

## Major studies and research projects

The Synchrotron Radiation Centre, established in 2009, is an interdepartmental unit of the Jagiellonian University. Its main and strategic objective is to build the SOLARIS National Synchrotron Radiation Centre, to provide scientists with access to a source of synchrotron radiation in the future, as well as allow scientists to conduct scientific and technological research in various fields of knowledge.

The **synchrotron** is the first tool in Poland with multiple research purposes, from physics, medicine and geology, to archaeology and the history of art.

Synchrotron studies lead to breakthrough discoveries in a broad range of research fields (they have contributed to the granting of several Nobel Prizes) and increase innovativeness and competitiveness of economies in the countries where they function. The synchrotron will be ready for use by research groups in 2016.

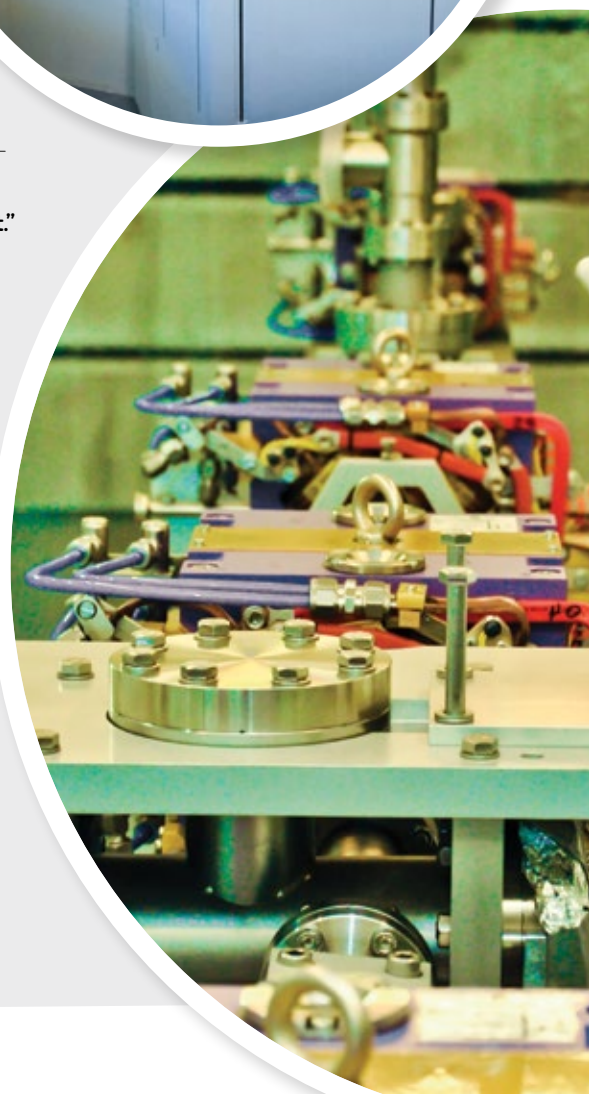
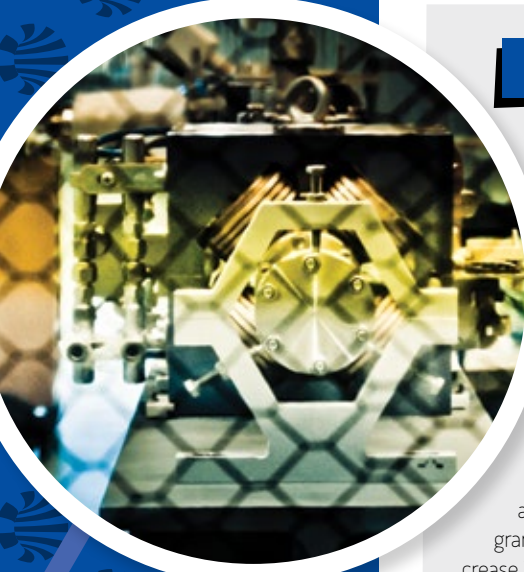
Scientists from the Synchrotron Radiation Centre also participate in other research projects which support the key project, that is, the construction of the synchrotron.

- **“PLGrid Plus.”** The SOLARIS team, in cooperation with scientists from Polish universities, take part in the project, which provides IT support to Polish research teams conducting their studies. Activities related to the “PLGrid Plus” project will enable the development of equipment and programming facilities for research conducted using synchrotron radiation.

- **“Swiss Light Source Performance Improvement Project.”** Piotr Tracz, PhD, was the coordinator of the linear accelerator on the SOLARIS team. He conducted the project for improving storage ring optics, reducing adverse effects of nonlinearity in the optical network to improve the parameters of electron-beam, and optimising the process to improve electron beam parameters, and optimising the beam injection process into a storage ring.

- **Liquid Crystals Studies.** Adriana Wawrzyniak, PhD, is the coordinator for the maintenance and development of accelerators on the SOLARIS team. She participated in the research project “Investigation of ferroelectricity mechanisms in molecular systems built from rod-like chiral and bent-core achiral molecules.” These research results are a major contribution to knowledge about alignment of liquid crystalline molecules in an external electric field, which is an important issue for applications in Liquid Crystal Displays (LCDs).

- **DYNASYNC.** Marcin Zajęc, PhD, the coordinator of the experimental line of soft X-rays on the SOLARIS team. He participated in the international DYNASYNC projects and domestic projects in surface physics such as dynamics and magnetism in nanoscale.



## Collaboration

The Synchrotron Radiation Centre works closely with international synchrotron centres, such as MAX IV Laboratory (Sweden), Elettra (Italy), CELLS – ALBA Synchrotron (Spain), and Swiss Light Source (Switzerland). Synchrotron Centre MAX IV Laboratory at Lund University (Sweden) is a strategic partner for the SOLARIS team. It carries out one of the most advanced projects in the world: the construction of two synchrotrons and a free-electron laser. This cooperation allowed for this expertise and know-how to be used in the construction of the Polish synchrotron, which will be a replica of the Swedish synchrotron. Scientists at the Centre, together with the Jerzy Haber Institute of Catalysis and Surface Chemistry at the Polish Academy of Sciences, collaborate with the Swiss Paul Scherrer Institut (PSI) and conduct final tests of the experimental station for the Polish synchrotron.

At each stage of the synchrotron's construction, scientists from SOLARIS collaborate with the Polish Synchrotron National Consortium, which includes representatives from 36 universities and research institutes in Poland. A similar cooperation is carried out in consultation with the Polish Synchrotron Radiation Society (PTPS), involving more than 150 scholars.

## Scholars

**Prof. Marek Stankiewicz** – professor of physical sciences at the Institute of Physics of the Jagiellonian University. Since 2010 he has been the Director of the Synchrotron Radiation Centre of the Jagiellonian University. He is the author, co-author, and team member of many domestic and international projects, such as the first Polish synchrotron construction project and the following projects: "Ultrafast Processes Laboratory," "Development of Techniques and Systems Allowing Constant Characteristics of Free-Electron Laser Impulses," and "The Attosecond Project."

He has conducted or participated in Swedish, French and British projects in atomic and molecular physics using lasers, high power lasers, attosecond lasers, and synchrotron radiation. Prof. Stankiewicz has published 64 papers in peer-reviewed international scientific journals and has obtained 7 patents. He also designed systems for experimental devices, including devices to create supersonic molecular beams, electron energy loss spectrometry, time-of-flight mass spectrometry, measurement systems for fluorescence spectra, and numerous high-vacuum device systems.

**Adriana Wawrzyniak, PhD** – holds a PhD in physical sciences. She works at the Synchrotron Radiation Centre as the coordinator for maintenance and development of accelerators. She spent four years at the Swedish synchrotron centre in Lund (MAX IV Laboratory) to prepare for the start-up of the Polish synchrotron. Her current scientific interests focus on particle accelerators, designing the magnetic network for linear and circular accelerators, and transfer lines.

She also works on optimising parameters that allow a synchrotron to achieve high performance, which requires advanced computer-aided calculations electron-beam dynamics. These research passions have practical applications for work on the Polish synchrotron project.

- Accelerator
- Physics
- Electronics
- Computer Science
- Vacuum Physics
- Electrotechnology
- Monitoring Systems
- Automation and Robotics

