

**ANNUAL REPORT 1999/2000**  
**EUROMET subject field photometry and radiometry**

**Erkki Ikonen, Helsinki University of Technology (HUT)**

**1. CONTACT PERSONS MEETINGS**

The annual contact persons meeting was held at UME, Turkey, 3-5 April 2000. It was attended by 23 persons from AT, CH, CZ, DE, DK, ES, FI, FR, GB, HU, IT, NL, NO, PL, PT, SE, SK, TR, and BIPM. An extra contact persons meeting to discuss calibration and measurement capabilities (CMC) was held at PTB, Braunschweig, 13-14 December 1999. It was attended by 11 persons from DE, ES, FI, FR, GB, IT, NL, PL, SE, and BIPM. The main subjects discussed in the meetings are described below.

**2. ANALYSIS OF CALIBRATION AND MEASUREMENT CAPABILITIES**

The contact persons group decided to analyze the CMCs in two stages: The first stage consists of analysis of the key comparison quantity CMCs and the second stage consists of analysis of other than key comparison quantity CMCs.

It was also agreed that the CMC entries cannot be accepted without supporting evidence as described in the letter of Dr. Quinn of 24 November 1999 and in the EUROMET project 512. The supporting evidence is most likely comparison data.

**CMCs of key comparison quantities**

After receiving the submitted key comparison quantity CMCs, the rapporteur sent them for comments to all contact persons. The anonymous comments were then delivered to the NMIs with a request of written replies. Finally, every CMC entry (with written comments and replies) was discussed in detail in the contact persons meeting. The contact persons meeting accepted the CMC data according to the unanimously accepted criteria. The contact persons also agreed on a detailed format for presenting data on key comparison quantity CMCs. The first round of analysis of key comparison quantity CMCs was completed in the contact persons meeting in April 2000.

The acceptance criteria for key comparison quantity CMCs are:

1. The CMC uncertainty cannot be lower than that reported for the results of the supporting comparison.
2. All CMC entries during the provisional period must be traceable to primary realizations of key comparison quantities for which there is comparison evidence to justify the stated uncertainty of the primary realization.

3. NMIs without comparisons and own primary realization will submit uncertainty budgets to justify their claimed uncertainties.

It should be noted that also informal bilateral comparisons can be used as comparison evidence.

These procedures and acceptance criteria are the result of the request for unanimous decisions. With the above rules, the contact persons group has succeeded in agreeing on key comparison quantity CMCs of thirteen EUROMET NMIs. The total number of accepted entries is about 70.

Most of the accepted entries are probably rather conservative. It is anticipated that after the provisional period of MRA, there would be no need to increase the CMC uncertainties.

### **Other than key comparison quantity CMCs**

Results of key comparisons and of informal bilateral comparisons of key comparison quantities are used to give general confidence in an NMI's capabilities in a wider field. For other than key comparison quantity CMCs the acceptance criteria are:

1. Each quantity is associated with a key comparison quantity.
2. The supporting evidence is provided by the CMC entry of the associated key comparison quantity or by a supplementary comparison.
3. The CMC uncertainty must be compatible with the associated key comparison quantity CMC or with the uncertainty of the results reported for the supplementary comparison.

Five working groups were formed that will be responsible for analysis of the quantities associated with spectral irradiance, spectral responsivity, photometry, spectrophotometry, and fiber optics. The first four working groups are chaired by coordinators of the corresponding EUROMET key comparisons (see Sec. 3). The fifth working group is the Fibre Optic Consultation Working Group (see EUROMET project 581).

It is anticipated that the total number of entries will be between 200 and 300 after the first round of analysis.

### **3. EUROMET KEY COMPARISONS**

EUROMET key comparisons are similar to the corresponding CCPR key comparisons. The following coordinating laboratories (underlined>) and participating laboratories are registered.

#### **Spectral irradiance**

EUROMET.PR-K1.a (GB AT CZ PL SE HU IT CH NL TR) Start 2001

**Spectral responsivity**

EUROMET.BPR-K2.a1 (NL SE) Start 2001

EUROMET.BPR-K2.a2 (NL NO) Start 2001

EUROMET.PR-K2.b (ES AT NL NO PL SE TR CH CZ) Start 2001

**Luminous intensity**

EUROMET.PR-K3.a, EUROMET project no. 569

(DE AT CZ FI NL PL SE FR IT) In progress

**Luminous flux**

EUROMET.PR-K4, EUROMET project no. 569

(DE AT CZ FI PL SE FR IT) In progress

**Spectral diffuse reflectance**

EUROMET.PR-K5 (HU CZ PL PT SE) Start 2001

**Spectral regular transmittance**

EUROMET.PR-K6, EUROMET project no. 538

(FR AT CZ NL PL PT SE HU TR) In progress

**4. STATUS OF EUROMET PROJECTS**

The status of EUROMET projects was updated. The project coordinators (underlined) and participants are listed below.

**Agreed projects in cooperation in research**

359 Wavelength standards for optical communication (DK PT SE)

562 Two photon metrology (IT FR GB HU DK CH NL ES US)

**Agreed comparison projects**

156 Comparison of high laser power (DE GB FR SE DK PT PL RU  
UA RO US)

353 Transmittance measurements of V( $\lambda$ ) filters (SE DK FI FR NL)

538 EUROMET key comparison of spectral regular transmittance  
(FR AT CZ NL PL PT SE HU TR)

569 Key comparisons of luminous intensity (EUROMET.PR-K3.a) and  
luminous flux (EUROMET.PR-K4)  
(DE FR IT AT CZ FI NL PL SE TR)

**Agreed traceability projects**

6 Reflectance of diffusing materials (DE GB FI SE)

36 UV radiometric scales and calibration services (DE GB)

37 Transfer standards for spectrophotometry and colorimetry (GB IT PT)

38 Fiber optic standards (GB CH ES IT PT)

40 Traceability of spectral irradiance scales (GB CH IT)

204 Measurement of diffusion of retroreflectors and ref. standards (IT GB)

374 Spectral responsivity scales (GB CH)

539 Radiometric calibration of French UV and VUV source standards (DE FR)

**Agreed projects in consultation on facilities**

437 Evaluation of the radiometric performance of UV photodetectors  
(DE DK ES FI FR NL SE GB US)

581 Fibre optic consultation working group  
(SE AT CZ DK FI FR DE HU IT NL NO PL PT SK ES CH TR GB)

**Proposed projects**

375 Comparison of characterization techniques for filter radiometry  
(GB DE FR HU SK FI)

443 Comparison of UV power meters (GB FR DE IT NL SE)

444 Comparison of luminance meters (GB DE ES FI FR HU IT SE)

**New proposed projects**

xxx Comparison of NIR diffuse reflectance scales (GB PT SE)

yyy Investigation into the differences between diffuse reflectance measured using conventional sphere based techniques and goniophotometric techniques (GB PL FR)

**Completed projects**

344 Fiber optic power meter comparison  
(GB ES DE NL FI SE CH DK FR US)

354 A photometric scale based on filtered trap detectors (SE DK FI FR IT)

475 Intercomparison of spectral irradiance scales with new travelling standards (DE FI SE)

**Deleted projects**

417 Comparison of spectral irradiance scales

Present number of agreed EUROMET projects:

Cooperation in Research	2
Comparison	4
Traceability	8
Consultation	2

The number of agreed projects participated (coordinated) by the EUROMET members:

GB 11(5), FR 8(2), DE 7(4), IT 7(2), SE 7(2), NL 6, DK 5(1), CH 5, FI 5, PT 5, ES 4, PL 4, AT 3, CZ 3, HU 3, TR 3, NO 1, SK 1