P-54

Generation of X-ray radiation with a femtosecond laser system

Ł. Węgrzyński[1]*, T. Fok[1], P. Wnuk[2], Y. Stepanenko[2]
P.W. Wachulak[1], A. Bartnik[1], C. Radzewicz[3],
H. Fiedorowicz[1] and K. Lawniczak - Jablonska[4]

[1]*Institute of Optoelectronics, Military University of Technology, Kaliskiego 2, 00-908 Warsaw, Poland*
[2]*Institute of Physical Chemistry, Polish Academy of Science, Kasprzaka 44/52, 01-224 Warsaw, Poland*
[3]*Institute of Experimental Physics, University of Warsaw Hoża 69, 00-681 Warsaw, Poland*
[4]*Institute of Physics, Polish Academy of Sciences Al. Lotników 32/46, 02-668 Warsaw, Poland*

Keywords: X-rays, femtosecond lasers, laser plasma X-ray sources

*e-mail: lwegrzynski@wat.edu.pl

Generation of X-ray radiation from a plasma produced as a result of interaction of femtosecond laser pulses with a solid target is presented. The laser pulses of 16fs time-duration and energy about 50mJ were created at 10Hz repetition rate with a femtosecond high-power (10TW) laser system developed recently at the Institute of Physical Chemistry PAS [1]. The laser system is based on the Noncollinear Optical Parametric Chirped Pulse Amplifier (NOPCPA) approach [2].

The laser pulses have been focused with a spherical lens (f = 50mm) on a solid target in a form of a metal plate. The lens and the target were mounted inside a vacuum chamber using translation and rotation stages. The translation stage made possible to change position of the target in respect to the laser focus and the rotation stage allowed irradiating previously undamaged surface of the target.

X-ray emission has been detected for the first time using a scintillator (P43) combined with a CCD camera. The preliminary spectral measurements performed for different target materials (Cu, Al) using the absorption filters technique confirmed that X-ray pulses were produced as a result of femtosecond K_α X-ray generation process [3, 4]. Intensity of X-rays strongly depended on the polarization of laser radiation. The new source can be used in fast X-ray diffraction studies and pulsed micro-radiography.

Acknowledgments: The research has been done under the research and development project funded by the National Center for Research and Development (NCBiR) Nr 02-0019-10/2011 and was supported by the 7th Framework Programme Laserlab-Europe Project No. 284464.

[1] Y.Stepanenko *JOSAB* 28 (2011) 2337, Y. Stepanenko *et al.* (in preparation)
[2] Dubietis et al., *Opt. Commun*. **88** (1992) 437.
[3] Rischel et al., *Nature* **390** (1997) 490.
[4] Salzmann et al., *Phys.Rev.E* **65** (2002) 03640.

P-55

Status and solutions for the Solaris control system

P. P. Goryl[1*], C. J. Bocchetta[1], V. Hardion[2], A. Kisiel[3],
K. Kopeć[1], P. Kurdziel[1], J. Lidon-Simon[2], F. Melka[1],
M. Ostoja-Gajewski[1], D. Spruce[2], M. J. Stankiewicz[1],
J. Szota[1], T. Szymocha[3], A. I. Wawrzyniak[1],
K. Wawrzyniak[1], M. Zając[1] and Ł. Żytniak[1]

[1]*National Synchrotron Radiation Centre 'Solaris', Jagiellonian University, ul. Czerwone Maki 98, 30-392 Kraków, Poland*
[2]*MAX IV Laboratories, Lund, Sweden*
[1]*AGH University of Science and Technology, ACC CYFRONET AGH, Nawojki 11, 30-950 Kraków, Poland*

Keywords: synchrotron radiation, IT, control system

*e-mail: piotr.goryl@uj.edu.pl

The Solaris control system has been designed and is in the implementation phase, now. Final development in the field of IT and control systems for the light source is now ongoing.

Control system implementation is based on several collaborations with other institutes supporting Solaris with both technological solutions and work. Among them, there are the MAX IV, the Elettra and the project PLGrid Plus. Some of implementation tasks are outsourced to companies having related experience. The main one are for PLC systems fabrication and for control system software and hardware integration.

The key choices are the TANGO CS for hardware integration, the Sardana software for experiments' control and the IcePAP system for motorization. Timing system will be built using hardware provided by Micro Research Finland, so called MRF system.

Implementation strategy and status along with technological choices and their impact for future facility operation will be presented.

Acknowledgments: Work supported by the European Regional Development Fund within the frame of the Innovative Economy Operational Program:
POIG.02.01.00-12-213/09