**Comité Consultatif de Photométrie et Radiométrie (CCPR)**

**Minutes of the 14th meeting of Working Group on Strategic Planning (WG-SP)**

held online because of the global pandemic

Thursday, 3 December 2020

(12am Paris, 2pm Moscow, 8pm Daejeon, 12pm Lower Hutt, 4am Boulder, 6am Gaithersburg)

Draft minutes v 0

**Attendees:**

CCPR Officials

Maria Nadal, WG-SP Chair

Joële Viallon, BIPM, CCPR Executive Secretary

Maria Luisa Rastello, CIPM, CCPR President

Dong-Hoon Lee, WG-KC Chair

Marek Smíd, CCPR-WG-CMC chair

CCPR-WG-SP members

Steven van den Berg, VSL

Peter Blattner, METAS

Liesl Burger, NMISA

Joaquin Campos Acosta, CSIC

Catherine Cooksey, NIST

Jimmy Dubard, LNE

Nigel Fox, NPL

Angela Gamouras, NRC

Teresa Goodman, NPL

Annette Koo, MSL

Stefan Kück, PTB, EURAMET TC-PR Chair

Dong-Hoon Lee, KRISS

John Lehman, NIST

Alan Migdall, NIST

Gael Obein, LNE

Maria Nadal, NIST

Yoshihoro Ohno, NIST

Hiroshi Shitomi, NMIJ/AIST

Armin Sperling, PTB

Andreas Steiger, PTB

Lilin Tay, NRC

Andrew Todd, NRC

Lutz Werner, PTB

Observers

Mohammad AlFohaid, SASO-NMCC, GULFMET TC-PR Chair

Giorgio Brida, INRIM

Tony Bergen, CIE Div2 Director

Jarle Gran, JV

Erkki Ikonen, MIKES

Carlos Matamoros, CENAM

Alice Meda, INRIM

Thiago Menegotto, INMETRO, SIM TC-PR Chair

Marek Smíd, CMI

Cho Man Tsui, SCL

Kuei-Neng Wu, CMS-ITRI

1. **Opening of the meeting**

Maria Nadal opens the meeting, welcomes all participants and invite each to introduce themselves

1. **Introduction**

Members

All members (INRIM, CSIC, KRISS, LNE, METAS, MSL, NIST, NMIJ; NMISA, NPL, NRC, PTB, VSL) have at least one representative in the meeting

CCPR officials

See list of CCPR officials present on page 1

Observers

See list of Observers present on page 1

1. **Appointment of the recording secretary**

Maria thanks Stefan Kück (PTB) for his job as rapporteur on the last CCPR-WG-SP meeting

Maria appoints Gaël Obein (LNE) has rapporteur for this meeting

1. **Documents presented to the meeting**

Maria reminds that all documents are available on the BIPM share-point at the following address:

<https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/welcome.jsp>

username: CCPR-WG-SP

password: strategy2014

1. **Approval of agenda**

Agenda have been uploaded on BIPM share-point [CCPR-WG-SP/20-02](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-02-2020_CCPR_WG-SP_Agenda_V3.1.pdf)

Agenda is approved without comment

1. **Approval of the minutes of the 13th meeting**

Minutes have been uploaded on BIPM share-point [CCPR-WG-SP/20-01](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-01-CCPR-WG-SP_Minutes_v1.5.pdf)

Minutes are approved without comment

Yoshi announces that the work of JTC2 “principle governing photometry” was published in Metrologia in March 2020.

1. **Participants to present how the pandemic is impacting their NMI’s work**

Maria invites each NMI to give a brief report on how the pandemic affected / affects the works

INRIM:

Giorgo gives the report

* First period (spring): Strong lock-down. Only essential services allowed. Others were stopped
* Second period (fall): Restriction removed. Access allowed with one person per lab. Calibration activity restarted. Research activity difficult
* Third period (winter): restriction again that impacted essentially research activity.
* In conclusion the impact is mainly on research activity that undergoes delays

CSIC:

Joaquin gives the report

* Lock-down in spring. Activity stopped
* Number of calibrations remains constant with delays
* Main problem is in link with the research project. Work from home allowed progress on theoretical work, but experimental work is delayed

KRISS:

Dong-Hoon gives the report

* Hardest restriction in March April where access to lab was restricted
* Except this period, situation normal at work, no total lock-down, calibration possible
* In order to support Korean industries, KRISS applies a large discount on calibration since April

LNE:

Jimmy gives the report

* March to May, calibration and research activities completely stopped.
* Since mid-May, calibration have started for industries
* Not too much restriction since May at LNE, activity back to normal

METAS:

Peter gives the report

* Not full lock-down in Switzerland but people were asked to work from home
* Calibration have not stopped but demand has decreased
* High demand for calibration of UV-C Lamps that is new and perceived as the impact of COVID

MSL:

Annette gives the report

* 4 weeks of hard lock-down. Out of this period, normal activity
* Noticed an increase of calibration demand on UV-C Lamps
* Difficulties to access to external support by suppliers because of the restriction

NIST:

Maria gives the report

* Beginning of March, it was asked to move to home and NIST faced issues with encryption and move of computer
* End of March, total shut-down and stop of calibration. Customers unhappy
* On site, lost of environmental control (temperature/Humidity).
* NIST opened a research proposal on how to help the US industry to support the COVID 19
* Collaboration with SIM on UV-C lamps
* In May, essential calibration restarted
* End of June, Boulder reopened at 10% capacity.
* Gaithersburg reopened only end of July. Still at only 10% of work onsite in December
* Cafeteria closed, conference rooms closed, travels cancelled.

NMIJ:

Hiroshi gives the report

* Encouragement by the ministry to initiate new projects in link with the fight against COVID19.
* UV-C Disinfection is studied. New UV-C lamps with radiation 222 nm arrived on market. NMIJ is implicated in the calibration of these sources
* Delay in calibration service of few months because employees are asked to work from home but not strong impact.

NMISA:

Liesl gives the report

* 5 weeks of lock-down in March. Progressive return to activity after.
* Funds have been cut. Development project were cut or moved forward.
* Project prioritized with activity in link with pandemic (Temperature calibration, UV-C lamps)
* Revenues at 30% from normal for the NMI.
* New training on radiance/irradiance measurements have been setup to support the use of UV-C disinfection lamps

NPL:

Teresa gives the report

* NPL closed from 21 March to early June. No access to the site
* Gradual reopening since June but very gradual and keeping a number of staff very low on site
* Priority to things linked with Covid.
* 2 projects in radiometry (national reference reflectometer & spectral irradiance instrument) identified as priority project.
* Regular calibration activity reduced because of limited number of staff.
* Climate activity less impacted because it deals with satellites data that doesn’t request lab presence.
* In term of CCPR related work, COVID pandemic has an impact in participation in K1, in addition with issue linked with the new blackbody installed in the lab. It causes delay. Also, on K2b, where second pilot measurement is slowed down because of the limited staff on site.
* NPL noticed Interest from customer on UV measurements, but NPL closed its activity several years ago. So NPL is redirecting the demands to other NMIs now

NRC:

Lilin gives the report

* In March, employees had to work from home.
* Efforts to increase the capacity of testing respirator filtration efficiency for public health in Canada.
* NRC continue to maintain official time
* Since September, limited number of staff are back at work with the objective to maintain calibration at 30% of the regular capacity.
* UV-C germicide lamp testing has increased.
* Regular activity is getting more time consuming and complicated because of the long time that facilities and standard artefact have been not used or stored (cleaning, recharacterization)
* No travel allowed
* But overall, NRC is coping

PTB:

Stephan gives the report

* No complete shut-down at PTB. Limitation of staff only
* In December, it is getting very close to normal
* Calibration service is not so affected
* Research project are more affected, particularly for JRP
* Issue are identified with shipments (cost and delay), particularly in Braunschweig

VSL:

Steve gives the report

* Not complete lock-down but first wave was difficult
* In summer period is was more relax
* Second wave is serious and again staff is encouraged to work from home.
* Number of people in the lab limited and it has consequence on experiments where you must work closely together (like cryogenic radiometer -> stopped)
* In general, the regular work continues
* Scientific collaborations are impacted mainly because travels stopped, and shipment are delayed

BIPM:

Joëlle gives the report

* BIPM has been impacted by the closure of BIPM
* Comparison impacted by shipment delays and NMI delays
* All meetings stopped at BIPM since March
* No meeting plan for 2021. All is moved online. All working CC group meet online
* BIPM hopes that there is no impact its activity and that NMIs don’t see an impact
* BIPM opened a repository on its website “metrology to fight against COVID 19”. Joële will share the link

CMI:

Marek gives a report

* Short lock down in April. Very similar to PTB and METAS
* No meeting but staff try to work as normally as possible
* International collaboration is the most impacted.

MIKES:

Erkki gives the report

* MIKES affected in spring (closure of one month).
* After, was almost back to normal.
* Now 1/3 in the lab, 1/3 in the office, 1/3 on remote. Remote is encouraged but work continue

1. **Review of Action Items from the Minutes of the 13th meeting**

Maria says that all actions items and decisions points are completed.

In order to save time, Maria gives a quick overview of the items and mentions that details can be read in the document *“*[*CCPR-WG-SP20-03-2019\_CCPR\_WG-SP\_Action\_Items\_and\_Decision\_Points\_v1.docx*](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-03-2019_CCPR_WG-SP_Action_Items_and_Decision_Points_v1.docx)” that is uploaded on the BIPM share-point and copied and paste also below :

Action Point :

AP-2019-01: WGC to upload presentation from Yoshi Ohno to the meeting documents.

* Completed. CCPR-WG-SP/19-18: “Yoshi Ohno Presentation to the CGPM”

AP-2019-02: Dong-Hoon Lee to report on the Single-Photon Workshop and on the TG7 meeting, both taking place in Milano, at the next WG-SP meeting.

* Completed

Dong-Hoon Lee, TG7 Chair, provided reports on the TG7 meetings in Boulder (2017-08-04) and in Milano (2019-10-22). Both reports are part of the documents presented at this meeting. In addition, TG7 Chair proposed a reportership in CIE Division 2 for the publication of a technical note on terminology on single/few photon metrology. TG7 chair will provide more details later in the meeting.

AP-2019-03: WGC to contact Andreas to comment on the outcome of the survey.

* Completed

WGC emailed Andreas Steiger a series of questions as a follow up from the TG8 (Discussion Forum on THz metrology) survey results. Below are Andreas Steiger’s responses:

1. Could you infer any further interest on THz laser power? *Not from the survey results but from contacts as described below:*
   1. *VNIIOFI visited PTB as they also want to set up a THz radiometry measuring station analogous to the one in PTB. When the VNIIOFI completes their setup, a bilateral THz power comparison is planned.*
   2. *Furthermore, I only know from a recent publication that the 41st Institute of China Electronics Technology Group Corporation in Qingdao has established a THz calibration system with a THz laser and a Chinese standard detector from NIM.* [*https://link.springer.com/chapter/10.1007%2F978-981-13-8595-7\_28*](https://link.springer.com/chapter/10.1007%2F978-981-13-8595-7_28)
   3. *Also, colleagues from the National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology (AIST) have improved their THz calorimeter.* [*https://link.springer.com/content/pdf/10.1007/s10762-018-0477-3.pdf*](https://link.springer.com/content/pdf/10.1007/s10762-018-0477-3.pdf)
2. Suggest any prioritization for future activities? *No*
3. Any interest in a second pilot study on laser power or on other measurands in the THz spectral region? *In my view, a comparison of how accurately THz time-domain-spectrometers (TDS) can measure the reflectivity of a sample could be useful.*
4. Need for more frequent comparisons? *No further THz comparison is necessary in the next two years.*
5. Responses from the survey are purely from NMIs or also contain responses from industry via the NMIs? *Only the three participants of the first pilot comparison (NIST, NIM and PTB) responded positively to the survey*
6. Need for another survey? *A second THz metrology survey may make sense because novel THz time-domain-spectrometers (TDS) are close to being applied in the industry for non-destructive testing, at least in Germany.*

AP-2019-04: Jimmy Dubard to clarify whether single mode comparison will be a SC or a pilot study.

* Completed

As discussed with Jacques Morel, it is decided that the comparison should be a supplementary comparison. Some NMIs need to have CMCs for this quantity that will be supported by this comparison.

AP-2019-05: WGC to work on updating CCPR strategy document.

* Completed

WGC is investigating the best way to update the strategy document. First virtual meeting will be on Jan 2021.

AP-2019-06: Hiroshi (new TG12 chair) to submit an overview about the outcome of the survey and distribute it to the TG members, 12/2019.

* Completed

On 2017-2018 a questionnaire was sent to the NMIs with four questions:

* 1. Research activity using LED sources for photometry in each member NMIs
  2. LED specification required
  3. Current status of collaboration with LED industry and manufacturers
  4. Current status of collaboration with universities and other communities for LED research.

Dr. Hiroshi collected all information from previous TG chair, Dr. Tatsuya, and will present a report later in the meeting.

AP-2019-07: John Lehman to submit presentation to WGC.

* Completed

CCPR-WG-SP/19-21: “Optical Fiber Power Presentation” By John Lehman

AP-2019-08: WGC to list TG 14 on the CCPR WG-SP website.

* Completed

TG14: Discussion Forum on Radiometry to Support Gravitational Wave Detection"

AP-2019-09: John Lehman to draft the terms of reference for the task group CCPR WG-SP TG14.

* Completed

As defined by John Lehman, the objectives of the CCPR-WG-SP Task Group 14 are:

* to discuss measurement issues and report on progress of the work performed in NMIs
* to identify new measurements needs of the community undertaking detection of gravitational waves
* to define priorities in terms of research activities
* to facilitate coordinated research work between country specific NMIs and the respective gravitational wave observatories.

AP-2019-10: WGC to contact the NIST conference services concerning the possibilities to have WG-meetings on Sunday, 21st and Monday, 22nd, 2019 at the University of Colorado.

* Completed

All arrangements were made, and Maria says that it was going to be a wonderful meeting but cancelled due to the pandemic.

**List of decision points:**

DP-2019-01: WG-SP decides TG 4 to be dissolved.

* WGC informed all members of TG4 about its dissolution. The text of the corresponding webpage will be modified as “this TG completed its task and was dissolved in September 2019”. After one year (11/21), TG4 will be fully removed from the list of SP tasks groups.

DP-2019-02: WG-SP decides JTC-2 to be dissolved.

* WGC informed all members of JTC-2 about its dissolution. The text of the corresponding webpage will be modified as “this TG completed its task and was dissolved in September 2019”. After one year (11/21), JTC-2 will be fully removed from the list of SP tasks groups.

DP-2019-03: The CCPR WG-SP decided to change the name of CCPR WG-SP TG14 to “CCPR WG-SP TG14 Discussion Forum on Radiometry to support Gravitational Wave Detection”

* Completed

DP-2019-04: Ad-hoc group formed on Support for NMI director´s meeting: Maria Luisa (chair), Nigel Fox, John Lehman, Stefan Kück, Marek Smid, Peter Blattner, Erkki Ikonen, Gael Obein, Joanne Zwinkels, Yoshi Ohno, Maria Nadal

* Completed

1. **Reports of WG and TG Chairs and Matters Arising:**

Maria invites TG chairs to give their reports, mentioning that related documents are available on BIPM share-point

**TG6: Discussion Forum on Fibre Optics (Jimmy Dubard)**

Jimmy presented the progress within TG6, see [CCPR-WG-SP20-13](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-13-TG6_Report-2020.docx). He reports that no meeting or event have been held since 2019 from now, but he has regular discussions with Michel Bouquain, chairman of IEC TC86 “Fiber optic” committee, during meetings of AFNOR (UF86 meetings held 3 to 4 times per year) in order to determine what are the metrological needs in the field.

Jimmy mentions that TG6 supports 2 comparisons

- APMP.PR-S8 « optical fibre length calibration », ongoing

- OTDR « Distance scale calibration », in preparation

Jimmy will give more details about it later when reporting on TG9

Marek ask if there is communication between TG6 and CCPR WG-CMC TG4. Jimmy says that it is Jacques Morel who does the link between the two TGs

**TG7: Discussion Forum on Few Photon Metrology (Dong-Hoon Lee)**

Dong-Hoon gives a ppt presentation to present progress within TG7 (see [CCPR-WG-SP20-09](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-09-report_TG7_DG_few_photon_metrology_2020.pptx))

Dong-Hoon mention that the group had a face-to-face meeting in Sept 2019 in Milano together with a workshop on few photon metrologies. Decision has been taken to edit a publication on terminology in single/few photon metrology. A project team has been formed later with objective is to do publication on terminology as a CIE technical note. In August, proposal has been done to CIE Div2 to create a reportership on “Terminology in single/few photon metrology”. Accepted as DR2-87 by CIE.

Dong-Hoon resumes the Single photon workshop that was in Milano (290 participants!). Main outcomes were:

* Single photon sources:

Integration of QDs with photonic circuits active in research

QD sources in near infrared (e.g. at 1550 nm) close to products)

* Single photon detectors

Arrays of Si SPADs for LIDAR and quantum imaging in development

SNSPD advanced in performance and commercialization

HgCdTe APD for mid-infrared introduced

* Single photon metrology

Methodology to test the performance of single photon sources and detectors, mostly done by NMIs

* Single photon applications

Most of papers presented are on this topic

Photon-counting imaging technologies for LIDAR and self-driving vehicles advanced

Large investigation in the field of QKD in China

Application of SNSPD in detecting the dark matter of the universe introduced

During this meeting, there has been a Joint meeting for TG7 (few photon metrology) and TG11 (single photon radiometry) with 19 experts from 11 countries where experts could share progress of pilot studies and discuss what should be done in TG activities. They identified issues in the fact that IEC is about to edit a standard document on single photon detectors where they may use terms that are not agreed with experts of TG7. It may request to urgently publish a guidance document to harmonize all the terms in the field.

CIE reportship DR2-87 has been created with the term of reference “To review the existing international standards for terminology in single/few photon metrology, to survey the current status of the terms used in the practice, and to publish an open-access Technical Note (TN) on the terminology issues that can be referenced by other publications in the field”. 12 experts participate to DR2-87. Target is to finish the TN for Sept 2021.

Dong-Hoon concluded his talk by showing the list of activities of the TG, emphasising that TG Chair engages himself to make a survey for collecting information from TG members (on the advances, on new demands, on the needs for SI traceability) every year before reporting to the CCPR-WG-SP.

**TG8: Discussion Forum on THz Metrology (Andreas Steiger)**

Maria noticed that no report has been received from the TG chair.

Andreas didn’t speak and we moved to the next TG

**TG9: OTDR length comparison (Jacques Morel)**

Maria displayed the report (see [CCPR-WG-SP20-04](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-04-Summary_of_activities_of_TG9_OTDR_2020.pdf)) and Jimmy gives a summary of the activity carried on in TG9.

Jimmy reports that the group is discussing with CCPR WG-CMC TG4 on a new CMC structure for fibre optics service categories. Discussion has been intense during the last months and today a consensus has been found to improve the structure. Next step will be to finalize the list of categories of services for final approval expected on first quarter of 2021

Second important activity is the organization of two Inter-comparison to support the new entries.

* First is APMP.PR-S8 about fibre length calibration. Measurements are finished and comparison is at pre-Draft A stage,
* Second comparison is about OTDR calibration (distance calibration). Comparison was planned to start after the APMP comparison. Nevertheless, NIS and NMISA need CMCs for this service. For this reason, the comparison may start earlier. NIS and NMISA are ready to take the lead of this inter-comparison. The technical document will be discussed and prepared within the TG9.

**TG11: Single Photon Radiometry (Stefan Kück)**

Stefan gives a ppt presentation to present progress within TG11 (see [CCPR-WG-SP20-05](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-05-Progress_Report_TG_11_Few_Photon_Radiometry_2020.pdf))

Seven participants of the pilot study have completed the measurements. VNIOFII and NIM still have to do it. Unfortunately, PTB is struggling to get the detectors sent to VNIOFII (custom problems, pandemic, administration…). It causes delay.

Final measurement at PTB is expected to summer 2021 and data treatment will follow.

Stefan concluded that in this comparison, lot of time has been lost in sending/ sending back the detectors. There is just ono set of detectors.

**TG12: Discussion Forum on the Use of White LED Sources for Photometry (Hiroshi Shitomi)**

Hiroshi gives a talk based on the report available on BIPM share-point (see here [CCPR-WG-SP20-08](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-08-%5bWG-SP_2020%5d_Progress_Report_on_TG12_shitomi.pdf) )

Hiroshi has taken the chair last year. He started his activity by summarizing the questionnaire initiated by Tatsuya Zama on priorities of future work of TG-12.

The questionnaire consists of the following four questions.

1. Research activity in each member NMIs

2. LED specification required

3. Current status of collaboration with industry and manufacturers

4. Current status of collaboration with universities and other communities.

Summary of answers from (at least) 7 NMIs is:

1. Research activity in each member NMIs

Many NMIs are active in the research for LED photometry and related technology, especially for the development of LED-based standard sources, characterization of LED sources and application of LED sources for new optical apparatus.

Some NMIs have intensively pursued their research on the development of LED standard sources as a replacement of traditional standard incandescent lamps.

Hiroshi founds that at the present stage, it seems difficult to replace the tungsten-based source (wavelength limitation, long term stability). Further research and strategy need to be done by NMIs.

2. LED specification required

There are some indispensable items that are requested to establish LED photometry for metrological purposes. For instance, internationally agreed reference spectrum (already addressed by CIE), but we need also standardized electrical setting, or standard electrical connectors to be developed.

3 & 4 :

Some collaboration research with LED manufacturers and lighting manufacturers are ongoing under the framework of involvement in big research program such as EMPIR project (see PhotoLED)

We would need to consider how to continue such intensive collaboration with manufacturers or others by finding out attracting topics that lead to further promote the collaboration. In addition to discuss current and future development, potential effect in the metrological system such as the maintenance and update of CMCs by completely changing LED-based standard sources would also be an important discussion point.

Hiroshi concluded is talk by tell us that he will set up a meeting after March 2021 in order to discuss the main scope on which TG12 will focus on in future

Maria commented that she looks forward for the upcoming meeting.

**TG13: Optical fibre power responsivity (John Lehman)**

John gives a ppt presentation to present progress within TG13 (see [**CCPR-WG-SP20-11**](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-11-TG13_CCPR_2020_Fiber_Power_Lehman.pptx))

John reminds that in the past there has not been official comparison of optical fiber power but many bilateral optical fiber comparison have been done. John shows the historical traceability chain at NIST between Electrical standard, Cryogenic radiometer and optical power meter in “free space” that gives 0.25% to 0.4%. Then he introduces the concept of developing a primary standard strictly devoted to optical fibre power that is a cryogenic radiometer couple with optical fibre to a commercial power meter (Optical Fiber Cryogenic Radiometer -> OFCR).

Idea for this year was to do a trilateral comparison with CENAM and METAS using the OFCR in order to understand and improve calibration uncertainties: Postponed due to COVID19. But protocol has been written.

A paper has been published called “Nature of fiber-coupled detector responsivity measurements at 0.1% using a primary standard” to demonstrate the uncertainty and to expose the limits of the system. John shows results extracted from the paper like temperature dependence of refractive index for different fibers, polarization dependent loss, fiber switch compared to beam splitter. At the end, expanded uncertainty for DTU responsivity using OFCR is at 0.094%.

In conclusion:

* Trilateral comparison delayed due to travel and lab limitations
* Optics Express Publication demonstrating 0.1 % uncertainty in fiber (with beamsplitter, not switch)
* Limits and extents for single photon calibrations in fiber identified

John finished in saying that for him, when we think about single photon, the uncertainty we can expect for single photon calibration can be much better than the actual achieved with µW. It’s not the detector that is limiting but the fiber, the switch, the connector and the low temperature.

John also mentions that Igor Vayshenker is now retired and thanks him for all the work done in this field of optical fiber power.

**TG 14: Discussion Forum on Improved 1 W Laser Power Responsivity (John Lehman)**

John gives another ppt presentation to present progress within TG14 (see [**CCPR-WG- SP20-12**](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-12-TG14_CCPR_2020_1_W_Discussion_Forum_Lehman.pptx)**)**

Talk started with an apologize because the title of the presentation is wrong, it’s not about 1W laser power anymore.

The story starts 10 years ago after a comparison of 1W / 10W laser power showing absolute power difference between institutes of few percent, where gravitational wave community needs much better.

During the workshop in Boulder in March 2019 between metrology and Gravitational Wave (GW) community, the group came to the following conclusions:

➛ if we get power wrong, we get GW distance wrong,

➛ if we disagree, we get GW location wrong,

➛ if we agree and we’re wrong, we get the Hubble constant wrong

Rather than using thermopile, the GW people use a Pcal sensor (integrative sphere couple with an InGaAs photodiode). Decision has been taken to compare the Pcal sensor with a thermopile. Bilateral comparison NIST vs PTB at 100 mW & 300 mW. NIST calibrated the PCal. PTB calibrated the Pcal. John shows the results of the comparison, that are unpublished. Excellent agreement.

To conclude, John presents the Planar Absolute Radiometer for Room Temperature (PARRoT), that is a 1W radiometer developed by VTT

End if TG reports. Maria concludes that the work done in the TG is impressive, even with the pandemic.

1. **Report from BIPM/ CIPM (Maria Luisa Rastello)**

Maria-Louisa mentions that she will give a short talk but that more information can be found in her report (see [CCPR-WG-SP20-14](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-14-CCPR_WG_SP_mlr.pdf))

The audio was really bad when Maria-Luisa was speaking, and unfortunately, it is difficult, even when listening the recorded video, to report was she said.

* Maria-Luisa mentions that the CIPM accepted SCL HK (Hong Kong (China)) as an observer of the CCPR.
* She gave a talk entitled ‘“What is next for the Candela?” at the 20th NMI Director’s meeting on October 17-18, 2019 that was very well received. She thanks the members who gave her support for this presentation.
* The CIPM appointed Dr Louw as Chair of the CIPM Sub-Committee on Strategy and expanded the terms of reference of the Sub Committee on Strategy to respond to the evolving needs for metrology and address key scientific challenges to advance the global measurement system.
* At its 18th meeting, the CIPM endorsed a Task Group on the Digital SI to explore and establish suitable liaisons with all relevant stakeholders aiming at agreeing an authoritative document on a meta-data format for SI-based data transfer, as well as for machine-interpretable unambiguous digital representation of metrological information and factual data in general.

1. **Report from CIE (Tony Bergen, D2 director)**

Tony gives a talk. His ppt that can be found here [CCPR-WG-SP/20-15](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-15-CIE_report_to_CCPR_WG-SP_2020.pptx)

He thanks Dong-Hoon and Peter Blattner for their contribution to his report.

Since our last meeting, CIE published 14 documents and half of them are from div2. Tony goes quickly over the 7 publications from D2 that are

* CIE 241:2020 Recommended Reference Solar Spectra for Industrial Applications
* CIE 239:2020 Goniospectroradiometry of Optical Radiation Sources
* CIE 238:2020 Characterization of AC-Driven LEDs for SSL Applications
* CIE 237:2020 Non-Linearity of Optical Detector Systems
* CIE TN 010:2019 Determination of the Optical Beam Axis, Centre Beam Intensity, and Beam Angle of Directional Light Sources
* CIE S 025-SP1/E:2019 Test Method for OLED Luminaires and OLED Light Sources
* CIE 235:2019 Optical Measurement of LED Modules and Light Engines

Tony mentions CIE support for global action against COVID-19:

* CIE has made available two publications (CIE 187:2010 UV-C Photocarcinogenesis Risks from Germicidal Lamps and CIE 155:2003 Ultraviolet Air Disinfection). These publications are still free available at the moment
* CIE sent a press release warning against using UV radiation to disinfect skin and published a Position Statement entitled “the Use of Ultraviolet (UV) Radiation to Manage the Risk of COVID-19 Transmission” that has been translated into 11 languages.
* Just after, CIE posted a 10-minutes video in support of the Position Statement.
* Currently, CIE is completing a document describing a test method for measuring UV luminaires

In term of current / new activity, CIE is currently revising S 010 (ISO 23539:2005) Photometry – the CIE system of physical photometry. There is a new established TC on Measurement of Total Transmittance, Diffuse Transmittance and Transmittance Haze. There is the reportership on terminology on few photon metrologies (see TG7), and also a new reportership on color temperature used in color appearance sources.

There were 2 tutorials this year, one on colorimetry and visual appearance, second on optical radiation and its effects on photobiological systems

Tony reports two technical discussion.

* First is on TC 2-90 (LED Reference Spectrum for Photometer Calibration) that should be published early 2021. This publication will include a CIE reference spectrum L41 (white LED at 4100K) and will include a spectral power distribution mismatch index for quantifying deviations of real sources compared with the reference spectrum. Objective of this CIE L41 is to be an alternative to CIE source A used in calibration service in order to reduce spectral mismatch correction (or error) in illuminancemeters
* Second in on TC2-82 (Revision of CIE Standard S 014-2 (CIE Standard Illuminants)) to include Illuminant D50. At the moment, there is comments on the determination of CCT of illuminants D50 and D65. Since the revision of the SI, Planck and Boltzmann constants have changed and it has an effect on the c2 constant used in Planck law. Illuminant A spectrum was for black body temperature at 2855,542 K (rounded to 2856 K). Now if we want to keep the same spectrum with the new values of the constants, black body temperature has to be at 2855,496 K (rounded to 2855K). To avoid this change, in CIE 015:2018, it has been decided to round the temperature to 2855,5K. But in CIE 015, it is also mentioned that if you want to calculate the CCT, you have to use ITC-90 and thus the old c2 value. This is inconsistent.

Outcome is still being resolved. CIE Standard S 014-2 revision will likely have calculations of CCT using both constants and CIE 015 « may » change in future

1. **Report from SP Chair Activities and TG10 (Maria Nadal)**

Maria’s activity is available in the 2019 actions items and decision points reports (see [CCPR-WG-SP/20-03](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-03-2019_CCPR_WG-SP_Action_Items_and_Decision_Points_v1.docx)).

In addition, she mentions that there was revision of appendix 2 and 3 of the SI brochure related to the mise-en-pratique of the candela (see [CCPR-WG-SP20-10](https://www.bipm.org/wg/CCPR/CCPR-WG-SP/Restricted/2020/CCPR-WG-SP20-10-UPDATES-Appendixes_2_and_3_of_the_SI_brochure....pdf)). Revisions have circulated and have been approved by TG4 members and equation (3) and (4) of the mise-en-pratique should be revised. It will be done, and the new version will be updated on BIPM website.

Maria moves on the activity of TG10 – Revision of the CCPR Strategy document.

Maria reminds the mission and details the members, noticing that 2 members who joined in 2018 are not listed on the member list (Steven van den Berg and Emma Woolliams). Maria asks why?

Nigel Fox says that it’s NPL that is member of TG10, not an individual. Nigel says that NPL, by concept, should be there. Maria will add Nigel and Emma to TG10.

Steven van der Berg took the opportunity that his name has been mentioned to announce that he will leave VSL soon and thus he can’t be member of the TG anymore. Steven will tell us who will be the representative for VSL later. Maria says that we will miss him.

Maria asks if anybody else wants to join the TG. Stefan Kück (PTB), Marek Smid (CMI) and Gaël Obein (LNE) raised their hand to join.

Maria reminds that the strategy document is available on BIPM website (see [here](https://www.bipm.org/utils/en/pdf/CCPR-strategy-document.pdf)). Last revision was in July 2018 under Joanne Zwinkels chairmanship. This document has to be revised every 2 years (minor) and every four years (major). It’s time to go for the major revision.

Maria looked at what is done by the other CCs. She noticed that most of them have a 1-page summary (CCT, CCL). Maria finds this useful and would like that we do the same. Joële finds that it’s a good idea. She recommends doing it by March-April 2021. Maria agrees.

Maria mentions that CCT and CCL have good strategy document. CCT has a good section on future metrology needs. She thinks that it’s where our document should be improved. She encourages all members to look at the CCT and CCL strategic document.

Objective for us is to have the revised document for summer 2022 before the next CGPM meeting). Maria-Luisa reminds that the next CCPR meeting will be in May 2022. Thus, the Strategic document should be done earlier.

Maria announces that the next TG10 meeting will be in January 2021.

1. **New WG-SP Business**

Maria asks if there are any new business? No answer.

1. **Next meeting date**

Maria suggests early summer, virtual.

Because it seems that a lot of NMIs have new research project in response to COVID-19, Maria suggests that we have a Workshop on “NMIs responses to COVID-19 as it relates to Photometry and Radiometry”. From Maria-Luisa report, it seems that a workshop on “What’s next for the candela” would be also interested. Maria-Luisa says that it should be better to put “What’s next for photometry”.

Maria asks if there is other proposal, comments? Joële says that the topic on new projects in link with COVID-19 seems interesting.

Action: Maria to send an email to all members asking for feedback and topics to see if we can have a workshop on mid-summer.

For information, next CCPR meeting will be 9-13 May 2022.

Maria closed the meeting.

All members congratulated Maria for her chair(wo) Manship and her capacity to keep the time.