




## **CIE DIVISION 6 PHOTOBIOLOGY & PHOTOCHEMISTRY REPORT FOR 2018 CIE-USNC**

David H. Sliney, Ph.D.  
On behalf of Prof George Brainard  
(USNC Member to Division 6)  
13 October 2018




**cie**   
US National Committee of the CIE




### CIE Division 6 – Photobiology & Photochemistry

#### Terms of Reference

- To study and evaluate the effects of optical radiation on biological and photochemical systems (exclusive of vision).



**cie**   
US National Committee of the CIE

## Current CIE Division 6 – Officers and US Members of Division 6

- Division Director John O'Hagan
- Associate Director Karl Schulmeister
- Associate Director David Sliney
- Associate Director Shu Takeshita
- Division Secretary Luke Price
- Division Editor Eric Liggins
- USNC Member of D6
  - George Brainard (Member)
  - Richard Vincent (Alternate)

## Current Technical Committees

- **JTC 9 (D1/D2/D3/D6): Quantifying ocular radiation input for “non-visual” photoreceptor stimulation**
- **JTC 5 (CIE-IEC): Review of IEC 62471/CIE S009 – Photobiological Safety of Lamps and Lamp Systems**
- **TC 6-64: Optical Safety of Infrared Eye Trackers Applied for Extended-Duration**
- **TC 6-52: Proper Measurement of Passive UV Air Disinfection Sources**

### JTC 9 (D1/D2/D3/D6): “Quantifying ocular radiation input for *non-visual* photoreceptor stimulation

- To define action spectra and metrics in order to quantify the ocular radiation input to all photoreceptors possibly involved in non-visual responses. To provide a method to calculate from a measured spectral irradiance, ideally at the cornea surface, the stimulation of each photoreceptor that can potentially contribute to non-visual responses. To demonstrate the validity of such metrics for predicting physiological responses based on existing data in the literature. Chair: [Luc Schlangen](#) (NL)
- NC Ballot just completed with 6 “yes” votes.

### JTC 5 (CIE-IEC): Review of IEC 62471/CIE S009

- To update CIE S009; to take account of revised exposure limit guidelines from the International Commission on Non-Ionizing Radiation Protection; to provide a clearer rationale for the definition of the risk groups; and to improve the guidance on measurements in conjunction with Division 2. To work with IEC TC76 and IEC TC34 on the development of product-specific requirements of the revised standard. However, responsibility for the product-specific requirements will rest with IEC. To work with IEC to produce a dual-logo standard to replace CIE S009/IEC 62471. Chair: [John O'Hagan](#)(GB)

## TC 6-64: Optical Safety of Infrared Eye Trackers Applied for Extended-Duration

To review the potential optical radiation hazards from infrared eye-tracking systems when exposure durations are continuous throughout the day. Emphasis is placed upon the use of eye-tracking for gaze-based communication for severely disabled persons, which requires exposure of the eyes throughout a day over many years. Although there exist exposure guidelines from the International Commission on Non-Ionizing Radiation (ICNIRP) for infrared exposure and a CIE Standard (S-009) for photobiological safety of lamps and lamp systems, the lengths of exposure employed in this type of interface technology for disabled users may exceed the durations envisioned in the current exposure guidelines and standards. Abnormalities in the eye behaviour of severely disabled users may also require special treatment in safety standards. Chair: David H. Sliney (US). Held up in CB.

## TC 6-52: Proper Measurement of Passive UV Air Disinfection Sources

To specify the biologically meaningful measurement distances and positions in installations of UV germicidal lamps for open, upper-air disinfection. Physical aspects of the measurement will be coordinated with CIE Division 2. Chair: Richard L. Vincent (US)

## Other Activities of Related to Division 6

- ILV- John O'Hagan & David Sliney represented D6 on JTC8 – Terms (w/ ISO)
- IES Research Symposium Light and Human Health  
Atlanta, Georgia April 8-10, 2018 (George Brainard, Dave Sliney)
- CIE Taipei Topical Conference  
April 24-25, 2018 (George Brainard, David Sliney, John O'Hagen)
- Society for Light Treatment and Biological Rhythms  
Groeningen, NL June 23-25 2018 (George Brainard)
- DOE Roundtable Human Physiological Responses to Light  
Washington DC, September 13, 2018
- Some Reporterships
  - e.g., "Measurement of Photobiological effective workplace exposures."

## The ILV revisions (JTC-5) – a definition of concern –

- David Sliney participated with Dr John O'Hagan (DD6) in JTC8 in many phone meetings and 2 meetings at CIE meetings on behalf of Division 6. Photobiological terms all finished.
- Committee chaired by Peter Zwick who has worked very hard to spearhead this effort.
- My concern – the definition of the "Troland" which is really D1 term, but used in flashblindness and optical safety as well.
  - Redefined incorrectly to be luminance intensity ( $\text{lm/sr}$ )
  - apparently by someone who did not understand the unit



ILV 17-1349

## troland *(correct definition)*

- unit used to express a quantity proportional to retinal illuminance produced by a light stimulus
  - Symbol: Td
- NOTE 1 When the eye is viewing a surface of uniform luminance, the number of trolands is equal to the product of the area in square millimetres of the limiting pupil, natural or artificial, by the luminance of the surface in  $\text{cd}\cdot\text{m}^{-2}$ .
- NOTE 2 In computing effective retinal illuminance, absorption, scattering, and reflection losses, and the dimensions of the particular eye under consideration must be taken into account as well as the Stiles-Crawford effect.
- NOTE 3 In German, "Pupillenlichtstärke" designates the retinal illuminance.
- NOTE 4 "troland at a scotopic level" is used when the luminance is evaluated for scotopic vision.

## Misunderstanding of the Troland

- In the draft international standard ILV, there is a new, erroneous definition.
- It is a silly simplification to the point of leading the reader to confusion in the draft update of the ILV which eliminates mention of the pupillary area in 17-22-038. The current draft has been reduced to " 1 Td is equal to a luminance of  $1 \text{ cd m}^{-2}$  viewed through a pupil of area  $1 \text{ mm}^2$ ." This is true, but it hardly tells the whole story.
- This error is compounded in definitions 17-22-010, 17-22-011, and 17-22-038 !!!

## What Happened with CIE DS-026?

- JTC9 completed their draft international standard in the spring. There were extensive comments for the JTC 9 Enquiry Draft in February 2018; and the final submitted to the BA in the summer, with NC voting in the past couple of months.
- This was not sent to me as VP-Technical for distribution to the D-members. Do we need to examine our procedure?