Lectures schedule

Lecture series 17 October 2017 – 6 February 2018

Modern developments in X-Ray and Neutron Methods for Science and Technology for Master

October 2017	
17.10.	**Prof. Dr. Alexei Erko (**HZB) - ***Introduction to synchrotron sources*** 1. Mission of the Helmholtz Centre Berlin **2.** Generation and applications of synchrotron radiation
20.10.*	BESSY II facility-methods and instrumentation (Prof. Dr. A. Erko) 15:00
24.10.	**Prof. Dr. Alexei Erko** (HZB) - ***X-ray interactions*** 1. The interactions of X-rays, X-ray optical properties, optical constants; 2. Absorption spectroscopy methods, EXAFS/XANES: principles and applications
27.10.*	Practical part: **EXAFS/μEXAFS, BESSY II** (Simone Vadilonga) 15:00
November 2017	
03.11.*	Practical part: **Nano-EXAFS, experimental measurements** (Dr. Ivo Zizak) 15:00
07.11.	**Dr. Ivo Zizak (**HZB) - ***Structural information from thin layers using X-rays*** 1. Described methods including micro-Laue and grazing-incidence diffractometry, small angle scattering; 2. Total reflection EXAFS and the nanometer-resolved EXAFS using standing wave technique.
10.11.	Practical part: **XAS - structure parameter evaluation I** (Dr. Ivo Zizak) 15:00
14.11	**Prof. Dr. Gerd Schneider** (HZB) –***X-ray microscopy*** 1. Basic concepts of X-ray microscopes, full field and scanning microscopes, Fresnel zone plates, contrast and dose. 2. Applications of X-ray imaging in life and materials science
17.11.	Practical part: **XAS - structure parameter evaluation II** (Dr. Ivo Zizak) 15:00
21.11.	**Dr. Florian Kronast (**HZB**) - *Photoemission spectroscopy, PEEM*** 1. Introduction into X-Ray and UV photoelectron spectroscopy (XPS, UPS); 2. Applications of photoelectron spectroscopy from the UV to the hard X-ray range, PEEM.
28.11.	**Dr. Philippe Wernet** (HZB) - ***Femtosecond soft X-ray lasers for material science*** 1. Evolution of femtosecond X-ray sources, the role of accelerator based concepts like Free-Electron Lasers; 2. Resonant Inelastic X-Ray Scattering (RIXS) method and its applications.
December 2017	
05.12.	**Prof. Dr. Alexei Erko** (HZB) - ***X-ray sources*** 1. X-rays and their properties, X-ray emission processes, X-ray laboratory sources, basic principles of X-ray optical components 2. Synchrotron radiation sources, particle accelerators, electron storage rings, bending magnets and insertion devices
12.12.	**Prof. Dr. Simone Raoux** (HZB) - ***Design and characterization of materials for renewable energy technologies*** 1. Renewable energy technologies 2. Advanced analytical methods, in particular synchrotron-based techniques.
15.12.	Practical part: **Photoelectron Emission Spectroscopy PEES** (Dr. Florian Kronast) 15:00
19.12	**Prof. Dr. Roel van de Krol** (HZB) - ***Solar fuel research*** 1. Direct generation of fuels from solar light; hydrogen generation in a solid-state material system in which both the semiconducting absorber and the catalyst are integrated into a structure; 2. Methods of materials characterization in the fields of photo-physics, surface- and material chemistry, photo-electrochemistry, interface- and surface sciences.
25.12 2017 – 6.01.2018 **Merry Christmas and Happy New Year!**	

January 2018	
9.01.	**Dr. Iain Wilkinson** (HZB) – ***Ultrafast XUV spectroscopy on laboratory sources*** 1. Ato-and femto-second XUV pulses generation in laboratory instruments; 2. Ultrafast time resolved spectroscopy methods in material and biological research.
16.01.	**Prof. Dr. Susan Schorr** (HZB) - ***Neutron diffraction*** 1. Basic principles of a type of *elastic* neutron scattering, neutron diffraction, concept of a diffractometer at a continuous wave source and a spallation neutron source, degree of monochromatization and resolution; 2. Structural information from a neutron diffraction pattern, method of Rietveld analysis, concept of the average neutron scattering length, examples of applications.
19.01.*	Practical part: **Neutron diffractometer at the BER II** (Dr. Michael Tovar) 15:00
23.01.	**Dr. Thomas Krist** (HZB) - ***Neutron optics*** 1. Introduction to the basic principles of neutron optics, polarization of neutrons, flight control of direction and the polarization state of neutrons; 2. Neutron super-mirrors as the basic elements in neutron optics: neutron guides, benders, polarizers, and focusing devices.
26.01	Practical part: **EMIL laboratory at BESSY II** (Prof. Dr. Simone Raoux**)** 15:00
30.01.	**Dr. Andrey Sokolov** (HZB) –***Optical properties of materials in soft X-rays*** 1. X-Ray reflectometry and at-wavelength characterization of material properties. 2. Thin films and multilayer structures properties in X-rays
February 2018	
02.02.	**Exam information meeting** 15:00
06.02.	**Final examination** (Klausur) 16:00

*Registration obligatory