International Commission on Illumination
Commission Internationale de l'Eclairage
Internationale Beleuchtungskommission

CIE Position Statement on the Blue Light Hazard

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CIE关于蓝光危害的立场声明

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There have been a number of reports in the media about the risk to human health following exposure to light from sources such as light emitting diodes (LEDs), referring to the term “blue light hazard” (BLH). This has been loosely used to represent the risk of actual eye damage and the influence on general well-being.

很多媒体□道声称□光二极管（LED）等光源的使用会□人体健康造成危害，□□危害一般称□“□光危害（BLH）”，泛指□□的眼□□□□及□一般健康状□的影响。

The term “blue light hazard” should only be used when considering the photochemical risk to the retinal tissues of the eye (technically referred to as “photomaculopathy”), usually associated with staring into bright sources, such as the sun or welding arcs. “Blue” is included in the term because the risk of photochemical injury is wavelength-dependent, peaking in the blue part of the optical radiation spectrum around 435 nm to 440 nm. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) have published the “blue light hazard function”, a wavelength-dependent weighting function, and guideline exposure limits [1]. The CIE has standardized this function as part of the CIE S 009:2002 "Photobiological safety of lamps and lamp systems", now published as IEC/CIE 62471:2006 [2]. There is no evidence in humans of any adverse health effects from occasional exposure to optical radiation at the exposure limits.

□□“□光危害”□在考□到眼□网膜□□的光化学□□（技□上称□“光斑病□”）□使用，通常与凝□阳光或□接□弧等明亮光源有关。□□中包括“□光”，因□光化学□□的□□取决于波□，并在光□位于435 nm到440 nm的□光波段达到峰□。国□非□离□射防□委□会（ICNIRP）□布了“□光危害函数”并□定了波□相关加□函数和指□性曝光极限[1]。CIE已将此函数□准化，并作□CIE S 009:2002“灯和灯系□的光生物安全”的一部分，□□布□IEC/CIE 62471:2006[2]。没有任何□据表明人体偶□暴露在限□范□内的光□射下会□健康□生任何不利影响。

Lamps, including LEDs, which emit primarily white light will usually contain a proportion of light at wavelengths that are relevant to the assessment of the blue light hazard. Lamps that are “cooler”, or attributed to a high colour temperature, are likely to contain a higher proportion of blue light than sources that are “warmer” or of a lower colour temperature. Indeed the

proportion of the blue light hazard exposure limit from incandescent and LED lamps for general lighting are similar for similar colour temperatures. Practical assessments have shown that the blue light hazard exposure limits are not exceeded under all reasonably foreseeable use conditions. Furthermore, the exposure levels are often lower than experienced from viewing a blue sky.

LED等白光灯具，通常会包含与□光危害相关的光。看起来“偏冷光”的灯或高色温的灯，相□于“偏暖光”或低色温的灯而言，可能包含更多□光成分。常□照明中白□灯和LED灯中，相同色温的灯具其□光危害曝光极限是相同的。□用□估表明，在合理可□□的使用状□下，灯具是不会超出□光危害曝光极限的。此外，□种灯具的□光曝光程度□常是低于□□□天□的曝光程度的。

It is also important to consider eye exposures in practice [3]. A number of studies have been published, with associated media coverage, which claim adverse effects from white-light sources. Most of these studies have unusual conditions, including:

□□□情况中人眼曝光程度的考□是非常重要的[3]。已有大量研究和媒体□道声称，白光光源□人眼健康存在不利影响。□些研究大多数是基于非常□状□，包括：

- long-term exposure,
- high colour temperature LEDs (i.e. a very high blue component),
- exposures significantly in excess of the ICNIRP exposure limit,
- fixation on the light source,
- the use of nocturnal animal models or human cells in vitro.

- 长时间曝光
- 高色温LED灯（蓝光成分非常多）
- 显著超出ICNIRP曝光极限的曝光
- 凝视光源
- 使用夜行动物模型或人体离体细胞

It is fundamental to appreciate that a white-light source emitting blue light at levels sufficient to approach the blue light hazard exposure limit would be extremely bright, thus producing discomfort glare, and that to stare into such sources would be considered unusual behaviour. Also, very high colour temperature lighting is perceived by most people as unpleasant and uncomfortable, particularly for lighting of homes. It is recognized that during normal behaviour, we experience transient exposures to high light levels, and may get many such exposures per day. However, accumulation of these exposures over the day will not result in the exposure limits being exceeded.

白色光源□出接近□光危害曝光极限□量的□光□，□出的光会很亮，□□就□生了令人不适的炫光。凝□□□的光源会被□□是不正常的行□。另外，高色温的照明□于大多数人而言都是令人不愉快和不舒服的，尤其是作□家用照明。□于行□正常的

人来□，每天都会有大量□□□□曝光在高□量的光中。然而，在一天当中□些曝光量的□累并不会曝光超□曝光极限。

Whilst the CIE considers that the “blue light hazard” is not an issue for white-light sources used in general lighting, even for those that are blue-enriched, caution is suggested for circumstances occurring over many days where continuous exposure to optical radiation, at levels that approach the blue light hazard exposure limit. Indeed such exposure should be avoided. Such exposure is unlikely for white-light sources, but may be possible with sources that primarily emit blue light.

□然CIE□□“□光危害”□于一般照明中使用的白光光源甚至富含□光成分的光源来□都不是□□，但□□多日□□暴露于接近□光危害曝光极限的光□射□□情况仍建□□慎。事□上□避免□种暴露。□种曝光□于白光光源来□不太可能，但是□于主要□出□光的光源来□□是可能的。

It should also be recognized that the use of sources emitting primarily blue light are a cause of concern for exposure to children’s eyes. Even if the blue light exposure limit is not exceeded, such sources may be dazzlingly bright to youngsters. For this reason, the use of blue indicator lamps is not recommended for toys and other devices that may be viewed by children. Where blue-light sources are used in such products, the blue light exposure limit should be reduced by a factor of 10. This is even more important for light sources emitting violet and deep-violet radiation.

□□□□到，使用主要□出□光的光源□致儿童眼睛的暴露同□需要引起□□。尽管没有超□□光曝光极限，□□的光源□于儿童来□太亮了而会使他□感到眩□。因此，不建□□儿童可能看到的玩具和其他□□使用□色指示灯。如果在此□□品中使用□光□主要光源，□□光曝光极限□降低□十分之一。□□于□出紫光和深紫光的光源尤□重要。

There have been claims that exposure to blue light may be linked to the risk of age-related macular degeneration. Such claims are currently speculative and are not supported by the peer-reviewed literature.

有文献称□光暴露可能与年□相关性黄斑□性的□□有关。□种□法目前是推□性的，并没有□□同行□□作支撑。

The term "blue light hazard" should not be used when referring to circadian rhythm disruption or sleep disturbance. However, the CIE recognizes that there is public concern over the non-visual influences of blue light on human health and has previously issued a position statement on this [4], an update on this will be issued in due course taking in to account, for example, CIE S 026:2018 [5].

当提及昼夜□律紊乱或睡眠障碍□，不□使用□□“□光危害”。不□，CIE意□到公众存在□光□人□健康的非□□影响方面的担□，并已就此□布了一份立□声明[4]，同□将考□适□□布□声明的更新文件，例如CIE S 026:2018[5]。

References

参考文献

[1] ICNIRP *Guidelines on Limits of exposure to incoherent visible and infrared radiation. Health Physics*. 105(1):74-96; 2013 (available from www.icnirp.org).

[1] ICNIRP非相干可见光和红外辐射曝光极限指南。健康物理学。105（1）：74-96；2013（可从www.icnirp.org获取）。

[2] IEC 62471:2006/CIE S 009:2002 Photobiological safety of lamps and lamp systems (bilingual edition) / Sécurité photobiologique des lampes et des appareils utilisant des lampes.

[2] IEC 62471:2006/CIE S 009:2002 S_curit_photobiologique des lampes et des appareils utilisant des lampes/灯和灯系统的光生物安全（双语版）。

[3] Sliney, D H, Bergman, R and O'Hagan, J. Photobiological Risk Classification of Lamps and Lamp Systems—History and Rationale. *LEUKOS*, 12:4, 213-234, 2016, DOI: 10.1080/15502724.2016.1145551.

[3] Sliney，D H，Bergman，R和O'Hagan，J. 灯和灯系统的光生物学风险分类--历史和原理。LEUKOS, 12:4, 213-234, 2016, DOI: 10.1080/15502724.2016.1145551.

[4] CIE *Position Statement on Non-Visual Effects of Light – Recommending Proper Light at the Proper Time, June 28, 2015*.

[4] CIE关于光的非视觉效应立场声明--建议在适当的时间使用适当的光，2015年6月28日。

[5] CIE S 026/E:2018 *CIE System for Metrology of Optical Radiation for ipRGC-Influenced Responses to Light.*

[5] CIE S 026/E:2018 CIE ipRGC影响对光反应的光辐射计量系统

About the CIE and its Position Statements

关于CIE及其立场声明

The International Commission on Illumination – also known as the CIE from its French title, the Commission Internationale de l´Eclairage – is devoted to worldwide cooperation and the exchange of information on all matters relating to the science and art of light and lighting, colour and vision, photobiology and image technology.

国□照明委□会--也被称□CIE，源自其法文名称□“the Commission Internationale de l´Eclairage”--致力于全球合作，并就有关光与照明、□色与□□、光生物学与□像技□的科学和□□的所有事□交流沟通。

With strong technical, scientific and cultural foundations, the CIE is an independent, non-profit organization that serves member countries on a voluntary basis. Since its inception in 1913, has been accepted as representing the best authority on the subject and as such is recognized by ISO as an international standardization body. As such the CIE is recognized by ISO as an international standardization body, publishing global standards on the fundamentals of light and lighting.

CIE□有□大的技□、科学和文化基□，是一个独立的非□利□□，在自愿的基□上□成□国服□。自1913年成立以来，已被国□□准化□□（ISO）□可□相关□域的最高□威。因此，CIE被国□□准化□□（ISO）□可□一个国□□准化机构，□行有关光与照明基□研究的全球□准。

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CIE立□声明首先确保与相关CIE技□委□会达成一致，并□CIE董事局批准，包括所有CIE分部（□行CIE科学工作的机构）的主任。

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