Module: Advanced Laboratory Course

Module No.: physics601

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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 y-y 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