



«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

## 39th Course: NEUTRINOS IN COSMOLOGY, IN ASTRO-, PARTICLE- AND NUCLEAR PHYSICS

ERICE–SICILY: 16 – 24 SEPTEMBER 2017

Sponsored by the: • European Physical Society • Extreme Matter Institute EMMI  
• GSI Helmholtzzentrum für Schwerionenforschung • KCETA Karlsruhe Institute of Technology  
• Italian Ministry of University and Research • Sicilian Regional Government

### TOPICS AND LECTURERS

#### *Search for the neutrinoless double beta decay*

• M. AGOSTINI, Gran Sasso Science Institute (GSSI), L'Aquila, IT

#### *Neutrinos and structure formation in the universe*

• M. ARCHIDIACONO, RWTH, Aachen, DE

#### *The KATRIN experiment*

• G. DREXLIN, KIT, Karlsruhe, DE

#### *The electron capture in Ho-163 experiment, ECHo*

• L. GASTALDO, University of Heidelberg, DE

#### *IceCube: building a new window on the universe*

• F. HALZEN, WIPAC, Madison, WI, US

#### *Dark matter and neutrinos*

• J. JOCHUM, University of Tuebingen, DE

#### *Electron capture and the neutrinos mass*

• G. KUNDE, LANL, Los Alamos, NM, US

#### *Neutrinos from supernova and compact object mergers*

• G. McLAUGHLIN, North Carolina State University, Raleigh, NC, US

#### *Sterile neutrinos*

• S. MERTENS, MPI for Physics, Munich, DE

#### *Search for the cosmic neutrino background*

• C. TULLY, Princeton University, Princeton, NJ, US

#### *The neutrino hierarchy problem and possible solutions*

• P. VOGEL, Caltech, Pasadena, CA, US

#### *Neutrino physics with JUNO and the experimental solution of the Hierarchy Problem*

• W. WANG, Sun Yat-Sen University, Guangzhou, PRC

#### *Summary talk*

• T. LASSERRE, CEA Saclay, FR; TU Muenchen, DE

### PURPOSE OF THE COURSE

The program concentrates on the following topics: Search for the neutrino cosmic background; Neutrinos and the structure formation of the Universe; Neutrinos and dark matter; Sterile neutrinos; Neutrinos in supernovae and merger events; Neutrinos in stellar burning and the formation of the elements; Determination of the electron-neutrino mass by electron capture (ECHo, NuMECS and HOLMES); Measurement of the electron-antineutrino mass in tritium decay (KA TRIN); Is the neutrino a Majorana- or Dirac particle? Determination by the neutrinoless Double Beta Decay. The Majorana-neutrino mass; The neutrino hierarchy problem and short base-line neutrino oscillations; Neutrinos and the search for fundamental symmetry violations such as CP-violation.

### APPLICATIONS

Persons wishing to attend the Course should register online at:  
<http://theorie.ikp.physik.tu-darmstadt.de/erice/> or <http://www.uni-tuebingen.de/erice/>  
or apply in writing to:

- Professor Dr Amand FAESSLER  
Universität Tuebingen  
Auf der Morgenstelle 14 – D-72076 Tuebingen, Germany  
Tel +49.7071.2976370 – Fax +49.7071.295388  
e-mail: [erice@physik.tu-darmstadt.de](mailto:erice@physik.tu-darmstadt.de)
- Professor Jochen WAMBACH  
Institut Kernphysik  
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Schlossgartenstrasse 2 – D-64289 Darmstadt, Germany  
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- Professor Michael BUBALLA  
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e-mail: [erice@physik.tu-darmstadt.de](mailto:erice@physik.tu-darmstadt.de)

They should specify:

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

Further information on the school and application forms for fellowships can be found at 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 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 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.