

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 18 countries:

Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, Germany, Israel, Italy, Lithuania, Netherlands, Norway, Poland, 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 research visits**
- Aimed at the development of collaborations between the research groups participating to the programme
- **Workshops**

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

ACTIVITIES OF THE PROGRAMME

- **Conferences**

Organization or co-sponsoring of conferences

- **Summer Schools**

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

APPLICATION INFORMATION

- Applications for short research visit grants can be submitted at any time and will be processed within typically 2-4 weeks.
- Instructions and application forms can be found on the SILMI website **www.esf.org** by proceeding as follows:
Activities → Research Networking Programmes
→ Physical and Engineering Sciences → Super-Intense Laser-Matter Interactions.

APPLICATION INFORMATION

- Proposals requesting support for conferences and workshops should be submitted in due time (preferably one year before the event) to allow discussing at a SILMI Steering Committee meeting.
- Informal contact with a member of the SILMI Steering Committee before submitting a conference or workshop proposal is recommended.