



## **Electricity and Magnetism Metrology Working Group**

**2015 SIM EM MWG Meeting**  
**Sunday, November 29, 09:00 h – 16:00 h**  
**Hotel Dall'Onder**  
**Bento Gonçalves, Brazil**

### **1. SIM EM MWG Annual Meeting - Introduction**

Welcome and introduction of the participants.

The meeting commenced at 9:15 am with a welcome by the chairman followed by self introductions of the attendees from the various countries represented.

Gregory Kyriazis (INMETRO) asked for a modification in the agenda to include his and René's proposal of an activity within the PTB project.

The agenda was approved by all participants.

Gregory Kyriazis (INMETRO) volunteered to take the minutes of the meeting.

### **2. General Issues**

#### **2.1. Matters arising from the last CCEM meeting**

CCEM is concerned with reducing the workload with CMCs. There are too many entries. One suggestion is to use matrices as much as possible. If the lab submits CMCs without matrices, the document should return to lab for revision.

Proposals to reduce the time for interregional reviewers. One proposal is to create a world board of reviewers so that once the CMC is submitted, it will be reviewed by that board. This proposal mimics what is already implemented within SIM. We already have a board of reviewers for intra-regional review. This proposal was advanced by APMP.

BIPM proposed that all new submissions should be completely arranged in matrices. Even if some categories in the new submission have no entries changed, the whole new CMC to be submitted should have all its entries arranged in matrices.

Another proposal was advanced by EURAMET. They suggest that only the highest level CMC entries should be published. They also propose to abolish the interregional review and rely only on the intra-regional review. Lucas Di Lillo (INTI) regards this proposal to be difficult to manage.

SIM position concerning this proposal is that all countries should publish their highest level entries. Thus, the highly developed countries would publish only quantum metrology entries and low developed countries could publish their best entries, for instance, zener or standard resistor entries.

Claudine Thomas (BIPM), responsible for CMCs publishing in JCRB website, retired and was replaced by Susan Picard.

François Piquemal (LNE) was replaced by Ilya Budovsky (NMI Australia) as chair of the CCEM RMO Working Group.

#### **2.2. CCEM Comparisons**

There is an increased tendency for sharing the responsibility in managing the comparisons. They believe this will hasten the comparison by sharing the workload involved.



## Electricity and Magnetism Metrology Working Group

### New CCEM Comparison

- K13 – power harmonics – travelling standard Fluke 6105, participants: NIST, NRC, SP, PTB, NPL, VNIIM, NIM. Comparison scheduled to start in October 2015.
- K4 – capacitance, 10 pF and 100 pF, 1 kHz and 1.592 kHz – Star approach, with two to three laboratories per RMO which send their calibrated standards to BIPM for comparison. Target start date: 2016, pending outcome of the related EURAMET supplementary comparison.
- K6a/K9 – ac/dc voltage transfer at 1-4 V, 10 Hz – 1 MHz and 500 – 1000 V, 10 Hz – 100 kHz. Participants interested so far: SP, INTI, PTB, NMIA, NRC, JV, NMIJ, NIM, LNE, NMISA. Expected start date: 2017.

## 2.3. SIM COMPARISONS

### 2.3.1. ONGOING COMPARISONS

- **SIM.EM-S12 (Bilateral comparison on AC Energy at 50 Hz and 60 Hz)**

Carlos Espinosa (CENAMEP AIP) presented the status of the comparison between CENAMEP AIP and INTN

Question posed: Should the uncertainty of the reference value be equal (at least) to the uncertainties of the CMC of CENAMEP or it could be lower?

Everybody agreed that the reference value could be lower if the results of the comparison justify this action.

The comparison finished but they did not arrive at the expected result so that a new comparison is being planned.

- **SIM.EM-K12 (Comparison on AC-DC Current Transfer Difference)**

Lucas Di Lillo (INTI) presented the results of the comparison.

This comparison was linked to CCEM.EM-K12. The comparison is finished and already published in the JCRB website.

Gregory Kyriazis proposed that some training on ac-dc transfer voltage and current could be organized having INMETRO, INTI and CENAM (for instance) as instructors and CENAMEP AIP, UDEC, INTN, INM, UTE (for instance) as participants funded by the PTB project.

- **SIM.EM-S8 (Comparison on High Current Instrument Transformer)**

Alejandro Santos (UTE) presented the results of the comparison.

Daniel Izquierdo (UTE) suggested informing in the comparison report that this comparison refers to the service category 'AC High Current Ratio'.

The comparison faced several problems related to participant countries customs. There is a pending problem between Mexico and Uruguay customs related to the payment of a penalty.

Lucas Di Lillo (INTI) commented that SIM invited a Mexican laboratory (LAPEM) to participate in this comparison. LAPEM made the measurements and informed UTE they would send the transformer to Uruguay. UTE however asked them to wait one month as UTE still had not the Uruguayan allowance to receive it. Due to this delay, UTE was charged a penalty by Mexican customs. LAPEM said they cannot send back the transformer until UTE pays such penalty. UTE agreed to pay the penalty and asked an invoice to LAPEM. However, LAPEM have not answered yet.



## Electricity and Magnetism Metrology Working Group

René Carranza (CENAM) will contact LAPEM to check if they can issue such invoice.

The comparison finished and a Draft A report is being written by UTE.

- **SIM.EM.RF-K5b-CL (Comparison on S-parameters)**

Lucas Di Lillo (INTI) presented the results of the comparison.

It was commented that NRC delayed one year after their measurement to convey their results to the pilot. KRISS who also participated in the comparison never responded and did not convey their results to the pilot.

Comparison finished and a Draft A report is being written by INTI.

- **SIM.EM-S11 (Bilateral Comparison on Resistance in 100 Mohms and 100 Gohms)**

Bilateral comparison between NIST and ICE.

Rand Elmquist (NIST) presented the results of the comparison and informed that the report has already been submitted to JCRB website.

Gregory Kyriazis (INMETRO) suggested that the comparison code terminology should be revised by SIM. All bilateral key comparisons should have its code derived from the master key comparison code by adding .1, .2, .3, etc. All bilateral supplementary comparisons should have their code derived from the master supplementary comparison code by adding .1, .2, .3, etc.

- **SIM.EM-K3 (Comparison on inductance)**

René Carranza (CENAM) presented the results of the comparison. The comparison was piloted by CENAM and the measurements completed in June 2015.

Draft B report was submitted to CCEM on Nov 09 2015 and Jose Angel Moreno (CENAM) submitted a paper on the comparison to CPEM 2016.

Based on proposal by the group, José Angel Moreno (CENAM) will write an extended paper on the comparison to be submitted to IEEE Trans IM.

### 2.3.2. New and Proposed Comparisons

- **DMM comparison**

Alexander Martinez (INM) presented the comparison called "Digital multimeter comparison". The suggested test points of the comparison will include DC voltage, AC voltage, resistance, DC current and AC current.

Gregory Kyriazis (INMETRO) noted that this comparison should be called 'Comparison on Voltage, Current and Resistance Measurements' as the previous SIM.EM-S5.

Lucas Di Lillo (INTI) proposed to run a new SIM.EM-S5 (traveling standard and test points to be defined) and, according to the suggestion of the CCEM, try to share the responsibilities of the comparison between 3 different NMIs (the NMI who will provide the traveling standard, the NMI in charge of customs issues, and the NMI responsible for writing the report)

Daniel Izquierdo (UTE) and Gregory Kyriazis (INMETRO) informed about their interest in a trilateral comparison on 10 ohms. The comparison pilot would be INTI and UTE and INMETRO suggested to employ an HP 3458A as traveling standard.



## Electricity and Magnetism Metrology Working Group

- **Intercomparison on Harmonics**

René Carranza (CENAM) presented the current status of this planned comparison.

He commented on the comparison schedule and the measurement time interval within each country.

The participating countries should define the time required for clearing customs in each country so that the comparison schedule can be defined by the pilot.

The participating countries agreed on two weeks for measurement time interval in each country.

SIM Pilot Study on the Characterization of the Symmetry of Two-channel Sampling Systems for Analyzing Sinusoidal and Nonsinusoidal Waveforms

Gregory Kyriazis (INMETRO) presented a proposal for a pilot study for preparing NMIs for SIM.EM-K13.

He will elaborate a protocol to be submitted to NMIs who may be interested in participating.

### 3. SIM and Interregional Reviews

COOMET.EM.8.2005 – final comments  
EURAMET.EM.13.2015 – final comments  
SIM.EM.8.2015 – final comments

New submissions for SIM CMC Review

CENAMEP AIP submitted a CMC to be reviewed by SIM.

### 4. Next SIM EM MWG Meetings

The next SIM EM MWG meeting will take place in Ottawa, Canada, during CPEM 2016.

The meeting ended at 14:45.

2015-11-29  
Lucas Di Lillo  
CHAIR SIM EM MWG  
ldili@inti.gob.ar