



«ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE  
TO PAY A PERMANENT TRIBUTE TO GALILEO GALILEI, FOUNDER OF MODERN SCIENCE  
AND TO ENRICO FERMI, THE "ITALIAN NAVIGATOR", FATHER OF THE WEAK FORCES



# INTERNATIONAL SCHOOL OF NUCLEAR PHYSICS

## 31st Course: NEUTRINOS IN COSMOLOGY, IN ASTRO-, PARTICLE- AND NUCLEAR PHYSICS

ERICE–SICILY: 16 – 24 SEPTEMBER 2009

Sponsored by the: • Deutsche Forschungsgemeinschaft • European Physical Society  
• Italian Ministry of University and Research • Sicilian Regional Government

### TOPICS AND LECTURERS

*Neutrinoless double beta decay, experiment (1)*

• H. EJIRI, Osaka, JP

*Neutrinoless double beta decay, experiment (2)*

• E. FIORINI, Milano, IT

*Neutrino hierarchy problem*

• M. LINDNER, Heidelberg, DE

*Analysis of Neutrino Oscillations*

• E. LISI, Bari, IT

*GUTs*

• R. MOHAPATRA, Maryland, US

*Ultra high energy cosmic rays (AUGER)*

• E. PARIZOT, Paris, FR

*Neutrinos and Astrophysics*

• G. RAFFELT, München, DE

*Super-Kamiokande*

• M. SHIOZAWA, Tokyo, JP

*Neutrinoless double beta decay, theory*

• F. SIMKOVIC, Bratislava, SL

*KamLAND and T2K*

• A. SUZUKI, KEK, JP

*Search for CP violation in the lepton sector*

• C. VOLPE, Orsay, FR

*Determining Neutrino Cross Sections*

• D. WARK, London, UK

*Neutrino reactions in the sun and in laboratories*

• M. WIESCHER, Notre Dame, US

### PURPOSE OF THE COURSE

Neutrino physics is presently progressing very fast. It is the only field where we have clear indications that one needs to extend the Standard Model of the electroweak and strong interactions beyond massless neutrinos. The Erice school on neutrino physics intends to review the latest status of the field and show its prospects. In detail, the following topics will be presented and discussed: properties of neutrinos, neutrinos and Grand Unification, the origin of the neutrino mass, Majorana versus Dirac neutrinos, the hierarchy problem, CP violation in the neutrino sector and the mixing angle  $\theta_{13}$ , neutrino oscillations, determination of the Majorana phases, neutrino mass from beta decay, double beta decay and neutrino mass, double beta decay and physics beyond the standard model, neutrinos and cosmology, neutrinos in supernovae, solar neutrinos, long-baseline neutrino experiments, neutrino factories.

### APPLICATIONS

Persons wishing to attend the Course should use the on-line registration under:  
<http://www.physik.tu-darmstadt.de/erice/> – <http://www.uni-tuebingen.de/erice/>  
or apply in writing to:

- Professor Amand FAESSLER  
Universität Tuebingen  
Auf der Morgenstelle 14  
D-72076 TUEBINGEN, Germany  
Tel +49.7071.2976370 – Fax +49.7071.295388  
e-mail: [erice2008@physik.tu-darmstadt.de](mailto:erice2008@physik.tu-darmstadt.de)

They should specify:

- date and place of birth together with present nationality;
- degree and other academic qualifications;
- present position and place of work;
- postal and e-mail address.

More information about the school and application forms for fellowships can be found under the same web address.

### 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 «Ettore Majorana» Foundation and Centre for Scientific Culture can be found on the WWW at the following address:**  
<http://www.ccsem.infn.it>

- **PLEASE NOTE**  
Participants must arrive on September 16, not later than 7 pm.