



**IEEE TC 5: High Power Electromagnetics (HPEM)
Long Beach Convention Center
Wednesday, 1 August 2018 (12:00 – 1:30 pm in Room 202AB)**

Unconfirmed Minutes

1) Opening of the meeting – W. Radasky, Chairman

Chairman Dr. William (Bill) Radasky brought the meeting to order at 12:30. Dr. Radasky welcomed the attendees, reviewed the agenda and asked for suggested changes; none were offered. Dr. Radasky made a motion to approve the agenda. Motion Seconded and Carried (MSC).

2) Review and approval of minutes of previous TC 5 meeting – W. Radasky

The unconfirmed minutes from TC 5 meeting in Singapore in May 2018 were reviewed and approved without any changes.

3) TC 5 membership list update – All

The TC 5 membership list over the past 5 years was reviewed and a signup sheet was passed around for the attendees this year. We indicated that we like to keep 5 years of attendance, as many people are interested, but cannot attend each year. Also we do not publish the detailed 5-year list on the website, as there may be private information contained in it. The website provides information only for the officers of TC 5 to allow contact from the membership. Only the officer's and subcommittee chairs email addresses are revealed on the website, and this has been approved by the IEEE according to the new European privacy law.

The attendees included: William Radasky (Chair), Michael McInerney (Vice-Chair), Bob Myers, Kingsley McRae, Abtin Spantman, Sven Fisahn, Heyno Garbe, Frank Sabath, Elya B. Joffe, Kin Sze, Monrad Monsen, Andres Garcia, Michael Khazhinsky, Matt Halligan, Tyler Bowman, Frank Leferink, Franco Moglie, Valter Mariani Primiani, and Petre-Marian Nicolae. New members will be added to our 5-year attendance list.

4) Report on the paper review process for Long Beach – W. Radasky

Radasky reviewed the paper review process for Long Beach and also the tutorials and special sessions presented. There were 9 regular and special session papers submitted, and 8 were accepted with 7 oral papers and one poster paper. There were one or two abstract papers, but the number accepted on behalf of TC 5 was not clear. There was a special session on ESD organized by Khazhinsky, and one workshop and one tutorial (Workshop on EM Time Reversal and its Application to EMC presented by Rachidi and Rubinstein, and a Tutorial on Lightning Effects on Power Distribution Systems presented by Procopio and Brignone).

Radasky mentioned that there was a lot of confusion regarding the separate review schedules for regular papers, special session papers and also the new abstract papers. We understood (after the fact) that abstract

reviews were to be performed by the chairman and vice-chairman, but TC 5 did not have the option to make the final selection on acceptance. In one case a paper that should have been rejected was not rejected, even though the individual reviews were for rejection. We were not happy about this process, which will be changed in the future.

5) **Report from the Lightning Subcommittee – W. Radasky for M. Rubinstein**

Radasky presented the Lightning SC brief on behalf of Rubinstein. The briefing charts are attached.

6) **Report from the EM Information Leakage Subcommittee – W. Radasky for Y. Hayashi**

Radasky presented the EM Info leakage brief on behalf of Hayashi. The briefing charts are attached.

7) **Report from the IEMI Subcommittee – F. Sabath**

Sabath presented an oral report on IEMI. A tutorial on IEMI had been held at the Singapore Conference – with worldwide presenters and a lot of interest from the audience. Also he is planning a possible TC 5 Subcommittee meeting in Amsterdam at EMC Europe. For the next meeting in New Orleans in 2019, he recommends a special session on IEMI Detectors with joint participation from TC 2 (measurements). He also hopes to make progress on a white paper on IEMI by the end of 2018.

A comment was made by Prof. Garbe at the meeting that TC 5, along with all TCs should try to make sure the IEEE EMC Society technical committees are well involved in all international conferences if we can. Dr. Radasky responded that we have been doing this for many, many years and will continue to do so. In particular we have participated in a major way to APEMC, Japan EMC, EMC Europe and AMEREM/EUROEM/ASIAEM for the last 10 years!

8) **Report from ESD Subcommittee – M. Khazhinsky**

Khazhinsky presented his briefing on the ESD SC. He mentioned the special session organized in Long Beach (to be presented on Thursday, 2 August). He also indicated that the ESD SC would likely like to present a tutorial during the New Orleans conference in 2019. His briefing charts are attached.

9) **Coordination with SC-1, Smart Grid – W. Radasky**

Radasky commented that TC 5 is keeping track of any issues involving Smart Grid, and both the Chair and the Vice Chair of TC 5 have been attending the SC 1 meetings for many years. Radasky mentioned that part of the Smart Grid work in the U.S. is actively considering HEMP and IEMI as special environments to be considered for the future, as there is concern that the planned high-speed communications systems for the power grid may actually increase the vulnerability of the grid in the future.

10) **TC 5 web page – M. McInerney, Vice Chairman**

McInerney mentioned the changes to the IEEE EMC website, and indicated that we have updated the TC 5 page through the Webmaster. We will need to update the new secretary contact information, due to the election held under agenda item 14.

11) **Review of HPEM activities since last TC 5 meeting – W. Radasky**

Radasky presented a short brief with information about activities in the U.S. covering mainly HEMP. It was mentioned that there was not a lot of activity in Europe since the end of the European projects. A briefing from an HPEM Workshop held in Lausanne, Switzerland in February 2018 was also presented. The Swiss indicated that this could become an annual event.

Both presentations are attached to these minutes.

12) **TC 5 Sessions at EMC Symposium 2019, New Orleans - All**

The recommendations for tutorials and special sessions were collected from the 4 subcommittees and each subcommittee plans on either a special session or tutorial in New Orleans: IEMI – SS, ESD – Tutorial, Lightning – SS, and EM Information Leakage – Tutorial.

13) **Update on aircraft lightning direct strike standardization - All**

Due to the lack of new information, it was decided to drop the discussion item involving an aircraft direct strike standard. It is not the role of a TC to formally launch a standard, but rather to support the development of a standard in the future by recommending that members of the TC participate. Also a new TC 8 has been formed under the TAC dealing with Aerospace and Space EMC, so it is likely that they may be involved in this topic in the future. It is noted that TC 5 is always looking for possibilities for new standards, but none have arisen at this time.

14) **Nominations and vote for Secretary of TC 5 - All**

The next item was to elect a new Secretary for TC 5. In Singapore Dr. Pina Dall'Armi-Stoks volunteered to become Secretary, and her CV was sent to the members of TC 5 before the meeting. The Chair asked if there were additional nominations, and there were not. A vote was taken, and she was unanimously elected for a 1-year term. Next year in New Orleans, three officers will be elected for a 3-year term, as is the custom in TC 5.

15) **Any other business - All**

A short discussion followed concerning the confusion this year in the scheduling of the reviews and the review process itself for regular papers, special session papers and abstracts. The TAC on Monday said that they will try to streamline the process in the future. Also Sabath mentioned for publications there will be a new EMC Letters journal, which will be more oriented to application types of papers. Further Prof. Garbe indicated that there will be a new group that will review incoming transactions papers to ensure whether the papers are first applicable to EMC, then whether they should go into the normal transactions or the new letters publications.

16) **Adjournment**

The meeting was adjourned at 1:18pm

TC-5 Meeting, Wednesday, Aug 1 2018, Long Beach

Report on Lightning Activities 2018/2019

M. Rubinstein

F. Rachidi

Outline

- Events with lightning as a topic in 2018 and in 2019
- Active lightning-related Working Groups
- This year's activities and proposals for 2019

Main Events with Lightning Related Content in 2018

✓ **March**
- ILDC/ILMC, Fort Lauderdale, USA, 12-14

✓ **May**
- Joint IEEE International Symposium on EMC and AP EMC, Singapore, 14-17
- GROUND & LPE conference, Pirenópolis, Brazil, 20-25
- URSI AT-RASC, Gran Canaria, Spain, 28-1

✓ **June**
- ICAE, Nara, Japan, 17-22

✓ **July**
- IEEE EMC & SIPI, Long Beach, USA 30-3

August
- AMEREM, Santa Barbara, USA, 27-31
- EMC Europe, Amsterdam, Netherlands, 27-30

September
- ICLP, Rzeszow, Poland, 2-7
- ICEAA , Cartagena de Indias, Colombia, 10-14

Main Events with Lightning Related Content in 2019

January

- AMS Annual Meeting, Phoenix, Arizona 6–10

June

- APEMC & EMC Sapporo, Japan, 3-7
- APL, Hong Kong, China, 12-14

July

- IEEE EMC & SIPI, New Orleans, Louisiana, 22-26
- ASIAEM, Xi'an, China, dates unknown at this time

September

- ICOLSE, Wichita, Kansas, USA, 10-13
- SIPDA XIV, Sao Paulo, Brazil, 30-4
- EMC Europe, Barcelona, Spain, 2-6

Active Lightning CIGRE Working Groups

- ◆ Working Group C4.23 “Guide to Procedures for Estimating the Lightning Performance of Transmission Lines” (2013, Chair: Christian Engelbrecht)
- ◆ Working Group C4.30 “EMC in Wind Generation Systems” (2013, Chair, WH Siew (UK))
- ◆ Working Group C4.33 ” Impact of Soil-Parameter Frequency Dependence on the Response of Grounding Electrodes and on the Lightning Performance of Electrical Systems” (2013, Chair: Silverio Visacro)
- ◆ Working Group 4.36 “Winter Lightning – Parameters and Engineering Consequences for Wind Turbines” (2014, Chair: Masaru Ishii)
- ◆ *Working Group 4.37 “Electromagnetic Computation Methods for Lightning Surge Studies with Emphasis on the FDTD Method” (2014->2018, Chair: Yoshihiro Baba)*
- ◆ Working Group C4.39 «Effectiveness of line surge arresters for lightning protection of overhead transmission lines» (2015, Chair: Kenji Tsuge)
- ◆ *Working Group C4.43 «Lightning problems and lightning risk management for nuclear power plants» (2017, Chair, Takatoshi Shindo)*

Other Working Groups

- ◆ IEEE PES Lightning Performance of Overhead Lines Working Group
 - ◆ Annual meeting will be held in August 2018 in Portland, as always in conjunction with IEEE PES GM.
 - ◆ Next year's meeting will be held in August, 2019 in Atlanta, Georgia, USA.

This year's activities and proposals for 2019

- ◆ 2018
 - ◆ Papers submitted to ICLP/ILDC/AMEREM/IEEE EMC&SIPI/ICAE/ICEAA
 - ◆ We organized and gave a workshop at IEEE EMC & APEMC on Lightning and Wind Turbines
 - ◆ We organized a workshop at IEEE EMC & SIPI, Long Beach
 - ◆ We solicited paper for lightning session on lightning for AMEREM, Santa Barbara
 - ◆ We solicited paper for lightning session on lightning for ICEAA, Cartagena
- ◆ 2019
 - ◆ Lightning session ASIAEM, Xi'an
 - ◆ Lightning Session IEEE EMC & SIPI, New Orleans

Activity Report

IEEE EMC Society TC5
Subcommittee: Electromagnetic
Information Leakage

Yuichi Hayashi

Special Sessions in **APEMC 2018**

SS-09: Hardware Security for IoT Devices

Chair: **William Radasky** (Metatech Corporation, Goleta, CA, USA)

Co-Chair: **Yuichi Hayashi** (Nara Institute Science and Technology, Japan)

The number of papers: **9 papers**

Wednesday afternoon

SS-09: Hardware Security for IoT Devices (I)

1. Introduction to EM Information Security for IoT devices
2. Comparison of two Setups for Contactless Power Measurements for Side-Channel Analysis
3. Extension of Signal-to-Noise Ratio Measurement Method to Byte-by-Byte Side-Channel Attack
4. Weighted Key Enumeration for EM-based Side-Channel Attacks
5. Detection of IEMI against IoT Devices Using Voltage Monitor Constructed by Fully Digital Circuit



Special Sessions in APEMC 2018

Thursday morning

SS-09: Hardware Security for IoT Devices (II)

6. On the Evaluation of Electromagnetic Information Leakage from Mobile Device Screens
7. Information leakage and recovery from multiple LCDs
8. A Possible Information Leakage From DVI Cable for Color Display
9. Study on Range of Information Leakage from IoT Devices with Hardware Trojans

2018 **JOINT** IEEE INTERNATIONAL SYMPOSIUM
ON ELECTROMAGNETIC COMPATIBILITY
AND INTERFERENCE
ASIA-PACIFIC INTERNATIONAL SYMPOSIUM ON



Regular session in **APEMC 2018**

TC-05: EM Information Leakage

Chair: **William Radasky** (Metatech Corporation, Goleta, CA, USA)

Co-Chair: **Yuichi Hayashi** (Nara Institute Science and Technology, Japan)

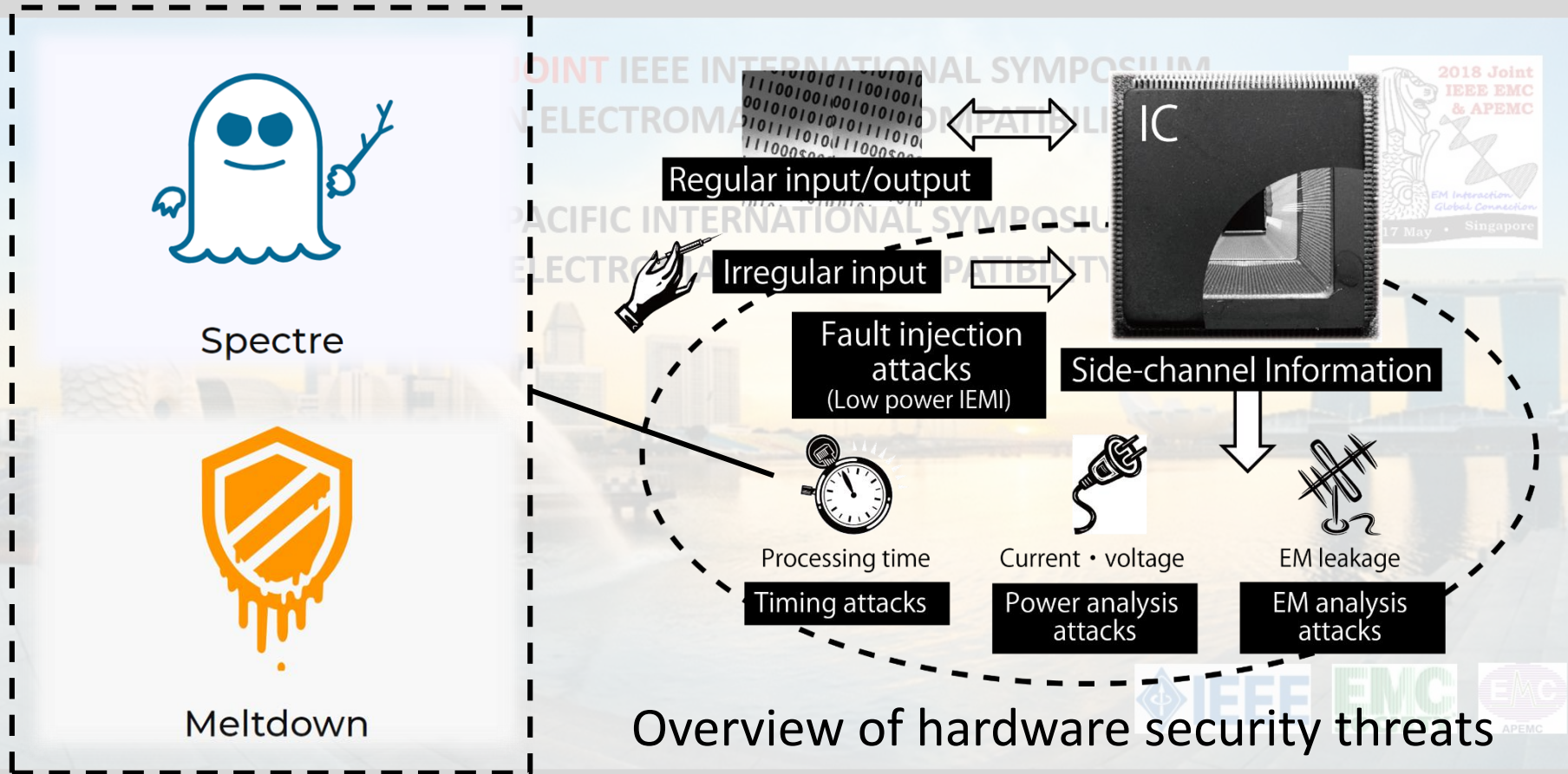
The number of papers: **6 papers**

Tuesday afternoon

TC-05: EM Information Leakage

1. Fundamental Study on Non-invasive Frequency Injection Attack against RO-based TRNG
2. Study on the Effect of Clock Rise Time on Fault Occurrence under IEMI
3. Data Injection Attacks Using a Hardware Trojan on a Transmission Line
4. HT-detection method based on impedance measurements of ICs
5. EM Security Analysis of Compact ECDSA Hardware
6. A Study on an Evaluation Method for EM Information Leakage Utilizing Controlled Image Displaying

Recent Security Issue: Meltdown and Spectre



In the threats, attackers can access memory space that only the privileged user can access by using the timing information generated from the processor.

Outreach activity in future

To promote the field of information leakage, we would like to have workshop/special sessions in future EMC symposiums.



Special session in EMC Sapporo & APEMC 2019 (joint)

Topic: Threats of hardware security degradation caused by EM leakage, low-power IEMI, malhardware and its countermeasures (tentative)

Tutorial Session in IEEE EMC Symposium in New Orleans

Topic: Recent topics on evaluation methods and countermeasures of EM information leakage (tentative)



ESD Update

Michael Khazhinsky

TC 5 (HPEM) Meeting - Long Beach
August 1, 2018

ESD Technical Exchange – 2018 Updates (1)

IEEE EMC Association supported ESD special paper session (TC 5) at EMC symposium 2018 on Thursday, August 2, 8:30 a.m.:

Relating the Commonalities and Robustness Characteristics of EMC and ESD Tests - Alan W. Righter
The Case for Measurement and Analysis of ESD Fields in Semiconductor Manufacturing - Timothy J. Maloney;

Implementation and Practical Experience with an Automatic Secondary ESD Detection Algorithm – Shubhankar Marathe, Giorgi Maghlakelidze, David Pommerenke;

A Preliminary Study of ESD Effects on the Process Calls Tree of a Wireless Router - Xiaorui Liu, Omolayo Oloseini Izadi, Giorgi Maghlakelidze, Martin Pommerenke, David Pommerenke.

Other ESD papers were presented on Tuesday, July 31, 10:30 a.m. in High Power Electromagnetics (TC 5) and Computation Tools and Techniques (TC 9) Sessions.

David Pommerenke will give ESD Fundamentals talk on Friday, August 3, 8:30 a.m. (EdCom)

ESD Technical Exchange – 2018 Updates (2)

7 EMC Conference paper was invited to be presented at 2018 EOS/ESD Symposium in September:

Human Body Impedance Modelling for ESD Simulations - I. Oganezova, R. Jobava, D. Pommerenke, J. Zhou, K. Ghosh, A. Hosseinbeig, J. Lee, N. Tsitskishvili, T. Jobava, Z. Sukhiashvili.

ESD Association has organized a new workshop on 'Robustness of IoT devices' along with 2018 ESD Symposium in September. EMC society became technical co-sponsor. David Pommerenke joined workshop advisory team as EMC TC 5 representative.

ESDA Technical Liaison (Michael Khazhinsky) participated in ESD paper selection for TC 5 sponsored sessions at 2018 EMC conferences in Singapore and Long Beach.

Cross advertisement has been implemented between ESDA and EMC Europe (Frank Leferink, Marcel van der Horst).

ESD Standards Updates

Nate Peachey drove joint ESDA/EMC standards development and attended a few standard-related working group meetings, including shielding for bags working group (P2710).

The intent is to define a standard for the measurement of shielding of bags. While this shielding measurement is targeted for EMC related measurements, this could also have application for the shielding required for ESD bags.

Currently shielding is a requirement but there is no measurement given to determine the level or the effectiveness of the shielding in ANSI/ESD S541.

Alistair Duffy (P2710 chair) has asked that Nate bring this perspective to the bag shielding standards working group.

Nate Peachey has recently transitioned his responsibilities as ESDA Standards Working Group Chair to Brett Carn.

ESD Technical Exchange - Future Plans

Continue select paper exchange program between the ESD Symposium and the EMC Symposium.

1 paper presented at 2018 EMC Symposium will be invited to be re-presented at 2019 ESD Symposium. This paper will not be republished at IEEE Xplore. However, it may be included in the ESD Symposium proceedings with the note that it is a re-publication from the EMC 2018 Symposium proceedings.

A proposal for a paper to be invited for the ESD Symposium presentation will be prepared by ESDA Technical Liaison (Michael Khazhinsky) by the end of October.

A similar reciprocal proposal will be also made for a paper from 2018 ESD Symposium to be invited for the presentation at 2019 EMC Symposium.

ESD Association will explore an opportunity to include 1-2 EMC society tutorials in 2019 ESD symposium tutorial program and will solicit ESDA instructors to present tutorials at 2019 EMC Conference (TC 5 sponsored session or EdCom).

Establish general MoU/Barter agreement between ESDA and EMC Europe.

Explore opportunities for cooperation with TC 9 and TC 10 (ESD simulation, EDA tools).

HPEM Activity in the U.S. in 2017-2018

Prepared by
Bill Radasky, Metatech Corp.
1 August 2018

US Congressional EMP Commission - 2017

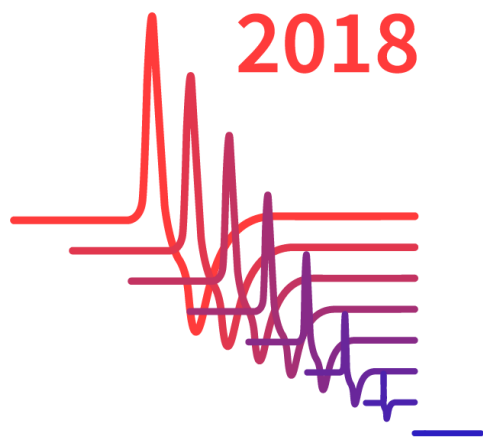
- The EMP Commission in the U.S. was asked to examine the recommendations made in 2008 with regard to protecting the critical infrastructures from HEMP
- Several new open reports were issued and can be found on the following website
 - <http://www.firstempcommission.org>

Main Commission Recommendations

- From “Assessing the Threat from Electromagnetic Pulse (EMP) Executive Report, July 2017 (released in May 2018)
- Main technical recommendations (paraphrased):
 - The Commission encourages the President to work with Congressional leaders to establish a joint Presidential-Congressional Commission, with its members charged with supporting the Nation’s leadership to achieve, on an accelerated basis, the protection of critical national infrastructures.
 - Government agencies and industries should adopt new standards to protect critical national infrastructures from damaging E3 HEMP heave fields, with more realistic standards
 - Electric grid equipment with long-replacement times such as large power transformers should be tested to system failure

Power Grid Progress

- Independent of the EMP Commission, several private electric power companies are working on substation electronics protection against HEMP and IEMI
 - Both new construction using pre-fab metal buildings and retrofit options are being considered
 - One power company will publicize its work at the AMEREM 2018 conference in Santa Barbara in August 2018



2018

High Power Electromagnetics Workshop

LAUSANNE
SWITZERLAND
FEBRUARY 05

Event Report

Prepared by

Nicolas Mora

IEEE CH EMC/AP/MTT Chapter Chair

April 2018

EVENT DESCRIPTION

The workshop was a one-day meeting for technical interchange on the topic of High Power Electromagnetics (HPE), with a focus in Nuclear Electromagnetic Pulse (NEMP), Intentional Electromagnetic Interference (IEMI), and Lightning Electromagnetics. The invited speakers gave lectures or short talks about their research or industrial activities. It constituted a very good opportunity to review the ongoing work about HPE in Switzerland and neighboring countries, and to foster networking and future activities in this domain that has lost some attention during the past years.

The event was organized with the support of the EMC laboratory of the Swiss Federal Institute of Technology (EPFL) and its head Prof. Farhad Rachidi, the URSI Swiss National Committee, and montena technology.

Objectives

- To reinforce contacts between key players in industry, academy, and private consulting involved in electromagnetic security and electromagnetic compatibility (EMC).
- To maintain a Swiss-European competence network in HPE
- To share scientific knowledge in HPE

Target audience

The workshop target were students, faculty members, industries, and agencies working in electromagnetic security and electromagnetic compatibility.

There were 72 registered participants. Among them 65% came from Switzerland, 21% from European countries (DE,FR,IT,PL,SE,UK), and 4% from non-European countries (USA,CO). Regarding the positions of the participants, 46% of them came from industry, 43% from academia, 8% from government agencies, and 3% did not include their position during registry.

General information

- Event duration: 1 day
- Number of participants: 72
- Location: [Room ELA1](#), [EPFL](#), Lausanne, Switzerland
- Time: 9h-17h
- Language: English
- Fee: Free-registration required
- Registration website: <https://events.vtools.ieee.org/m/48379>

Download/view pictures with description [here](#)

Final program

Time	Speaker	Organization	Title
9:00	Organization Committee	IEEE - EPFL - montena	Welcome words
9:20	Prof. Andy Marvin	University of York	Shielding of Populated Enclosures
10:00	Dr. Mats Bäckström	SAAB Group	HPM Protection and Verification
10:20	Coffee Break		
10:40	Prof. Lars Ole Fichte	Helmut Schmidt University	Ground Level Electric Field Magnitude after High Altitude EMP
11:00	Markus Nyffeler	armasuisse	Adapted IEMI Protection Measures
11:20	Prof. Flavia Grassi	Politecnico di Milano	Pulsed Current Injection to reproduce intense transient electromagnetic disturbances
11:40	Dr. Armin Kälin	EMProtec AG	EMP-Protection and Standardisation
12:00	Lunch break		
13:00	Prof. Farhad Rachidi	EPFL	Measurement of lightning current at Mount Säntis
13:40	Prof. Marcos Rubinstein	University of Applied Sciences Western Switzerland	Electromagnetic Time Reversal
14:00	Prof. Renato Procopio	University of Genova	Mitigation Effect of the Shield Wires on Lightning Induced Overvoltages
14:20	Coffee Break		
14:40	Prof. Jane Lehr	University of New Mexico	Recent Trends in High Power Switches
15:20	Dr. Jean-Christophe Joly	CEA	Added value of numerical simulation for HPEM experiments preparation in CEA Gramat
15:40	Dr. Carlos Romero	montena technology	Advanced modelling for high power electromagnetics problems
16:00	Prof. Felix Vega	National University of Colombia	HPE application for IEDs location and destruction
16:20	Dr. Nicolas Mora	IEEE EMC/AP/MTT Chapter	Closure Words

ORGANIZING COMMITTEE

The event was chaired and organized by the IEEE Switzerland joint chapter in EMC / AP / MTT



AP/MTT/EMC JOINT CHAPTER

ieee.ch/chapters/ap-mtt-emc/

CO-SPONSORS

The event was organized in strong cooperation and co-funding from:



EPFL EMC Laboratory

emc.epfl.ch



montena technology

www.montena.com



URSI Swiss National
Committee

www.ursi.org

EXPENSE REPORT

A summary of the expenses of the event is presented in the table below. Notice that the venue and logistical support for the event was provided by EPFL at no cost. Also, the expenses of the distinguished lecturer Prof. Andy Marvin were provided by the distinguished lecturer program of the IEEE EMC society. Therefore, these costs are not included in the report below.

HPE WORKSHOP 2018 - EXPENSES REPORT

Description	Total cost	%	Funded by
Invited speakers outside Europe : 1			
Airplane ticket	CHF 1 029	16%	IEEE EMC/APS Society
Transport and meal expenses	CHF 180	3%	IEEE EMC/APS Society
SUBTOTAL Speakers Abroad	CHF 1 209	19%	
Communications - attendants: 70			
Badges	CHF 194	3%	Montena technology
Badge cords	CHF 129	2%	Montena technology
Notepads	CHF 64	1%	Montena technology
Roll Up	CHF 49	1%	Montena technology
Graphic Design	CHF 1 497	24%	Montena technology
Souvenir (tote bag)	CHF 555	9%	Montena technology
SUBTOTAL Communications	CHF 2 488	40%	
Catering - attendants: 70			
Coffee,tea+croissants (morning and afternoon)	CHF 805	13%	IEEE Switzerland Section
Standing lunch	CHF 1 760	28%	IEEE Switzerland Section
SUBTOTAL Catering	CHF 2 565	41%	
TOTAL	CHF 6 261	100%	

A summary of the funding obtained by each partner is presented below

FUNDING SUMMARY

TOTAL BUDGET	CHF 6 261	100%
Financing Organization	CHF	%
Montena technology	CHF 2 488	40%
IEEE Switzerland Section	CHF 2 565	41%
IEEE EMC/APS Society	CHF 1 209	19%

SATISFACTION SURVEY

Two weeks after the workshop, we have conducted an online satisfaction survey among the participants. Out of the 72 registered attendees, only 25 answered the survey. In what follows we present the questionnaire that was asked during the survey.

Questionnaire

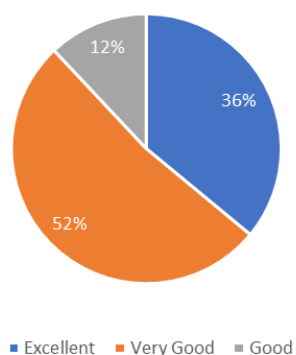
1. Overall, how would you rate the 2018 HPE Workshop?
2. Overall, how would you rate the communication of the event through the website?
3. How would you rate the venue/location?
4. How would you rate the catering of the event?
5. Which of the following fulfilled your expectations during the event?(Quality Presentations, Number of attendees, Opportunity Networking, Assistance Committee)
6. How likely is that you participate again to a HPE Workshop organized by IEEE?
7. In your opinion, how frequently shall the HPE Workshop be organized?
8. What did you like/dislike about the event?

Results

The results of the survey are presented with explanatory graphics as follows.

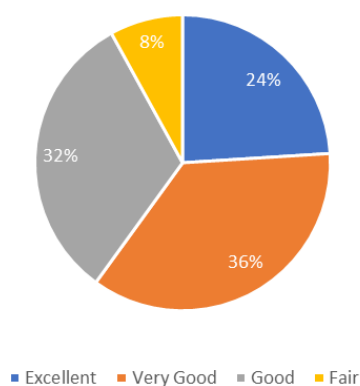
1. Overall, how would you rate the 2018 HPE Workshop? (25 answers)

Overall workshop rating

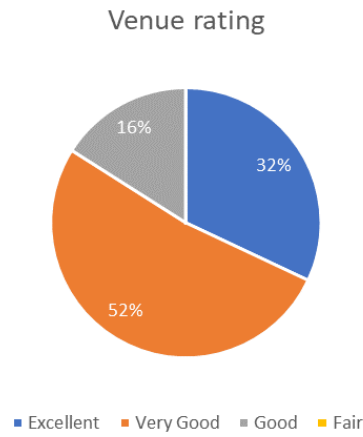


2. Overall, how would you rate the communication of the event through the website? (25 answers)

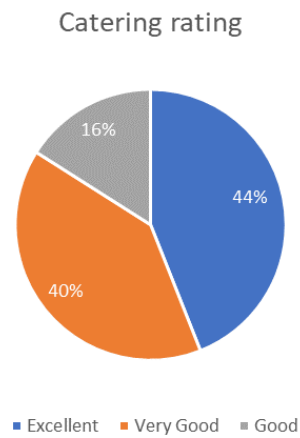
Website rating



3. How would you rate the venue/location? (25 answers)



4. How would you rate the catering of the event? (25 answers)

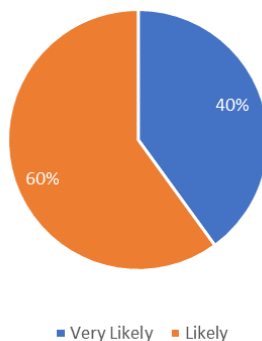


5. Which of the following fulfilled your expectations during the event? (25 participants)



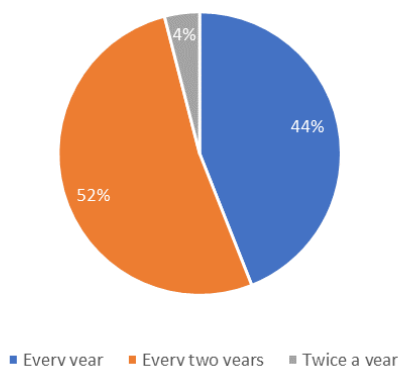
6. How likely is that you participate again to a HPE Workshop organized by IEEE? (25 answers)

Participate again to a IEEE HPE workshop



7. In your opinion, how frequently shall the HPE Workshop be organized?

HPE Workshop frequency



8. What did you like/dislike about the event? (several answers)

- Like: It was a one day workshop
- Great event! Thank you! The only issue for us has been to find the parking (we thought it would have been easier) and to pay since it doesn't accept credit cards...! Apart from that, excellent!
- Difficult to find the right location
- "Like: the wide range of topics covered by the presentations (from lightning to high-power switches and IEDs location & destruction)"
- Program and speakers were very good
- I liked that - after all there is such an event -participants are international - know-how transfer between participants - personal networking
- Everything was excellent!
- Everything was fine except I had to leave too early.
- Overall quality and level of such a chapter event.
- Variety of participants from the United States
- Opportunity for discussions could be better, maybe after the event... An international event it was!
- It was very friendly and passionate.
- The apero was not so delicious