Information sheet on laser attacks

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Things you should know about **laser attacks**

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Bayerisches Laserzentrum

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What's behind it?

Drivers and emergency services are often intentionally blinded with laser pointers. In addition to criminal intent, boredom, peer pressure, ignorance, or simply a desire to play are often behind it. The consequences for those attacked can be dramatic in individual cases.

It is therefore important to us to raise awareness of the issue of laser attacks with this brochure and to provide you with background information that can help you to react correctly in the event of an incident.

Of course, this complex issue can only be highlighted in our short information sheet and does not claim to be exhaustive. However, it is certainly suitable as an initial source of information.

bLz Bayerisches Laserzentrum

Contents

Basics laser radiation

- LASER is an artificial word that stands for "**L**ight **A**mplification by **S**timulated **E**mission of **R**adiation.
- Special materials, such as specially grown crystals, are required to amplify light and generate laser radiation.
- The "laser light" produced in this way has special properties that differ significantly from the light emitted by a light bulb, for example.
- Unlike incandescent light, laser radiation has a specific wavelength, i.e., a defined color; the wavelength is specified in nanometers (nm), e.g., 532 nm for green light.
- Not every laser emits visible radiation; there are also lasers that emit radiation in the invisible UV or infrared range.
- Due to the directional emission with little beam divergence, even at a distance of several meters from the laser beam source, a large part of the light output can still reach the eye, unlike when looking at a light bulb.
- If the laser beam hits the eye, the light output transported in the beam can cause burns on the retina, which in the worst case can lead to blindness.

The laser beam – fascinating and dangerous at the same time

Laser classes

- Laser devices are assigned to a specific laser class by the manufacturer according to their hazard potential, starting with laser class 1 (eye safe) up to laser class 4 (very dangerous to the eyes and skin); the hazard increases in the series
  1 ⇨ 1M ⇨ 2 ⇨ 2M ⇨ 3R ⇨ 3B ⇨ 4

- Only Class 1 lasers are considered eye-safe, even if visible Class 1 laser radiation has the potential to cause temporary blindness (flash blindness).

- More powerful Class 3B lasers and Class 4 lasers can ignite paper and cardboard and melt plastics; they can also cause burns to the skin.

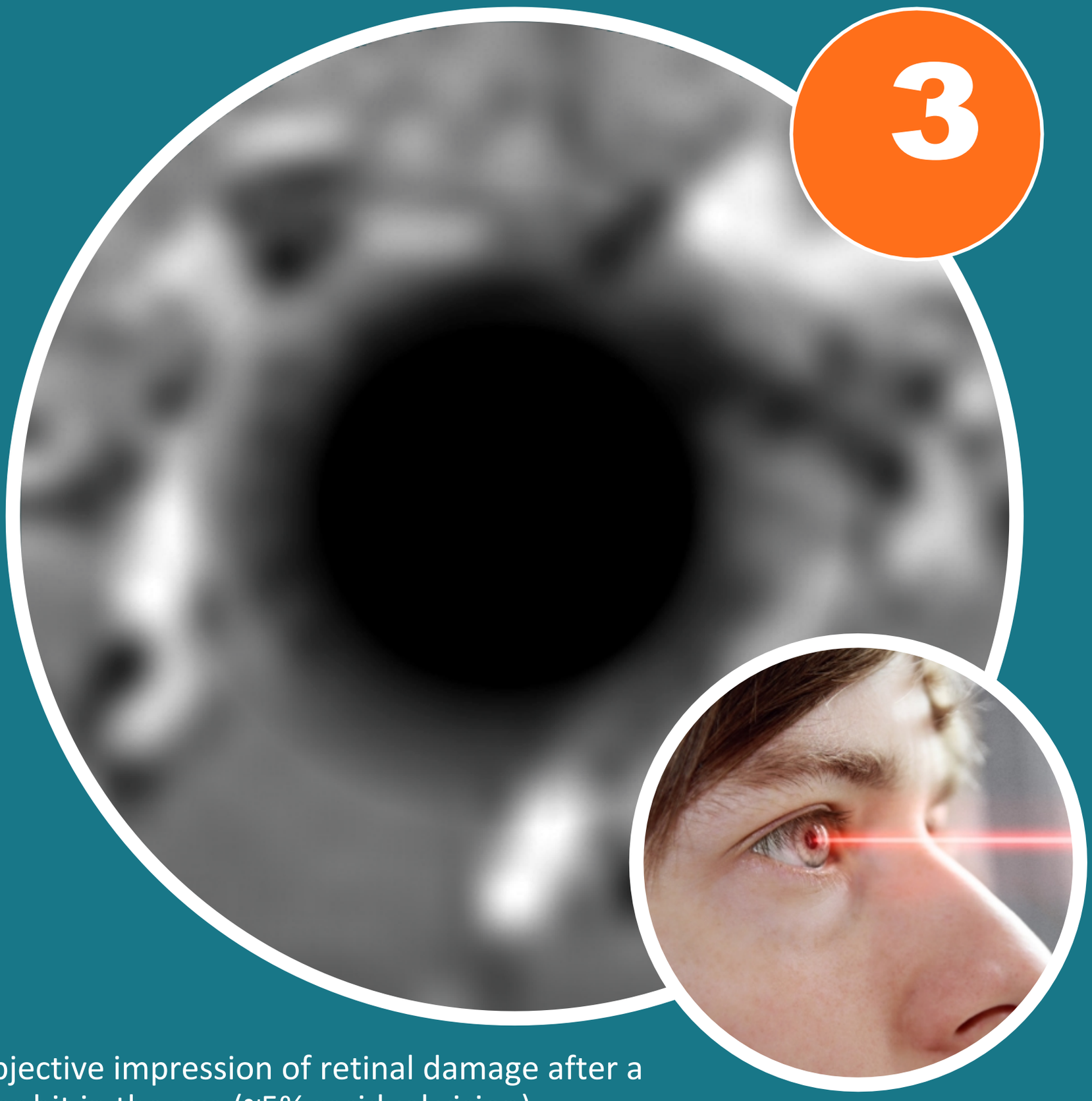
- Laser pointers are freely available on the international market in a wide range of wavelengths, from class 2 up to the highest hazard class 4.

- Normally, stickers on laser pointers indicate the laser class, wavelength, and laser power so that the danger of a product can be assessed; unfortunately, however, this information is often incorrect and the laser pointers have a much higher power output than labeled.

The sticker on the laser pointer provides information about its danger

Effects of laser radiation

- The human eye is significantly more vulnerable to laser radiation than the skin.
- Visible and invisible near-infrared laser radiation is focused onto the retina by the lens in the eye and is therefore particularly dangerous for the eye.
- Even weak Class 2 laser pointers can cause permanent damage to the retina of the eye if the beam is looked at for too long (reduction in visual acuity); quickly closing the eye and looking away protects the eye.
- Even with low laser power (laser classes 1 and 2), the glare effect of visible laser radiation and the risk of subsequent accidents (e.g., traffic accidents) is enormous (flash blindness).
- With more powerful lasers, especially class 3B and 4, looking into the beam can cause permanent damage to the eye even if you look away immediately.
- The probability of eye damage and its extent depend, among other things, on the laser power (laser class), the distance to the attacker, and the duration of exposure to the beam.



Subjective impression of retinal damage after a laser hit in the eye (~5% residual vision)

Detecting laser attacks

- With powerful Class 3B and 4 laser pointers, even in clean air, a clearly visible, thin, usually green or red beam of light can be seen moving through the air.
- Laser pointers with violet, blue, or yellow laser beams are also available for purchase; however, they are rarely offered and are usually more expensive than laser pointers in the common colors green and red.
- If the laser beam hits a vehicle windshield, depending on how dirty the windshield is, scattering effects may occur, which appear as a kind of colored flickering.
- If the laser beam hits the eye, severe glare (flash blindness) with at least temporary loss of vision is possible.
- There are also laser pointers with radiation in the infrared range that is invisible to the eye; these laser pointers pose a particularly high risk because the invisible radiation does not give any warning and therefore cannot be avoided; however, this radiation can be made visible and detected with an IR viewing device.

Laser attack on aircraft – dangerous glare for pilots during landing

Dealing with laser attacks

- If you detect a laser attack, do not reflexively search for the light source and look directly into the beam!
- Avoid eye contact with the laser beam at all costs!
- Turn your head away from the suspected source of the laser attack or shield your eyes from the laser beam by holding up your hand or folding down a sun visor!
- Call the police!
- CAUTION: Sunglasses do not protect against laser beams; however, laser safety goggles have been developed specifically for emergency services and vehicle drivers and protect against at least the most important laser wavelengths!

And if it does happen...

- First and foremost: Stay calm!
- Vehicle drivers: Immediately call the emergency services; notify the control center and subsequent vehicle drivers; request a replacement driver if necessary.
- Consult an ophthalmologist or eye clinic immediately.

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Recognizing laser attacks in time and quickly averting them protects you – laser safety goggles do anyway

We are here to help

Bayerisches Laserzentrum GmbH (blz) offers a wide range of laser safety services:

- Consulting on all aspects of laser safety
- Assistance with the application of standards, guidelines, and regulations relating to laser safety
- Performing laser safety calculations
- Support in the classification of laser systems and in the performance of risk assessments at laser workstations
- Laser exposure tests on laser safety and adjustment goggles as well as on laser safety shields
- Measurement of laser beam parameters
- Laser safety training, advanced training, and practical training (also as in-house training)

Please feel free to contact us – we look forward to hearing from you!

Your path to greater safety in laser application

Contact

Bayerisches Laserzentrum GmbH

Dr.-Ing. Hans-Joachim Krauß

Konrad-Zuse-Straße 2-6
91052 Erlangen, Germany

Phone: +49 9131 97790-23
info@blz.org| www.blz.org

We would like to thank
for their support.

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