Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

F-Praktikum Review Day

Aim of the review:

Compare / homogenise pedagogic scope of the various experiments in terms of

- **aim, structure and duration**

➔ Are the experiments adequate for 4th semester bachelor level *?

Review the F-praktikum

- scientific **content**, the **methods** and the **teaching objectives**

➔ Which skills do students learn through the F-praktikum ?

* The students must have passed Phy. I – III + AP I – II + heard Phy. IV or V
BUT not Phy. VI

Grade your experiment

Each F-praktikum experiment accounts for 2.5 LP (= 2.5 Semester Wochen Stunden)

This should correspond to:

- 3 full days Lab in presence [à 8h] for data taking & fast analysis [24 h]
- Analysis and Protocol (<20 page) [14 h]

Grade the complexity of the various aspects of your experiment in a scale from 1-5 where 1 is high and 5 low

Theory / preparation	Setup / experimental	Data taking	Analysis	Protocol

Fortgeschrittene Praktikum

from the student's perspective

Physics

Leistungs Punkte (12 LP)

Statistik & Computer (2 LP)
- Lectures 5 days [3 h/ day]
- Exercise 5 days [3 h/ day]

KV (1.5 LP)
- 1 day Lab in presence: data taking & analysis [8 h]
- Short protocol (<10 pages) [6 h]

Seminarvortrag (1 LP)
- 15 min talk + rehearsal [12 h]

3x Versuche (2.5 LP)
Festkörper- Teilchen- und Laserphysik
- 3 days Lab in presence: data taking & fast analysis [24 h]
- Analysis and Long Protocol (<20 page) [14 h]

1 LP = 14 h of work (not including preparation)

Fortgeschrittene Praktikum

LA

from the student's perspective

Leistungs Punkte (11 LP)

Experimentieren im Physikunterricht (2 LP)

Physikunterricht mit Forschungsbezug (4 LP) @ Light & Schools

Experimentieren in der Forschung (4 LP)
2x Versuche (2.0 LP)
Festkörper- Teilchen-

- 3 days Lab in presence: data taking + analysis simplified [24 h]
- Protocol / no theory (<15 page) [6 h]

Seminarvortrag (1 LP)

- 15 min talk + rehearsal [10 h]

1 LP = 14 h of work (not including preparation)

Fortgeschrittene Praktikum

from the assistant's perspective

Semester Wochen Stunden (2.5 SWS)
4 x 1 week experiment

1 week experiment [14 h contact = 0.53 SWS]

- 3 days Lab in presence [~4 h/day = 12 h]
- Correction of Protocol [4 h]
- Discussion of Protocol (<20 page) [2 h]

- Note: 0.53 x 4 = 2.5 SWS ➔ I asked the Studienbuero for a new revision, on the other hand often only 3 /4 experiments are booked. Flexibility on both sides apply!

Important: each experiment should be offered **4 times/block** Date adjustments are handled by supervisors with fpraktikum in CC !

1 SWS = 14 h contact to students / praktika are credited with factor 0.5

About the protocol

Aim

- Document the understanding of the experimental setup and conditions
- Document the data (include a table with measurements & errors)
- Document ALL steps of data analysis from raw measurement to plot
- Display results in a clear and scientific way (choice of axis range, labels, errors, fit, legend)
- Discussion of systematics …

Check plagiarism

Check plagiarism

Trigger different study for each group

MAX 20 pages including plots and tables !!! Important for you and for the students

- Theory session should be ~< 2 pages (the shorter the better)
  - only introduce the relevant equations for the analysis
  - often “taken” from instructions or previous protocols
  - if from ChatGPT usually too long and descriptive… ask a summary!!!

List of frequently heard answers in seminars

[Q] what did you actually measure and how?
[A] ... the resolution ... the amplitude ... the profile ...
➔ Here it goes about: what is the quantity you measure (usually: counts, currents, voltage) with which instrument? With which precision?

[Q] how did you calculate the error ?
[A] the program calculates the error !
➔ Here it goes about: do you actually understand what the program does? What you should expect form the program? Can you crosscheck the program with a simple example?

[Q] what is the precision of the measurement instruments?
[A] it was not written in the instructions
➔ Here it goes about: look for the manual of the instrument you use! Inform yourself beyond the instruction! Ask yourself critical questions

[Q] why there are no errors on your data points?
[A] the assistant told us it was not needed to plot them ...

BACKUP
Detailed questions to the experiments

Specific points of reflection

Scientific contest

- How is the experiment linked to the scientific bachelor program?
- Added value to the experiment to the lectures

Specific points of reflection

Aim of the experiment

- What is the emphasis of the experiment? (data analysis, experimental method, systematic study, precision measurement, discovery…)
- Which aspects of the experimental method are particularly important?
- How does it compare to state of the art experiments in the research field?

Specific points of reflection

Experimental setup (The black box)

- Do students have the possibility to assemble the setup?
- Can they modify parameter? What is the largest systematic effect?
- Do they learn how is the measurable “signal” obtained?

Note: also for experiments based on already available data it is essential that the students gain understanding of the setup that generated their data, difference between raw data and calibrated data, systematic effects

Specific points of reflection

Data analysis method (The other black box)

- Is data analysis a key aspect of this experiment?
- What are the challenges?
- Ideally students should analyse the data with own written code
- If this is not the case, they still should gain understanding of what the provided code does.
- Particular attention to statistical treatment of data: error treatment, binning, fit quality, …

Specific points of reflection

Key scientific results

- What do students learn from this experiment?
- What is the precision achieved ? How does it compare to literature / state of the art?
- What is the emphasis of the experiment?
- Which skills do students learn?

Specific points of reflection

Link to modern research in the physics department
(if applicable links to clusters of excellence)

- What is the modern application of this technologies / experimental methods
- In which group are these technologies / experimental methods applied
- What skills do the students gain which can be used in the research group?
- What is the difference between state of the art equipment and the F-praktikum setup?