

#TeraTec2024

Program

11th International Workshop on Terahertz Technology and Applications

March 12th to 13th, 2024, Fraunhofer-Center,
Fraunhofer-Platz 1, Kaiserslautern, Germany

In cooperation with



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11th 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:

- Manijeh Razeghi, Northwestern Universität Evaston, Illinois, US
- Daniele Fausti, Friedrich-Alexander-Universität Erlangen-Nürnberg, DE
- Sota Mine, Nagoya University, Nagoya, JP
- Md Sadman Sakib Rahman, University of California, Los Angeles, US
- Nan Zhang, ANOR Technology, Singapore, SG

The eleventh workshop will address primarily the topics:

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

Chairmen

- Georg von Freymann, University Kaiserslautern-Landau (RPTU), DE
- Joachim Jonuscheit, Fraunhofer Institute for Industrial Mathematics ITWM, DE

Preliminary Program

Tuesday, March 12th, 2024

10:00 **Registration and Laboratory Tour at Fraunhofer ITWM**

12:00 Snack

12:50 **Welcome and Opening Remarks**

Georg von Freymann, University Kaiserslautern-Landau (RPTU), DE

Session 1: Sources and Detectors

13:00 **RT-CW, Widely Tunable Semiconductor Terahertz Laser Diode** (invited)

Manijeh Razeghi, Northwestern University, Evanston, US

13:30 **One-Shot Terahertz Parametric Detection of Broadband Terahertz Pulses** (invited)

Sota Mine, Nagoya University, JP

14:00 **Power Scaling of Lithium Niobate for the Next Generation of Terahertz Time-Domain Spectrometer**

Tim Vogel, Ruhr-University Bochum, DE

14:20 **InGaAs: Rh-based Continuous Wave Terahertz Receivers Enabling a Record Peak Dynamic Range of 130dB**

Milan Deumer, Fraunhofer HHI, Berlin, DE

14:40 **Powerful Solid-State 500GHz Source for Research and Development of Terahertz Technologies**

Oleg Cojocari, ACST GmbH, Hanau, DE

15:00 Coffee Break

Session 2: New Technologies I

15:20 **Cavity Control of the Quantum Materials** (invited)

Daniele Fausti, Friedrich-Alexander-University Erlangen-Nürnberg, DE

15:50 **Frequency-selective Spectroscopy System Covering Terahertz Range Between 0.5THz to 2.5THz Using Ten Resonant TeraFET Detectors in Array Configuration**

Jakob Holstein, Goethe University Frankfurt, DE

16:10 **Photon-electron Double Mixing at 1THz Range Implemented With a Graphene Field Effect Transistor**

Shinnosuke Uchigasaki, Tohoku University, Sendai, JP

16:30 **Ultrafast Tunnelling Spectroscopy Down to a Single Atom: Phonon modulation of a Vacancy State in WSe₂**

Yaroslav Gerasimenko, University of Regensburg, DE

16:50 **Towards Terahertz Quantum Imaging**

Mirco Kutas, Fraunhofer ITWM, Kaiserslautern, DE

17:10 **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, March 13th, 2024

8:30 Bus Transfer to Fraunhofer ITWM

Session 3: New Technologies II

9:00 **Development of an Optical Coherence Tomography System Using a Swept-source Backward Terahertz Wave Parametric Oscillator**

Alexander De Los Reyes, RIKEN, Sendai, JP

9:20 **Towards Efficient Hollow-core Terahertz Waveguides?**

Georges Humbert, XLIM Research Institute, CNRS, Limoges University, FR

9:40 **Measurement of Terahertz Radiation Using a Scanning Terahertz Microscope**

Julius Mumme, TU Braunschweig, DE

10:00 **Photonic Integrated Circuits for High Range Resolution Terahertz Radars**

Nabanita Sengupta, University Duisburg-Essen, DE

10:20 **Sub-terahertz Feedback Interferometry and Imaging with Emitters in 130 nm BiCMOS Technology**

Dmytro But, Polish Academy of Sciences, Warsaw, PL

10:40 **Coffee Break**

Preliminary Program

Wednesday, March 13th, 2024

Session 4: Machine Learning

- 11:00 **Diffraction Networks for Terahertz Applications** (invited)
Md Sadman Sakib Rahman, University of California, Los Angeles, US
- 11:30 **Industrial Applications Innovated by Terahertz Sensing and AIoT Technologies** (invited)
Nan Zhang, ANOR Technology, Singapore, SG
- 12:00 **Reconstruction of Obscured Objects via Deep Learning**
Mingjun Xiang, Frankfurt Institute for Advanced Studies, DE
- 12:20 **Mill-scale Thickness Estimation by a Back-propagating Neural Network Approach: Regression and Classification Perspectives**
Haolian Shi, Georgia Institute of Technology Europe, Metz, FR
- 12:40 Lunch

Session 5: Applications

- 13:30 **Application of Terahertz Technology in Non-destructive Testing of Organic Composites**
Kun Meng, Quenda Terahertz Technology Co., Ltd., Qingdao, CN
- 13:50 **Terahertz Quantum-cascade Laser Instrumentation for Earth Observation**
Alexander Valavanis, The University of Leeds, UK
- 14:10 **Terahertz Cross-correlation Spectroscopy for Printed Electronics Manufacturing**
Simon Jappe Lange, Technical University of Denmark, Lyngby, DK
- 14:30 **Investigating of Additively Manufactured Structures with Terahertz Sensing Techniques**
Daniel Stock, University of Siegen, DE
- 14:50 **Non-destructive Testing of Launch Vehicle Tank Structures**
Maris Bauer, Fraunhofer ITWM, Kaiserslautern, DE
- 15:10 **Closing Remarks**
Georg von Freymann, University Kaiserslautern-Landau (RPTU), DE

Poster Session

- P01 Millimeter Waves Solve a Problem of Ultrasound-based Wall Thickness Measurements of FRP-components
Stefan Becker, Becker Photonik GmbH, Minden, DE
- P02 Time-domain Spectroscopy for Space Exploration at Terahertz Energy Scales
Dominic Azih, TU Berlin, DE
- P03 Enroute: Electric Field and Current Induced Second Harmonic Generation in Graphene
Jonas Woeste, TU Berlin, DE
- P04 Liquid Crystals for Electrical Control of Magnon-polaritons
Marcin Białek, Polish Academy of Sciences, Warsaw, PL
- P05 Grating-gate Plasmonic Crystals as Tunable Terahertz Filters
Pavlo Sai, Polish Academy of Sciences, Warsaw, PL
- P06 Micro-electromechanical Systems Inspired Metasurfaces for the Manipulation of Guided Spoof Surface Plasmon Polaritons
Steffen Klingel, University Kaiserslautern-Landau (RPTU), DE
- P07 Toward Biomedical Applications of Infrared Electric-Field-Resolved Spectroscopy
Jan Ornik, Leibniz Institute of Photonic Technology, Jena, DE
- P08 Ultrashort, High-power 2- μm Light Pulses via Nonlinear Optical Fibers
Florian Lindinger, Leibniz Institute of Photonic Technology, Jena, DE
- P09 Label-free Infrared-vibrational Flow Cytometry
Marinus Huber, Leibniz Institute of Photonic Technology, Jena, DE
- P10 Fickian Water Diffusion in Polymers Probed by Terahertz TDS
Sebastian Engelbrecht, French-German Research Institute of Saint-Louis ISL, FR
- P11 Nano-scale Development of Terahertz Plasmonic Amplifiers Based on 2D Materials
Hakan Altan, Middle East Technical University, Ankara, TR
- P12 Design of Dielectric-lined Terahertz Waveguides for Linear Acceleration
Moein Fakhari, DESY, Hamburg, DE

Poster Session

- P13 0.3 THz Dual-feed Mode Converter for Terahertz DLW LINACs**
Mostafa Vahdani, DESY, Hamburg, DE
- P14 Ultra Broadband Antenna-coupled Field Effect Transistor with 0.1 to 29.8 THz Frequency Coverage**
Fahd Rushd Faridi, Technical University of Darmstadt, DE
- P15 Dynamics of Intraband Absorption in Terahertz HgTe Nanocrystals**
Aurelie Fournier, Laboratoire de Physique de l'Ecole Normale Supérieure, CNRS, Paris, FR
- P16 Advancements in Electro-optical Measurements of Longitudinal Electron Bunch Profiles with MHz Repetition Rates at the KIT Storage Ring**
Stefan Funkner, Karlsruhe Institute of Technology, DE
- P17 Nondestructive Testing of Painted Wood with a 0.3 THz Confocal Microscope**
Fritz Berkmann, Italian Institute of Technology, Rome, IT
- P18 High-performance Terahertz Quantum Cascade Laser Waveguide Design**
Sebastian Gloor, ETH Zürich, CH
- P19 Terahertz Light-matter Interactions in Solid State Systems**
Paul Dean, University of Leed, UK
- P20 A Compact CW terahertz Gas Sensing System Based on a Dual-wavelength MOPA Laser**
Yinghui Hu, Ruhr University Bochum, DE
- P21 Microstructured GaAs Photoconductive Terahertz Large Area Emitters Driven by 18W Average Power, Green Femtosecond Laser**
Mohsen Khalili, Ruhr University Bochum, DE
- P22 Towards > 10 Milliwatts of Terahertz Power Using Organic Crystals**
Samira Mansourzadeh, Ruhr University Bochum, Germany
- P23 Terahertz Detection Based on a Novel 3D Rectification Effect in a Single-gate Graphene Transistor**
Hiroyoshi Kudo, Tohoku University, Sendai, JP
- P24 Powerful Terahertz-wave Frequency-domain Characterization System with is-TPG**
Yuma Takida, RIKEN, Sendai, JP
- P25 A Well-tuned and Fast Uncooled Pyroelectric IR and Terahertz Receiver**
Johannes Kunsch, LASER COMPONENTS Germany GmbH, Olching, DE
- P26 Imaging of Structures Embedded in 3D-printed Objects Using Terahertz Frequency-domain Spectroscopy**
Janis Kutz, TOPTICA Photonics AG, Gräfelfing, DE
- P27 Photonic Integrated Continuous-Wave Terahertz Spectrometer with Widely Tunable Dual Laser Source**
Lauri Schwenson, Fraunhofer HHI, Berlin, DE
- P28 Fiber-coupled Terahertz Time-domain Spectrometer with 10 THz Bandwidth Using III-V Photoconductive Membranes on Silicon**
Alexander Dohms, Fraunhofer HHI, Berlin, DE
- P29 Towards Fast Terahertz Imaging by Combining an F-theta Mirror-scanner with Optoelectronic FMCW System**
Konstantin Wenzel, Fraunhofer HHI, Berlin, DE
- P30 Nanoscale-resolved Terahertz Imaging and Spectroscopy: State-of-the-art and Beyond**
Lars Mester, Attocube Systems AG, Haar, DE
- P31 Terahertz Microscopy of Twisted-light Intensity Patterns with Superconducting Detectors**
Marius Neumann, TU Braunschweig, DE
- P32 Terahertz Excitation Spectroscopy of Semiconductors and Semiconductor Structures**
Vaidas Pačebutas, Center for Physical Sciences and Technology, Vilnius, LT
- P33 Ground-based Ship Detection in Rough Maritime Environment Using Passive MMW Sensors**
Markus Peichl, German Aerospace Center (DLR), Wessling, DE
- P34 Terahertz Line Scanner with GaN FET Detector Arrays for Industrial Applications**
Adam Rämmer, Ferdinand-Braun-Institut Leibniz-Institut gGmbH, Berlin, DE

Poster Session

- P35 Detector for Traceable Power Measurements of Antenna Emission Around 300 GHz**
Benjamin Röben, Physikalisch-Technische Bundesanstalt, Berlin, DE
- P36 Breath Analysis of COPD Patients by Terahertz/Millimeter-wave Gas Spectroscopy**
Nick Rothbart, German Aerospace Center (DLR), Berlin, DE
- P37 The OSAS-B Heterodyne Receiver for Atomic Oxygen in the Mesosphere and Lower Thermosphere**
Martin Wienold, German Aerospace Center (DLR), Berlin, DE
- P38 Some Examples of Terahertz Technology Applications**
Janez Trontelj, University of Ljubljana, SI
- P39 Silicon Terahertz Resonators for Gas Sensing**
Stefan Malzer, Friedrich-Alexander-University Erlangen-Nürnberg, DE
- P40 Remote Inline LFP Cathodes Characterization by Self-referencing Terahertz Sensors**
Faezeh Zarrinkhat, Teraview LTD, Cambridge, UK
- P41 Non-destructive Evaluation of Alumina-based Ceramic Ballistic Protection Armour in the Terahertz Range**
Norbert Palka, Military University of Technology, Warsaw, PL
- P42 Merging Photonics and Electronics for 6G Test and Measurement Applications**
Timo Noack, Rohde & Schwarz GmbH & Co. KG, Munich, DE
- P43 Optical Damage Thresholds of Single-mode Fiber-tip Spintronic Terahertz Emitters**
Felix Paries, Fraunhofer ITWM, Kaiserslautern, DE
- P44 Characterization of Silicon with TDS over a Wide Resistivity Range**
Joshua Hennig, Fraunhofer ITWM, Kaiserslautern, DE
- P45 Terahertz Upconversion with Organic Crystals**
Maximilian Christ, Fraunhofer ITWM, Kaiserslautern, DE
- P46 Terahertz Inspection of Battery Electrodes for Battery Electric Vehicles**
Shiva Mohammadzadeh, Fraunhofer ITWM, Kaiserslautern, DE
- P47 Coherent Off-Axis Terahertz Tomography with a Multi-Channel Array and F-Theta Optics**
Karl Henrik May, Fraunhofer ITWM, Kaiserslautern, DE
- P48 Continuous Wave Photonic Terahertz Frequency Synthesis for Spectrum and Vector Network Analysis**
Alexander Theis, Fraunhofer ITWM, Kaiserslautern, DE
- P49 Parasitic Mixing in Photomixers as Continuous Wave Terahertz Sources**
Michael Kocybik, Fraunhofer ITWM, Kaiserslautern, DE
- P50 New Series of Standards VDI/VDE 5590 on Terahertz Systems**
Technical Committee FA 1.31, VDI/VDE-GMA, Düsseldorf, DE



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