General safety briefing

Institut für Experimentalphysik
Universität Hamburg

29.11.2018

Content

Part I

- **Sexual harrassment/discrimination (D. Horns)**
- **General safety (M. Wieland)**
- **Handling of hazardous substances: ‘‘Chemicals“ (M. Wieland)**

Part II

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

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

- Safety lecture IExp
- Equal opportunity

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

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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

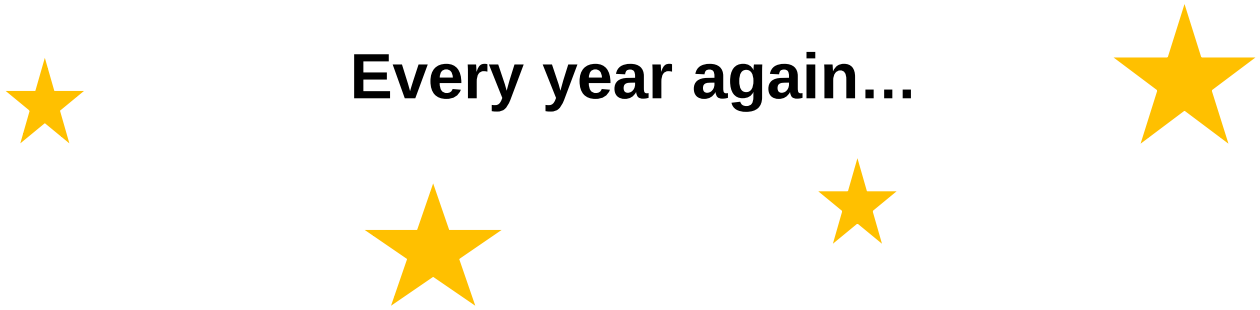
- nicht sicher sind, ob eine gegen Sie gerichtete Belästigung sexualisierte Diskriminierung ist,
- verbale Entgleisungen und anzügliche Bemerkungen am Arbeitsplatz nicht mehr tolerieren wollen,
- unerwünscht Briefe oder Geschenke erhalten,
- das Gefühl haben, dass Ihnen jemand nachstellt,
- am Arbeitsplatz 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

Part I: General safety

- **Organisation/sources of information**
- **Fire safety/emergency cases**
- **General safety rules/work equipment**
- **Special risks**



Every year again…

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

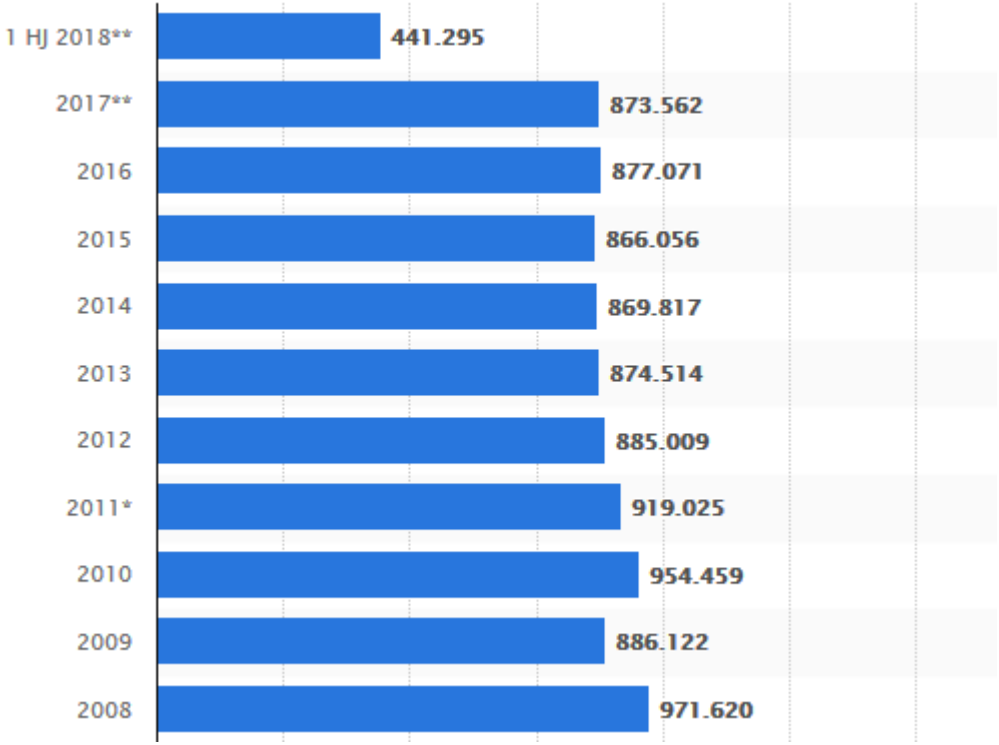
- **Safety at work:**

  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, 27.11.2018)



Most accidents happen due to „human failures“

→ disrespect of safety rules

⇓

Every person contributes by her/his action!

Presidential directive for employment protection: Organisation of employment protection at the University of Hamburg

Professors/Group leader sind für ihren jeweiligen Bereich der Forschung und Lehre unmittelbar zuständig und tragen damit gegenüber ihren Mitarbeiterinnen oder Mitarbeitern und Studierenden die **Verantwortung für den Arbeits- und Gesundheitsschutz** und sind verpflichtet, ihre Forschung und Lehre unter Beachtung des Umweltschutzes zu organisieren.

Leader of units of organisation tragen die **Verantwortung für Arbeits- und Umweltschutz** in ihrer jeweiligen Einrichtung.

Supervisors tragen für ihren Weisungsbereich die **Verantwortung hinsichtlich des Arbeits- und Gesundheitsschutzes** für Mitarbeiterinnen und Mitarbeiter sowie Studierende und sind verpflichtet, Umweltschutzbelange zu beachten.

Advice, control and support

Stabsstelle Arbeitssicherheit und Umweltschutz (AU)

- Informs responsible persons in each area about their duties
- Supports and advises selectively and regularly

Training programs: First Aid, Fire safety, …

Works doctor

- Advice, preventive medical checkup

→ provided by arbeitsmedizinischer Dienst Hamburg

Physics Department:

Officer for working safety
Bernd Poppendieker (Bahrenfeld)

Institute:

Safety delegates (per working group at least one person)
Special delegates (authority to issue directives):
- Laser safety delegate, radiation protection delegate, ….

More involved persons

Evacuation assistants

- Help to evacuate a building in case of a fire alarm
- Two persons per corridor/floor
- Training organised by AU

First Aider

- 10 % of staff
- First Aid course (1 day) valid for 2 years

Fire safety team

- First at fighting a fire
- Support in fire protection work
- Education: fire fighting training (valid unlimited)

→ Appendix to safety code

Where to search?

Information on job safety

Information on job safety

- **Website of the division for job safety and environmental protection (AU):**

  https://www.uni-hamburg.de/uhh/organisation/stabsstellen/arbeitssicherheit-und-umweltschutz.html

- **Job safety managment system (AGUM) used by the university:**

  http://uni-hamburg.agu-hochschulen.de/index.php?id=1095

- **Website of the institute (safety instructions, job safety code, …):**

  http://www.physnet.uni-hamburg.de/fachbereich-physik/institute/iexp/service/sicherheit_e.html

→ **Risk assesments**

- mandatory for every (dangerous) work, every work place

- provided by responsible, annual check, needs to be available in written form

→ **Operation instructions/Code of practice**

- Rules to follow when using work equipment
- Informs about potential special dangers
- Blue: Machines, Orange: Chemicals

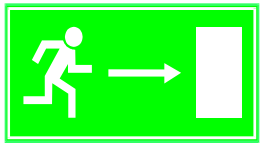
Fire safety

Emergency cases

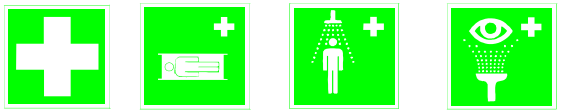
In an emergency case…

…you should know …

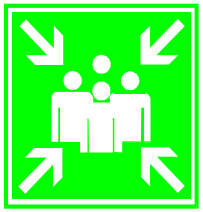
Emergency exits



Locations of first aid accessoires



Common meeting points

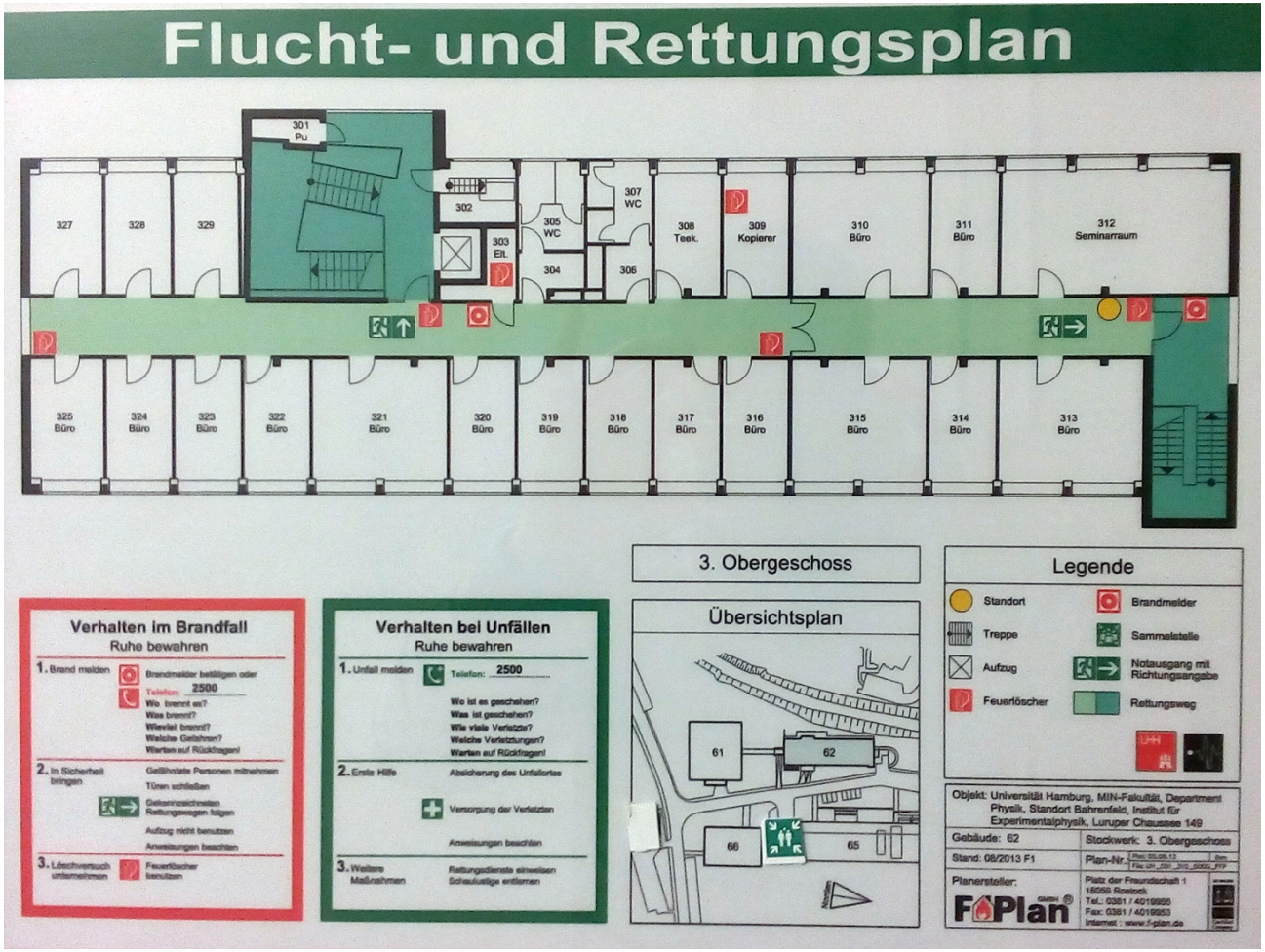


Locations of fire extinguishers

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

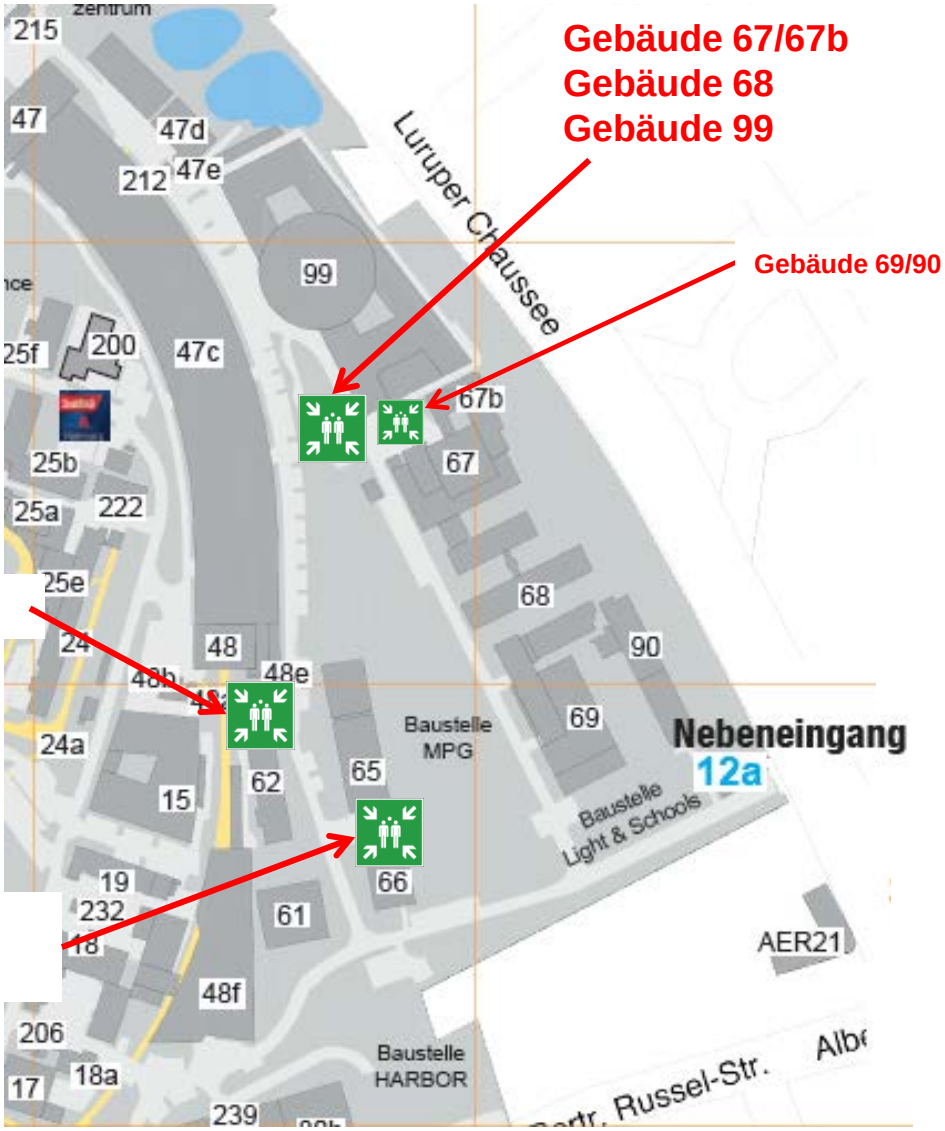
In case of an alarm you immediately have to go to the meeting points!
This also applies in case of a power failure

⇓

Evacuation assistants report building cleared

⇓

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



In 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 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
- **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 20.06.2019/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.**

Dr. H.-D. Gutowski Arzt für Unfallchirurgie Rugenbarg 20 22549 Hamburg 040/80010620	Dr. H.V. Grüber Arzt für Unfallchirurgie Giesestr. 7 22607 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 needed for insurence (UK Nord)) and your administration.**

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**

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 (also private ones!):

  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**

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!

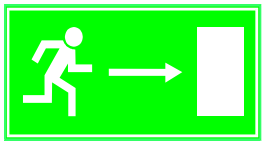
(Any similarity to actual events or persons/cars, living or dead, is purely coincidental.)

General safety rules

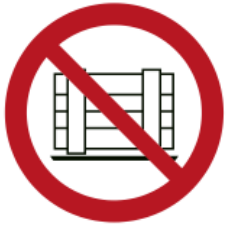
Respect safety signs:

Mandatory Signs: Personal Protective Equipment (PPE)

Exit or evacuation signs



Prohibition Signs



Fire safety signs

Warning Signs

General safety rules

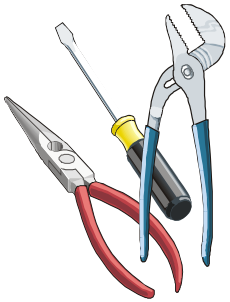
Warning: dangerous Voltage

Ionizing radiation

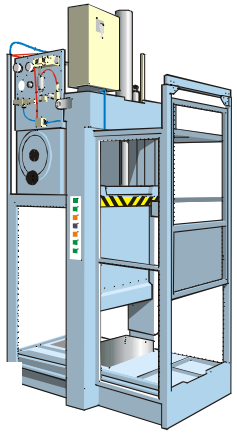
- Respect danger and warning signs as well as access restrictions!
- Crosscheck with responsible person if work has to be carried out in areas with access restrictions!
- Never carry out dangerous experimental or technical work alone!

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**

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

⇒ **Intended usage of work equipment!**

Special risks

Electrical devices/High voltages

Pressurized gas containers

Liquefied gases

Ionizing radiation

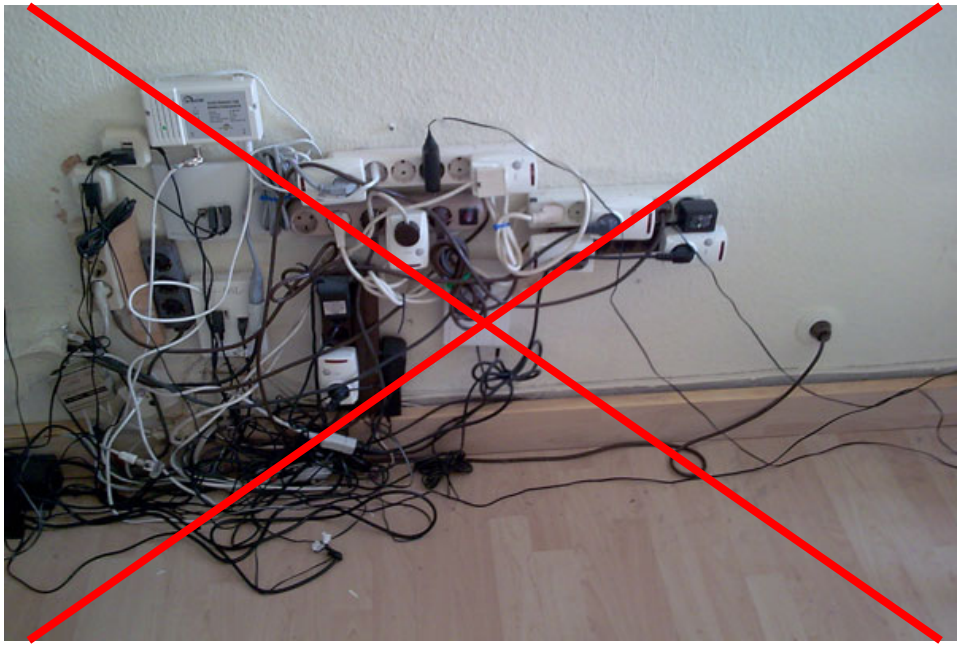
Electrical devices

- **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!



Electrical devices/high voltages

- **NEVER change any permanent electrical installation!**
- **Energized parts at voltages above 25V (AC) or 60V (DC) have to be shielded; warning signs have to be placed**
- **Devices for voltages above 1kV need to be labeled with „High Voltage“**

- **Always use appropriate cabling and connectors fulfilling the application demands; assembling has to be carried out by qualified&trained personnel!**

In case of doubt: Ask a professional!

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:
17.12.2018, 09:30-11:00 Uhr, 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

Safety briefing 2018

Part I
Hazardous substances

Institut für Experimentalphysik

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

You are responsible for safety at your working place!

Important:
Personal training at site by experienced user!
Or by Bernd Poppendieker
Bernd.Poppendieker@desy.de

Outline: Handling

- Important basic rules
- General behavior in lab
- Personal protective equipment (PPE)
- Storage and labeling of chemicals
- Sources of information about used chemicals:

  - hazard pictograms, hazard & precautionary statements, material safety data sheet
  - CLAKS database software

Important Basic Rules

- **substitution rule**: Always look if it would be possible to substitute dangerous by un-dangerous
- Only use **little necessary amounts,** small bottles not more than “daily use”
- bigger bottles in **safety cabinet**, and refill to small bottles (storage space available in build. 61, room 112)

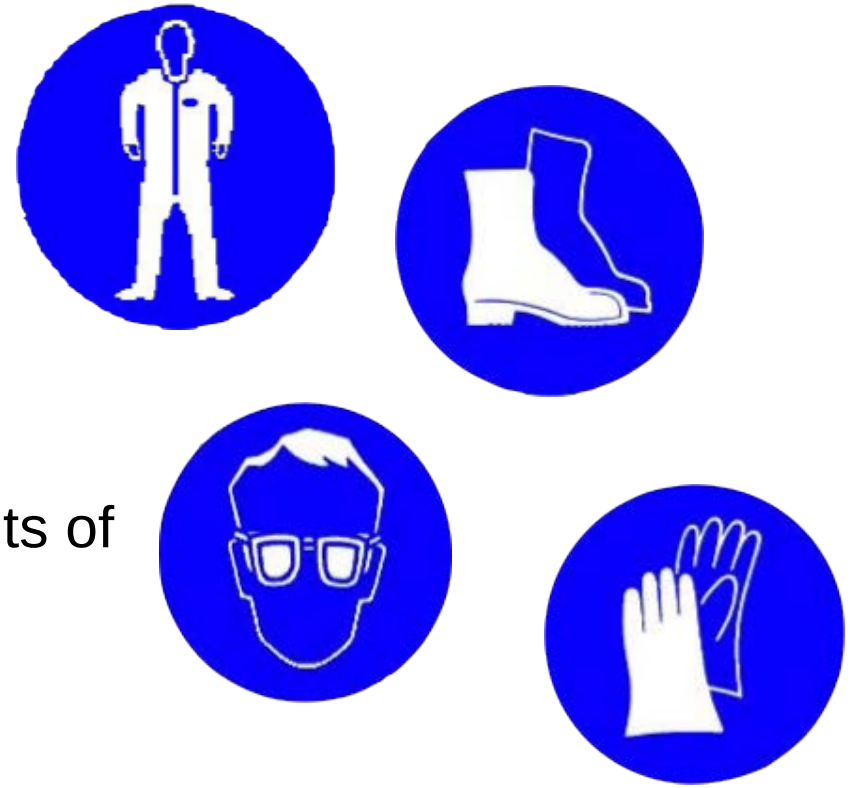
Behavior in (chemical) labs

- Work carefully
- Dangerous work: never alone
- Protect yourself and your colleagues
- <u>Everybody</u> is responsible for tidiness and cleanliness in lab

- Do NOT drink or eat
  - Do NOT smoke
    - NO Alcohol

Clothes and PPE

- Lab coats
- Long pants
- Proper closed shoes
- Protection googles
- Protection gloves
  (according to requirements of substance handled,
  i.e. solvent proof!)



Use of the fume hood

- Use and refill of hazardous substances is generally only allowed under the fume hood
- Correct operation of the fume hood needs to be checked before every use
- Front window should always be closed, for work only open as much as needed

Storage of chemicals

- Only suitable and allowed container
- Confusion must be impossible
- No chemicals in fridges used for food!

Labeling of containers

- Chemical Name
- Concentration
- Hazard pictograms
- H.- und P.-Statements
- Group/responsible person
- Date
- CLAKS barcode

Hazard Pictograms

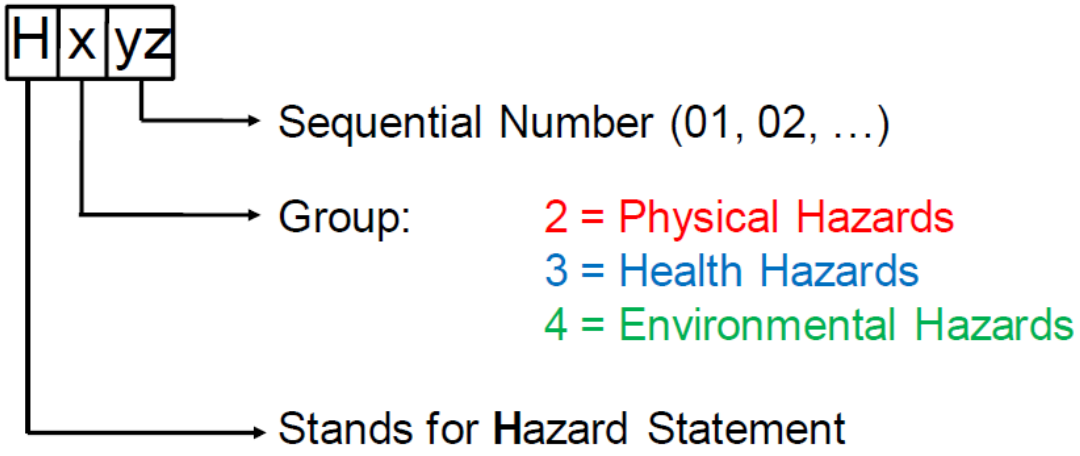
Global harmonized System GHS

Alt	Neu (GHS)
	
	
	
	
	
	

	
	
	Keine direkte Entsprechung
	
Keine direkte Entsprechung	
Keine Entsprechung	
Keine Entsprechung	

H- und P-Statements

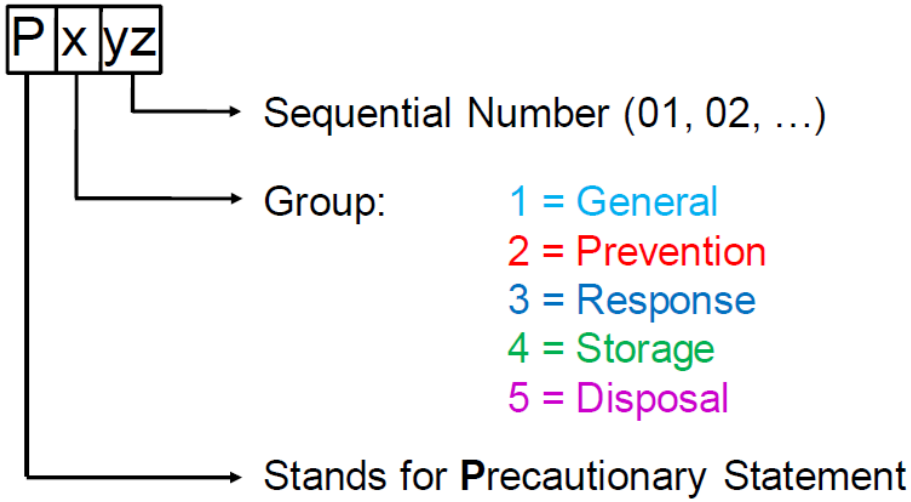
Hazard-Statements



→ Safety data sheet

H- und P-Statements

Precautionary Statements



→ Safety data sheet

Material safety data sheet

Sicherheitsdatenblatt

gemäß Verordnung (EG) Nr. 1907/2006 (REACH), geändert mit 2015/830/EU

Ethanol 96%, Ph.Eur., reinst

Artikelnummer: **P075**

2.2 Kennzeichnungselemente

Kennzeichnung gemäß Verordnung (EG) Nr. 1272/2008 (CLP)

Signalwort **Gefahr**

Piktogramme

Gefahrenhinweise

H225	Flüssigkeit und Dampf leicht entzündbar
H319	Verursacht schwere Augenreizung

Sicherheitshinweise

Sicherheitshinweise - Prävention

P210	Von Hitze, heißen Oberflächen, Funken, offenen Flammen sowie anderen Zündquellenarten fernhalten. Nicht rauchen.
P233	Behälter dicht verschlossen halten.

Sicherheitshinweise - Reaktion

P305+P351+P338	BEI KONTAKT MIT DEN AUGEN: einige Minuten lang behutsam mit Wasser ausspülen. Eventuell vorhandene Kontaktlinsen nach Möglichkeit entfernen. Weiter spülen.

Kennzeichnung von Verpackungen bei einem Inhalt von nicht mehr als 125 ml

Signalwort: **Gefahr**

Gefahrensymbol(e)

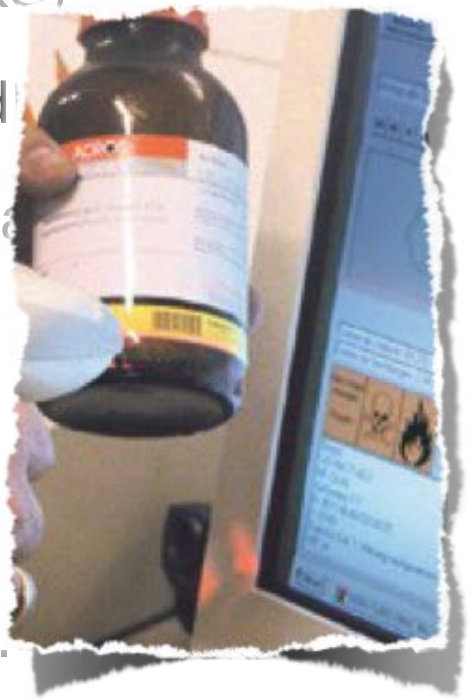
P210	Von Hitze, heißen Oberflächen, Funken, offenen Flammen sowie anderen Zündquellenarten fernhalten. Nicht rauchen.
P233	Behälter dicht verschlossen halten.
P305+P351+P338	BEI KONTAKT MIT DEN AUGEN: einige Minuten lang behutsam mit Wasser ausspülen. Eventuell vorhandene Kontaktlinsen nach Möglichkeit entfernen. Weiter spülen.

2.3 Sonstige Gefahren

Es liegen keine zusätzlichen Angaben vor.

CLAKS-database software

- Chemikalien Lager und Kataster System (CLAKS)
- Provides register/database for substances used
- Accounts for everybody who works with chemica
- Includes material safety data sheets and additional information
- Easy labeling of containers
- Each group needs to have a “CLAKS represent
- Procurement of chemicals possible



Information: http://www.chemie.uni-hamburg.de/claks/

Conclusion: Handling

It doesn’t matter which hazardous substances you use:

- leaches, acids, solvents
- compressed gases
- liquid nitrogen
- .....

It’s always important to be informed about the chemicals you are working with!!!

Disposal

Disposal is allowed only using specific containers

- **Container unexpired and clean from outside**
- **Correct labeling according specific guidelines**
- **Mandatory: hazard pictograms/UN-Code/origin of waste Must not be changed**

Transport to disposal station:

- **Carefully seal containers**
- **use buckets for carrying smaller containers, bowls for larger ones**
- **Wear suited protective equipment according to requirements of substance handled, i.e. solvent proof!**
- **Take special care of glass ware (risk of damage&cutting damage)**

Disposal

- For the Campus Bahrenfeld:
  → storage of dangerous materials container next to building 65

- Disposal is organized by Mr. Poppendieker, contacting him is mandatory!

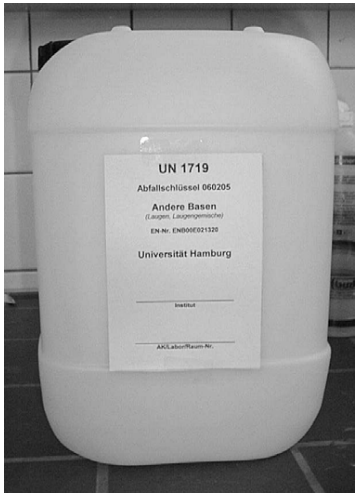
→ Supply of all material needed

→ bernd.poppendieker@desy.de,
0151-25052761 or 8998-2186

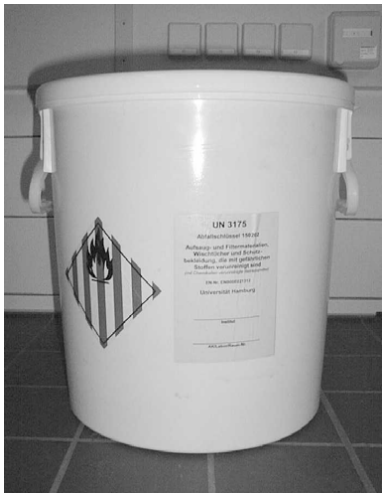
Allowed containers

Organic solvents, halogenated

Organic solvents, halogen-free



- Acids and acids mixtures
- Leaches and leach mixtures
- machine oils
- disinfections solutions



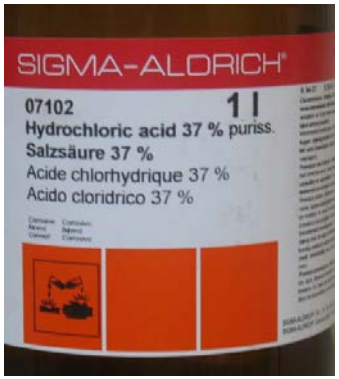
- Contaminated tissues, filters, gloves & clothes
- Broken glass
- Other solid contaminated waste

Pick up and disposal in the storage container

Labelling of disposal containers

Waste label: „Abfalletikett“

- **Must contain UN-code , the waste code (Abfallschlüsselnummer), a detailed description of the content and the origin (name, working group)**
- **Here the sames rules as for the labes for the chemicals apply!**
- **The disposal labels must not be changed or overwritten! Name of responsible person needs to be placed before filling the container.**



Transport- and handling regulations

Transport to disposal station:

- Carefully seal containers
- use buckets for carrying smaller containers, bowls for larger ones
- Wear suited protective equipment according to requirements of substance handled, i.e. solvent proof!
- Take special care of glass ware (risk of damage&cutting damage)

Labeling

- Appropriate hazard label has to be used, i.e.
- Disposal label has to contain:
  - UN-code
  - Origin of waste
  - Must not be changed

Transport- and handling regulations

Hazard label and pictograms: examples

UN 1719

Abfallschlüssel 060205

Andere Basen
(Laugen, Laugengemische)

EN-Nr. ENBAVG024041

Universität Hamburg

_____
Institut

_____
AK/Labor/Raum-Nr.

flammable

corrosive

Available from Mr. Poppendieker

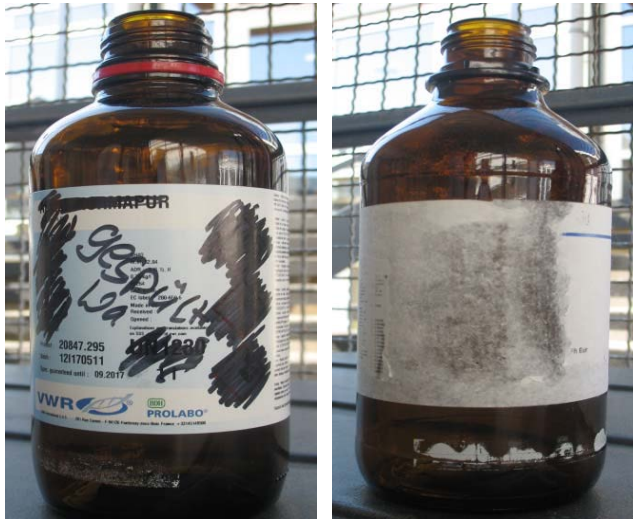
Transport- and handling regulations

Do NOTS:

Disposal of emptied containers/bottles

- **Containers have to be fully emptied&rinsed**
  - **No remaining chemicals**
  - **No smelling**
  - **Labels removed/destroyed**

- **Glas bottles should be disposed in regular bottle banks**
- **Follow transport and handling regulations**



Safetybox/Disposal of cannulas

- **dedicated box for used cannulas, different sizes available**
- **used cannulas are disposed as „chemically contaminated equipment“**
- **use of safetybox is mandatory!**
- **carefully seal box after completely filled**
- **in case of toxic contamination extra labelling required!!!**
- **disposal of the plastic caps is carried out separately**

Thank you for your attention!

Questions?

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Fachbereich Physik

Laser safety instruction

for the institute of experimental physics – location Bahrenfeld

Mark Prandolini, AG Prof. Drescher

University of Hamburg

2018/2019

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. Behavior in case of accident
4. Classification of lasers
5. Independent calculation of laser googles
6. Laser safety training for employees of the Institute

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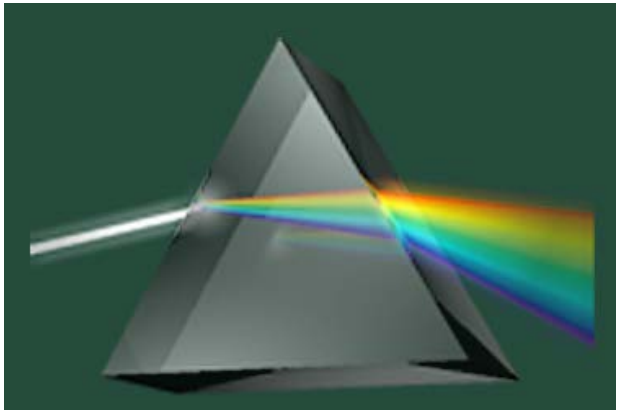
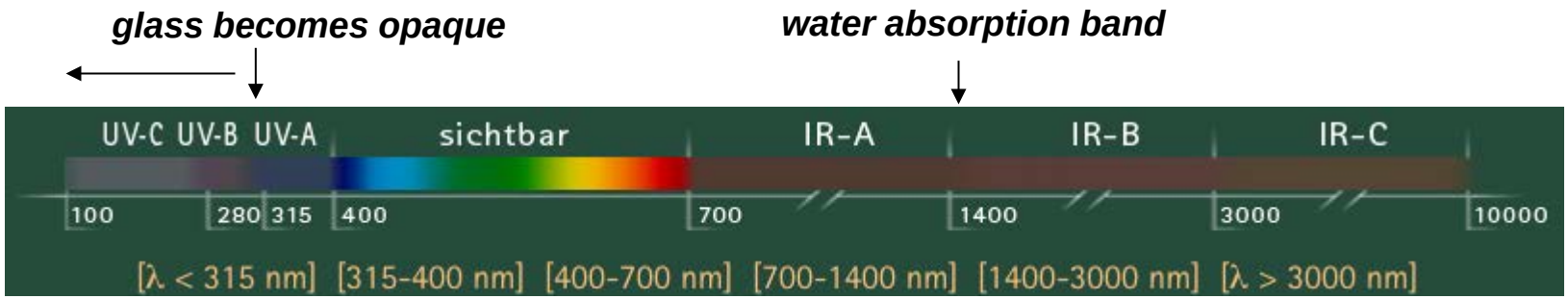
Fachbereich Physik

- 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.

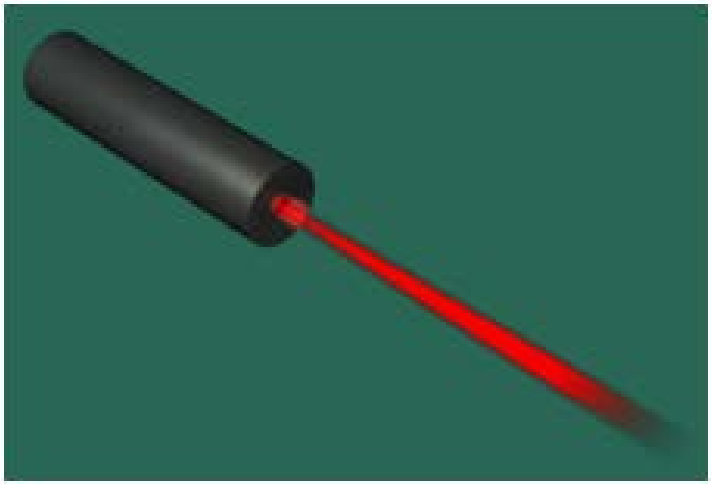




Spectral range from UV to far-infrared

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

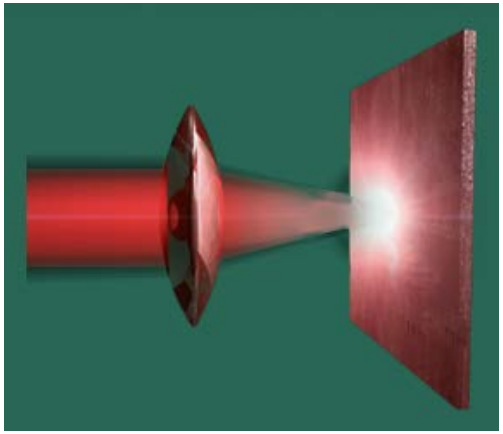
- Laser radiation always spreads as a ***collimated*** beam !

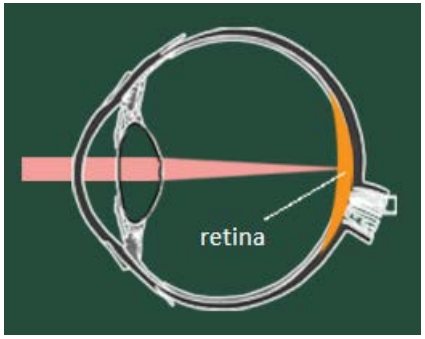


collimated beam

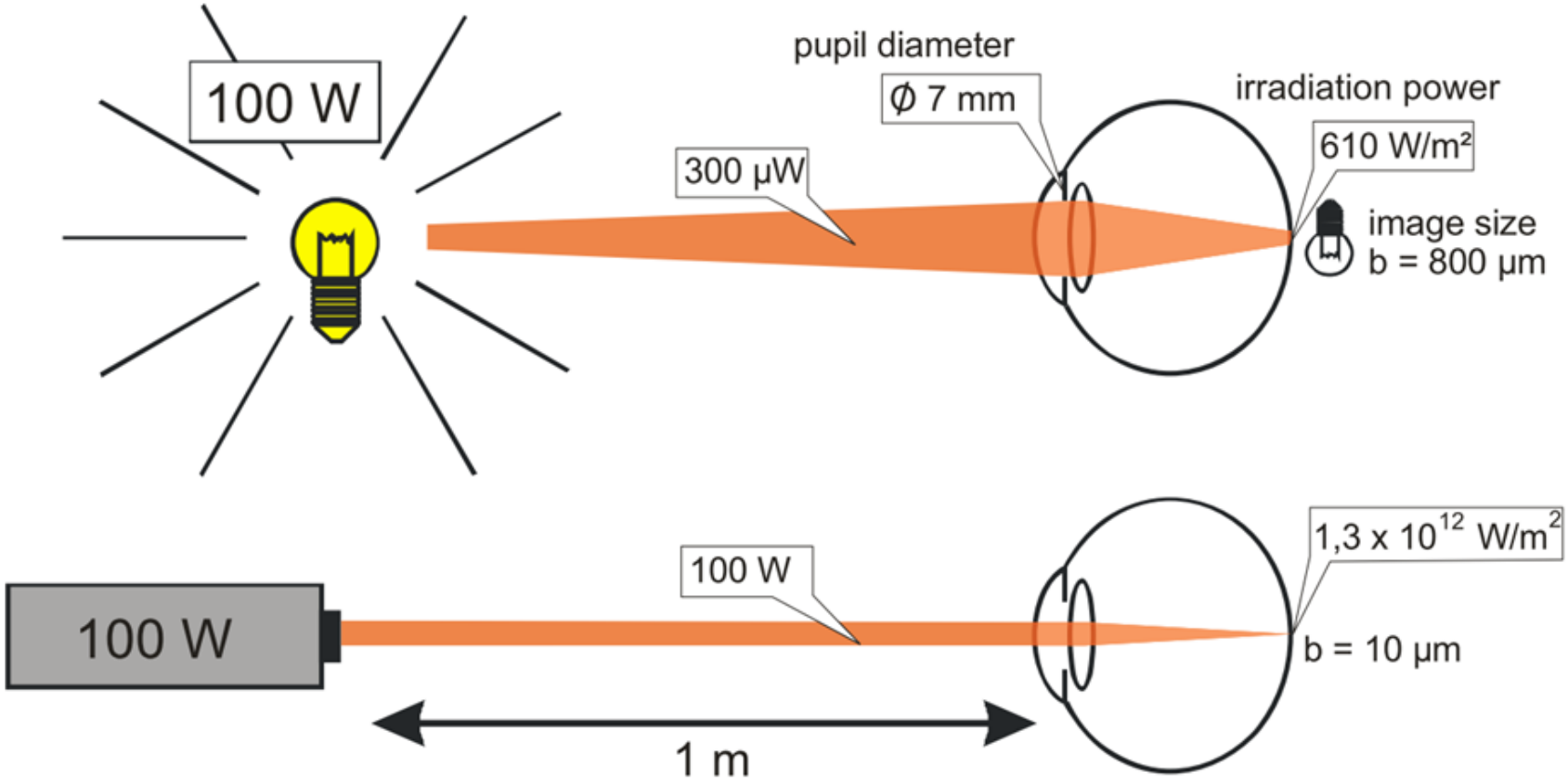
4π-emitter,
uncollimated

- 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.





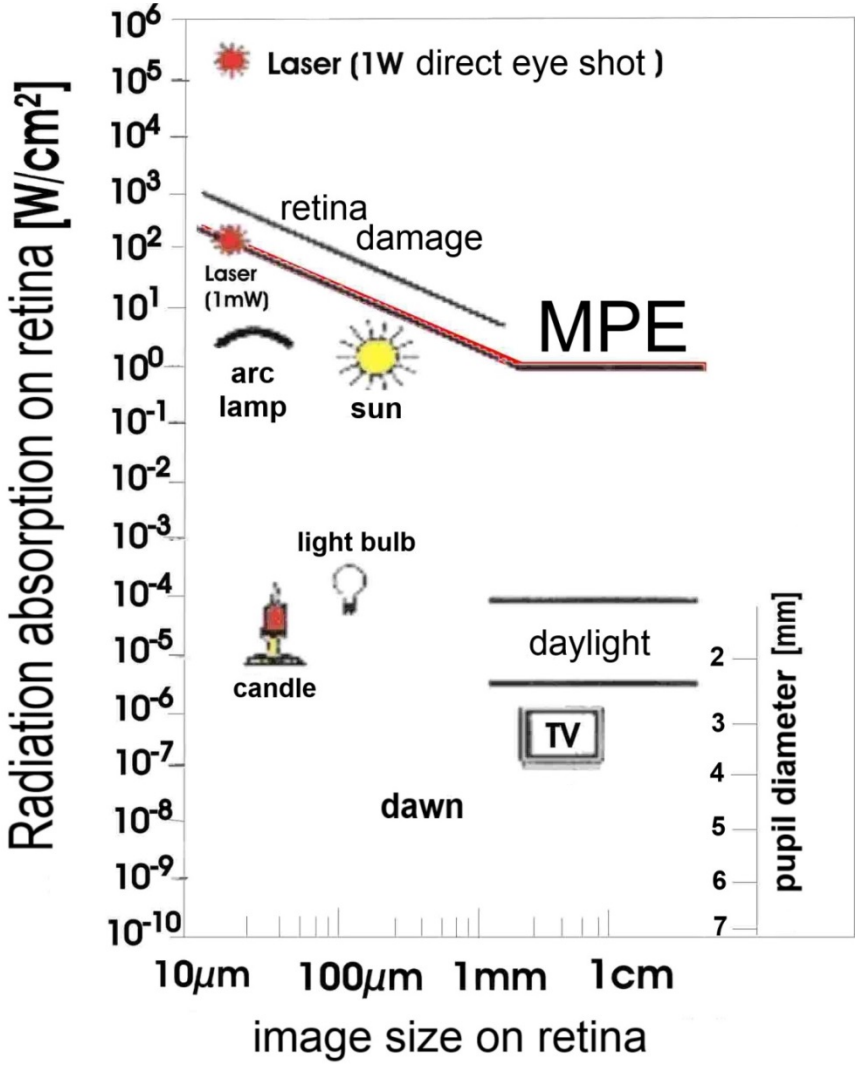
Comparison light bulb – laser beam



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

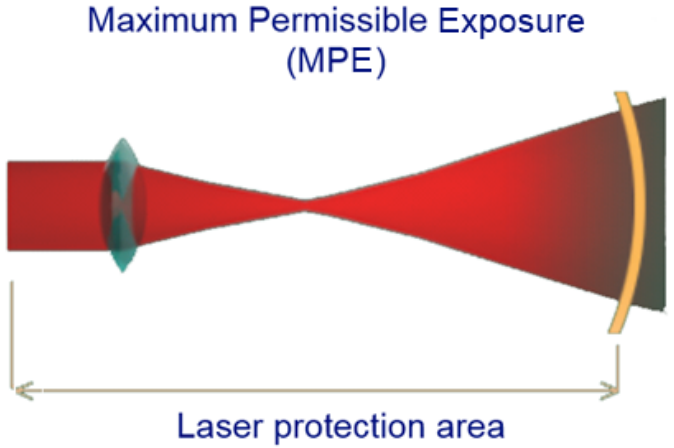
Interaction thresholds – light with eye



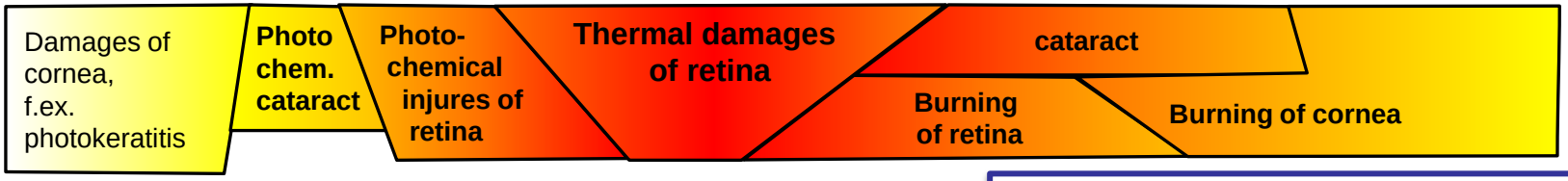
Damage of tissue appears after exceeding a certain irradiation power level [W/cm²].

⇒ 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.

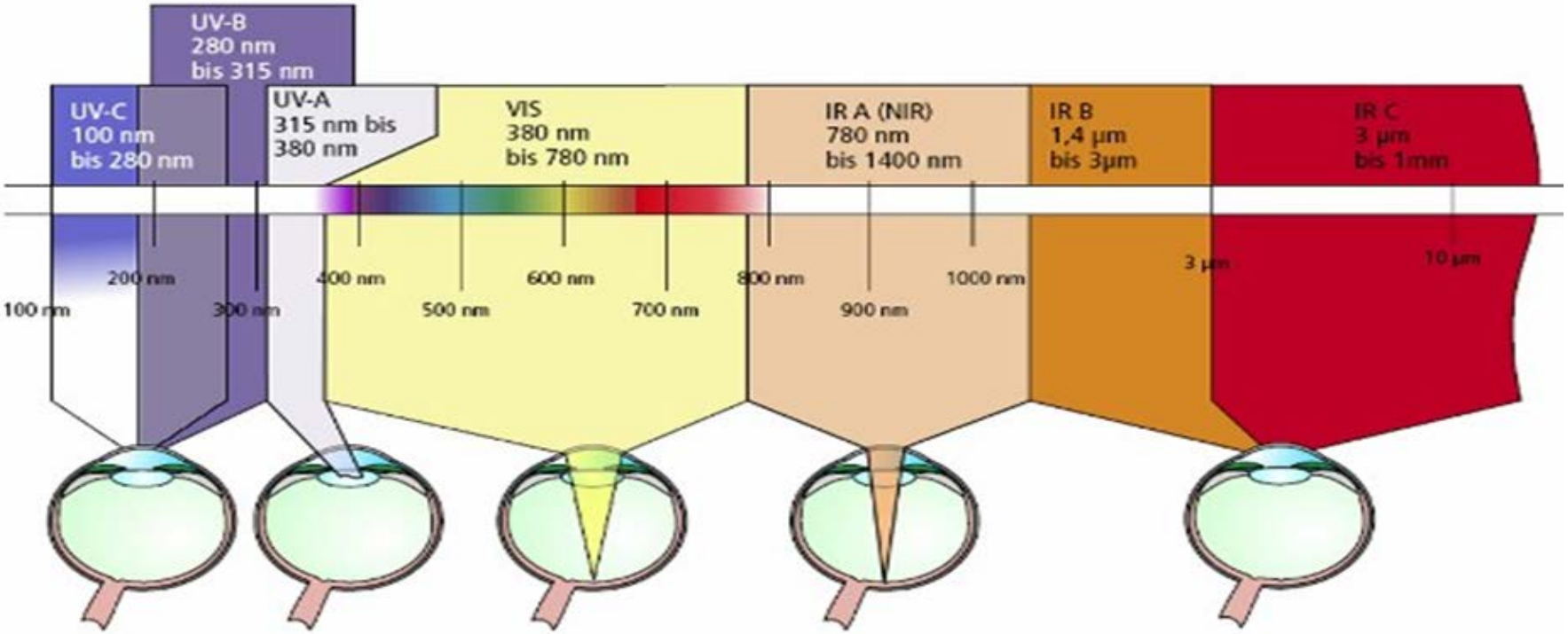


Injury of eye in different spectral ranges



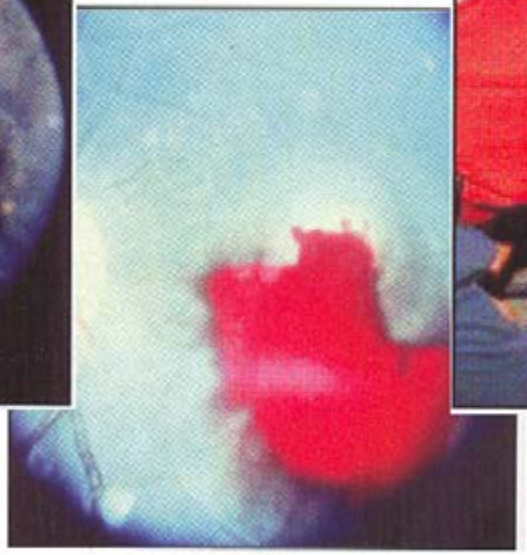
300µW/cm² - sun

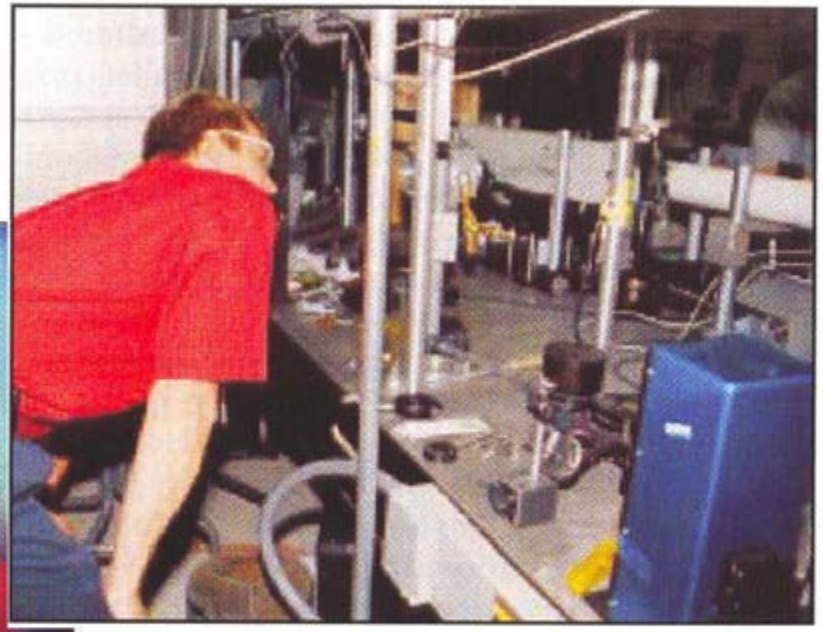
Photokeratitis = inflammation of cornea



Eye penetration depth of spectral ranges

- Laser accident by observation of a process chamber





- Q-Switch Nd:YAG Laser
- λ = 1064 nm

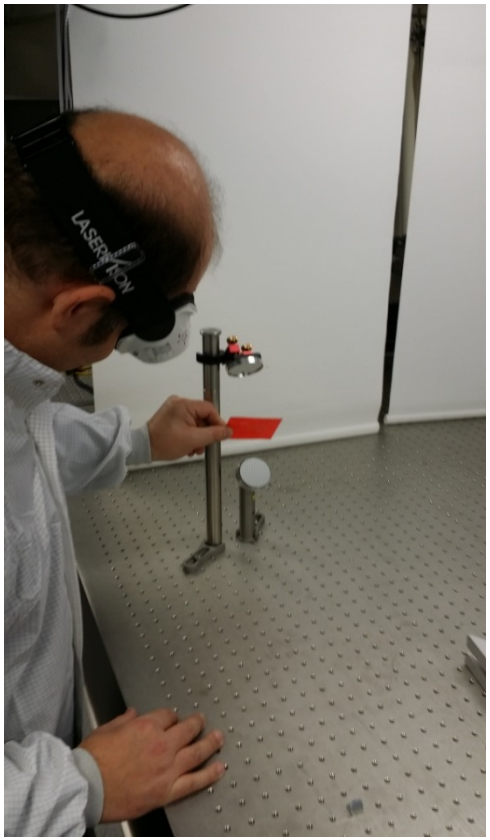
- Damage size of retina , ca. 0,4 x 0,25 mm^2

Photonics Spectra, 03/2005

Alignment of a periscope

wrong

right



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

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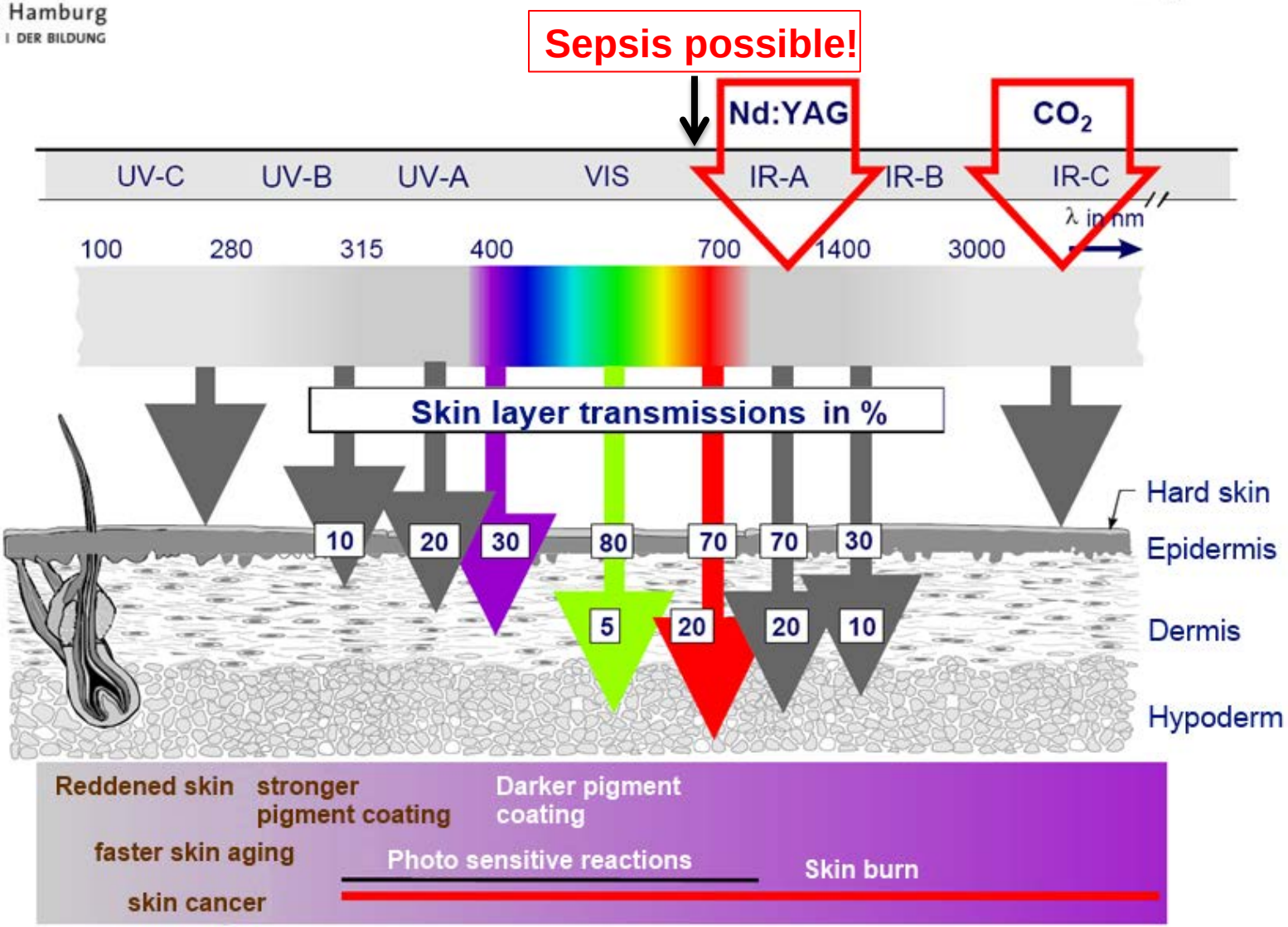
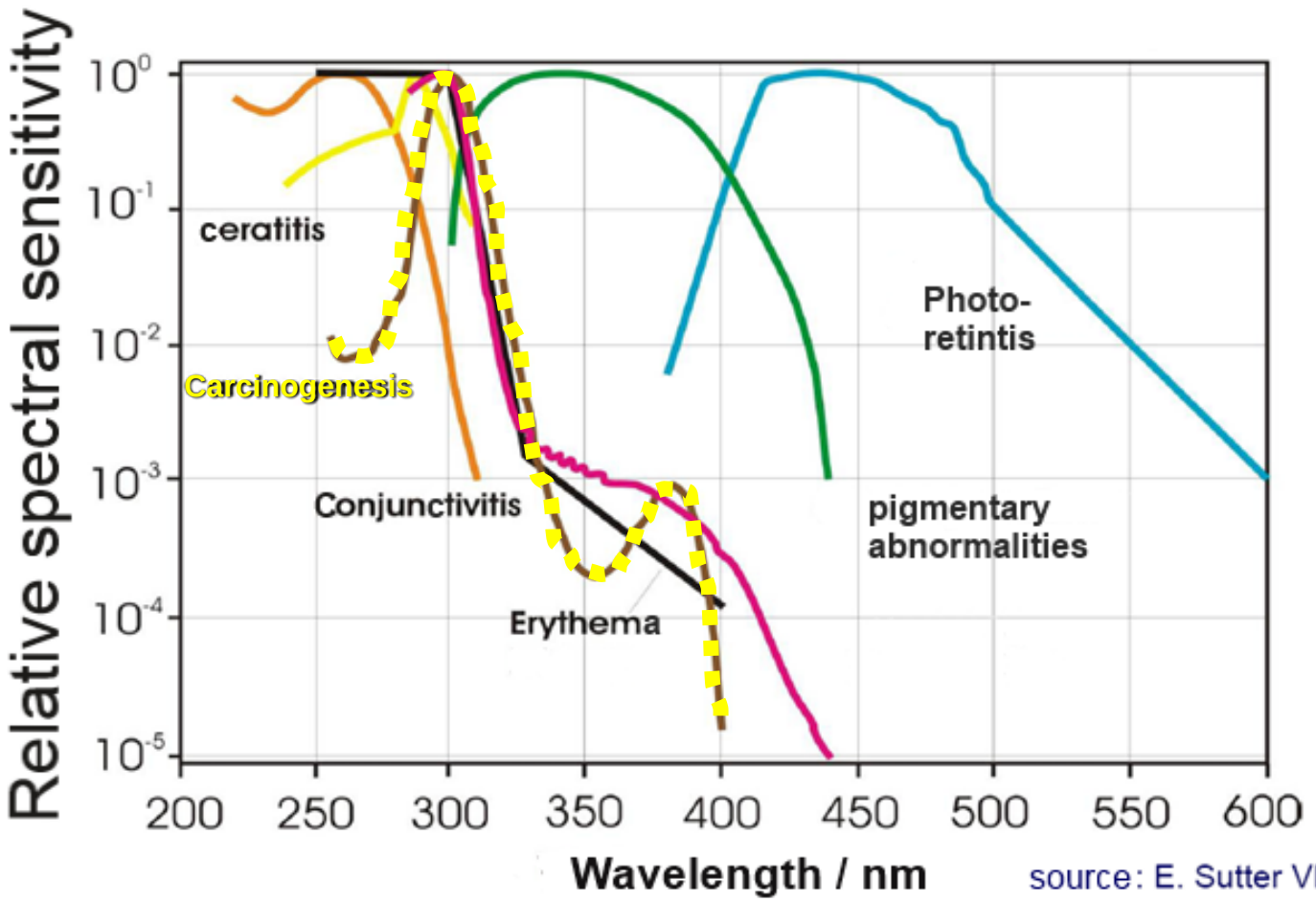
Fachbereich Physik



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 !

Behavior in case of laser accident !

- 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

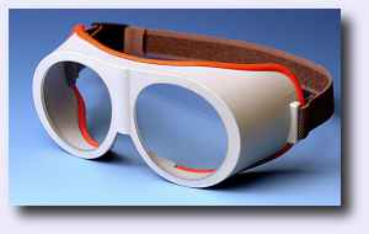
- Due to scarring a local retina damage can spread further. A doctor is able to stop the scarring and inhibit further nerve damage!
- Strong IR radiation can deeply penetrate the skin and may lead to an inner injury, which can lead to a sepsis !

Laser safety precautions - general

- 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

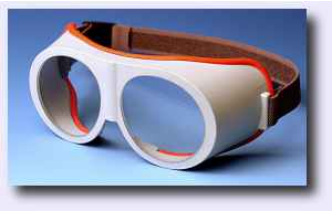
Certified gloves are available from Laservision and JUTEC

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 look into the beam

Laser class 2

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

Laser radiation

Don´t look with optical instruments

Laser class 1M

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

Laserstrahlung

Don´t look 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 to the accident insurance fund (german: Unfallkasse Nord). Instead declaration must be done at the *university department of safety at work* directly !

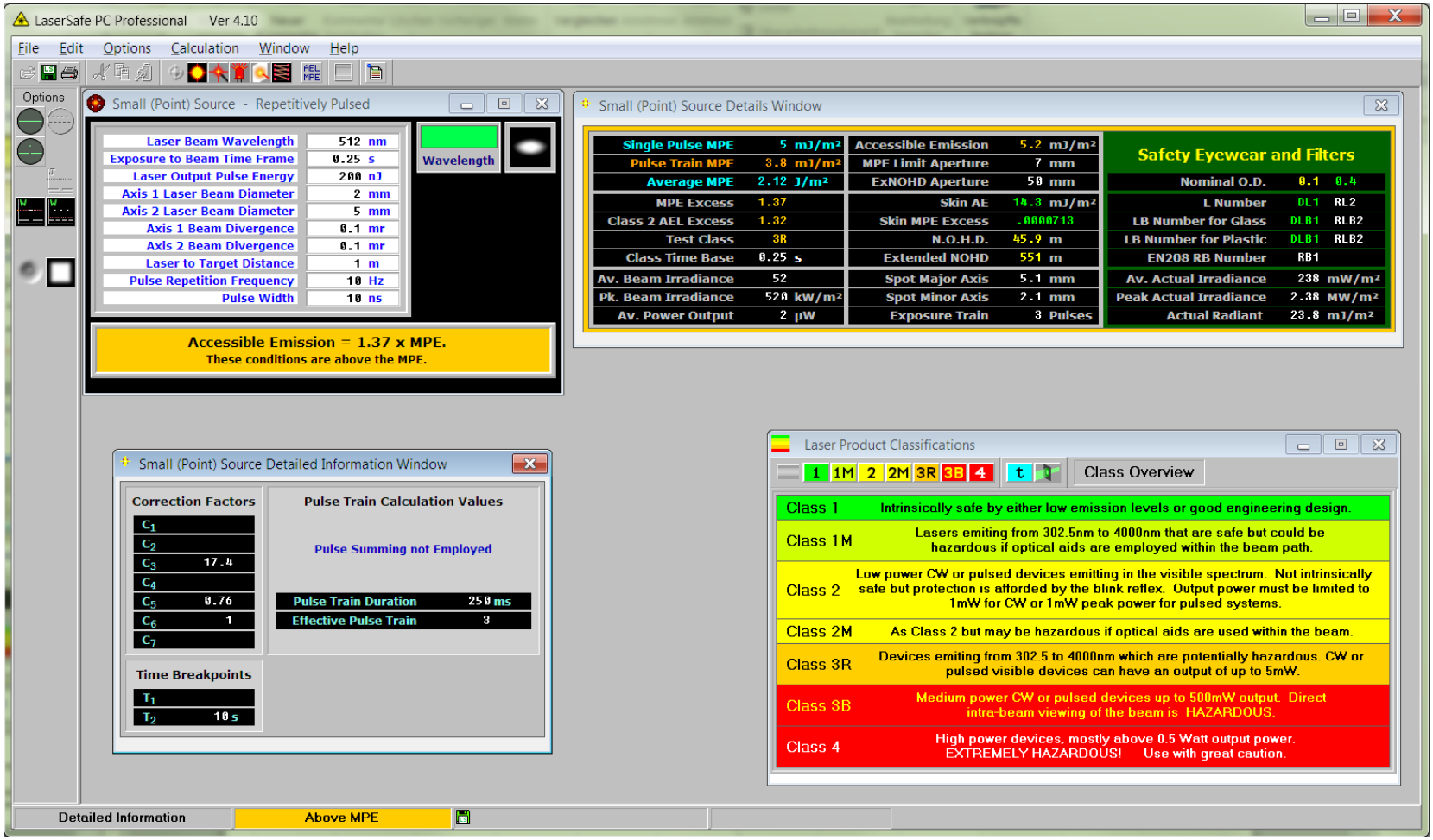
- The laser class must be known and a risk assessment must be created.

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

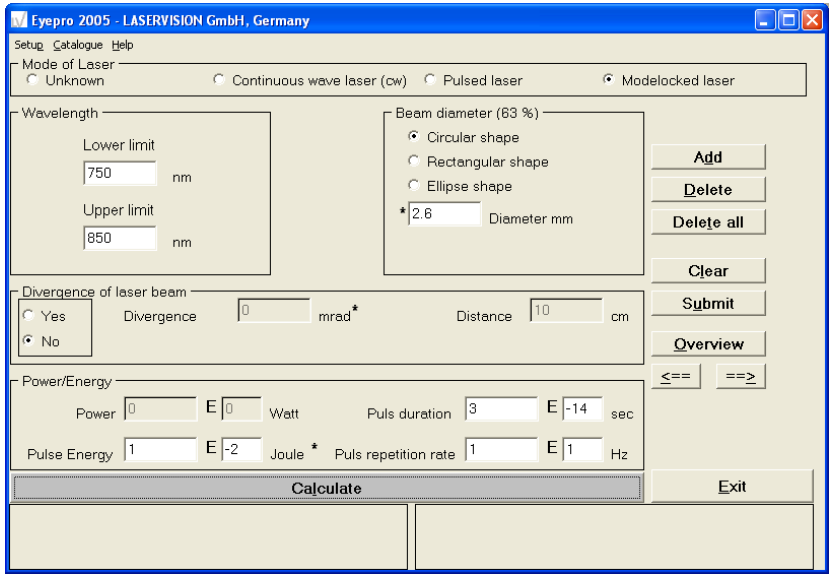
  Geb. 62, 3. Stock, **armin.azima@desy.de**

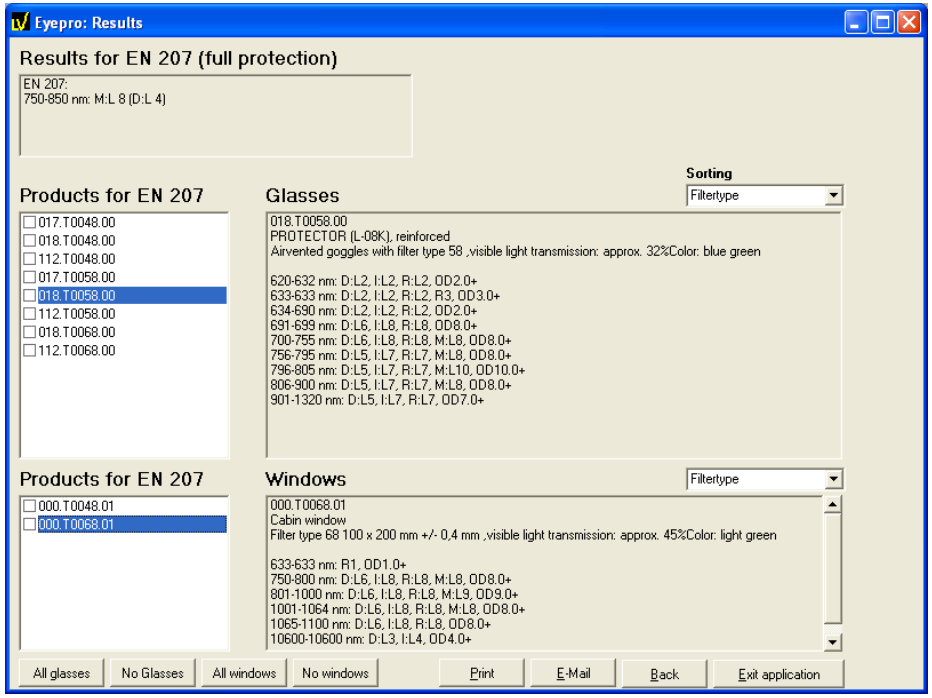
Calculation of laser classes and filter levels

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



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



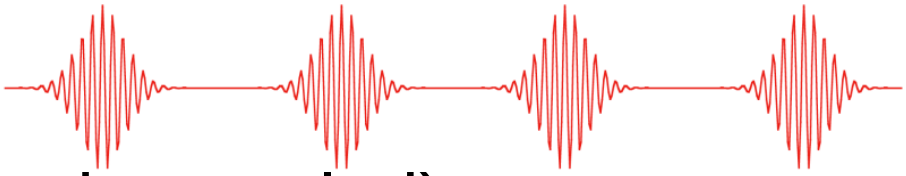


- magic thresholds, which define the level of laser protection (>400nm):

- cw-beam:

>1mW emitted power

- pulsed radiation:



>3nJ (mode coupled)

>200nJ (flash lamp induced)

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 Armin Azima in advance)

armin.azima@desy.de

- 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

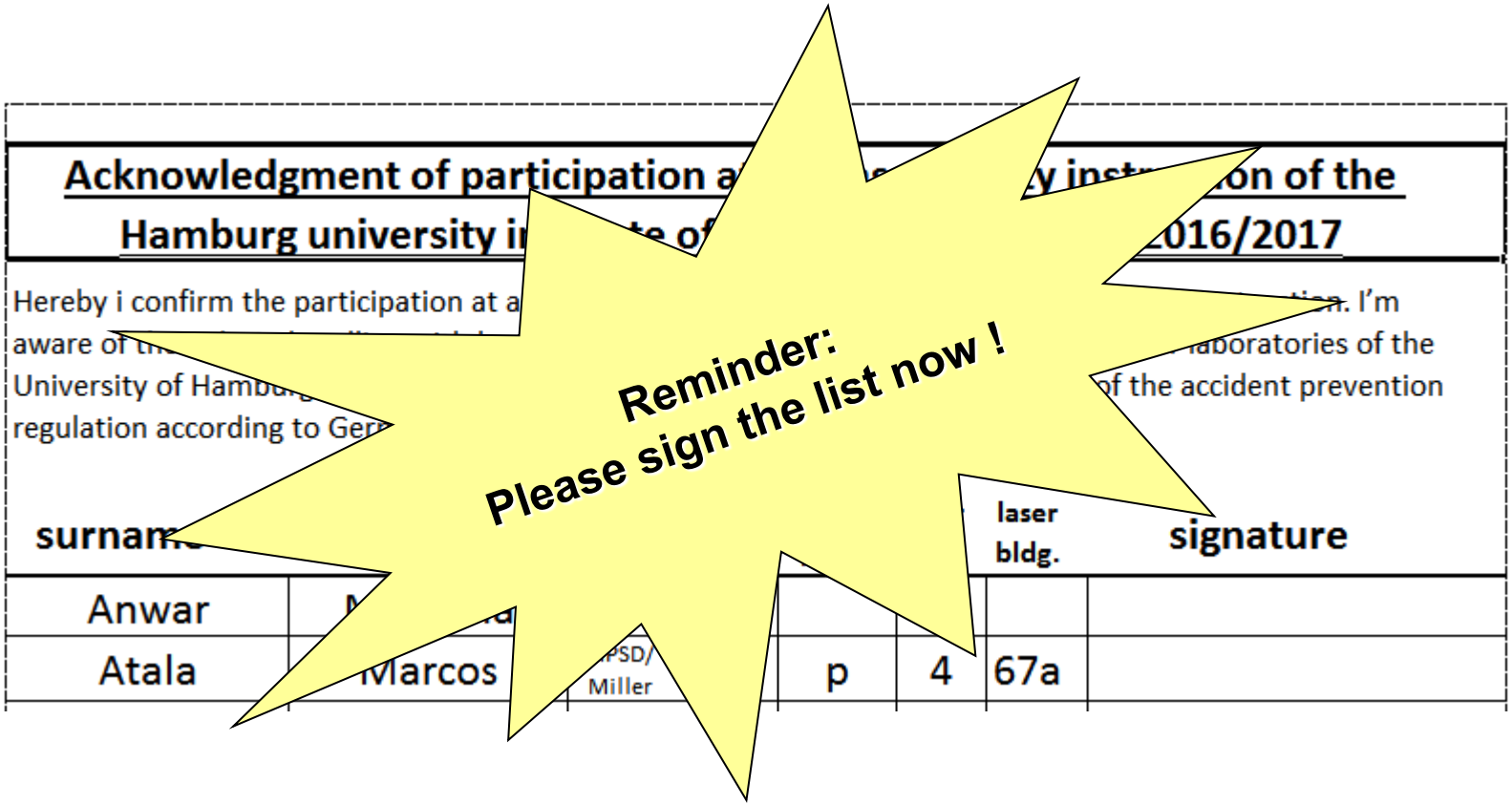
- The directive **TROS-Laser** is now binding for all institutes on the DESY campus !

- 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…

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

Reminder:
Please sign the list now !

Thank you for your attention!

Instructions for Radiation Protection

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



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)
  - “Röntgenschutzverordnung” (RöV)
  - 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)
Rüdiger Eggerstorf	StrlSchV		✔		
Michael Matysek	StrlSchV	✔			
Marek Wieland	RöV	✔			
Ole Windmüller	StrlSchV RöV			✔	
Martin Tluczykont	StrlSchV RöV	✔	✔	✔	✔

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

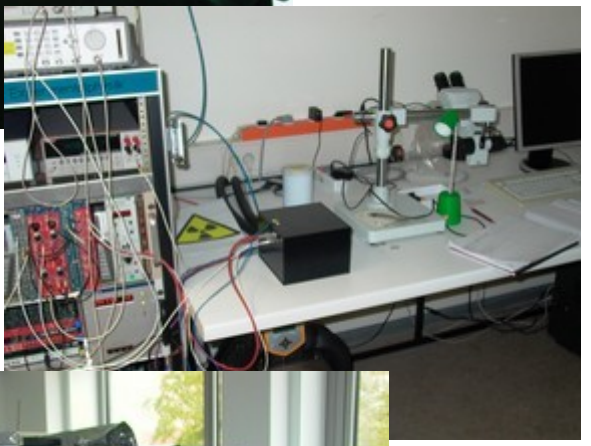
Radiation at the Institute for Experimental Physics

Storage

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

Radiation at the Institute for Experimental Physics

Usage in experiments



Radioactive materials:

– stored in safes at different locations

– can be used in experiments

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 !

Limits on exposure to radiation “Dosisgrenzwerte”

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    regularly inside “Kontrollbereich” / radiation controlled area
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    occasionally inside “Kontrollbereich” / radiation controlled area
- **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