

**Ettore Majorana Foundation and Centre for Scientific Culture**  
*(President: prof. Antonino Zichichi)*

**International School of Bioelectromagnetics “Alessandro Chiabrera”**  
*Director of the School: prof. Ferdinando Bersani (University of Bologna, Italy)*

The Centre for Scientific Culture in Erice (Sicily, Italy) is named after the great Italian scientist Ettore Majorana. Antonino Zichichi, the director of the Centre, has said: “At Erice, those who come in order to follow a certain School are called ‘students’, but actually they are young people who have successfully completed their University studies and who come to Erice in order to learn what the new problems are. However, what is distinctive for Erice is the spirit animating all participants: students no less than teachers. The prime objective is to learn. The student listens to the lectures and after that comes the most amusing part: the discussion session.”

Topics in Bioelectromagnetics have come to Erice many times in the past, especially in the 1980s, with international courses and workshops on non-ionising radiation, and today many participants of those courses contribute greatly to the development of this research field.

Following the request of the European Bioelectromagnetics Association (EBEA) and the Inter-University Centre for the study of the Interaction between Electromagnetic Fields and Biosystems (ICEmB), in 2003 the Ettore Majorana Centre has established a Permanent School of Bioelectromagnetics, named after Alessandro Chiabrera, who is considered as a master by the young scientists of the two organizations.

**VI COURSE: “Static and Low Frequency Magnetic Fields:  
“Physical Concepts, Biological Effects, Mechanisms and Limit Setting”**

Erice (Sicily, Italy): November 25-December 1

Directors of the Course:  
Frank S Prato PhD,

Lawson Health Research Inst., B5-004  
St. Joseph's Health Care, 268 Grosvenor Street  
London, Ont. N6A 4V2, Canada  
email: [prato@lawsonimaging.ca](mailto:prato@lawsonimaging.ca)  
office: (519) 646 6100 x64140  
fax: (519) 646 6205

Dr Jukka Juutilainen

Department of Environmental Science,  
University of Eastern Finland, P.O. Box 1627,  
FI-70211 Kuopio, Finland.  
[jukka.juutilainen@uef.fi](mailto:jukka.juutilainen@uef.fi)

## Course Presentation

Each year 100 million patients are exposed to strong static and low frequency magnetic fields while having a magnetic resonance imaging (MRI) procedure. Each year most of humanity is exposed to weak extremely low frequency (ELF) magnetic fields from electric power generation, distribution and use. Given this enormous exposure burden to humans and other biological organisms it is surprising that we still know so little about biological effects and, if there are effects, if they are detrimental. The Erice-EBEA school curriculum will cover a) fundamental physics including dosimetry and b) relevant data from biological systems from cell free systems to humans. These topics will be structured with respect to candidate biophysical and biochemical mechanisms including consideration of the target of the initial transduction mechanism and the importance of the choice of the experimental observable. The Erice-EBEA school will end with a consideration of what future experiments and scientific endeavors are needed to allow informed decision making with respect to exposure guidelines and further development of medical and non-medical applications.

### **Introduction to 2012 School on Bioelectromagnetism, Monday November 26 to Saturday December 1<sup>st</sup>, 2012**

**Instructors: Ferdinando Bersani, Frank S. Prato and Jukka Juutilainen**

#### **1.0 Day 1 (Monday Nov 26 Afternoon Start) - Exposure metrics including related physical concepts**

- 1.1 Introduction to Physics of Static and Low Frequency Magnetic Fields  
Time allocation: 2-2:45 PM  
Instructor: *Ferdinando Bersani (Bologna, Italy)*
- 1.2 Concepts in Risk Assessment including Deterministic and Stochastic effects  
Time allocation: 3-3:45 PM  
Instructor: *Jukka Juutilainen (Kuopio, Finland)*
- 1.3 Occupational and public exposure to static and low frequency magnetic fields  
Time allocation: 4-4:45 PM  
Instructor: *Isabelle Magne (Moret-sur-Loing, France)*
- 1.4 Magnetic Field Exposures from MRI now and in the future  
Time allocation: 5-5:45 PM  
Instructor: *Frank Prato (London, Ontario Canada)*
- 1.5 Magnetic Field Exposures from current therapeutic and future therapeutic devices  
Time allocation: 6-6:45 PM  
Instructor: *Ruggero Cadossi (Modena, Italy) or Alex Thomas (London, Ontario Canada)*

## **2.0 Day 2 – AM (Tuesday Nov 27) - Scientific Basis of current exposure limits**

### 2.1 Induced Current Mechanism – Concept in Safety Limits

Time allocation: 9-9:50 AM

Instructor: *Maila Hietanen (Helsinki, Finland)*

### 2.2 Static Magnetic Fields

Time allocation: 10-10:50 AM

Instructor: *Jolanta Karpowicz (Warsaw, Poland)*

### 2.3 Low Frequency Magnetic Fields

Time allocation: 11-11:50 AM

Instructor: *Alexandre Legros (London, Ontario Canada)*

LUNCH – 12.00 – 1.00PM

## **2.0 Day 2 – PM (Tuesday Nov 27) – Static Magnetic Fields: Biological Data**

### 2.4 In vitro studies on static magnetic fields

Time allocation: 1-1:45 PM

Instructor: *Maria Rosaria Scarfi (Naples, Italy)*

### 2.5 Animal studies on static magnetic fields

Time allocation: 2-2.45PM

Instructor: *Isabella Lagroye (Bordeaux, France)*

### 2.6 Human studies on static magnetic fields

Time allocation: 3-3.45PM

Instructor: *Maila Hietanen (Helsinki, Finland)*

### 2.7 Studies on biological and health effects of MRI exposure (involving both static and low frequency magnetic fields)

Time allocation: 4-4.45PM

Instructor: *Jolanta Karpowicz (Warsaw, Poland)*

## **3.0 Day 3 (Wednesday, Nov 28) – Tourist Activity**

## **4.0 Day 4 - AM (Thursday Nov 29) – Low Frequency Magnetic Fields**

### 4.1 In vitro studies on low frequency magnetic fields

Time allocation: 9-9:45 AM

Instructor: *Vijay (San Antonio, Texas USA)*

### 4.2 Animal studies on low frequency magnetic fields

Time allocation: 10-10:45 AM  
Instructor: *Isabelle Lagroye(Bordeaux, France)*

4.3 Human studies on low frequency magnetic fields  
Time allocation: 11-11:45AM  
Instructor: *Jukka Juutilainen(Kuopio, Finland)*

LUNCH 12.00 -1:00PM

#### **4.0 Day 4 - PM (Thursday Nov 29) - Concepts in Biophysical Detection Mechanisms and Role of Experimental Observable**

4.4 Magnetic dipoles including iron magnetite and ferritin (??)  
Time allocation: 1-1:45 PM  
Instructor: *David Dickman (Pasadena, California USA)*

4.5 Free Radical Mechanism including effects of visible light exposure  
Time allocation: 2-2:45 PM  
Instructor: *Christiane Timmel (Oxford, England)TBC*

4.6 Resonance Mechanisms associated with metallo-protein targets  
Time allocation: 3-3:45 PM  
Instructor: *VN Binhi (Moscow, Russia)*

4.7 Stochastic Resonance  
Time allocation: 4-4:45 PM  
Instructor: *Guglielmo d'Inzeo (Rome, Italy)*

#### **5.0 Day 5 - AM (Friday Nov 30) - New Approaches in Modelling and Experiments**

5.1 Molecular Dynamics  
Time allocation: 9-9:45 AM  
Instructor: *Guglielmo d'Inzeo (Rome ,Italy)*

5.2 New Cell and Animal Protocols Using Reporter Genes and Reporter Probes  
Time allocation: 10-10:45 AM  
Instructor: *Jeff Carson (London, Ontario Canada)*

5.3 Human Protocols Using Medical Imaging  
Time allocation: 11-11:45  
Instructor: *Frank Prato (London, Ontario Canada)*

LUNCH 1-2:00PM

#### **5.0 Day 5 - PM (Friday Nov 30) – Student Poster and Oral Presentations**

5.4 Student Poster Presentation  
Time allocation: 1-2PM

Instructors: Students will be at their poster to answer questions

#### 5.5 Student Poster Presentation

Time allocation: 2-3PM

Instructors: Three Selected Posters will be presented – 15 min each

### **6.0 Day 6 (Saturday Dec 1) - Identifying the gaps and proposals for future experiments and theoretical studies**

#### 6.1 Low Frequency Magnetic Fields

Time allocation: 9-9.45AM

Instructor: *Jukka Juutilainen (Kuopio, Finland)*

#### 6.2 Static Magnetic Fields and MRI

Time allocation: 10-10:45AM

Instructor: *Jolanta Karpowicz (Warsaw, Poland)*

#### 6.3 Medical Therapy Devices

Time allocation: 11-11.45AM

Instructor: *Alex Thomas*

#### 6.4 Summary: Past, Present and Future of ELF and Static MFs

Time allocation: 12-12.45PM

Instructors: *Frank Prato (London, Ontario Canada)*

Wednesday, Nov 28 is free for touristic excursions.

Diploma for the best poster presentation

Friday afternoon is devoted to oral and poster presentations by participants. A diploma will be awarded by a Scientific Committee to the author of the best poster.

Participation fee: 1300 € including food and lodging.

Application: Interested candidates should send an e-mail to the Directors of the Course at the following e-mail address:

[school@ebeam.org](mailto:school@ebeam.org), with the following information:

- A short Curriculum Vitae
- Scientific interest of the candidate
- For young Researchers: letter of recommendation of a Senior Scientist by e-mail (attached Word or PDF file)

In case of acceptance the candidate will be informed by e-mail.

The deadline for sending the requests of participation to the School is November 5, 2012.

The participation fee can be paid directly into the Bank Account of the Erice E. Majorana Centre, given to the applicants, following the acceptance, or directly to the School on arrival in Erice.

For details about the Ettore Majorana Centre: [www.ccsem.infn.it](http://www.ccsem.infn.it)

Participants must arrive in Erice on November 25, possibly not later than 6 p.m. or Monday 26 no later than 11 a.m., since the course starts on Monday at 2 p.m.