International Workshop on "High Energy Density Science & Non-linear X-ray Processes"

Laboratoire Physique-Chimie Matiere et Rayonnement, Paris, November 28-29, 2005

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Following the workshop Nov 28/29 at DESY a second workshop has been organized addressing the scientific fields of plasma physics and high-intensity phenomena in atoms, molecules, clusters and ions. This second workshop was again organized in close collaboration with European partners. The collaboration included not only to establish the scientific program but also the organisation of the workshop in Paris through people from the Laboratoire Optique Applique (LOA) in Palaiseau.

The scientific program was established by J. Marangos (Imperial College, London), Philippe Zeitoun (LOA, Palaiseau) and Thomas Tschentscher (DESY). Following a presentation of the project overview and beam parameters by Massimo Altarelli the program was divided into three scientific sessions:

- X-ray plasma generation and diagnostics (chair: J.-C. Gauthier, CELIA, Bordeaux),
- Non-linear and high-field x-ray processes (chair: J. Marangos, Imperial College, London),
- Extremely dilute systems and clusters (chair: A. Wolf, MPI Kernphysik, Heidelberg).

Each session was concluded with a summary of the most important aspects for the science in the respective field. Also, requirements for instrumentation were collected in order to guide the discussion in the working groups. In total 21 presentations were given. It is planned to publish the presentations of all workshops in spring 2006. In total 49 participants from ten European countries and the U.S.A. attended the meeting.

On the second day, working groups were formed to discuss in more detail scientific opportunities and, primarily, requirements for instrumentation for the experiments proposed during the presentations. After discussion it was decided to form two working groups:

- High energy density physics experiments

  The people in this group are interested in plasma physics like experiments. The plasma state of matter could be either generated using an optical laser or the FEL beam itself. A list of eight types of experiments was established and the most important requirements for these experiments were collected. In addition requirements to infrastructure means like an adequate optical laser or X-ray streak cameras were raised. The coordinator of this group still needs to be appointed.

- Investigations of small quantum systems

  The experiments in this group are aiming at single and sequential linear processes in a variety of gaseous samples. Further non-linear processes were discussed where very low cross-sections at X-ray energies could be significantly raised if applying visible laser pump X-ray probe techniques or vice versa. Discussion of the experimental requirements was started. As an infrastructure item an ion beam facility was brought up. The coordinators of this group are J. Marangos (London) and A. Wolf (Heidelberg).

Both group have started to write up their findings. These reports will define the layout of experimental stations for related scientific experiments at the European XFEL. These stations shall be described in the technical design report to be written in 2006.