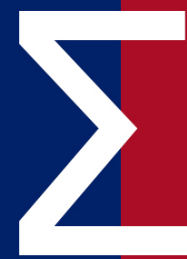


ΛΟΓΟΣ



THE ART OF SCIENTIFIC MIND

COLLECTION OF SCIENTIFIC PAPERS

WITH PROCEEDINGS OF THE IV INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE

EDUCATION AND SCIENCE OF TODAY: INTERSECTORAL ISSUES AND DEVELOPMENT OF SCIENCES

DECEMBER 9, 2022 • CAMBRIDGE, GBR 





EUROPEAN
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Cambridge, United Kingdom
«P.C. Publishing House»
2022

Vinnytsia, Ukraine
«Yevropeiska naukova platforma»
2022

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The conference is included in the catalog of International Scientific Conferences; approved by ResearchBib and UKRISTEI (Certificate № 373 dated August 26th, 2022); certified by Euro Science Certification Group (Certificate № 22419 dated November 14th, 2022).

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Education and science of today: intersectoral issues and development of sciences: Collection of scientific papers «ΛΟΓΟΣ» with Proceedings of the IV International Scientific and Practical Conference, Cambridge, December 9, 2022. Cambridge-Vinnytsia: P.C. Publishing House & European Scientific Platform, 2022.

ISBN 978-617-8126-03-2

ISBN 978-1-8380555-5-4 (PDF)

DOI 10.36074/logos-09.12.2022

«European Scientific Platform», Ukraine

«P.C. Publishing House», United Kingdom

Papers of participants of the IV International Scientific and Practical Conference «Education and science of today: intersectoral issues and development of sciences», held in Cambridge, December 9, 2022, are presented in the collection of scientific papers.

UDC 001 (08)

ISBN 978-617-8126-03-2

ISBN 978-1-8380555-5-4 (PDF)

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DOI 10.36074/logos-09.12.2022.26

COMPLEX OF SAFETY MEASURES WHEN WORKING WITH LASERS

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UKRAINE

Lasers have a small divergence of the beam, which can be focused and at the same time create significant energy densities. These unique properties allow them to be used in various fields of science and technology, communication and industry, in agriculture and medicine, in the construction of large engineering structures in instrument and mechanical engineering, electronics, etc. At the same time, such widespread use of lasers increases the number of working personnel exposed to laser radiation. That is why it is so important to pay attention to preventive measures aimed at preventing and minimizing the manifestation of this dangerous and harmful factor on the human body. Depending on the design features of lasers and the conditions of their operation and use, a number of dangerous production factors can be determined when working with them [1]:

- direct, scattered and reflected laser radiation;
 - ionizing radiation;
 - light radiation;
 - ultraviolet radiation;
 - noise;
 - vibration;
 - high voltage;
 - electromagnetic fields from the pumping generator;
-

- radiolysis, dustiness and gassiness of the air in the working area;
- use of aggressive or toxic substances in the design of the laser.

All these factors affect the human body in different ways. First of all, it depends on the illumination, the energy exposure in the pulse, the wavelength of the radiation; impulse repetition frequency and time of their direct impact; the area of the irradiated area and the biological and physical and chemical characteristics of tissues and organs.

Working with lasers requires compliance with a number of conditions under which the actual levels of eye and skin exposure are within the regulated limits of current regulatory documents. Such requirements are ensured by the introduction of special protective screens, the channeling of laser radiation through light guides, and the use of appropriate protective glasses. The latter must be carefully selected, taking into account the value of the wavelength of the laser light, including a mandatory check of the transmission spectrum. The glasses should ensure containment of laser radiation, but at the same time not be too dark. In addition to the use of such glasses, measures to protect against laser radiation include specialized painting or wall treatment, as well as the use of a shielding method.

The use of various types of lasers in the visible range requires the installation of warning light boards. Also, when working with a laser, special inscriptions are widely used. In the case of continuous work with lasers with a power of 1-5 mW, it is necessary to provide for the introduction of the following measures [2]:

- eye protection;
- special arrangement of premises;
- the maximum possible limitation of the path of the laser beam;
- use of light warning boards.

If a medium power laser is used, the use of the above measures and means is mandatory. In the case of working with particularly powerful lasers, you should additionally carry out a thorough control of the room and the alarm system. It is also necessary to implement remote start-up, full control and power blocking.

The safety of personnel operating laser installations requires the presence of: dielectric mats near the remote control and control panel, special protective gloves, grounding devices, protective glasses with filters, a first-aid kit with the necessary set of medicines and tools, everything necessary for personal hygiene, appropriate firefighting equipment, etc [3]. In addition, there must be at least two workers at the same time in the workplace where work with the laser is carried out.

Conclusion. Summarizing the above, we can conclude that personal safety when working with lasers is primarily ensured by strict compliance with a number of rules and regulations. It is necessary to clearly understand that laser radiation carries a huge danger, especially for tissues that can directly absorb radiation. Laser radiation poses a particular danger to human eyes and skin. Such exposure to direct or reflected radiation can cause irreversible processes in the visual analyzers or skin, and in the worst case, lead to serious injuries and even loss of vision.

References:

- [1] M. D. Soltani et al., (2021). *Safety analysis for laser-based optical wireless communications.*: Retrieved from <https://arxiv.org/abs/2102.08707v3>.
- [2] *Safety of laser products. Part 1 : IEC 60825-1 (2007). Equipment classification and requirements.*
- [3] Бородай І. І., Прудніков Д. К. (2021). Біофізична характеристика впливу лазерного випромінювання на біологічні тканини. *Матеріали VII Всеукраїнської науково-технічної конференції «Фізика та медицина у сучасному житті»*, (с. 47-51). 19-21 травня, м. Одеса, Україна.