

21 May 2008

1. General Aspects

All relevant information about the TC-PR can be found at the new TC webpage's:
<http://www.euramet.org/index.php?id=tc-pr> .

During the last year members of the TC-PR were mainly occupied by preparing the proposals for joint research projects in the framework of the EMRP. One of the projects has been finally successful (see section 6).

Unfortunately several problems on CMC submissions and on key comparisons appeared during the year (see section 3 and 4). To reduce future confusions several documents are being elaborated summarizing the different EURAMET TC-PR procedures.

At the last EURAMET General Assembly in June 2007 a new chair of TC-PR was elected: Peter Blattner (METAS) took over the chairmanship succeeding Maria Luisa Rastello (INRIM).

2. Projects

In respect to the year 2000 the number of traceability projects and comparisons has significantly increased. However the number cooperation and consultation projects decreased.

Number of running TC-PR projects	2000	2008
Traceability	9	14
Comparison	7	12
Cooperation	3	2
Consultation	3	1

New projects:

During the last period the following new projects were agreed:

Project 1023 Comparison of Spectral Responsivity in spectral range 300nm to 1000nm

This bilateral comparison is provided according to the technical protocol for the bilateral comparison of spectral responsivity scales between CMI (Czech Republic) and SMU (Slovakia) based on the protocol drawn up by the working group of the EUROMET.PR-K2.b comparison.

Project 1048 Cryogenic Solar Absolute Radiometer (CSAR)

Determining the Total Solar Irradiance (TSI) is a long-standing goal in climate research. However, none of the currently available TSI measurements are directly traceable to an SI radiometric standard. The terrestrial measurements of the solar radiative flux is currently based on a conventional primary standard, the World Radiometric Reference (WRR). The WRR is defined from the average of a group of absolute ambient temperature cavity pyrheliometers, the World Standard Group (WSG). By comparing the WRR to the SI it was recently shown that the originally stated WRR uncertainty of 0.3% is still valid. This relatively large uncertainty stems from the different ranges of operation of the two types of standards making it difficult to compare the two. The SI-unit for radiant power (in Watts) is normally realized by national metrology institutes by using cryogenic radiometers and international comparisons are periodically carried out to ensure a worldwide uniform measurement system, the measurement uncertainty of cryogenic radiometer being below 0.01%. The goal of the project is to build a new instrument based on cryogenic technology and being capable of measuring direct solar irradiance with a much smaller uncertainty than the current standard instruments of the WSG. In carrying out this task, significant consideration will be given to the potential use of such a radiometer in

space. In space the CSAR would not only provide measurements of TSI but also serve as a reference standard to allow the in-flight calibration of Earth viewing imaging radiometers as well.

Project xxxx Traceability of photometrical and radiometrical quantities between LNE/INM and DMDM Since the activities in photometry and radiometry at the BIPM were closed down in 2003, the DMDM now consigns the LNE-INM to accomplish the calibration of different photometrical and radiometrical standards to maintain traceability of the units of luminous flux, luminous flux and spectral power responsivity.

At the LNE-INM, the realization of the lumen, the unit of luminous flux, is based on the French candela by employment of a goniophotometer. The candela, the unit of luminous intensity, is based on radiant power measurements transferred by a photometer. Thus, the luminous intensity and flux standard lamps of DMDM will be calibrated on a regular time schedule at the LNE-INM. Spectral power responsivity of three DMDM silicon detectors will be calibrated regularly by LNE-INM by comparison with trap detector.

3. Comparisons

Current situation of EURAMET TC-PR comparisons:

The current situation of the comparison is summaries in the table below. During the last year one bilateral key comparison has been completed (EUROMET.PR-K3.b.1). Unfortunately there were some confusions about the current status of some comparisons. Some of the comparisons are registered at BIPM only; others are registered at EURAMET but not at BIPM. In order to make the procedures of conducting comparisons more clearly several summary documents were prepared by the TC-PR chair.

BIPM - Identifier	Euramet Nr	quantity	status as of 2008-05-21
EUROMET.PR- K1.a		spectral irradiance (250-2500nm)	Technical protocol in discussion by the participant
EURAMET.PR-K1.a.1		spect. irradiance (290-900nm), bilateral MIKES and NIMT(Thailand)	results received
EURAMET.PR-K1.a.x	876	spect. irradiance (290-900nm), bilateral INM(RO) and LNE-INM	Technical Protocol under approval
EUROMET.PR-K2.a.1		spectral resp. (900-1600nm), bilateral NMI-VSL and SP	planned since 2001
EUROMET.PR-K2.a.2		spect. resp. (900-1600nm), bilateral NMI-VSL, JV	planned since 2001
EUROMET.PR-K2.b	587	spect. resp. (300-1000nm)	started 2002, measurement completed, Draft A in preparation
EUROMET.PR-K2.b.x		spect. resp. (300-1000nm) bilateral SMU and CMi	approval of TP by CCPR WG KC in progress
EUROMET.PR-K3.a	569	luminous intensity	approval of TP by CCPR WG KC in progress
EUROMET.PR-K3.b.1	824	luminous responsivity, bilateral	completed, 2007
EUROMET.PR-K4	569	luminous flux	approval of TP by CCPR WG KC in progress
EUROMET.PR-K4.1	823	luminous flux, bilateral	approval of Draft B by CCPR WG KC in progress
EUROMET.PR-K5	619	spectr. diffus. reflectance	started in 2005, measurement completed, Draft A in preparation
EUROMET.PR-K6	538	spectr. diffus. transmittance	started in 2001, measurement completed, Draft A in preparation
EUROMET.PR-K6.1	766	spectr. diffus. transmittance, bilaterl	measurement completed
EUROMET.PR-S1	666	Comparison of chromatic dispersion reference fibres	completed, 2005
EUROMET.PR-S1.1		Comparison of chromatic dispersion reference fibres, sub. Bilat	completed, 2006
EUROMET.PR-S2	156	high laser power	started in 2005, measurement almost completed
	443	Comparison of Ultraviolet Power Meters.	planned since 2003, to start not before 2009

CCPR working group on key comparisons (WG KC):

During the last WG KC meeting the next round of key comparisons at CCPR-level were discussed. The working group has emphasized the need for reducing the number of participants in CCPR KCs. It agreed to adopt the following prerequisite for CCPR KC participants:

- 1) Be a CCPR member.
- 2) Have an independent realization of the quantity.
- 3) Have a CMC coverage of the quantity at the time of call (at all wavelengths, if wavelength range required by the type of comparison).

In addition there are some restrictions on the number of participants: If the total number of participants which fulfil the entry conditions is 12 or less, all applicants are accepted. If the total number of participants which fulfil the entry conditions exceeds 12, each RMO Group will limit the participants as following:

Group 1: EURAMET+COOMET : 6

Group 2: APMP+SADCMET : 4

Group 3: SIM. : 2

The method of selecting participants is up to each RMO Group. EURAMET has 12 permanent CCPR members. The selection method will be discussed during the next EURAMET TC-PR meeting.

4. CMCs

An overview of the past and present CMC submissions is given in the table below. During the last year a number of problems appeared. CMCs of several countries got lost after the inter-RMO review process of batch EUROMET.PR.4.2006 due to a misunderstanding from a communication between TC-PR chair and the BIPM-KCDB manager. Unfortunately the lost CMCs had to go again through the interRMO process. Furthermore several NMIs were surprised that the CMC had not reached the intra-RMO process.

In order to clarify the situation a new summary document on the CMC submission process has been prepared by the TC-PR chair. In addition the status of each individual CMC submission can be tracked at the website of TC-PR.

During the last year EURAMET TC-PR has reviewed and accepted the CMC batch COOMET.PR.4.2007.

Designation	Contents	Status	Comments
EUROMET.PR.1.2001	Initial submission from most of EUROMET NMIs	published, 2001-10-10	
EUROMET.PR.2.2002	submission from most of EUROMET NMIs	published, 2002-10-31	
EUROMET.PR.3.2005	CMCs from FI, SK, ES, and CH	published, 2006-04-26	
EUROMET.PR.4.2006	CMCs from CH, DE, FI, GB and TR	published, 2007-05-11	Some CMCs from DE(PTB), FI(MIKES), and CH(PMOD) got lost
EUROMET.PR.5.2007	Some of the lost CMCs from FI	published, 2007-06-22	fast track process, initiated during CCPR WG CMC meeting
EUROMET.PR.6.2007	Some of the lost CMCs from FI and DE	published, 2008-02-08	
EUROMET.PR.7.2007	The lost CMC's from CH(PMOD)	interRMO review	
EURAMET.PR.8.2008	CMCs from DE, FR, FI, TR,...	intraRMO review	

CCPR working group on CMC (WG CMC)

At the last WG CMC meeting EURAMET TC-PR took over the chair of the CCPR WG CMC.

A major point of discussion during the last meeting was the relation between supporting comparisons and CMC's. The situation in the field of radiometry and photometry is quite complex: There are about 120 different service categories to be related to 6 different key comparisons. In order to simplify the task the services were regrouped into the following categories

1a : are key comparison quantities

- 1b : are very closely related key comparison quantities
- 1c : have some relationship to a key comparison quantity
- 3a : have no directly related KC quantity but there is a SC of the quantity
- 3b : have no directly related KC quantity but there is no SC of the quantity

A set of rules has been elaborated by a task group and will be discussed during the next WG CMC meeting.

5. Activities of the Sub-Committees

TC-PR has presently no Sub-Committee. During the last TC meeting there was a proposition to create a sub-committee for optical fibre metrology. Some of the members were opposed to the idea because in their opinion all other subfields (for instance colorimetry, photometry...) would then also need a technical sub-committee.

6. Participation in iMERA-Plus

Several members of the EURAMET TC-PR are participating at the "quantum candela" project (JRP2.3). The project is aimed at developing standards for few photon metrology and linking these to the existing radiometric scales. In the long-term this could result in a redefinition of the candela in terms of the Planck constant. This task will require a step change in optical metrology in order to bridge the energy difference between the quantum and classical world.

7. Meetings

The last TC-PR contact person meeting took place at NPL from April 17 to April 18, 2008. There were 21 members and guests from NIS Egypt, VNIIOFI Russia and PMOD Switzerland present on the meeting. After the meeting, most participants visited the laboratories at NPL.

8. Issues

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9. Strategic planning

EUROMET TC-PR road-maps (version December 2006) served as a starting point for discussion during the last CCPR WG-SP meeting to brainstorm on the preparation of input to Kaarls 2007 Report. At that meeting CCPR WG SP members were asked if any key economies or issues were missing. The following were mentioned: semiconductor industry (use of shorter and shorter wavelengths), terahertz metrology, optical storage requirements, holography, nanophotonics, ultra high-resolution spectroscopy, defense industry. EURAMET TC-PR members agreed that the revision and/or update of road-maps is not of the highest priority. However it has been agreed that a working group will take care of future strategic planning, reporting to the TC-PR members at the annual meeting.

10. Outlook for 2008/2009

A major objective for this year is to clean up the situation of the different projects. Furthermore the future of comparisons has to be discussed in detail.

Peter Blattner (METAS), 2008-05-21
Chair EURAMET TC-PR