

# **THE SILMI PROGRAMME**

# WHAT IS SILMI ?

- SILMI is a Research Networking Programme of the European Science Foundation ( ESF ) in the Physical and Engineering Sciences ( PESC ).
- Full title:  
  
« Super-Intense Laser-Matter Interactions »
- Duration: 5 years ( 4 May 2009- 3 May 2014 ).

# **PARTICIPATING COUNTRIES AND BUDGET**

- The SILMI programme is supported by the following 16 countries:

Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, Germany, Italy, Lithuania, Netherlands, Norway, Portugal, Romania, Spain, Sweden and Switzerland.

- The SILMI annual budget is 126.500 euro.

# SCIENTIFIC CONTEXT

- Recent development of facilities delivering laser pulses with unprecedented characteristics, in two complementary directions:
  - IR and optical pulses of high repetition rate ( beyond the kHz ), very short duration ( a few optical cycles ) and very high peak intensity.
  - Ultra-violet and X-ray pulses generated by FEL's and high order harmonic sources.

# SCIENTIFIC CONTEXT

- The members of the SILMI programme have access to the facilities belonging to the Laserlab-Europe consortium.
- In addition, new European facilities, devoted to the study of super-intense laser-matter interactions, are planned. Foremost among these are:
  - FLASH ( Free-electron laser in Hamburg ).
  - ELI ( Extreme Light Infrastructure ).
  - HIPER ( High Power laser Energy Research ).

# RESEARCH PROGRAMME

- The SILMI programme is based on two mutually interlocking working groups:
- Working group 1: Super-intense laser-matter interactions at the *microscopic* level.
- Working group 2: Super-intense laser-matter interactions at the *macroscopic* level.

# WORKING GROUP 1

- Study of the interaction of atoms, molecules and clusters with high-intensity laser light.
- The topics to be investigated include:
  - **Attophysics:**  
Production, characterization and use of sub-femtosecond pulses for real-time observation and direct control of the electronic motion in atoms and molecules.

# WORKING GROUP 1

- **Multiphoton processes in atoms:**

Electron correlation effects in multiphoton multiple ionization, production of « hollow atoms » by inner-shell multiple ionization.

- **Multiphoton processes in molecules:**

Fragmentation dynamics of laser-driven molecular processes, multiphoton ionization of molecules.

- **Multiphoton processes in clusters.**



## WORKING GROUP 2

- Study of the interaction of solids and plasmas with high-intensity laser light.
- The topics to be investigated include:
  - **Harmonic generation from solid surfaces.**
  - **Generation of very bright beams of particles:**  
Electron, positron, ion and secondary nuclear beams generated in laser-plasma interactions.

## **WORKING GROUP 2**

- **Laser acceleration of particles:**

Development of laser-driven particle beams to generate monoenergetic electron and ion beams.

- **Laboratory astrophysics.**

- **Fast ignition:**

Study of electron propagation and high current transport in the relativistic regime.

# ACTIVITIES OF THE PROGRAMME

- **Short term and exchange visits**

Requests for short term visits (about one week) and exchange visits (about one month) should be sent to the members of the Core Committee:

- C. Joachain : [cjoacha@ulb.ac.be](mailto:cjoacha@ulb.ac.be)
- D. Batani : [batani@mib.infn.it](mailto:batani@mib.infn.it)
- J. Meyer-ter-Vehn: [meyer-tervehn@mpq.mpg.de](mailto:meyer-tervehn@mpq.mpg.de)

and to Mrs. C. Mabrouk at the ESF: [cmabrouk@esf.org](mailto:cmabrouk@esf.org)

# ACTIVITIES OF THE PROGRAMME

- **Workshops**

Organization or co-sponsoring of workshops gathering about 50 participants for 3-4 days.

Last workshop:

« Sources of Superintense and Ultrashort Laser Pulses »

Porto, October 26 - 28, 2009

Organizer: H. Crespo

# ACTIVITIES OF THE PROGRAMME

- **Conferences**

Organization or co-sponsoring of conferences.

Next conference:

« Superstrong Fields in Plasmas »

Villa Monastero, Varenna, October 3 - 9, 2010

Organizer: D. Batani

# ACTIVITIES OF THE PROGRAMME

- **Summer Schools**

Organization of three summer schools during the five-year period of the programme.

- Next summer school:

Ettore Majorana Centre, Erice, July 2011

Co-directors: D. Batani and C. Joachain