«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 NONEQUILIBRIUM PHENOMENA

20th Course: *NONEQUILIBRIUM COMPLEX SYSTEMS & TRANSITIONS: FROM BRAIN TO CLIMATE*

ERICE - SICILY: 26 JUNE – 29 JUNE 2026

Sponsorized by Italian Ministry of Education, University and Scientific Research - Sicilian Regional Government – Istituto per la Ricerca e l'Innovazione Biomedica (IRIB) - Consiglio Nazionale delle Ricerche and Consorzio Interuniversitario Scienze Fisiche Applicate (CISFA)

INVITED SPEAKERS AND LECTURES

Allegra Michele
Beane Wendy Scott
Benzi Roberto
Bruneo Dario
Capuano Francesco
Catania Maria Vincenza
Chiofalo Maria Luisa
De Rubeis Silvia
Gammaitoni Luca
Kerskens Christian
Lucà Rossella
Magazù Salvatore
McFadden John Joe
Moreva Ekaterina
Nawaiseh Rawan
Nitsche Michael
Pioggia Giovanni
Plenio Martin
Sergi Alessandro
Spagnolo Bernardo
Tuszynski Jack
Votano Lucia

PURPOSE OF THE COURSE

In 2021, Giorgio Parisi, recipient of the Nobel Prize in Physics, brought renewed attention to the profound and multifaceted concept of complexity in natural and artificial systems. His work highlighted that many of the most intriguing forms of order in nature emerge far from equilibrium, through the interplay of fluctuations, nonlinear interactions, and multiscale organization. Building on this perspective, the course "*Non-equilibrium Complex Systems & Transitions: From Brain To Climate*," delivered within the framework of the International School on ***Nonequilibrium Phenomena***, aims to advance understanding of the fundamental principles governing nonequilibrium dynamics across a wide range of complex systems, while fostering interdisciplinary dialogue and high-level training at the interface of physics, biology, and climate science.

The course will address phenomena spanning neural computation, cognitive emergence, and biological self-organization, as well as atmospheric dynamics, climate variability, and the formation of extreme events. By bringing together researchers from physics, neuroscience, climatology, biology, applied mathematics, and related disciplines, the Course will highlight how order, unpredictability, and adaptability coexist in nature, and how self-organization, collective behavior, and information flow arise in open systems driven far from equilibrium. In continuity with the scientific tradition of the Ettore Majorana Foundation and the International School on Nonequilibrium Phenomena, the 20th Course seeks to broaden the conceptual foundations of complex-systems science.

Particular emphasis will be placed on the interplay between classical and quantum dynamics, the role of fluctuations across scales, the physics of learning and adaptation, and the search for unifying theoretical frameworks capable of describing macroscopic organization in biological, ecological, and climatic systems. Ultimately, the Course aims to provide participants with a modern, interdisciplinary perspective on nonequilibrium phenomena, fostering collaboration across traditionally separated domains and promoting the development of innovative theoretical, computational, and experimental approaches to the study of complexity.

A Focus Issue in EPL entitled "Non-Equilibrium Complex Systems & Transitions: from Brain-to-Climate" is planned, subject to confirmation. Oral and poster contributions will be considered for inclusion in the Focus Issue following peer review.

APPLICATIONS

Further information about the Course is available at:

https://necst-b2c26.sciencesconf.org

Persons interested in attending the Course are kindly requested to contact the organizers at: smagazu@unime.it (Prof. Salvatore Magazù)

PLEASE NOTE

Participants must arrive in Erice no later than 12h:00 noon on 26th June 2026.

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 Thucy- dides (~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 Sicanians 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 Anchises, by his son Aeneas, 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 medie-val 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 «Ettore Majorana» Foundation and Centre for Scientific Culture can be found on the WWW at the following address:
http://www.ccsem.infn.it

C. Guarcello - S. Magazù - B. Spagnolo - D. Valenti
Directors of the Course

A. Lanzara - M. Palma - B. Spagnolo
Directors of the School

A. Zichichi
EMFCSF President

M. T. Caccamo - A. Sergi
Scientific Committee