THE ENRICO FERMI AND GALILEO GALILEI CELEBRATIONS
A TRIBUTE TO THE "ITALIAN NAVIGATOR", FATHER OF THE WEAK FORCES
AND TO GALILEO GALILEI, FOUNDER OF MODERN SCIENCE

INTERNATIONAL SCHOOL OF QUANTUM ELECTRONICS

37th Course

ATOMS AND PLASMAS IN SUPER-INTENSE LASER FIELDS

ERICE-SICILY: 5 - 15 JULY 2003

Sponsored by the: • Italian Ministry of Education • Italian Ministry of University and Scientific Research • Sicilian Regional Parliament
• Italian Research Group on Quantum Electronics and Plasma Physics (G. N. E. Q. P.) of the National Research Council
• University of Rome "Tor Vergata" • University of Milano-Bicocca • European Science Foundation (E. S. F.)

PROGRAMME AND LECTURERS

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- S. Atzeni, Università di Roma "La Sapienza", Italy
- S. Bouquet, CEA, Saclay, France
- R. Potvielege, University of Durham, UK
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- M. Koenig, LULI, Ecole Polytechnique, Palaiseau, France
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- F. Pegoraro, Università di Pisa, Italy
- H. Walther, MPQ, Garching, Germany
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- J. Tisch, Imperial College, London, UK
- A. Maquet, Université Pierre et Marie Curie, Paris, France
- M. Zarcone, Univeristy of Palermo, Italy
- J. Marangos, Imperial College, London, U.K.
- T. Pikuz, Nat.Res.Inst. PhysicalTechnical Radiotechnical Measurements, Russia
- L.F. DiMauro, Brookhaven National Laboratory, U.S.A.
- C. Keitel, Univ. of Freiburg, Germany
- W. Sandner, Max-Born Institut, Berlin, Germany
- A. Migus, LULI, Ecole Polytechnique, Palaiseau, France

Metrology of femtosecond and attosecond phenomena
Laser acceleration of electrons and production of energetic particles
Hydrodymanic Instabilities laser produced plasmas
Astrophysics in the laboratory
Interaction of ultra-short, few-cycle pulses with atoms and ions
Experiments on intense laser produced plasmas
Shock wave experiments and Dense plasmas
Theory of multiphoton ionisation of atoms
Relativistic plasmas
Magnetic fields and solitons in relativistic plasmas
Quantum interaction of single atoms
High Order Harmonic Generation and atto-physics
Interaction of clusters with intense laser fields
Atoms and molecules in strong and ultra-strong laser pulses
Anisotropic laser plasmas: Non linear processes and properties
Interaction of strong laser fields with molecules
Recent advances in X-ray spectroscopy and X-ray imaging
Laser-Atom Interactions at Extremes: Current and FutureProspects
Relativistic quantum dynamics in extremly intense laser pulses
Atomic physics in strong laser fields
Basics and recen progress in short-pulse hig-energy laser systems

PURPOSE OF THE COURSE

The advent of laser systems capable of delivering very short pulses and very high intensities has made accessible new regimes to experimental investigations and has opened new horizons in the interaction of laser fields with atoms, solids and plasmas. In these extreme conditions, electrons are accelerated at velocities close to the velocity of light and the electromagnetic fields are much bigger than the atomic electric fields, so that strongly non-linear and relativistic interactions take place. The traditional distinction between solids and atoms on one side and plasmas on the other side tends to vanish and exotic states of matter are created. A large variety of applications is expected, from novel light and X-ray sources from high harmonics emission, to new particle acceleration techniques and the new "fast ignition" approach to Inertial Confinement Fusion. The Course will cover areas of interest to the atomic physics and to the plasma physics scientific communities and is opened in particular to students and researchers wishing to enter this new field. Lectures and specialised seminars will cover current developments in theory and experiments but are also intended to give the basics of the field. The course falls among the activities of the Programme "FEMTO" (Interaction of superintense, femtosecond laser fields with atoms, solids and plasmas), a program of the European Science Foundation in the Physical and Engineering Sciences.

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.), says: "*After the fall of Troy some Troyans on their escape from the Achaei arrived in Sicily on boats 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 Troyan 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 he 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.

GENERAL INFORMATION

Advanced research papers by participants of the Course are welcome for presentation, and will be considered for publication in the Proceedings of the Course together with the invited lectures. A poster session is planned for such contributions.
Persons wishing to attend the Course, and those wishing to present a contribution, should apply in writing to:

Prof. Giovanni Petrocelli
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tel.: +39 06 7259 7211 or 7246
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e-mail: petrocelli@ing.uniroma2.it

They should specify:
i) full name(s), address, age, nationality;
ii) academic qualifications and degree;
iii) present position and place of work;
iv) current research activity;
v) list of publications

Junior scientists should enclose a letter of recommendation from the head of their research group or from another senior scientist active in the field.
The total fee, which includes full board, a copy of the proceedings and lodging (arranged by the School), is EURO 1000.

Closing date for application: June 26, 2003
No special application form is required

Admission to the Course will be decided in consultation with the Advisory Committee of the School comprising Professors D.Batani, C.J.Joachain, A.N.Chester, S.Martellucci, and A. Zichichi. Grants covering travel (up to 500 Euro) or fee (1000 Euro) are available: these should be explicitly requested in the application. Deadline for request of grants is June 1, 2002. Participants must arrive in Erice on July 5, no later than 4 pm and leave no earlier than July 15 at 2 pm.
Detailed information and the final programme of the Course, including timetable of lectures, will be sent to successful applicants together with the letter of acceptance.

More information about the activities of the Ettore Majorana Centre can be found on the WWW at the following address:
http://www ccsem infn it

More information about the programme FEMTO can be found at
ht://www.esf.org/physical/pp/FEMTO/
or by writing to D.Batani (batani@mib.infn.it)

D. BATANI - C. J. JOACHAIN
DIRECTORS OF THE COURSE

A. N. CHESTER - S. MARTELLUCCI
DIRECTORS OF THE SCHOOL

A. ZICHICHI
DIRECTOR OF THE CENTRE