

**Module: Specialization I**

Module No.: physics610

**Course:**  **Accelerator Physics**

Course No.: physics612

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

**Requirements:****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, ...) 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/>