

Safety Instructions and hazards in the lab





General Aspects

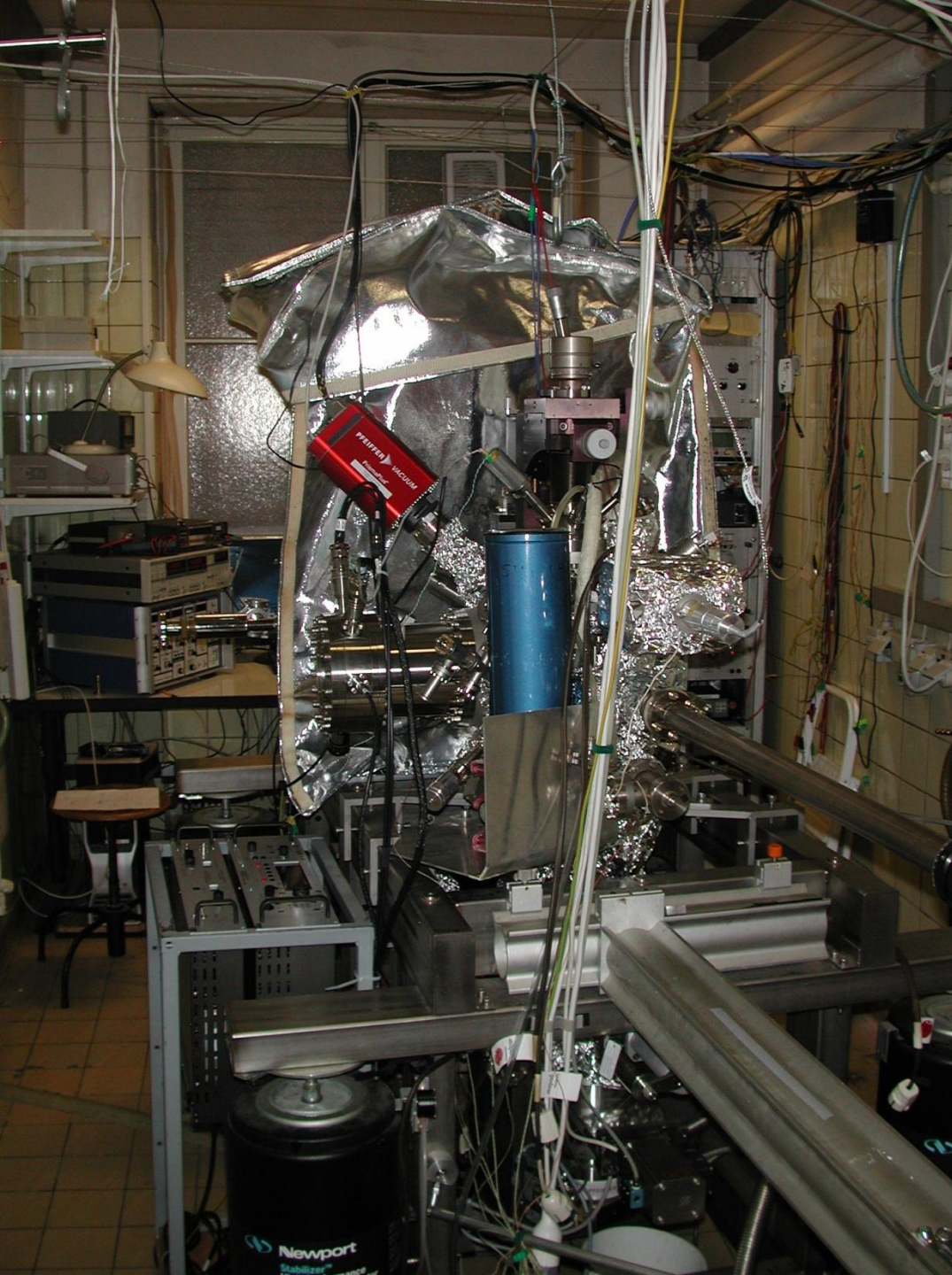
Safety comes first!

- Please ask your advisor/tutor for a **specific introduction and safety instruction** of the experiment.
- Please make sure that you can **get in contact** with your tutor whenever required.
- In **case of any uncertainties**, pause the experiment and contact your tutor.



General Aspects

- **All labs and working areas** have to be safe also **for any other persons.**
- **Tidiness and cleanliness** in the lab and in working areas are essential for personal safety.
- **Do not eat or drink or smoke in the lab.**
- **Personal safety comes first.**



Hazards in the lab

1. Pressurized gases
2. Cold/liquid gases
3. Electricity
4. Mechanical hazards
5. Chemical agents
6. Lasers



Pressurized Gases

- The Storage of **pressure gas cylinders** in the lab is only allowed if these are enclosed in special cabinets.
- Pressure gas cylinders have to be **secured by a chain or equivalent means** to avoid tipping over.
- The transport of pressure gas cylinders requires the use of **special trolleys** which are equipped with special security means (chain for fixation) and with the **security cap** screwed to the **pressure gas cylinders**
- The **withdrawal of gases** requires the use of special hoses and pressure regulators that are suited for the specific kind of a gas.
- **Pressure gas cylinders** have **to be protected from warming-up**.



Pressurized Gases



Pressurized Gases

- Labelling

Tafel 2 Spezielle Kennzeichnung für gebräuchliche Gase
Farbe des Flaschenmantels: Siehe Kennzeichnungsgrundsätze und Vereinbarungen.

Gas	Schulterfarbe	Gas	Schulterfarbe
Acetylen	kastanienbraun	Stickstoff	schwarz
Sauerstoff	weiß	Kohlendioxid	grau
Distickstoffoxid (Lachgas)	blau	Helium	braun
Argon	dunkelgrün		

Tafel 1 Allgemeine Kennzeichnungsregel für Gase und Gasgemische, die nicht nach Tafel 2 und 3 speziell festgelegt sind.

Eigenschaften	Schulterfarbe	Beispiele
giftig und/oder ätzend ¹⁾	gelb	Ammoniak, Chlor, Arsin, Fluor, Kohlenmonoxid, Stickoxid, Schwefeldioxid
entzündbar ²⁾	rot	Wasserstoff, Methan, Ethylen, Formiergas Stickstoff/Wasserstoffgemisch
oxidierend ³⁾	hellblau	Sauerstoff-, Lachgasgemische (außer Inhalationsgemische, Tafel 3)
erstickend ⁴⁾	leuchtendes Grün	Krypton, Xenon, Neon, Schweißschutzgasgemische, Druckluft technisch.

1) Abgrenzung giftig/nicht giftig und ätzend/nicht ätzend siehe ADR/RID Anl.A 2.2.2 u. P200 (ISO 10298). Korrosiv bezieht sich in diesem Fall auf Verätzung menschlichen Gewebes
 2) Abgrenzung brennbar/nicht brennbar siehe ADR/RID Anl.A 2.2.2 u. P200 (EN 720-2)
 3) Abgrenzung oxidierend/nicht oxidierend siehe ADR/RID Anl.A 2.2.2 u. P200 (EN 720-2)
 4) Die Farbe leuchtendes Grün darf nicht für Luft zur Inhalation angewendet werden.

Die Schulter wird nur mit der Farbe der primären Gefährdung gekennzeichnet. Auf die farbliche Darstellung von 2 Gefährdungseigenschaften (z.B. giftig/ätzend und entzündbar) in Form von Ringen oder Quadranten wird verzichtet.

Liquid Gases

- You are only allowed to **transport liquid gases** using special containers (Dewars, He-storage cans, ...)
- Transport of liquid gases in the **elevator** is only allowed if **no persons are in there**. (Hazard of suffocation)
- Use **special protection gloves** and **safety goggles**.



Transport cans for liquid gases



Electricity

- Hazards by **high currents**: e.g., caused by rings
- Hazards by **high voltages** (HV), partially above 10 kV
 - ion pump
 - ionization gauge
 - sputter gun
 - screen voltage at the low energy electron diffraction apparatus
 - electron bombardment heating
- Always check which parts of the instrumentation could be under high voltage (e.g., thermocouple, sample holder, etc.).
- Consider the earthing/grounding and check it.
- No work on open electrical equipment (electrical workshop)



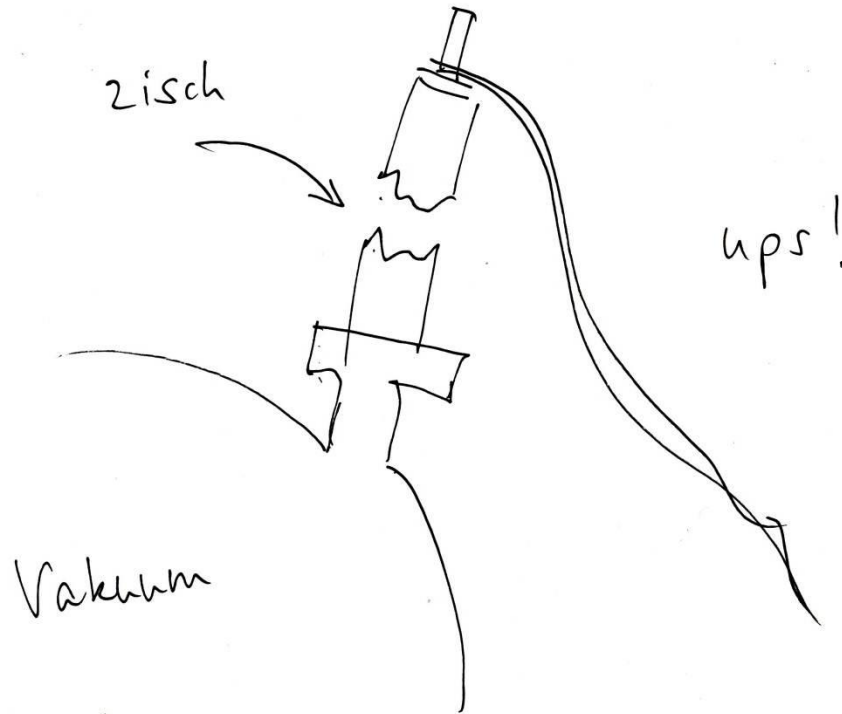
High Voltages



Mechanical Hazards

- Hazard of injury
 - Mark any protruding parts
 - Cover-up sharp and spiky edges and objects
 - Hazard of sharp objects in particular in the height of your and other persons eyes
- Be careful about lifted weights
- Secure electrical leads against strain ("Zugentlastung")
- Ultra sonic bath (hazard of periosteal detachment)

Topic: Protection of electrical leads



Chemicals

- **Everybody** who uses chemicals must be **knowledgeable about their properties and hazards.**
- Perform all work with chemicals, if ever possible, in **fume cupboards**
- Working with chemical requires that the related **safety sheets** and the **handling instructions** are available and that the respective guidelines are considered.
- At lab places, the **storage** of chemicals is limited to amounts that are directly needed for the experiments.
- Larger quantities of chemicals must be stored in the **safety cupboards** ("Lösungsmittelschrank")



Chemicals

- Poisonous/toxic substances must be kept under lock and key.
- Containers for chemical must be labelled according to the rules of the "GefStoffV":
 - Chemical name, name of responsible person/working group, hazard symbols with text, and the H- and P- phrases as numbers (use GHS phrases)
- Working with hazardous chemicals requires personal safety equipment (lab coat, goggles, gloves)
- Transport of chemicals only with special equipment (canisters, buckets, etc.)



Chemicals - disposal

- The **disposal of chemicals** of all kinds has to be done according to the regulations for disposal given by the University of Bonn.
- Everybody who works with chemicals has to make himself knowledgeable about the regulations for disposal.
- Everybody is responsible himself for disposal of his chemical waste.

<http://www.sichtech.uni-bonn.de/>

Chemicals - disposal

- Solvents and mixtures of solvents
- Aqueous rinsing solvents, containing metal salts
- Fluids/substances, contaminated by organic chemicals
- Non-contaminated broken glass
- Needles, cannulas, spiky sharp objects



In the case of an injury

- First-aid-kits are available in the labs
- Please report all injuries in the small book in one of the first-aid-kits ("Verbandsbuch")
- Universitätsklinikum Bonn "Unfallchirurgie"
Telephone: 0 287 - 154 77
- Augenklinik (Ernst-Abbe-Straße 2): 0287 - 15505
- Telephone number in case of emergency: **112**

What to do in case of an emergency?

- Remove hazard (but stay safe yourself!)
- Control respiration of injured person
- Call other persons for help
- Make emergency telephone call: **112** (answer the questions given to you on the phone)
- If required spend respiration and cardiac massage
- Await and guide the ambulance car (possibly block doors in open positions).
- **Where is the next defibrillator?**
Institut for Strahlen- und Kernforschung in the Nussallee, basement, corridor right, 1. door on the left



First aid kits and documentation



In the case of an emergency call: 112

Emergency call from all telephones is possible by:

0-112; 0-110

or

112; 110

NOTRUF

0 112 Feuerwehr, Notarzt, Rettungsdienst

0 110 Polizei

0-19240 Information bei Vergiftungen
(nur von sog. amtsberechtigten Telefonapparaten)

88-33211 Information bei Vergiftungen
(für sog. nicht amtsberechtigte Telefonapparate)

NOTRUFANGABEN:

Wo geschah es?

Institut _____

Strasse _____

Ort _____

Etage _____

Raum _____

Was geschah?

Kurze Beschreibung der Notfallsituation wie z.B. Feuer, Unfall

Wie viele Verletzte?

Zahl der Verletzten angeben

Welche Arten von Verletzungen?

z.B. Verbrennung, Verbrühung, Verätzung, Schnittverletzung

Warten auf Rückfragen!

Telefonhörer erst auflegen, wenn die Notrufzentrale das Gespräch beendet!!

Diesen Hinweis bitte im Blickfeld jedes Telefonapparats bzw. mindestens einmal pro Raum anbringen! Die Ortsangaben sind entsprechend einzutragen. Ggf. ist diese Anweisung auch in der Sprache der anwesenden Personen auszuhängen.



Laser protection space



In the case of fire

- In the case of fire
 - Make an emergency call or use the fire alarm button
 - Make own attempts to kill the fire only if you are safe.
 - Evacuate building, assembly point on the parking spot
- You should know in advance:
 - Where are the fire extinguishers?
 - How does one operate these?
 - Which extinguishers to use for which kind of fire?
 - Where is the next fire alarm button?
 - Which is the next/best route for escape?





Assembly point

During the time of the street work, the provisional assembly point is the car park opposite the entrance to Sobotta Street.

Fire extinguishers



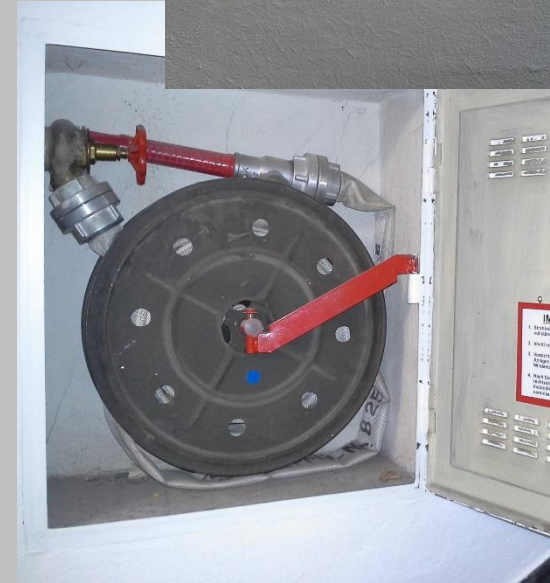
Fire blanket



CO₂
extinguisher



powder
extinguisher



fire hose

In the case of fire

	 A	 B	 C	 D
Pulverlöscher mit Glutbrandpulver				
Pulverlöscher mit Metalbrandpulver				
Pulverlöscher				
Kohlendioxid-Löscher (co2)				
Wasserlöscher				
Schaumlöscher				

electricity !

Lasers

- Working with lasers requires special safety training!
Just a few special remarks:
- Do not look into the laser beam
- Wear special laser eye protection
- Pay attention to the warning symbols
- Do not enter the laser safety space unless you are instructed to do (note the warning light).
- The laser safety space has to be secured against trespassing of unauthorized persons.
- Enclose the laser beam path as best as possible
- Diffusely reflected laser beams are dangerous, too. (jewelry, watches, ...)

