ETTORE MAJORANA FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE
TO PAY A PERMANENT TRIBUTE TO GALILEO GALILEI, FOUNDER OF MODERN SCIENCE AND TO ENRICO FERMI, "THE ITALIAN NAVIGATOR", FATHER OF THE WEAK FORCES
President: Antonino Zichichi *Director: Fiorella Ruggiu*

International School of Bioelectromagnetism "Alessandro Chiabrera"

Directors of the School:
Ferdinando Bersani (University of Bologna, Italy) and Maria Rosaria Scarfì (CNR-IREA, Naples, Italy)

The Centre for Scientific Culture in Erice (Sicily, Italy) is named after the great Italian scientist Ettore Majorana. Antonino Zichichi, the President of the Centre, has said: "At Erice, those who come in order to follow a certain School are called 'students', but actually they are young people who have successfully completed their University studies and who come to Erice in order to learn what the new problems are. However, what is distinctive for Erice is the spirit animating all participants: students no less than teachers. The prime objective is to learn. The student listens to the lectures and after that comes the most amusing part: the discussion session."
Topics in Bioelectromagnetics have come to Erice many times in the past, especially in the 1980s, with international courses and workshops on non-ionising radiation, and today many participants of those courses contribute greatly to the development of this research field.
Following the request of the European Bioelectromagnetics Association (EBEA) and the Inter-University Centre for the study of the Interaction between Electromagnetic Fields and Biosystems (ICEmB), in 2003 the Ettore Majorana Centre has established a Permanent School of Bioelectromagnetics, named after Alessandro Chiabrera, who is considered as a master by the young scientists of the two organizations.

9th INTERNATIONAL THz-Bio WORKSHOP

Erice (Sicily, Italy): April 30 to May 3, 2020

Sponsored by the: Ministry of Education, University and Scientific Research – Sicilian Regional Government

Co-organized with:

Italian National Agency for New Technologies, Energy and Sustainable Economic Development

CNR – Institute for Electromagnetic sensing of the Environment

Co-Chairs of the Workshop:

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The millimeter wave and terahertz regions are frontier areas for research in physics, chemistry, materials science, biophysics, biology, and medicine. The interest in novel imaging, sensing and spectroscopy in the above range of frequencies has grown steadily during the past twenty years, as new instrumentation, as well as new techniques and new applications have become available.

In 2010 a workshop series entitled "International THz-Bio Workshop" started in Korea with the support of the Ministry of Education, Science and Technology. In 2016 its international organizing committee was encouraged to consider a rotation of this workshop series between different geographical areas. It was then decided to host the THz-Bio Workshop 2017 at ENEA-Frascati in Italy. After the success of this event ad a search of future possible sites, it has recently been decided to hold the 9th International THz-Bio Workshop at the world known "Ettore Majorana Foundation and Centre for Scientific Culture" in Erice, Sicily, in the frame of the activities of the Erice International School of Bioelectromagnetism (http://www.eisbem.eu/) from April 30 to May 3, 2020.

The aim of the "THz-Bio Workshop" is to bring together scientists from different communities to discuss a broad range of scientific issues in the Terahertz and adjacent parts of the Infrared and Microwave spectral regions. Topics of the Workshop include, but are not limited to: spectroscopic measurements on biological systems of increasing complexity, mechanisms of interaction and effects induced by the electromagnetic field, safety issues, technological developments of terahertz active & passive instrumentations and THz-Bio sensing & imaging.
In addition, a special session, entitled *Breakthrough detection and imaging technologies in the THz frequency range* will collect contributions of researchers involved in five projects, focused on the THz radiation based emerging technologies and funded by the ATTRACT consortium, with the aim to advance in the strong potentiality of the THz radiation in bio-applications. ATTRACT is a European consortium funded by the EU (GA777222), which aims to create a co-innovation ecosystem between fundamental research and industrial communities, whose goal is to develop breakthrough detection and imaging technologies for scientific and commercial uses.

The programme of the Workshop will consist of invited, contributed papers and posters. Selected papers presented at the Workshop will be published as a special issue of the *Journal of Infrared, Millimeter and THz Waves.*

Award for the best poster presentation
One day will be partially devoted to poster presentations by participants. A Scientific Committee will award the author of the best poster.

Participation fee: Regular registration € 800
Student registration € 500

The Registration fee will cover the attendance of all sessions, workshop material, full board and lodging (4 nights from April 29 to May 3) a 'half-day excursion' and social dinner.

Details about registration can be found at https://agenda.enea.it/event/195/

For any specific question, please contact us at eisbem@eisbem.eu

PROGRAMME

April 29 – Wednesday

Arrival and accommodation

19:30 Welcome cocktail offered by *Electron Mec* - San Rocco, Marsala Cellar

April 30 – Thursday

08:30 Registration
09:00 Welcome & Introduction by the School Directors and Workshop Co-chairs

5G Technology

09:30 This is your Brain on 5G - *Peter Siegel (USA)*
10:00 Millimeter waves in bioelectromagnetics and body-centric applications - *Maxim Zhadobov (France)*
10:30 What do we know about 5G Wireless Communication and Health Effects? - *Myrtill Simko (Sweden)*
11:00 -11:30 Coffee Break

Medical Applications I

11:30 Cell demethylation using resonant terahertz radiation for potential cancer treatment - *Joo-Huik Son (Korea)*
12:00 Terahertz *in vivo* imaging for improved skin diagnosis and treatment - *Emma Mc Pherson (UK)*
12:30 Applications of THz spectroscopy and holographic approach for diagnostics of dry pellet of human blood plasma - *Olga Smolyanskaya (Russia)*
13:00 Remote Diagnostics of Human Psychoemotional States by the Infrared –Terahertz Image from Face Areas - *Olga Cherkasova (Russia)*
13:20 - 15:00 Lunch Break

Special Session - Breakthrough detection and imaging technologies in the THz frequency range I

15:00 ATTRACT PROJECT - Breakthrough detection and imaging technologies from idea to real world application - *Pablo Garcia Tello (Switzerland)*
15:30 Graphene based THz detectors: focus to bio-applications - *Polina Kuzhir (Finland)*
15:50 Nonlinear THz studies at the TeraFERMI beamline - *Andrea Perucchi (Italy)*
16:10 Between photonics and electronics: 2D materials for THz technologies - *Alessandro Tredicucci (Italy)*
16:40 - 17:00 Coffee Break

Special Session - Breakthrough detection and imaging technologies in the THz frequency range II

17:00 Tunable superconducting GHz-THz radiation sensors - *Federico Paolucci (Italy)*
17:20 Development of an active Terahertz spectro-imaging system, *Pedro Martin-Mateos (Spain)*
17:40 THz Applications and Design Thinking, *Pablo Garcia Tello (Switzerland)*

May 1 - Friday

Spectroscopy I

08:20 Confined Water Molecules: Quantum Electric Dipole Lattice, *Martin Dressel (Germany)*
08:50 Acceleration of collective orientation in nanoconfined water of DMPC - *Gun-Sik Park (Korea)*
09:20 Title to be defined - Paul Ben Ishai (Israel)
09:50 Investigation of normal and cancer gastric tissues by terahertz and infrared spectroscopic methods - *Roman Grigorev (Russia)*
10:10 THz spectroscopy of dry pellets of rat blood plasma - *Anastasiya Lykina (Russia)*
10:30 -11:00 Coffee Break

Medical Applications II

11:00 Early screening of diabetic foot syndrome by terahertz imaging - *Goretti Hernandez-Cardoso (Mexico)*
11:20 Diagnosing diabetic foot with THz imaging: A progress report - *Enrique Castro Camus (Mexico)*

11:50 Breast Carcinoma Segmentation Based on Terahertz Refractive Index Thresholding - *Quentin Cassar (France)*
12:10 Intraoperative diagnosis of human brain gliomas using THz spectroscopy and imaging - *Olga Cherkasova (Russia)*
12:40 – 14:30 Lunch Break

Mechanisms of interaction

14:30 Terahertz perturbation of the nanoscale biomembrane landscape - *P. Thomas Vernier (USA)*
15:00 Terahertz Spectroscopy of Biological Molecules and Tissues - *Masahiko Tani (Japan)*
15.30 Genome-wide mRNA-seq analysis in Human Fibroblasts exposed to 25 GHz - *Elisa Regalbuto (Italy)*
15:50 Comparison between effective medium theory models for the dielectric response of biological tissues to terahertz radiation - *Goretti Hernandez-Cardoso (Mexico).*
16:10 – 16:40 Coffee Break & poster session

Spectroscopy II
16:40 Water status measurements of plants using THz spectroscopy - *Martin Koch (Germany)*
17:10 Monitoring the Porosity of Pharmaceutical Tablets Using THz Frequency Domain Spectroscopy - *Moradi Kouchi (Sweden)*
17:30 On chip Frequency Domain Terahertz Spectroscopy of Liquids - *Juan Cabello-Sanchez (Sweden)*

Imaging I and Technical session

17:50 Terahertz radiation emission of liquid metal droplets - *Alexander Shkurinov (Russia)*
18:20 Self-Assembling of Lysozyme: Structural and Elastic Investigations - *Sara Catalini (Italy)*
18:40 Lytid commercial solutions for THz bio applications - *Anna Golinelli (France)*
19:10 – 19.40 Electron-Mec product range presentation - *Luigi Calligarich (Italy)*
20:30 Workshop Dinner & best poster award

May 2 - Saturday

Imaging II

9:00 Biological effects of millimeter waves on neurons and related cells - *Vincent Wallace (Australia)*
9:30 Terahertz diffractive structures for compact skin cancer detection setup - *Pawel Komorowski (Poland)*
9:50 Analysis of diffusion and effects of substances applied over stratum corneum samples using THz imaging - *Mariana Alfaro (México)*
10:10 Development of a 0.6 THz Reflection Microscope for Dermatology - *Michele Ortolani (Italy)*
10:30– 11:00 Coffee Break
11:00 – 12:00 Closing session & Wrap-up Discussion
12:30 – 18:30 Excursion

May 3 - Sunday

Departure

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