



COMMISSION INTERNATIONALE DE L'ÉCLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

DIVISION 2 : PHYSICAL MEASUREMENT OF LIGHT AND RADIATION

Home Page: <http://cie2.nist.gov>

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Minutes of 2007 CIE Division 2 Meeting

9:00 – 17:30, 11 July 2007
Beijing

Abbreviations:

AD: Associate Director	ML: Member List
CIECB: CIE Central Bureau	NC: National Committee
CIEBA: CIE Board of Administration	TC: Technical Committee
CM: Country Member	TCC: Technical Committee Chair
D2: Division 2 (D1, D4, D8, likewise)	TR: Terms of Reference
DD: Division Director	ST: Status
DS: Division Secretary	WG: Working Group
ILV: International Lighting Vocabulary	

Attendees:

Tony Bergen	Photometric Solutions International, Australia
Guy Vandermeersch	IBE-BIV, Belgium, (D2 AD)
Stefaan Forment	Light&Colour, Belgium
<u>Jean-Michel Deswert</u>	Laborelec, <u>Belgium</u>
<u>Carla Thereza Coelho</u>	Inmetro, <u>Brazil</u>
Alan Robertson	NRC, Canada
<u>Joanne Zwinkels</u>	NRC, <u>Canada</u>
<u>Jianguan Pan</u>	EVERFINE, <u>China</u>
Junkai Li	Sensing Instruments, China
Tongsheng Mou	Hangzhou Zheyijang University, China
Tao Luo	CABR, China
<u>Erkki Ikonen</u>	MIKES, <u>Finland</u>

Farshid Manoocheri	MIKES/TKK, Finland
<u>Jean Bastie</u>	BNM-INM/CNAM, <u>France</u>
Gerhard Rösler	XRITE, Germany
Udo Krüger	TechnoTeam, Germany
Thomas Nägele	Instrument Systems, Germany
Werner Halbritter	OSRAM, Germany
Walter Steudtner	OSRAM, Germany
Günther Heidel	OSRAM Opto Semiconductors, Germany
Klaus Richter	BAM, Germany
<u>Georg Sauter</u>	PTB, <u>Germany</u> (D2 AD)
Andreas Höpe	PTB, Germany
Armin Sperling	PTB, Germany (D2 Secretary)
Bruno Weis	Germany
Jens Schütte	CML Innovative Technologies, Germany
<u>Janos Schanda*</u>	Univ. Veszprém, <u>Hungary</u> (CIE Vice President)
<u>Maria Luisa Rastello</u>	INRIM, <u>Italy</u>
Oswaldo Da Pos	Parma University, Italy
<u>Ichiro Saito</u>	NMIJ, <u>Japan</u>
Ken Sagawa	AIST, Japan (CIE Secretary)
Kosei Oshima	Otsuka Electronics, Japan
Kohtaro Kohmoto	Teknologue Co. Ltd., Japan
Koichi Ikeda	IEIJ, Japan
Syunsuke Mishima	Otsuka Electronics Co., Japan
Kazuak Ohkubo	Otsuka Electronics Co., Japan
Kenji Godo	NMIJ, Japan
Hiroshi Shitomi	NMIJ-AIST, Japan
<u>Dong-Hoon Lee</u>	KRISS, <u>Korea*</u>
Seongchong Park	KRISS, Korea
Sunglim Park	Optel Precision, Korea
Jeong Kyn Park	Optel Precision, Korea
Daejin Jang	Optel Precision, Korea
Teng Hai Lau	Philips Lumileds, Malaysia
Melvin Ho	OSRAM Opto Semiconductors, Malaysia
<u>John Clare</u>	MSL, IRL, <u>New Zealand</u>
<u>Raisa Stolyarevskaya</u>	Light and Engineering, <u>Russia</u>
Sergey Shvetsov	ANO SvetoS, Russia
Olga Melamed	VNISI, Russia
<u>Meena Lysko</u>	National Metrology Institute of South Africa, <u>South Afrika*</u>
<u>Joaquin Campos Acosta</u>	IFA-CSIC, <u>Spain*</u>
<u>Hans Allan Löfberg</u>	Univ. Gävle, <u>Sweden</u>
<u>Peter Blattner</u>	METAS, <u>Switzerland</u>
<u>Rojana Leecharoen</u>	NIMT, <u>Thailand*</u>
<u>Teresa Goodman</u>	NPL, <u>UK</u> (CIE Vice President)
Ian Tutt	Trinity House, UK
Yoshi Ohno	NIST, USA (D2 DD)
Yuqin Zong	NIST, USA
Cameron Miller	NIST, USA
George Eppeldauer	NIST, USA
<u>Norbert Johnson</u>	3M, <u>USA</u> (D2 AD)
Carl Andersen	FHWA, USA

Kathleen Muray	INPHORA, USA
Larry Leetzow	USA
Richard Austin	Gamma Scientific, USA

Total **65** persons from **22** countries, including **20** country members. Underlines indicate country members. * proxy for country member.

Handouts

Agenda of 2007 Division 2 meeting (**Attachment 1**)

List of the country members, TCs, Reporterships, and Liaisons.

Opening

Division Director, Teresa Goodman, opened the meeting at 9:00 a.m. and welcomed everyone present. She introduced the Division officers for the next term and announced that she would hand over the directorship to Yoshi Ohno (USA) during this meeting. The new Division Secretary is Armin Sperling (Germany). The Associate Directors Georg Sauter (Germany), Norbert Johnson (USA), and Guy Vandermeersch (Belgium) as well as the Editor Jim Gardner agreed to resume their office.

DD asked for a moment of silence for Reiner Rattunde, Wolfgang Budde and Jim Palmer who passed away during the last year.

Goodman then introduced the delegation from the CIE Board of Administration – CIE President Wout van Bommel, new CIE President Franz Hengstberger, new Vice President-Technical Janos Schanda, and new General Secretary of the CIE CB Martina Paul, who were present at the beginning of the D2 meeting.

Greetings and Informations from CIE Board

CIE President, Wout van Bommel expressed his pleasure and appreciation with respect to the co-operation within the Division 2 during his tenure. Franz Hengstberger as the next President of the CIE reported a few important changes in CIE activities. First, all the division websites will be moved to the CB webserver, and related to this, the whole CIE website structure will be renovated. Second, the International Lighting Vocabulary will be available as a free of charge dictionary on the website. Janos Schanda (next VP-Technical) explained that the English version of the dictionary will be accessible by the end of the year 2007. The other official languages of CIE should follow as soon as possible. All national committees are also invited to provide their national version. Beside the online dictionary, also a book version will be available.

1. Attendance list, apologies

Secretary received regrets from the following persons:

- Gyula Dezsi (Hungary C/M)
- Jim Gardner (Australia, D2 Editor)
- Mihai Simionescu (Romania C/M)

Richard Young (USA)
Arnold Gaertner (Canada)
Ian Lewin (USA)Richard Harold (USA)
Barry Rowland (Finland)
Toni Gugg-Helminger (Germany)
Allan Ottosson (Sweden C/M)
Etienne Pierson (Belgium C/M)
John Scarangelo (USA, TC2-46 chair)
Tom Larason (USA, TC2-29 chair)
Ken Vassie (UK, TC2-42 chair)
Keith Niall (Canada, R2-33 reporter)
Kamuran Turkoglu (Turkey, C/M)

2. Introductions

All the participants introduced themselves.

3. Approval of Agenda

The agenda of 2007 Division 2 meeting (**Attachment 1**), which was distributed to the attendees and also via e-mail circular prior to the meeting, was approved.

4. Approval of the 2006 Div.2 meeting minutes

The minutes of the 2006 D2 meeting in Braunschweig, Germany, which were distributed via e-mail circular and on the website, were approved with no change.

5. Director's Report (T. Goodman)

Meetings: The CIE BA is trying to emphasize the importance of the CIE to outside and especially to raise the profile of the quadrennial meetings. As a first approach, selected papers and posters of the meeting in Beijing will be published in a Book of Highlights. Prior publication, the contributions will be peer reviewed to ensure that only high quality new work is published.

Publications: All CIE publications should be up-to-date. Therefore, a rigorous process will be established to review all CIE publications every four years to determine whether it is current or need to be revised. Detailed procedures are to be determined.

Guidelines: Guidelines for TC membership were developed in D2. Similar guidelines are considered for all CIE Divisions. There was a discussion among the attendees, about how to treat guests during TC meetings. Some TCs have a large number of guests. DD emphasized that some guidance is given in the guideline document. The Guidelines for uncertainty section in TC reports were also developed in D2 and are available also on D2 website.

Webshop: DD asked for feedback on CIE publication webshop. There were many comments that restrictions on PDF documents make it very difficult to use. DD promised a discussion at the Board.

Next Sessions: Next CIE Midterm session in 2009 will be in Budapest, Hungary. Dates are TBD (last week of May is considered). Next Quadrennial Session 2011 will be in Sun City, South Africa. Dates are TBD (first two weeks in July is considered).

6. Secretary's Report (Y. Ohno)

CIE 26th Session TC meetings: 11 TC meetings were held in Beijing, and one meeting of a reportership. Each TC meeting was very well attended. Most of the TCs had 40 to 60 participants.

Membership: D2 now has 36 country members. The representative of Belgium has changed. Thailand will be expelled by the end of this year (2007) if there is no payment of their due from their national committee.

Reports Issued: The summary and the minutes of 2006 D2 meeting in Braunschweig were produced and distributed. D2 Activity Report, containing the minutes of the D2 Meeting in Braunschweig was produced and distributed in June 2007.

Division 2 Mailing List: 198 persons are on the D2 mailing list (reflector) and kept updated. The e-mail addresses are protected, and are available as the subscriber list of the D2 email reflector, which is password-protected (user id: cie2, password=vienna). The Secretary tries to keep all the addresses updated as much as possible, but there are always a few addresses that do not work. The Secretary requests everyone to inform him of any changes of e-mail address, to ensure that D2 information can be distributed to everybody.

D2 website: D2 website is kept updated as often as necessary. There have been no major changes in structure, but there will be changes soon as the D2 website will be moved to the CB webserver. Updated status of all TCs are available on the TC page. 17 TC drafts are posted with password protection. Secretary requested all the TC chairpersons to send him a copy when they distribute a new TC draft so that these can be updated. We have a global password that can access all TC documents and TC passwords that can access each TC documents only. The global password is distributed only to CMs, TC chairs and management team. The passwords for each TC can be distributed to members of each TC. TC chair should distribute TC password to TC members periodically.

E-mail reflectors: The Email reflectors are created on request basis and are maintained for D2 and eight TCs at the moment, e.g. CIE2-xx@nist.gov .. for TC2-29, 40, 45, 48, 49, 50, 60. A reply to this email goes to the entire list of the TC members. Use of email reflectors for TC discussions between physical meetings is strongly encouraged. Links to message archives of these reflectors are provided in the D2 home page or the TC page (password required).

7. Editor's report

DS received a written report from the Editor, Jim Gardner, who was not present.

In the past 12 months, final edits have been prepared for:

DS014-1 Colorimetry - Part 1: CIE standard colorimetric observers
DS014-2 Colorimetry - Part 2: CIE standard illuminants
(both now accepted by CIE and being balloted by ISO)
TC2-16, TC2-45 (both accepted for publication)
TC2-25 (in country ballot stage).

The Editor has additional remarks: First, TC chairs should send a reminder to the Editor, if he does not respond to the TC chair's request for one month, unless Editor indicated that there will be a delay. Second, the TC chairs should send new drafts to Editor already at an early stage and possibly often when it nears the final form to do informal edits. Informal edits are useful to tidy up formatting and to act in a refereeing mode for items that may have been overlooked or lacking in clarity, etc. Once the TC have approved the document in a completed form, there needs to be a formal request from the TC chair for the official D2 edit. Ideally the country ballot stage should be left for comment on the technical content and not be sidetracked by editorial mistakes.

DS thanked the Editor for his excellent, thorough work on editing a number of documents in timely manner, which was endorsed by all participants.

8. Progress reports from Technical Committees, Reporters, and Liaison persons

8.1. Associate Director Sauter and TC chairpersons

Reports on TCs 2-29, 37, 40, 43, 46, 47, 48, 58, 59, 60 were given.

8.2. Associate Director Vandermeersch and TC chairpersons

Reports on TCs 2-23, 49, 50, 52 were given.

8.3. Associate Director Johnson and TC chairpersons

Reports on TCs 2- 17, 19, 25, 28, 32, 42, 44, 51, 53, 56, 57 were given.

The reports given for 8.1, 8.2 and 8.3 are summarized below in the numerical order of all the TCs.

TC2-17 Recommendation for integrated irradiance and spectral distribution of simulated solar radiation

Chair: Gene Zerlaut (USA) **AD:** Johnson

ML: Chomiczewski (USA), Cordo (USA), DePietro (USA), Ellersick (USA), Christiaens (France), Grossman (USA), Gueymard (USA), Ketola (USA), Martin (USA), Myers (USA), Riedl (Germany), Robbins III (USA), Schoenlein (Germany), Scott (USA), Severon (Germany) – revised March 2006.

TR: Revise and update CIE Publication No.20 (1972)

ST: DS received a report from Zerlaut after the meeting (2006-7-6): TC2-17 met on 28 June 2006, in Toronto, Canada. It has been agreed that the TC's work will be based on SMARTS2 version 2.9.5. Two other salient results of the meeting are: [1] Relevant tables of CIE Publication #85 will be re-constituted using SMARTS2 ver2.9.5 and will initially include Tables 2, 4 and Column 2 of Table 8; [2] the Chair will appoint four initial task group leaders whose function will be to provide the TC with atmospheric and geometric input parameters for spectral energy distributions designed for their

specific applications. The re-constituted Publication #85 spectra noted above will be made available before the next meeting, which is planned for the spring of 2007 in Europe. A major agenda item for the next meeting will be to establish criteria for breaking down the detailed spectral energy distributions into wavelength bands that are amenable to simulations - and to being measured. There was no further information available in Beijing about the meeting in spring 2007.

TC2-19 Measurement of the Spectral Coefficient of Retroreflection

Chair: N. Johnson (USA)

AD: Johnson

ML: Arens (USA), Brekke (Norway), Fisher (USA), Hsia (USA), Hubert (France), Kurioka (Japan), Price (Great Britain), Rendu (France), Rennilson (USA), Richey (Germany), Schreiber (Germany), Sugiyama (Japan), Terstiege (Germany), Vandermeersch (Belgium)

TR: Identify the critical measurement parameters, tolerances, and requirements for, and conduct an international intercomparison of, the spectral coefficient of retroreflection.

ST: Report given by the TCC, Johnson. The final preparation of the draft is now completed and will be sent to the editor soon.

TC2-23 Photometry of Street-Lighting Luminaires

Chair: G. Vandermeersch (Belgium) **AD:** Vandermeersch

ML: Ian Lewin (USA), A. Blochouse (Belgium), A. Corrons (Spain), L. Bedocs (UK), A. Por (France), C. Stratford (UK), R. Rattunde (Germany), G. Rossi (Italy), D. Gibs (UK), A. Ottoson (Sweden) - rev. 2003

TR: Prepare a technical report on the photometry of street lighting luminaires.

ST: Report given by the TCC, G. Vandermeersch.

No progress was reported. Related to the TC, after the meeting in Leon an additional subject came up regarding the investigation of methods for the measurement of new light sources that are sensitive to temperature. A working group from Switzerland, Germany and Austria prepared a report and recommendations on how to measure such light sources. With this input and with additional input from other parallel working groups (e.g. in CEN) this report may be finished soon.

TC2-25 Calibration Methods and Photoluminescent Standard for Total Radiance Factor Measurement

Chair: J. Zwinkels (Canada)

AD: Johnson

ML: Bristow (Sweden), Erb (Germany), Leland (USA), McCamy (USA), Nayatani (Japan), Puebla (Germany), Racz (Hungary), Simon (USA), Witt (Germany), Peter Clarke (NPL)- revised Aug. 2002

TR: Prepare a CIE report on methods for measurement of total radiance factors of photoluminescent materials. Recommendations for realizing and calibrating photoluminescent standards by the one and two-monochromator methods will be included.

ST: Report given by the TCC, J. Zwinkels. All work by the TC is complete and the final draft has been distributed for Division/BA ballot. (2007-07-05)

<Status after 2007 D2 meeting>

The TC report was published as CIE 182:2007 Calibration methods and photoluminescent standards for total radiance factor measurements (2007-12-17)

TC2-28 Methods of characterizing spectrophotometers

Chair: Teresa Goodman (UK) **AD:** Johnson

ML: Andor (Hungary), Bastie (France), Berns (USA), Distl (Germany), Eckerle (USA), Konstantinova (Bulgaria), McCamy (USA), Robertson (Canada), Sugiyama (Japan), Ulyanov (Russia), Zwinkels (Canada)

TR: Write a CIE report on the characterization of spectrophotometers by means of reference materials and other methods, with particular reference to linearity, wavelength error, stray light, and integrating sphere errors.

ST: The Report was given by DD, T. Goodman, who took over the chairmanship from Peter Clarke (UK) during the last meeting in Braunschweig. There were some problems to find the last draft. The work on the revision of the found last draft will follow soon. It was pointed out that the consideration of uncertainties has to be revised. Alan Robertson mentioned that he did this work before GUM. Most other things seemed to be still current.

TC2-29 Measurement of Detector Linearity

Chair: Thomas Larason (USA) **AD:** Sauter

ML: J. Bastie (France), J. Clare (New Zealand), R. Distl (Germany), G. Eppeldauer (USA), T. Goodman (UK), P. Webb (USA), J. Palmer (US), G. Sauter (Germany), G. Andor (Hungary), A. Bittar (New Zealand), W. Budde (Canada), G. Dezsi (Hungary), Mihailov (Russia), K. Moestl (Germany) - July 2003 (being updated)

TR: Prepare a CIE guide on methods for the characterization of the linearity of detectors of optical radiation, including different principles by which the linearity of detectors can be determined and causes of non-linear behavior, to aid users of optical radiation detectors in the selection and use suitable devices for specific applications.

ST: Report was given by Y. Ohno. The last TC meeting was in Braunschweig in 2006. Draft 4 was discussed then and several comments received. TCC was to review the proposed ILV terms related to detectors and linear detector. No further activities reported.

J. Clare remarked that there was no feedback to contributions he made. There was also a remark during TC2-48 that new methods for the measurement of detector linearity (like the DSR method) discussed there should also be mentioned in TC2-29. The member list should be updated. DS will communicate these to TCC.

TC2-32 Measuring Retroreflectance of Wet Horizontal Road Markings

Chair: N. Hodson (USA) **AD:** Johnson

ML: Austin (USA), Davies (USA), Dibbern (Germany), Hubert (France), Johnson (USA), Lundkvistl (Sweden), Meydan (Australia), Meseberg (Germany), Rennilson (USA), Schmidt-Clausen (Germany), Schnell (USA), Schreuder (Netherlands), Soardo (Italy), Sorenson (Denmark) - revised August, 1999

TR: To prepare a guide for the methods of measuring coefficient of retroreflected luminance (specific luminance) of horizontal road markings under wet weather

conditions.

ST: AD, Johnson reported. The TCC, N. Hodson, have been retired. There is a draft on the website, but it is not clear, whether the chair may proceed or not. If the chair will not be able to continue, AD has to look for a new chair. R. Austin volunteered to go through the document to help to review the current state of the draft. But he remarked that methods currently in discussion do not work very well and that there have to be some investigations on test methods for that.

<Status after 2007 D2 meeting>

In March 2008, the TCC, Neil Hodson, completed his 6th Draft and sent it to D2D, and resigned the chair. It seems the document is ready for TC ballot. The document was sent to Editor to edit the format and structure of the document. We need a new TC chair to complete the document.

TC2-37 Photometry Using Detectors as Transfer Standards

Chair: Y. Ohno (USA) **AD:** Sauter

ML: Andor (Hungary), Austin (USA), Bastie (France), Bittar (New Zealand), Czibula (Germany), Corrons (Spain), Dézsi (Hungary), Eppeldauer(USA), Gardner (Australia), Goodman (U.K.), Kohler (BIPM), Moore (UK), Muray(USA), Pietrzykowski (Poland), Rattunde (Germany), Rastello(Italy), Sauter (Germany), Schanda (Hungary), Wychorski (USA)

TR: To prepare a report on the properties of $V(\lambda)$ -corrected detectors that are suitable for disseminating and maintaining photometric units. This report will include methods for the use of these detectors.

ST: Report given by the TCC, Y. Ohno.

Draft 8 has been prepared for 2nd TC ballot, and has been sent to Editor.

<Status after 2007 D2 meeting>

In February 2008, the 10th draft has been completed and was sent for the 2nd TC ballot with deadline 2008-4-30.

TC2-40 Characterizing the Performance of Illuminance and Luminance Meters

Chair: P. Blattner (Switzerland) **AD:** Sauter

ML: Austin (USA), Bastie (France), Czibula (Germany), Dezsi (Hungary), Goodman (UK), Khandelwal (India), Khanh (Germany), Mahidharia (India), Moore (UK), Ohno (USA), Pietrzykowski (Poland), Saito (Japan), Sauter (Germany), Stolyarevskaya (Russia), Xu (Singapore), Ye (China) – revised July 1999

TR: Convert the present CIE Technical Report No. 69 into an ISO/IEC standard. Prepare a combined CIE/ISO standard describing the definitions of quantities influencing the performance of illuminance and luminance meters, as well as defining measurement procedures for the individual error quantities.

ST: The former TCC, Reiner Rattunde, passed away in Nov. 2006. Peter Blattner (Switzerland) agreed to take over the chairmanship, which was approved unanimously by D2. An email reflector for the TC has been created. The TC met in Beijing and report given by Blattner. The meeting was attended by about 50 participants including about 10 TC members. Prior to the meeting in June, the TCC distributed Draft 7 with

two new sections and several proposals for further changes. Several points on further changes for the draft were discussed at the meeting. The main concern was on class L photometers and uncertainty of f_l' value. The TCC proposed to form a task group to do some practical measurements of class L photometers and to report the experiences back to the TC. First results should be available during the next six months. The TC plans next physical meeting in Turin 2008. The minutes of the TC meeting are available for further details.

TC2-42 Colorimetric Measurements for Visual Displays

Chair: K. Vassie (UK)

AD: Johnson

ML: G Andor (Hungary), S Ansell (USA), R Baribeau (Canada), R Berns (USA), P Boyton (USA), CDalton (UK), A Hanson (UK), J Hardis (USA), H Ikeda (Japan), H Lara (USA), J Laur (Germany), C Leone (USA), M Lindfors (Finland), R Luo (UK), L MacDonald (UK), J Maelfeyt (Belgium), S McFadden (Canada), Y Ohno (USA), ML Rastello (Italy), M Reid (UK), T Sakai (Japan), J Schanda (Hungary), A Stienstra (Netherlands), M Stokes (USA), F Vienot (France) – revised June 2001

TR: To produce a Technical Report summarizing recommended practice for the measurement of the colorimetric and spectroradiometric properties of visual displays.

ST: A written report from TCC, Ken Vassie, was read by Y. Ohno. The original TC members were contacted by e-mail. Seven out of 25 members are wishing to continue to participate. Members were requested to comment on their views regarding continuation support for the publication of the report (in view of the time that the report has been in preparation). There was general support for continuing work on the report though several modifications will have to be incorporated. The ICDM (International Committee on Display Metrology) have evolved from the VESA committee which created the Flat Panel Display Measurement (FPDM) standard. The ICDM is wishing to update this document and issue it through a recognized international standardizing body. CIE is being considered together with IEC and SEMI (Editor-in-chief is Dr Ed Kelley from NIST). The FPDM is the dominant measurement guide currently utilised within the flat panel display community. The display community would benefit significantly from the ICDM document. The inaugural meeting of the SID ICDM took place at SID'07(May). Richard Austin attended this meeting representing CIE-USA. A meeting of ICDM is planned for August 6 & 7 meeting in Copenhagen, Denmark.

There was a controversial discussion about the role of CIE in this subject area and whether this task can be done by this TC, which planned to create a more fundamental document. As the SID is not an international standardizing body, it was pointed out that something like a joint standard could only be realized if CIE has a major impact on this document. Richter mentioned that there is also an ISO standard 9241 Part 310-317 for visual display requirements in preparation so that there might be an overlap. Finally the discussion ends up with the general vote of the participants to close the TC and to establish a reportership to maintain liaison with ICDM and investigate a possible need for a new TC to collaborate with ICDM.

TC2-43 Determination of measurement uncertainties in photometry.

Chair: G. Sauter (Germany) **AD:** Sauter

ML: Bastie (France), Corrons (Spain), Daubach (USA), Ellis (USA), A.Gaertner (Canada), Goodman (Great Britain), Moore (Great Britain), Ohno (USA). Aug. 2002

TR: To prepare a CIE recommendation as the basis for the determination of measurement uncertainties valid for selected quantities used in photometry.

ST: Report was given by G. Sauter. DS, Ohno, posted the Draft 8 of TC2-43 on the website. The draft includes the main part and the annexes A and B but missing C. Annex C will be send out by the end of the year. On the webpage is also an Excel tables "TC2-43E8a.xls" which can be used and optimized by the members. Additionally there is a "Mathematica"-notebook "UncBud_TC2-43M8a.nb" with the identical examples as in the Excel tables. To run the notebook, one has first to add the new created Mathematica package"CIEGUM.m" in the directory "Applications" of Mathematica. The TCC likes to have the recommendation of TC2-43 as an open document, to which additional annexes can be added if required. J. Schanda suggested to publish the recommendation and the annexes separately.

TC2-44 Vocabulary Matters

Chair: J. Gardner (Australia) **AD:** N. Johnson

ML: Being reconstructed.

TR: To provide liaison between Div.2 and TC 7-06 "Lighting Terminology" and support the preparation of the new edition of the Lighting Vocabulary in the field of light and colour measurements.

ST: DS reported an earlier communication with the Editor regarding this TC. ILV (International Lighting Dictionary) is being finalized by CIE BA. Regarding membership list: Any members of D2 should be able to raise questions on terminology through the D2 discussion list. If new or revised terms are suggested, those contributing to the discussion become the committee members for that item. The result of such a discussion, and also terms derived from TC reports, would then be reviewed as part of the formal approval when a new version of the ILV is being prepared.

TC2-46 CIE/ISO standards on LED intensity measurements

Chair: John Scarangelo (USA) **AD:** Sauter

ML: Angerstein (Germany), Bando (Japan), Bouman (Netherlands), Bym (USA), Carr (USA), Distl (Germany), Ellis (USA), Goodman (UK), Heidel (Germany), Hwang (Taiwan), Jones (USA), Lester (USA), Moore (UK), Ohno (USA), Rastello (Italy), Sauter (Germany), Scarangelo (USA), Schanda (Hungary), Schumacher (Germany)

TR: To prepare a CIE/ISO standard on the measurement of LED intensity measurements based on the CIE Pub. 127.

ST: The TCC sent his written report to DS. The TC will be working via email on a new draft that will address several editorial, format, and technical issues that still remain. The first issue has to do with how to more clearly define the mechanical axis in a general way that covers the small multi-chip and multi-lens LEDs that we want to include in the scope of the standard. The second issue has to do with the need to specify the LED conditions with respect to temperature and forward current since

these have a big input on the measurement. On temperature, some members would like to specify a specific T_j or T_a and some would like to keep the standard more flexible since T_j is difficult to measure and a specific T_a would limit the use of the standard. The TCC will propose solutions on these issues. The third issue had to do with what to include in an uncertainty guideline section. Now that we have the "Guideline for Uncertainty Sections", we will attempt to add a section with at least a table as suggested. The last issue is that the document should be put in the template for these standards.

It was stated by different members, that there is almost no progress within this TC since the last draft was circulated in Tokyo. DD will ask TCC whether he is able to continue this TC or if there is need to find a new TCC. AD, Sauter, raised a question how to deal with uncertainties in standards. It was agreed that the recommendation of TC2-43 can be used as a normative reference within the standard.

TC2-47 Characterization and Calibration Methods of UV Radiometers

Chair: Armin Sperling (Germany) **AD:** Sauter

ML: L.P.Boivin (Canada), Hengstberger (South Africa), Wilkinson (Australia), Lambe (UK), Rattunde (Germany), Saunders (USA), Pietrzykowski (Poland), Corrons (Spain), Larason (USA), Thompson (USA), Kohmoto (Japan), McArthur (Canada), Kravetz (USA)- Aug. 2002

TR: Prepare a CIE recommendation on methods of characterization and calibration of broad-band UV radiometers in the spectral ranges of UVA and UVB for industrial applications.

ST: The report was given by the new TCC A. Sperling. The TC met first time with the new TCC in Beijing after a long time of inactivity. The former TCC (Gan Xu) gave an overview on the past work and the structure of the existing draft. The new TCC explained proposed changes within the first chapters to make the document consistent with the ILV and the TC2-40 draft. The new draft will be send to all members within this year. The next meeting of the TC is planed in Turin, Italy, 2008.

TC2-48 Spectral responsivity measurement of detectors, radiometers, and photometers

Chair: G. Eppeldauer (USA) **AD:** Sauter

ML: Austin (USA), Boivin (Canada), Bouman (USA), Corrons (Spain), Coutin (France), Dezsi (Hungary), Gardner (Australia), Goodman (UK), Köhler (BIPM), Larason (USA), Larsen (Denmark), McArthur (Canada), Ohkubo (Japan), Palmer (USA), Pietrzykowski (Poland), Rattunde (Germany), Sauter (Germany), Webb (USA), Xu (Singapore), Schanda (Hungary) – June 2001.

TR: To rewrite the technical report CIE 64 (1984) "Determination of the spectral responsivity of optical radiation detectors" to update device and measurement technology, and include the spectral irradiance and radiance responsivity measurement for radiometers and photometers from UV to near IR.

ST: Report given by TCC, G. Eppeldauer. The TC met in Beijing with 40 participants. The 10th draft was distributed to the members and participants. The document, now 71 pages, is getting close to its final shape. The document is restricted to single element devices. Measurements of imaging devices have been left out. The Summary and

Introduction have been modified because of this restriction. The Uncertainty chapter, using the contribution from Stefan Winter, has been extended with the correction for wavelength shift. An agreement has been made at the meeting to reference the TC2-43 uncertainty document that includes the mathematical methods based on GUM. Only the technical issues that belong to spectral responsivity measurements are discussed in this report. The Differential Spectral Responsivity (DSR) method has been added to the document. This method is useful to correctly measure detectors with non-linearity. It was agreed that the effect of irradiance and spectral distribution of the bias-light will be discussed and a guidance will be given that describes when and how to use this method for regular (not solar) detectors. The technical details and the results obtained from silicon and near-infrared detector tests will be described in an Appendix. The PTB members (Georg Sauter, Armin Sperling, and Stefan Winter) promised to make this extension to the document by the end of the calendar year. A new sub-chapter on stray light and fluorescence issues has been added to the document. This addition deals with stray light problems in monochromators and fluorescence of optical components. Yuqin Zong of NIST agreed that the stray light correction method will be described and adapted for spectral responsivity measurements. The Appendix has been reorganized. It was questioned during the meeting if the Details of Monochromator Optics in the Appendix is necessary. As the CIE Document #63 on Spectroradiometric Measurement of Light Sources discusses some monochromator details, this document will be referenced and the Appendix will be either modified or removed. The chairman will send the modified draft document to Jim Gardner, editor. The document will be ready for TC ballot in about one year.

TC2-49 Photometry of Flashing Light

Chair: Y. Ohno (USA)

AD: Vandermeersch

ML: Carl Andersen (USA), John Arens (USA), Richard Austin (USA), Jan Berkhout (USA), Dennis Couzin (USA), Dave Ellis (USA), George Eppeldauer (USA), Ahmad Fedai (USA), Irena Fryc (Hungary), David Gibbs (UK), Teresa Goodman (UK), Franz Hengstberger (South Africa), David King (USA), Rainer Kohler (BIPM), Hideki Kondo (Japan), Reiner Rattunde (Germany), Justin Rennilson (USA), Ken Sagawa (Japan), H. -J. Schmidt-Clausen (Germany), Georg Sauter (Germany), Ian Tutt (UK), Françoise Vienot (France), Pierce Webb (USA). – April 2003.

TR: Produce a technical report for photometric measurements of flashing light, including derivation of the photometric quantities applied to flashing light, measurement of light sources, and calibration of photometers for flashing light.

ST: The report was given by the TCC, Y. Ohno. The TC met in Beijing with 41 participants. The previous draft of 2002 simply described the existing three basic methods (Form Factor, Blondel-Rey and Allard), while Modified Allard method was proposed by D. Cousin and Y. Ohno. The previous meeting was 2002, when the TC agreed to obtain visual experimental data on Modified Allard method before it can be adopted. No experiments, however, have been conducted since then, while the industry kept stressing the needs for one standard method. While there is still a lack of measurements, data in a paper of the US Coast Guard from the 1986 dealing with trains of pulses agreed very well with the results of Modified Allard method. Based on these data, the TCC proposed to adopt Modified Allard as the recommended method.

TCC wrote and distributed draft 3.0 prior to the meeting. The TC discussed this proposal at Beijing meeting, and after long discussion, the TC basically agreed to adopt this proposal, with several suggestions. The limitations of this method were discussed and will be described in the new draft. It was also decided to focus this report on effective intensity, not broadly measurement of flashing lights. Therefore, the terms of reference will be modified and the draft will be revised accordingly. During discussion it was noted that the restriction to white light has to be addressed somewhere in the document.

TC2-50 Measurement of the optical properties of LED clusters and arrays

Chair: J. Schuette (Germany)

AD: Vandermeersch

ML: C. Jones (USA), J. Scarangelo (USA), Xu Gan (Singapore), J. Arens (USA), T. Goodman (UK), D. Halkin (Belgium)

TR: To produce a technical report for the measurement of optical properties of visible LED arrays and clusters, to derive optical quantities for large LED arrays and recommendations for measurement methods and conditions.

ST: Report given by the TCC, J. Schuette. TC met in Beijing, attended by 17 members and 50 observers. The definition of terms “LED cluster” and “LED array” was discussed again. Participants (especially manufacturers and users of LED clusters and arrays) were asked to select typical objects that need to be characterized and provide corresponding drawings/data-sheets. Members are asked to make proposals on how to measure these artifacts in regard to quantities of interest to industry. The measurement conditions for total luminous flux, luminance, chromaticity and homogeneity, and spatial distribution should have highest priority. Whenever a significant amount of heat is produced, temperature at a representative reference point on object should be stated in addition to ambient temperature.

TC2-51 Calibration of multi-channel spectrometers

Chair: Richard Austin (USA)

AD: Johnson

ML: T. Goodman (UK), G. Hopkinson (UK), S. Prince (UK), Pietrzykowski (Poland), R. Smith (USA), R. Bergman (USA)

TR: Produce a technical report for the calibration of array spectroradiometers primarily for the determination of colorimetric and photometric quantities, including performance characteristics, evaluation of these characteristics, calibration methods and guidance in the application of methods for the determination of uncertainty.

ST: Report given by the TCC, R. Austin. The TC met in Beijing with 39 attendees including 10 members. The member list needs to be updated. A new draft (Draft 2) was presented and discussed at the meeting. It was proposed to have changes in the terms of reference to focus the report more on photometric and colorimetric quantities. The changes were approved by D2 with no objection.

New TR: Produce a technical report for the calibration of detector array spectroradiometers primarily for the determination of colorimetric and photometric quantities, including performance characteristics, evaluation of these characteristics, calibration methods and guidance in the application of methods for the determination of uncertainty.

A few other changes in the draft were agreed at the meeting. It was also suggested to

look at the materials from TC2-30. The TCC plans possible additional meeting to solicit inputs by the end of the year.

TC2-52 Addendum to CIE 121 for the Photometry of Emergency Lighting Luminaires

Chair: G. Vandermeersch (Belgium)

AD: Vandermeersch

ML: Antonio Corrons (Spain), Allan Ottosson (Sweden), Reiner Rattunde (Germany), Christine Stratford (UK), Bruno Weiss (Germany), Lou Bedocs (UK), Giuseppe Rossi (Italy), - updated July 2003.

David Price (UK, until 1/3/2003), John Arens (USA, until 1/1/2002).

TR: To produce an addendum to CIE publication 121 containing specific requirements for the photometry of emergency lighting luminaires, in particular to provide additional correction factors on the relative output of the luminaires at specified times of operation.

ST: Report given by the TCC, G. Vandermeersch. The latest draft went through TC ballot, and was rejected by members from the UK because of a method used in the draft concerning the total luminaire luminous flux output which is not useable for lighting designers. As this method is based on an existing IEC standard, there is a difficult situation which must be solved. A revision of the IEC standard is in discussion but the progress is unclear. Therefore, it was discussed during the division meeting, whether a report with an appendix on the minority viewpoint may be a solution. Further discussions with members and manufacturers will take place in the near future

<Status after 2007 D2 meeting>

In February 2008, the TCC sent Draft v5 (Oct. 2007) to the Editor requesting Division ballot. The draft was edited after discussion on a few points, and was sent to CIE CB on 2008.3.10 requesting Division/BA ballot.

TC2-53 Multi-Geometry Color Measurements of Effect Materials

Chair: Roesler (Germany)

AD: Johnson

ML: Mike Pointer (UK), Maria Naddal (USA), Jerzy Pietrzykowski (Poland), George Andor (HU), Luise Rastello (Italy), Marta Klanjsek Gunde (SI), Irena Fryc (Poland), Allan Rodrigues (USA), Mike Nofi (USA), Danny Rich (SUSA), Thomas Dauser (Germany), Peter Gabel (Germany), Werner Cramer (Germany), Gorow Baba (Japan), Ellen Carter (USA), Harold VanAken (USA) - April 2003

TR: Write recommendations for the color measurement of effect materials.

Workplan:

Comparison of the DIN and ASTM standards on Multigeometry color measurement.

Preparation of an educational section to combine most interests.

Recommendations from the educational section for the next meeting.

ST: Report given by TCC G. Roesler. The TC met in Beijing with 16 participants. The new draft 3a was presented and will be circulated to all members, but as many new guests were present at the meeting much time was spent for educational purpose again. It was decided that there will be no more education during future meetings. The terms of reference were discussed and the structure of the report. It was stated that it is important to define first the criterions when multi-geometry colour measurements are

necessary. As an example, the multi-geometry colour measurements for a textured plastic sample was given, which shows considerable changes in colour and brightness depending on the aspecular angle. There is still a discussion in terminology how to describe the geometry in the best way while the differences between ASTM and CIE could be essentially solved in favour of CIE over the last year. Beside this, there is an urgent need for measured data of reference materials. During the discussion it was pointed out that, with respect to the determination of colour differences, still a lot of work has to be done especially if gonio-apparent materials are taken into account.

TC 2-56 CIE/ISO standard on retroreflection measurements

Chair: C. Miller (USA)

AD Johnson

ML: Johnson (USA), Stratford (UK), Jenkins (Australia), Sorenson (Denmark), Rastello (Italy), Ledoux (France), Frank (Germany)

TR: To prepare a CIE/ISO standard on the measurement of retroreflective materials based on CIE Publication 54.2

ST: Report given by TCC, C. Miller. The TC met in Beijing with 6 members present. There was much discussion on the scope and the purpose of this standard. The TCC will combine all further minor details during discussion into a Draft 1a which will be sent to the members which were not be able to participate. After discussion by email, a Draft 2 will be prepared, which should be ready for discussion during the next meeting in Italy.

TC2-57 Revision of CIE S014-2

Chair: A. Robertson (Canada)

AD Johnson

ML: Bristow (Sweden), Hirschler (Hungary), McGinley (Austria), Pointer (UK), Ohno (USA), Rich (USA), Schanda (Hungary), Zwinkels (Canada) – confirmed June 2007

TR: To revise CIE Standard S014-2 (Colorimetry Part 2: CIE Standard Illuminants) to include Illuminant D50.

ST: Report given by TCC, A. Robertson. The TC was established at the 2003 D2 meeting in San Diego on the understanding that it would not start work until the current revision of S014-2 was completed. With the publication of CIE S 014-2/E:2006 *Colorimetry – Part 2: CIE Standard Illuminants* in December 2006, the work can now begin. A first draft will be written within the next 6 - 12 months.

TC2-58 Measurement of LED radiance and luminance

Chair: K. Kohmoto (Japan)

AD Sauter

ML: Horak (Germany), Sliney (USA), Muray (USA), Goodman (UK), Ohno (US) + others to be agreed

TR: To prepare a CIE Technical Report setting out recommended measurement methods for the luminance and radiance of LEDs, taking particular account of the specific requirements of relevant photobiological safety standards

ST: Report given by TCC K. Kohmoto. The TC met in Beijing with 72 participants. The TCC reported on the joined meeting of TC6-55 and TC2-58 in Ottawa last year. One major point discussed was the definition of terms: How to define LED luminance and its geometrical condition; How to define the photobiological (effective) illuminance.

Draft 1 (2007-6-1) was discussed at the meeting. Among several points discussed, it was suggested to divide the report into a physical part (radiance, luminance, apparent source etc) and a part dealing with photobiological issues (like eye movement, actinic spectra, angle etc.), where the photobiological assessment of radiance is more important than that of luminance. It was also pointed out that D6 is waiting for results and that the progress must be enhanced.

TC2-59 Characterisation of Imaging Luminance Measurement Devices

Chair: P. Blattner (Switzerland) **AD:** Sauter

ML: To be finalised

TR: To prepare a Technical Report on methods for the characterization of imaging luminance measurement devices.

ST: Report given by the TCC, P. Blattner. The TC met in Beijing with 47 participants. A new draft (No. 0.5) was circulated just before the meeting. The most comprehensive input came from U. Krüger who presented his contribution during the TC meeting, including approaches for characteristics like scattered light (contrast) and linearity (f_3). There was also a discussion about spectral measurements and nonuniformity effects, which has to be continued. P. Blattner asked to resign the chairmanship of this TC to be able to concentrate on TC2-40, and nominated U. Krüger (Germany) to take over the TC. Krüger agreed to take over the chairmanship of this TC, and it was approved unanimously by D2.

TC2-60 Effect of Instrumental Bandpass Function and Measurement Interval on Spectral Quantities

Chair: Emma Woolliams (UK) **AD:** Sauter

ML: Heidel (Germany), Ohno (USA), Robertson (Canada), Saito (Japan), Sauter (Germany), Schanda (Hungary), Sperling (Germany), Steudtner (Germany), Kohmoto (Japan), Lau (Malaysia), Zwinkels (Canada), Bastie (France), Scarangelo (USA), Young (USA), Woolliams (UK), Goodman (UK) – Feb. 2006

TR: To prepare a technical report that describes the effect of instrumental bandpass functions and measurement wavelength interval on spectrally resolved quantities and provide recommendations on suitable methods to minimize the error introduced by instrumental bandpass functions on spectrally integrated or weighted quantities.

ST: Ohno reported for the TCC. An email reflector was created after Braunschweig meeting, and has been very actively used. The TC members have been confirmed and introduced, and Woolliams produced a first draft 1.0, with members then taking turns to add more contents. Draft 2.0 has been done by Gardner, and 2.1 by Schanda.

8.4 Reporters

R2-23 ISO/CIE Standards for the measurement of reflectance and Transmittance

Reporter: D. Rich (USA) **AD:** Johnson

TR: To investigate the need for converting the CIE technical report on reflectance and transmittance measurement (CIE 130) to a joint ISO/CIE standard

ST: A written report submitted by D. Rich after the meeting. See **Attachment 2**.

R2-28 Evaluation of Colorimeter Spectral Responsivity

Reporter: B. Kranicz (Hungary) **AD:** Sauter

TR: To review new methods for assessing the ‘quality-of-fit’ of the spectral responsivity of colorimeters, particularly for use with new sources such as LEDs.

ST: As no report was given for several years, D2 agreed to close this reportership.

R2-32 Visual Appearance Measurement

Reporter: M. Pointer (UK) **AD:** Johnson

TR: To monitor the work of Divison 1 on visual appearance measurement, which will include potential new measurement areas

ST: CIE Publication 175:2006, *A Framework for Measurement of Visual Appearance* has now been published. This substantial document represents four years hard work by a technical committee of over 20 active participants. This reportership will be kept open because there was a proposal to start a new type of network within CIE regarding Appearance which must be decided by the board. The reportership may be used to expect a status report on this item just before the next CIE meeting.

R2-33 Measurement of Laser-Based Projection Displays

Reporter: K. Niall (Canada) **AD:** Sauter

TR: To describe concepts and methods of photometry for the comparison of laser-based projection displays.

ST: A written report was submitted from K. Niall. The report outlines the characteristics of laser projection displays and the difficulties in measurement of such displays as the photometer signals are pulses. The BRDF of the screen also need to be characterized. See **Attachment 3** for the details. This reportership will be kept open until it is finalized.

R2-34 Methods for Characterising and Calibrating Detectors in Photon Counting Regime

Reporter: M. L. Rastello (Italy) **AD:** Sauter

TR: To consider the emerging requirements for characterisation and calibration of detectors in the photon counting regime.

ST: Report was given by M. L. Rastello. The Photon counting community is getting more and more active. The main field of interest is single photon counting and the aim to calibrate single photon detectors. Possible applications are in low level signal detection, nanobiology, security, optical communication and space. On the other side are different types of single photon sources, which also need to be characterised and calibrated. In Sept. 2007 there will be the 3rd workshop on single photon techniques at NIST, followed by a second workshop at NPL in 2008. Reportership should be kept open until next meeting where to decide to establish a technical committee.

R2-36 Measurement requirements for solid state light sources

Reporter: G. Heidel **AD:** Sauter

TR: To investigate the need for guidelines and recommendations relating to the measurement of LEDs, OLEDs and other solid state light sources that are not covered

by other CIE Publications or TCs. Specific aspects to be considered include guidance for production areas, high brightness LEDs (e.g. pulsed operation and temperature control) and detector qualification (f_1 etc.).

ST: Report was given by G. Heidel. The Reportership had a meeting in Beijing with 22 participants. Y. Ohno made a proposal to create a new TC to develop a recommendation on measurement of high-power LEDs at higher temperatures using a temperature-controlled heat sink. While participants agreed on general needs for new methods for high-power LEDs, some participants did not agree on using heat sink temperature, stressing that temperature reference should be junction temperature. In conclusion, it was not agreed to establish a TC, but agreed to keep investigating appropriate methods and continue discussion by email. D2 agreed to continue this reportership.

R2-37 Industrial lighting requirements for a D65 illuminant

TR: To investigate the requirement for a specification for a practical D65 source for use in industry, particularly the lighting industry.

Reporter: E. Pierson AD: Vandermeersch

E. Pierson was not really active anymore in the field of lighting. He will be replaced by Jean-Michel Deswert as D2 representative for Belgium. Pierson submitted a two-page report in 2006 proposing to close the TC. It was kept open for possible further studies on new type of sources. It was agreed to close the reportership with no objection.

8.5. Liaisons with other Divisions

Division 8 (Alan Kravetz)

No report received.

8.6 Liaisons with other organizations

CCPR - Comité Consultatif de Photométrie et Radiométrie (Yoshi Ohno)

A cooperation agreement between CIPM and CIE was signed in April 2007. “The Agreement recognizes the responsibilities and roles of the BIPM and the CIE and emphasizes the need to consult together to ensure that data related to measurements of light, optical radiation, colour, optical properties of materials, and photobiological and photochemical quantities are based on units traceable to the International System of Units (SI). The Agreement also recognizes the importance of the international recognition and acceptance of measurement procedures for these quantities which can be provided through the Mutual Recognition Arrangement of the International Committee for Weights and Measures, the CIPM MRA.”

CCPR and its working groups met at BIPM in Paris in June 18-22. President of CCPR is F Hengstberger. In response to the Agreement, CCPR has J. Bastie as official liaison person from CIE to CCPR. Also, CIE has been designated as an official observer status in CCPR. In addition, Ohno has been appointed as the liaison person from CCPR to CIE to ensure communication between the two on the issues of quantities and units, e.g., how to handle photometric quantities with 10 deg observer and mesopic vision. Also on photobiological

quantities. There are three Working Groups which meet every year; WG Key Comparisons (chair, Ohno), WG Calibration and Measurement Capabilities (chairman rotates among RMOs), and WG Strategic Planning (chair, Zwinkels). WG-KC is planning next-round CCPR KCs, and agreed on a general principles to be followed to limit the number of participants for CCPR KCs to within 12.

ISO TC6/WG3 Paper, board & pulps – optical properties (J. Zwinkels)

The report was given by Joanne Zwinkels. In the past year, several ISO standards on optical properties of paper, pulp and board, have gone for ballot. These are:

- Paper and board: Measurement of specular gloss – Part 1: 75 degree gloss with a converging beam, TAPPI method.
- Paper – determination of light scattering and absorption coefficients using Kubelka-Munk theory
- Paper, board and pulp: Basic equations for optical property.
- ISO/CD 5631 Paper and board – Determination of colour by diffuse reflectance: This standard has been issued in three parts:
 - Part 1: Indoor daylight conditions (C/2 degrees)
 - Part 2: Outdoor daylight conditions (D65/10 degrees)
 - Part 3: Indoor illumination conditions (D50/2 degrees)

This WG has indicated a need for a CIE normative reference for indoor and outdoor illumination conditions and the work being carried out in CIE TC 1-66, Chaired by Dr. Schanda, has addressed this need by recently establishing recommendations for spectral power distributions for indoor daylight (ID65) and indoor illumination conditions for D50 (ID50). The WG has also indicated a need for a normative reference for the weighting tables for tristimulus calculations since colorimetric instrumentation for the paper industry typically uses a 10 or 20 nm measurement interval. At this time, ISO has received special permission from ASTM to include a copy of the relevant weighting tables from ASTM E308-99 for inclusion in each of the above ISO colour measurement standards. However, the WG would prefer to cite a CIE recommended method for computing these weighting tables for abridged tristimulus calculation.

- The five authorized laboratories for ISO TC6/WG3 (known as the OPAL Group) met in Stockholm, Sweden, 11-12 June 2007. Some of the issues that were raised were: the need for a black level calibration procedure; and the geometric and bandpass correction procedures from 45/0 geometry, 5 nm bandpass standardizing laboratory calibration conditions to the d/0 geometry, 10 nm bandpass of ISO 2469 commercial instrumentation conditions.

IEC TC34 Lamps and related equipment (Vandermeersch)

A written report submitted by Vandermeersch after the meeting. See **Attachment 4**.

ISO on reflectance and transmittance issues (D. Rich)

See **Attachment 2** R2-23 report submitted by Rich.

IDA (J. Rennilson)

No report received.

OIML (G. Sauter)

No particular issue to be reported at this moment.

IALA (Carl Andersen/Ian Tutt)

The report was given by Ian Tutt. IALA(AISM) International Association of Marine Aids-to-Navigation and Lighthouse Authorities was founded in 1957, and now based in Paris. It provides international recommendations and guidelines for marines aids to navigation (AtoNs). It meets quadrennially (Shanghai 2006). IALA has following committees. For light related matters: Aid-to-Navigation Management Committee (ANM) and Engineering, Environment and Preservation Committee (EEP). For IALA Lights Topics: Effective Intensity (to provide an all-encompassing effective intensity model for all flash shapes), Conspicuity (to provide a model to quantify the conspicuity of an AtoN (or AtoNs)), and Synchronised Lights (synchronising several buoy lights to flash together to enhance conspicuity). Ad Hoc WG (Lights) was set up in 2004 to provide updated recommendations on AtoN Lights, for Colours of Signal Lights, Notation of Luminous Intensity and Range, Measurement, and Calculations. New Products coming out includes flickering light (10 Hz, 30% duty cycle), LED precision sector light (red, white and green, 10 deg arc, >5000 cd), and large LED array (60,000 cd white).

IEC TC100 (Color measurement and management in multimedia systems) (D. Rich)

No report received.

9. Proposals for dissolution of TCs and reporterships

TCs closed since last D2 meeting and prior to this D2 meeting in Beijing:

- TC2-16 Characterisation of the performance of tristimulus colorimeters (Report published as CIE 179:2007)
- TC2-39 Geometric Tolerances for Colorimetry (Report published as CIE 176:2007)
- TC2-45 Measurement of LEDs - Revision of CIE 127 (Report published as CIE 127:2007)

During the 2007 Division meeting it was decided to close:

- TC2-42 Colorimetric Measurements of visual displays. Closed due to inactivity. Related activity will continue under a new reportership.
- R2-28 Evaluation of colorimeter spectral responsivity. Closed due to inactivity.
- R2-37 Industrial lighting requirements for a D65 illuminant. A report was submitted in 2006 with no TC proposal, and activity completed.

10. Proposals for new TCs and reporterships

There were one new TC proposal and two proposals for reportership. D2 decided to establish the following TC and reporterships.

TC 2-62 Imaging-photometer-based near-field goniophotometry

Chair: Walter Steudtner (Germany) - AD Sauter

TR: To prepare a CIE recommendation on the methods for characterization and calibration of imaging-photometer-based near-field goniophotometers and for determination and conversion of photometric data of lamps and luminaries for both near-field and far-field applications.

This TC was proposed by Steudtner that such new type of instruments are starting to be used in the industry and a technical recommendation document is needed. D2 voted to establish this TC with no objection. Possible members should contact Walter Steudtner.

R2-38 Measurement of spectral properties of photometers and colorimeters

Reporter: Jiangen Pan (China) AD: Sauter

TR: Investigate the measurement conditions for spectral responsivity of colorimeters and photometers, with special account for determination of f_1' .

This reportship was proposed by J. Pan, who addressed that f_1' value varies significantly under different conditions (angle of incidence, spatial uniformity, temperature, etc.) and expressed a concern that there were no measurement condition requirements in the TC2-16 document (already published) and also in TC2-40 draft. He proposed to investigate the characteristics of photometers and colorimeters further for the f_1' issue. D2 agreed to establish this reportship with no objection.

R2-39 Display measurement standard - liaison with ICDM

Reporter: Ken Vassie (UK) AD: Johnson

TR: Liaise with International Committee on Display Metrology (ICDM) and report any needs for action by CIE D2.

This reportship was proposed as a result of the discussion for TC2-42.

10.3 New Liaisons

No new liaison functions have been established.

10.4 Changes in TCs and reportships

- The chair of TC2-40 is changed to Peter Blattner (Switzerland), due to death of R Rattunde.
- The chair of TC2-59 is changed to Udo Krueger (Germany), due to Blattner's taking on TC2-40.
- The TR of TC2-51 (Calibration of multi-channel spectrometers) is changed.
New TR: Produce a technical report for the calibration of detector array spectroradiometers primarily for the determination of colorimetric and photometric quantities, including performance characteristics, evaluation of these characteristics, calibration methods and guidance in the application of methods for the determination of uncertainty.
- The TR of TC2-49 will be changed to limit the scope to measurement of effective intensity only. The new TR will be finalized by the TC.

11. General issues (DD Y. Ohno)

11.1. Future D2 Symposia

It was already agreed last year to have next symposium in 2008 in Turin, Italy, hosted by INRIM. The subject was planned to be LED measurement. J Schanda announced that next CIE Midterm session is planned to be held in Budapest, Hungary in spring 2009 and a Solid State Lighting conference is planned as the conference part. This will include sessions on measurements of LEDs/SSL. He invited active participation of Division 2 in the 2009 conference instead of holding a LED Symposium in 2008. D2 agreed to accept his invitation. Therefore, D2 agreed to have a Symposium for 2008 focusing on different topic – with a focus on imaging photometers and colorimeters, spectral measurements and f1' characterization, near-field goniophotometry among other topics.

11.2. Future Directions for Measurement R&D

This topic was not discussed this time.

12. Future D2 Meetings:

2008: D2 meeting will be in Torino, Italy, hosted by INRIM, in conjunction with a D2 symposium described above (Advances in Photometry and Colorimetry). The week of July 7 is considered, and to be officially announced soon.

(The symposium is scheduled for July 7-8, and D2 meetings July 9-11.)

2009: D2 will meet in Budapest, Hungary, in conjunction with the CIE Midterm session as described above. A conference on solid-state lighting planned for the Midterm will replace the LED measurement symposium originally planned. Last week of May is considered.

2010: open

2011: Sun City, South Africa (27th Quadrennial Session)

13. Any other business

1) Question from Div. 4 meeting regarding the measurement of the maximum luminous intensity of a luminaire at certain angles, where no light is coming out. Uncertainties should be given here as absolute values, but it is a nonlinear problem, as no negative values are allowed. Further discussions may be arranged by email.

2) Dong-Hoon Lee announced NEWRAD conference (13. – 16. Oct., 2008) and invited all participants.

3) Ken Sagawa (D1) gave a short presentation on the proposed definition of age-related luminance, which will be a part of CIE/ISO joint standard being proposed for accessibility design. As this concerns issues of quantities and units, Sagawa asked for comments from D2. A problem was raised from Sauter and there was some discussion.

It was agreed that a written response from D2 will be provided later on.

14. Adjournment

The Division 2 meeting adjourned at 17:30, July 11.

Attachment 1 Agenda of 2007 Div.2 Meeting

Attachment 2 Reporter R2-23 ISO/CIE Standards for the measurement of reflectance and transmittance (Danny Rich)

Attachment 3 Report on R2-33 Measurement of Laser-Based Projection Displays (Keith Niall)

Attachment 4 Liaison Report - IEC TC 34 (Guy Vandermeersch)

2007 Division 2 Meeting

Beijing, China

09:00 – 17:30, 11 July 2007

Agenda

1. Attendance list, apologies
2. Introductions
3. Approval of agenda
4. Approval of the minutes of 2006 Division meeting
5. Director's report
6. Secretary's report
7. Editor's report
8. Progress reports from Technical Committees, Reporters and Liaison Persons
 - 8.1. Associate Director Sauter and TC chairpersons
 - 8.2. Associate Director Vandermeersch and TC chairpersons
 - 8.3. Associate Director Johnson and TC chairpersons
 - 8.4. Reporters
 - 8.5. Liaisons with other Divisions
 - 8.6. Liaisons with other Organisations
9. Proposals for dissolution of TCs and reporterships
10. Proposals for new TCs and reporterships
11. General issues
 - 11.1. Future D2 Symposia
 - 11.2. Future directions for measurement R&D
12. Future meetings
 - 12.1. 2009
 - 12.2. 2010
 - 12.3. 2011
13. Any other business
14. Adjournment

Attachment 2

Reporter R2-23 ISO/CIE Standards for the measurement of reflectance and transmittance

There have been no new standards on the measurement of reflectance and transmittance. Technical Committee TC 2-39 had its report and recommendations published in 2006. That report makes significant recommendations on establishing specifications and tolerances for the geometry of spectrophotometry for regular and diffuse spectral transmittance and for diffuse and biconical spectral reflectance factor. Those recommendations should be considered for submission as a Division 2 standard to supplement the Division 1 standard derived from Publication 15 on Colorimetry or perhaps be incorporated into the standard that will be issued based on Publication 15.

ISO 13655 on the measurement of the reflectance factor and color of printing is still under revision. In addition to the problem of the measurement of the reflectance of non-optically thick materials, where the measurement radiance may propagate horizontally away from the measurement aperture or through the specimen and be reflected from the backing into the measurement aperture, they now have come to where the information and recommendations of CIE Publication 163 have forced them to define a measurement condition that is currently unattainable. This condition is described as Measurement Condition M1 in which the instrument source shall be a D50 simulator with a simulation index of BB or better, as described in CIE Publication 51.

ISO 5 series has been completely revised with new, clearer specifications of the requirements for density using spectral reflectance or transmittance measurements and then numerical conversion to ISO Status Density (transmission density or reflection density). The series was scheduled to go to ballot in the fall of 2006 but was held up. It is now being prepared to be balloted in the fall of 2007.

There is a need to continue to monitor the advances of the ISO and CIE looking for the opportunity to set up a TC to develop a standard on the measurement of spectral reflectance (either regular or diffuse) and transmittance (either regular or diffuse). As can be seen from the brief literature survey diffuse reflectance measurement systems are being utilized in many areas of study, most especially in the study of human tissue defects and diseases. This remains an area where the CIE should take a clear lead in defining proper measurement techniques, configurations and standards.

The CCPR-K5 key comparison of diffuse reflectance is shown as having completed the measurement phase but not the analysis and publication phase of the comparison. The results of this study will certainly provide valuable information for revision of a Division 2 standard on the measurement of diffuse reflectance and the issuance of a standard on such.

Respectfully submitted,
Dr. Danny C. Rich

Attachment 3

Report on R2-33 Measurement of Laser-Based Projection Displays

Keith Niall

June 29, 2007

Laser based projection displays are relatively new. Such projectors consist of laser beams that are scanned and synchronously modulated. A particular feature of the laser display is the very short lifetime of the pixels. Each pixel produces light only for the very short time during which the laser beam passes over it. These short transients make the measurement of the properties of images produced laser displays more difficult in comparison to conventional display devices. The wisdom of extending conventional methods of measurement to these displays can be questioned. Conventionally, the evaluation of the brightness and contrast of a display is done with a telephotometer. The telephotometer consists of an imaging lens that projects the image of the scene on a detector and pupils that define the envelope of the effective input beam of light. In the context of display characterization, the telephotometer is pointed on a small part of the display screen and it collects rays coming from this observation zone. Only a fraction of the optical power reaches the detector of the telephotometer. In the case of laser displays, the optical signal is difficult to measure since it is relatively weak and contains rapid transients.

As an alternate method, rapidly varying optical signals can be measured accurately, provided they are sufficiently strong. In order to facilitate the measurements of the characteristics of laser display images, the detection paradigm must be changed in order to ensure a larger optical signal on the photodetector. A proposed alternate method aims at achieving this goal. This method involves measuring the irradiance (optical power per unit surface) in the plane before the screen. The radiance or luminance is then determined by computation using the measured reflectivity properties of the screen. In the proposed method, the irradiance is measured at different points in the plane or surface located immediately in front of the surface normally occupied by the screen. The test pattern proposed for the measurement is a checkerboard. The irradiance measurement is performed in the middle of each bright square. For each sampling position, a first measurement is performed for the maximum value of irradiance, and a second one is performed for the minimum value with a reverse video test pattern.

Some modern screens possess microstructures allowing control of directional scattering properties. For such screens, scattering properties generally depend on illumination direction. The mathematical representation of the screen's reflectivity properties that is used for the luminance computation is the Bidirectional Reflectance Distribution Function (BRDF). The BRDF gives the reflected radiance per unit of incident irradiance for any reflection direction and any illumination direction. Specialized devices exist that allow the efficient measurement of the BRDF spectral distribution. The method involves that a part of screen be sacrificed for the BRDF measurement. Having the spectral BRDF of the screen and a sampling of the screen irradiance, the luminance may be determined for any observer position and any point on the screen using a dedicated computer program.

Many practical considerations should be addressed for implementation of the proposed method. Parasitic light may have significant impact on the results. Both spatial and temporal samplings of the optical signal may also introduce errors if they are not done appropriately. Parasitic light is generated both by the projector itself and by the environment. Veiling glare comes from the undesirable reflections on the lens surfaces and on mechanical parts of the

projector. It increases with the total amount of optical power contained in the projected image. Ambient illumination and the back reflection on walls and objects are the two main sources of parasitic light generated by the environment. Such parasitic light is environment dependent. Parasitic back reflection occurs when light coming from the screen is reflected back toward it by walls and objects. The parasitic light affects considerably the image contrast since it adds a background intensity on the screen. The checkerboard test pattern is chosen in order to generate the unavoidable veiling glare that is representative of a normal image. Such test pattern contains about half of the maximum available optical power and generates about half of the maximum possible veiling glare. Choosing a pattern with less optical power would reduce the amount of veiling glare and result in an estimated contrast not representative of the contrast for a normal image. Signal deterioration due to environment parasitic light changes from place to place and is a problem for standard measurement. Fortunately, there exists simple techniques to overcome such problems. The contribution of the environment dependent parasitic light may be measured and then subtracted from the useful signal. This may be done by putting the photodetector in the shadow of a black opaque mask. The light from the projector (including the veiling glare) is blocked and only the ambient illumination and the parasitic back reflection can reach the photodetector.

The sampling process required for the characterization must be adapted to take into account the spatial distribution as well as the temporal fluctuations of the phenomenon to characterize. Care must be taken to avoid problems related to the pixelization of the image and fast variations due to scanning. Depending on the laser display technology, there can be dead zones in between pixels or inside each of them. Such periodic structures may induce measurement errors when the detector dimensions do not include an integer number of structure periods. Depending on the relative position of the photodetector with respect to the pixel array, more or less dead zones are included in the effective area of the detector. This means that the signal is thus dependent on the detector position with respect to the pixel lattice. These potential spatial sampling problems can be avoided if simple rules are respected. Those rules concern the number of pixels contained within the detector's effective surface, the shape of the detector and its orientation with respect to the pixels.

Attachment 4

Liaison Report - IEC TC 34

Guy Vandermeersch

IEC TC34 «Lamps and associated equipment » is the world standardisation body dealing with the safety and the interchangeability of lighting products. Normally the TC relies on CIE for all photometric performances or lighting requirements except for emergency lighting where lighting is safety. For photometric measurements it refers totally to CIE. At the Berlin meeting October 2006, TC 34 reconfirmed its interest in the work of CIE and maintained Guy Vandermeersch as liaison member.

To mention specially for 2006-2007 is the work in the field of emergency control gears and luminaires. End 2006 IEC standard IEC 61347-2-7 “Particular requirements for d.c. supplied electronic ballasts for tubular fluorescent lamps for emergency lighting” was published: This standard officialises for the first time EBLF (Emergency Ballast lumen factor) as the main parameter for the characterisation of the emergency lighting performances of a control gear. However alignment problems exist with the older and well recognised IEC 60598-2-22 “Luminaires for emergency lighting” and intensive work in this field continues within two specific panels. Guy Vandermeersch is member of the two panels.

Other recent publication or new projects to mention:

- IEC62442-2 (project): Lamp control gear – Part 1: Method of measurement to determine energy consumption of ballast-lamp circuits and Part 2: Ballasts for fluorescent lamps – Performance requirements – Energy labelling and minimum energy performance standards (MEPS) requirements.
- IEC 62031 (project): LED Modules : Safety
- IEC 61347-2-13, Ed.1. Control gear for LED modules: Safety requirements
- IEC 62384, Ed.1. Control gear for LED modules: Performances
- IEC 62386, Ed.1. Digital addressable lighting interface
- IEC 60598-2-14, Ed.1 (project): Luminaires for Neon-signs and Similar Equipment
- IEC 60598-2-27, Ed. 1 (project): Luminaires for furniture