

#TeraTec2022

# Program 10<sup>th</sup> International Workshop on Terahertz Technology and Applications

---

May 31 to June 1, 2022, Fraunhofer-Center,  
Fraunhofer-Platz 1, Kaiserslautern, Germany

In cooperation with



DEUTSCHE  
GESELLSCHAFT FÜR  
ZERSTÖRUNGSFREIE  
PRÜFUNG e.V.



# Exhibitors and Sponsors

---



# 10<sup>th</sup> International Workshop on Terahertz Technology and Applications

---

Terahertz technology has proven to be a valuable tool for applications in diagnostics, measurement, and testing. The industrial use of this technology, however, raises a few challenging questions. The “International Workshop on Terahertz Technology and Applications” fosters the exchange of knowledge and experience between academics and industry in this exciting and rapidly developing field. The following renowned experts have confirmed their participation and will give invited lectures to the forum:

- **Michael Janssen**, Max Planck Institute for Radio Astronomy, Bonn, DE
- **Frank Hegmann**, University of Alberta, CA
- **Kazunori Serita**, Osaka University, JP
- **David R. Smith**, Duke University, US

The tenth workshop will address primarily the topics:

- Industrial Applications
- Homeland Security
- Communications
- Astronomy and Astrophysics
- New Terahertz System Technologies

## Chairmen

- **Georg von Freymann**, Technische Universität Kaiserslautern, Germany
- **Joachim Jonuscheit**, Fraunhofer Institute for Industrial Mathematics ITWM, Germany

# Preliminary Program

## Tuesday, May 31, 2022

---

**10:00 Registration and laboratory tour at Fraunhofer ITWM,**

**12:00 Snack**

**13:00 Welcome and opening remarks**

Georg von Freymann, Fraunhofer ITWM, Kaiserslautern, DE

### Opening Talk

**13:10 Direct Imaging of Black Holes at Terahertz Frequencies (invited)**

Michael Janssen, Max Planck Institute for Radio Astronomy, Bonn, DE

### Session 1: New Technologies I

**13:40 Terahertz Plasmonics of Semiconductor Core-Shell Nanowires**

Alexej Pashkin, Helmholtz-Zentrum Dresden-Rossendorf, DE

**14:00 Terahertz Vortex Beams and Landau Level Transitions for Demultiplexed Orbital Angular Momentum Detection**

Samuel Weber Pinnock, University of Stuttgart, DE

**14:20 Hot-Dirac-Fermion enabled Terahertz Technologies**

Klaas-Jan Tielrooij, Catalan Institute of Nanoscience and Nanotechnology, Bellaterra, ES

**14:40 Measuring Terahertz Radiation by Detecting Visible Photons**

Daniel Molter, Fraunhofer ITWM, Kaiserslautern, DE

**15:00 Coffee break**

## Session 2: New Technologies II

- 15:30 Mono-cycle Terahertz Pulses from Intersubband Shift Currents in Asymmetric Quantum Wells**  
Matthias Runge, Max-Born-Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, DE
- 16:00 Imaging using Feedback Interferometry with a 260 GHz Integrated Source**  
Dmytro D. But, Institute of High Pressure Physics PAS, Warsaw, PL
- 16:20 Photomultiplier Tubes for Sensitive Infrared-to-Terahertz Detection**  
Tobias O. Buchmann, Technical University of Denmark, Kgs. Lyngby, DK
- 16:40 Agile Terahertz Frequency Comb Source for Room Temperature Applications**  
Dominik Theiner, Technical University of Wien, AT
- 17:00 Terahertz Shockwaves: Generation and Applications**  
Gabriel Fitzky, University of Konstanz, DE
- 17:20 Poster session**
- 19:00 Bus transfer to hotels**
- 19:30 Welcome Drink at the "Fruchthalle"**
- 20:00 Evening reception at the "Fruchthalle"**

# Preliminary Program

## Wednesday, June 1, 2022

---

**8:30 Bus transfer to Fraunhofer ITWM**

### Session 3: Near-field Microscopy and Network Analyzer

**9:00 Imaging Ultrafast Phenomena on the Nanoscale (invited)**

Frank Hegmann, University of Alberta, Edmonton, CA

**9:30 Non-invasive Determination of the Electrical Conductivity and the Carrier Density of Silicon with Terahertz Near-field Microscopy**

Hartmut G. Roskos, Goethe-Universität, Frankfurt am Main, DE

**9:50 Broadband characterization of a high-Q resonator by a Semi-integrated, 1.5-port Photonic VNA between 0.4 and 1.5 THz**

Amlan kusum Mukherjee, Technical University of Darmstadt, DE

**10:10 Free-space Terahertz Spectrum Analysis with a Hybrid System**

Fabian Friederich, Fraunhofer ITWM, Kaiserslautern, DE

**10:30 Coffee Break**

### Session 4: Metamaterial and Communication

**10:50 Metasurface Apertures for Communications and Sensing (invited)**

David R. Smith, Duke University, Durham, US

**11:10 Dispersion-Engineered Metasurfaces for Coupling and 2D Guiding of Spoof Surface Plasmon Polaritons at Terahertz Frequencies**

Steffen Klingel, Technical University of Kaiserslautern, DE

**11:30 Real-Time THz Wireless Link for IEEE802.15.3d Applications**

Ingmar Kallfass, University of Stuttgart, DE

**11:50 Physical Layer Security for THz-Communication**

Christoph Herold, Technical University of Braunschweig, DE

**12:10 Lunch**

## Session 5: Other Application

- 13:00 Scanning Point Terahertz Source Microscope for Biological Applications (invited)**  
Kazunori Serita, Osaka University, JP
- 13:20 Validation of Terahertz/Millimeter-Wave Gas Spectroscopy Applied to Medical Human Breath Analysis**  
Nick Rothbart, German Aerospace Center, Berlin, DE
- 13:40 Polymer Based Photoacoustic Transducer for Gas Detection in Sealed Packages**  
Mattias Verstuyft, Ghent University, BE
- 14:00 Influence of Data Preparation and Data Volume of THz-TDS Data on Material Identification by Neural Networks**  
Tobias Kubiczek, University of Duisburg-Essen, DE
- 14:20 Terahertz FMCW Non-destructive Testing of the Mica Insulation of Power Generator Bars**  
Andrey Mashkin, Siemens Energy Global GmbH & Co. KG, Mülheim a. d. R., DE
- 14:40 High-Speed Non-Destructive Terahertz Inspection of Cylindrical Structures**  
Dovilė Čibiraitė-Lukenskienė, Fraunhofer ITWM, Kaiserslautern, DE
- 15:00 Closing remarks**  
Georg von Freymann, Fraunhofer ITWM, Kaiserslautern, DE
- 15:15 Coffee Break**
- 15:15 Laboratory tour at Fraunhofer ITWM**
- 17:00 End of workshop**

# Poster session

---

- P1 Novel Terahertz Reflection Probe for Accurate TDS Measurement**  
Andreas Steiger, Physikalisch-Technische Bundesanstalt (PTB), Berlin, DE
- P2 Terahertz Time-Domain Spectroscopy for Paper Handling of Legacy Documents**  
Min Zhai, Georgia Tech Lorraine, Metz, FR
- P3 Fiber-coupled Terahertz Time-domain Spectrometer with 10 THz Bandwidth**  
Robert B. Kohlhaas, Fraunhofer HHI, Berlin, DE
- P4 Environmental Graphene Conductivity Sensing using Terahertz Time-domain Reflection Spectroscopy**  
Hungyen Lin, Lancaster University, Lancaster, GB
- P5 Terahertz Non-destructive Evaluation of Solid Rocket Fuels**  
N. Pałka, Military University of Technology, Warsaw, PL
- P6 Characterization of the Dielectric Properties of Building Materials for the Design of Terahertz Communication Channels**  
Fatima Taleb, Philipps-Universität Marburg, DE
- P7 TRL Calibration Kit for sub-mmWave Characterization of InP-HEMT**  
Rita Younes, University of Lille, FR
- P8 Spintronic Inverse Spin Hall Terahertz Photomixing: First Demonstration of Narrow-linewidth Terahertz CW and Frequency Comb Generation**  
Pierre Kolejak, University of Lille, FR
- P9 3D printing of TOPAS for THz transparent devices**  
Elena Mavrona, Empa, Dübendorf, CH
- P10 High resolution spectral THz Imaging of Wood**  
Peter Zolliker, Empa, Dübendorf, CH
- P11 High-Bandwidth Terahertz Time-Domain Ellipsometer for Material Characterization and Thin-Film Measurements**  
Rüdiger Mästle, Helmut Fischer GmbH, Sindelfingen, DE



- P12 Non-destructive Quality Control of Additive Manufactured Objects using Terahertz Time-domain Spectroscopy**  
Volker K. S. Feige, University of Applied Sciences, Düsseldorf, DE
- P13 Advancing VxOy Films Toward Use in Room Temperature THz Cameras**  
Bahar Atik, METU MEMS Center, Ankara, TR
- P14 Tailoring a Metamaterial Microbolometer Absorber for Operation in the Sub-1 THz Region**  
Oytun Demirörs, METU MEMS Center, Ankara, TR
- P15 Phase Retrieval for Coherent Terahertz Imaging with Physics-informed Deep Learning**  
Mingjun Xiang, Frankfurt Institute for Advanced Studies, Frankfurt am Main, DE
- P16 Efficient Hollow-core Terahertz Waveguides based on the Latest Hollow-core Optical Fiber Designs**  
Georges Humbert, University of Limoges, FR
- P17 Fully Blind Characterization of a Deep-subwavelength Thin Material Layer by means of a Differential Narrow-band Transient Radar**  
Ali Pourkazemi, Vrije University Brussels, BE
- P18 E-Band Self-Mixing Radar Demonstrator with 13 GHz Bandwidth**  
Janis Wörmann, University of Stuttgart, DE
- P19 Real-time Video Signal Transmission in E- and H-band**  
Simon Haußmann, University of Stuttgart, DE
- P20 Cost-effective Detector for 300 GHz Frequency Range based on 180-nm Si CMOS Technology**  
Cezary Kołaciński, Institute of High Pressure Physics, Warsaw, PL
- P21 Plasmon Resonances in Large Surface AlGaIn/GaN Grating-gate Structures for Terahertz Devices with Electrically Controlled Frequency**  
Pavlo Sai, Institute of High Pressure Physics, Warsaw, PL

# Poster session

---

**P22 Terahertz Time-Domain Spectroscopy for Quality Control of Commercial Gasolines**

Kamil Stelmaszczyk, Institute of High-Pressure Physics, Warsaw, PL

**P23 Sub-THz Detection by AlGaIn/GaN FinFETs with Improved Impedance Matched Modified Bow-tie Antennas**

Maksym Dub, Institute of High-Pressure Physics, Warsaw, PL

**P24 Carbon-based Aerogels as sub-THz Absorbers**

Piotr A. Drózdź, Institute of High Pressure Physics, Warsaw, PL

**P25 Material-Sensitive Millimeter-Wave and Terahertz Radar Imaging: Algorithms and Applications**

Ingrid Ullmann, Friedrich-Alexander University Erlangen-Nuremberg, DE

**P26 Sensitive Antenna-coupled Room-temperature Power Detectors for Frequencies above 1 THz**

Anastasiya Krysl, Goethe Universität, Frankfurt am Main, DE

**P27 Use High Temperature Co-fired Ceramic (HTCC) Technology for Traveling Wave Tube Amplifiers Operating at Millimeter Wave Range**

Giacomo Ulisse, Goethe Universität, Frankfurt am Main, DE

**P28 Terahertz-homodyne System with Chirped Mirrors for Phase Delay Variation**

Lisa C. Kreuzer, Ruhr University Bochum, DE

**P29 5.6 mW average power, 8 THz bandwidth Terahertz Source using Organic Crystal BNA driven by a 45 fs fiber laser**

Samira Mansourzadeh, Ruhr-Universität Bochum, DE

**P30 Average Power Scaling of Terahertz Spintronic Emitters Efficiently Cooled in Reflection Geometry**

Tim Vogel, Ruhr-Universität Bochum, DE

**P31 Ultrafast Detection of Terahertz Radiation with Regenerative Terahertz Quantum Detector**

Paolo Micheletti, ETH Zurich, CH

**P32 Planarized Terahertz Quantum Cascade Lasers for Active and Passive Broadband Photonics**  
Urban Senica, ETH Zurich, CH

**P33 Spintronic Terahertz Emitters: Current Status and Future Developments**  
Tom S. Seifert, Freie Universität Berlin, DE

**P34 Configuration of a MEMS-Based Reflectarray Using a Genetic Algorithm for Beam Steering Applications**  
Xuan Liu, University of Duisburg-Essen, DE

**P35 Kilohertz Pixel-Rate Multilayer Terahertz Imaging of Subwavelength Coatings**  
Kim-Sophie Ellenberger, Fraunhofer ITWM, Kaiserslautern, DE

**P36 Electronic Phase Detection with sub 10 fs Timing Jitter for Terahertz Time Domain Spectroscopy Systems**  
Felix Paries, Fraunhofer ITWM, Kaiserslautern, DE

**P37 Hand-Guided Mobile Terahertz 3D Imaging Platform with Aspherical Telecentric f-Theta Optics**  
Shiva Mohammadzadeh, Fraunhofer ITWM, Kaiserslautern, DE

**P38 A PRIORI Information in Terahertz Tomography**  
Henrik May, Fraunhofer ITWM, Kaiserslautern, DE

**P39 New Series of Standards VDI/VDE 5590 on Terahertz Systems**  
Technical Committee VDI/VDE-GMA FA8.17 TERAHERTZ SYSTEMS, Düsseldorf, DE

## Contact

---

Fraunhofer-Institut für Techno- und  
Wirtschaftsmathematik ITWM

Fraunhofer-Platz 1  
67663 Kaiserslautern  
Germany

Phone +49(0)631/3 1600-0  
E-Mail [info@itwm.fraunhofer.de](mailto:info@itwm.fraunhofer.de)  
[www.itwm.fraunhofer.de/mc](http://www.itwm.fraunhofer.de/mc)  
[www.teratec.org](http://www.teratec.org)