



Electricity and Magnetism Metrology Working Group

2014 SIM EM MWG Meeting
Saturday, August 30, 09:00 h – 18:00 h
Windsor Barra Hotel
Avenida Lucio Costa, 2630 - Barra da Tijuca
Phone: xx55 (21) 2195-5000, Fax: xx55 (21) 2195-5050
Rio de Janeiro - Brazil

Agenda

09:00 – 09:15	Introduction Welcome / Introduction of the participants Approval of the Agenda	Gregory Kyriazis SIM representatives
09:15 – 10:00	General Issues Matters arising from the last SIM, CCEM and JCRB meetings Funding for SIM activities	Gregory Kyriazis SIM representatives
10:00 – 10:45	SIM/IAAC/COPANT Energy Project Presentation of results of workshops and trainings since September 2013 Training on Calibration of Power Quality Reference Standards Training on Calibration of HV and HC Transformers for Energy Meters Internship Program: Strengthening the technical competences of SIM NMIs to develop and provide measurement services in electrical magnitudes	Héctor Laiz Gregory Kyriazis
10:45 – 11:15	SIM.EM-K5 Electric Power Comparison Pilot: CENAM, Draft B status	David Avilés
11:15 – 11:40	SIM.EM-S7 Electric Energy Comparison Pilot: CENAM, Draft A status	David Avilés
11:40 – 12:05	SIM.EM-K12 AC-DC Current Transfer Comparison Pilot: INTI, Draft B status	Lucas Di Lillo
12:05 – 12:30	SIM.EM-K4.1/S4.1 Bilateral Capacitance Comparison (NIST and ICE) Pilot: NIST, Final comments	Harold Sánchez
12:30 – 14:30	Interval for lunch	
14:30 – 14:55	SIM.EM-S8 Comparison on Instrument Current Transformers Pilot: UTE, Progress status	Leonardo Trigo
14:55 – 15:20	SIM.EM.RF-K5b.CL Comparison on S-parameters Pilot: INTI, Progress status	Lucas Di Lillo
15:20 – 15:45	SIM.EM-S11 Comparison on Resistance (100 MΩ and 100 GΩ) Pilot: NIST (participant ICE) – Protocol status	Rand Elmquist
15:45 – 16:05	SIM.EM-K3 Inductance Comparison Pilot: CENAM, Progress status	David Avilés
16:05 – 16:30	New and Proposed Comparisons SIM Pilot Study or Comparison on Current Shunts / Low-valued Resistors Pilot: CENAM	David Avilés
16:30 – 17:00	SIM and Interregional CMC Reviews CMC SIM.EM.07.2014 – Argentina – final comments CMC EURAMET.EM.12.2014 New submissions for SIM CMC Review Updating the list of SIM reviewers	Gregory Kyriazis SIM representatives
17:00 – 17:25	Terms of Reference (ToR) Nominees for next chair of SIM EM MWG	Gregory Kyriazis
17:25 – 17:45	Other Business Developments at the laboratories	SIM representatives
17:45 – 18:00	Next SIM EM MWG Meetings XI Semetro (2015) – Brazil CPEM 2016 – Canada	SIM representatives



Electricity and Magnetism Metrology Working Group

Participants at the annual SIM EM MWG meeting in Buenos Aires, on September 21, 2013

Country	NMI	Name	E-mail
Argentina	INTI	Hector Laiz	laiz@inti.gov.ar
ARGENTINA	INTI	Lucas Di Lillo	ldiLi@inti.gov.ar
USA	NIST	Andrew Koffman	andrew.koffman@nist.gov
Costa Rica	ICE (Designated)	Harold Sánchez	hsanchez@ice.go.cr
PANAMA	CENAMEP	CARLOS ESPINOSA	CESPINOSA@CENAMEP.ORG-PA
CHILE	CONMETINN	DANIEL CARCAMO	dacarcam@udec.cl
PERU	INDECOPI	HENRY DIAZ	hdiaz@indecopi.gov.pe
EL SALVADOR	CIM	CARLOS ARTIGA	carlos.artiga@sim.gov.sv
ALAIN MICHAUD	NRC	CANADA ALAIN MICHAUD	ENRC-CNRC
CANADA NRC	ALAIN MICHAUD	MICHAUD@NRC-CNRC.GC.CA	
México	CENAM	Israel Garcia	igarcia@cenam.mx
México	CENAM	David Aviles	daviles@cenam.mx
Trinidad & Tobago	TTBS	KPhillip Grant	kphillipgrant@ttrb.com
USA	NIST	Rand Elmquist	elmquist@nist.gov
Colombia	INM	Mauricio Satchica A.	msatchica@inm.gov.co
Colombia	INM	Alexander Martínez	amartinez@inm.gov.co
Germany	PTB	Luciano Scrimini	luciano.scrimini@ptb.de
URUGUAY	UTE	LEONARDO TRIGO	LTRIGO@UTE.COM.UY
URUGUAY	UTE	Gonzalo Aristoy	garistoy@UTE.COM.UY
URUGUAY	UTE	Juicio Izquierdo	juicio@ute.com.uy
BRASIL	INMETRO	GREGORY KYRIAZIS	GAKYRIAZIS@INMETRO.GOV
Jamaica	BSJ	Clayton Lewis	clewis@bsj.org.jm



Electricity and Magnetism Metrology Working Group

1. SIM EM MWG Annual Meeting - Introduction

Welcome and introduction of participants.

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

Daniel Izquierdo (UTE) asked for a modification in the agenda to include some issues concerning the new development at UTE with the Josephson Effect.

Hector Laiz (INTI) asked for a modification in the agenda in order to make his presentation about SIM/IAAC/COPANT Energy Project at the beginning of the meeting.

In order to reduce the length of the meeting the lunch was eliminated and replaced by two coffee breaks.

The agenda was approved by all participants.

2. SIM/IAAC/COPANT Energy Project

Hector Laiz (INTI) made a presentation in which he showed the results of the activities done within the project on “Training and traceability for power quality measurements” organized between COPANT, SIM, OEA and PTB. He mentioned that all the activities which the project organized were within the scope of the SIM EM Working group, i.e:

- 1) Power quality training workshop that was given before the SEMETRO 2013 in Buenos Aires.
- 2) Verification of electrical energy meters course given in Costa Rica from 27th to 29th November 2013. This course was divided into different components according to the knowledge of the participants. Harold Sanchez, from ICE was involved in the organization of the course. All participants were very interested in continuing the activities in this issue.
- 3) Course on “Training on power quality on calibration reference standards”. This course was presented before the CPEM 2014 in Rio de Janeiro. The first part of the course was theoretical and the second part was practice. In the course Fluke instruments were used, like Fluke 6100 calibrator.
- 4) Course on “Calibration of HV and HC transformers”. This course will take place at UTE, Uruguay from 6th to 9th October 2014. Hector Laiz encouraged people to complete the registration form for this course. Gregory Kyriazis mentioned that the attendees at the moment of this meeting were few and it is necessary to discuss if the course will be done in the scheduled dates or need to be delayed. Luciana Scarioni, from PTB indicates that it is impossible to postpone the course due to PTB financial limitations.



Electricity and Magnetism Metrology Working Group

At the time of this meeting there were only 5 participants but 3 more colleagues show interest in the course.

Hector Laiz mentioned that calibration of HV and HC is an important part of the project and one of the most important issues of power grids.

- 5) There will be a course named “Escuela Andina de Metrología” from 19th October until 31st October.
- 6) Concerning the internship program, each NMI which is interested in this program should contact the host NMI and complete the internship form and send it to Luciana Scarioni and Lucas Di Lillo. Once the agreement between the host and participant NMI is done, the NMI should send the form to Hector Laiz and Gregory Kyriazis in order to present this proposal to the SIM Council to be approved. The minimum stay is one week and each NMI can receive up to 2000 Euros for travel ticket and the per diem should be paid by the NMI.
- 7) Another activity was the proposal of the “Workshop on Assessment and acceptance activities of type approval certificates”, including software on smart grids, (hardware and software) Possible dates. March or April 2015 at INTI
- 8) As a result of the course of PQ in CPEM, a SIM intercomparison on power harmonics was proposed by René Carranza. It was suggested to organize a meeting in CENAM to discuss the protocol and the degree of advance of the power quality measurement after the course in Rio de Janeiro. Hector Laiz mentioned that it will be important to write an acknowledgment letter to Fluke due to its presence in the course and the fact that he supplied the instruments.

3. General Issues

- During the SIM General Assembly at CENAM there was a TC meeting. It was discussed the possibility of doing a training and a workshop on CLIMATE SCIENCE AND RENEWABLE energy. This project is between CENAM and NIST and it is similar to the joint project between PTB/COPANT, OEA and SIM project. It is expected to receive a new financial source of funding for the activities from this project. The first activity within this project was in Queretaro, the second one was in Guatemala, and the next after this meeting there will be another activity in Uruguay. It is planned to have the final activity in Bogota, Colombia during the next SIM General Assembly in November. Gregory



Electricity and Magnetism Metrology Working Group

Kyriasis wants to know which the formal way to make the proposals is. Hector Laiz did not know the answer because he is not the SIM representative in this project. Hector Laiz presented the schedule workshop on Climate Science to be done in Uruguay after this meeting.

- Sim Funding

Gregory Kyriasis stated that thanks to the contribution of PTB the PQ course could be done. PTB paid the registration fee of the CPEM 2014, lodging for the PQ course assistants and travel tickets. Gregory Kyriasis also mentioned that the participation of IUAPAP was important because it sent funds for the CPEM. He also mentioned that SIM had funds to support the attendance of some participants but these funds arrived too late so none NMI used them.

Hector Laiz also mentioned that was approved a SIM budget of U\$S 400000 for 3-years. In November, during the Council Meeting a new budget will be discuss.

4. SIM.EM-K5 Electric Power Comparison

David Avilés (CENAM) made a presentation on the SIM EM K5 comparison. The status of this comparison is finished. Draft A and Draft B was issued and distributed to participants.

Draft B was sent to the CCEM and Jonathan Williams is going to send draft B to other RMO for its approval. The deadline for make any comments or suggestions was September 1st. Draft B must be completed at the end of this month to be publish at the BIPM website.

5. SIM.EM-S7 Electric Energy Comparison

Gregory Kyriasis sent draft B to participants 3 weeks before the day of this meeting. Harold Sanchez, from ICE mentioned that the uncertainty if ICE during this comparison was 290 ppm and nowadays, after a recalibration of its standard the uncertainty can be reduced to 100 ppm.

6. SIM.EM-K12 AC-DC Current Transfer Comparison

Lucas DI Lillo (INTI) made a presentation on AC-DC current transfer difference comparison SIM.EM-K12. Draft A was finished and Draft B is under revision by the supporting group of the comparison. The results show very good agreement except for the case of Egypt in 10 mA and 5 A at 10 kHz.

During the comparison the data logger failed, Gregory Kyriasis recommended using 2 data loggers instead of one for preventative failure.



7. SIM.EM-K4.1/S4.1 Bilateral Capacitance Comparison (NIST and ICE)

Harold Sanchez (ICE) made a presentation on the bilateral comparison between NIST and ICE SIM.EM-K4.1/S4.1. In 1 pF, 10 pF 100 pF with AH standard at 1 kHz. Measurements were finished and Andrew is reviewing draft A.

8. SIM.EM-S8 Comparison on Instrument Current Transformers

Gonzalo Aristoy from UTE talked about the CT SIM.EM -S8 comparison. He presented the protocol in which it is established that there are 3 to 6 weeks to make the measurements and send report results. One of the delays in the comparison was during the shipping to Brazil. At that time, the standard was shipped to San Pablo instead of Rio de Janeiro and that resulted as a delaying in the arrival to INMETRO. Lucas Di Lillo from INTI proposed that the standard should be send only once the custom agent says that the paperwork is ok. Currently, the standard is in Panama. The delay in this comparison is nowadays of 5 months so a new schedule was proposed. Daniel Izquierdo, from UTE asked to confirm the new schedule by mail. He will send it to all participants during next weeks. It is planed that the intercomparison will be completed in July 2015. Jamaica is interested in participate in the comparison but wants to see the protocol. Daniel Izquierdo Is going to send the protocol so Jamaica can see if they are in condition and have the instruments to participate in this comparison.

9. SIM.EM.RF-K5b.CL Comparison on S-parameters

Lucas Di Lillo, from INTI presented the current status of the SIM.RF Radio frequency comparison. The comparison is in progress and at the moment of the meeting the standard was in KRISS, Korea. After that the standard will be sent again to INTI for the last measurement. Gregory asked if the reference value will be given by all participants including Korean. Lucas Di Lillo had no answer for that and committed to ask.

10. SIM.EM-S11 Comparison on Resistance (100 M Ω and 100 G Ω)

Rand Elmquist, from NIST presented the bilateral comparison between NIST and ICE, SIM.EM-S11 at 100 Mohm and 100 Gohm. The protocol was published in the BIPM website on 08.08.2014 and Draft B was sent on 22.08.2014. The uncertainties informed by ICE are 15ppm for 10 Mohm at 1 to 100 V and 150 ppm for 100 Gohm at 10 to 100 V. Gregory Kyriazis committed himself to send the draft to the participants, although it is not necessary because bilateral comparison do not need SIM member's approval. Chile wants



Electricity and Magnetism Metrology Working Group

to now the procedure for such bilateral comparisons. Gregory Kyriazis said that the first step is the contact between the two institutes involved in the comparison. If they agree the pilot lab has to write a protocol and sent it to the SIM EM WG chairman. The chairman sends the protocol to the KCDB and, once the comparison is done draft B is sent to the BIPM.

11. SIM.EM-K3 Inductance Comparison

David Aviles from CENAM made a presentation about this comparison. He mentioned that all the connections between the inductor and the frame were broken. It seems that the container was opened at customs and was not well packaged. Lucas Di Lillo from INTI indicated that when INTI received the standards he noticed that these connections were broken. Anyway the good thing is that the comparison continues.

12. New and Proposed Comparisons

CENAM proposed a Comparison SIM.EM-S12 on Low-valued Resistor. The pilot lab will be CENAM and the support group will be integrated by Rand Elmquist and Marlin Kraft. The testing points will be of 0.1 mohm, 1 mohm, 10 mohm and 100 mohm at 10 mW. Several NMIs are interesting. The Protocol will be available on November 2014 and scheduled to start on February 2015. Contact: Felipe Hernandez from CENAM

Israel Garcia, from CENAM proposed a new RF comparison, involving the calibration factor and reflection coefficient of mount thermistors with type N connectors at 7 frequencies to be determined between 50 MHz and 18 GHz (equal to the RF CCEM-K8. CL). The proposed measurement points are 0.05, 1.00, 4.00, 8.00, 12.00, 15.00 and 18.00 GHz. The participants that will take part in the comparison will be INTI, NIST, NRC, CENAM and ICE. It was approved as travelling standard the agilent 8478B. The reference values will be those from NIST and NRC and the pilot will be CENAM. It will begin on 2015 and the stipulated time for measurements is of 4 weeks per participant.

Another comparison suggested by Israel Garcia was on broad band Scattering coefficients by methods at 100 MHz to 26.5 GHz (3.5 mm). The contact personal will be Susana Padilla (spadilla@cenam.mx). This comparison can start in 2015 and end in 2017. The mandatory points are 100 MHz, 12.4 GHz and 26.5 GHz and the measurand will be S11, S12, S21 and S22. Gregory Kyriazis mentioned that is not necessary to make another comparison because we already have a comparison of these characteristics. Alain Michau from NRC indicated that the connectors are different types and the frequency points are not the same, but it is not convenient to add frequencies because they are many points to measure and make the report. Lucas Di Lillo remarked that



Electricity and Magnetism Metrology Working Group

since the current RF comparison within SIM which is piloted by INTI, he recommends to finish this comparison and see the results before starting another one.

Daniel Izquierdo from UTE presents the Josephson Effect at high temperatures. He mentioned that UTE started some years ago to work together with colleagues from Russia on the Josephson effect at high temperature. The maintenance cost of the system is very low because it uses nitrogen and the total equipment will cost approximately U\$S 10000.

He mentioned that there is lots of work to do and UTE decided to propose to join the efforts of the SIM members to work in the project. The basic idea of the project is the I&D of Josephson arrays at high temperature. One of the suggestions is that the colleagues from Russia come to South America to transfer his knowledge and technology. Colombia, CENAM and NRC showed interest in this project.

13. SIM and Interregional CMC Reviews

- CMCs

Gregory Kyriazis informed that, as is very well known, the CCEM recommended to use matrix instead of lines in the CMCs file. This is to avoid too many entries in the file.

He also mentioned that the last CMCs file submitted according to the new recommendations of the CCEM was by INTI, Argentina.

- New submissions for SIM CMC Review

Gregory Kyriazis informed that the new CMCs file of INMETRO are under revision.

The working group recently received CMCs files from Euramet and these files were distributed within the colleagues who are responsible for the CMCs revision

ICE is planning to reduce uncertainties and submit a new CMCs file

Chile is preparing new CMCs file to be submitted to intraregional review.



Electricity and Magnetism Metrology Working Group

- Updating the list of SIM reviewers
Some modifications were introduced to the SIM reviewers. The new list is shown below.

Categories		Primary reviewer	Emails	Secondary reviewer	Emails
1.	DC voltage	Yi-hua Tang (NIST)	yi-hua.tang@nist.gov	David Avilés (CENAM)	caviles@cenam.mx
2.	Resistance	Felipe Hernandez (CENAM)	fhernand@cenam.mx	Isabel Castro (ICE)	Bcastro@ice.go.cr
3.	DC current	Regis Landim (Inmetro)	rplandim@inmetro.gov.br	Wendler Kay (NRC)	kai.wendler@nrc-cnrc.gc.ca
4.	Impedance	Marcel Cote (NRC)	Marcel.Cote@nrc-cnrc.gc.ca	Andrew Koffman (NIST)	andrew.koffman@nist.gov
5.	Ac voltage	Lucas Di Lillo (INTI)	ldili@inti.gob.ar	Sara Campos (CENAM)	scampos@cenam.mx
6.	Ac current	Sara Campos (CENAM)	scampos@cenam.mx	Ghislain Granger (NRC)	ghislain.granger@nrc.ca
7.	Power	Daniel Slomovitz (UTE)	DSlomovitz@ute.com.uy	Harold Park (NRC)	harold.parks@nrc-cnrc.gc.ca
8.	High voltage and current	José Luis Casais (INTI)	jcasais@inti.gob.ar	Marlin Kraft (NIST)	marlin.kraft@nist.gov
				Patricia Cals de Oliveira	pcoliveira@inmetro.gov.br
10.	E&M fields	Perry Wilson (NIST)	perry.wilson@nist.gov	Israel Garcia	igarcia@cenam.mx
11.	Radio frequency	Ronald Ginley (NIST)	rginley@nist.gov	Alain Michaud (NRC)	alain.michaud@nrc-cnrc.gc.ca
12.	Measurements on materials				
9.	Other DC and low frequency	Wendler Kai (NRC)	kai.wendler@nrc-cnrc.gc.ca		



14. Terms of Reference (ToR)

Nominees for next chair of SIM EM MWG

Gregory Kyriazis presented the document with terms of reference and all the responsibilities to be chair of the SIM working group. This document was signed by participants during the 2008 meeting in Washington.

The only candidate was Lucas Di Lillo from INTI. The members voted unanimously for Lucas Di Lillo to be the new chair.

The period is 3 years long, until August 2017.

Until November 2014 Gregory Kyriazis will continue as chair of the Working group until the SIM Council approves the new chairman designation.

Lucas Di Lillo will send the report of this meeting. Gregory Kyriazis will continue with all the issues concerning the relation with the BIPM as Lucas Di Lillo will start to work in all the others issues related to the Working Group.

15. Next SIM EM MWG Meetings

Concerning the next meetings of the Working group, there were two proposals. For the year 2015 it was proposed that the meeting can be held at Recife during the SEMETRO.

For the year 2016 meeting it was suggested that can be done during the CPEM conference to be held in Canada.

Both proposals were accepted.