



Chapter Chatter

Dennis Lewis, Associate Editor

I hope everyone enjoyed this year's IEEE EMC+SIPI symposium in Washington, DC as much as I did. Many thanks to the entire conference committee for an excellent program and wonderful social events. If you weren't able to attend in person, I hope you had the opportunity to join some sessions through the on-line program. It always amazes me how much work is going on in our EMC community. In addition to all the activities that go on during

the annual symposium, EMC members contribute to our society throughout the year by hosting Chapter events and workshops. These events are a valuable way to gain/share knowledge and network with others with similar interests. Thank you to those who dedicate their time and effort to organize these events! Please keep sending in your Chapter write-ups so we can share them with others.

Chicago

The Chicago Chapter was well represented at the annual Symposium in Washington DC. Chair Jack Black presented "How to Run a MiniSymposium" at the Chapter Chair Training Workshop. At the awards luncheon, Don Sweeney, founder of DLS and long-serving EMC Society Board of Directors member, was recognized for his years of service. Also Ray Klouda of ELITE Electronic Engineering was recognized for

his Klouda Family Scholarship in memory of their founder, his father, Jim Klouda. At the Gala Banquet, Louann Devine Mlekodaj and Tom Braxton danced in the "Bollywood routine" organized by Caroline Chan. Co-Secretaries Denny Barfuss and Jerry Meyerhoff organized a road trip to DC with their spouses who greatly enjoyed the companion tours along with Treasurer Bob Hofmann's family. Secretary Jerry Meyerhoff co-authored a paper on EMC education with San Rotter of Madison, Wisconsin at the

Tuesday morning session organized by TC1 under Tom Braxton, Chicago Programs Chair. It was very timely as it immediately followed the Keynote Speech by Julius Knapp of the FCC on the complex future of the IoT (Internet of Things). There he identified that future engineers need even more EMC skills and know-how. Tom Braxton spoke on "Transient Immunity Testing" at the TC2 Wednesday afternoon "EMC Standards in Product Design" at the TC1 sponsored tutorial on



The Chicago EMC Chapter was very active at the 2017 IEEE Symposium on EMC+SIPI in Washington DC the week of August 7. San Rotter from Madison, WI presents "EMC Education for the Citizen-Engineer", a presentation co-authored by Jerry Meyerhoff of the Chicago Chapter.



Chicago EMC Chapter members Chris Dewitt, Louann Devine Mlekodaj and Tom Braxton (from left) enjoy a break from the technical sessions at the symposium held at the Gaylord Hotel and Convention Center.



Denny Barfuss, Frank Krozel and San Rotter (from left) of the Chicago EMC Chapter visited during the symposium Welcome Reception.



Chicago EMC Chapter members surprised us with dancing at the symposium Gala Dinner. Can you spot Tom Braxton and Louann Devine Mlekodaj?



The Consultant's Toolkit speakers Ken Wyatt, Patrick André and Joanna Hill (from left) take a question from Chicago EMC Chapter member Stu Brenner.

Friday morning on EMC Management. He also addressed the Young Professionals luncheon session. Jerry Meyerhoff also did a Hardware Experiment Demo in the exhibits hall on "Identifying Common Mode and Differential Mode Emissions." At the Friday morning "EMC Consultant's Toolkit" workshop, Jerry joined colleagues Ken Wyatt, Patrick André and Joanna Hill for the seventh installment of the workshop.

The Chicago Chapter is looking forward to another great year of regular monthly meetings and our 20th MiniSymposium. Please visit www.emcchicago.org for more information on Chicago EMC Chapter activity.

Germany

This year's Ph.D. student meeting of the IEEE German EMC Chapter took place on July 18th and 19th at the Institute for Energy Transmission and High Voltage Engineering, University of Stuttgart.

neering (Prof. Tenbohlen), University of Stuttgart. Sixteen participants working in the field of EMC attended from different German universities (e.g. Aachen, Dortmund, Hamburg, Hanover, Magdeburg, Stuttgart, Wilhelmshaven). It was a very good opportunity to get to know each other and exchange experiences. Prof. Tenbohlen opened the event and gave a presentation about the local institute. Two lecture blocks about "EMC of PCBs" and "EMC of Power Electronics" followed on the first day. Afterwards, the group visited the development center of Robert Bosch GmbH in Reutlingen, which allowed an interesting view into the working environment of professional EMC engineers. A barbecue took place in the evening, providing a relaxed atmosphere to review the first day. The second day continued with another set of lecture blocks about "Large EMC Systems" and "Research on EMC Methods" in which the Ph.D. students continued presenting and discussing their ongoing work.



Jerry Meyerhoff provides a demonstration of conducted emissions during the symposium's popular Experiments and Demonstrations program.

Los Angeles

The Los Angeles EMC Chapter held a double-header meeting on Tuesday, May 23, 2017 at the Toyota Automotive Museum in Torrance, California. The meeting started at 1:00 pm with a complimentary lunch buffet generously sponsored by Fischer Custom Communications. Following lunch, our first speaker, Erik Borgstrom with Element Materials Technology in Minneapolis, Minnesota presented "Military and Aerospace EMC Testing: Recent Advancements and Future Changes." Erik discussed the primary test standard for Military EMC testing, MIL-STD-461, which has recently been released at a new revision level - 461G. This latest revision of MIL-STD-461 includes new (to the military) EMC tests that are a significant departure from previous versions of the standard. On the aerospace side, the global standard for aircraft EMC, RTCA/DO-160, is in the process of major revisions to some of the more diffi-



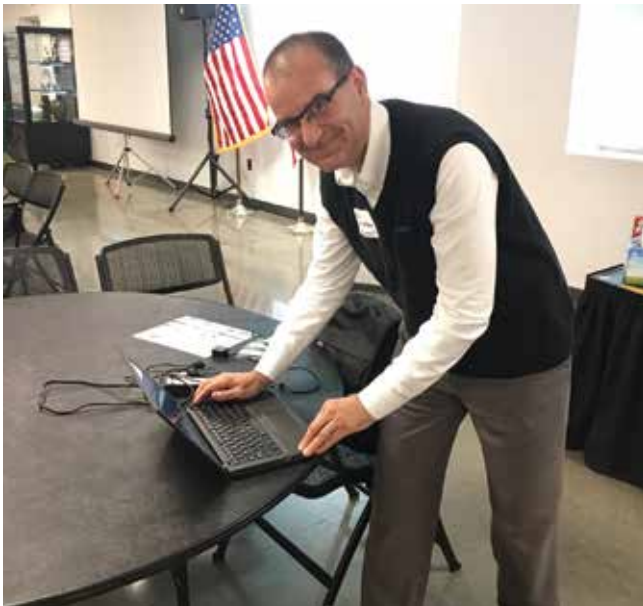
The Ph.D. student meeting of the German EMC Chapter took place on July 18-19, 2017 at the Institute for Energy Transmission and High Voltage Engineering, University of Stuttgart. Attendees posed for a group photo following the meeting.



Speakers Kris Hatahita and Erik Borgstrom visited with Los Angeles EMC Chapter Chair Ray Adams (from left) prior to the start of the May 23, 2017 Chapter meeting.



Los Angeles EMC Chapter members enjoyed a complimentary lunch courtesy of Fischer Custom Communications prior to the start of the Chapter meeting.



Speaker Erik Borgstrom of Element Materials Technology prepares for the first presentation during the double-header Los Angeles EMC Chapter meeting.



Erik is shown giving his presentation "Military and Aerospace EMC Testing: Recent Advancements and Future Changes."



Kris Hatahita, IEEE EMC Society Distinguished Lecturer, gets ready to start the second presentation at the Los Angeles EMC Chapter meeting.



Kris presented "Electromagnetic Environmental Effects in the Military" to the largely aerospace based meeting attendees – a perfect fit for southern California.



The Los Angeles EMC Chapter meeting in May was held at the Toyota Automotive Museum in Torrance, California. Following the meeting, the speakers and Chapter chair toured some of the vintage cars on display.

cult sections, which will also be a significant change from previous versions. Erik's presentation provided an overview of the EMC requirements in both of these standards, highlighting and delving deeper into:

- The similarities and differences between the two standards
- The significant changes in the recently published MIL-STD-461G
- The changes in progress for DO-160
- The lightning induced/indirect effects testing requirements in both standards

The presentation was an excellent summary of the past, current and future editions of these standards.

The second presentation was given by Kris Hatashita, an IEEE EMC Society Distinguished Lecturer based in Ottawa, Ontario, Canada. Kris presented "Electromagnetic Environmental Effects in the Military." Kris documented how military electromagnetic compatibility (EMC) is a matter of life and death as modern war-fighters rely on the safe, secure and reliable functioning of their devices. Military EMC includes aspects of electronic interoperability that are seldom or never considered in the commercial realm. This talk presented technical details of EMC consideration in tactical and strategic military operations. The topics discussed included hazards of electromagnetic radiation to ordnance (HERO), electromagnetic data security (EMSEC), counter improvised explosive device (CIED) EMC issues and included first-hand experiences of work done in the Afghan theatre. The presentation was an eye-opener about the severity of EMI and importance of EMC in the military.

Our out of town expert speakers from the very cold climates of Minnesota and Ontario, Canada have interesting backgrounds. Erik Borgstrom has worked in the Electromagnetic Compatibility testing field for more than 30 years. As the EMI Department Manager at Element Materials Technology's Minneapolis Lab (formerly Environ Laboratories), he specializes in EMI testing for the Defense and Aerospace industries. Erik is one of Element's representatives on RTCA Special Committee 135 (responsible for revising DO-160), where he has been active for over 20 years, serving as Change Coordinator for DO-160 Section 22 (Lightning Induced Transient Susceptibility) and Section 25 (Electrostatic Discharge). He is also an active member of SAE, where he serves as the DO-160 Task Group Leader on the AE-2 Aircraft Lightning Committee, a contributing member of the AE-4 Aircraft HIRF Working Group, and as Secretary for the AE-4 Aircraft EMC Working Group. Erik has written several articles and presented many papers at Symposia and Conferences hosted by IEEE, SAE, and other related organizations, all focused on EMC and/or Lightning for the Defense and Aerospace industries.

Kris Hatashita has been the Electromagnetic Environmental Effects subject matter expert for the Canadian Army tactical communications group since 2002 where he plans and oversees Canadian Army compliance with EMI, EMC, EMSEC, and RF safety requirements. Prior to this, Kris was an independent E3 consultant and President of ISOTEC Corporation whose clients included the Canadian Department of National Defence, the Canadian Army, Navy and Air Force, the Royal Canadian Mounted Police (RCMP), the Communication Security Establishment (CSE) and the Department of Foreign Affairs and International Trade. Kris has worked at or

with many technology corporations throughout his career including General Dynamics Canada, Digital Equipment Corporation, Zenith Corporation and Hewlett-Packard. Kris's career in E3 began in 1985 in the aerospace industry after completing a BSc in Physics at the University of Waterloo. While working for Garrett Aerospace, Kris was selected to undergo training through CSE in the joint Canada-US Industrial TEMPEST Program. Through this program, Kris became the first non-American to become a Certified TEMPEST Professional – Level II by the United States National Security Agency – a certification he holds to this day. Kris Hatashita was a member of the IEEE EMC Society Board of Directors in 2014-2015 and the General Chair of the 2016 IEEE International Symposium on EMC in Ottawa, Canada – those of you who attended the symposium will agree it was fantastic! Currently, Kris is an IEEE EMC Society Distinguished Lecturer, a lecturer at the Canadian Forces School of Communication and Electronics at the Royal Military College in Kingston and a consultant to the Canadian Department of National Defense for the Army Communications Group. He is also a big hockey fan as we all learned during his presentation.

Over 30 people attended the meeting which concluded at 5:00 pm. Many thanks to our speakers, the attendees and to our lunch sponsor, Fischer Custom Communications, for a very educational and enjoyable afternoon.

Pittsburgh

A technical meeting for the joint Pittsburgh EMC Society Chapter and Power & Energy/ Industry Applications Chapter was conducted on Thursday May 11, 2017 at the Westinghouse Headquarters in Cranberry, Penn-



Kris Hatashita, IEEE EMC Society Distinguished Lecturer, presented at the joint Pittsburgh EMC Society Chapter and Power & Energy/ Industry Applications Chapter on Thursday May 11, 2017.



The audience appreciated the varied background of speaker Kris Hatashita, a Lecturer at the Canadian Forces School of Communication and Electronics College in Kingston at the Royal Military. He is also a consultant to the Canadian Department of National Defense for the Army Communications Group.



A wonderful dinner buffet was provided at meeting held at the Westinghouse Headquarters in Cranberry, Pennsylvania. Over 25 people attended the joint meeting.



Pittsburgh EMC Chapter Chair Mike Oliver (left) of MAJR Products Corporation thanked Kris Hatashita for his excellent presentation following the meeting.

sylvania. Michael Oliver, IEEE EMC Chapter Chair and David Vaglia, Power & Energy/ Industry Applications Past Chapter Chair, co-hosted the meeting with 25 persons in attendance. The meeting started with a social/dinner prior to a technical presentation. We had the privilege of having Kris Hatashita as our technical speaker; Kris is an IEEE EMC Society Distinguished Lecturer as well as a Lecturer at the Canadian Forces School of Communication and Electronics College in Kingston at the Royal Military. He is also a consultant to the Canadian Department of National Defense for the Army Communications Group. Kris was on the EMC Society Board of Directors from 2014-2015 and was the General Chairman of the 2016 IEEE EMC Symposium in Ottawa.

While working for Garrett Aerospace, Kris was selected to undergo training through CSE in the joint Canada-US Industrial TEMPEST Program. Kris is a Certified TEMPEST Professional – Level II by the United States National Security Agency. Kris Hatashita has a Bachelor of Science in Physics and

has been an EMC professional for thirty years working for industry and government organizations as an EMC subject matter expert. His list of clients includes General Dynamics Canada, The Royal Canadian Mounted Police, Lockheed Martin Canada, The Canadian Parliament and The Communication Security Establishment Canada.

At the meeting, discussions encompassed facility safety, fire exits, and future IEEE meetings by David Vaglia. The upcoming technical presentation was discussed and an introduction of Kris Hatashita was done by Mike Oliver. The technical presentation by Kris Hatashita was titled "Electromagnetic Environmental Effects in the Military". The presentation focused on Military electromagnetic compatibility (EMC) and that it is a matter of life and death as modern war-fighters rely on the safe, secure and reliable functioning of their electronic devices. Military EMC includes electronic interoperability that are seldom or never considered in the commercial realm. The talk presented technical details of EMC

consideration in tactical and strategic military operations. The topics discussed included hazards of electromagnetic radiation to ordnance (HERO), electromagnetic data security (EMSEC), counter improvised explosive device (CIED) EMC issues and first-hand experiences of work done in the Afghan theatre.

ON BEHALF OF ALL OF US IN PITTSBURGH, PA, "THANK YOU KRIS HATASHITA FOR YOUR CONTRIBUTION TO OUR EMC PITTSBURGH CHAPTER and POWER & ENERGY/INDUSTRY APPLICATIONS CHAPTER."

Rock River Valley

The EMC Chapter of Rock River Valley Section (RRVS) of North Central Illinois and Southern Wisconsin held a one-day EMC seminar on June 13, 2017 in Rockford, Illinois. The venue was Giovanni's Restaurant and Conference Center. This was the 6th seminar held by EMC Chapter that was formed in June 2007.



The EMC Chapter of Rock River Valley Section (RRVS) of North Central Illinois and Southern Wisconsin held a one-day EMC seminar on June 13, 2017 in Rockford, Illinois.



The RRVS seminar was well attended with the total number of attendees around 80 people. The seminar featured exhibits and demos provided by some 20 vendors across the US.



RRVS EMC seminar committee members Mark Harris, Rakesh Vasudevan, and Adrian Vandergrift (from left) cheerfully supported the successful seminar.



Marketing Director Steve Laya with Elite supported the RRVs EMC Seminar. Elite was the Diamond Sponsor!



Jamal Shafii (left), the RRVs EMC Chapter Chair, presented a certificate of appreciation to RRVs EMC Seminar speaker Dan Beeker. Jitendra Solanki on the right is the RRVs Section Chair.



Engineering Director Phil Cox (left) with NTS-Rockford received a certificate of sponsorship from Jitendra Solanki as Dan Beeker looks on. NTS-Rockford was a Gold Sponsor of the RRVs EMC Seminar.

Daniel Beeker of NXP Semiconductors was our speaker. With more than 39 years of experience in electronic system design and EMC, Daniel Beeker provides applications support for NXP automotive customers worldwide. Daniel worked for Freescale Semiconductor before Freescale and NXP merged in 2015. Daniel also specializes in EMC and signal integrity design techniques for systems and PCBs. In support of this, Daniel has completed more than 200 PCB design evaluations for customers and internal NXP products. Daniel teaches field based design techniques at NXP and industry conferences worldwide; this amounts to more than 70 sessions with more than 3,500 attendees since 2010. Daniel is also involved with NXP IC package design and IC development tool teams to support improved EMC performance, working on more than 20 IC designs.

The title of the seminar was "EM Field-Based Design of Circuit Boards for First Pass EMC Compliance." The seminar was organized into four sessions targeting specific important aspects of circuit board

design. Attendees learned how understanding the behavior of EM fields can help to design PCBs that will be more robust and have better electromagnetic compatibility performance.

There were two sessions in the morning and two sessions in the afternoon with refreshment breaks and sit in lunch. Session titles were as follows: Session 1- Understanding how Electromagnetic Fields Behave on Circuit Boards, Session 2- First Pass EMC Circuit Board Design: Techniques to Improve Performance, Session 3- Power Distribution Made Easy, and Session 4- PCB Design to Survive Transients.

The first session explained how electromagnetic fields behave on circuit boards. Material presented focused on the basic principles and physics of electromagnetic energy. In the second session, techniques to improve EMC performance of circuit boards were discussed. A design approach that utilizes an electromagnetic physics-based design methodology to control the field energy was presented. The

third session focused on a simple EM physics- and geometry-based approach for designing power distribution networks on PCBs. From input power connection to the IC die, the simple rules discussed can be used to reduce power supply noise and improve EMC. The final session was on PCB design to survive transients. This session covered some definitions of ESD and EOS while explaining the important differences in the energy involved and the resulting damage and design to mitigate transients.

The seminar was well attended with the total number of attendees around 80 people. The seminar featured exhibits and demos from about 20 vendors across the US. Attendees had the opportunity to network with exhibitors during breaks, at lunch, and at the post-seminar social event. The attendees were from industries in Illinois, Wisconsin, Minnesota, Iowa, and Indiana. We had a social hour at the conclusion of the seminar for attendees and exhibitors to mingle in a relaxed environment. A survey was handed out at the end

of the seminar. The survey feedback was very positive both in terms of the speaker presentation and technical content.

San Diego

The San Diego EMC Chapter held a meeting on Wednesday, May 24, 2017 at Advanced Test Equipment Rentals in San Diego, California. The meeting started at 6:00 pm with a complimentary dinner buffet generously

sponsored by the IEEE San Diego Section. Some 45 people attended the meeting. Following dinner, Kris Hatashita, an IEEE EMC Society Distinguished Lecturer based in Ottawa, Ontario, Canada presented "Electromagnetic Environmental Effects in the Military." Kris documented how military electromagnetic compatibility (EMC) is a matter of life and death as modern war-fighters rely on the safe, secure and reliable functioning of their devices. Military EMC includes aspects of electronic interoperabil-

ity that are seldom or never considered in the commercial realm. This talk presented technical details of EMC consideration in tactical and strategic military operations. The topics discussed included hazards of electromagnetic radiation to ordnance (HERO), electromagnetic data security (EMSEC), counter improvised explosive device (CIED) EMC issues. He included first-hand experiences of work done in the Afghan theatre – this was especially interesting!



Gabe Alcala (left) and Jamison Berg of Advanced Test Equipment Rentals greeted attendees at the May 24, 2017 San Diego EMC Chapter meeting held at their facility.



Over 40 people attended the May San Diego EMC Chapter meeting which featured guest speaker Kris Hatashita, IEEE EMC Society Distinguished Lecturer.



Kris Hatashita presented "Electromagnetic Environmental Effects in the Military" at the San Diego EMC Chapter meeting. His clever pointer amused the audience!



San Diego Section Chair, Gabe Alcala joined Speaker Kris Hatashita and San Diego EMC Chapter Chair Mark Frankfurth (from left) for a photo following the presentation.



Parthiv Parikh of SGS North America (right) visits with Jari Vikstedt of ETS-Lindgren on site at the SGS San Diego test lab. SGS and ETS-Lindgren co-sponsored the IEEE San Diego Joint Chapter event on July 13.



Michael Foegelle of ETS-Lindgren presents "Complex Challenges in Measuring 5G/Millimeter Wave Device Performance" to over 65 attendees at the technical tour of SGS in San Diego.



The 5G demonstration showed a simple 2-dimensional antenna pattern measurement for a 5G/millimeter wave (mmWave) antenna. Attendees could see in real time the challenges in millimeter wave communications and the tasks that lie ahead in order to perform accurate and confident measurements for 5G/mmWave antennas.



One of the tour stops included an interesting review of the many phantoms used when testing wireless devices. That is expensive, but important inventory!



SGS North America team members joined ETS-Lindgren's Michael Foegelle following the technical tour. Attendees learned about the extensive wireless test capabilities available using the antenna measurement system chamber shown. Pictured from left are Jessie Ren, Dan Sanchez-Weston, Amy O'Regan, Parthiv Parikh, Michael Foegelle, Nathan Gieselmann, James You, and Fred Jeong.

Kris Hatashita has been the Electromagnetic Environmental Effects subject matter expert for the Canadian Army tactical communications group since 2002 where he plans and oversees Canadian Army compliance with EMI, EMC, EMSEC, and RF safety requirements. Prior to this, Kris was an independent E3 consultant and President of ISOTEC Corporation whose clients included the Canadian Department of National Defence, the Canadian Army, Navy and Air Force, the Royal Canadian Mounted Police (RCMP), the Communication Security Establishment (CSE) and the Department of Foreign Affairs and International Trade. Kris has worked at or with many technology corporations throughout his career including General Dynamics Canada, Digital Equipment Corporation, Zenith Corporation and Hewlett-Packard. Kris's career in E3 began in 1985 in the aerospace industry after completing a BSc in Physics at the University of Waterloo. While working for Garrett Aerospace, Kris was selected to undergo training through

CSE in the joint Canada-US Industrial TEMPEST Program. Through this program, Kris became the first non-American to become a Certified TEMPEST Professional – Level II by the United States National Security Agency – a certification he holds to this day. Kris Hatashita was a member of the IEEE EMC Society Board of Directors in 2014-2015 and the General Chair of the 2016 IEEE International Symposium on EMC in Ottawa, Canada. Currently, Kris is an IEEE EMC Society Distinguished Lecturer, a lecturer at the Canadian Forces School of Communication and Electronics at the Royal Military College in Kingston and a consultant to the Canadian Department of National Defense for the Army Communications Group.

There were many questions throughout and following the presentation. It was a lively meeting! The San Diego EMC Chapter thanks Kris Hatashita for adding a visit to the San Diego Chapter following his visit to the Los Angeles EMC Chapter the day

before. As a HUGE hockey fan, we especially appreciate that he gave up watching a Pittsburgh Penguins versus Ottawa Senators championship game in order to drive from LA to SD for our presentation. Now, that's dedication to the IEEE EMC Society!

On July 13, 2017, the San Diego EMC Chapter collaborated with the San Diego Joint Chapter for Antennas and Propagation, Solid State Circuits, Microwave Theory and Techniques, Electron Devices, and Circuits and Systems for a technical tour of SGS North America in San Diego, California. Tour attendees also included international IEEE members and guests in town for the annual symposium of the IEEE Antennas and Propagation Society held at the nearby Manchester Grand Hyatt hotel. With over 65 people in attendance, the late comers added to the standing room only crowd.

Following a complimentary dinner and networking with beer and wine, attendees were warmly welcomed by Mr. Parthiv Parikh, Global Business Development Manager, with SGS North America. Parthiv provided an overview of his company's test lab capabilities. A technical presentation followed by Dr. Michael Foegelle of ETS-Lindgren who discussed "Complex Challenges in Measuring 5G/Millimeter Wave Device Performance." Michael explained that as new 5G/millimeter wave technologies become increasingly implemented into the modern wireless environment, we face new and unique challenges of verifying the product primarily meets the regulatory requirements for OTA, RF, and EMC performance, among others. The smart antenna systems used in today's products make the test methodologies that have been used for

decades obsolete. New innovative test methods need to be developed. In addition, 5G/millimeter wave products are primarily designed for communication. Measuring the performance of the device with adaptive antenna systems (AAS) creates test challenges. Michael demonstrated these problems and outlined possible solutions for how to effectively measure some of these parameters. He concluded by humorously (but accurately) noting that 5G ensures job security for EMC, RF and wireless engineers for the extended future!

Following the presentation, attendees took a tour of the SGS lab and stopped at three demonstration stations:

- Antenna Measurement System chamber for MIMO and SISO measurements
- Tabletop test box for 5G measurements
- A display of various phantom devices used for wireless measurements

There were many questions at each of the demonstration stations and attendees stayed well past the scheduled adjournment time of 9:00 pm.

Many thanks to our event sponsors SGS North America and ETS-Lindgren for the memorable evening with good food and drink, great technical content, and impressive lab tour. The warm hospitality of the SGS North America team on site who stayed late to support the event was especially appreciated!

Santa Clara Valley

"Identifying, Visualizing and Minimizing EMC and EMI Problems using 3D EM Simulation" was presented by speaker David Johns of CST of America at the Santa Clara Valley EMC Chapter meeting held at 7layers on June 13, 2017.

David explained that in today's high tech world, companies are under tremendous pressure to innovate and bring new products to market with minimal delay. At the same time, electronics products are getting more challenging to design due to higher data rates, higher component densities, reduced physical space and demands for conformal/flexible structures. Designers and analysts often face competing design requirements, such as EMC and thermal conflicts. On a positive note, computational electromagnetic methods have evolved significantly over the last few decades and combined with incredible improvements in computing speed and capacity, electromagnetic simulation has become an integral and important part of the design process. This presentation discussed the state of the art in EMC simulation and provided examples of identifying, visualizing and minimizing EMC problems.

David Johns is currently the VP of Engineering for CST of America, responsible for CST's technical support and engineering services in North America. He completed his Ph.D. at Nottingham Uni-

versity in the UK in 1996 for his research work on the 3D TLM method for electromagnetic field simulation. David has over 25 years of experience in developing and applying computational electromagnetics to a wide range of applications including EMC, EMI, ESD, E3 and MW/RF and antennas. He is a frequent speaker at the IEEE International EMC Symposium and has authored many papers and articles on the subject of EM simulation.

Seattle

The IEEE Seattle Section and several of its Chapters held a tabletop show on May 17, 2017 at the Museum of Flight in Seattle. Participating Chapters included the Electromagnetic Compatibility (EMC) Society; the Antennas and Propagation (AP) Society; Microwave Theory and Techniques (MTT) Society; Electronic Devices (ED) Society Joint Chapter; as well as the Communications Society (ComSoc) and Vehicular Technology (VT) Society Joint Chapter. Together these Chapters presented: "Advances in Antenna/EMC/Wireless Test and Measurement: A Colloquium and Exhibition" with Special Keynote Speaker, Professor Yahya Rahmat-Samii, of the University of California, Los Angeles (UCLA). Over 100 IEEE members and guests attended the event.

Following a complimentary breakfast, the full day program began at 8:00 am with a welcome by Dennis Lewis, Chair of the



David Johns of CST of America was the speaker at the Santa Clara Valley EMC Chapter meeting held at 7layers on June 13, 2017.



Santa Clara Valley EMC Chapter members presented David Johns with a certificate of appreciation following his excellent presentation.



The Seattle EMC Chapter organized a multi-Chapter Section at the Museum of Flight on May 17, 2017. Attendees settle in for the full-day program, “Advances in Antenna/EMC/Wireless Test and Measurement: A Colloquium and Exhibition.”



Keynote speaker, Professor Yahya Rahmat-Samii of the University of California at Los Angeles (UCLA), gave a fascinating talk on “Evolution of Reflector Antennas in Diverse Applications: From Archimedes’ Burning Mirror to Innovative CubeSat Antennas.”



Several companies supported the Seattle Colloquium and Exhibition including ETS-Lindgren (left) and Element Materials Technology.



Speaker Scott Prather (left) of AT&T in Redmond, WA visited with Dave Michelson of the University of British Columbia. Dave is very active in the Vancouver BC, Canada IEEE Antennas and Propagation Chapter.



Exhibitor tabletop displays lined the perimeter of the room; the attendees sat in the center of the room with break stations at the back of the room.



Kymeta sent their best and brightest to the Seattle event, including (from left) Dean Busch, Kenny Kirchoff and Russell Soerens.



Although cool and cloudy in Seattle, IEEE members and guests enjoyed the fresh air during the break, including (from left) John Liu, Ian King, Alexander Wang, Varun Bedi, and Joseph Kpoto. All are with AT&T in Redmond, WA except for Alexander Wang who is with Ericsson.



Professor Yahya Rahmat-Samii (left) of UCLA chatted with Mike Violette of Washington Labs. Mike presented “EMC of Things: How the IoT Needs Electromagnetic Compatibility” and provided an update on the IEEE New Initiative on IoT.



Seattle EMC Chapter Logistics Coordinator, Dean Shipman (left) of SynTek, visited with speakers Harry Skinner (right) of Intel and Professor Joshua R. Smith with the University of Washington (UW).



Over 100 people attended the full-day technical program held at the Museum of Flight in Seattle. Exhibitor Danny Odum (seated right) of Ametek took a moment to check email.



Exhibitors Jon Nguyen of Haefely Hipotronics, Gabe Alcala of Advanced Test Equipment Rentals and Alea Langford of Element Materials Technology (from left) networked during the refreshment break at the Seattle Colloquium and Exhibition.



Speakers Dr. Kate Remley of NIST and Dr. Hossam Fattah of Microsoft transition between their presentations at the IEEE Seattle Section gathering on May 17, 2017.



A few of the expert speakers on the Seattle program included (front row from left) Dennis Lewis of Boeing, Yahya Rahmat-Samii of UCLA, Mike Violette of Washington Labs, (back row from left) Harry Skinner of Intel, Scott Prather of AT&T, Michael Foegelle of ETS-Lindgren, and Joshua R. Smith with UW.



Seattle EMC Chapter Chair Dennis Lewis (left) caught up with Jason Bommer of ANSYS at the conclusion of the event. Dennis and Jason are chair and vice-chair, respectively, of the 2019 IEEE International Symposium on EMC+SIPI in New Orleans.



Seattle Section officers, EMC Chapter officers and speakers celebrate the conclusion of a great event on May 17 at the famous Crab Pot restaurant on the Puget Sound.



There's nothing better than cracking crab and peeling shrimp at the Crab Pot. The Seattle EMC Chapter officers thanked the speakers for sharing their expertise with a delicious dinner.

Seattle EMC Chapter – the principal organizer of the event. The extensive and interesting technical program included the following presentations:

EMC of Things: How the IoT Needs Electromagnetic Compatibility: Update on IEEE New Initiative on IoT

By Mr. Mike Violette, Founder and CEO, Washington Labs, Gaithersburg, Maryland

KEYNOTE PRESENTATION: Evolution of Reflector Antennas in Diverse Applications: From Archimedes' Burning Mirror to Innovative CubeSat Antennas

By Yahya Rahmat-Samii, Distinguished Professor, Member of the US National Academy of Engineering, Department of Electrical Engineering, University of California, Los Angeles, USA

Perpetual Computing: Technologies for Banishing Batteries

By Dr. Joshua R. Smith, Associate Professor, Department of Computer Science and Engineering, Department of Electrical Engineering, University of Washington

Wireless Integration Interference Challenges (aka EMC for Highly Integrated Wireless Devices)

By Mr. Harry G. Skinner, Intel Labs, Hillsboro, Oregon

Complex Challenges in Measuring 5G/Millimeter Wave Device Performance

By Dr. Michael Foegelle, ETS-Lindgren, Cedar Park, Texas

Optimizing the Radiated Performance of Wireless IoT Devices

By Mr. Scott Prather, AT&T, Redmond, Washington

An Overview of the 3GPP/LTE Narrowband Internet of Things (NB-IoT)

By Dr. Hossam Fattah, Microsoft, Redmond, Washington

Over-the-Air Testing of Large Cellular Wireless Devices in Reverberation Chambers

By Dr. Kate Remley, IEEE EMC Society Distinguished Lecturer, National Institute of Science and Technology (NIST), Boulder, Colorado

The program was designed to bring the latest information related to RF, EMC, and

Antenna measurement techniques and standards to the local community. Experts in industry and academia shared practical information on various wireless topics related to 5G and the Internet of Things (IoT) in an extended presentation format. This allowed a thorough discussion of each topic and provided the opportunity for extended questions and answers. The "hands-on" quality of the presentation enabled attendees to learn useful information that could be used on the job – in the "real world."

The tabletop show included 18 exhibitors of EMC, wireless and antenna test and measurement related products and services in the technical presentation area. These products and services addressed the needs of the commercial, military, and aerospace industries. Special thanks are due to our generous Lunch Sponsors: Advanced Test Equipment Rentals, Ametek CTS US, AR RF/Microwave Instrumentation, Haefely Hipotronics, Pearson Electronics, and Wavecontrol, Inc.

Following the technical presentations, an exciting raffle was held with exhibitor sponsored prizes! Then, from 4:15 to 6:00 pm, the Museum of Flight was open to everyone at no charge. Attendees could take a self-guided tour of the museum's Red Barn (famous due to its origin of The Boeing Company) and Personal Courage Wing (a two-story gallery that highlights the human spirit of those involved in fighter aviation in World War I and World War II).

Kudos to the Seattle EMC Chapter officers for organizing a very successful event, including Dennis Lewis of Boeing (Chair); Janet O'Neil of ETS-Lindgren (Vice-Chair); Leo Smale (Secretary/Treasurer) and Brad Catlin (Registration), both of Lionheart Northwest; and Dean Shipman (Event Logistics) of Syntek. Thank you to consultant Titus Lo (Com-Soc and VT Chapter Chair) and Professor M. P. (Anant) Anantram of the University of Washington (MTT/AP/ED Chapter Chair) for their help in securing outstanding speakers. Lastly, many thanks to Alon Newton of Microsoft, IEEE Seattle Section Chair, for his tireless support of this event!

The Seattle EMC Chapter was proud to offer this outstanding, full day educational opportunity that included a continental breakfast and lunch at NO CHARGE to attendees. The event was funded by the generosity of the participating exhibitors. Our Chapter looks forward to future events!

Singapore

Si-Ping Gao, Secretary, reports that this year marks the prosperity of the IEEE EMC Singapore Chapter because 22 technical and one administrative events have been organized or sponsored. Among the technical seminars, besides those already reported in the last Chapter Chatter column, Prof. Dominique Lesselier from CNRS-Centrale-Supélec-Univ. Paris Sud, gave an very interesting talk on "Eddy-Current Non-destructive Testing, Sparse-Grid Surrogate Model, Bayesian Inversion, and Model Choice" on 20 July 2017. The talk broadened the horizons of many attendees working in the field of EMC. Prof. Lesselier introduced one of the famous non-destructive testing (NdT) methods using eddy current as the illumination source. Due to the non-linear nature of the inverse problem, the complicated forward model is replaced by a computationally inexpensive surrogate model to overcome the "curse of dimensionality" and a Markov Chain Monte Carlo (MCMC) algorithm is applied to solve the inverse problem itself. Simulation and experimental results show that this method is effective and promising in dealing with a non-linear inverse problem. Another invited talk was given by Prof. Kama Huang from Sichuan University of China, which was entitled, "Microwave Propagation in Chemical Reactions". Prof. Huang introduced the dielectric polarization in polar-molecule reactions in the liquid phase theoretically. On the basis of the modified Smoluchowski equation, the polarization can be described with the rotational diffusion vector and component concentration vector. The electromagnetic wave propagation in a unimolecular reaction is thus characterized.

Apart from the seminars, a two-day EMC Joint Workshop 2017 was successfully held in Singapore on 18-19 May 2017 with the joint efforts of the EMCJ technical group of



Professor Dominique Lesselier discussed eddy-current non-destructive testing (NdT) methodology during his presentation at the Singapore EMC Chapter seminar on July 20, 2017.



An EMC Joint Workshop 2017 was successfully held in Singapore on May 18-19, 2017 with the joint efforts of the EMCJ technical group of IEICE Japan and the Singapore EMC Chapter. Professor See Kye Yak addressed the audience at the opening ceremony.



Dr. Martin Leung from Computer Simulation Technology (CST) Singapore presented during the EMC Joint Workshop on May 19, 2017. Over 40 people attended the EMC Joint Workshop 2017 in Singapore.



Participants of the EMC Joint Workshop visited an anechoic chamber located at Nanyang Technological University, Singapore.

IEICE Japan and the Singapore EMC Chapter. It aimed to provide a platform for EMC scientists and engineers to share their recent findings and developments and interact with each other for brainstorming. Thanks to the organizers from the Japan team and Prof. See Kye Yak and Dr. Richard Xian-Ke Gao from the local Singapore team, up to 40 people were attracted to attend the workshop, including researchers from both countries as well as engineers from CST as the local sponsor.

Last, but not least, the Singapore Chapter would like to express our gratitude for obtaining the Bob Haislmaier Angel Fund from the IEEE EMC Society. It allows us to organize more technical activities this year and also to be helpful for co-organizing the 2018 Joint IEEE International EMC and APEMC Symposium that will be held in Singapore in May 2018.

Southeastern Michigan

Scott Niemiec of Rohde & Schwarz came to the Southeastern Michigan IEEE EMC

Chapter on June 15, 2017 to explain the necessity for pre-selection in EMC receivers and spectrum analyzers. Scott brought his father, an electrician and seasoned electrical engineer, to record and brighten our meeting. Scott mentioned the great need for pre-selection due to noise at

lower frequencies that carries more power sufficient to overload or damage the input amplifiers. He used the example of woofers that can move us but tweeters that just irritate us when they are over-driving. Scott said that pre-selection is an often misunderstood concept, especially



Southeastern Michigan EMC Chapter Chair Scott Lytle (left) presented speaker Scott Niemiec of Rohde & Schwarz with a certificate following the meeting on June 15, 2017.

EMC Europe 2018

International Symposium on Electromagnetic Compatibility

EMC EUROPE 2018

AMSTERDAM, HOLLAND

**August 27-30, 2018,
Amsterdam, the Netherlands**



EMC week in Amsterdam

EMC Europe is the leading EMC Symposium in Europe and the 2018 edition will be held at the Beurs van Berlage in the heart of Amsterdam, the Netherlands, from August 27th till August 30th, 2018. We wish to invite and encourage all those working in the field of electromagnetic compatibility to participate in this prestigious event.



Accepted papers will appear in IEEE Xplore.

The call for paper can be found on the website :
www.emceurope2018.org

Important dates

- Special Sessions : 1 January, 2018
- Paper submission : 15 February, 2018
- Proposal for Workshops, Tutorials, Short Courses : 15 March, 2018
- Notification of acceptance : 15 April, 2018
- Final Paper Submissions: 15 May, 2018

Contact and Information : info@emceurope2018.org



Symposium Venue

Amsterdam is the Netherlands' capital, known for its artistic heritage, elaborate canal system and narrow houses with gabled facades, legacies of the city's 17th-century Golden Age. Its Museum District houses the Van Gogh Museum, works by Rembrandt and Vermeer at the Rijksmuseum, and modern art at the Stedelijk. Cycling is key to the city's character, and there are numerous bike paths.

The conference center, the Beurs van Berlage, is a building on the Damrak, in the center of the city. This former commodity exchange is one of the defining monuments of the Dutch capital.



Exhibits

During the Conference, an exhibition of software, hardware, equipment, materials, services and literature is planned. This will be an excellent opportunity for companies to present their latest developments to a world-wide public of researchers and engineers. Companies, institutions, research centres and universities are welcomed to promote the latest products and innovations.



Speaker Ken Javor (left) and Syracuse Section Chair Don McPherson visited at the joint Syracuse IEEE EMC Chapter and the Syracuse Chapter of the International Council on Systems Engineering (INCOSE) meeting on June 20, 2017.



The audience enjoyed two presentations by EMC Consultant Ken Javor: "An Insider's View on the Changes to MIL-STD-461G and 464 Work Items" and "Military Control of Electronic Interference, WWII to the Present."



The first slide of Ken Javor's presentation was indicative of his captivating mix of expertise and humor.

with both spectrum analyzers and EMI receivers using the term in different contexts. His presentation reviewed how both CISPR and MIL-STD-461 standards reference pre-selection. He explained why differences in the pre-selection architectures of spectrum analyzers and EMI receivers existed in reference to the differences of the machines. To drive home the value of pre-selection, videos showing different measurement results with and without pre-selection were shown and discussed. The slides from the meeting are on our website.

The Southeastern Michigan EMC Chapter has discovered the fountain of engineering students' attendance at meetings. On July 20, 2017, we invited Ken Redcap, Tom Hagen and Jim Abshier to speak about RADIO ASTRONOMY FOR THE AMATEUR and a multitude of students showed up (unfortunately not all registered for the meeting)! Ken and Jim regaled the audience with stories about cannibalizing their

neighbor's cast off electronics, with them making machines made from old CRTs (a source of great transformers) and other magical mechanical materials searching the sky for radio signals! We heard of varying degrees of radio astronomy, from giant dish antennae to the itty bitty telescope made from an old satellite TV dish (each with their differing resolutions). They even made a telescope using interferometry and two old satellite dishes to simulate a much bigger and more expensive setup. On the high end for both price and resolution, they discussed professional radio telescopes with giant dishes that were built and designed to be radio telescopes. They both use the radio telescopes associated with the Oakland Astronomy Club, The McMath-Hulbert Astronomical Society and SARA -The Society of Amateur Radio Astronomers. Membership brochures to join SARA were distributed (it's only \$20/year)! SARA has used the 100m telescope in Greenbank, West Virginia (WV). Kimball Williams said he is dreaming of a field trip to Greenbank,

Come on, people!

MIL-STD-461G Section 4.3.8.2 formalizes a requirement to perform bond checks on the test sample enclosure prior to EMI testing, and prior to cable connection.

Section 4.3.6 requires LISNs to be bonded to the ground plane with a 2.5 milliohm resistance.

Section 4.3.7.2 requires that only the antenna in use be located in the test chamber during RE/RS testing. Translation: the anechoic-lined shield room is a test chamber, not a broom closet.

Sections 4.3.8.6.1 and 4.3.8.6.2 require the 5 cm above ground cable standoff be achieved using "non-conductive material such as wood or foam." And that the entire length of the cable, not just the two meters exposed to the antenna, be so-supported above the ground plane. So no more using rf absorber material for that purpose, folks!



"Doh!"

Ken Javor explained the changes to MIL-STD-461G with humor and a common-sense perspective.

WV with all the enthusiasts in the crowd! Ask them to speak to your group! You might have a fountain of undergrad and grad EE students to your meeting too!

Syracuse

On June 20, 2017, the Syracuse Chapter of the IEEE EMC Society and the Syracuse Chapter of the International Council on Systems Engineering (INCOSE) joined Rohde & Schwarz in sponsoring two educational talks by Ken Javor. In his first talk, titled "An Insider's View on the Changes to MIL-STD-461G and 464 Work Items," Ken shared his 30+ years of expertise in EMI/EMC and explained the evolutionary changes in the standard, including additions, deletions and some subtle revisions. His presentation was packed with technical detail and sprinkled with humorous cartoons that highlighted his common-sense perspective. In his second talk, "Military Control of Electronic

Interference, WWII to the Present,” Ken offered the history that preceded his experience and shaped the standard in place today. Between the talks, the attendees were treated to a delightful buffet dinner, sponsored by Rohde & Schwarz. The talks and dinner made for a very enjoyable educational and social evening that was much appreciated by all who attended.

Taipei

On July 6, 2017, the IEEE EMC Taipei Chapter, in corporation with Auden Technology Corp., organized a full-day workshop on “Next Generation Smart Life with Bio-electromagnetics and Advanced Telecommunication Technology,” held at the Evergreen International Convention Center of Chang Yung-Fa Charity Foundation. This is the second consecutive year that both organizations hosted this event together. The workshop widely covered the topics of fifth-generation (5G) wireless technology, Internet of Things (IoT), and bio-electromagnetics. The total number of attendees was over 300. Their enthusiasm and support made the workshop a great success.

The morning sessions with keynote speeches covered several main themes of IoT and 5G millimeter-wave technology. The keynote speech of Professor Ruey-Beei Wu, National Taiwan University, was focused on the education programs for cultivating the young talent aiming at IoT and cloud solutions. The keynote speech of Professor Niels Kuster, IT IS Foundation, got the attention of participants on the topic of a novel electromagnetic system for demonstration and compliance of 5G millimeter-wave sources. Professor Jyh-Yih Hsu of National Chung-Hsing University



Over 300 attendees visited with instrumentation providers in the exhibition area at the Taipei workshop. Their enthusiasm and support made the workshop a great success.

talked about the topic of exploring business models in the development of IoT and big data analytics. Profess Kin-Lu Wong of National Sun Yat-sen University presented the design and testing results of various MIMO antennas for mobile devices.

There were three parallel tracks and a total of 18 discussed topics in the afternoon sessions. In the 5G Communication Track, Professor Cheng-Nan Chiu of Yuan Ze University, was the moderator to introduce speakers to give presentations covering such topics as 5G technology roadmaps, measurement methods, and antenna applications from LTE-M to NB IoT. In the Biomedical Application and Electromagnetic Track, the moderator, Professor Jian-Jang Huang of Yuan Ze University, invited speakers to address topics of application and safety test of electrical stimulator, aesthetic medicine, a phased array dipole antenna for cancer treatment, and simulation platform and validated hardware solutions for active implant MRI safety assessment. The IoT and Application Track, hosted by Professor Ding-Bing Lin, invited speakers to talk about such topics as IoT in mass transportation systems, thread in IoT

development, big data analytics and platform. The participants had the chance to get to know the trends of IoT and the digitalization development of different industries.

Turkey

With the new team elected at the end of 2016 (Chair: Assoc. Prof. Özgür Ergül, Hande Ibili, Sadri Güler, and Türker Dolapçı), the Turkey joint AP/MTT/EMC/ED Chapter has been very active this year. Thanks to the support of the EMC Society, the Chapter has organized 12 seminars so far (through August 2017) given by experts in different areas of electromagnetics, including:

24 February 2017

Speaker: Assoc. Prof. Fatih Dikmen, Gebze Technical University. Topic: “Construction of Efficient Wave Scattering Algorithms in 2D with Integral Equation Formulations.”

3 March 2017

Speaker: Prof. Ayhan Altınta, Bilkent University. Topic: “Design and Implementation of an Electromagnetic Wireless Passive Structural Health Monitoring System.”



On July 6, 2017, the IEEE EMC Taipei Chapter organized a full-day workshop on “Next Generation Smart Life with Bio-electromagnetics and Advanced Telecommunication Technology.” Dr. Yu-Bin Chang, Chairman of Auden Techno. Corp., welcomed the audience.



Prof. Dr. Ding-Bing Lin, the Chairman of the Taipei EMC Chapter, delivered an opening speech. The workshop widely covered the topics of fifth-generation (5G) wireless technology, Internet of Things (IoT), and bio-electromagnetics.



With the new team elected at the end of 2016 (Özgür Ergül, Hande Ibili, Sadri Güler, and Türker Dolapçı), the Turkey joint AP/MTT/EMC/ED Chapter has been very active in 2017. Thanks to the support of the IEEE EMC Society, the Chapter has organized 12 seminars as shown above from January to August 2017. The seminars were presented by experts in many different areas of electromagnetics.

10 March 2017

Speaker: Prof. Gökhan Çınar, Eskisehir Osmangazi University. Topic: "Wiener-Hopf Analysis of Baltic HVDC Submarine Power Cable Measurement."

17 March 2017

Speaker: Asst. Prof. Hüseyin Arda Ülkü, Gebze Technical University. Topic: "Quantum Corrected Plasmonic Field Analysis using Time Domain Surface Integral Equation Solvers."

7 April 2017

Speaker: Dr. Mehmet Çiydem, Engitek Ltd. Topic: "Mobile Base Station Communication Antennas."

14 April 2017

Speaker: Prof. Özlem Aydın Çivi, Middle East Technical University. Topic: "Reconfigurable Reflectarrays: Design, Analysis and Fabrication."

21 April 2017

Speaker: Asst. Prof. Rohat Melik, TOBB-ETÜ. Topic: "Modulation of Ion Concentration In-Vivo."

28 April 2017

Speaker: Prof. Irsadi Aksun, Koç University (Co-Author: H. Serhat Tetikol). Topic: "Understanding Surface Plasmon Polaritons (SPP) via Critical Study of Dispersion Relation – Complete Picture and Correct Interpretation."

2 May 2017

Speaker: Prof. Ibrahim Tekin, Sabancı University. Topic: "High Isolation Full Duplex Communication Antennas."

5 May 2017

Speaker: Assoc. Prof. Hüsnü Emrah Ünal, Middle East Technical University. Topic: "Transparent Contacts with Metal Nanowire Networks."

12 May 2017

Speaker: Prof. Vakur B. Ertürk, Bilkent University. Topic: "Incomplete-Leaf Multilevel Fast Multipole Algorithm for Multiscale Electromagnetics Problems."

26 May 2017

Speaker: Assoc. Prof. Alpan Bek, Middle East Technical University. Topic: "High Resolution Optical Microscopy and Spectroscopy Techniques in Biology."

The seminars attracted great interest, particularly from the undergraduate and graduate students, with an average attendance of 40 students at each meeting. The Chapter is continuing to organize new events, including three Distinguished Lecturer talks before the end of 2017.

United Kingdom and Ireland

On Wednesday, 5 April 2017, an afternoon technical meeting was held at Boscombe Down Aviation Collection (BDAC) Old Sarum Airfield Museum near Salisbury with four speakers and 20 registered attendees. The varied program included: The latest on the Radio Equipment Directive (RED) by Nick Hooper; an overview of the RF Design, Test & Evaluation Groups – Current and Future Capability by Ed Dunkin of QinetiQ, who are located at MoD Boscombe Down; an Overview of Absorber Technology for EMC Chambers by

Paul Duxbury of Rainford EMC Systems Ltd, MVG; and the Pitfalls and Practice of RF Conducted Immunity Tests by Tim Williams of Elmac Services. The technical presentations were followed by an introduction presentation to BDAC and the Aeroplane and Armament Experimental Establishment (A&AEE) Boscombe Down and a museum visit, which was extended to 6:00 pm and enjoyed by all. Military flying began at Boscombe Down in 1917, and BDAC tells the place it has in the history of flight and flight test. The museum, which occupies a historically listed building, "Restores the past for the future," and encourages visitors to touch the exhibits and sit in the aircraft cockpits.

Our Special Summer event on Wednesday 12 July 2017 was a full day technical meeting at the Buckinghamshire Railway Centre, Station Road, Quainton, near Aylesbury. Four speakers presented to 20 attendees a varied program which included: PLT- where next by John Pink; Dual mode crossed HF measuring loop antennas by David Lauder of University of Hertfordshire; Resilience to Electromagnetic Disturbances for reducing functional safety and other risks by Keith Armstrong, Cherry Clough Consultants Ltd; and The Role of Electromagnetic Modelling in Design, Development and Certification of Aircraft by Professor Ian MacDiarmid, University of Liverpool and Professor Chris Jones, BAE Systems. The meeting room was within a glass-roofed former Oxford Rewley Road station which was dismantled, moved and re-erected at its current location at Quainton. A guided tour of the site was given which included the workshops operated by enthusiasts to refurbish rolling stock. This was also a Steaming Day and there was a full-size steam train in action to ride on. **EMC**



Tim Williams of Elmac Services enjoyed sitting in a Harrier cockpit at the UK and Ireland EMC Chapter event at the Boscombe Down Aviation Collection.



At the UK and Ireland EMC Chapter event at the Buckinghamshire Railway Centre, Independent Consultant John Pink has a discussion on the steam train controls, observed by Ian MacDiarmid of the University of Liverpool and Tim Davison of Plantronics.