

Module No.: physics601  
 Credit Points (CP): 7  
 Category: Required  
 Semester: 1.



## Module: Advanced Laboratory Course

### Module Elements:

Nr.	Course Title	Number	CP	Type	Workload	Sem.
1.	Advanced Laboratory Course	physics601	7	Laboratory	210 hrs	WT/ST

### **Requirements for Participation:**

#### **Form of Examination:**

written report for every laboratory

#### **Content:**

Every student has to complete this Laboratory Course. The course consists of advanced experiments introducing into important subfields of contemporary experimental physics and astrophysics. The lab-course is accompanied by a seminar.

#### **Aims/Skills:**

The students shall gain insight in the conceptual and complex properties of relevant contemporary experiments. The students gain experience in setting up an experiment, data logging and data analysis. They experience the intricacies of forefront experimental research

#### **Course achievement/Criteria for awarding cp's:**

Before carrying out an experiment, the students shall demonstrate to have acquired the necessary preparatory knowledge. Experiments are selected from the catalogue of laboratory set-ups offered. Cumulative lab-units of  $\geq 9$  are required.

Requirements for the examination (written report for every laboratory): successful completion of the experiment and initial oral questioning plus seminar talk

**Length of Module:** 1 semester

**Maximum Number of Participants:** ca. 100

#### **Registration Procedure:**

s. <https://basis.uni-bonn.de> u. <http://bamawww.physik.uni-bonn.de>

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Category	Type	Language	Teaching hours	CP	Semester
Required	Laboratory	English	3+2	7	WT/ST

**Requirements for Participation:**

Lab course physik661 "Praktikum Kerne und Teilchen" or successful completion of the experiment "Nuclear electronics and lifetime measurement" of physik661.

**Preparation:**

An appropriate knowledge of the physics background and the experimental environment of the laboratories is required. Recommended lectures are specified in the catalogue of laboratories.

**Form of Testing and Examination:**

Experiments are selected from the catalogue of laboratory setups offered. Five experiments are required. One of the experiments 1-3 is compulsory for physics students. Two of the experiments 14-17 are compulsory for astrophysics students. Requirements for the module examination (written report for every laboratory): successful completion of the experiment and initial oral questioning

**Length of Course:**

1 semester

**Aims of the Course:**

The student shall gain insight in the intricate workings of physics in relevant advanced experiments. The student gains experience in the setting up of a proper experimental environment and experiences the intricacies of forefront experimental research and presenting his/her results.

**Contents of the Course:**

Advanced experiments are carried out. Experimenting time ~8 to 16 hrs, preparation time and report writing each ~15 hrs. The experiments are chosen among those being offered and after consultation with the head of the course.

In the accompanying seminar the students report about one experiment. This experiment will be selected after consultation with the head of the course.

**Recommended Literature:**

Hand outs and literature will be distributed with the registration for an experiment

Catalogue of laboratories: (subject to change, for an up-to-date catalogue see <https://www.physik-astro.uni-bonn.de/praktika/en/modules/physics601> )

1. Analysis of decays of heavy vector boson Z0
2. ATLAS
3. Investigation of particle-antiparticle oscillations at BELLE-II
4. Radiofrequency cavities for particle acceleration
5. Lab course accelerator Bonn (LAB)
6. Properties of elementary particles
7. STYX
8. Positron lifetime in metals and insulators
9. Nuclear  $\gamma$ - $\gamma$  angular correlations
10. Optical frequency doubling
11. Laser spectroscopy
12. Magneto-optic trap

13. Laser Gyroscope
14. Optical astronomy (Recommended: astro800 Introduction to Astrophysics or an equivalent basic knowledge in astrophysics)
15. Setting up a Radio-astronomical receiver / Setting up a Radio Interferometer (Recommended: lecture astro123 "Einführung in die Radioastronomie" or lecture astro841 Radio Astronomy: tools, application, impacts)
16. Photometry of star clusters
17. Radio astronomical observing course (Recommended: lecture astro123 "Einführung in die Radioastronomie" or lecture astro841 Radio Astronomy: tools, application, impacts)