

ADVANCED PRACTICAL COURSES M AT THE INSTITUTES OF PHYSICS

February 13, 2020

Dear students,

in addition to the information given on the Practical Course M website, this instruction sheet provides all details about conducting the experiments and writing the corresponding reports. To ensure a smooth and efficient run of the course, we would like to ask you to read it carefully and to follow the instructions stated herein throughout the course.

1 General

- General information about the Advanced Practical Course M can be found at: <http://www.physik.uni-koeln.de/301.html>
- For any questions please contact: praktikum-m@ikp.uni-koeln.de
- The Advanced Practical Courses M cover 5 different fields of experimental physics: (i) atomic and molecular physics, (ii) solid state physics, (iii) nuclear physics, (iv) biophysics, and (v) elementary particle physics. In general, the **students have to conduct 2 from these 5 Advanced Practical Courses M.**
- Specific information about the Advanced Practical Courses M can be found via the links given on: <http://www.physik.uni-koeln.de/301.html>
- The experiments from the fields (i), (ii), (iii) and (iv) are located at the University of Cologne in the Institutes of Physics I, Physics II, Nuclear Physics, and Biophysics, respectively, whereas those of (v) are located at Bonn University.
- Each Advanced Practical Course M shall be completed within 1 semester. Failed experiments must be repeated or replaced by other experiments from the same field.
- Each semester, **briefings on security aspects** and radiation protection are offered. For (i), (ii), and (iii) there is one common briefing, while (iv) has a separate briefing. Both briefings are offered at the beginning of the lecture time. The briefing of (v) is during an organisational meeting at Bonn University at the end of the lecture time. The exact dates and locations of these meetings will be announced on the homepage of the Advanced Practical Course M. **In order to perform an experiment of the various Advanced Practical Courses M, it is compulsory to have attended the respective briefing within the previous 12 months.**

2 Registration and schedule

- The registration has to be done before the briefing. Every student has to register separately for each of the chosen Advanced Practical Courses M.
- The **registration is done via the database** for all practical courses:
<https://lecture.ph1.uni-koeln.de:8080/account/login>
If you are not yet registered due to a former participation in Practical Courses A or B, you can easily register using the "Sign up" function. The main purpose of this database is to provide an overview of the experiment appointments and statuses as well as being a simple tool for contacting the assistants.
- **Master students of the University of Cologne** can register to any of the Practical Courses M. In addition, **master students from Bonn University** can register to the Practical Course M in solid state physics. Moreover, we accept those **bachelor students of the University of Cologne** who have already successfully finished the corresponding field of Practical Course B.
- The experiments are typically performed in **groups of 2–3 students**. In order to create a group, the student registering first receives a groupcode, which has to be entered with the registration of the other group members. If you do not have a partner, we will assign the groups.
- The **detailed organisation of the experiments** differs slightly between the different institutes. In some cases, the database only assigns the experiments to your group, but you will have to arrange the dates individually with the tutors of the experiments. Please, arrange these dates as soon as possible, because your tutors might be absent for longer periods during the semester because of conferences, external measurements, vacation, ... Due to security reasons, the experiments in the Institute of Nuclear Physics can only be performed on Monday or on Thursday, following a fixed schedule, i.e., appointment dates can not be arranged individually. The experiments at Bonn University can only be done during the lecture-free time. Please, also consider the detailed information on the homepages of the different institutes as well.

3 Experimentation and Analysis

- Before doing the experiment, there will be a short discussion in which the tutor ensures that the necessary theoretical background to successfully perform the experiment is given. By failing to provide this background the tutor has to deny the performance of the experiment.
- Furthermore a written version of the working principles has to be produced before every experiment. This has to be brought in to the experiment as well.
- Successful performance of an experiment will be documented by an "AT" entry in the on-line database and on the preparation text or measurement protocol.
- Every group has to produce an analysis report of the experiment which has to be done in a scientific way with the following structure:
 - Frontpage with name of the experiment, names of the attending students and of the tutor, and the date when the experiment was performed.

- Table of contents and bibliography
 - Short introduction including the basic principles of the experiment.
 - Setup with sketches, circuit diagrams, etc.
 - Measurement report containing all data that were not recorded by a computer.
 - A comprehensive analysis of all data including a complete error estimation.
 - Discussion of the results (quality, sources of errors, possibilities for improvement, comparison with literature etc.)
- The **time limit** to hand in the complete report is **three weeks**. The report has to be in digital form (hand written protocols from the experiment can be attached in the appendix) and a digital version (PDF) has to be sent to the tutor. If corrections are necessary they have to be done within **one week** regardless of lecture-free time. The same time limits apply to the tutors for the inspection of the report.
 - If the analysis cannot be finished in time, contact your tutor **within the time limit**. He/she will then evaluate if and how far the deadline can be postponed.
 - If the report has proven to be sufficient (Endtestat) the assistant will note this in the online database and on the printed report.
 - **Never try to produce a report via "Copy & Paste". In such a case, your group will immediately fail the Advanced Practical Course M.**

4 Exams and grades

- The **Advanced Practical Courses M (i)-(iv) are graded via oral exams** of 30–40 minutes, which are taken by the professors from the respective institutes of the University of Cologne.
- Having obtained **all 4 'Endtestats'** of one Advanced Practical Course M, you have to register for the corresponding oral exam in your examination office (usually at Mrs. Herrmann for the Physics Master course). In advance, you should look up free "MP exam" appointments in the calendar application of the database.
- The **Advanced Practical Course M in elementary particle physics follows the regulations of Bonn University**. The students have to perform 2 experiments covering 5 so-called "labunits" (LU) and the grade is based on the performance during the experiment and the quality of the written reports about the experimental results.

5 Contact

If you have any questions please write an email to the organisational team via:
 praktikum-m@ikp.uni-koeln.de
 or directly contact the responsible persons listed on the websites of Practical Courses M.