Draft Minutes: Comité Consultatif de Photométrie et Radiométrie (CCPR)
Working Group on Key Comparisons (WG-KC) Meeting – Part 1
Virtual Meeting on WebEx; 13:00 - 15:45 CET (UTC +1), 30 November 2021

Version 3, 03 February 2022

Attended by the following members (M) and observers (O):

Dong-Hoon Lee, KRISS (M), WG-KC Chair
Joële Viallon, BIPM, CCPR Executive Secretary

Errol Atkinson, NMIA (M)
Boris Khlevnoy, VNIIOFI (M)
Anatolii BESCUPSCHI, INM-MD (O), COOMET TC-PR Chair
Rheinhardt Sieberhagen, NMISA (O), AFRIMETS TC-PR Chair
Li-Lin Tay, NRC (M)
Yandong LIN, NIM (O)
Arnold Gaertner, NRC (M)
Mohammad AlFohaid, SASO-NMCC (O), GULFMET TC-PR Chair
Yoshi Ohno, NIST (M)
Annette Koo, MSL (M), APMP TC-PR Chair
Maria Nadal, NIST (M) CCPR-WG-SP Chair
Lutz Werner, PTB (M)
Hiroshi Shitomi, NMIJ/AIST (M)
Armin Sperling, PTB (M)
Howard Yoon, NIST (M)
Farshid Manoocheri, MIKES (M)
Thiago Menegotto, INMETRO (O), SIM TC-PR Chair
Angela Gamouras, NRC (M)
Luke Sandilands, NRC (M)
Cameron Miller, NIST (M)
Stefan Kück, PTB (M)
Nigel Fox, NPL (M)
Marek Smid, CMI (O), CCPR WG-CMC Chair
Teresa Goodman, NPL (M)
Emma Woolliams, NPL (M)

The following members were absent:
LNE-CNAM
CCPR President
EURAMET TC-PR Chair

1. Opening and introductions, appointment of recording secretary
Dong-Hoon Lee welcomed everyone to the meeting and confirmed attendance of participants.
Annette Koo was appointed recording secretary for the meeting.
WG chair informed that the audio of the meeting will be recorded for archiving. There was no objection.

2. Approval of the agenda

The draft agenda V.1 (CCPR-WG-KC/2021-01) was approved.

3. Documents presented to the meeting

The working documents will be made available on the BIPM website after the meeting.

4. Approval of the minutes of the 2020 meeting

The draft minutes of the last meeting version 2, revised on 10 April 2021, were distributed on 10 June 2021 and no further comment was received.
The draft minutes of the last meeting version 2 (CCPR-WG-KC/2021-02) were approved.

4.1. Review of action items from the 2020 meeting

The list of action items from last meeting with status of 30 November 2021 (CCPR-WG-KC/2021-03) was reviewed:

AP-2020-01 Not complete

AP-2021-01 - NPL submits the Draft B report of CCPR-S3 (bilateral NPL-NMIJ) to the WG-KC by the end of January 2022.

AP-2020-02 - AP-2020-05: Complete

5. Reports by pilots of on-going CCPR Key Comparisons

5.1.Updates of the CCPR comparison summary (Exec. Secretary)

There have been no final reports published since the last meeting.

The new KCDB makes it easy to search for an find a list of current CCPR comparisons and their status so we no longer need to maintain the “CCPR Summary”.

DP-2021-01: CCPR Summary no longer necessary, so only planned comparisons will be required to be kept updated.

5.2. K3.2014 (2nd) Luminous intensity (NRC)

Arnold Gaertner reported (CCPR-WG-KC/2021-04) that Draft B-2 was sent to the CCPR WG-KC for review in May 2021. The pilot has heard nothing since then.
The Executive Secretary reports that no comments have been received, so the final report has been accepted. Following formal notification from Executive Secretary, the final report can be forwarded by the pilot to the KCDB for publication.

Yoshi asked a question about publication in Metrologia. Joële Viallon responded that this occurs automatically via the KCDB.

Boris Khlevnoy: Reminded the pilot that the list of authors should include at least one person from each participating laboratory.

Discussion: CCPR G2 has two contradictory comments about the authorship of KC reports.

AP-2021-02 CCPR WG-KC chairperson will remove clause 5.6 of G2 so that authorship will include at least one person from each laboratory as per clause 6.8. The reference to the CIPM MRA will also be checked and updated if necessary.

5.3. K4.2017 (2nd) Luminous flux (NMIJ)

Hiroshi Shitomi reported (CCPR-WG-KC/2021-05) that only four participants have submitted their final measurement reports. All participants have committed to submit results by March 2022.

Armin Sperling: EURAMET is waiting for the results to link to this comparison so delays should be minimised.

Yoshi Ohno: Proposed that March 2022 should be a final deadline. If results are not submitted by this time, they will be removed from the comparison.

WG-KC requests that March 2022 will be the final deadline for submission of results by all participants.

Nigel Fox: In future, extensions to deadlines for participant activity should be made with discussion amongst all participants to relieve the pressure from the pilot.

Howard Yoon: Noted that for spectral irradiance there is a current discussion about accepting only the first round of measurements. This is a possibility for K4 if necessary.

Marek Smid: If the participant is unable to complete all measurements, perhaps the laboratory is not able to deliver a service, and so the question arises as to whether they should be able to claim a CMC.

Howard Yoon: It would be very useful for the CCPR WG-KC to discuss the issue and give guidance.

5.4. K2.b.2016 (2nd) Spectral Responsivity 300 – 1000 nm (KRISS)

Dong Hoon Lee reported (CCPR-WG-KC/2021-06) that in June 2021 participants decided to (a) carry out further stability testing between KRISS and NIST to try and resolve drift issues and (b) calculate DoEs anonymously to show severity of the issue. Next participant meeting will be held in February 2022 to discuss results of that work.

Yoshi Ohno: Asked if stability problems affected both trap and single element detectors?

Dong Hoon Lee: Stability problem found primarily from single element detectors and the KCRV is calculated separately for each type of detector. But linking to RMO comparisons is done via single element detectors.

Yoshi Ohno: Perhaps KCRV should only be calculated for single element detectors at wavelengths above 400 nm. Can the pilot lab measurements be corrected to improve results? Or a new set of measurements may be used rather than original, low reproducibility results?

Dong Hoon Lee: Yes, a further set of better measurements has been carried out and so this option will be discussed when the participants meet again. But some uncertainty will need to be added for stability of the artefacts over time. A lower overall uncertainty may be achieved this way.

Howard Yoon: NIST found that the detectors were very stable with their latest measurements. Corrections cannot be made to non-reproducibility of pilot facility. No participant should be able to re-participate with an improved facility, even the pilot.

Nigel Fox: We need a KCRV on single element photodiodes over the full wavelength range. It's not unreasonable to allow the pilot to improve their system and use new results to allow the

comparison to be completed. Provided the original results and reasons for all changes are also included in the report.

Maria Nadal: We only have one comparison every decade, so perhaps it would be better to repeat the comparison and give good results.

Dong Hoon Lee: A new set of measurements will be the clearest solution. Other options are more difficult and would probably result in CMCs with higher uncertainties until a new comparison can be completed.

Yoshi Ohno: The question remaining is whether the participants will agree to use the latest, improved measurements from KRISS to allow for better linking.

Marek Smid: If higher uncertainties are forced by the results of this comparison, the effect will also be felt at the RMO, and potentially for a long time.

Nigel Fox: Can we use the results from the previous comparison for single element detectors below 400 nm?

Howard Yoon: Measurements on single element detectors in the UV is critical. We should await the analysis and the coming participant discussion.

5.5. K2.a.2016 (2nd) Spectral Responsivity 900 – 1600 nm (NPL)

Teresa Goodman reported that final measurements at NPL are now complete. Data analysis will begin January 2022. Target date of starting pre-draft A procedure: March 2022.

Howard Yoon asked for a date for when the technical report template will be delivered to the participants. The template will be sent along with the evaluation and characterisation report by the end of January 2022.

AP-2021-03 The detector evaluation and characterisation report will be sent to participants by the end of January 2022.

5.6. K1.a.2017 (2nd) Spectral Irradiance 250 – 2500 nm (VNIIOFI)

Boris Khlevnoy reported (CCPR-WG-KC/2021-12) that during Pre-draft A participants have discussed the inclusion of results for two participants, who did not have results for the second round. After voting on the issue, the problem has been brought to the WG-KC for discussion.

Nigel Fox: The identity of participants should not have been known during decision making. WG-KC should be careful about making a general rule which may not apply in other contexts.

Howard Yoon: The viability of the NMI's ability to deliver a service is brought into question if they cannot deliver a second round measurement.

Nigel Fox: The risk of non-equivalence is carried by NPL if it is included in the KCRV, not to other participants.

Armin Sperling: The risk is also to the KCRV.

Howard Yoon: For irradiance lamps, only one round of measurements is too risky.

Teresa Goodman: The relative data for the first round at NPL and the pilot shows that either the lamps are stable or that all three lamps drifted by the same amount. NPL's facility is unavailable due to H&S reasons, not due to viability of the system itself. The pandemic has drawn out the resolution of this.

Yoshi Ohno: If the reason for multiple rounds is only for redundancy, then the rules allow for participation in only one round.

Armin Sperling: It might be more than redundancy for multiple rounds. It is suggested to calculate the difference of the KCRV with and without including the second round results.

Boris Khlevnoy: The difference of the KCRV with and without NPL is within standard uncertainty of KCRV. The uncertainty of the KCRV is minimised when all participants are included. He proposes to calculate the KCRV with and without NPL and allow the participants to decide when they meet again.

WG-KC recommends that the participants reconsider the decision to include or exclude NPL based on results of further analysis by the pilot.

Yoshi Ohno: It should be kept in mind that no absolute data should be revealed in the pre-draft A stage. The decision should be based on only relative data. Dong-Hoon and Boris agreed.

The meeting was terminated at this agenda point as the meeting exceeded the time limit already by 40 minutes.

Feedback on the CIPM MRA G11 document is due on 1 March 2021, so some discussion of this should be held soon

AP-2021-04 Annette Koo will organise a meeting of TG3 to respond to the revision of CIMP MRA G11.

AP-2021-05 The WG-KC chair will organise a second meeting of the CCPR -WG-KC by end of February.

Meeting closed at 15:43 (CET)

Summary of Action Points and Decision Points (Part 1)

AP-2020-01 NPL submits the Draft B report of CCPR-S3 (bilateral NPL-NMIJ) to the WG-KC by the end of January 2022.

AP-2021-02 CCPR WG-KC chairperson will remove clause 5.6 of G2 so that authorship will include at least one person from each laboratory as per clause 6.8. The reference to the CIPM MRA will also be checked and updated if necessary.

AP-2021-03 The detector evaluation and characterisation report will be sent to participants by the end of January 2022.

AP-2021-04 Annette Koo will organise a meeting of TG3 to respond to the revision of CIMP MRA G11.

AP-2021-05 The WG-KC chair will organise a second meeting of the CCPR -WG-KC by end of February.

DP-2021-01: CCPR Summary no longer necessary, so only planned comparisons will be required to be kept updated.

Draft Minutes: Comité Consultatif de Photométrie et Radiométrie (CCPR)
Working Group on Key Comparisons (WG-KC) Meeting – Part 2
Virtual Meeting on WebEx; 13:00 - 15:18 CET (UTC +1), 22 March 2022

Version 2, 15 April 2022

Attended by the following members (M) and observers (O):

Dong-Hoon Lee, KRISS (M), WG-KC Chair
Joële Viallon, BIPM, CCPR Executive Secretary

Errol Atkinson, NMIA (M)
Thiago Menegotto, INMETRO (O), SIM TC-PR Chair
Yoshi Ohno, NIST (M)
Marek Smid, CMI (O), CCPR WG-CMC Chair
Yandong LIN, NIM (O)
Howard Yoon, NIST (M)
Annette Koo, MSL (M), APMP TC-PR Chair
Cameron Miller, NIST (M)
Farshid Manoocheri, MIKES (M)
Erkki Ikonen, MIKES (M)
Joaquin Campos, CSIC (O), EURAMET TC-PR Chair
Stefan Kück, PTB (M)
Gaël Obein, CNAM (M)
Angela Gamouras, NRC (M)
Armin Sperling, PTB (M)
Hiroshi Shitomi, NMIJ/AIST (M)
Martin Drury, NPL (M)
Teresa Goodman, NPL (M)
Luke Sandilands, NRC (M)
Maria Nadal, NIST (M) CCPR-WG-SP Chair
Li-Lin Tay, NRC (M)

Apologies:
CCPR President

The following members were absent:
VNIIOFI
AFRIMETS TC-PR Chair
COOMET TC-PR Chair
GULFMET TC-PR Chair
WG KC TG1 Chair
WG KC TG2 Chair

Opening and introductions, appointment of recording secretary
Dong-Hoon Lee welcomed everyone to the meeting and confirmed attendance of participants. Annette Koo was appointed recording secretary for the meeting.

BIPM Executive Secretary informed participants that the audio of the meeting will be recorded for helping to write the minutes. There was no objection.

Review of Action items from Part 1

AP 2021-01 Complete
AP 2021-02 Preparation in progress
AP 2021 -03 Not complete – by 25 March
AP 2021-04 Complete
AP 2021-05 Complete

5. Reports by pilots of on-going CCPR Key Comparisons

5.3. K4.2017 (2nd) Luminous flux (NMIJ)

Update from Hiroshi Shitomi: Participants have been reminded to send in their measurement reports. The deadline (31 March 2022) is not yet passed.

Armin Sperling asked whether the PTB results are still outstanding and noted that he thought the results had been sent in 2017.

Hiroshi Shitomi asked PTB to please re-send their results.

AP-2021-06 Hiroshi Shitomi to remind all participants who have not yet submitted results by email.

5.4. K2.b.2016 (2nd) Spectral Responsivity 300 – 1000 nm (KRISS)

Dong-Hoon reported that a participant meeting was held on 16 March which resulted in the following plan.

Decided to continue the data analysis without re-measuring any artefacts.

The Pre-Draft A process will be re-commenced.

5.5. K2.a.2016 (2nd) Spectral Responsivity 900 – 1600 nm (NPL)

The detector evaluation and characterisation report has been delayed and will be sent by Friday 25 March 2022.

AP-2021-07 NPL to send detector evaluation and characterisation report to participants by Friday 25 March 2022.

5.6. K1.a.2017 (2nd) Spectral Irradiance 250 – 2500 nm (VNIIOFI)

The pilot for this comparison was not at the meeting but Howard Yoon reported that the pilot has revealed non-anonymised results for different scenarios (with and without exclusion of certain participant measurements). There are slight differences to the number of laboratories who agree at the $k = 1$ level. It is something of a concern that the non-anonymised results are used for this consideration, but probably will not strongly impact the decision.

Howard Yoon noted that NIST is embargoed from communication with the pilot during this period. Several other members noted that they are also restricted from communication (Australia, Canada, Germany, UK, Japan, Czech Republic, France, Finland).

Joële Viallon shared a message from the BIPM director. In particular with regard to communication:

> "Some NMIs/DIs have shared information about difficulties they have in maintaining contacts with some participants in CC activities. If needed, the staff of the BIPM are available to support the communications needed to progress the work of the CCs."

Joële Viallon confirmed that, depending on the volume of communications, she is available to support communication as required to enable progress in comparison activity. But the BIPM cannot assist with artefact transport.

Gaël Obein noted that as individual scientists we should not be expected to make political decisions about participation in technical activity. It is for our governments to make decisions and for us to follow those instructions.

Some members may also need to step back from any collaborative activity, including comparisons, and their participation in online meetings may also be impacted. The situation for each member is slightly different and may change.

DP-2021-02 Where necessary, CCPR members may take up the offer of assistance in communication with other States to continue progress relating to CCPR comparisons.

With respect to the non-anonymised data circulated for K1a, Dong-Hoon noted that it is surprising that anonymity was not preserved.

Yoshi Ohno asked whether the data can be considered a Draft A report.

After some discussion it was agreed that although the results do not constitute a true Draft A (given that there are many options for DoEs in the set of results), the pre-Draft A process is complete in the sense that it is no longer permissible for any participant measurement results to be changed or withdrawn.

5.7. K5.2019 Spectral diffuse reflectance (MIKES)

Progress was reported by Farshid Manoocheri (WGKC-21-07). Only one participant has not completed measurements for first round, and two participants have not submitted their results for the first round. MIKES is hoping to resume the pilot 2nd round measurements by the end of March.

5.8. K1.b Spectral irradiance 200 nm to 400 nm

Cameron Miller reported (WGKC-21-07) that one new participant accepted (A*STAR). One participant does not have an independent realisation but accepted for this comparison.

The draft protocol has been sent to participants and responses are due April 8.

Each participant should send three De lamps to NIST by January 2023.

6. Second-round CCPR KCs

6.1. Review of schedule and status

Meas. Start	Id	Quantity	Pilot	Status
2013	K6.2010	Regular spectral transmittance	MSL	Published
2014	K3.2014	Luminous intensity	NRC	Draft B in review by CCPR

2016	K4.2017	Luminous flux	NMIJ	Measurement in progress
2016	K2.b.2016	Spectral responsivity 300 nm to 1000 nm	KRISS	Pre-draft A process
2016	K2.a.2016	Spectral responsivity 900 nm to 1600 nm	NPL	Measurement in progress
2017	K1.a.2017	Spectral irradiance 250 nm to 2500 nm	VNIIOFI	Pre-draft A finished
2019	K5.2019	Diffuse spectral reflectance	MIKES	Measurement in progress
2020	K1.b	Spectral irradiance 200 nm to 400 nm	NIST	Technical protocol in review
2022(?)	K2.c	Spectral responsivity 200 nm to 400 nm	PTB	Wait for draft B of K2.b
2022(?)	K2.d	Spectral responsivity 10 nm to 200 nm	PTB	Call for participants

6.2. Preparing for K2.d (PTB)

Stefan Kück reported that after the second call for participants, responses have been received from PTB, NIST and VNIIOFI. Everything is currently on hold.

7. Reports from RMOs

7.1. Final reports published since the last meeting

- SIM.PR-K6.2010
- COOMET.PR-S8/S9/S7/S1
- EURAMET.PR-S5

7.1. Reports from RMO representatives

APMP by Annette Koo reported on comparison progress (WGKC-21-09). The participants of APMP K2.b have agreed to abandon the comparison, but this needs approval from CCPR.

Dong-Hoon Lee, as pilot of the comparison, presented the case for abandonment.

Howard Yoon identified that there was a clear problem with the link labs and questioned whether they need to increase their CMCs.

Erkki Ikonen agreed that it looks like there is a problem of linking, but the performance of link laboratories does not affect their CMCs. We should not make decisions to discourage volunteers to act as linking laboratories.

Yoshi Ohno noted that it is worth publishing the results elsewhere.

Joële Viallon noted that a report can be published on the CCPR website.

DP 2021-03: The CCPR WG-KC recommends that the CCPR approves abandonment of APMP.PR K2.b.

EURAMET by Joaquin Campos who reported on comparison progress (WGKC-21-14) and read out a position statement of recently given by EURAMET at a JCRB meeting regarding collaboration with

federal or public institutions from Russia or Belarus as a consequence of the Russian invasion of Ukraine.

Howard Yoon mentioned that there is talk about excluding Russia from a CCT comparison. This may become more of an issue also for CCPR.

Joële Viallon noted that comparisons organised under the MRA are organised by BIPM and CCs. Participants can withdraw due to participation of another member, but the comparison will be at risk if the number of participants is too small. The situation should be managed on a case-by-case basis.

SIM by Thiago Menegotto who reported on comparison progress (WGKC-21-10).

8. Reports from Task Groups

8.3. TG3 Comparison Analysis (MSL)

Annette Koo shared the response compiled by TG3 to the revision of MRA G11 (WGKC-21-13).

Joële Viallon noted that other CCs thought that the inclusion of dark uncertainties shouldn't be prescribed by the G11. Did the CCPR consider this?

Annette Koo responded that in general TG3 accepted that dark uncertainties are a better option that exclusion of participants and other ad hoc rules to achieve consistency.

Erkki Ikonen noted that even if 'dark uncertainty' is removed from the G11, CCPR will continue to use it (as we already do with Mandel Paule, for example).

8.4. TG4 Pilot study for the use of alternative standards for photometric comparisons (MIKES)

Erkki Ikonen reported (WGKC-21-11) that candidate artefacts from NIM and PTB have been extensively tested. They are now ready for the pilot study which will go ahead with luminous flux (pilot NIM) and luminous intensity (pilot PTB).

There needs to be an online meeting in April to track progress.

Erkki will confirm a suitable date with NIM and PTB, and will open meeting to other task group members.

9 Comparison Review

9.1 Updates of comparison review

CCPR KCs/SCs:

- CCPR-K3.2014 (draft B): approved on 02 April 2021
- In review: CCPR-S3.x (draft B), review comments sent to pilot on 19 Jan 2022

RMO KCs:

- SIM.PR-K6.2010 (draft B): approved on 09 April 2021
- GULFMET.PR-K4.2021 (protocol): approved on 14 Oct 2021
- EURAMET.PR-K5.xx (protocol): approved on 30 Nov 2021
- In review: APMP.PR-K5 (protocol), no response

RMO SCs:

- EURAMET.PR-S5 (draft B): approved on 26 Nov 2020
- COOMET.PR-S1 (draft B): approved on 19 Jan 2022

9.1 Issues raised in the review

APMP.PR-K5 spectral diffuse reflectance (protocol) piloted by NMISA

- Review comments forwarded on 31 Oct 2019, but no response yet
- Pilot handed over to MSL and a new protocol is being prepared

10. Other business

Call for nomination for new chair of WG-KC in progress, deadline: 20 April 2022

11. Next Meeting

The 25th CCPR meeting: 10 – 11, May 2022, Virtual meeting → No WG meeting planned.

WG-KC meeting 2022 proposed in Nov 2022.

The meeting closed at 15:18 (CET).

Summary of Action Points and Decision Points (Part 2)

AP-2021-06 Hiroshi Shitomi to remind all participants who have not yet submitted results by email.

AP-2021-07 NPL to send detector evaluation and characterisation report to participants by Friday 25 March 2022.

DP-2021-02 Where necessary, CCPR members may take up the offer of assistance in communication with other States to continue progress relating to CCPR comparisons.

DP 2021-03: The CCPR WG-KC recommends that the CCPR approves abandonment of APMP.PR K2.b.