A-01 **News from SOLARIS – the first Polish Synchrotron**

Synchrotron SOLARIS – getting ready for the first users

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Last September the Opening Ceremony of National Synchrotron Radiation Centre SOLARIS took place.

SOLARIS has been constructed as the result of the *National Electromagnetic Radiation Centre for Research Purposes (Stage I)* project which was granted by the Polish Ministry of Science and Higher Education in April 2010. It was financed from the European Union Regional Development Fund within the Innovative Economy Operational Program. The project was completed in December 2015.

In few months the facility will be opened to the first users. This signals new chapter for Polish researchers.

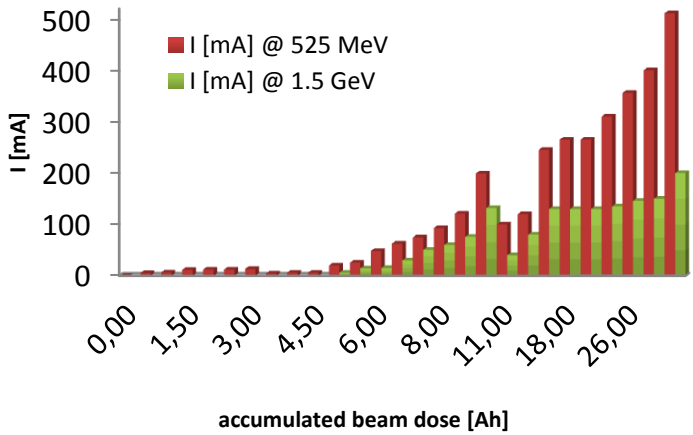
During the final year of the completion of the project the installation and integration of the storage ring was achieved (April 2015) and SOLARIS team commenced the machine startup and commissioning (May 2015). This resulted in the systematically increased amount of the stored ring current. Eventually first photons were detected at the beamlines input detectors. Following this success, in summer 2015 the 5th straight section vacuum chamber was replaced and an APPLE II type undulator was installed. By the autumn, after tedious optimizations and commissioning procedures, nominal optics parameters were achieved in the storage ring. 100mA stored current was reached at the target 1.5 GeV energy with the lifetime of few hours. After that, at the beginning of 2016, the next action was undertaken and Landau cavities were installed in order to improve the electron bunches quality leading to the extension of the lifetime and intensification of the stored current. The accelerator systems of SOLARIS reached their assumed configuration in February 2016. However the further development is foreseen in the future – mostly for linac – to avoid ramping and providing the top-up operation.

Since February, the final commissioning process has begun. The stored current is systematically being increased and the vacuum systems outgassed. After 30Ah of accumulated beam dose, 511 mA of stored current was reached at 525 MeV energy and 200 mA at 1.5 GeV (see Picture 1).

SOLARIS control systems, including software have been also continuously tested, debugged and if necessary modified and improved.

Concurrently to the efforts to improve the machine performance and reach the stable final mode of operation, there has been very steep progress towards the commissioning of the two experimental beamlines.

The Project budget has allowed for construction of two beamlines. The first one operates from the bending magnet providing photons in 200 eV- 2000 eV energy range and is equipped with two experimental stations: Photo Emission Electron Microscope (PEEM) and X-ray Absorption Spectroscopy (XAS) chamber. Since July 2016 the components of the beamline front-end have been commissioned and tested. The beamline subsystems are being tested and integrated. First test experiments with synchrotron radiation in the end-stations are foreseen at the beginning of 2017.

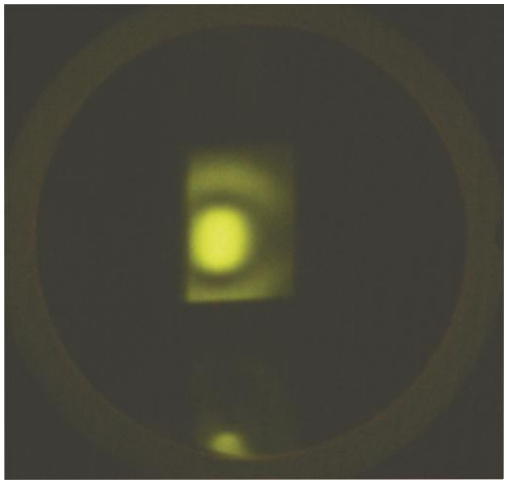


Picture 1. Maximum value of stored electro current versus the accumulated beam dose.

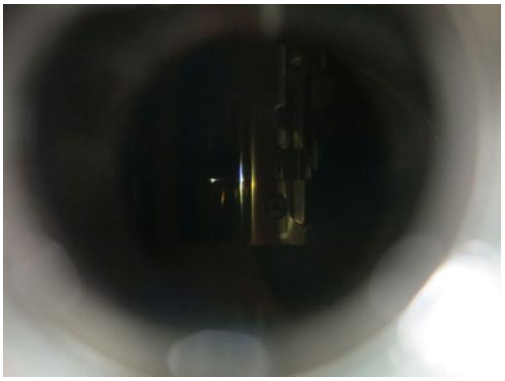
The second beamline operates from an APPLE II type undulator in the photon energy range 8 -100 eV and allows for Ultra high resolution Angular Resolved Photo Electron Spectroscopy (UARPES) measurements. All subsystems of this beamlines have been integrated and UHV environment has been achieved. At the end of April the first light was fed to the beamline and after some alignment corrections and undulator adjustment the first photons reached the experimental chamber (see Pictures 2 and 3). The UARPES commissioning process has already begun and the first test measurements are planned at the end of 2016.

At the end of February 2016, due to the mutual initiative of Swedish and Polish research groups almost complete set of components of yet another beamline arrived to SOLARIS. Until then the beamline (I1011) was part of MAX-lab SR facility in Lund, installed at the closed in December 2015 MAX II 1.5 GeV ring. The beamline was decommissioned and transported to Kraków by the Polish group of technicians and researchers from different institutions led by SOLARIS team. After necessary adaptations, modifications and re-equipping enabling its installation at SOLARIS, it will provide research options in the soft X-ray energy range exploring X-ray Magnetic Circular Dichroism and X-ray Magnetic Linear Dichroism phenomena.

In parallel to the above described activities there has been ongoing undertakings targeted at assuring the future position of SOLARIS as the key national and international research facility. Eventually, in March 2016, by the governmental decision, Poland joined CERIC-ERIC consortium delegating SOLARIS as the Partner Facility. The mission of CERIC-ERIC consortium is to share between its Central European members an integrated multidisciplinary and multiprobe Research Infrastructure open for external basic and applied users in the fields of Materials, Biomaterials and Nanotechnology. Each of the 7 participating countries provide for the others free access to its outstanding research infrastructure (Representing Facility). Joining CERIC-ERIC is very important for SOLARIS. Apart of the other aspects, it enables new options regarding the financial support on the national and international level, e.g. joined (with other CERIC-ERIC members) applications for funds for new beamlines granted directly by European Union.



Picture 2. First harmonics radiation (140 eV) from the UARPES beamline undulator registered on the YAG screen placed 16m from the source. There is a clear diffraction pattern: central spot of 5mm diameter surrounded by the first order ring. *(Photo by J. Kołodziej)*



Picture 3. White synchrotron radiation (monochromator at zero order) registered at the UARPES experimental chamber manipulator *(Photo by M. Stankiewicz)*