Association, which concluded the first day. The conference opening on Monday offered, in addition to the exciting opening session, 12 regular technical sessions.

On Tuesday, which also hosted the opening of EuMW 2023, EuMIC offered five regular sessions, one joint session with EuMC, the foundry session, two interactive poster sessions (one of them joint), and the EuMIC closing session. Several of the regular sessions featured keynote industry talks on topical themes. The joint foundry session was

organized as a panel session, which not only addressed the European Union Chip Act but also delivered the latest updates from the RF and microwave semiconductor foundries.

This year, the EuMIC closing session started with two prominent keynote presentations, the first by distinguished Prof. Gabriel Rebeiz, University of California, San Diego, CA, USA, was “Leaving the Marconi Era and Entering the Directive Communications and Sensors Era for 5G/6G and Satellite Communications” (see Figure 14), followed by Dr. Julio C. Costa, Global Foundries, USA, on “Radio Frequency Silicon-on-Insulator Technology for the RF Front End: Then, Now, and Tomorrow.” This was followed by a celebration of our best contributors. The prize for the best EuMIC paper went to P. Neininger, F. Thome, L. John, A. Leuther, S. Chartier, and R. Quay, and the EuMIC Young Engineer Prize was awarded to A. Elmenshawi, M. W. Mansha, S. Muralidharan, and M. M. Hella. The EuMIC awards were kindly sponsored by IHP Solutions and the GAAS Association. In addition to these prestigious prizes, the GAAS Association Tom Brazil Fellowship Award, an essay competition that focuses on promoting and encouraging the achievements of excellent students, was handed out for the first time since the award was established. First place went to Yicun Guo, and second and third places were awarded to Paul Tschammer and Aarón García-Luque, respectively.

EuRAD 2023

Twenty years after EuRAD was launched in The Netherlands, the 2023 conference took place in Berlin for the first time. The event proved to be a great success, boasting a turnout of more than 600 participants and the submission of more than 200 papers—significantly surpassing the figures from previous years. The EuRAD core team consisted of Christian Waldschmidt (Ulm University) and Christina Bonfert (Ulm University) as general chair and cochair, respectively, with Marlene Harter (Offenburg University



Figure 9. The gala dinner in the Tipi am Kanzleramt.



Figure 10. The student career event and student career party.

of Applied Sciences) serving as TPC chair. Additionally, numerous volunteers played a crucial role in contributing to the organization of the event.

EuRAD encompasses a vast spectrum within the realm of radar, addressing not only the traditional subjects of microwave and millimeter-wave technology but also delving into aspects of radar signal processing. In 2023, the spotlight was on cutting-edge topics, such as the application of AI in radar, automotive radar advancements, and the integration of communication and sensing. Special sessions delved into emerging areas, such as the integration of radars on drones.

EuRAD opened on Wednesday, the fourth day of EuMW, with two plenary talks. First, Tom Driscoll from Echodyne presented the latest developments in the field of phased arrays for a variety of different applications (see Figure 15). Then, Andreas Schießl and Matthias Gareis, both from Rohde und Schwarz, presented the technology behind the latest walk-through body scanners. In addition, 29 technical sessions featured in-depth scientific presentations and insightful industrial keynotes, providing valuable perspectives from experts in the field. This multifaceted approach not only enriched the conference program but also facilitated a comprehensive presentation of current radar developments and applications. The AF and DSS were also of great interest to many EuRAD attendees.

EuRAD concluded on Friday with the traditional EuRAD lunch, which was seamlessly integrated into the closing session this year. In a plenary talk, Christoph Reising presented the latest radar activities of the Fraunhofer Institute for High Frequency Physics and Radar Techniques in the field of space observation with large radars. The EuRAD Best Paper Award, sponsored by Thales and presented by Mayazzurra Ruggiano, was awarded to Anum Pirkani from the University of Birmingham. Johanna Bräunig from Friedrich-Alexander-University in Erlangen-Nuremberg won the



Figure 11. *The EuMW/EuMC opening session.*



Figure 12. *Daniel Mittleman during his plenary talk.*



Figure 13. *(From left) Amelie Hagelauer (EuMC TPC chair), plenary speaker Heike Riel (IBM) with a piece of the Berlin Wall, Ilona Rolfes (EuMC chair), and Thomas Zwick (EuMW general chair).*



Figure 14. Gabriel Rebeiz during his plenary talk in the EuMIC closing session.



Figure 15. Tom Driscoll during his plenary talk.



Figure 16. Part of the EuMW 2023 team.

EuRAD Young Engineer Award, sponsored by Hensoldt and presented by Guy Kouemou.

Conclusions

Thanks to all who participated in EuMW 2023 and brought it to life! We can definitely conclude that Berlin, with its fascinating combination of a thriving social and political life and its intense historical heritage, is a great location for EuMW. The conference center suited our needs very well and was well connected to the city. This, together with the very attractive city of Berlin, makes it a wonderful location for future EuMWs. Second, we can also conclude that, in postpandemic times, an in-person event with all of its networking opportunities has great value and is important for our scientific international microwave community.

On behalf of the “hidden” team of EuMW 2023, which is not prominently visible at the conference and cannot be fully mentioned in this article, we would like to highlight three people who made a special contribution to this edition of EuMW. The overall coordination of all details was the responsibility of Operations Officer Akanksha Bhutani. Local Arrangement Chair Marcel Runge took care of all local details in hub27 as well as all additional events, such as dinners and tours in Berlin. Our publication chair, Benjamin Nuß, was the person primarily responsible for the program booklet, the website, and the publication of the papers in IEEE *Xplore*. In addition to the three mentioned, the EuMW 2023 team consisted of almost 50 highly motivated, reliable, and absolutely great people who all contributed to the success of this conference (see Figure 16). The authors of this article would like to thank everyone once again for their great commitment: you have been great! After the conference is before the conference. Well, before the doors closed on the Berlin edition, the next team had already started its preparation for EuMW 2024, which will be held in Paris on 22–27 September 2024. We are looking forward to yet another edition of Europe’s largest microwave science event. 