

International Workshop on Terahertz Science, Nanotechnologies and Applications

Saturday July 16th

12.00 - 18.30: Arrival and Registration

20:00 - 22:00: Dinner

22:00: Sicilian cakes, marsala and piano music in the "Marsala Room Cave"

Sunday July 17th

9:15 – 9:30: **G. Scamarcio** and **M. S. Vitiello** *Opening remarks*

SESSION I

Chair: G. Scamarcio (University of Bari and CNR-IFN, Italy)

9:30 – 10:15: **Mauro Pereira** (Sheffield Hallam University, UK) *invited*

"TERA-MIR Radiation: Materials, Generation, Detection and Applications - From Detectors to Laser Linewidth"

10:15 – 11:00: **Tadao Nagatsuma** (Osaka University, Japan) *invited*

"Present and Future of Terahertz Wireless Communications"

11:00 – 11:30: *Coffee Break and Exhibition Time*

SESSION II

Chair: F. Keilmann (Ludwig-Maximilians-Universität, Munich, Germany)

11.30 – 12:15: **Dmitry Turchinovich** (Max Planck Institute for Polymer Research, Mainz, Germany) *invited*

"Thermodynamic Picture of Terahertz Conduction in Graphene"

12.15 – 13:00: **Peter Jepsen** (DTU Fotonik, Kgs. Lyngby, Denmark) *invited*

"Ultrafast Nonlinear Terahertz Spectroscopy"

13:00 – 16:00: *Lunch Break and Exhibition Time*

SESSION III

Chair: K. Unterrainer (TU Wien, Austria)

16.00 – 16:45: **Kaori Fukunaga** (National Institute of ICT, Tokio, Japan) *invited*

"THz technology for cultural heritage applications"

16.45 – 17:30: **Joo-Hiuk Son** (University of Seoul, Korea) *invited*

"Towards Clinical Applications of Terahertz Sensing in Cancer Diagnosis"

17.30 – 18:15: **Alessandro Tredicucci** (University of Pisa, Italy) *invited*

"Towards the development of THz active optomechanics"

20:00 - 22:00: Dinner

22:00: Sicilian cakes, marsala and piano music in the "Marsala Room Cave"

Monday July 18th

SESSION IV

Chair: D. Mittleman (Browne University, Providence, USA)

9:30 – 10:15: **Manfred Helm** (Helmholtz-Zentrum, Dresden-Rossendorf, Germany) *invited*

"Surprising effects of electron-electron scattering in graphene revealed by THz pump-probe spectroscopy"

10:15 – 11:00: **Jacob Khurgin** (Johns Hopkins University, Baltimore, USA) *invited*

"Comparative analysis of optical and electrical methods of THz generation"

11:00 – 11:30: *Coffee Break and Exhibition Time*

SESSION IV

Chair: M. Helm (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

- 11.30 – 11:55: **H. Schneider** (Helmholtz-Zentrum Dresden-Rossendorf, Germany) *invited*
"Exciton dynamics in semiconductor quantum wells and single quantum dots studied with a THz free-electron laser"
- 11.55 – 12:15: **J. Mangeney** (CNRS - Lab Pierre Aigrain, Paris, France) *invited*
"Diffraction-limited ultrabroadband terahertz spectroscopy"
- 12.15 – 12:30: M. Shalaby (Paul Scherrer Institute, Villingen, Switzerland)
"Terahertz brightness at the extreme: Demonstration of low frequency 83 MV/cm^3 THz bullets"
- 12.30 – 12:45: S. Cibella (CNR-IFN, Rome, Italy)
"Superconducting hot electron bolometer based on a metamaterial absorber for THz frequencies"
- 12:45 – 13:00: M. Wenclawiak (Technische Universität Wien, Austria)
"Resonant response and interaction in a system of coupled dipoles"

13:00 – 16:00: Lunch Break and Exhibition Time

SESSION V

Chair: R. Hillenbrand (NanoGune, Spain)

- 16.00 – 16:45: **Daniel M. Mittleman** (Brown University, Providence, USA) *invited*
"Laser terahertz emission microscopy with near-field probes"
- 16.45 – 17:30: **Oleg Mitrofanov** (University College of London, UK) *invited*
"Terahertz near-field imaging and spectroscopy using sub-wavelength aperture probes"
- 17.30 – 18:15: **Richard Averitt** (UC San Diego, USA) *invited*
"Metamaterial Dynamics and Control: Background and Recent Developments"

18:15 – 20:00: Poster Session I and Exhibition Time

20:00 - 22:00: Dinner

22:00: Sicilian cakes, marsala and piano music in the "Marsala Room Cave"

Tuesday July 19th

SESSION VI

Chair: M.S. Vitiello (NEST CNR-NANO and Scuola Normale Superiore, Italy)

- 9:30 – 10:15: **Manijeh Razeghi** (Northwestern University, Evanston, USA) *invited*
"High power solid-state frequency comb and terahertz sources at room temperature"
- 10:15 – 11:00: **Edmund Linfield** (University of Leeds, UK) *invited*
"MBE Growth of Terahertz Frequency GaAs-AlGaAs Quantum Cascade Lasers"

11:00 – 11:30: Coffee Break and Exhibition Time

SESSION VII

Chair: J. Tignon (Ecole Normale Supérieure, France)

- 11.30 – 11:55: **H.W. Huebers** (German Aerospace Center, Berlin, Germany) *invited*
"4.7-THz Quantum-Cascade Lasers as Local Oscillators for the Heterodyne Spectrometers on Board of SOFIA"
- 11.55 – 12:10: M. Giglio (University of Bari, Italy)
"Methanol Quartz-Enhanced Photoacoustic Spectroscopy Sensor Employing a Terahertz Quantum Cascade Laser Source"
- 12.10 – 12:25: D. Winge (University of Lund, Sweden)
"Simulating THz QCLs: Trends from samples from different labs"
- 12:25 – 12:40: T. Fobbe (Ruhr-Universität Bochum, Germany)
"Modifying a metal-metal waveguide to achieve broadband THz group velocity dispersion control"

13:00 – 16:00: Lunch Break and Exhibition Time

SESSION VIII

Chair: O. Mitrofanov (UCL, UK)

16.00 – 16:45: **Fritz Keilmann** (Ludwig-Maximilians-Universität, Munich, Germany) *invited*
"Nano-FTIR Applied from Solid to Wet Matter"

16.45 – 17:30: **Rainer Hillenbrand** (NanoGune, Donostia – San Sebastian, Spain) *invited*
"IR and THz Near-Field Nanoscopy of 2D Materials"

17.30 – 18:15: **Martin Koch** (Philipps-Universität Marburg, Germany) *invited*
"Devices to guide and manipulate THz waves"

18:15 – 20:00: Poster Session II and Exhibition Time

20:00 - 22:00 Dinner

22:00: Sicilian cakes, marsala and piano music in the "Marsala Room Cave"

Wednesday July 20th

SESSION IX

Chair: C. Sirtori (University of Paris 7, France)

9:30 – 10:15: **Tobias Kampfrath** (Fritz Haber Institute of the Max Planck Society, Berlin, Germany) *invited*
"Probing and controlling ultrafast magnetism with terahertz electromagnetic pulses"

10:15 – 11:00: **Jerome Tignon** (Ecole Normale Supérieure, Paris, France) *invited*
"Modelocking TeraHertz Quantum Cascade Lasers"

11:00 – 11:30: Coffee Break and Exhibition Time

11.30 – 12:15: **Karl Unterrainer** (Technische Universität Wien, Austria) *invited*
"Linear and Non-linear THz Dynamics of Nanostructures"

12:15 – 13:30: Lunch Break

14:00 – 23:00: Excursion and Dinner

Visit to the archeological site of Selinunte (Selinus), an ancient Greek city in front of the Mediterranean sea, followed by a swimming and dinner at the nearby beach of Marinella.

Thursday July 21st

SESSION X

Chair: M. Razeghi (Northwestern University, Evanston, USA)

9:30 – 10:15: **Carlo Sirtori** (University of Paris 7, France) *invited*
"Antennas and electronic resonators for THz quantum detectors"

10:15 – 11:00: **Wojciech Knap** (University of Montpellier II, France) *invited*
"Terahertz Nanometer Field Effect Transistors From Basic Physics to First Imaging Applications"

11:00 – 11:30: Coffee Break and Exhibition Time

SESSION XI

Chair: M. Koch (Philipps-Universität Marburg, Germany)

11.30 – 12:15: **Paolo De Natale** (CNR-INO Florence, Italy) *invited*
"Terahertz Metrology"

12.15 – 13:00: **Harmut Roskos** (Goethe-Universität, Frankfurt, Germany) *invited*
"Linear and Nonlinear Time-Resolved Spectroscopy with Broadband THz Pulses from an Air-Plasma Source"

13:00 – 16:00: Lunch Break and Exhibition Time

SESSION XII

Chair: T. Kampfrath (Fritz Haber Institute of the Max Planck Society, Berlin, Germany)

- 16.00 – 16:25: **I.C. Benea-Chelmus** (ETH Zurich, Switzerland) *invited*
"Electric field and intensity correlations of a Terahertz Comb based on fast electro-optic sampling"
- 16.25 – 16:50: **M.A. Hubers** (University of Regensburg, Germany) *invited*
"Ultrafast mid-infrared near-field microscopy of nanowires - from semiconductors to phase-transitions"
- 16.50 – 17:05: L.Viti (NEST, CNR-Nanoscience Institute and Scuola Normale Superiore Pisa, Italy)
"Sub-wavelength near-field probes at Terahertz frequencies"
- 17:05 – 17:20: H.A. Durr (SLAC National Accelerator Laboratory, Menlo Park, USA)
"Ultrafast THz Field Control of Electronic and Structural Interactions in Vanadium Dioxide"
- 17:20 – 17:35: S. Biasco (Scuola Normale Superiore, Pisa)
"Two-dimensional random quantum cascade resonators at Terahertz frequencies"
- 17:35 – 17:50: C. Maissen (ETH Zurich, Switzerland)
"Concomitant Coupling of Intersubband Transition and Cyclotron Transition to Split Ring Resonators"

20:00 - 22:30: Conference Banquet

Friday July 22nd

SESSION XIII

Focus Session on Graphene

Moderators:

Miriam S. Vitiello (NEST CNR-NANO and Scuola Normale Superiore, Italy)
Yang Hao (Queen Mary University of London, UK)

- 09.00 – 09:20: A. Lombardo (Cambridge Graphene Center, UK)
"High frequency graphene conductivity"
- 09.20 – 09:40: V. Bianchi (CNR-NANO and Scuola Normale Superiore)
"Terahertz Saturable absorbers based on liquid phase exfoliated and ink-jet printed graphene films"
- 09:40 – 10:00: H. Graef (Laboratoire Pierre Aigrain, Ecole Normale Supérieure, Paris, France)
"Graphene THz plasma resonance transistors with doping modulation"
- 10.00 – 10:20: J.H. Poumirol, (University of Geneva, Switzerland)
"Electric and plasmonic control of terahertz magneto-absorption and Faraday rotation in large-scale graphene"
- 10.20 – 10:40: T. Slipchenko, (University of Zaragoza, Spain)
"Faraday rotation in graphene without high magnetic fields"

10:40 – 11:00: Coffee Break and Exhibition Time

- 11:00 – 11:20: K. J. Tielrooij (ICFO, Barcelona)
"Terahertz photodetection using hot carriers in graphene"
- 11:20 – 11:40: E. Dardanis (Scuola Normale Superiore, Pisa)
"Detection of a 3.4 THz QCL with Black Phosphorus Field Effect Transistors in far-field and near-field architectures"
- 11:40 – 12:00: J. Tiang (Queen Mary University of London, UK)
"Graphene based Transparent Terahertz absorber"
- 12:00 – 12:20: P. Jepsen (DTU Fotonik, Kgs. Lyngby, Denmark)
"Ultrafast large-area graphene mobility mapping"
- 12:20 – 12:40: S. A. Mikhailov (University of Augsburg, Germany)
"Low-Dimensional Electron Systems for Terahertz Devices"
- 12.40 – 13:00: Michael A. Andersson (Chalmers University of Technology, Gothenburg, Sweden)
"Millimeter wave and THz electronics in CVD Graphene"

Poster Session I

1. H. Hempel (Helmholtz-Zentrum Berlin, Germany)
"Charge Carriers Localization on nm-Scale limits Transport in $\text{Cu}_2\text{ZnSn(S/Se)}_4$ Thin Film Solar Cells measured by Time Resolved THz Spectroscopy".
2. F. Lyzwa (University of Fribourg, Switzerland)
"Terahertz ellipsometry study on Ruddlesden-Popper $\text{SrO}(\text{SrTiO}_3)_n$ thin films, grown by MAD-ALE"
3. R. Baba (The University of Glasgow, UK)
"Design of High Efficiency Resonant Tunnelling Diode THz Emitters and Development of MOVPE Growth and Characterisation Processes"
4. M. Shalaby (Paul Scherrer Institute, SwissFEL, Switzerland)
"Intense THz source based on BNA organic crystal pumped at conventional Ti:Sapphire wavelength"
5. A. Siemion (Warsaw University of Technology, Poland)
"THz Beam Shaping"
6. M. Marcinkiewicz (University of Montpellier, France)
"Temperature-driven massless Kane fermions in HgCdTe crystals"
7. E. Javadi (University of Tehran, Tehran, Iran)
"Terahertz imaging Using Commercial GaAs High Electron Mobility Field Effect Transistor"
8. Z. Ollmann (University of Pécs, Hungary)
"Design of High-Energy Terahertz Pulse Sources based on Contact Grating"
9. E. Bryerton (Virginia Diodes, Charlottesville, USA)
"Design and Characterization of WM164 (1.1-1.5 THz) Vector Network Analyzer Extension Modules"

Poster Session II

1. A J Vickers (University of Essex, Colchester, UK)
"THz Emission Studies on Semiconductor Alloy, InAsBi"
2. A.N. Majeed (The University of Sheffield, UK)
"Room Temperature Generation of THz Waves Using 2nd Order Non-Linear Excitonic Effects With CW Excitation of GaAs/AlGaAs Multi-Quantum Well"
3. F. Valmorra (ETH, Zurich, Switzerland)
"Extra-ordinary transmission and near-field interaction of paired dual THz-metasurfaces"
4. C. Hauri (SwissFEL, Paul Scherrer Institute, Switzerland)
"Ultrabroadband cross-phase modulation induced by intense THz radiation"
5. M. Shalaby (Paul Scherrer Institute, SwissFEL, Switzerland)
"Anomalous visualization of sub-2 THz radiation on silicon-based CMOS and CCD sensors"
6. S. Schönhuber (Technical University of Wien, Austria)
"Study of Collimated Broadband Surface Emission from THz Quantum Cascade Random Lasers"
7. J. Wu (Cambridge Graphene Center, UK)
"Nanoscale electrical properties of graphene and layered materials by Scanning Microwave Microscopy"
8. D. Purdie (Cambridge Graphene Center, UK)
"Fabrication of high-mobility graphene transistors for room-temperature resonant THz detectors"
9. R. Gente (Philipps-University Marburg, Germany)
"Water status monitoring of plants using THz systems"
10. O.A. Rakhimova (National Academy of Sciences of Ukraine)

"Nanoparticles for Cancer Cell Diagnostics and Ablation- Modelling the Interaction of Nanoparticles with Radiation"