



«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 NEUTRON SCIENCE AND INSTRUMENTATION

## 3<sup>rd</sup> Course: WATER AND THE WATER SYSTEMS

ERICE-SICILY: 22 – 31 JULY 2016

Sponsored by the: • Italian Ministry of Education, University and Scientific Research • Sicilian Regional Government • CNR • CSGI •

### PROGRAMME AND LECTURERS

*Measurements of quantum kinetic energy tensor in stable and metastable water near the triple point*

• C. ANDREANI, Rome Tor Vergata University, Rome, IT

*Polymorphism in lattice models*

• M. BARBOSA, Universidade do Rio Grande do Sul, Porto Alegre, BR

*Electronic structure and molecular dynamics in disordered water phases at low and high pressure*

• R. CAR, Princeton University, NJ, US

*Evidence of liquid-to-liquid phase transition in deeply cooled confined water shown by neutron and X-ray scattering studies*

• S.-H. CHEN, Massachusetts Institute of Technology, Cambridge, MA, US

*Protein hydration water*

• A. CUPANE, University of Palermo, IT; CNRS, Paris, FR

*Supercooled water – models and simulations*

• P.G. DEBENEDETTI, Massachusetts Institute of Technology, Cambridge, MA, US

*Water and protein folding*

• G. FRANZESE, Barcelona University, ES

*MD simulation in confined water*

• P. GALLO, University of Rome Tre, IT

*Amorphous ices*

• T. LOERTING, Innsbruck University, AT

*On the hydrophobic and hydrophilic interactions in water – alcohol solutions*

• F. MALLAMACE, University of Messina, IT

*Probing supercooled water with x-ray laser and coherent synchrotron radiation*

• A. NILSSON, Stockholm University, SE

*Enhancing crucial fluctuations*

• M. PARRINELLO, Eidgenössische Technische Hochschule, Zürich, CH

*Pair-distribution functions of water and X-ray spectroscopy applied to water*

• L. PETERSSON, Stockholm University, SE

*The many facets of experimental ice research*

• C. SALZMANN, University College London, UK

*Atomic quantum dynamics: Neutron experiments to benchmark state-of-the-art modeling*

• R. SENESI, University of Rome Tor Vergata, IT

*Liquid polymorphism and the liquid-liquid critical point*

• E.H. STANLEY, Boston University, Boston, MA, US

*Roles of local structural ordering in water anomalies and ice nucleation*

• H. TANAKA, Tokyo University, JP

*Fundamental aspects of the glass transition*

• S. TORQUATO, Princeton University, Princeton, NJ, US

*The low density and high density water liquid phases*

• L. XU, Beijing University, Beijing, CN

*Self-organized criticality at the mesoscale: Understanding the glass transition through molecular simulations*

• S. YIP, Massachusetts Institute of Technology, Cambridge, MA, US

### PURPOSE OF THE COURSE

The Course "Water and Water Systems" will include advanced scientific discussions and lectures on the theory, simulations and experiments devoted to understanding condensed water phases and water solutions. Course Objectives. Water plays a key role in chemistry, biology, geology and the environmental sciences. Yet, in spite of decades of intense research, the microscopic mechanisms that are behind its unusual structural and dynamical properties and give rise to its rich phase diagram are far from being well understood. The study of water and its solutions from a molecular perspective is at the intersection of physics, chemistry, biology and materials science. It requires sophisticated experimental methods and advanced techniques of statistical physics.

The Course will consist of lectures and specialized seminars by leading experts, which are directed at graduate students, postdoctoral researchers and junior scientists working at universities and research institutions. It will provide a broad overview of the field, including the most recent ideas in theory and experiment, as well as a critical discussion of the problems that are currently attracting the attention of the researchers. By gathering participants with different specialized backgrounds the course also aims at cross-fertilization of ideas that could advance the state of the field.

### APPLICATIONS

Persons wishing to attend the Course should send a letter to the Director of the School:

Professor Carla ANDREANI

Department of Physics, University of Rome Tor Vergata, Rome, IT

e-mail: [carla.andreani@uniroma2.it](mailto:carla.andreani@uniroma2.it)

### PLEASE NOTE

Participants must arrive in Erice on July 22, no later than 7 p.m.

### 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 Achaei 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.csem.infn.it>

R. CAR – F. MALLAMACE  
DIRECTORS OF THE COURSE

I.S. ANDERSON – C. ANDREANI – R.G.M. CACIUFFO  
DIRECTORS OF THE SCHOOL

A. ZICHICHI  
PRESIDENT OF THE EMFSC