



«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 SOLID STATE PHYSICS

## 82<sup>nd</sup> Workshop: UNCONVENTIONAL COMPUTING: MATERIALS SCIENCE, INFORMATICS, HARDWARE, SOFTWARE

ERICE-SICILY: 20 – 26 OCTOBER 2022

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

### PROGRAMME AND LECTURERS

*Unconventional computing schemes: Physics of computation, chemical computing, bio-molecular computing, cellular automata as models of massively parallel computing, complexity, logics of unconventional computing*

*Dynamical Systems Models*

*Hardware: Nanoelectronics (SET, SAT, nanoparticles, atomic switch networks, dopant networks, memristors), spintronics (impurities in semiconductors, MTJ, STT, skyrmions, artificial spin-ice), photonics, mechanical systems, biological systems*

*Software: Theory of computation and nature-inspired algorithms*

*Applications: Neuromorphic and in-materia computation, quantum reservoir computation/processing, nanoelectronics, health-care, complex systems time series prediction, music, ....*

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- V. BRAGAGLIA, IBM, Zurich, CH
- S. BROWN, University of Canterbury, Christchurch, NZ
- M. DALE, University of York, UK
- M. FANCIULLI, University of Milano Bicocca, IT
- J. GROLLIER, CNRS/Thales lab, Palaiseau Cedex, FR
- M. KLÄUI, University of Mainz, DE
- T.C.H. LIEW, Nanyang Technological University, SG
- E.R. MIRANDA, University of Plymouth, UK
- K. NAKAJIMA, The University of Tokyo, JP
- G.Ch. SIRAKOULIS, Democritus University of Thrace (DUTH), GR
- S. STEPNEY, University of York, UK
- G. TUFTE, Norwegian University of Science and Technology, Trondheim, NO
- S. VASSANELLI, University of Padova, IT
- W.G. VAN DER WIEL, University of Twente, Enschede, NL
- R. ZAMBRINI, IFISC (CSIC-UIB) Palma de Mallorca, ES

#### PURPOSE OF THE WORKSHOP

The unconventional computing is a niche for interdisciplinary science, cross-bred of computer science, physics, mathematics, chemistry, electronic engineering, biology, material science and nanotechnology. This Workshop will address principles and mechanisms of information processing and functional properties of physical, chemical and living systems to develop efficient algorithms, design optimal architectures and manufacture working prototypes of future and emergent computing devices.

The aim of this Workshop is to bring together active scientists in the different areas relevant to the interdisciplinary field of unconventional computing (UC) to discuss recent advances in materials science and physics of reservoirs, theoretical models of dynamical systems, applications in different fields such as information processing (classical, non-Von-Neumann, and quantum), nanoelectronics, and art. The Workshop is addressing young researchers and newcomers as well as leading scientists active in the different aspects of UC to discuss the most important questions and find directions to answer them. The scientific focus of this Workshop will be on 1. Dynamical Systems Models, 2. Physical reservoirs, 3. Software, 4. Applications.

#### APPLICATIONS

Persons wishing to attend this Workshop should send an application, preferably by electronic mail, to:

Professor Marco FANCIULLI  
email: wuc@unimib.it  
<https://wuc.mater.unimib.it>

Specifying:

- Date and place of birth together with present nationality
- Present position and place of work
- An abstract, if they wish to give a contribution (oral or poster).

#### PLEASE NOTE

Participants must arrive in Erice on October 20, 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 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>