

Lab Intermediate Physics

Module assigned to 1st semester

Identification Code	2288870140
ECTS-Points	4
Credit Hours	2
Language	english
Length of the Module	1 semester
Date and Capacity	winter term 30 students
Responsible Lecturer	Prof. Dr. Paul Ziemann
Further Lecturer	Dr. Ulf Wiewald
Study Programme	Master degree in Advanced Materials Compulsory
Prerequisites	BSc degree
Study Objectives	The students will learn the principles of scientific working, scientific work and management, basic terms, methods and tools
Module Contents	<p>I) X-ray diffraction: Evaporation of Au film at room temperature, short introduction into the problems of Vacuum physics and evaporation techniques, θ- 2θ-measurements on those films, identification of various reflexes, selection rules for fcc, determination of lattice parameters, second measurement on a pre-prepared epitaxially grown Au film, measurement of a low resolution pole figure.</p> <p>II) Thermal conductivity: Temperature dependence (4.2 - 15K, 15K - 77K) of the thermal conductivity of sapphire, quartz, Pb, Cu; this includes the handling of liquid Helium & Nitrogen.</p> <p>III) Electrical conductivity: Temperature dependence (4.2 - 77K) of metals (Cu, Au), a doped Semiconductor (p-Si), Constantan and Superconductors (Pb, YBaCuO), this includes the handling of liquid Helium & Nitrogen.</p> <p>IV) XPS/UPS: XPS/UPS spectra of different metals (Al, Au, AuAl₂) as well as non-metals (Si, BN, WO₃) are presented. After a short introduction into the applied methods the following properties should be discussed: Fermi energy, various involved electronic transitions, chemical shifts, line shapes, estimate of near surface stoichiometries.</p>
Literature	- Handouts
Teaching Methods	Laboratory, seminar and report
Estimation of working load	18 h laboratory (presence), 22 h preparation, 80 h home writing report and revision Total: 120 h
Examinations	Seminar, report, certificate
Grade Composition	Passed or failed
Usability	MSc course of studies Advanced Materials