



«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 NEUTRON SCIENCE AND INSTRUMENTATION

## 1<sup>st</sup> Course: *INSTRUMENTS AND DEVICES FOR NEUTRON SCATTERING EXPERIMENTS*

ERICE-SICILY: 28 JULY – 4 August 2015

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

### PROGRAMME AND LECTURERS

#### *Welcome and introduction*

- R. CACIUFFO, European Commission, JRC, ITU, Karlsruhe, DE
- K. ANDERSEN, European Spallation Source, ESS AB, Lund, SE

#### *Neutron guides*

- K. ANDERSEN, European Spallation Source, ESS AB, Lund, SE

#### *eV spectrometers*

- C. ANDREANI, Rome Tor Vergata University, IT

#### *History, development and application of neutron sources*

- J.M. CARPENTER, ANL Argonne National Laboratory, Argonne, IL, US

#### *Neutron detectors*

- G. GORINI, Milano-Bicocca University, Milan, IT

#### *Instruments for neutron diffraction*

- P. HENRY, European Spallation Source, ESS AB, Lund, SE

#### *3-axis spectrometers*

- K. KAKURAI, Japan Atomic Energy Agency, Ibaraki JP

#### *Neutron spin-echo spectrometers*

- T. KELLER, Max Planck Institute for Solid State Research, Garching, DE

#### *Instruments for neutron reflectometry*

- S. LANGRIDGE, ISIS, Science and Technology Facilities Council, Rutherford Appleton Laboratory, Didcot, UK

#### *Techniques for neutron spin manipulations*

#### *Sample environment devices*

- E. LELIÈVRE-BERNA, ILL, Institut Laue-Langevin, Grenoble, FR

#### *CANS facilities*

- C.K. LOONG, Tsinghua University, Beijing, CN

#### *Instrument types and constructability*

- R. MCGREEVY, ISIS Neutron and Muon Source, Science and Technology Facilities Council, Rutherford Appleton Laboratory, Didcot, UK

#### *Neutron and $\gamma$ -ray shielding*

- G. MUHRER, European Spallation Source, ESS AB, Lund, SE

#### *Time-of-flight spectrometers*

#### *Spectrometers for diffuse neutron scattering*

- R. OSBORN, ANL Argonne National Laboratory, Argonne, IL, US

#### *Methods & concepts of neutron scattering*

- R. PYNN, Indiana University, Bloomington, IN, US

#### *Neutron imaging instruments*

- M. SCHULZ, Universität München, DE

#### *Future neutron sources*

- A.D. TAYLOR, STFC, Polaris House, Swindon, UK

#### *Neutron monochromator devices*

- Z. YAMANI, CNBC, National Research Council, Chalk River Laboratories, Chalk River, CA

#### *Instruments for fundamental science*

- O. ZIMMER, ILL, Institut Laue-Langevin, Grenoble, FR

### PURPOSE OF THE COURSE

The School aims at educating graduate students on neutron scattering techniques and on the nuances of neutron instrumentation design. Participants will be exposed to the utilization of major neutron facilities, in neutron scattering techniques, instrumentation and data collection, analysis and interpretation, cutting-edge research in chemistry, material science, physics and applications. Lecturers, from international research facilities and university, will address basics on neutron scattering, concepts about neutron sources, design of instrumentation for neutron scattering, detectors and sample environment equipment, and applications of neutron techniques. Students will have the opportunity to hear about the latest research being carried out with the techniques at international neutron facilities. In addition students will follow practical work, in order to gain a comprehensive training on modern instrumentation issues at both steady state and pulsed neutron sources. Practical sessions will be organized at major neutron sources immediately after the course in Erice. The School aims to build interactions between graduate students, international research centers for neutron scattering [ILL Reactor (F), ISIS Neutron Facility (UK), SNS (US)] and university groups.

The School program consists of lectures, tutorials and problem classes taking place each weekday with occasional evening lectures. In addition, students make short presentations to their tutorial groups about their current research projects, and go through a neutron beam-time proposal writing exercise.

### APPLICATIONS

Persons wishing to attend the Course should send a letter to the Director of the School:

Professor Carla ANDREANI  
Department of Physics, University of Rome Tor Vergata, Rome, IT  
e-mail: [carla.andreani@uniroma2.it](mailto:carla.andreani@uniroma2.it)

### PLEASE NOTE

Participants must arrive in Erice on July 28, 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 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 Corino, 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>

K. ANDERSEN – R.G.M. CACIUFFO  
DIRECTORS OF THE COURSE

I.S. ANDERSON – C. ANDREANI  
DIRECTORS OF THE SCHOOL

A. ZICHICHI  
PRESIDENT OF THE EMFCSC