

# Accelerator Physics - physics612

Degree - M.Sc. in Physics (PO von 2014)

<i>Module</i>	<b>Specialization: Experimental Physics</b>
<i>Module No.</i>	physics61a

<i>Course</i>	<b>Accelerator Physics</b>
<i>Course No.</i>	physics612

<b>Category</b>	<b>Type</b>	<b>Language</b>	<b>Teaching hours</b>	<b>CP</b>	<b>Semester</b>
Elective	Lecture with exercises	English	3+1	6	WT

## Requirements for Participation:

### Preparation:

**Form of Testing and Examination:** Requirements for the examination (written or oral): successful work with the exercises

**Length of Course:** 1 semester

### Aims of the Course:

Understanding of the functional principle of different types of particle accelerators

Layout and design of simple magneto-optic systems

Basic knowledge of radio frequency engineering and technology

Knowledge of linear beam dynamics in particle accelerators

### Contents of the Course:

Elementary overview of different types of particle accelerators: electrostatic and induction accelerators, RFQ, Alvarez, LINAC, Cyclotron, Synchrotron, Microtron

Subsystems of particle accelerators: particle sources, RF systems, magnets, vacuum systems

Linear beam optics: equations of motion, matrix formalism, particle beams and phase space

Circular accelerators: periodic focusing systems, transverse beam dynamics, longitudinal beam dynamics

Guided tours through the ELSA accelerator of the Physics Institute and excursions to other particle accelerators (COSY, MAMI, HERA, &mlr;) complementing the lecture

### Recommended Literature:

F. Hinterberger; Physik der Teilchenbeschleuniger und Ionenoptik (Springer Heidelberg 1997)

H. Wiedemann; Particle Accelerator Physics (Springer, Heidelberg 2. Aufl. 1999)

K. Wille; Physik der Teilchenbeschleuniger und Synchrotronstrahlungsquellen (Teubner, Wiesbaden 2. Aufl. 1996)

D. A. Edwards, M.J. Syphers; An Introduction to the Physics of High Energy Accelerators, Wiley & Sons 1993)  
Script of the Lecture "Particle Accelerators"  
<http://www-elsa.physik.uni-bonn.de/~hillert/Beschleunigerphysik/>