

<b>Scientific supervisor</b>	
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Department	Department of Solid State Physics
Laboratory	Electronic Structure of Materials Laboratory
Group webpage	<a href="http://www.zfcs.if.uj.edu.pl/electronic-structure-research">http://www.zfcs.if.uj.edu.pl/electronic-structure-research</a>
<b>Proposed research topic</b> <i>Investigation of electronic structure of materials</i>	
<b>Short description (&lt; 1000 characters)</b> The internship will be devoted to the investigation of electronic structure of materials. The knowledge of such a structure helps to understand the properties of various materials. The subject of investigations will be a band structure and Fermi surface of new systems, which typically have a metallic character. Currently, the materials investigated in the laboratory include topologically nontrivial systems, superconductors and topological superconductors. In the future, such materials can be used in a development of new branches of electronics, in particular based on spin or they can be applied in devices for energy saving. However, nowadays these systems are in the center of interest of physicists due to the fact that phenomena observed in them are not fully understood.  The internship will take place in the Electronic Structure of Materials Laboratory of the Department of Solid State Physics. It will cover a preparation of single crystals for the experiment, determination of their crystallographic orientation with Laue camera. Next, measurements will be carried out in the system consisting of ultra-high vacuum chambers. The samples will be investigated by means of angle-resolved photoemission spectroscopy (ARPES). The results, which are obtained in a form of large matrices of numbers, will be subjected to the analysis using appropriate computer procedures.  The student-in-training will gain certain experience with ultra-high vacuum systems and will learn basic facts related to band structure of materials. Trainee's activity will be related to research topics being currently a subject of investigations in the laboratory. If interested, the student can join the research group and continue investigations after having the internship completed. We also perform ARPES studies at the Solaris synchrotron (as well as at foreign synchrotrons), where the work, which has been started in the laboratory, will be continued.	
<b>Main research tool</b> Ultra-high vacuum equipment designed to investigations with angle-resolved photoemission spectroscopy (ARPES), X-ray photoemission spectroscopy (XPS) and ultraviolet photoemission spectroscopy (UPS).	
<b>Additional requirements to the candidate</b> The candidate should be interested in a laboratory work, which covers both single crystal preparation under a microscope and handling a large ultra-high vacuum system. The student should have an intention to develop her/his knowledge about the phenomena, which are in the center of interest of contemporary solid state physics. In addition, a will to develop basic skills in computer programming is welcome.	
<b>Possibility to continue student internship in the form of:</b>	
Diploma thesis (master's or bachelor's degree)	X
PhD study	X