



GEORG-AUGUST-UNIVERSITÄT  
GÖTTINGEN

Faculty of Physics  
Advanced Lab Course (Master-FP)

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# **Advanced Lab Course (Master-Fortgeschrittenenpraktikum I/II)**

## **Introductory Meeting & Safety Briefing**

Summer Term 2019

Thomas Kurz  
Third Institute of Physics

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## General Information (1)

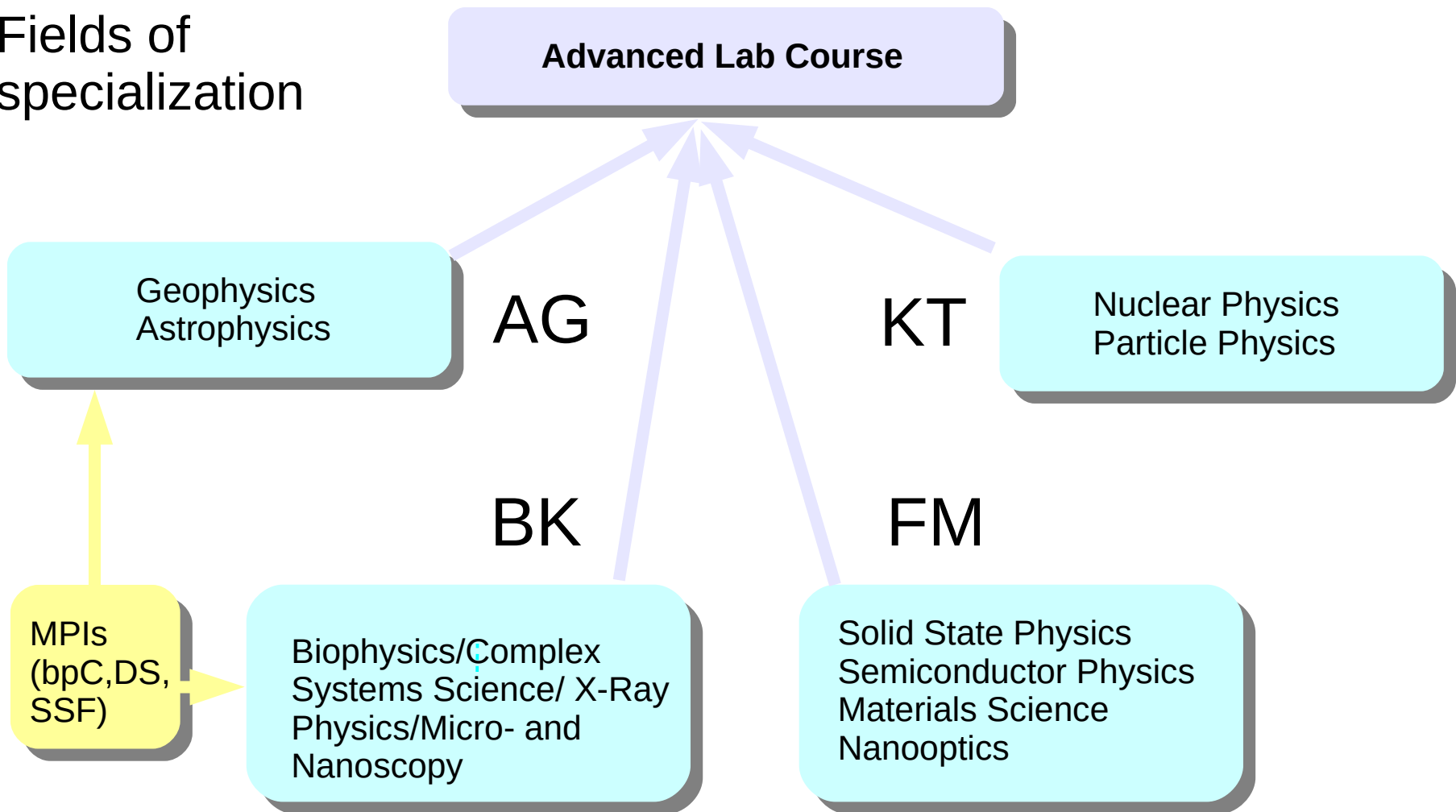
- ALC has two parts (1 and 2)  
either part can be conducted in summer or winter term
- Part 1: module M.Phy.1401  
is a required course, usually completed  
in the first semester of the Master program
- Part 2: module M.Phy.1402  
is an elective course, usually completed  
in the second semester of the Master program

Pt. 2 can be substituted by certain other courses  
(Internship, Electronics Lab)

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## Fields of specialization





## General Information (2)

- per Part/Module: 4 Labs – 6 hours/week (SWS) – 6 CP
- Experiments usually done by teams of two
- Web page:  
[advanced-lab-course.physik.uni-goettingen.de](http://advanced-lab-course.physik.uni-goettingen.de)

provides ...

- all information on organization of the ALC (not up-to-date yet)
  - online schedule and assignment of Labs
  - abstracts/descriptions of the experiments offered
  - instructions
-



## General Information (3)

- contact persons/persons in charge
    - questions on experiments, appointments  
**Tutors**
    - questions on the assessment/acceptance/oral exam  
**Examiners**
    - questions and constructive critics concerning the organization of the ALC  
**Organizer**
-



## Registration (1)

- Registration for exam

- via FlexNow!

- first examination date\*: **July 19, 2019**

- second examination date\*: **Oct 11, 2019**

**Please register (or cancel) in time.**

**Registration after the deadline is not possible!**

\* These are formal dates. You should have conducted your Labs by then but it is **not required** that oral examination is already taken

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- **EXCEPTION**

**for those of you who will finish the Lab course  
with the previous type of examination (graded  
reports, see below):**

**please DO NOT register on FlexNow**

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## Registration (2)

- online assignments
  - organization tool to manage the Lab schedule
  - please enroll for the course in **stud.ip**  
you will then receive an email with your ID  
and password
  - with these credentials you can sign in for  
Labs on the ALC's web site

**Please keep in mind:**

**Registration on stud.ip ≠ Registration for exam on FlexNow**

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## **Course of actions**

- sign in for Labs online or make appointments directly with the tutor. This is possible during the whole semester.
  - download the instructions (password required)
  - contact the tutor at least one week in advance (mandatory). The tutor will give hints for preparation and additional literature, if available
  - prepare yourself thoroughly (theory)
  - conduct the experiment. In general, Labs take place on Wednesdays, 09:00-17:00
  - write the report (submission deadline: 2 weeks after the Lab)
-




## Lab assignments (1)





- are self-organized: 'first come, first served'
  - ID and password are required
  - use registration form to sign in for a Lab (self-explanatory)
  - for each Lab entry there is a sign-in period, it generally ends one week before the appointed date
  - upon registration, you can make a reservation for your team partner
  - it is also possible to cancel the registration, to make a reservation later or to cancel a reservation
  - please fill up open slots before opening a new group
-



← → ↻ 🏠 ⓘ advanced-lab-course.physik.uni-goettingen.de ... 🔍 ⚙️

⚙️ Most Visited 📄 Members 📧 WebMail 📡 Connections 📄 BizJournal 📄 SmartUpdate 📄 Mktplace

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**Master-Forschungspraktikum**

**Lab registration, Winter Term 2018/19** ▶ **Information on registration**

**Sign-in Form**

☒ Register ☐ Cancel registration

User ID:  Password:

Date:  Experiment:  .  (3 characters)

Reservation:

Watchword:  (4-12 characters)

**Sign-in Form**

☒ Register ☐ Cancel registration

User ID:  Password:

Date:  Experiment:  .  (3 characters)

Reservation:

Watchword:  (4-12 characters)

- sign in for Lab and reserve second slot (specify watchword)
- sign in for second reserved slot - requires watchword
- sign in for third slot (triple)
- sign in for third reserved slot (triple) - requires watchword



## Lab assignments (2)

- please avoid to cancel an appointment on short notice
  - check your online schedule after having registered for a Lab
  - the schedule also shows free (available) slots
  - please observe the information that may appear with an online abstract (e.g., “Contact the tutor to make appointments”)
  - other weekdays or Lab dates in the lecture-free period are possible, please check with the tutors
  - you can sign in for up to eight Labs
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### Versuchstermine im Sommersemester 2014 geordnet nach Versuchen

Ordnen nach: ▶ [Teilnehmern](#) ▶ [Datum](#) ▶ [Versuchen](#) ▶ [Betreuern](#)

▶ AG.RBK	▶ AG.EBD	▶ AG.ELS	▶ AG.MWH	▶ AG.TIM	▶ AG.VOB	▶ AG.ZSP	▶ BK.ABB
▶ BK.AFM	▶ BK.GAS	▶ BK.MDS	▶ BK.MIF	▶ BK.NLF	▶ BK.NSE	▶ BK.PKR	▶ BK.STM
▶ BK.TRS	▶ FM.AWG	▶ FM.ATE	▶ FM.BFE	▶ FM.DIF	▶ FM.ERH	▶ FM.HEU	▶ FM.LEE
▶ FM.MEC	▶ FM.MKS	▶ FM.MTT	▶ FM.PHA	▶ FM.TES	▶ KT.KRB	▶ KT.MOE	▶ KT.PVK
▶ KT.DAK	▶ KT.GID	▶ KT.HIP	▶ KT.HPD	▶ KT.PTQ	▶ KT.WZE		

### Versuchsvergabe für ▶ BK.MDS Molekulardynamik-Simulationen

Stand: 22.04.14 / 17:33:30

Datum	Teilnehmer	Buchungszeitraum	?	Datum	Teilnehmer	Buchungszeitraum	?
30.04.14	[KI_St/Ja_Vo]	14.04.14-28.04.14	■	18.06.14	[--/--]	24.04.14-13.06.14	■
07.05.14	[FI_Sp/res.]	14.04.14-02.05.14	▶ ■	25.06.14	[--/--]	24.04.14-20.06.14	■
14.05.14	[Aj_Fi/To_Ja]	14.04.14-09.05.14	■	02.07.14	[--/--]	24.04.14-27.06.14	■
21.05.14	[frei/frei]	14.04.14-16.05.14	▶ ■	09.07.14	[--/--]	24.04.14-04.07.14	■
28.05.14	[--/--]	24.04.14-23.05.14	■	16.07.14	[--/--]	24.04.14-11.07.14	■
04.06.14	[--/--]	24.04.14-30.05.14	■	23.07.14	[--/--]	24.04.14-18.07.14	■
11.06.14	[--/--]	24.04.14-06.06.14	■				

Anzahl gebuchter Termine: 3



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#### Versuchstermine im Sommersemester 2014 geordnet nach Datum

Ordnen nach:    ▶ Teilnehmern    ▶ Datum    ▶ Versuchen    ▶ Betreuern

#### Ferientermine:

▶ 13.03.14   ▶ 09.04.14   ▶ 10.04.14   ▶ 11.04.14   ▶ 14.04.14   ▶ 15.04.14   ▶ 16.04.14   ▶ 17.04.14  
▶ 30.07.14   ▶ 06.08.14   ▶ 11.08.14   ▶ 12.08.14   ▶ 13.08.14   ▶ 14.08.14   ▶ 15.08.14

#### Termine in der Vorlesungszeit:

▶ 23.04.14   ▶ 24.04.14   ▶ 25.04.14   ▶ 30.04.14   ▶ 07.05.14   ▶ 14.05.14   ▶ 15.05.14   ▶ 21.05.14  
▶ 28.05.14   ▶ 04.06.14   ▶ 11.06.14   ▶ 18.06.14   ▶ 25.06.14   ▶ 02.07.14   ▶ 09.07.14   ▶ 16.07.14  
▶ 21.07.14   ▶ 23.07.14

#### Versuche am Mi., 21.05.14

Stand: 22.04.14 / 17:35:35

Versuch	Teilnehmer	Versuch	Teilnehmer	Versuch	Teilnehmer
AG.RBK	[HT_Tr/frei] ▶	AG.EBD	[frei/frei] ▶	AG.ELS	[frei/frei] ▶
AG.MWH	[frei/frei] ▶	AG.TIM	[Al_St/Ju_Be] ▶	AG.VOB	[frei/frei] ▶
AG.ZSP	[frei/frei] ▶	BK.ABB	[Fl_Sp/res.] ▶	BK.GAS	[frei/frei] ▶
BK.MDS	[frei/frei] ▶	BK.MIF	[Ma_Mo/Ju_Vo] ▶	BK.NLF	[Lu_Sc/WS_Re] ▶
BK.NSE	[Br_Vi/LT_Dr] ▶	BK.PKR	[An_Fi/En_Fi] ▶	BK.STM	[Jo_vD/res.] ▶
BK.TRS	[frei/frei] ▶	FM.AWG	[St_Be/NO_No] ▶	FM.ATE	[frei/frei] ▶
FM.BFE	[St_Bo/Ph_Bu] ▶	FM.DIF	[Ja_Ne/Ha_Bl] ▶	FM.ERH	[Ci_Se/Ka_Si] ▶
FM.MKS	[KI_St/Te_Th] ▶	FM.MTT	[Ph_He/No_Ba] ▶	FM.PHA	[Em_Ro/frei] ▶
FM.TES	[Ma_Sc/To_Me] ▶	KT.KRB	[frei/frei] ▶	KT.MOE	[frei/frei] ▶
KT.PVK	[Ch_Ec/Ni_Wy] ▶	KT.DAK	[Re_Po/Bj_Kl] ▶	KT.GID	[Ph_Wi/Ha_Sc] ▶
KT.HIP	[frei/frei] ▶	KT.HPD	[frei/frei] ▶	KT.PTQ	[frei/frei] ▶
KT.WZE	[frei/frei] ▶				

Anzahl gebuchter Versuche: 19



## Lab assignments (3)

- Teams of three are possible, but should remain an exception please ask the tutor or the organizer
  - you can fail a Lab
    - in case of absence without reason
    - if you are ill-prepared
    - If your report is not accepted
  - in case of failure:
    - make a new appointment with the tutor (same experiment)
    - take another Lab
-



## Instructions, Preparation of the experimental work

- download the instructions (protected)
  - in case that the online instructions are (still) missing or an English version is not yet available but needed: ask the tutor for assistance
  - Preparation:
    - work out the required theory
    - read recommended references
    - answer questions that are posed in the instructions
    - the description of the relevant theory is (the first) part of your Lab report
-





## Experimental Work

- location of the Lab: see ALC web site or ask the tutor
  - please show up in time
  - starts with a discussion of the experiment and explanations by the tutor, possibly including special safety instructions  
**this is the opportunity to ask questions and clarify things!**
  - Presence of the tutor required in case of
    - possibility of personal safety hazard
    - operation of expensive equipment
  - in case of uncertainty or doubt:
    - Do not hesitate to ask
    - try common sense
-



## Lab protocol/notes

- documents the course of your experimental work.  
Note down
    - all relevant data
    - instrument settings
    - experimental steps and procedures
  - tables of measured values
    - hand-written record, or
    - electronic spreadsheet, attach a printout to your report
  - the Lab protocol is an important part of your report
-



## Lab report (1)

- For each Lab a written report has to be submitted (= practice of scientific writing)
  - **OLD:** it is a graded examination record, stays with the faculty
  - **NEW:** reports are returned to you after being accepted
  - every student has to submit his/her own report, prepared independently and formulated with his/her own words, except for
    - the Lab protocol
    - figures and calculations used in the analysis of the results (team work)
-



## Lab report (2)

- Length  $\approx$  **10** pages of text (without figures and the protocol)
  - structure:
    - (1) **OLD:** standard cover sheet with all required information and signature (if printed)  
**NEW:** cover sheet and a **Lab record** sheet
    - (2) abstract, summarizing the goal of the experiment  
(~ **0.5-1** page)
    - (3) theory part (concise, ~ **3-4** pages)  
answers to questions, if required
    - (4) description of experimental procedure  
(related to protocol)
-



## Lab report (3)

- structure of report (continued)
    - (5) Analysis and interpretation of results,  
including error analysis and discussion  
(~**5-6** pages)
    - (6) Lab protocol (original or photocopy)
-



## Lab report (4)

- Formal requirements
    - hand-written or created with word-processing software LaTeX, Libreoffice, Word ... (templates available for download), Font size  $\geq 10$  pt
    - please use the standard cover sheet, attach Lab record
    - paper sheets should be firmly stapled together
    - please do not use spiral binding or plastic folders
    - prefer recycling paper
    - electronic submission: by admission of tutor
-



## Lab report (5)

- requirements with regard to form and content
    - text clearly structured and logically presented (with sections, subtitles)
    - concise and focused presentation
    - please observe orthography and punctuation
    - figures and diagrams of appropriate size and scaling  
well-readable axis labels and legends
    - numbered equations
-



## Lab report (6)

- numerical values rounded according to precision of measurement
  - use of SI units, unless otherwise stated
  - Language of the report: English or German (upon tutor's consent)
  - Submission deadline  
2 weeks after the Lab (extension is possible if approved by the tutor)
  - In case that revision is required
    - use version numbers
    - attach all previous versions of report upon resubmission
-





## New: Lab record

= Form that is to accompany  
each submitted report

→ statement of acceptance

- download form, print out
- keep signed forms safe,  
needed for admission to exam
- **Reports can be given back  
for revision until they meet  
the acceptance criteria or  
are rejected**



### Lab record

Please attach a copy of this form to each submitted report.  
Keep the documents safe. They are needed for admission to the oral examination.  
Please fill in required information with print letters. Shaded areas are reserved for tutors/examiners

#### A. Personal Information

family name
first name
matriculation number
email

personal  
information

#### B. Lab

acronym+name of Lab	
name(s) of team partner(s)	
name of tutor	name of examiner

Lab name+  
date

tutor  
acknowledges  
reception

#### C. Report

version 1	date of submission of original version	<input type="checkbox"/> accepted on <input type="checkbox"/> returned on (date)	signature of tutor
version 2	date of submission of first revision	<input type="checkbox"/> accepted on <input type="checkbox"/> returned on (date)	signature of tutor
version 3	date of submission of second revision	<input type="checkbox"/> accepted on <input type="checkbox"/> returned on (date)	signature of tutor

examiner  
states acceptance  
no grade

#### D. Statement of acceptance

Report accepted	date of signature	signature of examiner
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## **OLD: Grading/Inspection of graded reports**

- grade: numerical scale 0...10, 0 points = failed
  - grading is determined by the examiner together with the tutor
  - sum of points → final grade  
threshold for passing: 30% (12 pts)
  - inspection of graded reports is possible
  - please ask the tutor for email notification and feedback
  - **This type of examination applies only to those students who had successfully completed at least one Lab before Oct 1, 2018, and is expected to run out at the end of the semester**
-



## **Crediting of external courses**

- only possible for elective module M.Phy.1402

### **Substitution by another module:**

Internship, Electronics Lab

### **crediting of other accomplishments**

Lab courses abroad, Summer schools (CERN, DESY,...)  
other experimental courses or practicals

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## Crediting of external courses (2)

- requirements:
    - the external course is not credited against other modules or substituted for other courses
    - informal certification of a habilitated member of the faculty is needed with assessments (grade) of the achievement (should be submitted before the examination date)
    - written document (e.g., a report) on the course work
-



## **NEW: Oral Examination**

- requirement for admission to the examination  
("Prüfungsvorleistung")

Successful completion of four Labs per module  
testified by four Lab records signed by Lab examiners

For Part 2 the number of Labs can be smaller when  
external courses are taken into account

- after having fulfilled the requirements, print out  
and fill in an Examination Form and let it be signed  
by the organizer of the Advanced Lab Course
-



## Examination form (double-sided)

(to be returned to the organizer)



Georg-August-Universität  
Göttingen

Advanced Lab Course  
Faculty of Physics  
University of Göttingen

### Examination Form

Please check boxes that apply and fill in required information with print letters/Please print out double-sided

#### A. Semester

☐ Summer semester 20\_\_ ☐ Winter semester 20\_\_/\_

#### B. Module

☐ Part I (required course), Module M.Phys.1401 ☐ Part II (elective course) Module M.Phys.1402

#### C. Personal Information

family name
first name
matriculation number
email

#### D. Labs conducted

Please attach a Lab record with signed statement of acceptance for each entry

1	Acronym+name of lab	Date conducted	name of tutor
2	Acronym+name of lab	Date conducted	name of tutor
3	Acronym+name of lab	Date conducted	name of tutor
4	Acronym+name of lab	Date conducted	name of tutor

#### E. External credits in module M.Phys.1401 only, attach certificate

description of course	equivalent number of Labs
-----------------------	---------------------------

#### F. Statement of admission (to be filled in by the Lab organizer)

It is confirmed that all requirements for admission to the examination are fulfilled.

signature of the organizer (T. Kurz)	<input type="checkbox"/> first signature and stamp required <input type="checkbox"/> second (required) examination
--------------------------------------	--

#### G. Oral examination (to be filled in by the examiner/observer)

Please observe the statement above before entering the examination.

Examiner:			
name of examiner	signature of examiner		
Observer:			
name of observer	signature of observer		
Date:	Time:	Grade:	

record of examination:



## **Organizing the oral examination**

- choose a person from the list of examiners (on the website) who is entitled to carry out the final exam
  - get in touch with this person early to get her/his approval
  - after having obtained admission, find a suitable examination date with the examiner and define with her/him the possible subjects of the exam
  - typically, these will center around the Labs you have conducted, and contents of external courses if applicable
-



## **Taking the oral examination**

- date, time and location as appointed with the examiner
  - duration: 30 minutes
  - language: German or English
  - bring with you all of your Lab reports, including previous versions, or submit them beforehand, as the examiner may want to have a look at them
  - bring with you the examination form
  - The signed examination form should be sent to the organizer immediately
-





## Evaluation and Feedback

- An evaluation form can be downloaded and submitted anonymously
  - Constructive critics and ideas for improvement are welcome any time!
  - Please report any possible errors, misprints etc in instructions or on the web site to the person in charge
-



## **Safety briefing follows ....**

- Safety guidelines can also be downloaded from the ALC web site
  - Please acknowledge that you have taken part in the safety briefing and that you have taken notice of the safety advices by signing and returning the confirmation form
  - Without this signature you may not take part in the Advanced Lab Course!
  - For some Labs you may obtain additional specific safety instructions related to the specific hazards.
-



## General Precautions

- do not work alone in a possibly hazardous environment
  - when personal hazards exist during parts of the experimentation, the presence of the tutor is required
  - the use of protective measures or equipment is mandatory (e.g. protective wear, shields or safety goggles)
  - inform yourself on first-aid measures:  
first-aid box, first-aid post, next doctor
-



## Fire protection

- fire alarm system: in case of alarm
    - leave the building immediately (next escape way)
    - go to the meeting point outside the building
  - if you discover a fire:  
activate fire alarm box, push emergency stop  
call 112, leave building
  - small fires: use fire extinguisher
  - self protection has absolute priority
  - do **not** use elevators in case of fire
-



## **Radiation protection**

- radiation control areas and restricted areas may only be entered by persons whose exposition to radiation is monitored (by dosimeter)
  - For work with radioactive substances, the students will be instructed by the tutor, who is responsible for proper handling and shielding
  - Pregnant women are not allowed to conduct an experiment involving radioactive samples
-



## Electrical equipment

- In case of an accident with electricity:
    - push **emergency stop** immediately
    - do not touch anything or anybody beforehand!
  - Persons affected have to be brought to the emergency room of the University clinic (UMG)
  - prevention: do not use extension leads on the floor
  - if you are uncertain or doubtful about the electrical wiring of an experiment:  
please ask the tutor before switching it on!
  - This pertains in particular to experiments involving high voltages
-



## Working with gases/liquid nitrogen

- Liquid nitrogen may only be transported or refilled under supervision of the tutor
  - Never handle liquid nitrogen without protective eye shield and gloves
  - Never handle liquid nitrogen in a closed room without sufficient air circulation
  - In particular: liquid nitrogen vessels **must not** be accompanied when transported in an elevator
-



## Working with chemicals

- ... is restricted to dedicated chemical labs
  - work under the laboratory hood, if possible
  - be informed about the potential hazards and health risks of the substances you are using
  - wear protective equipment (gloves, glasses)
  - take care of proper disposal
  - label all vessels/flasks according to their contents
  - clean and return the hardware you have used
  - analogous procedures apply for biological material
-