

International Workshop “Quantum THz Nanomaterials and Devices: Science, Technology and Applications”

Ettore Majorana Foundation and Center for Scientific Culture, Erice (IT) | July 5th-11th, 2026

Venue: Aula Dirac, San Domenico – Majorana center

Exhibition will run daily (Sunday 5pm - Friday 5pm) - top floor of San Domenico



Workshop Programme

Sunday July 5th

9.00 – 19.00: Arrival and Registration

12:30 - 14:30 Lunch

19:30 – 21:30: Dinner

From 21:30: **Welcome reception**

Sicilian cakes, marsala piano music in the “Marsala Room Cave”

Monday July 6th

08:45-09:15 **Giorgio Benedek, Federico Capasso, Oleg Mitrofanov and Miriam S. Vitiello**

Opening remarks

SESSION I: Photonics I

Chair: Federico Capasso (Harvard University, USA)

9:15 – 10:15: **Andrea Alù** (City University of New York, USA), *tutorial*
“Polaritonic Metamaterials”

10:15 – 10:45: Coffee Break

SESSION II: Photonics II

Chair: Oleg Mitrofanov (University College of London)

10:45 – 11:45 **Ileana Cristina Benea-Chelmus** (EPFL, Switzerland), *lecture*
 "Photonic integrated devices for next-generation sensing and metrology in the terahertz"
 11:45 – 12:00 O. Nagy (Ruth University Bochum, Germany)
 "High-repetition-rate THz air photonics"
 12:00 – 12:15 A. Martinez (Ruth University Bochum, Germany)
 "Terahertz Generation in DAST Driven by a High-Repetition-Rate 2.1 μm fs-Holmium Amplifier"
 12:15 – 12:30: S. Schäffer (Ecole Normale Supérieure, Paris France)
 "Mid-infrared Driven Nonlinear THz Response in the Topological Crystalline Insulator $\text{Pb}_{1-x}\text{Sn}_x\text{Se}$ "
 12:30 – 12:45: M. E. Portnoi (University of Exeter, UK)
 "Tunable Terahertz Transitions in Quasi-One-Dimensional Carbon-Based Nanostructures"
 12:45 – 13:00: G. Cywiński (CENTERA, Poland)
 "Integration of Active and Passive sub-THz Elements into a Single Monolithic Circuit Fabricated in Advanced Nitride Technology"

13:00 – 15:45: Lunch Break and Free Time

SESSION III: Metasurfaces

Chair: Miriam Serena Vitiello (CNR-NANO, Italy)

15:45 – 16:45: **Federico Capasso** (Harvard University, USA) *lecture*
 "From Classical to quantum metasurfaces"
 16:45 – 17:05: M.A. Belkin (University of Munich, Germany) **invited**
 "Generation of continuous-wave 1-12 THz radiation with intersubband polaritonic metasurfaces"
 17:05 – 17:20: D. Peeters (Eindhoven University of Technology, The Netherlands)
 "Near-Field Terahertz Time-Domain Microscopy of Metasurfaces"
 17:20 – 17:35 H. Liu (Cambridge University, UK)
 "Design of an Ultra-Thin Gallium Phosphide Metasurface for High-Resolution Terahertz Hyperspectral Imaging"

SESSION IV POSTER SESSION

17:35-19:30 **POSTER SESSION & coffee break**
 Flash poster presentation (5 min/poster) & Poster session

19:30 - 21:30: Dinner

From 21:30: Sicilian cakes, marsala and piano music in the "Marsala Room Cave"

Tuesday July 7th

SESSION V: Quantum Matters and ultra-strong coupling

Chair: Alfred Leitenstorfer (University of Konstanz, Germany),

9:00 – 10:00: **Junichiro Kono** (Rice University, USA) *lecture*
 "Cavity-Dressed Quantum Matter"
 10:00 – 10:15: F. Velli (TU Dortmund University, Germany)
 "Ultrastrong coupling of cavity-less THz magneto plasmon polaritons"
 10:15 – 10:30: M Białek (CENTERA and Technical University of Warsaw, Poland)
 "From Weak to Strong Magnon-Photon coupling in the THz range"
 10:30 – 10:45: P. Sai (CENTERA and Technical University of Warsaw, Poland)
 "Magneto-Plasmonic Terahertz Crystals with Multiple Bernstein Modes contributed"
 10:45 – 11:00: D. Yavorskiy (CENTERA and Technical University of Warsaw, Poland)
 "Deep-Strong Light-Matter Coupling of Kane Fermions Beyond Room Temperature"

11:00: 11:20: Coffee Break

SESSION VI: Time-domain and near-field

Chair: Rupert Huber (University of Regensburg, Germany)

11:20 – 12:20: **Alfred Leitenstorfer** (University of Konstanz, Germany) *lecture*

"Studying Electromagnetic Quantum Fluctuations in the Time Domain"

12:20 – 12:35: E. Mironova (EPFL)

"Quantifying thermal THz-field-induced modulation in on-chip two-color correlation measurements"

12:35 – 12:50: L. Viti (CNR-NANO)

"Engineering Dirac Plasmon Dispersion in Topological Insulator Meta-Resonators via THz Near-Field Nanoscopy"

12:50 – 13:05: S. Anglhuber (University of Regensburg, Germany)

"Direct spatio-temporal mapping and manipulation of THz surface plasmon polariton propagation"

13:05 – 13:20: R. Rouzegar (Zurich Instruments)

"From Noise to Signal with the Right Measurement Technique"

13:20 – 15:30: Lunch Break and Free Time

SESSION VI Quantum Cascade Lasers I

Chair: Jerome Faist (ETHz, Switzerland)

15:30 – 16:30: **Edmund Linfield** (University of Leeds, UK) *lecture*

"Molecular Beam Epitaxial Growth of quantum cascade lasers – The Challenges and the Rewards"

16:30 – 16:45: Q. Wang (University of Singapore)

"Terahertz Semiconductor Multi-bound States-Assisted Flat-Band Lasers"

16:45 – 17:00: T. Letsou (Harvard University)

"Active integrated photonics using quantum cascade lasers"

17:00 -17:20 coffee break

SESSION VII Quantum Cascade Lasers II

Chair: Mikhail Belkin (Technical University of Munich, Germany)

17:20 – 17:35: Q. Qin (Nanjing University, China)

"Surface-Emitting THz Quantum Cascade Lasers via Valley-Edge Topological Cavities"

17:35 – 17:50: A. De Vetter (Ecole Normale Supérieure, Paris)

"Time-resolved emission dynamics in ring-shaped THz QCLs driven by a bus laser"

17:50 – 18:05: F. Wang (Quantum Science Center, Shenzhen, China)

"Extended Combined Resonant Tunneling and Rate Equation Model for Group-IV Room-Temperature THz Quantum Cascade Lasers"

18:05 – 18:20: D. Piciocchi (ETH Zurich, Switzerland)

"Shaping of Frequency Combs from Fast-Gain Lasers"

18:20 – 18:35: M.A. Justo Guerrero (CNR-NANO, Italy)

"Engineering Frequency Comb Regimes in Elliptical THz Quantum Cascade Lasers with integrated graphene"

19:30 - 21:30: Dinner

21:30: Sicilian cakes, marsala and piano music in the "Marsala Room Cave"

Wednesday July 8th

SESSION VIII Special Session Women in Terahertz I

Chair: Miriam S. Vitiello (CNR-NANO, Italy)

9:00 – 10:00: **Manijeh Razeghi** (Northwestern University, USA), **keynote**

"Breaking the *Reststrahlen* Barrier with III-V semiconductors: RT, THz Laser Diodes and frequency combs word record power and quantum device technology"

10:00 – 10:30: **Mona Jarrahi** (UCLA, USA), **invited**

"Spatiotemporally Encoded Time-Domain Terahertz Imaging"

10:30 – 10:50: Coffee Break

SESSION IX Special Session Women in Terahertz II

Chair: Margherita Maiuri (Politecnico di Milano, Italy)

10:50 – 11:20: **Clara Saraceno** (Ruth University Bochum, Germany), **invited**

"Average power scaling in Terahertz time-domain spectroscopy"

11:20 – 11:50: **Juliette Mangeney** (CNRS and Ecole Normale Supérieure, France), **invited**

"An on-chip THz two-level system based on a graphene double quantum dot"

11:50 – 12:20: **Hannah J. Joyce** (University of Cambridge, UK), **invited**

"Advancing Terahertz Functionality through III–V Nanostructures"

12:20 – 12:35: L. Di Virgilio (Politecnico di Milano, Italy)

"Directional charge–phonon coupling in mixed exciton–charge-transfer states in DNTT single crystals"

12:35 – 12:50: X.L. Liu (University of Manchester (UK)

"Mapping the crystal damage in silicon carbide (SiC) introduced by ion implantation with scattering type-scanning near-field optical microscopy (s-SNOM)"

12:50 – 14:30 Lunch Break

14:45 – 23:00: **Excursion & Dinner**

Thursday July 9th

SESSION X Ultrafast spectroscopy

Chair: Junichiro Kono (Rice University, USA),

9:00 – 10:00: **Rupert Huber** (University of Regensburg, Germany) **tutorial**

"Sub-cycle videography of strong-field controlled electrons"

10:00 – 10:15: A. Valladares (Politecnico di Milano, Italy)

"Tracking the ultrafast broadband chiro-optical nonlinearities of plasmonic nano-helicoids"

10:15 – 10:30: V. Bergbauer (University of Regensburg, Germany)

"All-optical atomic-scale microscopy with continuous-wave mid-infrared radiation"

10:30 – 10:45: A. Reich (Neaspec/Attocube)

"Integrating nanoscale spatial resolution with ultrafast spectroscopy"

10:45: 11:15: Coffee Break

SESSION XI Spectroscopy and imaging

Chair: Mona Jarrahi (UCLA, USA)

11:15 – 11:30: M. Khalili (Ruhr-University Bochum, Germany)

"Sub-diffraction spatially-resolved THz-TDS at high speeds enabled by high-average power large-area emitter"

11:30 – 11:45: X. Cao (EPFL, Switzerland)

"Monolithically Integrated Broadband Terahertz Transceiver for On-chip Spectroscopy on Thin-film Lithium Niobate"

11:45 – 12:00: M. Yessenov (Harvard University)

"Observation of Spatially Structured Montgomery Effect in Free Space"

12:00 – 12:15: J. Lee (Teraview, UK)

"Temperature-Dependent Optical Properties of NMC811 Battery Electrode Probed by Terahertz Spectroscopy"

12:15 – 15:45: Lunch Break and Free Time

SESSION XII Cavity QED and non-linear optics

Chair: F. Capasso (Harvard University, USA)

15:45 – 16:45: **Jerome Faist** (ETHz, Switzerland) ***tutorial***

"Controlling solid state phases through vacuum fields"

16:45 – 17:00: Cormac McDonnell (Tel-Aviv University, 69978 Tel-Aviv, Israel)

"THz Field Induced Second Harmonic Generation in Semiconductor Thin Films"

17:00 – 17:15: P. Undrum Fathi (Harvard University)

"Metasurface Enhanced Nonlinear Polarization Using Multi Quantum Wells"

17:15 – 17:30: S. Mukherjee (Ecole Normale Supérieure, Paris, France)

"Tailoring Terahertz Spin-Charge Conversion in 2D transition metal dichalcogenide Heterobilayers"

17:30 – 17:45: Z. Wang (TU Dortmund University, Germany)

"Ultrafast terahertz high-harmonic generation in Dirac/Weyl semimetals and semiconductors"

20:00 – 22:30: **Conference Banquet**

Friday July 10th

SESSION XIII Electronics, transceivers and applications

Chair: M. Razeghi (Northwestern University)

9:00 – 10:00: **Tadao Nagatsuma** (University of Tokyo, Japan) ***lecture***

"Engineering the Terahertz Era: Heterogeneous Integration of Photonics and Electronics"

10:00 – 10:15 R. De La Bastida (Catalan Institute of Nanoscience and Nanotechnology, Spain)

"Enabling thin film thickness determination and data transfer using a sub-THz coherent graphene detector"

10:15 – 10:30 K. Delfanazari (University of Glasgow, UK)

"Terahertz quantum communication with superconducting circuits"

10:30 – 10:45 J. Elumalai (University of Leeds)

"Spectrally Efficient 16-QAM OFDM Transmission in a Terahertz laser Free-Space Link"

10:45 – 11:00 V. Pushkarev (CNR-NANO, Italy)

"Graphene-Based Terahertz Photodetectors on integrated Photonic Platforms"

11:00-11:30: Coffee Break

SESSION XIV Metasurfaces and light-matter interaction

Chair: Ileana Cristina Benea-Chelms (EPFL, Switzerland)

11:30 – 12:30: **Margherita Maiuri** (Politecnico di Milano, Italy) ***tutorial***

"Ultrafast all-optical metasurfaces: controlling light and manipulating matter"

12:30 – 12:45: Y. Hao (Queen Mary, London UK)

"Thermolytic and Auxetic Miniaturization for Nano-architected 3D Metamaterial"

12:45 – 13:00: D. Cassara (Harvard University)

"Experimental Demonstration of Near-Zero-Reflection Bilayer Dielectric Metasurfaces"

13:00 – 13:15 A. Schirato (Politecnico di Milano, Italy)

"All-optical manipulation of the spatio-temporal response of dynamic metasurfaces"

13:15 – 15:15 Traditional Sicilian Lunch

SESSION XV Quantum Cascade Lasers III

Chair: Edmund Linfield (University of Leeds, UK)

15:15 – 16:15: **Paul Chevalier** (Harvard University, USA), ***tutorial***

"The quantum cascade laser pumped molecular laser: from design to applications"

16:15 – 16:30: R.E. Vass (ETH, Zurich)

"Miniature, Low-Dissipation Quantum Cascade Ring Lasers"

16:30 – 16:45: Q. Yang (Fraunhofer Institute for Applied Solid State Physics (IAF), Freiburg)

"Rate equations approach for optically pumped CH₃F terahertz gas lasers"

16:45 – 17:00: A. Sorgi (CNR-INO Florence)

"Design and Characterization of a THz Diffraction Grating for Quantum Correlation Measurements"

17:00: **Federico Capasso, Oleg Mitrofanov** and **Miriam S. Vitiello**

Closing remarks

19:30 - 21:30 Closing Banquet Dinner

21:30: Sicilian cakes, marsala and piano music in the "Marsala Room Cave"

Saturday July 11th

Departures