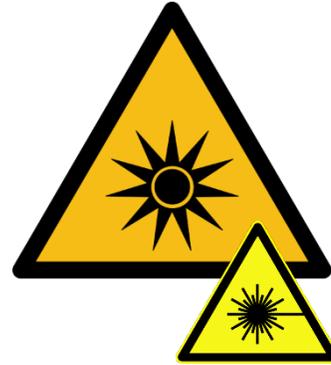
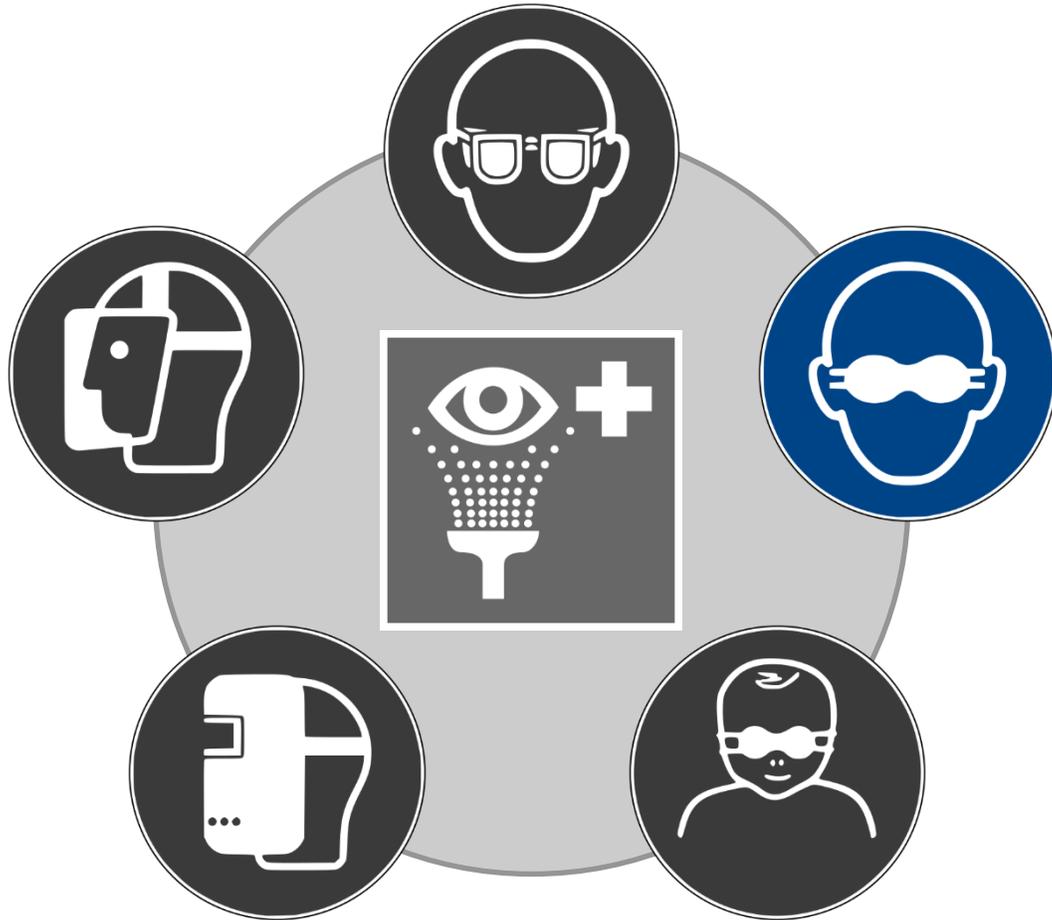


Eye Safety

Swissphotonics



Center of Competence for Opto-Electronics

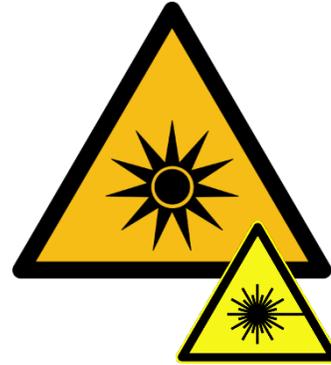
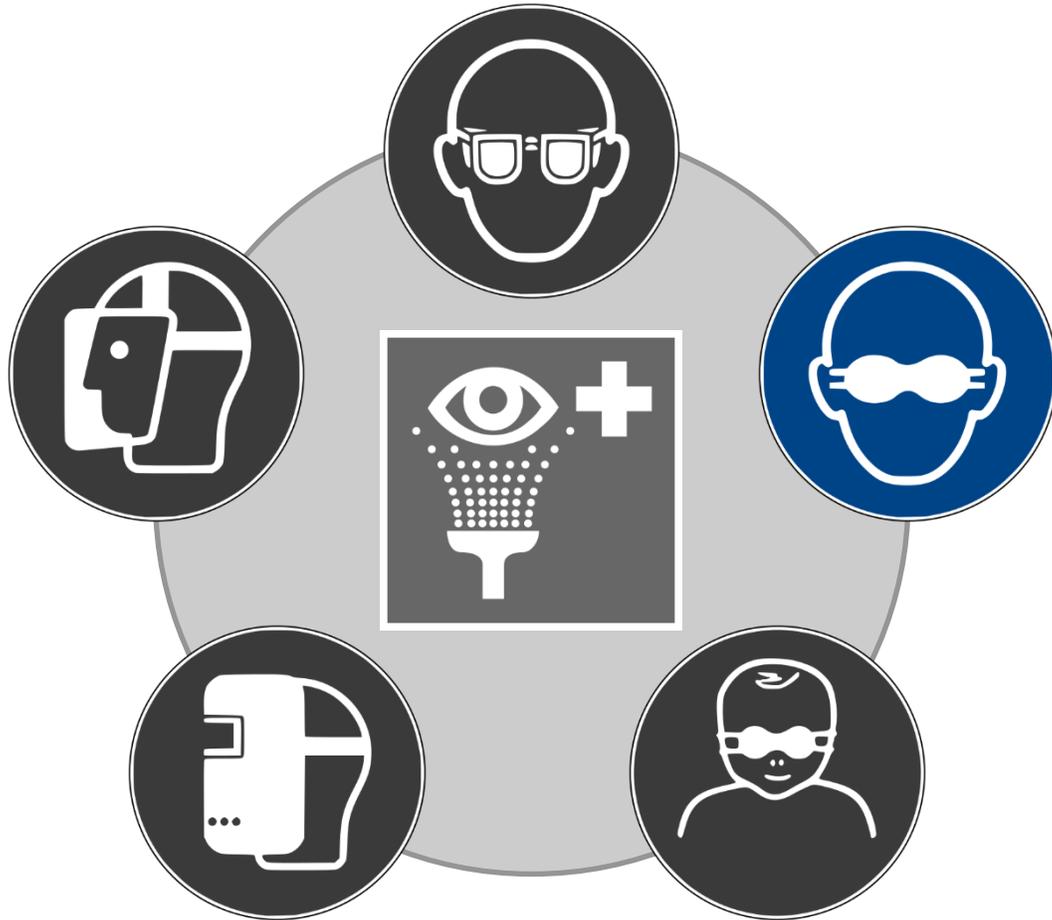


optical radiation in the visible and near-infrared range

Center of Competence for Opto-Electronics:

1. Robustness against extraneous light
2. Characterization of optical devices regarding specifications
3. Light sources and eye safety

Center of Competence for Opto-Electronics

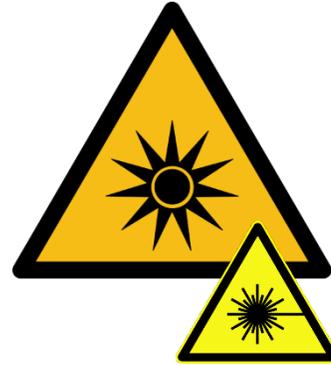
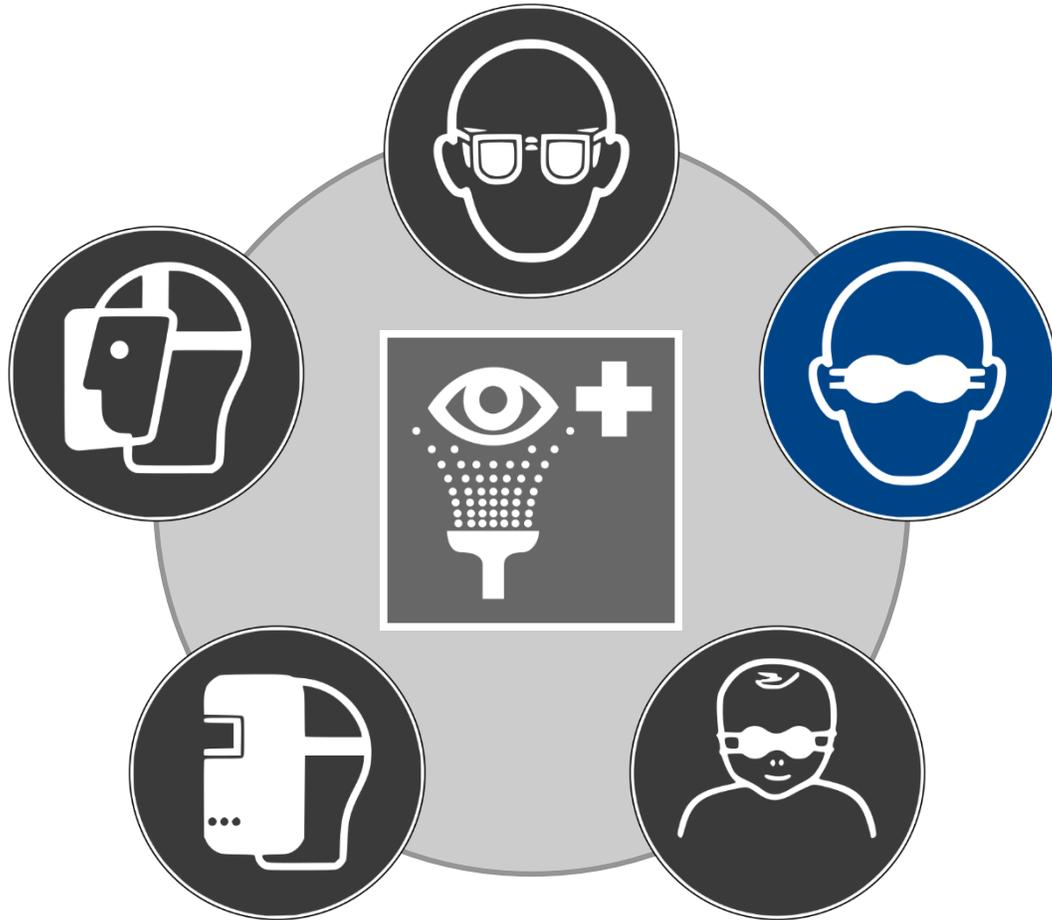


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Center of Competence for Opto-Electronics



optical radiation in the visible and near-infrared range

Center of Competence for Opto-Electronics:

1. Robustness against extraneous light
2. Characterization of optical devices regarding specifications
3. Light sources and eye safety



divergent



collimated



convergent

Problem? – Please ask us any question!

Need to start working
with lasers or high
intensity sources?

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Need to start working
with lasers or high
intensity sources?

Need to get CE, TÜV,
... certification?

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Need to start working
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Need to get CE, TÜV,
... certification?

Need to verify
compliance with
standards?

Problem? – Please ask us any question!

Need to start working
with lasers or high
intensity sources?

Need to get CE, TÜV,
... certification?

Need to verify
compliance with
standards?

Need to measure an
«exotic» quantity?

Problem? – Please ask us any question!

Need to start working
with lasers or high
intensity sources?

Need to get CE, TÜV,
... certification?

more to come...

Need to verify
compliance with
standards?

Need to measure an
«exotic» quantity?

Problem: start working with lasers or high intensity sources

Need to start working
with lasers or high
intensity sources?

We can support and advise you
regarding laser safety, setting up
your lab, product development,
measurements, etc.

Problem: start working with lasers or high intensity sources

Need to start working
with lasers or high
intensity sources?

setup your lab

- know-how
- safety, protection
- equipment
- experiments

product development

- standards
- simulation, modelling
(Zemax, python)
- design, construction
- classification
(according standards)

measurements

- according standards
- temporal
- spatial / geometry
- spectral

Problem: compliance with standards

Need to verify
compliance with
standards?

We can help you figure out what
standards apply and what the
implications to your product are

Problem: compliance with standards



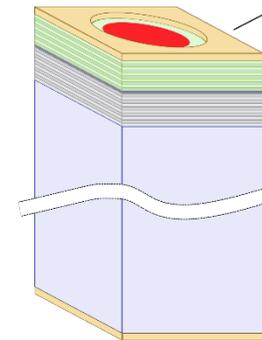
ToF camera



LED

DIN Norm EN 62471
«Photobiological safety of
lamps and lamp systems»

eye-safe = group 1 / low risk



VCSEL

DIN Norm EN 60825
«Safety of laser products»

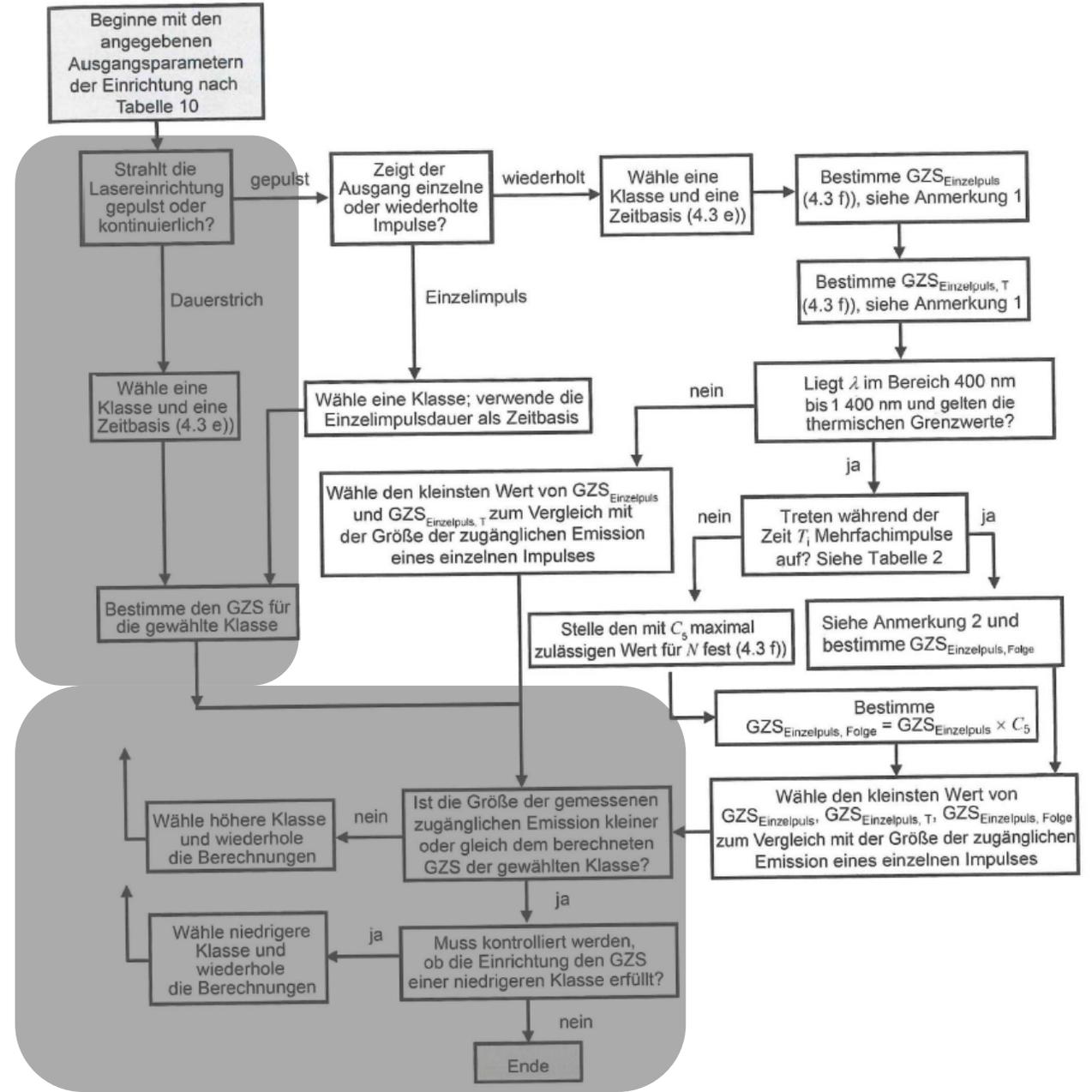
eye-safe = laser class 1

Need to verify
compliance with
standards?

Problem: compliance with standards – DIN Norm EN 60825

most simple but also most strict assessment
continuously emitting point source

Need to verify compliance with standards?

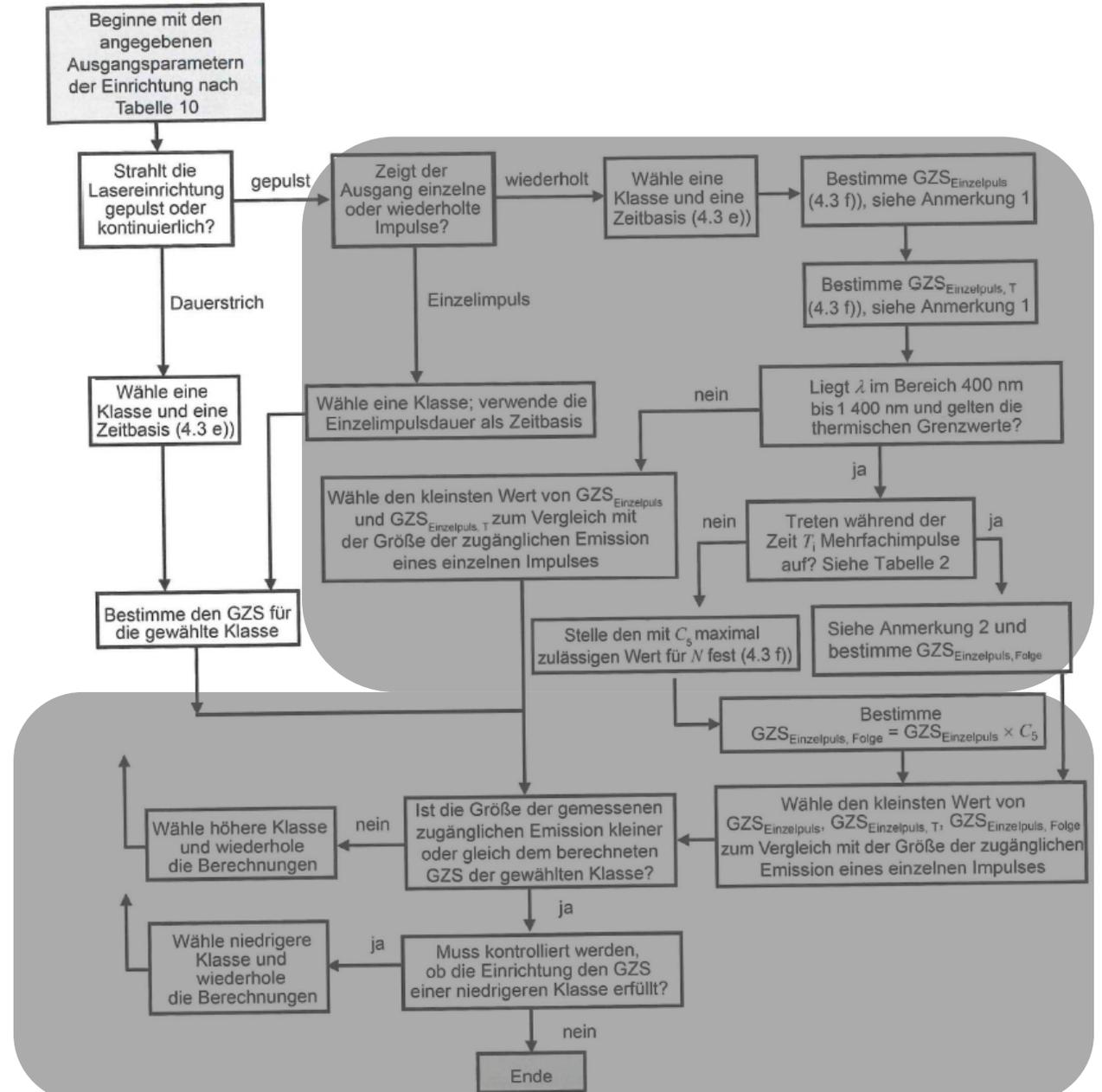


Problem: compliance with standards – DIN Norm EN 60825

complex assessment that allows to apply higher power

depending on temporal and spatial (geometry) distribution

Need to verify compliance with standards?



Problem: compliance with standards – ToF & VCSEL – DIN Norm EN 60825

Need to verify compliance with standards?



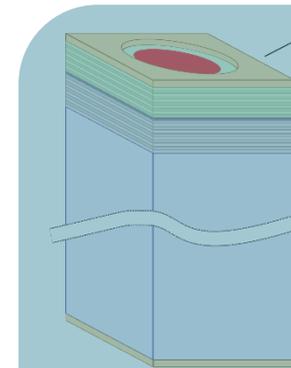
ToF camera



LED

DIN Norm EN 62471
«Photobiological safety of lamps and lamp systems»

eye-safe = group 1 / low risk

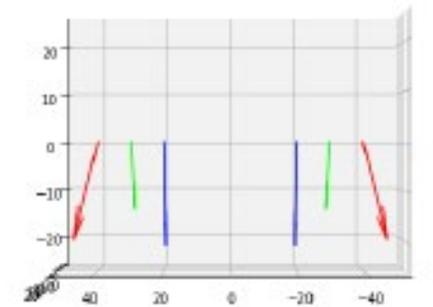
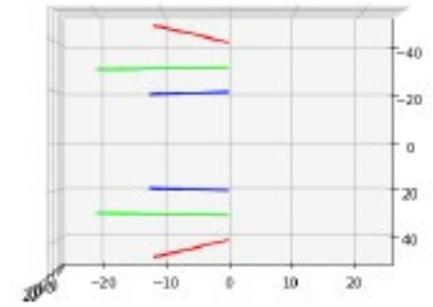
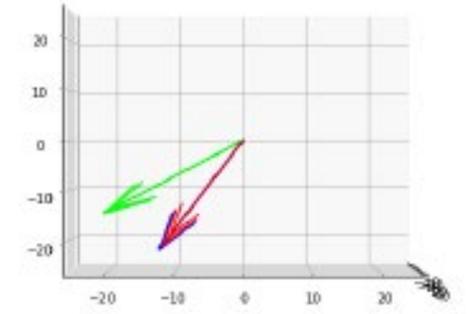
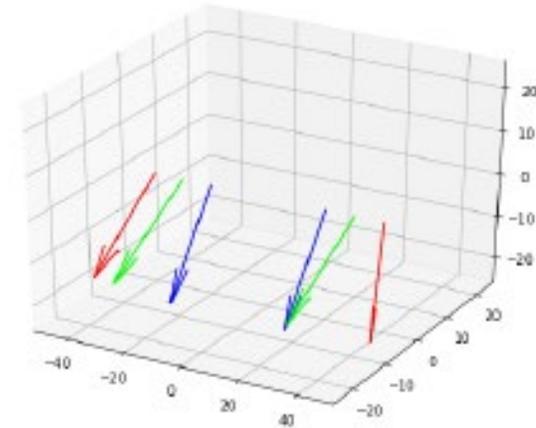
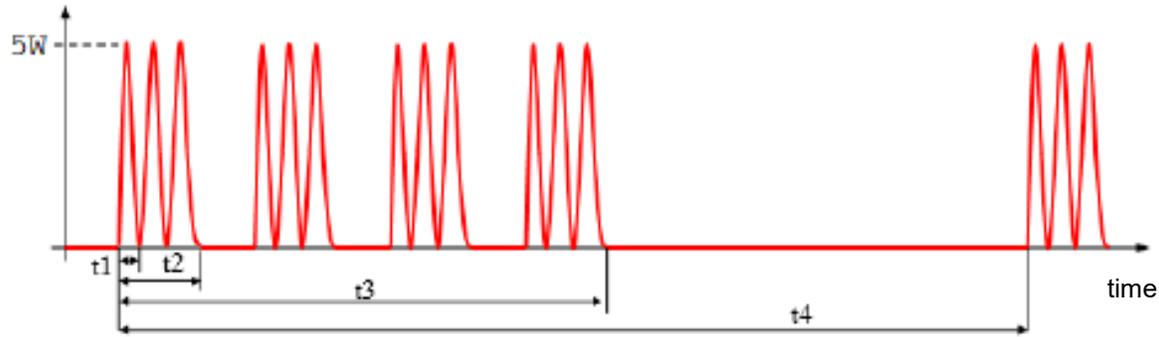


VCSEL

DIN Norm EN 60825
«Safety of laser products»

eye-safe = laser class 1

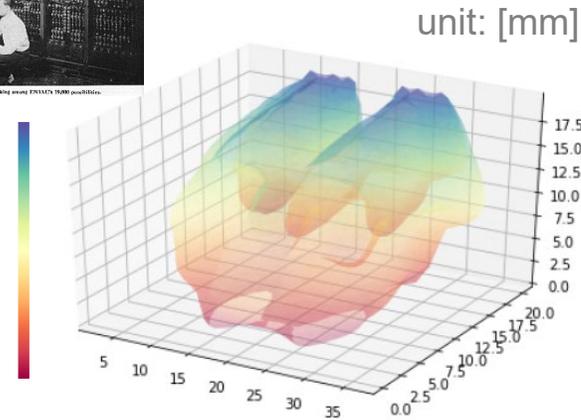
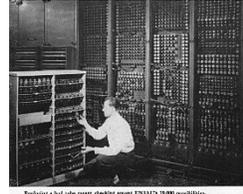
Problem: compliance with standards – ToF & VCSEL – DIN Norm EN 60825



Need to verify compliance with standards?

unit: [mm]

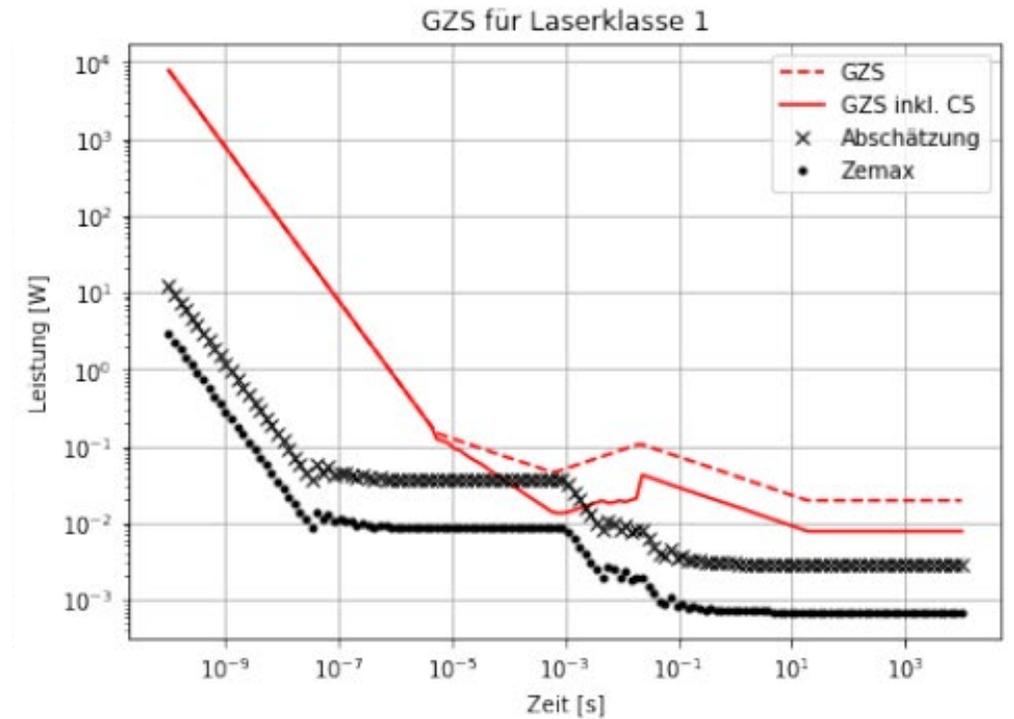
Problem: compliance with standards – ToF & VCSEL – DIN Norm EN 60825



Modell and Simulation

Need to verify compliance with standards?

Power



Problem: compliance with standards – ToF & LED – DIN Norm EN 62471

Need to verify compliance with standards?



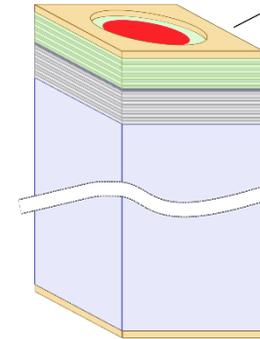
ToF camera



LED

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«Photobiological safety of lamps and lamp systems»

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VCSEL

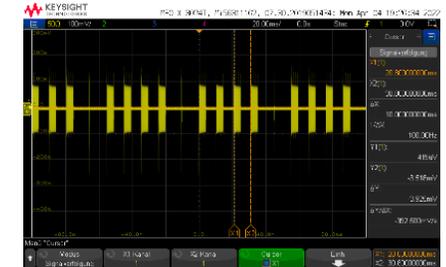
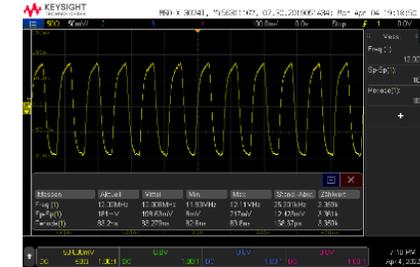
DIN Norm EN 60825
«Safety of laser products»

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Problem: compliance with standards – ToF & LED – DIN Norm EN 62471



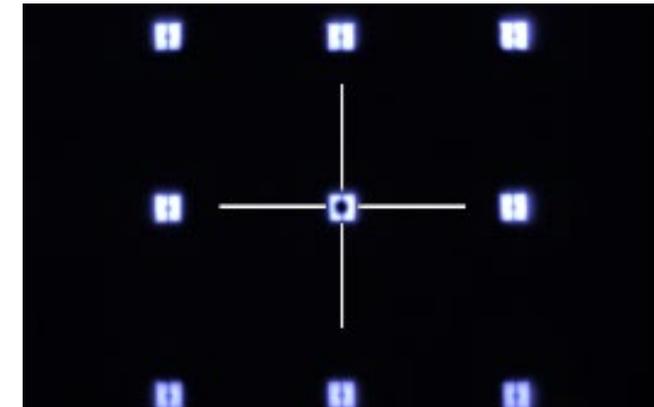
Timing



Illumination Geometry

Irrandiance (+Spectrum)

Radiance (+Spectrum)



Need to verify compliance with standards?

Problem: get CE, TÜV, ... certification

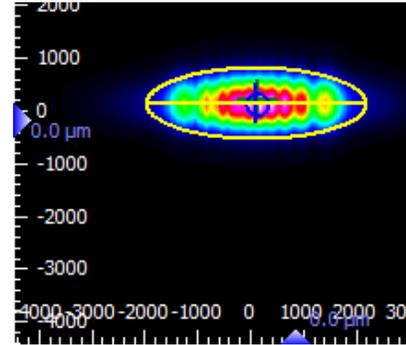
Need to get CE, TÜV,
... certification?

We can do measurement and
classification according to the
standards

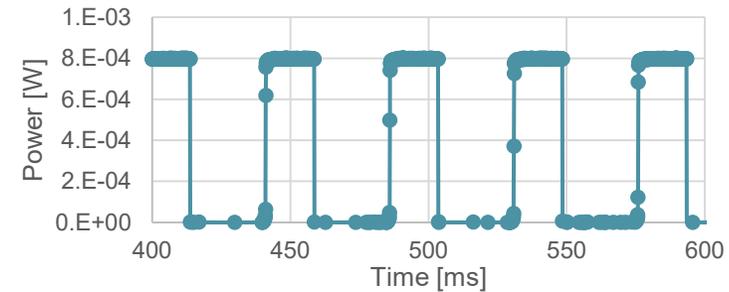
Problem: get CE, TÜV, ... certification



Illumination Geometry



Timing, Power and Energy



Need to get CE, TÜV, ... certification?

please note:

FHGR eye safety lab is currently **not** accredited.

However we can do the same measurements beforehand.

Problem: measure an «exotic» quantity

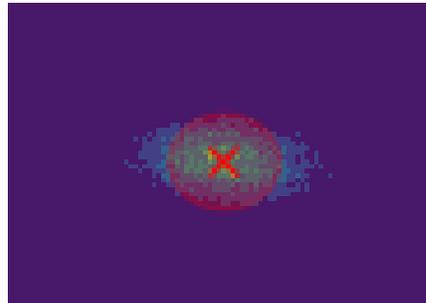
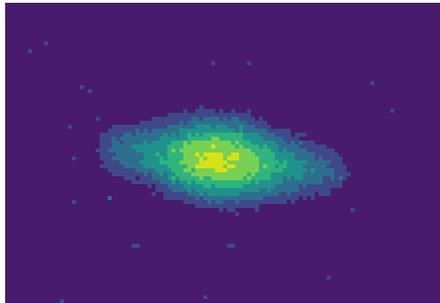
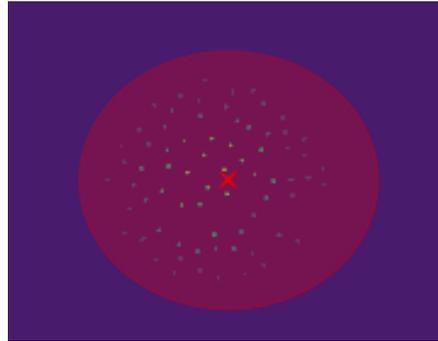
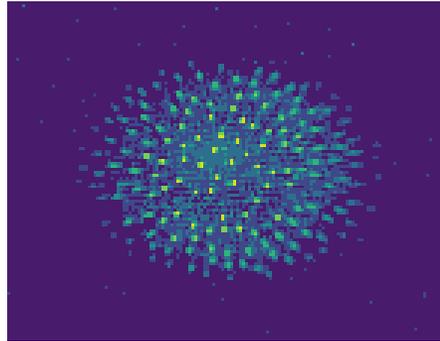
We have various measurement devices and setups to measure and calculate important quantities

Need to measure an «exotic» quantity?

Problem: measure an «exotic» quantity



Power (spatial)



Need to measure an «exotic» quantity?

Summary

Help to get you started:

- know-how
- safety, protection
- equipment
- experiments

Measure the Emissions:

- according standards
- time dependent
- position dependent
- wavelength dependent
- more (blue light, T/R, color, ...)

more to come...

Support your development:

- model/Sim.: selection of parts
- design: optimize usage
- classification: verify results

Consultation on any question:

- don't bother just call and ask
- we help you to solve the problem and proceed

Questions?

Help to get you started:

- know-how
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What is your question?

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Questions?

What is your
question?

Take-Home-Message:

**Consultation on any question -
don't bother just call and ask!**

**Vielen Dank für Ihre Aufmerksamkeit.
Grazia fitg per l'attenziun.
Grazie per l'attenzione.**