# PHELIX – a new beamline at SOLARIS synchrotron

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PHELIX is a future beamline in National Synchrotron Radiation Centre SOLARIS in Kraków using soft X-rays, the source of which will be an Elliptically Polarizing Undulator APPLE II type with permanent magnets. This type of insertion device gives the opportunity to obtain a variable polarization of light: from linear at any angle to elliptical. The maximum size of the excited area on the sample will be smaller than 100 μm × 100 μm with the resolving power (RP) at least 10 000 over the entire energy range (available range 30-1500 eV) and for all polarizations. The beamline itself is at an advanced stage of design.

The PHELIX end-station will enable a wide range of spectroscopic and absorption studies (TEY and TFY modes) under UHV conditions, characterized by different surface sensitivity. A hemispherical photoelectron energy analyzer is planned with the energy resolution of 1 meV. Besides collecting standard high-resolution spectra, the spectrometer would allow, e.g. to map the band structure in three dimensions and detect the spin in three dimensions. Applying VLEED-type spin detector gives rise to the scattering probability of the electron by a factor of ten comparing to the Mott detector. This, along with about two to four times higher sensitivity for spin polarization, results in a few tens times higher efficiency than the Mott detector. The analysis chamber will be equipped with additional sources of radiation (X, UV) enabling operation without a beam.

The PHELIX end-station would also allow to perform samples preparation with precise control of their thickness. A separate preparation chamber will contain effusion cells and electron beam evaporators (EBVs), a LEED diffractometer, leak valves with different gases and a sample heating stage with the possibility to elevate the temperature up to 2000°C. The system will be also equipped with a crystal cleaver chamber allowing to expose atomically smooth surfaces under ultra-high vacuum conditions.

The beamline will be suitable for investigations of new materials for spintronics and magnetoelectronics, topological insulators, thin films and multilayers systems, surface of bulk compounds, surface magnetism, spin polarized surface states, chemical reactions taking place on the surface, biomaterials, etc.

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