



«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 WATER AND WATER SYSTEMS

## 1<sup>st</sup> Course: WATER AND THE WATER SYSTEMS THE HYDROPHOBIC EFFECT

ERICE-SICILY: 4 – 11 JULY 2018

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

### PROGRAMME AND LECTURERS

*Amorphous ices and glassy states an experimental overview*

• K. AMANN-WINKEL, Stockholm University, SE

*Hydrogen dynamics in ice and water by deep inelastic neutron scattering*

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

*Confined water: From new phases to the water filtration*

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

*MC renormalization group for quenched disordered systems*

• R. CAR, Princeton University, Princeton, NJ, US

*Scaling and universality in glass, gel and jamming transitions*

• A. CONIGLIO, Università di Napoli Federico II, Naples, IT

*Hysteresis in the temperature dependence of the IR bending bands of supercooled confined water*

• A. CUPANE, Palermo, IT; CNRS, Grenoble, FR

*The concept of bionano interactions*

*Current and future applications of bionano interactions*

• K.A. DAWSON, University College Dublin and CBNI, Dublin, IE

*Water at Interfaces*

• G. FRANZESE, Universitat de Barcelona, ES

*Mode coupling theory and glassy dynamics for supercooled liquids and water*

• P. GALLO, University of Rome Tre, Rome, IT

*An introduction to the hydrophobic effect*

• F. MALLAMACE, University of Messina, IT

*Water sorption thermodynamics in rubbery and glassy polymers*

• G. MENSITIERI, Università di Napoli Federico II, IT

*Coherent X-ray diffraction of liquid, supercooled and glassy water*

• F. PERAKIS, Stockholm University, SE

*Structural origin of anomalous properties of water*

• L. PETTERSSON, Stockholm University, SE

*Recent experiments & calculations addressing the question of water's hypothesized liquid-liquid phase transition*

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

*Large-density fluctuations and hyperuniformity: Many-body systems*

*Large-density fluctuations and hyperuniformity: Water systems*

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

*Full quantum nature of water: A study at sub-molecular level*

• E. WANG, Peking University, Beijing, CN

*Bio-inspired materials for controlling ice formation*

• J. WANG, Chinese Academy of Sciences, Beijing, CN

*Specific heat anomaly and liquid-liquid long-range fluctuation in hydrophobic confined water*

• L. XU, Peking University, Beijing, CN

*Understanding the mechanisms of soft-matter rheology 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 Directors of the School:

Prof. Roberto Car (Princeton University): [rcar@princeton.edu](mailto:rcar@princeton.edu)

Prof. Francesco Mallamace (University of Messina): [mallamace@unime.it](mailto:mallamace@unime.it)

Prof. Lars Pettersson (Stockholm University): [lpm@fysik.su.se](mailto:lpm@fysik.su.se)

### PLEASE NOTE

Participants must arrive in Erice on July 4, no later than 2 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 – L.G.M. PETTERSON  
DIRECTORS OF THE COURSE

R. CAR – F. MALLAMACE – L.G.M. PETTERSON  
DIRECTORS OF THE SCHOOL

A. ZICHICHI  
PRESIDENT EMFSCS