General safety briefing

Institut für Experimentalphysik
Universität Hamburg

05.12.2019

Content

Part I

- **Sexual harrassment/discrimination (E. Garutti)**
- **General safety (M. Wieland)**

  Fire safety, general behaviour, hazardous substances, etc.

Part II

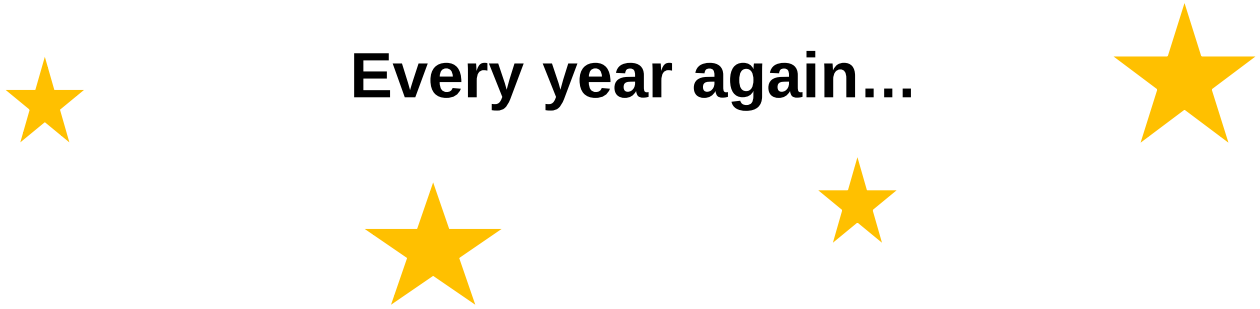
- **Radiation safety (M. Tluczykont)**
- **Laser safety (A. Azima)**

Part I: General safety

- **Organisation/sources of information**

  website/safety code/risk assessments/operation instructions

- **Fire safety/emergency cases**
- **General safety rules/work equipment**
- **Special risks**



Every year again…

→ **annual general and working place related safety briefing**

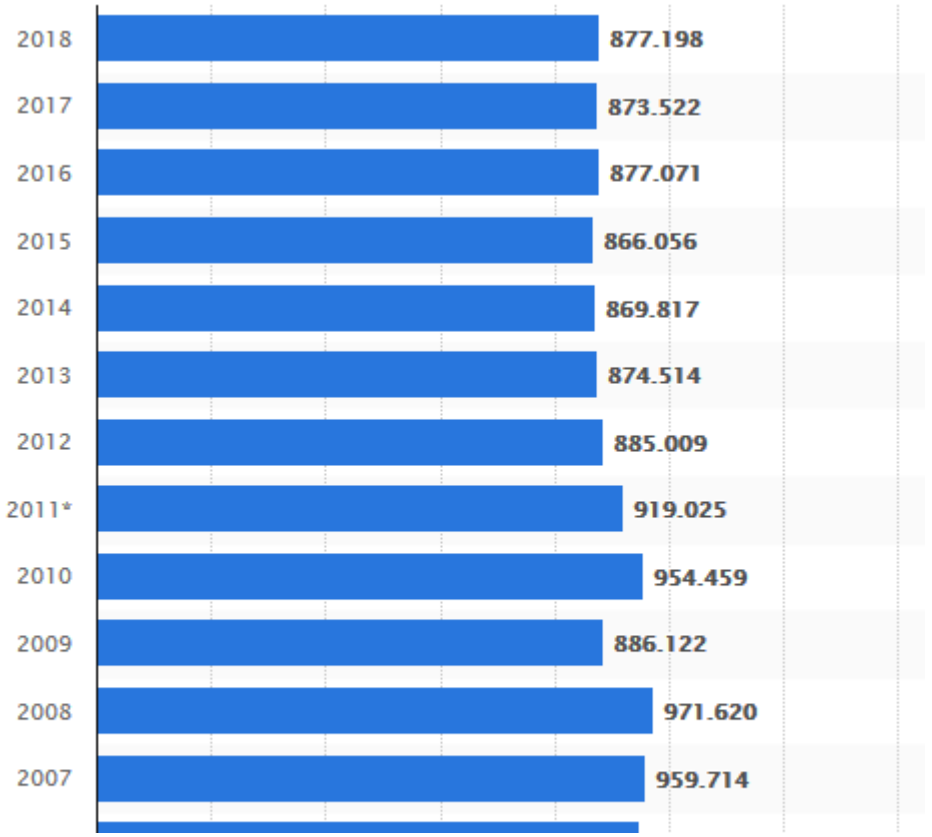
- **Safety at work:**

  Avoiding of accidents & protection of health

- **Comply with legal requirements**

  (statutory accident insurance (UK Nord))

Amount of accidents at work in the past decade in Germany
(from: de.statista.com, 02.12.2019)



1,7%

Most accidents happen due to „human failures“

→ disrespect of safety rules

⇓

Every person contributes by her/his action!

Fire safety

Emergency cases

Fire safety

- **No smoking and open fire allowed in any building**
- **Corridors/Stairways are escape ways in case of an emergency**

⇓

KEEP CLEAR of cartons & packaging/tables, chairs, etc.
NEVER block fire protection doors!
NEVER block safety equipment (fire extinguisher etc.)

→ evacuation assistants/building responsibles

- **Emergency exits** must not be locked and always kept clear!
- **Electrical devices** for preparation of hot water:

  To be used only in appropriate rooms (kitchens)

  VdE testing (electrical safety) necessary!

  Usage of fire resistant support mandatory!

⇒ **If needed talk to your local safety delegate or have a look into the Fire Safety Regulations**

In an emergency case/rescue plan:

Call SAVE/DESY:

2500 / external calls: 040-8998-2500

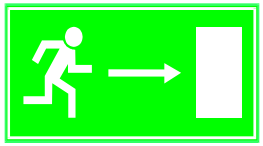
Where…	did the accident/incident happen?
What…	happened exatly? Short description of the situation!
How many…	injured/involved people?
What…	kind of injuries?
WAIT!	In case of any questions!

→ Do NOT call external fire men/ambulance/police!

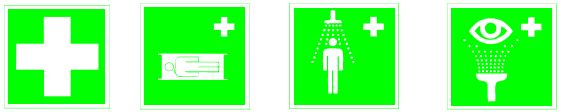
In an emergency case…

…you should know …

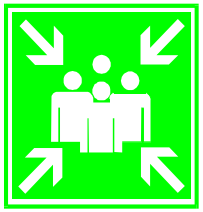
Emergency exits



Locations of first aid accessoires



Common meeting points

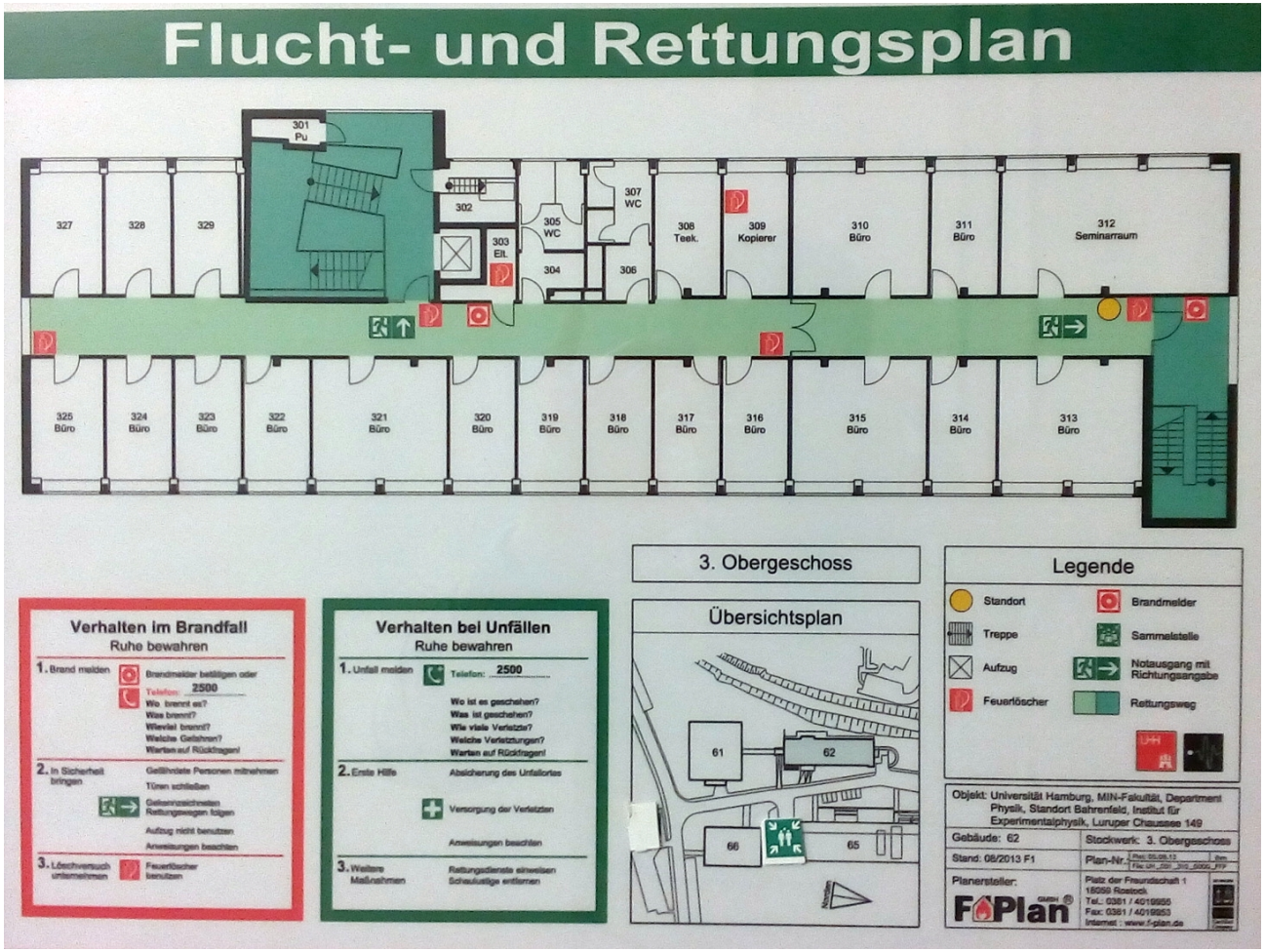


Locations of fire extinguishers

First-Aiders

Emergency number

Escape way and emergency exit maps



You have to be able to orient yourself even under strong smoke development!

Common meeting points

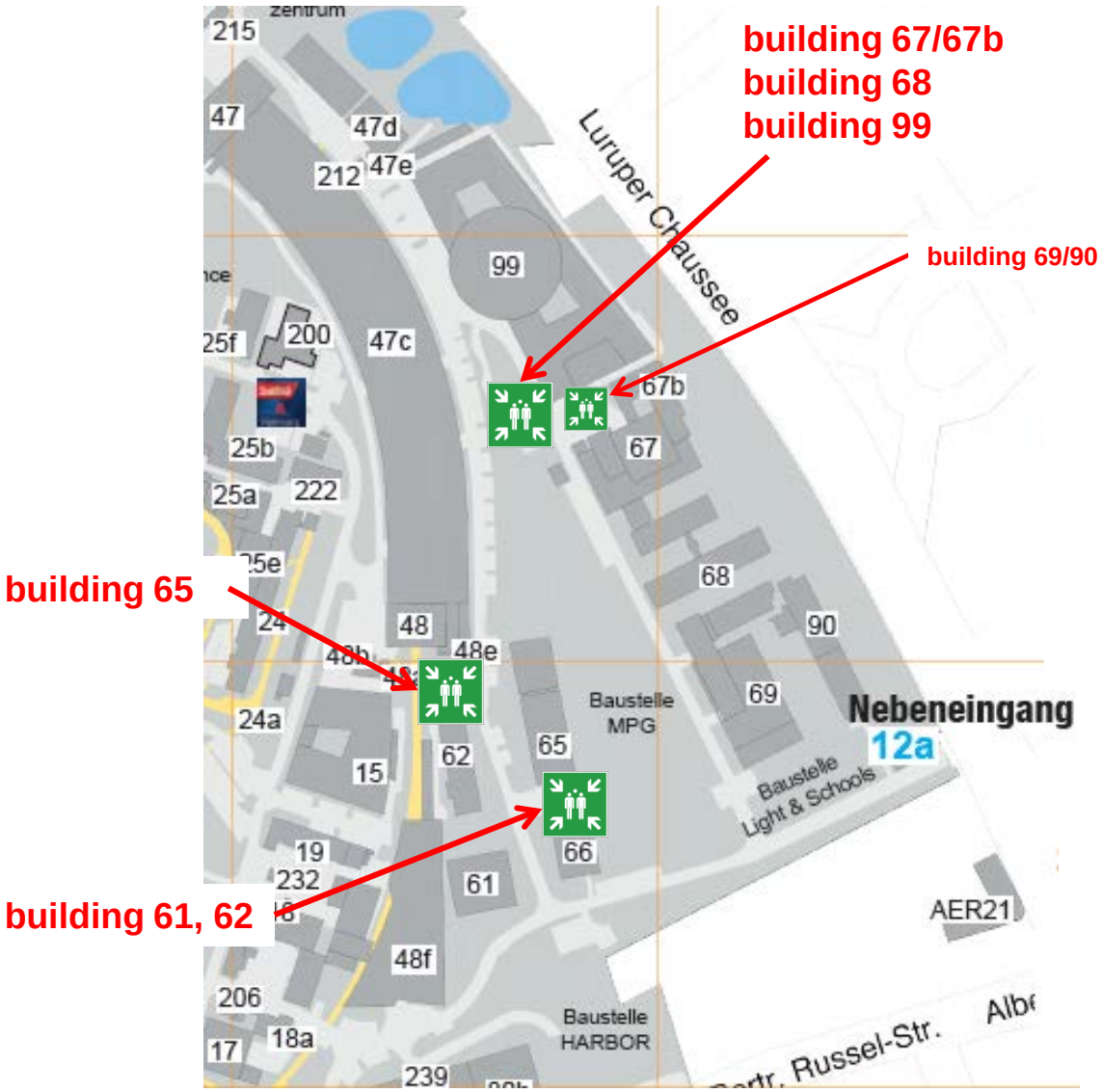
In case of an alarm you immediately have to leave the building and go to the meeting points!
This also applies in case of a power failure

⇓

Evacuation assistants report building cleared

⇓

Check if all colleagues are there and inform rescue people if necessary



In case of a fire

- **Press fire alarm buttons or call 2500**
- **Stay calm, close windows and doors**
- **If possible, switch of machines/experiments**
- **In case of an alarm leave the dangerous area immediately and help injured or disabled persons**
- **Only try to extinguish a fire if this is possible without bringing yourself into danger!**
- **Do NOT enter any area under smoke!**
- **Do NOT use the elevator**
- **Move to the meeting points!**

In case of a fire

If you are not able to leave the building:

- **Go to a room with windows**
- **Move close to the floor if smoky areas have to be crossed**
- **Keep doors closed**
- **Try to give signals from the window that people get aware of you**

In case of an accident

- Rescue injured persons from the hazard area and place them in recovery position (if unconscious)
- Take care of life-threatening injuries/ involve second person
- **Call** Where?
  2500 How many injured?
  Kind of injury *
- Continue supply of injured person
- Briefing for SAVE if possible
- Minor injuries: First Aid Kits
  Verbandsbuchauszug
  (Proof for accident at work)
  Spare parts for First Aid Kits: Mr. Illing/Weppner 2207/2106

*** Try to decide if ambulance is needed**

Mandatory if:

1. **Person unconscious**
2. **Life-threatening injuries**
3. **Electrical accident**

First-aider course 09.09.2020/English

Accidents:

- **Accident at or on the way to or at work: If a physician has to be consulted, visit at a so called „Durchgangsarzt“ (approved by health insurance) or a hospital is mandatory.**

MVZ Elbe West Rugenbarg 20 22549 Hamburg 040/866215580	Dr. H.V. Grüber Arzt für Unfallchirurgie Jürgen-Töpfer-Straße 46 22763 HH 040/892392	AK Altona u.a. Augenklinik Paul-Ehrlich-Str. 1 22763 Hamburg 040/18 18-81 0

Names and addresses of other „Durchgangsärzte“:
Appendix 2 of the job safety code
or at http://lviweb.dguv.de

- **Report any accident - in particular if medical assistance is needed - to your supervisor/boss (report may be needed for insurence (UK Nord)) and your administration.**

General safety rules

Work equipment

General safety rules

How to behave on the Campus Bahrenfeld

- The speed limit is 30 km/h (no matter which vehicle you are using)
- Adapt yourself to the weather conditions!

- Parking is only allowed at dedicated places – never block emergency exits or emergency access roads!

General safety rules

Respect restrictions (blockades) even if this leads to detours!
⇒ This also applies for pedestrians!

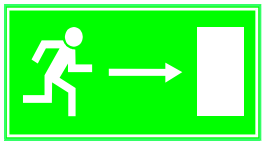
(Any similarity to actual events or persons/cars, living or dead, is purely coincidental.)

General safety rules

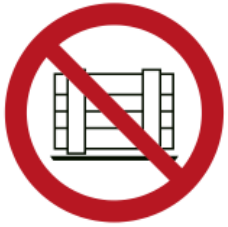
Respect safety signs:

Mandatory Signs: Personal Protective Equipment (PPE)

Exit or evacuation signs



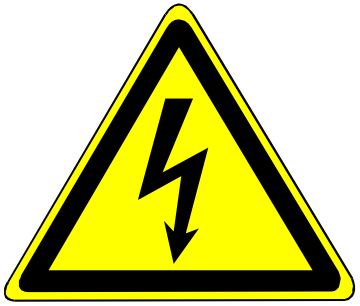
Prohibition Signs



Fire safety signs

Warning Signs

General safety rules



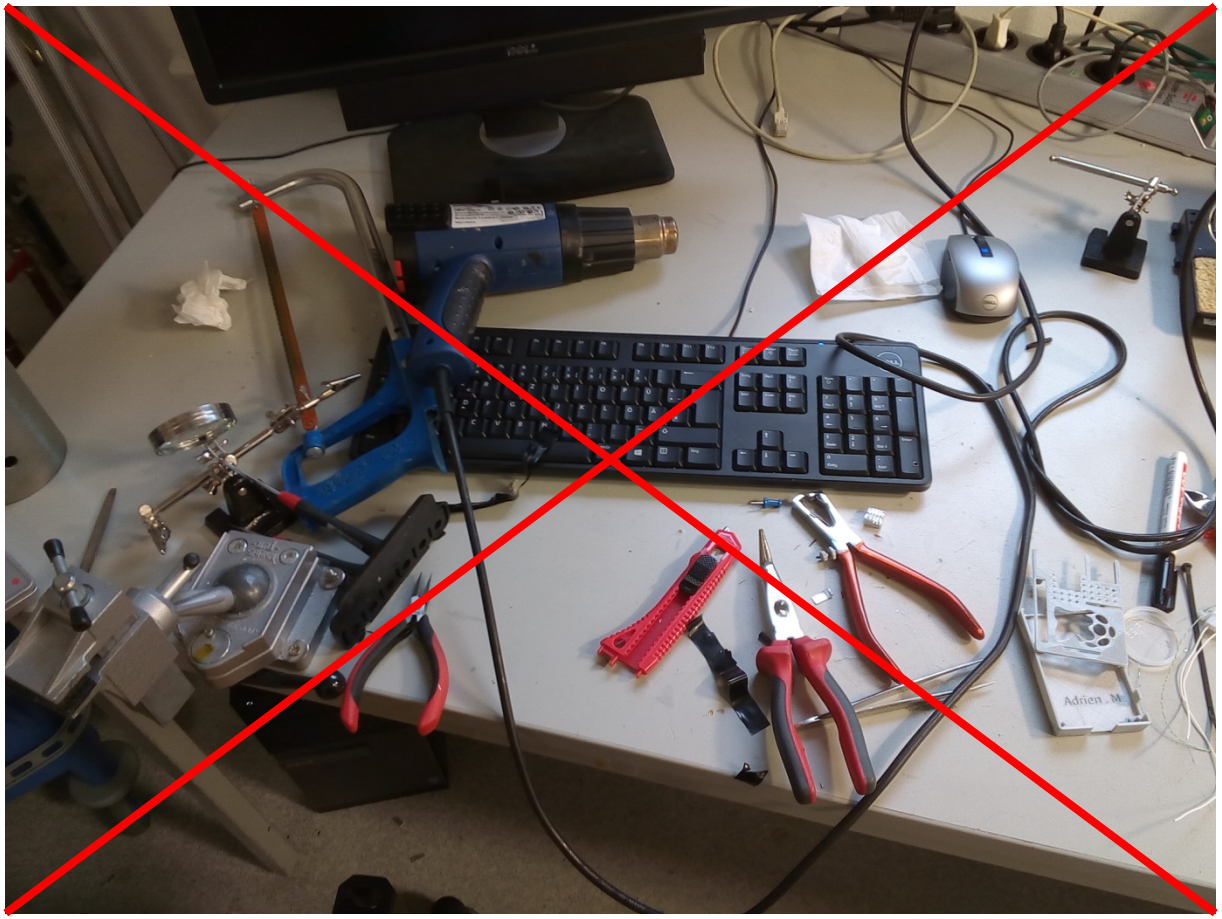
Warning: dangerous Voltage

Ionizing radiation

- **Respect danger and warning signs as well as access restrictions!**
- **Crosscheck with responsible person if work has to be carried out in areas with access restrictions!**
- **Never carry out dangerous experimental or technical work alone!**
- **Always work calm and thoughtfully**

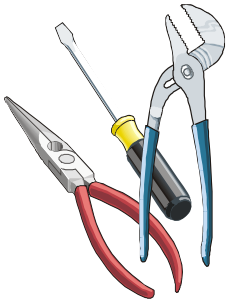
  → Keep working space clean and tidy

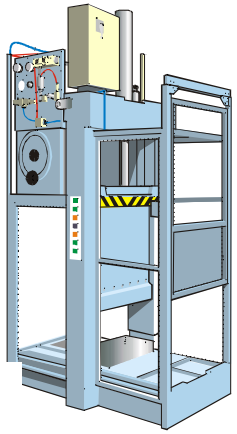
General safety rules



Work equipment

Work equipment: tools, devices, machines or machinery





→ **Follow manuals & warning notices,**
also operation instructions

→ **Keep an eye on regular checks required, e.g. for ladders, forklifts**

Rules for safe operation:

- **Every user has to be instructed BEFORE using any device/machine**
- **Visual inspection BEFORE usage!**
- **NEVER operate devices with open housings,**
  do NOT bypass, shortcut or even remove safe
- **Use your PPE (to be supplied by employer):**
  - **safety boots,**
  - **gloves,**
  - **safety glasses,**
  - **ear protection**
- **No alcohol/smoking at work**

25% of the accidents at work happen due to manipulated safety mechanisms!

Special risks

Hazardous substances

Electrical devices/High voltages

Pressurized gas containers

Liquefied gases

Ionizing radiation

Hazardous substances

- **Even Work with small amounts of common chemicals could be dangerous:**

  → Careful handling of hazardous substances is important for your safety and for the safety of your colleagues!

- **All chemicals need to be registered in the register of hazardous substances of the university (CLAKS)**

- **Informationen about used chemicals:**
  hazard pictograms, hazard & precautionary statements, material safety data sheet (CLAKS)

- **People/Groups working with hazardous substances need a separate (working place related) instruction (group leader, Mr. Poppendieker or deputy)**

Hazardous substances

- **Only use little necessary amounts, small bottles not more than "daily use"**
- **Bigger amounts need to be stored in the chemical storage in building 61**
- **Wear proper safety equipment:**
  Lab coats/long pants/closed shoes/ protection gloves + goggles
- **Use of suited containers**
- **Labelling (CLAKS)**

Hazardous substances

- **Disposal of chemicals:**
  All substances for disposal are kept at the storage of dangerous materials next to building 65!

- **Before this happens:**
  Do you have the correct container?
  Is it correctly filled?
  And properly labelled?
  How to transport it?

Questions concerning proper disposal:
B. Poppendieker, 62/112, phone: 2186
email: bernd.poppendieker@desy.de

Current deputies: Oliver Becker, Marek Wieland, Matthias Schnepp

Electrical devices

- **Do NOT use damaged devices! Clearly label them and arrange for repair**

→ movable electrical devices regularly have to inspected by trained personnel, inspecting periods may vary (i.e. offices every 2nd year)

- **Use extensions safely:**
  Avoid risk of stumbling by use of cable ducts

- **Multiplugs MUST not …**

  … be used as extensions:
  No stacking of multiplugs!

Handling of pressurized gas containers

- **…is allowed only AFTER being instructed:**

  → Main risks: tilting over/displacement of air

- **Storage only in an appropriate gas bottle storage**
  Supply (secured) in the lab is allowed

- **NEVER move without protection cap/do NOT use valve as handle**

  → Usage of gas bottle cart

- **Secure bottles against tilting over BEFORE usage**

- **Labeling of laboratories needed (fire brigade!)**

- **Color code according to type of gases: Only use pressure reducers suited for the used gas!**

⇒ Follow risks assessments/operation instructions!

Liquefied gases

Using liquefied gases (liquid nitrogen/helium) the following risks occur:

- **Freezes (cold burns) by direct contact**

- **Suffocation due to evaporation of huge amounts of liquefied gases in rooms**
  ⇒ Never transport liquefied gases AND persons simultaneously in an elevator!

- **Possibility of oxygen enrichment**

⇒ Handling of liquefied gases is allowed for instructed persons only.

⇒ Persons allowed to order (liquefied) gases from the DESY-Gaselager need a special instruction

⇒ Follow risks assessments/operation instructions!

Ionizing radiation

Sources of stray radiation,
x-ray sources

Radioactive elements,
activated parts

In general: NO ADMITTANCE!

Ionizing radiation

Prohibited and controlled

Radiation safety lecture!!!

Interlockdoors and -installations

Radiation safety lecture at DESY:
12./13./16.12.2018, 09:30-11:00am, DESY main audience

Ionising radiation

Shieldings and protective barriers:

- Never remove!
- Any change is only allowed after consultation and approval of the responsible radiation safety officer!






Questions? Comments?

Safety delegates of working groups& supervisors

Special safety delegates for particular duties :

Officer for working safety (Herr Poppendieker)

Radiation safety delegate (Herr Tluczykont)

Laser safety delegate (Herr Azima)

Hazardous substances delegate (Herr Schnepp)

Fire protection (Bernd Poppendieker)

Organisation of job safety (M. Wieland)

Or: Sicherheit_IEXP@desy.de

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- Sicherheitsbelehrung IExp
- Gleichstellung

PROF. DR. DIETER HORNS

SEXUAL HARASSMENT AND ASSAULT AT WORK

OVERVIEW

- Definition - legal basis
- Recommendations
- Contact points/support

WHY RAISE THE TOPIC HERE?

- Our actions affect others and vice versa
- We all need to set limits to and not tolerate sexual misconduct (guideline of the UHH)
- Create awareness and provide information

Mandatory measure for everyone: safety lecture

LEGAL BASIS AND DEFINITION

GENERAL ACT ON EQUAL TREATMENT (ALLGEMEINE GLEICHBEHANDLUNGSGESETZ) §3 ABS 4

Sexual harassment shall be deemed to be discrimination […] when an unwanted conduct of a sexual nature, including
- unwanted sexual acts and requests to carry out sexual acts
- physical contacts of a sexual nature, comments of a sexual nature
- as well as the unwanted showing or public exhibition of pornographic images,

takes place with the purpose or effect of violating the dignity of the person concerned, in particular where it creates an intimidating, hostile, degrading, humiliating or offensive environment.

WHAT DEFINES SEXUAL HARASSMENT?

Characteristical for sexual misconduct

- One-sided
- against the will and consent of the concerned person
- Violates the dignity of the concerned person

Decisive is the individual perception of the concerned person

DEVASTATING STATISTICS

- Germany (2004, Bundesministerium): 24% of interviewed women have been sexually harassed in working environment last 12 months
- Europe-28 (2014): 22% report sexual harassment(violence) last 12 months (but 75% in management) in work context, heavily under-reported
- Australian Universities (2017): 21% sex. harassment (94% do not report)
- Vast majority of perpetrators (up to 99%) are male (also male victims)
- Terrible consequences – for the victims (anxiety, loss of confidence, vulnerability)

FORMS OF SEXUAL HARASSMENT

- verbal: intrusive comments about physical appearance, sexually suggestive comments/jokes, inappropriate invitations, sexually explicit emails/messages
- Non verbal: inappropriate staring, leering, unwelcome touching, stalking, exposing
- Sexual assault

FORMS OF SEXUAL HARASSMENT

- verbal: intru ysical appearance, nments/jokes, inappropriat plicit emails/mess
- Non verbal: ering, unwelcome t sing
- Sexual assau

RECOMMENDATIONS

- Respect others and set limits↔no tolerance for sexual misconduct
- Mind the cultural context
- Supervisors: set limits, create awareness, optimize the working environment/laboratories
- If you feel sexually harassed: confront the perpetrator or seek help

Each one of us can contribute to create a safe and healthy work environment

ASSISTANCE – SUPPORT – HELP

Most important points of contact

- Equal opportunity officers on campus
  - University: Dieter Horns/Erika Garutti
  - DESY: A.C. Jauch
- University downtown: Ilka Sterner

We are primarily committed to help you – we provide council and support – confidential and independent.

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#GRENZEN SETZEN!...


DU BIST NICHT ALLEIN!
Fühlst du dich an der Uni sexuell belästig oder bedroht?
Bleibe mit deinen Gefühlen nicht allein. Hole dir Hilfe bei uns!
Kontakt – und Beratungsstelle gegen sexuelle Diskriminierung und Gewalt
www. uni-hamburg.de/belaestigung
Tel. 42838-3682

...GEGEN SEXUELLE DISKRIMINIERUNG UND GEWALT

Sie können sich an die Kontakt- und Beratungsstelle wenden, wenn Sie

- nicht sicher sind, ob eine gegen Sie gerichtete Belästigung sexualisierte Diskriminierung ist,
- verbale Entgleisungen und anzügliche Bemerkungen am Arbeitsplatz nicht mehr tolerieren wollen,
- unerwünscht Briefe oder Geschenke erhalten,
- das Gefühl haben, dass Ihnen jemand nachstellt,
- am Arbeitsplatz zu sexuellem Verhalten aufgefordert wurden,
- jemanden zum Reden brauchen.

ILKA STERNER
Kontakt- und Beratungsstelle bei
sexueller Diskriminierung und Gewalt
Grindelallee 46, 20146 Hamburg
04042838-2302 oder 0151 26825818

https://uhh.de/kontaktstelle-sexuelle-diskriminierung

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Fachbereich Physik

Laser safety instruction

for the institute of experimental physics – location Bahrenfeld

Mark Prandolini, AG Prof. Drescher

University of Hamburg

2019/2020

Signature liste

Acknowledgment of participation at the laser safety instruction of the Hamburg university institute of experimental physics

Hereby i confirm the participation at a general as well as a workplace specific laser safety instruction. I'm aware of the risks in handling with laser systems of the laser classes 2-4. Inside the laser laboratories of the University of Hamburg, i will comply with the rules of the Laser safety guide lines of the accident prevention regulation according to German's directive **TROS-Laser***

surname	name	group	bldg.	pulsed /cw	laser class	laser bldg.	signature
Anwar	Mamuna	Drescher	62		4		
Atala	Marcos	MPSD/ Miller	99	p	4	67a	

***Technical Rules for Occupational Safety and Health Regulation to artificial optical radiation**

for **newcomers**

Acknowledgment of participation at a laser safety instruction

Hereby i confirm the participation at a general as well as a workplace specific laser safety instruction. I'm aware of the risks in handling with laser systems of the laser classes 2-4. Inside the laser laboratories of the University of Hamburg, i will comply with the rules of the Laser safety guide lines of the accident prevention regulation according to German's directive **TROS-Laser***.

Hamburg, the _____ signature _____

Seen by laser safety officer Bahrenfeld site

Armin Azima

Surname: _____ Dept./group: _____

Name: _____ Building: _____

E-Mail: _____

Dealing with†: cw-laser ☐ pulsed laser ☐
laser class: _____

*Technical Rules for Occupational Safety and Health Regulation to artificial optical radiation †unless known

Overview

1. Laser radiation - basics
2. Danger from laser radiation for eye and skin
3. Classification of lasers
4. Behavior in case of accident
5. Independent calculation of laser googles
6. Laser safety training for employees of the Institute

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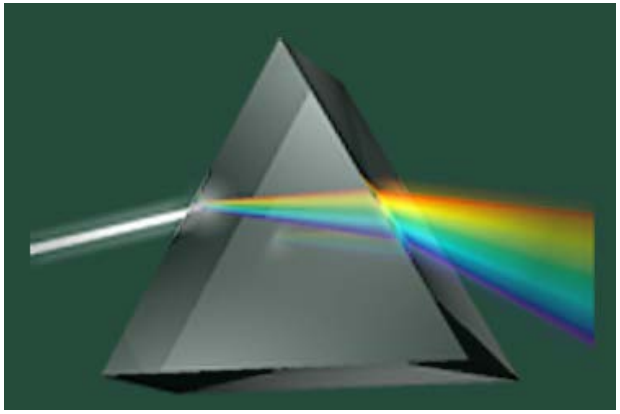
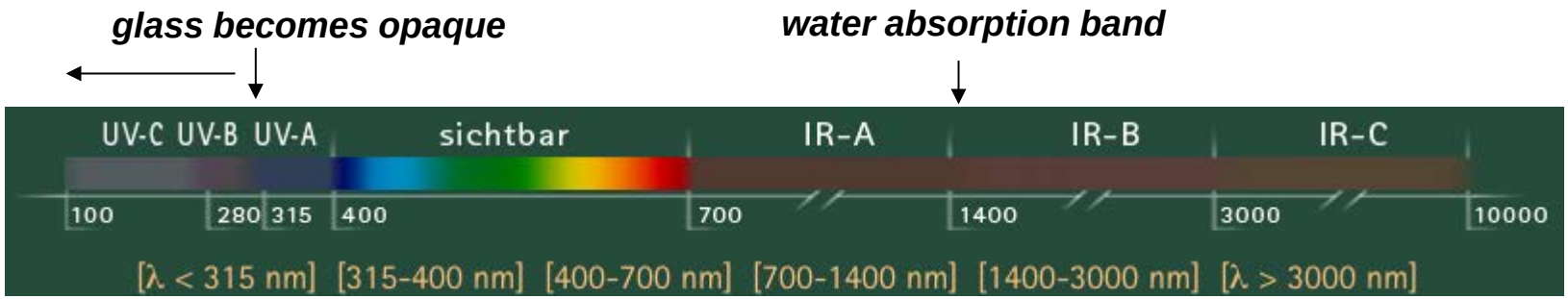
Fachbereich Physik

- Light spreads as an electro-magnetic wave through space
- Natural light sources always consist of multiple wavelengths.
- A part of the EM spectrum can be observed by the human eye as different colors.

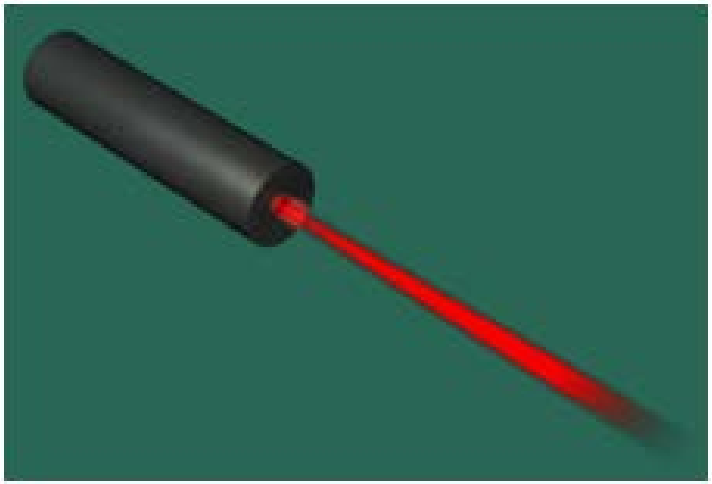




Spectral range from UV to far-infrared

- Laser radiation is artificial light, which does not exist in nature.

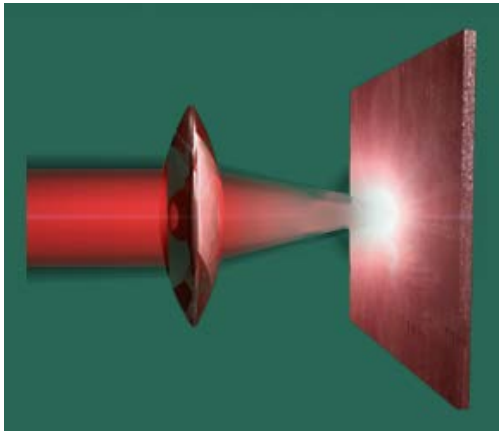
- Laser radiation always spreads as a ***collimated*** beam !

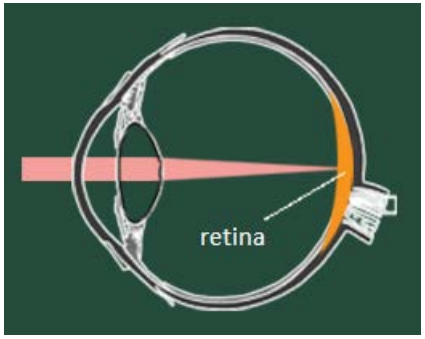


collimated beam

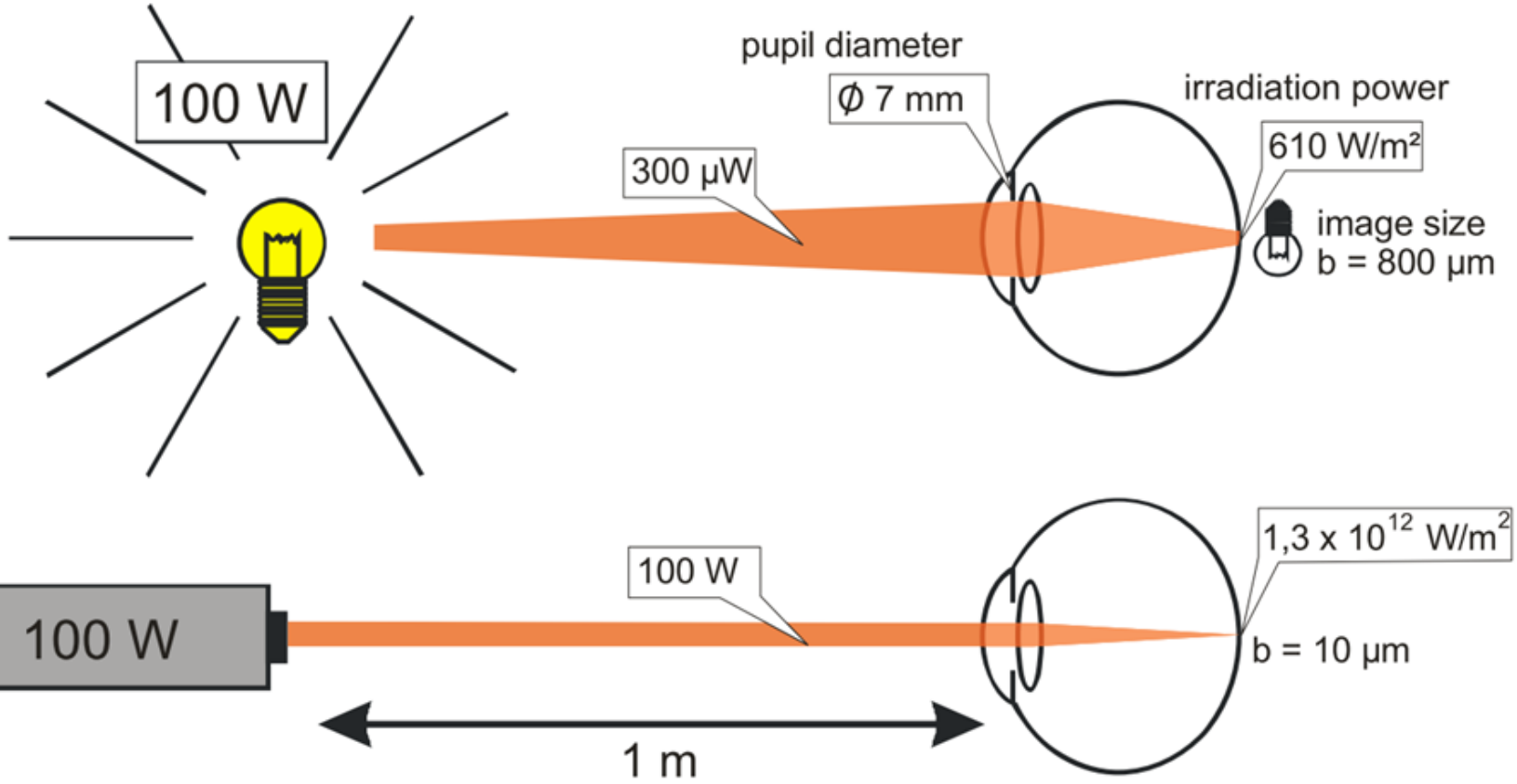
4π-emitter,
uncollimated

- collimated radiation is hazardous for the human eye, because it can be much stronger focused by a lens than any natural light source. In particular this is dangerous in the case of the eye pupil, which focusses any collimated beam directly into the visual nerve of the retina.





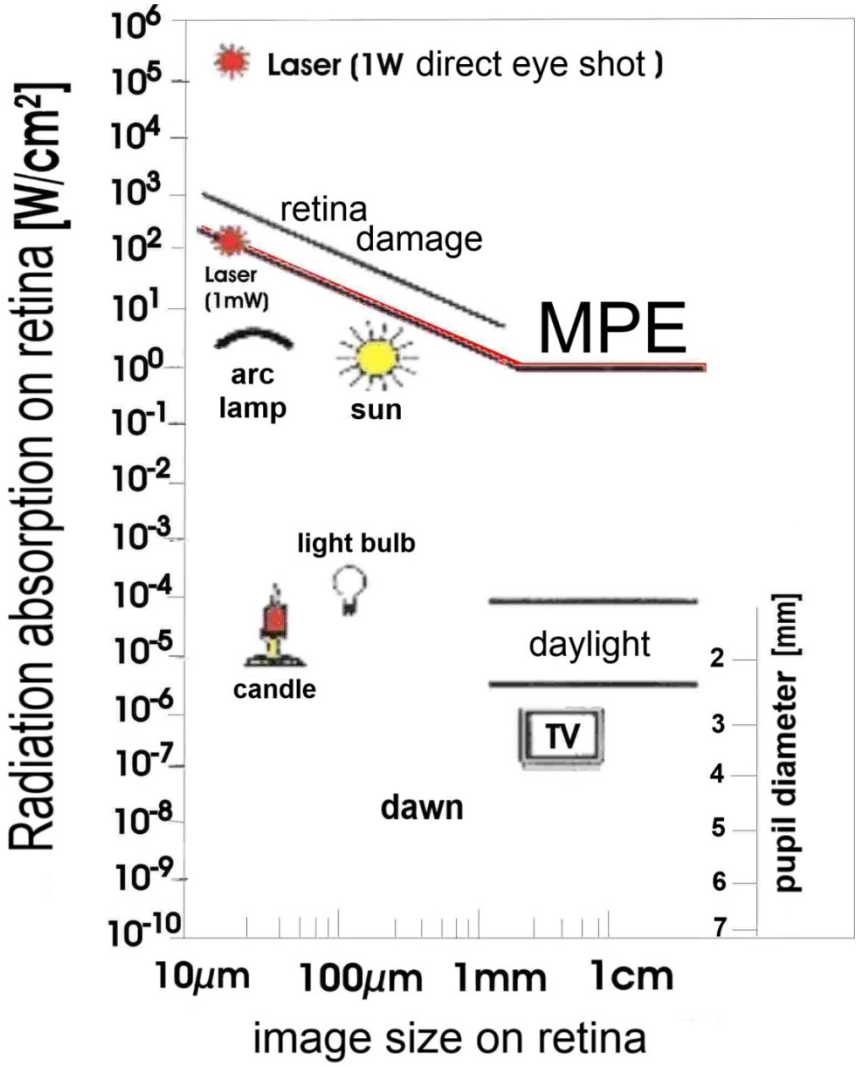
Comparison light bulb – laser beam



ratio of irradiation powers: $\frac{I(\text{Laser, 100 W})}{I(\text{light bulb, 100 W})} = \mathbf{2{,}1 \times 10^{9}}$

source: Bayerisches Laserzentrum

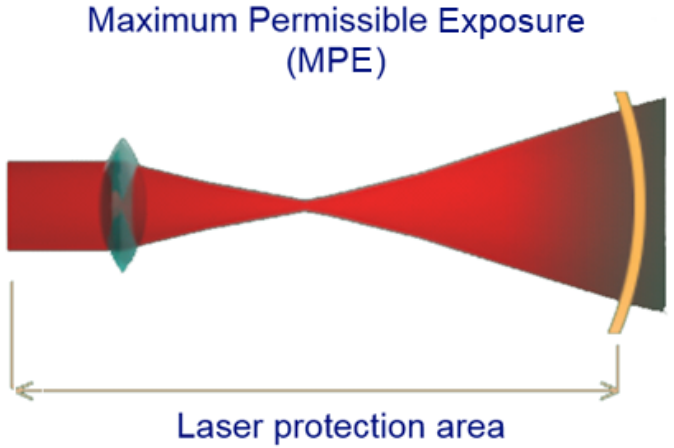
Interaction thresholds – light with eye



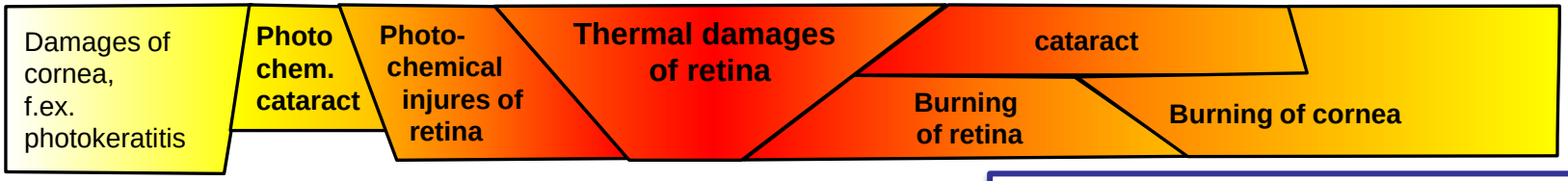
Damage of tissue appears after exceeding a certain irradiation power level [W/cm²].

⇒ Threshold definition for tissue damage: **MPE** (German MZB)
(**M**aximum **P**ermissible **E**xposure)

In combination with the thresholds for accessible radiation (German GZS), laser classes and laser protection areas are defined in DIN-EN 60825.

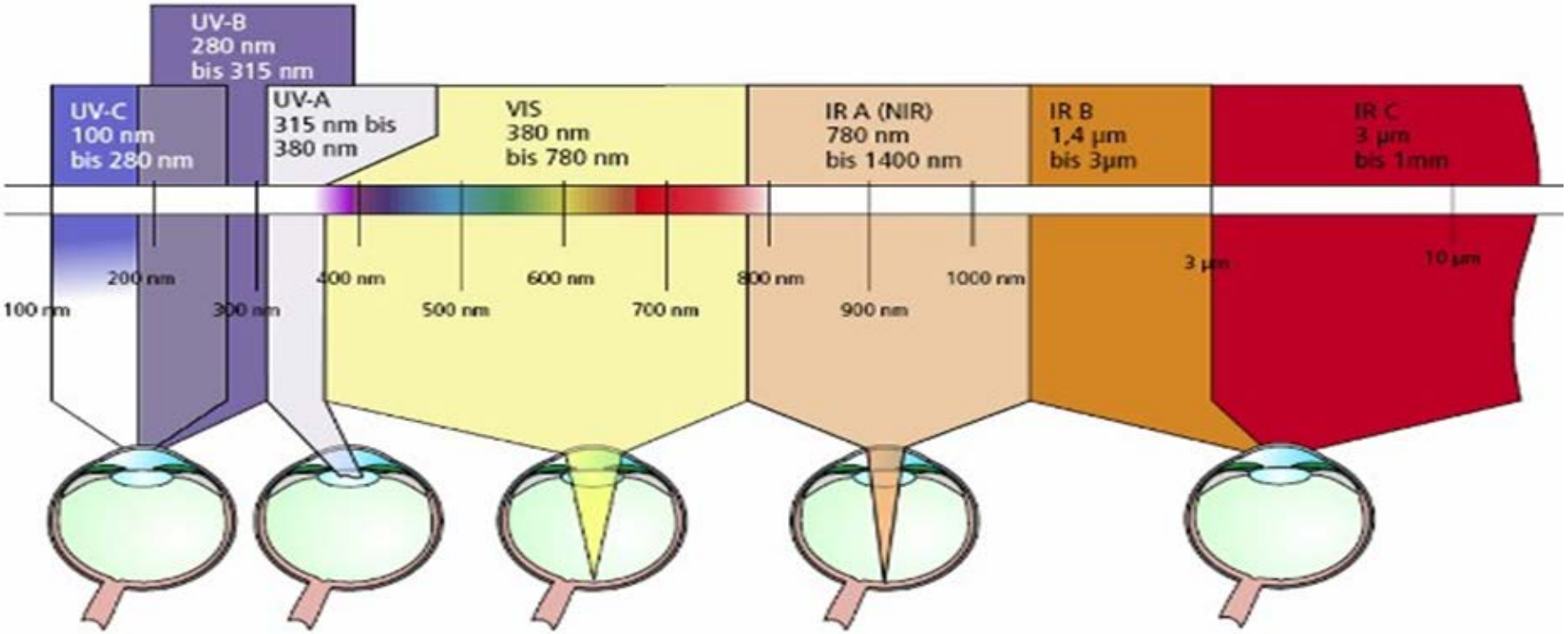


Injury of eye in different spectral ranges



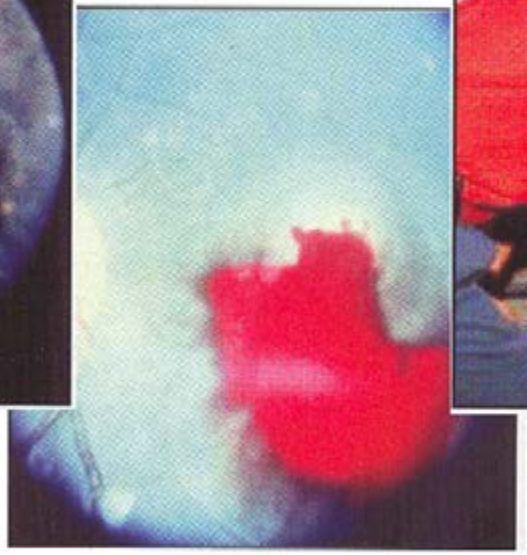
300µW/cm² - sun

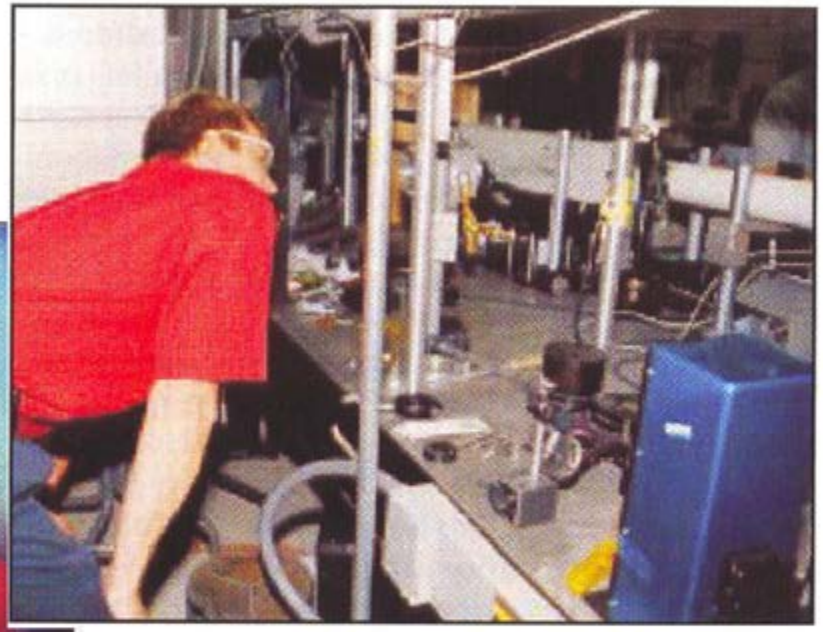
Photokeratitis = inflammation of cornea



Eye penetration depth of spectral ranges

- Laser accident by observation of a process chamber





- Q-Switch Nd:YAG Laser
- λ = 1064 nm

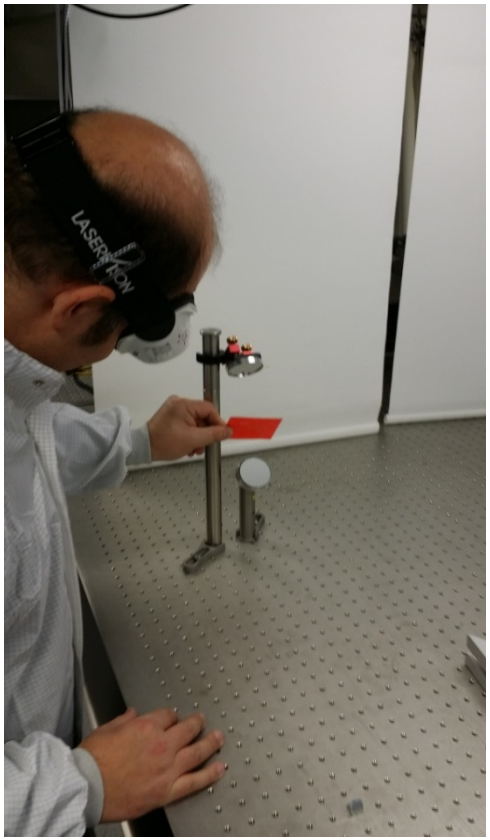
- Damage size of retina , ca. 0,4 x 0,25 mm^2

Photonics Spectra, 03/2005

Alignment of a periscope

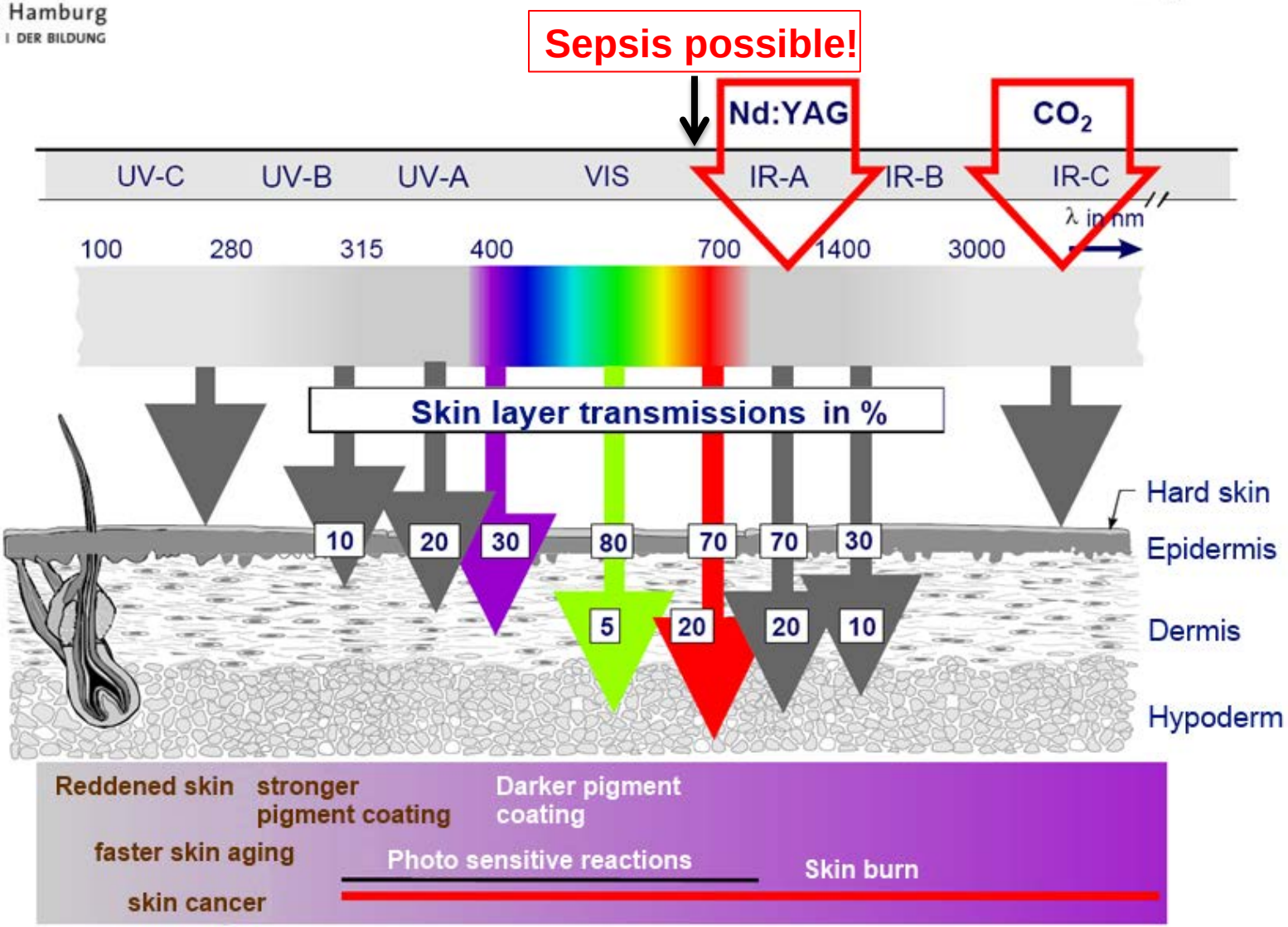
wrong

right



Real example of a laser accident (without injury) at the institute !

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG
Fachbereich Physik

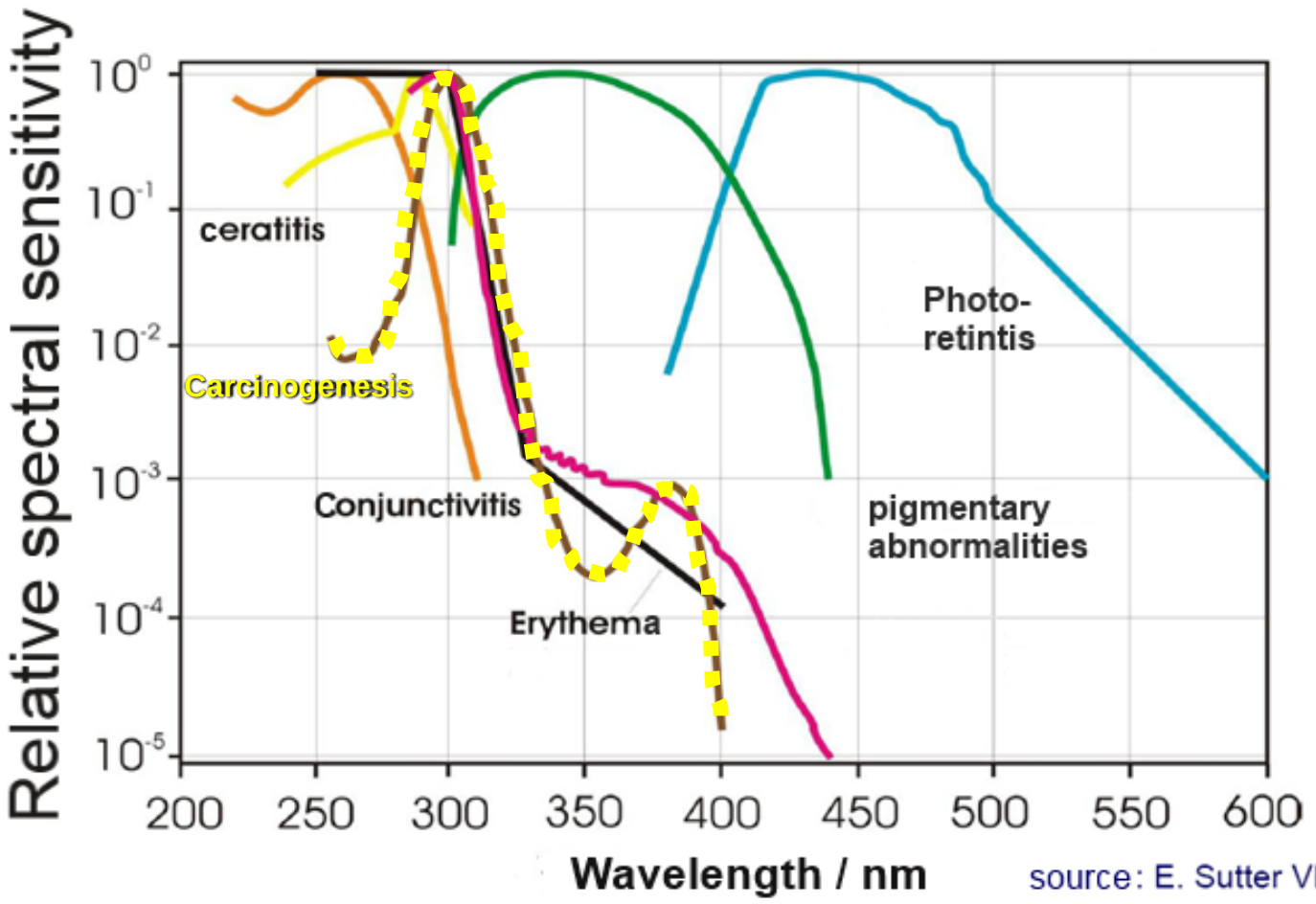


Laser based injury of skin

source : BAUA-Forschungsbericht F2117; Meier, Püster, Beier, Wenzel

Be careful during „laser welding“ !!

Biological skin reactions in the UV range



source: E. Sutter VDE Schriftenreihe Bd. 104

Wear gloves for wavelengths smaller than 400nm !

- If there exists the suspicion, that an eye damage has occurred, quickly head for an ophthalmic doctor, f.ex.:

UKE Eppendorf
Klinik für Augenheilkunde
Martinistraße 52
20246 Hamburg
Tel.: +49(0) 40 7410 - 52350

Notfallpraxis Altona
Stresemannstraße 54
22769 Hamburg22763
Hamburg

- in case of a heavy accident CALL 2500 and inform them that an eye specialist is required and wait for rescue service

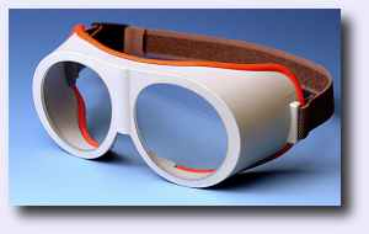
Tel.: 2500

- Due to scarring a local retina damage can spread further. A doctor is able to stop the scarring and inhibit further nerve damage!
- Strong IR radiation can deeply penetrate the skin and may lead to an inner injury, which can lead to a sepsis !

- Laser safety areas are marked !

- Access of laser safety areas only for instructed personnel !
- Intense laser radiation should always be covered.
- Pre-alignment works should be done using class 1 or 2 lasers.

- Adolescents older than 16 may have laser access only under the continuous supervision of an expert.



- **Always wear laser goggles !**

… and better not touch the beam …

1. For any work with radiation of <400nm wavelength, …
2. … or for any works with the laser welding facility

➔ wear protection gloves

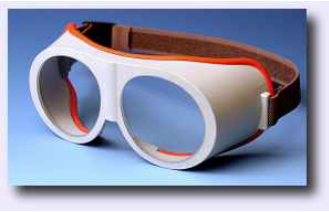
Certified gloves are available from Laservision and JUTEC

DIN standards for laser protection gloves meanwhile are available
(DIN SPEC 91250:2014-11 (D))

Since 2003 the following **laser classification** is active

- class 1 — **harmless** for the human eye
- class 1M — **harmless** because of large divergence.
  Becomes harmful, if observed with **optical instruments**
- class 2 — **actually harmless** for the human eye for **exposure times < 0,25s**
  only defined for **visible light**, with working eye lid closing reflex,
  P<1mW ⇔ E_Puls<3nJ
- class 2M — because of divergence **actually harmless** as class 2.
  Becomes harmful, if observed with **optical instruments**

- Klasse 3R — **direct beam harmful**, but not for the skin,
  - » (may exceed up to 5 times the thresholds of class 2 in visible range and of class 1 in the non-visible range)
- Klasse 3B — **direct beam harmful** for skin and eye**,** reflexes not
- Klasse 4 — **direct beam very harmful for eye and skin**,
  diffuse reflexes in the near field as well, incineration endanger



Laser class 1

acc. to DIN EN 60825-1:2001-11

Laser radiation

Don‘t watch into the beam

Laser class 2

acc. to DIN EN 60825-1:2001-11

Laser radiation

Don‘t watch with optical instruments

Laser class 1M

acc. to DIN EN 60825-1:2001-11

Laserstrahlung

Don‘t watch into the beam neither directly nor with optical instruments

Laser Klasse 2M

acc. to DIN EN 60825-1:2001-11

No laser safety precautions are necessary !

Laser radiation

avoid direct irradiation

Laser class 3R

acc. to DIN EN 60825-1:2001-11

Laser radiation

don‘t expose yourself to the beam

Laser class 3B

acc. to DIN EN 60825-1:2001-11

Laser radiation

avoid irradtion of eye or skin by direct beam or reflexes

Laser class 4

acc. to DIN EN 60825-1:2001-11

Laser protection measures are required !

- Since June 2015 new laser systems **do not** have to be declared at the accident insurance fund (german: Unfallkasse Nord). Instead declaration must be done at the *university department of safety at work* directly !

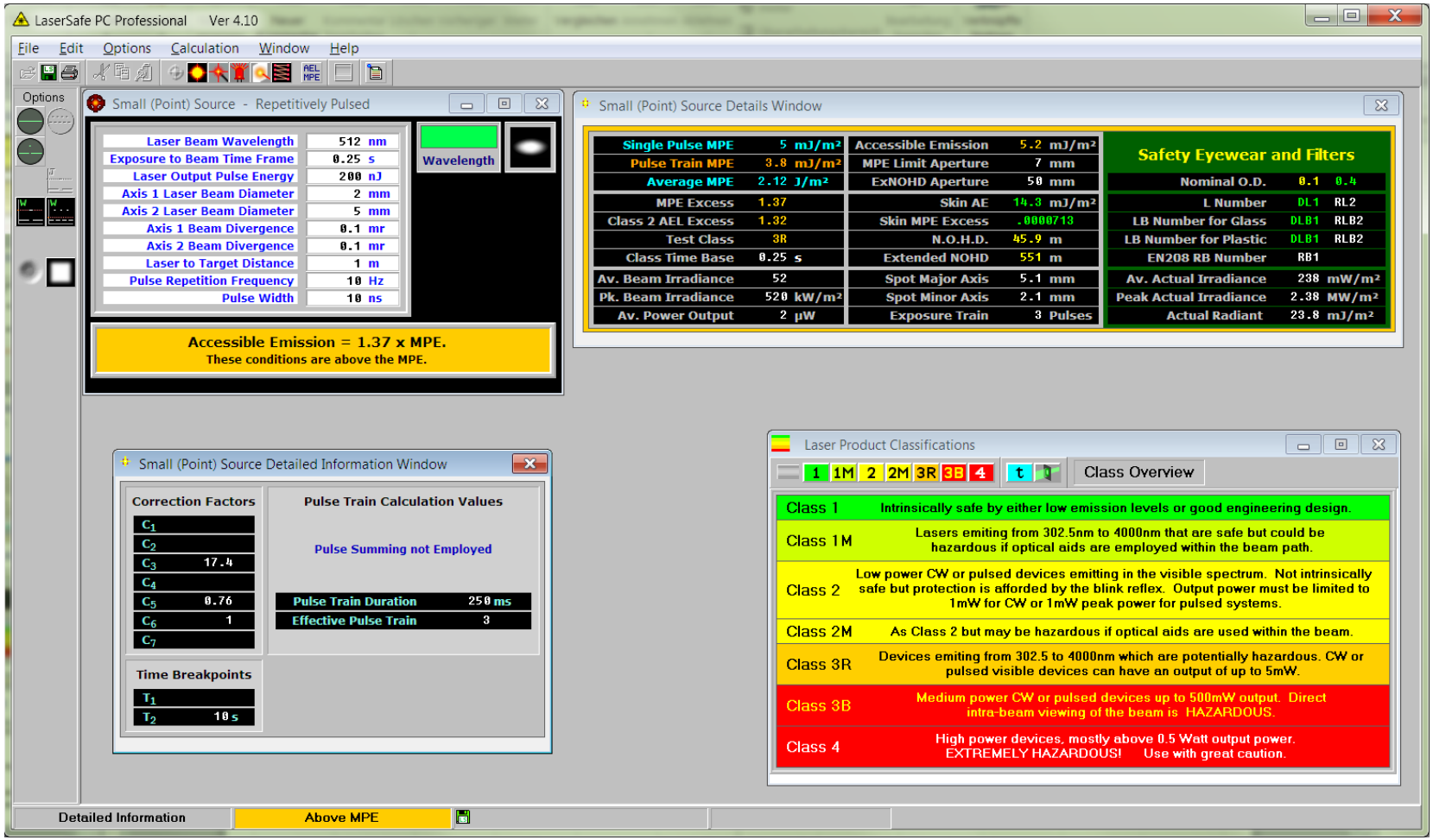
- The laser class must be known and a risk assessment must be created.

- please always keep me informed me, if you install a new laser system in bldg. 61 or 62

Geb. 62, 3. Stock, **armin.azima@desy.de**

Calculation of laser classes and filter levels

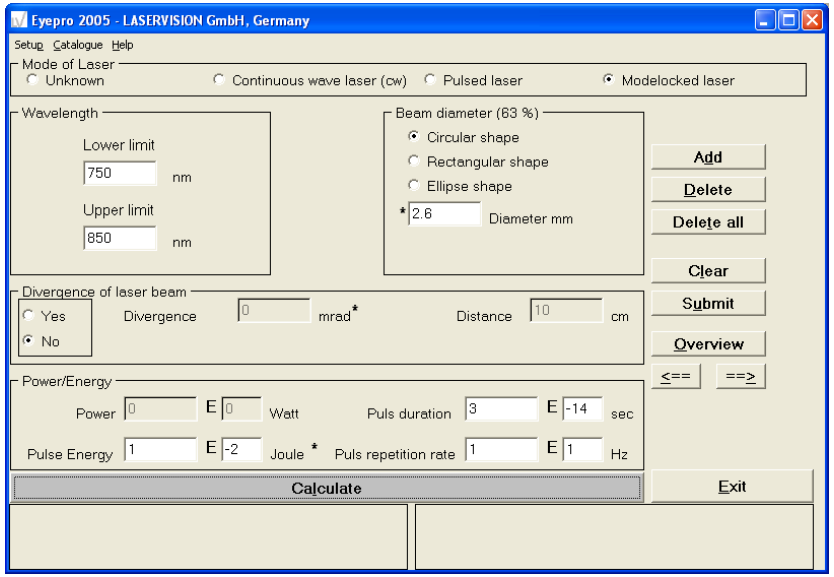
- use LaserSAFE PC pro, for each PC on the DESY campus available free of charge !

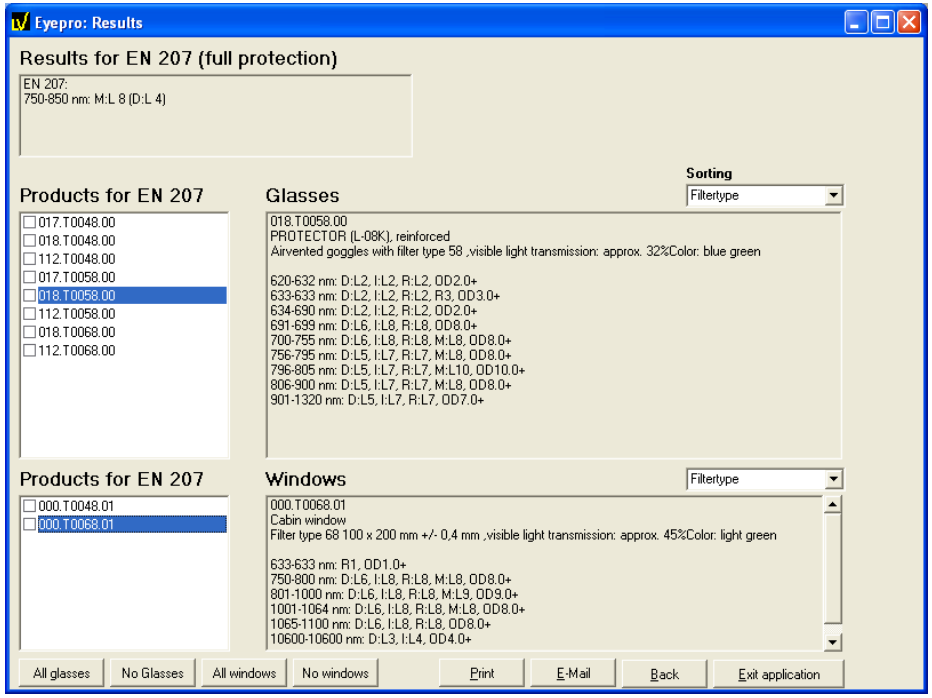


Download: http://d5.desy.de/e61251/e64402/index_ger.html

Finding the right laser goggles

- additionally one can use the free software **“Eyepro” from LASERVISION** to select the right filter types for laser goggles.



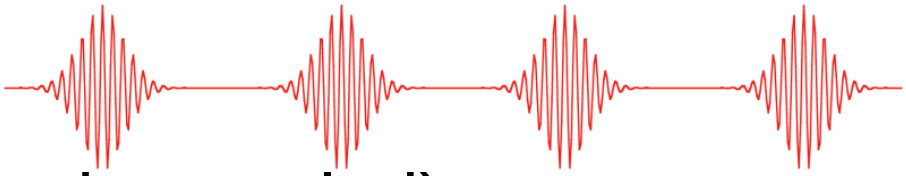


- magic thresholds, which define the need of laser protections (>400nm):

- cw-beam:

>1mW emitted power

- pulsed radiation:



>3nJ (mode coupled)
>200nJ (flash lamp induced)

- A laser safety instruction for all on the DESY campus, who work with laser systems of class 3R, 3B or 4 is available as PPT file!

- This and further information you find at DESY homepage → … → D5 safety
  http://d5.desy.de/e61251/e64402/index_eng.html

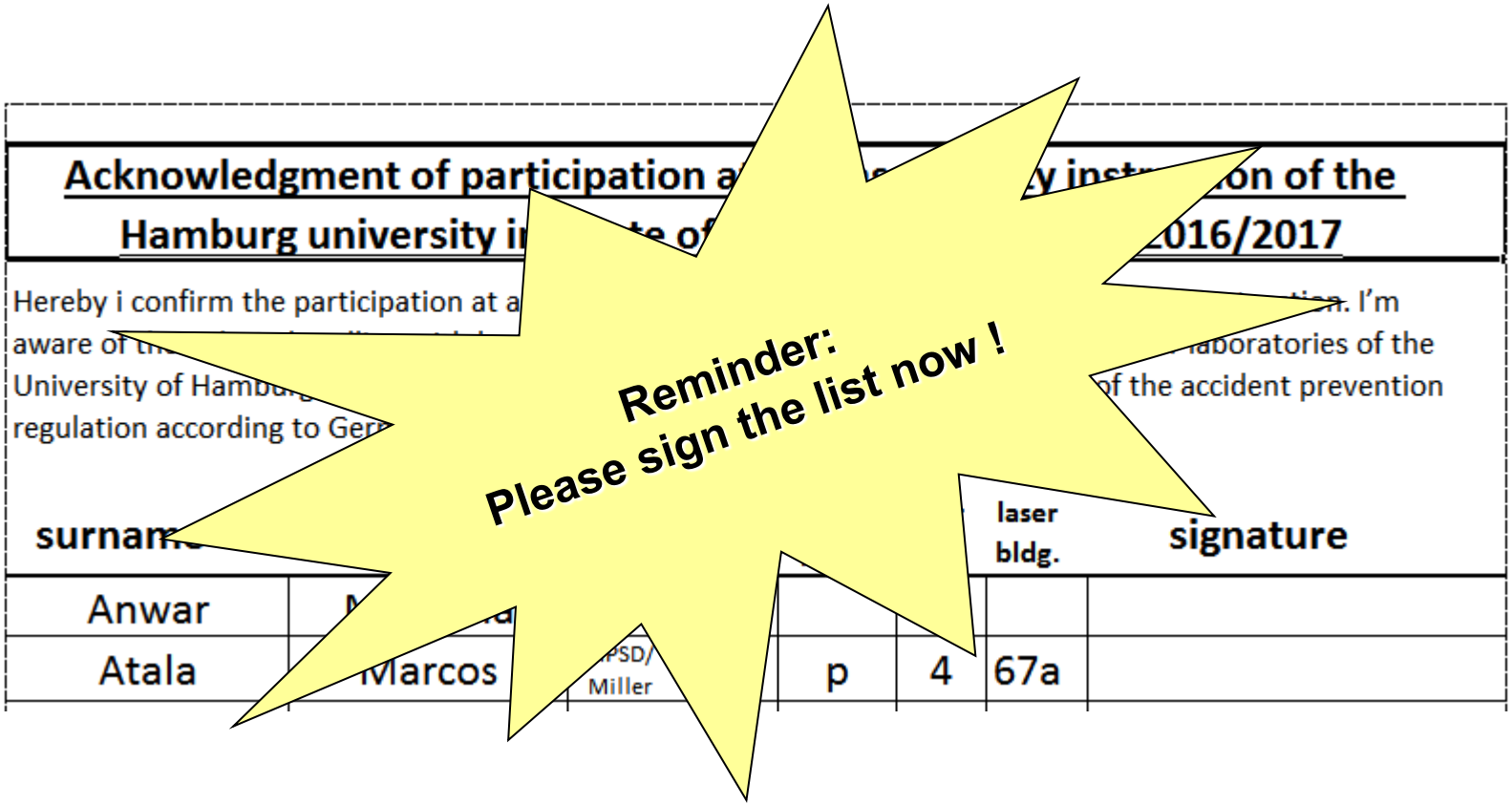
- The directive **TROS-Laser** is now binding for all institutes on the DESY campus !

- Stand Nov. 2017

  – since the beginning of 2017, the following university-wide regulation has come into force:

  All research group leaders who operate laser safety-relevant systems are automatically nominated as laser safety officers in their area.

  In addition, the groups can appoint technical representatives to support the respective laser safety officer in his task.



Acknowledgment of participation a… y inst…on of the Hamburg university i… te of … 2016/2017

Hereby i confirm the participation at a… …tion. I'm aware of th… …laboratories of the University of Hambu… …f the accident prevention regulation according to Ger…

Reminder:
Please sign the list now !

surnam…					laser bldg.	signature
Anwar	M…					
Atala	Marcos	PSD/ Miller	p	4	67a	

Computer supported laser safety training available

There exists a computer supported laser safety instruction

in bldg. 62, 3rd floor, seminar room 312

1. Move through the ***tutorial***.
2. Sign the ***notification.***
3. Let a form of notification be ***cross signed*** by me.

(Empty forms will be available !)

(Please contact me in advance)

armin.azima@desy.de

Thank you for your attention!

Instructions for Radiation Protection

Strahlenschutzunterweisung nach
§38 StrlSchV (Strahlenschutzverordnung)
Und
§36 RöV (Röntgenschutzverordnung)



Instructions for Radiation Protection

Strahlenschutzunterweisung nach
§38 StrlSchV (Strahlenschutzverordnung)



Radiation protection

- Protection from damage by ionizing radiation
  - Protection of human beings and environment
  - Radioactive materials
  - Ionizing radiation from activities with purpose
    “Zielgerichtete Nutzung”
    (Not: natural radiation)
- Lawtext
  - “Strahlenschutzverordnung” (StrlSchV)
  - Availability: my office, Internet

Guidelines

- “Strahlenschutzverfügung” (President, UHH)
- “Sicherheitsordnung” incl. Section “H. Strahlenschutz”
- “Betriebsanweisungen” / Code of practice
- “Strahlenschutzanweisung” / Code of practice
  for radiation passport
- “Merkblätter” / Handout-Memos
  Emergency plan (Alarmierungsplan), etc.

www.desy.de/~tluczym/Strahlenschutz

- AGUM System:
  safety (including radiation safety) relevant information stored centrally on University web site.

  uni-hamburg.agu-hochschulen.de

	Code of Practice	Date: 23 June 2015
Scope: Handling radioactive materials	Valid for: All persons in the rooms of the Institute of Experimental Physics	Signature:

DESIGNATION

Radioactive preparations

General code of practice for handling and storing radioactive preparations

RISK TO PERSONNEL AND THE ENVIRONMENT

- The effects of large doses (> 1 Sv) of ionizing radiation on human beings can include acute deterministic radiation damage (burns, organ damage, radiation disease, death). Small doses of radiation can cause stochastic radiation damage (carcinomas, leukemia, genetic damage).

SAFETY MEASURES AND CODE OF CONDUCT

- Radioactive materials are to be handled exclusively for work-related purposes.
- The basic radiation safety rules apply: justification of their use (minimization of activity), minimization of the exposure time, maximization of the distance to the source, optimization of the shielding.
- The following regulations apply: German Radiation Protection Ordinance (Strahlenschutzverordnung, StrlSchV; see Foyer Building 67 or Internet), the radiation protection regulations issued by the president of the University, and section "H" of the Safety Regulations (*Strahlenschutzanweisung*) of the Institute of Experimental Physics.
- All persons exposed to radiation must be briefed by the radiation safety officer. Attendance of yearly radiation safety briefings is mandatory.
- Transport of radioactive materials on the DESY campus is allowed exclusively with the agreement of the radiation safety officer.
- Transport of radioactive materials outside the DESY campus is subject to the German Road Transport Regulations (Straßenverkehrsordnung, StVO) and may only be arranged by the radiation safety officer.
- Radioactive materials must be stored in well-shielded, lockable cabinets (safes). In addition to the safes in the main storage room for radioactive materials, safes are also available in the laboratories in order to minimize exposure during transportation.
- Radioactive substances are issued exclusively by the radiation safety officer for work purposes. The recipient must sign them out, and the radiation safety officer must confirm their receipt with signature and date.
- The procurement of radioactive materials can only be arranged via the radiation safety officer.
- In controlled areas (radiation dose in excess of 6 mSv but less than 20 mSv per year), official personal dosimetric monitoring must be carried out. Even if the radiation dose per year expected is lower, official personal dosimetric monitoring can be requested.
- Enclosed radioactive substances above a certain level of activity must undergo an official yearly inspection (StrlSchV). When this inspection is to be carried out, the sources must be handed over to the radiation safety officer.
- Radiation protection equipment (shielding, transport containes) must not be modified!
- Unborn children deserve special protection. Corresponding safety measures can only be implemented if the radiation safety officer has been informed about the pregnancy.

WHAT TO DO IN THE EVENT OF ACCIDENTS: EMERGENCY NUMBER EXT. 2500

- In the event of malfunctions or accidents (e.g., a high level of radiation exposure, contamination of persons or rooms, damage or loss of radioactive chemical preparations and fire), inform the radiation safety officer, staff, and the supervisor.
- In the event of incipient fires: fight the fire if this is possible without putting yourself at risk. Every fire must be reported to the Technical Emergency Service, (ext. 6666).

- In the event of more serious incidents: dial emergency number ext. 2500.
- Evacuate persons from the hazardous area without putting yourself at risk.
- Treat minor injuries using the first-aid kit (enter the details in the logbook).
- Inform the radiation safety officer and first-aid officers.
- List of emergency doctors: http://lviweb.dguv.de/dguvLviWeb/faces/D

CONSEQUENCES OF NON-COMPLIANCE

- Health consequences: injuries and sickness
- Disciplinary consequences: written warning

	Code of Practice	Date: 23 June 2015
Scope: Working with X-ray equipment and stray radiations emitters	Valid for: Employees in the buildings of the Institute of Experimental Physics	Signature:

DESIGNATION

Equipment for the generation of ionizing radiation and stray radiation emitters

General code of practice for the use of X-ray equipment and stray radiations emitters

RISKS TO PERSONNEL AND THE ENVIRONMENT

- The effects of large doses (> 1 Sv) of ionizing radiation on human beings can include acute deterministic radiation damage (burns, organ damage, radiation disease, death). Small doses of radiation can cause stochastic radiation damage (carcinomas, leukemia, genetic damage).
- Equipment uses high voltage. Please refer to the *Code of Practice: Electricity*.

SAFETY MEASURES AND CODE OF CONDUCT

- Operating instructions for the X-ray equipment must be observed.
- The following regulations apply: German X-ray Ordinance (Röntgenverordnung, RöV, see notice in Building 67 or Internet), the radiation protection regulations issued by the president of the University, and section "H" of the safety regulations (*Strahlenschutzanweisung*) of the Institute of Experimental Physics.
- Persons working with ionizing radiation must be briefed by the radiation safety officer. Participation in the annual briefing is obligatory.
- Technical briefings must be provided by the group leader or the leading experimentalist. These are also required for operating the system.
- Safety devices must be visually inspected before switching on the equipment and must not be removed or bypassed.
- Structural modifications of any kind to the X-ray tubes are not permitted.
- Positional changes during the experiment and swapping devices between experiments are only permitted with the agreement of the radiation safety officer.
- The operating time of a system should be limited (switch on only when necessary!).
- The operating time is to be documented in a logbook (*Betriebsbuch*).
- In controlled areas (radiation dose in excess of 6 mSv but less than 20 mSv per year), official personal dosimetric monitoring must be carried out. Even if the radiation dose per year expected is lower, official personal dosimetric monitoring can be requested.
- Radiation protection equipment (shielding, transport containes) must not be modified!
- Unborn children deserve special protection. Corresponding safety measures can only be implemented if the radiation safety officer has been informed about the pregnancy.

WHAT TO DO IN THE EVENT OF MALFUNCTIONS

- In the event of malfunction of the experiment, stop the experiment and activate emergency stop.
- Inform other members of staff and the supervisor.
- If the X-ray equipment malfunctions, inform the radiation safety officer.
- In the event of incipient fires: fight the fire if this is possible without putting yourself at risk. Every fire must be reported to the Technical Emergency Service, (ext. 6666).
- In the event of more serious incidents: dial emergency number ext. 2500.

WHAT TO DO IN THE EVENT OF ACCIDENTS: EMERGENCY NUMBER EXT. 2500

- Evacuate persons from the hazardous area without putting yourself at risk.
- Contact the Technical Emergency Service: emergency number ext. 2500.
- Treat minor injuries using the first-aid kit and enter the details in the logbook (*Verbandsbuch*).
- Inform trained first-aid officers and the radiation safety officer.
- List of emergency doctors: http://lviweb.dguv.de/dguvLviWeb/faces/D

MAINTENANCE

- Before using a machine, always check its function and safety mechanisms!
- Maintenance and repair must be only be carried out by trained specialist staff!
- The equipment must undergo a technical inspection at 5-year intervals.

CONSEQUENCES OF NON-COMPLIANCE

- Health consequences: injuries and sickness
- Disciplinary consequences: written warning

Organisation of radiation protection

- **Der Strahlenschutzverantwortliche:**
  Officially responsible person.
  UHH: president of the University
  Arbeitssicherheit: Sandra Nickelsen & Esther Bossmann
- **Der Strahlenschutzbevollmächtigte:**
  Fullfills the duties of the responsible person
  InstExpPh: Prof. Dr. Dieter Horns
- **Der Strahlenschutzbeauftragte (StrlSchB):**
  - Radiation safety officer/expert: **talk to me !**
  - Makes sure StrlSchV and RöV are followed
  - Interface to “Amt für Arbeitsschutz” / Work safety agency
  - Expert: Specific radiation safety knowledge

Enabler (not preventer !)

Organisation of radiation protection

- **Strahlenschutzbeauftragte at InstExpPh:**

Name	Type	Bahrenfeld	Vorlesungs-vorbereitung	Mediziner-praktikum	Dosimetrie / Strahlenpässe (Fremde Anlagen)
Gerald Rapior	StrlSchV		✔		
Stephan Martens	StrlSchV	✔			
Marek Wieland	RöV	✔			
Ole Windmüller	StrlSchV RöV			✔	
Martin Tluczykont	StrlSchV RöV	✔	✔	✔	✔

+ INF (M. Langer, K. Groth)
+ ILP (U. Pape, F. Holweg)
+ DESY (M. Salmani, +D3)

Radiation at the Institute for Experimental Physics

HH-RA 42/17

Radioactive materials:
– stored in safes at different locations
– can be used in experiments

Radiation at the Instit
Experimental Phys

HH-RA 42/17

Radioactive materials:

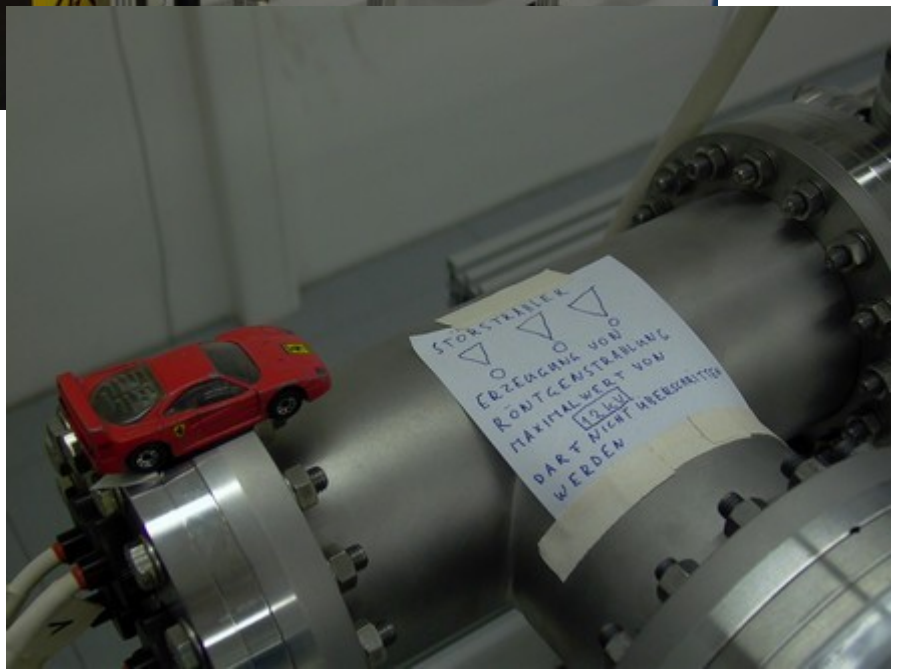
– stored in safes at different locations

– can be used in experiments

Kobalt 60								
27Co060/01	245	kBq	04.02.74	1.1	kBq	19.11.14	21.10.14	A
27Co060/02	295	kBq	06.03.74	1.4	kBq	19.11.14	21.10.14	A
27Co060/04	70	kBq	09.02.73	0.3	kBq	19.11.14	21.10.14	A
27Co060/05	3700	kBq	27.12.83	63.6	kBq	19.11.14	09.10.14	F
27Co060/06	389	kBq	01.04.79	3.6	kBq	19.11.14	09.10.14	F
27Co060/10	91800	kBq	25.12.98	11339.5	kBq	19.11.14	21.10.14	A
27Co060/11	87000	kBq	25.12.98	10746.5	kBq	19.11.14	21.10.14	A
27Co060/12	3700	kBq	27.05.50	0.8	kBq	19.11.14	21.10.14	A
27Co060/16	185	kBq	01.07.75	1.0	kBq	19.11.14	11.11.14	M
27Co060/17	185	kBq	01.07.75	1.0	kBq	19.11.14	11.11.14	M
27Co060/18	185	kBq	01.07.75	1.0	kBq	19.11.14	11.11.14	M
27Co060/19	118	kBq	26.04.68	0.3	kBq	19.11.14	21.10.14	A
842000				22160.2	kBq			
Strontium 90								
38Sr090/05	37000	kBq	27.11.92	21743	kBq	19.11.14	09.10.14	F
38Sr090/06	37000	kBq	19.07.96	23745	kBq	19.11.14	09.10.14	F
38Sr090/07	1850	kBq	01.07.59	485	kBq	19.11.14	24.10.14	N
38Sr090/08	9250	kBq	01.07.59	2423	kBq	19.11.14	21.10.14	A
38Sr090/09	185	kBq	01.07.75	71	kBq	19.11.14	11.11.14	M
38Sr090/10	185	kBq	01.07.75	71	kBq	19.11.14	11.11.14	M
38Sr090/11	185	kBq	01.07.75	71	kBq	19.11.14	11.11.14	M
38Sr090/12	37000	kBq	20.07.11	34133	kBq	19.11.14	13.03.14	G
38Sr090/13	100000	kBq	20.07.11	92250	kBq	19.11.14	13.03.14	G
DESY-Sr90 15	7400	kBq	01.01.14	7244	kBq	19.11.14	22.10.14	G
220000				182236	kBq			
	Aktivität bei Kauf			**Aktivität heute**			**geprüft**	**Ort**
Ruthenium 106								
44Ru106/01	4000	kBq	27.09.94	0.00	kBq	19.11.14	21.10.14	A
8000				0.00	kBq			
Cadmium 109								
48Cd109/01	474	kBq	01.09.90	0.001	kBq	19.11.14	21.10.14	A
48Cd109/02	4720	kBq	01.10.92	0.027	kBq	19.11.14	21.10.14	A
8000				0.03	kBq			
Cäsium 137								
55Cs137/01	740	kBq	01.07.90	423	kBq	19.11.14	21.10.14	A
55Cs137/02	371	kBq	20.07.73	144	kBq	19.11.14	21.10.14	A
55Cs137/03	333	kBq	01.07.79	148	kBq	19.11.14	21.10.14	A
55Cs137/04	7400	kBq	15.03.82	3493	kBq	19.11.14	21.10.14	A
55Cs137/09	410	kBq	01.12.82	197	kBq	19.11.14	21.10.14	A
55Cs137/10	453	kBq	01.12.82	217	kBq	19.11.14	24.10.14	N
55Cs137/16	422	kBq	01.04.79	186	kBq	19.11.14	09.10.14	F
55Cs137/18	3700	kBq	01.07.60	1061	kBq	19.11.14	09.10.14	F
55Cs137/19	370	kBq	01.07.60	106	kBq	19.11.14	09.10.14	F
55Cs137/23	55	kBq	01.07.70	29	kBq	19.11.14	21.10.14	A
55Cs137/24	333	kBq	01.07.78	144	kBq	19.11.14	21.10.14	A
55Cs137/25	333	kBq	01.07.83	162	kBq	19.11.14	21.10.14	A
62000				6299.47	kBq			
Barium 133								
56Ba133/02	429	kBq	01.04.79	41	kBq	19.11.14	09.10.14	F
56Ba133/05	200	kBq	01.07.60	6	kBq	19.11.14	22.10.14	A)G
1300				46.33	kBq			
Europium 152								
63Eu152/01	451	kBq	01.04.84	92	kBq	19.11.14	09.10.14	F
100				91.71	kBq			
Wismut 207								
83Bi207/04	392	kBq	01.10.80	193	kBq	19.11.14	09.10.14	F
500				193.04	kBq			
Radium 226								
88Ra226/03	37000	kBq	01.07.60	36138	kBq	19.11.14	21.10.14	A
74000				36138	kBq			
	Aktivität bei Kauf			**Aktivität heute**			**geprüft**	**Ort**
Thorium 228								
90Th228/02	3848	kBq	18.01.71	0.000	kBq	19.11.14	21.10.14	A
90Th228/03	1850	kBq	19.05.78	0.00	kBq	19.11.14	21.10.14	A
90Th228/04	1850	kBq	17.01.90	0.2	kBq	19.11.14	09.10.14	F

Radiation at the Institute for Experimental Physics

X-rays



Labelling requirements

“Kennzeichnungspflicht”

Experiments with ionizing radiation
must be labelled with standard symbols

Labelling requirements

Labelling requirements

Storage rooms for radioactive material:
Additional labelling for fireworkers

Labelling requirements

In case...

- … you are not sure of the risk of exposure
- … labelling is unclear

→ ask the StrlSchB = radiation protection representative

Facilities / devices (X-rays or stray radiation)

- Necessitate a permission (in most cases)
- Are checked by a service company in a 5-year rhythm

- Modifications of existing facilities – madatory procedure:
  - Contact StrlSchB
  - StrlSchB organizes **inspection** by independent engineers
  - StrlSchB contacts work safety agency for modification of **permission**

Purchasing / Acquisition and transport of radioactive materials

- **Contact StrlSchB**
- Handling of radioactive materials: permission for specific nuclides
- Further regulations exist for:
  - Transport
  - Disposal
- **Always contact the StrlSchB !**

Basic principles of radiation protection

ALARA principle:

“As low as reasonably achievable”

“Die 4 A's”

Aufenthaltsdauer	Exposure time	minimize
Abstand	Distance	maximize
Abschirmung	Shielding	optimize
Aktivität	Activity	minimize

Dose and Radiation protection areas

- **Unit: Sievert** [Sv] = J/kg
  - Dose [mSv]
  - Dosisleistung (dose rate) [µSv/h]
  - Takes into account energy deposit and biological effective harmfulness of radiation types

- **“Überwachungsbereich” (monitoring area)**
  → 1 – 6 mSv per year
- **“Kontrollbereich” (control area)**
  → 6 – 20 mSv per year
- **“Sperrbereich” (prohibited area)**
  → > 3 mSv/h

Limits on exposure to radiation “Dosisgrenzwerte”

- “Beruflich strahlenexponierte Personen”
  persons with radiation exposure **at work**
  - Kategory A: 6 mSv – 20 mSv per year
    regularly inside “Kontrollbereich” / radiation controlled area
  - Kategory B: < 6 mSv per year
    occasionally inside “Kontrollbereich” / radiation controlled area

Only exposures at work are relevant for StrlSchV / RöV !

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- **Private** radiation exposure:
  - Medical diagnostics ~ 2 mSv per year
    - Tooth: <0.01 mSv
    - Thorax X-ray: ~0.08 mSv / exposure
    - CT: 2-25 mSv / exposure
  - Natural sources ~ 2 mSv per year
  - Round-trip by plane to New York: ~ 0.1 mSv
  - Cigarettes – Pb210, Po210: 11 cigarettes per day
    = 6 mSv organ dose per year

Only exposures at work are relevant for StrlSchV / RöV !

Limits on exposure to radiation “Dosisgrenzwerte”

- Special limits:
  - Persons under 18 years: < 1mSv / year
  - Women: Organ dose at uterus <2mSv / year
  - Pregnant women: exposition of child <1mSv/year

- Limits for pregnancy are valid starting with StrlSchB *knowing* about it

Dosimetrie & Strahlenpässe

- **Official dosimetry:**
  - for persons who work inside “Kontrollbereich”
  - If you work with radioactive material and need a dosimeter, contact me !
  - Ordering a dosimeter takes about 4 weeks
- **Radiation passports (Strahlenpässe):**
  - “Arbeit in fremden Anlagen” = work in foreign facilities
  - For persons exposed to radiation at work outside UHH (BESSY, Rossendorf, DESY, ...)
  - **Mandatory:** need to be updated before going to the “Fremde Anlage”

Radiation passports

- **Procedure for registration** (~2 weeks):
  - Fill in required information + signatures
  - StrlSchB sends passport to “Amt für Arbeitsschutz” for registration
  - Sent back to me

- **Procedure for passport maintenance**
  - **Passports stay in Office 16**, Building 68
  - **Mandatory regular update** by me
  - If needed for beamtime: **handed out against signature** by me
    (Also access to my office: M. Matysek, W. Weppner, D. Horns)
  - Handout along with **OSL-Dosimeter against signature**
  - Note: exceptions exist, where Albedo Dosimeters need to be ordered (~2 weeks !)
  - When back from beamtime, **return passport and dosimeter immediately**

- **Strahlenschutzanweisung zu Genehmigung HH-RA 31/06**

Thanks