



«ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE

TO PAY A PERMANENT TRIBUTE TO ARCHIMEDES AND GALILEO GALILEI, FOUNDERS OF MODERN SCIENCE  
AND TO ENRICO FERMI, THE "ITALIAN NAVIGATOR", FATHER OF THE WEAK FORCES



# INTERNATIONAL SCHOOL OF QUANTUM ELECTRONICS

## 57<sup>th</sup> Course: PHOTOACOUSTIC AND PHOTOTHERMAL PHENOMENA. FOCUS ON BIOMEDICAL AND NANOSCALE IMAGING AND NDE

ERICE-SICILY: 19 – 26 OCTOBER 2016

Sponsored by the: • Italian Ministry of Education, University and Scientific Research • Sicilian Regional Government • Europe Union • SBAl Department, "La Sapienza" and "Tor Vergata" University Rome • CNRS • Toronto University • GESCA Group • FLIR

### PROGRAMME AND LECTURERS

*Moving photoacoustic sources, trace detection using a high frequency moving grating, and photoacoustic pyrometry*

• G. DIEBOLD, Brown University, Providence, RI, US

*Photothermal effects in nanoplasmics. Recent applications in physics, chemistry and biology*

• G. BAFFOU, Institut Fresnel, Marseille, FR

*Biomedical photoacoustic imaging using all-optical ultrasound detection*

• P. BEARD, University College London, UK

*Considerations on outdoor application of infrared thermography for transport infrastructures survey*

• J. DUMOULIN, IFSTTAR, Bouguenais, FR

*The PROFIDT (PROperty & Field Darboux Transformations) method: A new approach for exact analytical modeling of diffusion-like and wave-like phenomena in graded materials*

• J.C. KRAPEZ, ONERA, Palaiseau, FR

*In vivo applications of luminescent nanothermometers*

• D. JAQUE, Universidad Autonoma de Madrid, ES

*Improving the inversion procedure to characterize vertical cracks using IR thermography*

• A. MENDIOROZ, Universidad del Pais Vasco, Bilbao, ES

*Photoacoustic tomography: From principles to designs to diagnostic imaging of breast cancer*

• A.A. ORAEVSKY, University of Houston, TX, US

*Photoacoustic and photothermal spectroscopy: A new tool for non-invasive glucose monitoring*

• M. SIGRIST, ETH, Zürich, CH

*Photoacoustic imaging towards quantification and clinical translation*

• W. STEENBERGEN, University of Twente, NL

*Photothermal based characterization of thermophysical properties: From sub-micron to sub-nano scale*

• X. WANG, IOWA State University, Ames, IA, US

*Applications of microfluidic TLS and TLM*

• M. FRANKÓ, University of Nova Gorica, Pristava, SI

*Inverse problems, regularization, and applications to thermal signal reconstruction*

• P. BURGHOLZER, Research Center for Non-Destructive Testing, Linz, AT

*Thermal properties and NDT of materials by IR thermography*

• P. BISON, CNR, Padova, IT

*Basics and applications of photothermal beam deflection spectroscopy*

• D. KORTE, University of Nova Gorica, SI

*Pulsed photothermal characterization of biological tissue*

• B. MAJARON, Jožef Stefan Institute, Ljubljana, SI

*Photothermal coherence tomographies: Principles and applications in biomedicine and manufacturing NDE*

• A. MANDELIS, University of Toronto, ON, CA

### PURPOSE OF THE COURSE

The aim of the Course is to bring together all scientists, technology developers and technology users who are investigating or exploiting optically and electromagnetically excited acoustical and thermal phenomena for the investigation of a large variety of material properties and applications. The wealth of photoacoustic and photothermal (PA/PT) topics indicate that this field has developed a broad range of tools for fundamental and applied research. PA/PT research has reached a mature state, with an established position in measurement technology and materials characterisation and future progresses are guaranteed by the close synergy with advances in laser technology and measurement technology. This Course acknowledges the explosive growth of biomedical photoacoustics and tissue imaging, and the presence of an ever growing biomedical photoacoustics research community around the world and in Europe, in particular. It also acknowledges the significant and growing contributions of photoacoustic and photothermal non-destructive evaluation/characterization to nanoscale and other advanced materials (with connections to biomedical imaging by use of nanoparticles). Participants are encouraged to present their own results in the field. In parallel to the Course an International School is also organized together with the Graduate School of the University of Nova Gorica, Slovenia. The International School will be organized as a series of intensive lectures on the basis of photoacoustic and photothermal instrumental techniques, which are preparatory to attend the Course. Participants will earn 10 ECTS credits.

### APPLICATIONS

Persons wishing to attend the Course should apply in writing to the Director of the Course:

Professor Roberto LI VOTI  
Dipartimento S.B.A.I. – Università La Sapienza di Roma  
Via A. Scarpa 16 - 00161 Roma, Italy  
Fax: +39.06.44240183 – e-mail: [roberto.livoti@uniroma1.it](mailto:roberto.livoti@uniroma1.it)

They should specify: i) full name(s), address, age, nationality; ii) academic qualifications and degree; iii) present position and place of work; iv) current research activity; v) list of publications.

### PLEASE NOTE

Participants should arrive in Erice on October 19, not later than 5 pm.

### POETIC TOUCH

According to legend, Erice, son of Venus and Neptune, founded a small town on top of a mountain (750 metres above sea level) more than three thousand years ago. The founder of modern history — i.e. the recording of events in a methodic and chronological sequence as they really happened without reference to mythical causes — the great Thucydides (~500 B.C.), writing about events connected with the conquest of Troy (1183 B.C.) said: «After the fall of Troy some Trojans on their escape from the Achaean arrived in Sicily by boat and as they settled near the border with the Sicilians all together they were named Elymi: their towns were Segesta and Erice.» This inspired Virgil to describe the arrival of the Trojan royal family in Erice and the burial of Anchise, by his son Enea, on the coast below Erice. Homer (~1000 B.C.), Theocritus (~300 B.C.), Polybius (~200 B.C.), Virgil (~50 B.C.), Horace (~20 B.C.), and others have celebrated this magnificent spot in Sicily in their poems. During seven centuries (XIII-XIX) the town of Erice was under the leadership of a local oligarchy, whose wisdom assured a long period of cultural development and economic prosperity which in turn gave rise to the many churches, monasteries and private palaces which you see today. In Erice you can admire the Castle of Venus, the Cyclopean Walls (~800 B.C.) and the Gothic Cathedral (~1300 A.D.). Erice is at present a mixture of ancient and medieval architecture. Other masterpieces of ancient civilization are to be found in the neighbourhood: at Motya (Phoenician), Segesta (Elymian), and Selinunte (Greek). On the Aegadian Islands — theatre of the decisive naval battle of the first Punic War (264-241 B.C.) — suggestive neolithic and paleolithic vestiges are still visible: the grottoes of Favignana, the carvings and murals of Levanzo.

Splendid beaches are to be found at San Vito Lo Capo, Scopello, and Cornino, and a wild and rocky coast around Monte Cofano: all at less than one hour's drive from Erice.

More information about the other activities of the «ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE can be found on the WWW at the following address:  
<http://www.ccsem.infn.it>

R. LI VOTI – A. MANDELIS  
DIRECTORS OF THE COURSE

A.N. CHESTER – S. MARTELLUCCI  
DIRECTORS OF THE SCHOOL

A. ZICHICHI  
PRESIDENT OF THE EMFSC