

MASTER SPONSOR



ROHDE & SCHWARZ

FINAL PROGRAM

2018 IEEE SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY, SIGNAL AND POWER INTEGRITY



EMC+SIPI 2018
July 30 - August 3, 2018 *Long Beach, CA*
Your Port for EMC+SIPI Compliance

**ANTENNA
SHORT COURSE**
with Constantine Balanis
& Other Distinguished
Presenters



KEYNOTE SPEAKER
YAHYA RAHMAT-SAMII



**EMC+SIPI 2018
ONLINE SYMPOSIUM**



**TECHNICAL
PROGRAM DETAILS**



www.emc2018usa.emcss.org



IEEE

EMC
SOCIETY®

MIL-STD-461 TESTING

SIMPLIFIED WITH PEARSON PRODUCTS

CS114/115/116

CS101



New Injection Probe, Current Probe and Test Fixture specifically designed for sections CS114/115/116 in MIL-STD-461 (including "G") and RTCA/DO-160 requirements.

- Consists of 3 Components
 - 8700i Injection Probe
 - 8705C Current Probe
 - F-3 Test Fixture (accommodates both probes)
- Wideband response - 10 kHz to 400 MHz
- Max Input Power - 100W for 30 minutes
- Max RMS Current - 4 Amps
- Max Peak Current - 15 Amps
- Compact design with 2.0 inch aperture

Greatly simplifies the measurement of injected audio-frequency ripple on an AC or DC power bus in EMI tests such as MIL-STD-461G CS101.

- Two Models - PRD-120 & PRD-240
- Measure audio frequency (CS101) ripple injected on power buses
- Separates ripple from power waveform
- Used with a spectrum analyzer
- Max Voltage 120-240 Vac, 270 Vdc
- Switch selectable frequency response:
 - Flat response 10 Hz to 150 kHz
 - CS101 setting provides constant output over entire frequency range



pearsonelectronics.com

PHONE: +1 (650) 494-6444
HOURS: 8AM ~ 5PM PACIFIC TIME

LONG BEACH, CALIFORNIA
YOUR PORT FOR EMC+SIPI COMPLIANCEJuly 30 – August 3, 2018
Long Beach Convention Center**GET THE EMC+SIPI 2018 MOBILE APP**

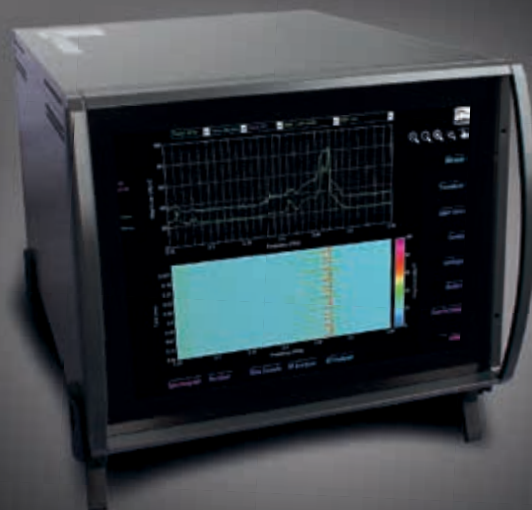
The mobile app gives you complete schedules of the symposium, session details and the ability to add presentations to your personal schedule. The full exhibitor list with contact information is included with an interactive map to help you find the booth you are seeking. In addition, the app allows you to search for sessions by name or presenter and much more.

**SEARCH FOR "IEEE EMC" IN
THE APPLE APP STORE OR
GOOGLE PLAY STORE.****EMC+SIPI 2018 FEATURES**

- EMC+SIPI Online – IEEE EMC Society is back with the 2nd global online EMC, Signal and Power Integrity Conference - [Page 13](#)
- Antenna Short Course – Constantine Balanis & other distinguished presenters will provide an overview of fundamental and advanced antenna topics- [Page 80](#)
- Keynote Speaker - Professor Yahya Rahmat-Samii - [Page 30](#)
- Three days of Workshops and Tutorials on topics ranging from Smart Grid to Wireless, Automotive to Home Appliances - [Page 18](#)
- Three Compelling Special Sessions on ESD, EMI/EMC Research in Power Electronics Systems and Automotive EMC & Electric Vehicles - [Page 72](#)
- Come to the Exhibit Hall to get your questions answered during the Ask the Experts Panels and watch demonstrations of EMC and SIPI concepts and methods during the Experiments & Demos. - [Page 127](#)

THE NEW BENCHMARK IN EMC TESTING

BEST RF PERFORMANCE AND LOWEST NOISE FLOOR



**BOOSTING your overall test & measurement quality
by patented TDEMI® TECHNOLOGY**



685 MHz

**REAL-TIME BANDWIDTH
TDEMI® TECHNOLOGY**

40 GHz

**ULTRA-FAST RECEIVER SCANNING
TDEMI® TECHNOLOGY**

The TDEMI® ULTRA is the only Solution providing all the Features of the "FFT-based measuring Instrument" according to the new Standards with 685 MHz Real-time Bandwidth and CISPR Detectors.

Welcome	3
About EMC Society	5
Chairman's Message	7
Our Sponsors	8
Area Information	9
Getting Around	11
EMC+SIPI Online	13
Schedule at a Glance	15
Technical Programs	17
Monday, July 30, 2018	17
Tuesday, July 31, 2018	29
Keynote Presentation	30
Calling All Hams!	34
Wednesday, August 1, 2018	49
Special Event: Antenna Short Course	50
Antenna Course Speaker Bios	52
Thursday, August 2, 2018	71
Friday, August 3, 2018	89
Jet Propulsion Lab (JPL) Tour	96
Best Symposium Paper Finalists	102
Education	106
Clayton R. Paul Global University	106
Professional Development Hours	107
Ancillary Meetings	108
Working Groups/Collateral Meetings	108
Technical Committees	111
ANSI C63® Workshop	116
iNARTE Symposium Activity	117
Social Events	119
Welcome Reception	120
Evening Gala	120
Awards Luncheon	121
Chapter Chair Training Luncheon	121
Founders & Past Presidents' Luncheon	121
IEEE Young Professionals	122
Youth Technical Program	124
Team EMC Bike Ride	124
Exhibits	127
Exhibit Hall Floorplan	128
Exhibitor List	129
Exhibitor Profiles	130
Meet the Committee	148
Advertiser's Index	150



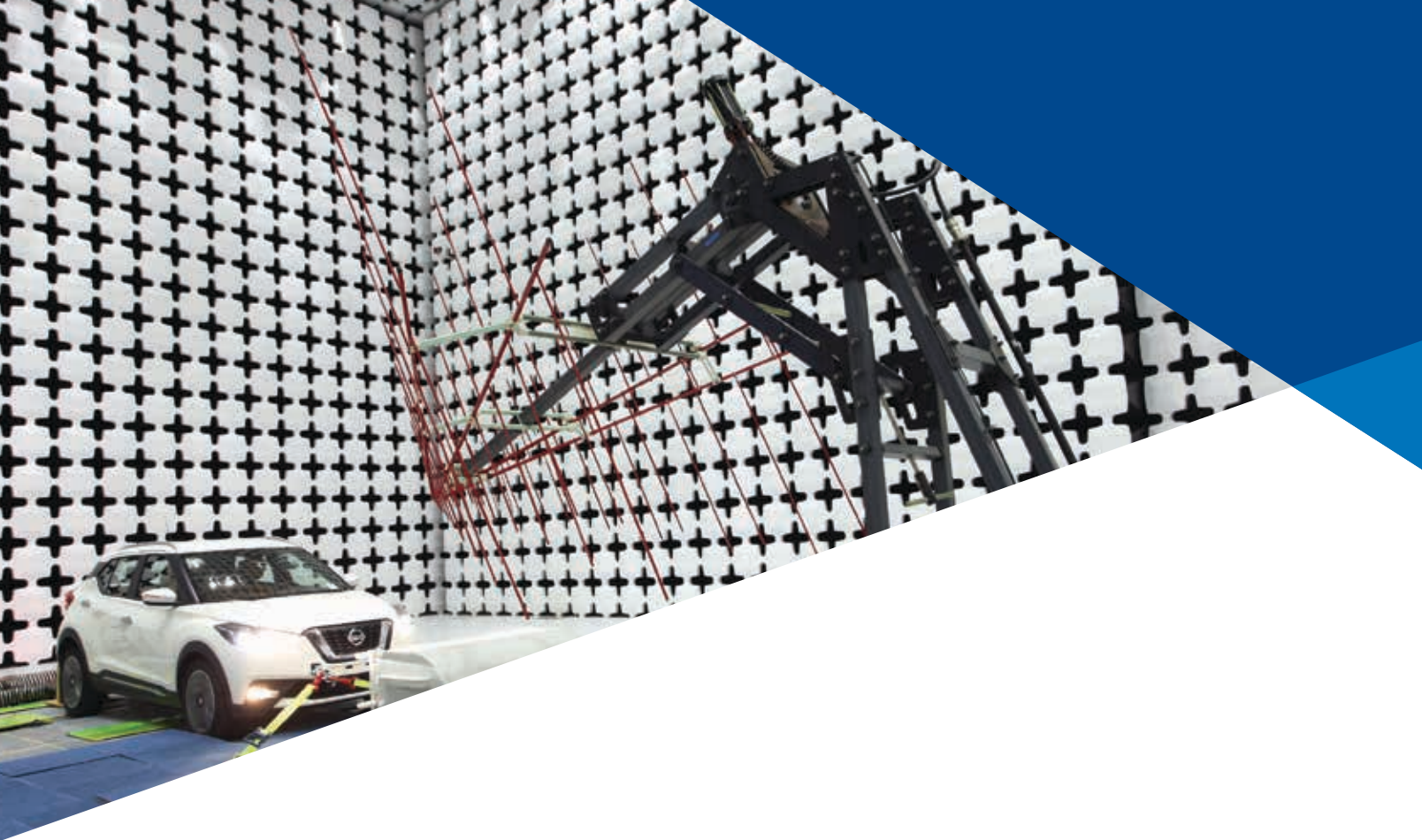
**BRINGING
COMPATIBILITY
TO ENGINEERING
INNOVATIONS
SINCE 1957**

The IEEE EMC Society has been at the pivot point of engineering technology for over a half-century. With a long history of developments in Electromagnetic Compatibility and Electromagnetic Environmental Effects, the Society brings sharp focus to methods and practices for proper performance of energy, electrical, communications, information technology and wireless systems. The Society promotes information sharing through regional chapters and international symposia. Collaboration across the research, design, test, regulatory and media industries has helped shape the world as we know it.



Become a member today at

www.emcs.org



GOING BEYOND THE STANDARDS.

The future is here! From driverless vehicles and drones delivering pizzas, to ear buds that act as virtual mixing boards for real-world audio, our lives are increasingly dominated by EMC. So, too, is ETS-Lindgren's work in compliance testing and measurement, transcending the standards of EMC performance – Beyond Measure.

As an international manufacturer of market-leading components and systems that measure, shield and control electromagnetic and acoustic energy, ETS-Lindgren is the driving force that allows some of the biggest industry names, and latest technological advances, to meet compliance standards. From chambers to test cells, absorbers, positioners, antennas, and expert service to ensure optimal performance, ETS-Lindgren's EMC solutions are designed for reliability, diversity, scale and precision.

More importantly, our ability to create real-world test scenarios, troubleshoot potential failures and maximize the chance of passing standards within the allotted time and budget helps our customers bring life-changing products to market – faster.

Drop by ETS-Lindgren in booth number 311 to see the latest offerings including VisionTRX™ Visual Monitoring System and our 5G mmWave wireless testing solutions. To view our accreditations and case studies, visit our website at ets-lindgren.com.

BEYOND MEASURE.™



Offices Worldwide | ets-lindgren.com

7/18 RR © 2018 ETS-Lindgren v1.0

The 2011 IEEE International Symposium on EMC was held in Long Beach and I had the honor to chair that event. There are memorable moments from 2011 such as Francesca Maradei and me giving our welcome speeches, while in SCUBA gear, inside the big display tank at the Aquarium of the Pacific (see photo at right). Since it was a great experience, I made a proposal to the EMCS Board of Directors (BOD) to bring the symposium back to Long Beach. The BOD selected Long Beach for 2018 and I have the privilege of chairing this conference for a second time.

The Southern California Metropolitan area has long been a center of Aerospace research, development and production with such companies as Hughes Aircraft Company, TRW Inc, Rockwell International, McDonnell Douglas Corp, Litton, and Northrop. None of these original names still exist untouched. Today it's Northrop Grumman and The Boeing Company proving that this industry has adapted to change and will continue to meet the challenges of today and those posed by the future. Even the early EMI Receivers were developed by Stoddart Aircraft Radio Company of Hollywood by Richard R. Stoddart who designed the elaborate radio system for the historic Howard Hughes 1938 round-the-world flight. Today, Southern California includes recent aerospace newcomers such as SpaceX, Virgin Galactic and Rocket Launch, that will advance the aerospace industry into tomorrow.

We are pleased to bring the EMC Symposium back to the Long Beach Metro area. We are continuing to include **Signal Integrity & Power Integrity (SIPI)** as an integral part of the conference, reflecting the EMC Society's influence and focus on this critical topic of engineering design. An exciting special event is the NEW short course led by noted author, **Professor Constantine Balanis**, providing an overview of fundamental and advanced antenna topics. This is a very timely topic due to the rapid advances in wireless technology. The session will also include three distinguished lecturers. In addition, the keynote speaker, **Professor Yahya Rahmat-Samii**, is an expert on antenna design and electromagnetics among his numerous accolades. Our **Global EMC University** features an overview of fundamental topics by expert instructors designed for those new to the field of EMC and SIPI.

We have brought back the EMC+SIPI 2018 Online Symposium which allows us to connect to our community in a high tech way. Join us from your computer, your tablet, or wherever you browse online! This is an EMCS BOD sponsored initiative to help us invent the future instead of being a bystander in



A LETTER FROM THE EMC+SIPI 2018 GENERAL CHAIR RAY ADAMS

the digital world of today. Nothing is quite like the physical on-site symposium, but this is an excellent alternative for those who cannot attend and do not want to miss out on the engaging technical presentations.

The Long Beach Convention and Entertainment Center is an excellent venue for a symposium of this size and we will own the town for a week. The technical sessions and exhibit hall with over 150 booths are located in the Convention Center Hall A. The Welcome Reception will add a California urban vibe, as we will be outside where attendees will have a choice of a variety of meal selections from gourmet food trucks in The Cove. Similar to 2011, we will host the Symposium Gala on the historic Queen Mary with an updated format to provide an enjoyable time for all. The Queen Mary is an engineering marvel on her own and HAMS operators will have a unique opportunity to visit the on-board radio station. Back by popular demand, the week will end with a **technical tour of the Jet Propulsion Lab (JPL)** in nearby Pasadena. Tickets are limited - check at the Registration desk for availability.

We have a fully-subscribed program that will provide something for everyone. We hope you enjoy the hospitality, weather, and events, both technical and social.

Welcome to Long Beach, California!

Raymond K. Adams
General Chair 2018 IEEE Symposium
on EMC and SIPI

**THE EMC+SIPI 2018 COMMITTEE EXTENDS OUR GRATITUDE
TO THIS YEAR'S SPONSORS FOR THEIR SUPPORT.**

THANK YOU TO OUR MASTER SPONSOR



ROHDE & SCHWARZ

THANK YOU TO OUR BRONZE SPONSOR



THANK YOU TO OUR SPONSORS



Bruce Archambeault



THANK YOU TO OUR MEDIA SPONSORS

[Evaluation Engineering](#)

[Microwave Journal](#)

[In Compliance](#)

[Safety & EMC Magazine](#)

[ITEM Media](#)

[Seven Mountains Scientific / ENR](#)

[Webcom Communications](#)

DISCOVER THE BEAUTY OF LONG BEACH, CALIFORNIA!

**CLICK TO WATCH
THE “WELCOME TO
LONG BEACH” VIDEO**

ABOUT LONG BEACH

Far more than just an ocean-lover's paradise, Long Beach is an industrious, urban waterfront city known best for its dynamic culture, robust economy and its very eclectic, colorful lifestyle. In a State known for its beach cities, Long Beach has some distinct advantages, including its close proximity to Los Angeles and its year-round temperate climate. Humbly boasting a more relaxed and affordable experience than its larger neighbor, Long Beach offers its visitors a rich mix of art and culture, giving the location an exciting and unique vibe.

It's also the State's next Silicon Valley, according to their very progressive Mayor who has a plan in place to attract even more tech companies to add to an already impressive list of corporate residents, like Epson, Laserfiche and Boeing. Here you'll enjoy a revived downtown waterfront and harbor, home to the Queen Mary, the Aquarium of the Pacific, countless restaurants, music festivals, museums and a plethora of varied styles of shopping and entertainment. Oh, and there's also the beach itself! Long Beach may be the 7th largest city in California and the 2nd most productive container port in the world, but to those who have peeked behind the curtains, it's known as the playground of Southern California, with something for everyone.

LONG BEACH CONVENTION & ENTERTAINMENT CENTER

Located in the heart of downtown Long Beach, the Long Beach Convention Center is within walking distance to first-class accommodations, shopping, dining, attractions, sightseeing along picturesque bays and 5 1/2 miles of sandy beach.

**HYATT REGENCY LONG BEACH**

Explore a premier waterfront setting steps away from Long Beach Convention and Entertainment Center and Aquarium of the Pacific when you stay at Hyatt Regency Long Beach. With a perfect combination of style, sophistication and comfort, you can count on a relaxing and productive stay at this luxury downtown hotel, the only 4 Diamond Award-winning hotel in Long Beach.

When it comes time to venture out, you are in the heart of it all with over a 100 restaurants within walking distance, shopping and entertainment at The Pike across the street and the fascinating Aquarium of the Pacific less than a mile away. Step back in time on Queen Mary or take in a concert at the Long Beach Arena. Southern California theme parks and three area airports are a short drive away.



Having
an EMC
Compliance



EMERGENCY?

YOU need
to make the
RIGHT CALL!

1.914.806.8063

Quick turnarounds,
custom solutions and
one-on-one support from
the industry's top EMI Filter
designers and engineers.

ITG | The Source for EMI FILTER
and COMPONENT Solutions!



Better products from

The **AUTHORITY** on EMI FILTERS

 www.ITG-Electronics.com/category/2

Engineering Electronics Partnership since 1963

**KARMEI SHUTTLE AIRPORT TRANSFERS**

Discounts for EMC+SIPI 2018 Attendees to and from your hotel!

Book with Karmel Shuttle Service! Reservations are required, but quick and easy!

For reservations within 12 hours of your pick-up time, or to place reservations by phone, please call: Toll free 1-888-995-RIDE (7433)

PROMO CODE: "IEEE18" to receive your discount.

Click on this link to manage your Airport transfers to and from your Hotel!

INTERFERENCE TECHNOLOGY®

Your gateway to the EMI/EMC community.



Subscribe Now for **FREE** at
www.interferencetechnology.com

REGISTRATION IS STILL OPEN FOR THE EMC+SIPI 2018 ONLINE SYMPOSIUM



THE EMC+SIPI 2018 ONLINE SYMPOSIUM

is being co-hosted and broadcast on-demand with the traditional EMC+SIPI 2018 Symposium event in Long Beach, CA. July 30 – August 3, 2018. Registrants and attendees of the online conference can learn a wide range of new and established EMI/EMC, SI and PI design and testing techniques without the need for travel. In addition to broadcasting presentations from Long Beach, CA, EMC+SIPI 2018 Online features an expansive schedule of webinars and presentations exclusively available online.

5-DAY ATTENDEES OF THE EMC+SIPI 2018 SYMPOSIUM IN LONG BEACH, CA RECEIVE FREE ACCESS

to the online portion, providing you a parallel online learning experience. You can view presentations on-demand from your office or anywhere at your leisure, solving the problem of having to choose between presentations that occur at the same time.

HOW DOES ATTENDING ONLINE WORK?

Check your inbox - you will receive an email that includes a link to each presentation. The online presentations are on-demand and will be made available 24 hours after the live presentation is held in Long Beach, and will continue to be accessible after the event in Long Beach comes to an end.



**LOOK FOR THE ONLINE ICON THROUGHOUT
THE PROGRAM TO SEE WHAT SESSIONS ARE
AVAILABLE AT EMC+SIPI 2018 ONLINE.**



REGISTER AT:

www.emc2018usa.emcss.org/registration/online-registration

40 YEARS



of EMC/EMI and Environmental Simulation Testing & Engineering Leadership

Retlif has touched many worlds since 1978.

We take pride in knowing that we have supported our clients at the highest levels by adding value technically and by providing guidance through the myriad of red tape minefields and compliance issues that litter every world.



Independent and proud of it, a field leader since our founding in 1978. Rely on Retlif.

Thank you for allowing us to partner with you for 40 years!



**RETLIF TESTING
LABORATORIES**


40 YEARS OF TESTING EXCELLENCE

795 Marconi Avenue • Ronkonkoma, NY 11779 USA
TEL: (631) 737-1500 • FAX: (631) 737-1497
www.retlif.com

NEW YORK • NEW HAMPSHIRE • PENNSYLVANIA • WASHINGTON D.C.

SCHEDULE AT A GLANCE

	MONDAY, JULY 30	TUESDAY, JULY 31	WEDNESDAY, AUGUST 1	THURSDAY, AUGUST 2	FRIDAY, AUGUST 3
7:00 AM				Team EMC Bike Ride	
7:30 AM					
8:00 AM					
8:30 AM					
9:00 AM	Workshops & Tutorials	Keynote	Concurrent Sessions	Concurrent Sessions	Workshops & Tutorials
9:30 AM					
10:00 AM	Break	Break & Exhibits	Break & Exhibits	Break & Exhibits	Break
10:30 AM					
11:00 AM	Workshops & Tutorials	Concurrent Sessions	Concurrent Sessions	Concurrent Sessions	Workshops & Tutorials
11:30 AM					
12:00 PM					
12:30 PM	Break / Chapter Chair Training Luncheon	Break & Exhibits	Break & Exhibits / YP Luncheon / Founders Luncheon	Awards Luncheon	Break
1:00 PM					
1:30 PM					
2:00 PM	Workshops & Tutorials	Concurrent Sessions	Workshops & Tutorials	Concurrent Sessions	Workshops & Tutorials
2:30 PM					
3:00 PM	Break	Break & Exhibits	Break & Exhibits	Break	Break
3:30 PM					
4:00 PM	Workshops & Tutorials	Concurrent Sessions	Workshops & Tutorials	Concurrent Sessions	Workshops & Tutorials
4:30 PM					
5:00 PM					
5:30 PM					
6:00 PM	YP Networking Event The Yard House	Welcome Reception The Cove			
6:30 PM					
7:00 PM			Evening Gala The Queen Mary		
7:30 PM					
8:00 PM					
8:30 PM					
9:00 PM					

	SPECIAL EVENTS
	TECHNICAL SESSIONS
	SOCIAL EVENTS
	BREAKS/EXHIBITS

SPEAKERS' READY ROOM

Location: Promenade 102C
Monday - Friday
7am - 5pm

SPEAKERS' BREAKFAST

Location: Promenade 203C
7:15am - 8:15am

COMPANION SUITE

Location: Becon Rotunda
Hyatt Long Beach
Monday - Friday
7am - 10am
(Registered Companions Only)

MASTER SPONSOR



ROHDE & SCHWARZ

WE'RE ONLINE!

BENEFITS & FEATURES

- Watch Exclusive presentations that are only available online!
- Learn EMC, Signal Integrity and Power Integrity techniques
- Expert technical papers
- Practical EMC+SIPI tutorials



Registration is Still Open for the EMC+SIPI 2018 Online Symposium

Watch presentations from the Symposium ON DEMAND from your computer (or phone, or tablet!) for a parallel online learning experience. This solves the problem of having to choose between presentations that occur at the same time!

**Did you miss a presentation, or want to watch one again?
Great News:**

EMC+SIPI 2018 Online is FREE to all 5-day Paid On-Site Technical Attendees! Check your inbox for details.

www.emc2018usa.emcss.org



IEEE
































EMC
SOCIETY®

MONDAY, JULY 30, 2018



Photo by Richard Georgerian

SCHEDULE AT A GLANCE

8:30 AM	TUTORIAL EMC Fundamentals 1 PROMENADE 104A Pg. 18 	TUTORIAL Advances in Antenna Calibration and Measurements for EMC Applications PROMENADE 101A Pg. 20  	TUTORIAL Basic EMC Measurement PROMENADE 102AB Pg. 21  	WORKSHOP EMC Consultant's Toolkit PROMENADE 104B Pg. 22 	WORKSHOP Electromagnetic Time Reversal and Its Application to Electromagnetic Compatibility PROMENADE 101B Pg. 23  
10:00 AM	COFFEE BREAK				
10:30 AM					
12:00 PM	LUNCH BREAK				
1:30 PM	TUTORIAL EMC Fundamentals 2 PROMENADE 104A Pg. 19 	TUTORIAL Introduction to EMI Modeling Techniques PROMENADE 104B Pg. 24 	TUTORIAL Smart Grid Support and EMC Issues PROMENADE 101A Pg. 25  	TUTORIAL EMC Design and Test of Modern Wireless Devices PROMENADE 102AB Pg. 26  	TUTORIAL Principles of Power Integrity for PDN Design PROMENADE 101B Pg. 27  
3:00 PM	COFFEE BREAK				
3:30 PM					
5:30 PM					

SCHEDULE AT A GLANCE - MONDAY, JULY 30, 2018

**FULL-DAY
TUTORIAL**
MO-AM-1
& MO-PM-1**EMC FUNDAMENTALS 1 & 2****8:30AM - 12:00PM**

LOCATION

PROMENADE 104A**Sponsored by IEEE EMCS Education Committee (EdCom)****Chair:****Lee Hill**, *Silent Solutions LLC. Amherst, NH, USA*

This tutorial is an overview of many of the major topics that need to be considered when designing an electronic product or system to meet EMI/EMC requirements. The tutorial will present the foundational ideas from physics, mathematics, and demonstrate the engineering approaches to help the attendees to be able successfully design, evaluate, diagnose, and/or solve EMI/EMC problems. The main objective of this tutorial is to provide a learning opportunity for those that are new to EMC/EMI as well as provide a review of the basics to those who already have experience in this area. Topics included in the Tutorial are emissions (both radiated and conducted), printed circuit boards (PCB), grounding, shielding, cables, filters and testing fundamentals.

**PLANNED SPEAKERS & TOPICS
EMC FUNDAMENTALS 1
8:30 AM - 12:00 PM****Introduction***Lee Hill, Silent Solutions LLC. Amherst, NH, USA***Essential Principles of Cross Talk and Mitigation Strategies****Eric Bogatin**, *Teledyne LeCroy, University of Colorado Boulder, Longmont, CO USA*

The physical and mathematical basis behind crosstalk; identifying inductive/capacitive/common-impedance coupling mechanisms; mitigation techniques, including shielding. PCB and cables/connectors.

Inductance and Capacitance**Bruce Archambeault**, *Missouri University of Science and Technology, Rolla, Missouri, USA and IBM, Research Triangle Park, NC, USA*

Relationship between voltage, E-fields and capacitance. Relationship between currents, H-fields and inductance. Definition of inductance from Faraday's law, loop inductance (highlight loop size and current density as secondary but important in some cases), how to calculate, mutual inductance (effect of distance between loops). Definition and concepts of internal and external inductance, self and mutual inductance, partial inductance. Estimating inductance of canonical structures.

Current Return**Scott Piper**, *General Motors Corporation, Milford, MI, USA*

The influence of frequency and inductance on return currents; the impact of the return path on emissions and susceptibility. Effect of traces near edge of planes, return current spread (microstrip vs. stripline), effect of via transitions on return current. Current paths in buildings, vehicles and enclosures; as well as current paths at the PCB-level and IC-level.

Transmission Lines and Basic Signal Integrity**Xiaoning Ye**, *Intel Corporation, Hillsboro, OR, USA*

Time and frequency behavior of transmission lines; transmission line impedance, matching, and reflection; brief introduction to S-parameters; impact of transmission line behavior on signal integrity. Differential and common-mode signaling; very basic channel analysis (eye diagrams, bit-error rate, jitter, equalization).

1:30PM - 5:30PM

LOCATION

PROMENADE 104A**TECHNICAL
ICON GUIDE****Physical Symposium****Online Symposium****PLANNED SPEAKERS & TOPICS
EMC FUNDAMENTALS 2
1:30 PM - 5:30 PM****Radiated Emissions*****Cheung-Wei Lam, Apple Inc., Cupertino, CA, USA***

Frequency content of digital signals; generation of electric and magnetic fields; identifying typical noise sources that drive unintentional antennas. Efficiency of unintentional antenna vs. physical/electric size.

**Radiated Electric and Magnetic Field Emissions
Shielding and Mitigations*****Pablo Narvaez, Jet Propulsion Laboratory, Pasadena, CA, USA***

A brief introduction to the theory of shielding; absorption and reflection loss, the difference between electric, low-frequency magnetic and high-frequency magnetic field shielding. Near field shielding vs. shielding to reduce far field radiation. Shielded enclosures and the influence of apertures and holes on shielding effectiveness. Shielding materials and gaskets; effective and ineffective techniques of implementing a shield. Discussion of cable shielding

Filters***Frank Leferink, Thales Nederland B.V. and University of Twente, Hengelo, and Enschede, Netherlands***

Parasitic effects in real world filter components. Differential and common-mode signals; imbalance in differential-mode circuits, the concept of noise blocking and noise diversion; common filter configurations; filtering of common-mode and differential mode noise; implementation of filters for power lines and for I/O; measurement of conducted noise.

Grounding***Todd H. Hubing, Clemson University, Clemson, SC, USA***

The difference between a "ground" and a "signal return"; where to ground for emissions and immunity and why; where to ground for safety and why; ground loops; purpose of single-point grounds to avoid low frequency conducted coupling. Relationship between grounding and bonding. Resistance/impedance levels for various types of grounding connections - DC vs. RF.

**The First Transcontinental Flight by
Calbraith Rodgers was completed in
1911 in Long Beach, California.**

Cal Rodgers flew a distance of 4,000 miles from Sheepshead Bay, New York to Long Beach, California, when he landed in water just near the Pine Avenue pier. The flight required 49 days to complete due to a series of 16 near fatal crashes as he followed railroads westward as his guides across the nation. His actual flight time was three days, ten hours, four minutes.

On December 10, 1911 Rodgers completed his flight in Long Beach and was escorted over the water by Earl Daugherty, Frank Champion and Beryl Williams, other Long Beach aviators. He landed near Seaside and Linden Avenues. Made against seemingly overwhelming odds of weather and mechanical malfunctions and failures, Rodgers demonstrated to the nation the potential of the airplane for long distance travel and air commerce, and established the feasibility of transcontinental airmail service.

**HALF-DAY
TUTORIAL**
MO-AM-2**8:30AM - 12:00PM**

LOCATION

PROMENADE 101A**ADVANCES IN ANTENNA CALIBRATION AND
MEASUREMENTS FOR EMC APPLICATIONS****Co-Chairs:****Zhong Chen**, ETS-Lindgren, Cedar Park, TX, USA**Takehiro Morioka**, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan

Antennas and probes are used in diverse environments for radiated EMC measurements. Accurate calibration and characterization have a direct impact on the uncertainties of radiated measurements. During calibrations, the antenna test environment can be well controlled, but it may not be representative for the end use case. It is important to understand how the test environments interact with the antennas, and how the overall measurement uncertainties are affected. One of the goals of the tutorial is to address antenna and probe measurements in these diverse and sometimes complicated test environments. Advances in latest research and standards development in antenna measurements are presented.

PLANNED SPEAKERS & TOPICS**E-field Measurements below 30 MHz in Military and Automotive EMC Testing****Carlo F. M. Carobbi**, University of Florence, Italy**Time Domain Techniques to Remove Close-by Objects for Antenna Measurements****Zhong Chen**, ETS-Lindgren, Cedar Park, TX, USA**Introduction to Reverberation Chamber Concepts and its Application for Probe Calibration and Antenna Efficiency Measurements****Dennis Lewis**, Boeing, Seattle, WA, USA**High-Precision Electric Field Measurement and Uncertainty****Takehiro Morioka**, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan

Photo by Samantha Franson

**HALF-DAY
TUTORIAL**

MO-AM-3

**BASIC EMC MEASUREMENTS****8:30AM - 12:00PM**

LOCATION

PROMENADE 102AB**Sponsored by TC 2****Chair:****Don Heirman**, Don HEIRMAN Consultants,
Lincroft, NJ, USA

There continues to be those entering into the EMC measurement activity. Basic EMC immunity measurements methods cover a wide range of electromagnetic phenomena. This tutorial will be an introduction to product immunity testing to comply with either corporate or regulatory requirements with a focus on a sampling of those standards that replicate these phenomena and are used for basic measurements. Included will be a description of the immunity test sites, those becoming popular, their validation requirements, and an overview of test setups. The reference for this will be the latest activity in national and international standards related to continuous and transient (low power and high power) EMC immunity measurements and application. Where appropriate, attendees will be asked questions as to what they learned and have an opportunity for extended questioning of the speakers' subjects at a panel discussion at the end of the session.

PLANNED SPEAKERS & TOPICS**Basic Measurement Sites, Methods, and Associated Errors****Don Heirman**, Don HEIRMAN Consultants, Lincroft, NJ, USA**CISPR 35 Tests****Ghery Pettit**, Pettit EMC Consulting, Olympia, WA, USA**IEC View of Transient Immunity Testing****Thomas E. Braxton**, Shure Incorporated, Niles, IL, USA**High Power Electromagnetics Test Facilities and Measurement Methods****William A. Radasky**, Metatech Corporation, Goleta, CA, USA

**HALF-DAY
WORKSHOP**
MO-AM-4**EMC CONSULTANT'S TOOLKIT****8:30AM - 12:00PM**

LOCATION

PROMENADE 104B**Chair:*****Jerry Meyerhoff***, JDM Labs LLC, Buffalo Grove, IL, USA

As more engineering and design firms outsource and reduce staff, more qualified EMC engineers are finding themselves "homeless". As well, there are hundreds of companies that do not have the resources to hire a full-time EMC engineer. The purpose of this workshop is to provide an introduction to the technical, business and marketing skills to interested EMC engineers so that they can successfully locate, market and provide effective services to these companies at a fair profit and with job satisfaction.

Topics to be addressed include practical tools and skills in the area of marketing and self-promotion, acquiring low-cost equipment, developing a troubleshooting kit using new and low-cost DIY tools & probes, how to use social media marketing such as LinkedIn to bring in business, networking practices, advertising, setting up your office, pricing your services, tracking your time, best business practices, how to present yourself professionally, tax and legal obligations and how to review contracts and non-disclosure agreements.

PLANNED SPEAKERS & TOPICS**Marketing Yourself*****Jerry Meyerhoff***, JDM Labs LLC, Buffalo Grove, IL, USA**The Seven Habits of Highly Successful Consultants*****Kenneth Wyatt***, Wyatt Technical Services LLC, Woodland Park, CO, USA**Professional Consulting: How to Look and Act the Part, and Prepare Yourself for Business*****Patrick André***, André Consulting Inc., Mill Creek, WA, USA**Acquiring Test Equipment & Developing a Low-Cost EMC Troubleshooting Kit*****Patrick André***, André Consulting, Inc., Mill Creek, WA, USA***Kenneth Wyatt***, Wyatt Technical Services LLC, Woodland Park, CO, USA**Consulting, An Academic's Experience*****Arturo Mediano***, University of Zaragoza, Spain**Consultants Workshop Panel Q&A*****Jerry Meyerhoff***, JDM Labs LLC, Buffalo Grove, IL, USA

**HALF-DAY
WORKSHOP**
MO-AM-5**8:30AM - 12:00PM**

LOCATION

PROMENADE 101B**ELECTROMAGNETIC TIME REVERSAL AND ITS
APPLICATION TO ELECTROMAGNETIC COMPATIBILITY****Sponsored by TC 5****Co-Chairs:****Farhad Rachidi**, *Swiss Federal Institute of Technology - EPFL, Lausanne, Switzerland***Marcos Rubinstein**, *University of Applied Sciences Western Switzerland, Yverdon-les-Bains, Switzerland*

Time reversal has emerged as a very interesting technique with potential applications in various fields of engineering. It has received a great deal of attention in recent years, essentially in the field of acoustics, where it was first developed by Prof. Fink and his team in the 1990s. In the past decade, the technique has also been used in the field of electromagnetics and applied to various other areas of electrical and computer engineering. In particular, the technique has been successfully applied in the fields of electromagnetic compatibility (EMC).

The aim of this workshop is (i) to familiarize the audience with the concept and the theoretical foundation of the electromagnetic time reversal theory, and (ii) to present several applications in the field of electromagnetic compatibility.

PLANNED SPEAKERS & TOPICS**An Introduction to Time Reversal**

Marcos Rubinstein, *University of Applied Sciences of Western Switzerland, Yverdon-les-Bains, Switzerland*
Farhad Rachidi, *Swiss Federal Institute of Technology - EPFL, Lausanne, Switzerland*

Unique Applications of Time-Reversed Electromagnetic Waves

Steven Anlage, *University of Maryland, College Park, MD, USA*

Time Reversal and Reverberation Chambers: Properties and Opportunities for Applications

Andrea Cozza, *CentraleSupélec, Gif sur Yvette, France*
Florian Monsef, *CentraleSupélec, Gif sur Yvette, France*

Time-Reversal Imaging Techniques for Soft-Fault Detection in Cable Networks

Andrea Cozza, *CentraleSupélec, Gif sur Yvette, France*

Time Reversal Applied to Fault Location in Power Networks

Mario Paolone, *Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland*
Farhad Rachidi, *Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland*

**HALF-DAY
TUTORIAL**
MO-PM-2**1:30PM - 5:30PM**

LOCATION

PROMENADE 104B**INTRODUCTION TO EMI MODELING TECHNIQUES****Sponsored by TC 9****Co-Chairs:**

Bruce Archambeault, IBM Corporation
and Missouri University of Science and
Technology, Research Triangle Park, NC
and Four Oaks, NC, USA

Matthias Troescher, CST GmbH, Munich,
Germany

This tutorial will provide an introduction to all of the commonly used numerical EMC modeling techniques. It is intended to provide EMC engineers who are interested in learning the basics of these modeling techniques a fundamental understanding of all the different techniques, without the need for detailed math. Practicing modelers will also benefit from learning the fundamentals of modeling techniques they are currently not using. Each technique will be presented along with their strengths and weakness, so engineers can decide which techniques are appropriate for their types of problems.

PLANNED SPEAKERS & TOPICS**Introduction to the Finite-Difference Time-Domain (FDTD) Technique**

Bruce Archambeault, IBM Corporation and Missouri University of Science and Technology, Research Triangle Park, NC and Four Oaks, NC, USA

Introduction to the Finite Element Method

Chuck Bunting, Oklahoma State University, Stillwater, OK, USA

Integral Equation Methods (MOM) in Numerical Modeling

Todd H. Hubing, Clemson University, Clemson, SC, USA

Transmission-Line Matrix Method (TLM)

David P. Johns, CST of America, Framingham, MA, USA

Introduction to the (PEEC) Partial Element Equivalent Circuit Approach Applied to SI/PI

Albert E. Ruehli, Missouri University of Science and Technology, Rolla, MO, USA

Lijun Jiang, The University of Hong Kong, Hong Kong, China

Giulio Antonini, University degli Studi dell'Aquila, L'Aquila, Italy

The Importance of Validation for All Simulations

Scott Piper, General Motors, Milford, MI, USA

**HALF-DAY
TUTORIAL**

MO-PM-3

**SMART GRID SUPPORT AND EMC ISSUES****1:30PM - 5:30PM**

LOCATION

PROMENADE 101A**Sponsored by SC 1****Chair:****Donald N. Heirman, Don HEIRMAN**
Consultants, Lincroft, NJ, USA

Smart Grid continues to be a hot topic worldwide. 2018 proved to be another banner year for working on Smart Grid. This tutorial will review the latest Smart Grid EMC activities of key organizations and provide an example of an EMC working group on the topic. The focus will be on the 2018 activity on EMC implications, including what is being accepted and what is not. It will discuss EMC compatibility levels between the popular power line (carrier current) communications and grid connected power inverters (ac/dc power converters). The tutorial will also give specific examples of the immunity testing needed for Smart devices used in power station and substation environments. Finally, the tutorial will place in perspective the EMC status and the work still needed to be done to make it an integral part of the Smart Grid, the primary US organizations dealing with the project and the link to a free webinar on the extent/severity of the EMC problems.

PLANNED SPEAKERS & TOPICS**Immunity for Power Station and Substation Environments****William A. Radasky, Metatech Corporation, Goleta, CA USA****Current EMC Testing for Communications Networking Devices and Future Testing of IEDs in Transmission and Distribution Facilities****Jerry Ramie, ARC Technical Resources, San Jose, CA, USA****Application of Selected EMC standards by the SEPA (Smart Electric Power Alliance) EM Interoperability Issues Working Group (EMIWG) and its Association with the SEPA Testing and Certification Committee (TCC)****Donald N. Heirman, Don HEIRMAN Consultants, Lincroft, NJ, USA****EMC between Communication Circuits and Power Systems in the Frequency Range 2-150 kHz****David Thomas, University of Nottingham, Nottingham, UK**

**HALF-DAY
TUTORIAL**
MO-PM-4**1:30PM - 5:30PM**

LOCATION

PROMENADE 102AB**EMC DESIGN AND TEST OF MODERN WIRELESS DEVICES****Co-Chairs:****Janet O'Neil**, ETS-Lindgren, Cedar Park, TX, USA**Jari Vikstedt**, ETS-Lindgren, Cedar Park, TX, USA

With the continuous development of wireless technologies and their tight integration with various electronic/computer/communication devices, EMC issues, at both the system and the intra-system levels, become increasingly important. Our tutorial will begin with a review of the current rulemakings in the US and Canada for wireless devices. The greatest challenges the test labs face with testing wireless devices and their techniques for addressing those challenges will be reviewed. Discussion will address reverberation chamber and anechoic chamber test environments for wireless devices. Planned topics also include a review of the challenges generated by the 5G New Radio (NR) and mmWave performance requirements. The tutorial will conclude with a review of spectrum issues that may impact the functionality of wireless devices.

PLANNED SPEAKERS & TOPICS**An Update on U.S. and Canada Wireless Rulemakings****Greg Kiemel**, Element Materials Technology, Hillsboro, OR, USA**Measurements of Wireless Devices in Reverberation Chambers****Damir Senic**, ANSYS, Canonsburg, PA, USA**The 5G New Radio - Implications for EMC and Antenna Testing****Jari Vikstedt**, ETS-Lindgren, Cedar Park, TX, USA**Metrology for Congested Spectrum: Measuring the Impact of Adjacent-band LTE Waveforms on GPS Receivers****William Young**, MITRE, McClean, VA, USA

**HALF-DAY
TUTORIAL**

MO-PM-5

**1:30PM - 5:30PM**

LOCATION

PROMENADE 101B**PRINCIPLES OF POWER INTEGRITY FOR
POWER DISTRIBUTION NETWORK (PDN) DESIGN****Co-Chairs:****Larry Smith**, *PDNpowerIntegrity.com*,
San Diego, CA, USA**Eric Bogatin**, *Teledyne LeCroy*, Longmont,
CO, USA

Power Quality is very important for proper CMOS circuit performance. Power Distribution Network (PDN) design begins by establishing DC and AC target impedances. RLC circuit elements are developed to represent the VRM and the inductances and capacitances associated with the board, package and die. The PDN impedance is best managed in the frequency domain by controlling the peaks and dips. In the final analysis, PDN noise performance in the time domain is what matters to the circuits. Time domain noise is classified into voltage responses from impulse, step and resonant current waveforms. This tutorial delivers the fundamental principles necessary for good PDN intuition.

PLANNED SPEAKERS & TOPICS**The Scope of the Power Distribution Network (PDN)****Eric Bogatin**, *Teledyne LeCroy*, University of
Colorado Boulder, Longmont, CO, USA**PDN Target Impedance, Transient Currents,
Components and Calculations****Larry Smith**, *Qualcomm*, San Diego, CA, USA**Capacitance, Inductance and Resistance in the PDN
Ecology****Eric Bogatin**, *Teledyne LeCroy*, University of
Colorado Boulder, Longmont, CO, USA**PDN Resonance Calculator, L and C properties, VRM,
Ideal Voltage Source Isolation in Simulations****Larry Smith**, *Qualcomm*, San Diego, CA, USA**Switched Capacitor Load and FPGA Model to
Hardware Correlation****Larry Smith**, *Qualcomm*, San Diego, CA, USA**Model to Hardware Correlation for Measurement
Controller****Eric Bogatin**, *Teledyne LeCroy*, University of
Colorado Boulder, Longmont, CO, USA



TMD

...the *power* in microwaves!



(c) TRW Limited

**BRAND
NEW**

Modular design
offering improved
user interface and
maintainability

INSTRUMENTATION AMPLIFIERS WHICH DELIVER **THE POWER** FOR EMC HIRF TESTING.



TMD's new modular
Instrumentation Amplifier

TMD's solid state and TWT amplifiers operate in the range DC-40 GHz up to 50 kW.

Delivering the highest field strengths in the test environment, they meet the most demanding worldwide testing standards; including RTCA/DO-160, MIL Standard, EUROCAE and AIRBUS ABD 100.

They are based on the same switched mode power supply technology as our rugged amplifiers with all the advantages of performance and reliability that entails, but neatly re-packaged into compact, lightweight and affordable rack-mountable units.

For more information on our existing range of instrumentation amplifiers, or to find out about our bespoke solutions, email us at wecare@tmd.co.uk, info@tmdus.com or visit our websites.

- Advanced self-diagnostics
- Ethernet interface
- Remote management and diagnostics
- VSWR reflected power protection
- Plug and play field replaceable power supplies
- And more ...

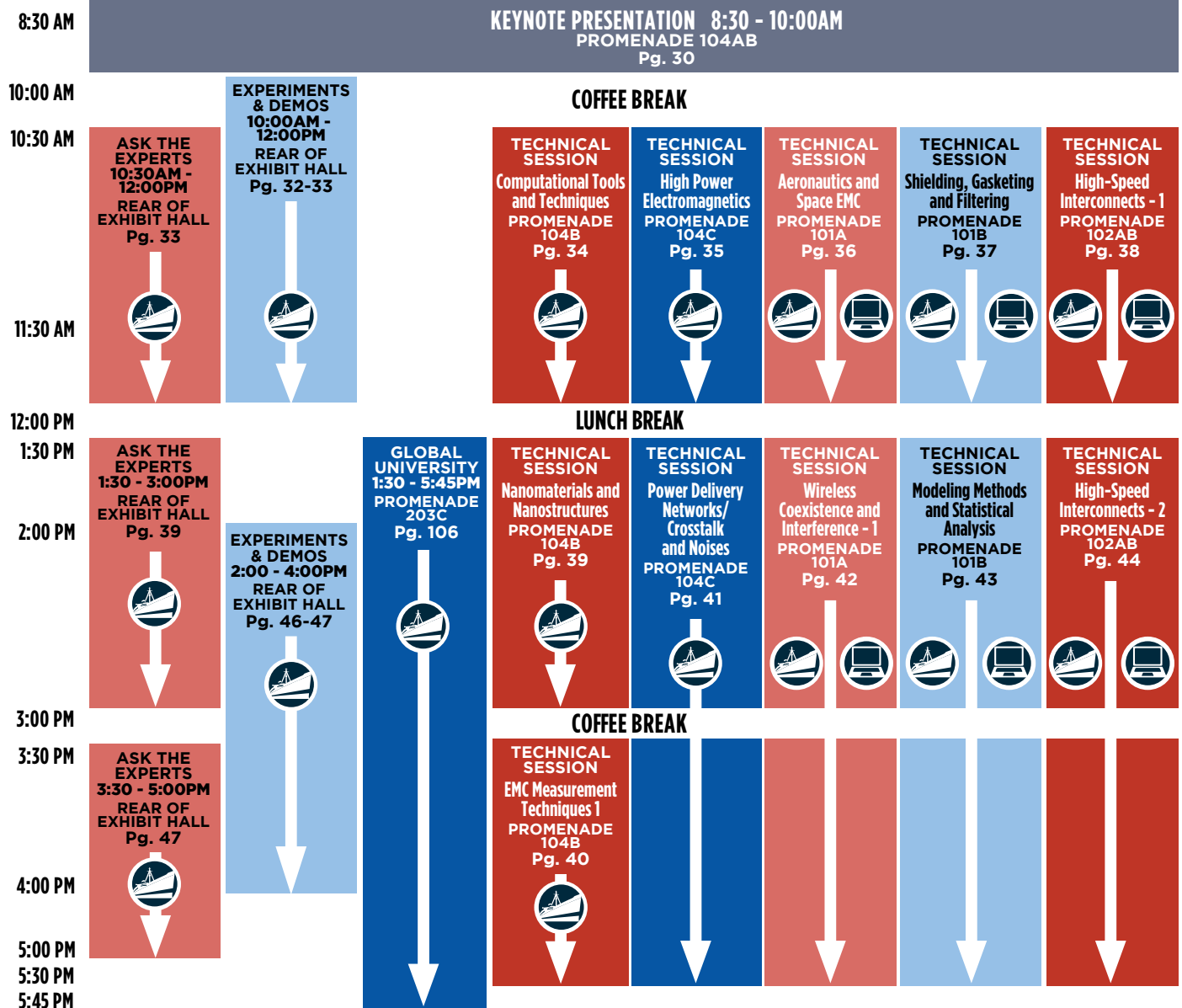
www.tmd.co.uk 
www.tmdus.com 

TUESDAY, JULY 31, 2018



Photo by Richard Georgerian

TECHNICAL SCHEDULE AT A GLANCE

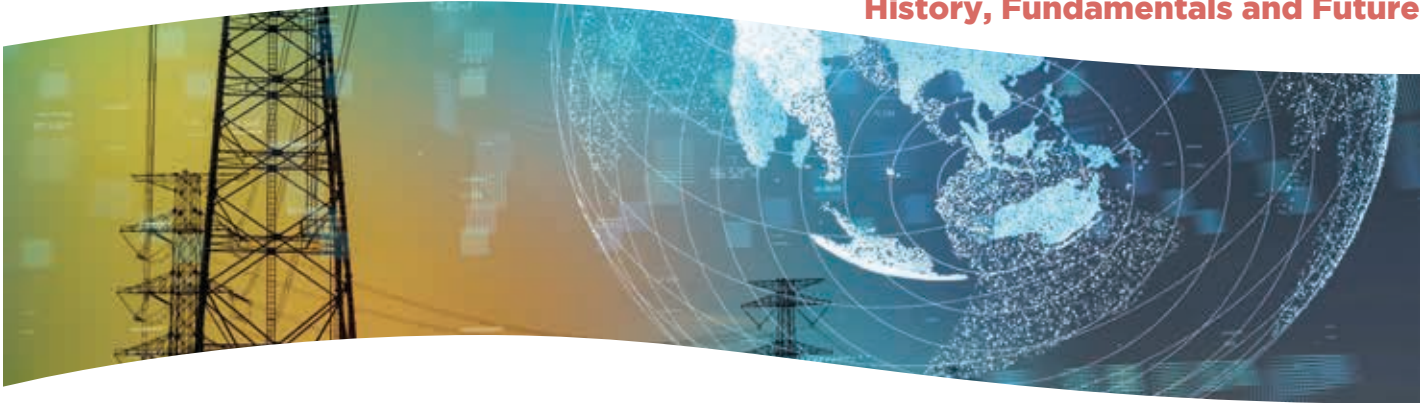


**KEYNOTE
PRESENTATION****8:30AM - 10:00AM**

LOCATION

PROMENADE 104AB

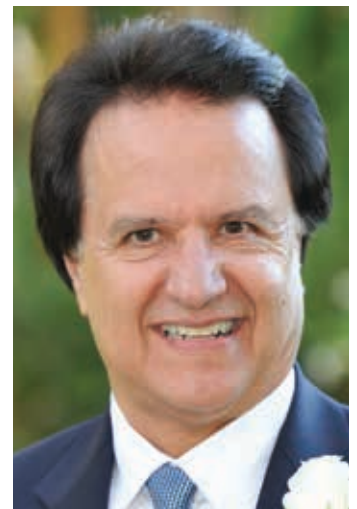
THE ART AND ENGINEERING OF ANTENNA NEAR-FIELD MEASUREMENTS AND DIAGNOSTICS: History, Fundamentals and Future



This talk will provide the participants with a novel way to understand the fundamental concepts behind modern antenna measurements and, in particular, the near field measurements and diagnostic techniques. Starting from Marconi's first antenna pattern measurements, we then suggest planar near-field measurements as an exciting paradigm linking electromagnetic theory, sampling techniques, and FFT. Starting from the basic electromagnetic principles, the underlying concepts governing simulations, designs and operations of planar near field measurements and diagnostics techniques will be reviewed. Modern measurement schemes such as plane-polar and bi-polar scanning will be highlighted. Advances in applying these techniques to millimeter-wave measurements will be reviewed. Representative measurement results of reflector, array and reflectarray antennas will be presented. The importance of near field diagnostic techniques will be discussed through some unique test cases. Finally, the topic of phaseless measurement techniques and algorithms will be touched upon demonstrating the potential applications of these techniques in modern antenna measurements. Among the examples that will be touched upon are the measurements of Galileo mesh reflector antenna, weather array, Rapidsat antenna aboard the space shuttle, etc. It is the intent of this talk to expose the participants to the fun world of antenna metrology, where they can appreciate how a number of related fields are integrated in this endeavor.

YAHYA RAHMAT-SAMII

Yahya Rahmat-Samii is a Distinguished Professor, holder of the Northrop-Grumman Chair in electromagnetics, member of the US National Academy of Engineering (NAE), winner of the 2011 IEEE Electromagnetics Field Award and the former chairman of the Electrical Engineering Department at the University of California, Los Angeles (UCLA). Before joining UCLA, he was a Senior Research Scientist at Caltech/NASA's Jet Propulsion Laboratory. Dr. Rahmat-Samii has had pioneering research contributions in diverse areas of electromagnetics, antennas, measurement and diagnostics techniques, numerical and asymptotic methods, satellite and personal communications, human/antenna interactions, RFID and implanted antennas in medical applications, frequency selective surfaces, electromagnetic band-gap structures, applications of the genetic algorithms and particle swarm optimizations, etc. His original antenna designs are on many NASA/JPL spacecrafts for planetary, remote sensing and CubeSat missions. Dr. Rahmat-Samii is a Fellow of IEEE and URSI. He has authored or co-authored over 1000 technical journal articles and conference papers and has written over 35 book chapters and five books.



Catch them because you can. With the new flagship in EMI testing.

The new R&S®ESW EMI test receiver catches them all, the spikes and other disturbances that may show up in your DUT. Thanks to its unrivaled dynamic range, its ultrafast FFT-based time domain scan and realtime spectrum analysis, there is no way to escape its analysis power. For certification or lab tasks – this is the instrument you can totally rely on.

Get the details: www.rohde-schwarz.com/ad/esw



**EXPERIMENTS
& DEMOS**

LOCATION

10:00AM - 12:00PM**REAR OF EXHIBIT HALL****MODELING OF CABLE
HARNESS RADIATION
AND SUSCEPTIBILITY FOR
AUTOMOTIVE AND AIRCRAFT
STRUCTURES****Presenter:****Derek Campbell**, Altair, Irvine, CA, USA

EMC/EMI Engineers commonly strive to address compliance problems involving cables, which have a major impact on the susceptibility and emissions performance of a system. This software demonstration will therefore include bi-directional coupling considerations, interconnection of cable paths into harnesses and a unique approach for solving shielded cables along an arbitrary path. A few scenarios will be discussed (e.g. lightning, high-intensity radiated fields (HIRF)) for aerospace applications.

**EXPERIMENTS
& DEMOS**

LOCATION

10:00AM - 12:00PM**REAR OF EXHIBIT HALL****INCORPORATING
EQUIPMENT UNDER TEST
(EUT) MONITORING WITHIN
IMMUNITY TESTING****Presenter:****Michael Christopher**, ETS-Lindgren,
Cedar Park, TX, USA

Automating the EMC test process has the benefits of improving measurement accuracy and repeatability while also increasing test throughput. The automated EMC test process is further enhanced by incorporating EUT monitoring using a vision system within the test program. Immunity testing with built-in EUT monitoring decreases error probability. This demonstration will show how a vision system can be incorporated into immunity testing and reduce potential errors.

**EXPERIMENTS
& DEMOS**

LOCATION

10:00AM - 12:00PM**REAR OF EXHIBIT HALL****5G PERFORMANCE
MEASUREMENTS****Presenter:****Jari Vikstedt**, ETS-Lindgren, Cedar Park,
Texas, USA

This demonstration will present a 2-dimensional antenna pattern measurement for a 5G/millimeter wave (mmWave) antenna array using a compact portable antenna measurement system. The demonstration will be accompanied by a presentation that highlights the challenges associated with evaluating 5G New Radio (NR) clients and gNodeB base stations that utilize beamforming antennas and mmWave communication.

**ASK THE
EXPERTS
PANEL**

LOCATION

10:30AM - 12:00PM**REAR OF EXHIBIT HALL****AUTOMOTIVE HYBRID, ELECTRIC
AND AUTONOMOUS -
ADDRESSING THE COMPLEXITY
OF MODERN VEHICLES****Panelists:****Craig Fanning**, Elite Electronic Engineering, Inc.,
Downers Grove, IL, USA**Rob Kado**, FIAT Chrysler Automobiles (FCA),
Auburn Hills, MI USA**Jon Kinney**, Keysight Technologies, Santa Rosa,
CA, USA**Bob Mitchell**, Analog Devices, Wilmington, MA, USA**Scott Piper**, General Motors, Milford, MI, USA**Carlo Carobbi**, University of Florence, Florence, Italy**Garth D'Abreu**, ETS-Lindgren, Cedar Park, TX, USA

Today's complex vehicle platforms include propulsion, entertainment and safety related systems all having to function reliably without impacting safety or the legacy communications infrastructure. The increased interest in autonomous vehicles is also driving the need for more sophisticated automotive EMC design and test scenarios, such as those addressing EMC, sensors (including radar) and wireless considerations. This impacts both component level and full-vehicle level emissions and immunity.

Our Automotive "Ask the Experts" panelists represent a diversity of automotive related organizations, including full vehicle manufacturers, an integrated circuit (IC) manufacturer, members of the ISO/CISPR D Automotive EMC Committees, an automotive test chamber and instrumentation manufacturer, a commercial automotive EMC test lab, and a noted IEC specialist in measurement uncertainty related to automotive EMC standards. These experts will share their knowledge on current and future automotive EMC design and test considerations. Bring your questions or simply listen and learn.

**TECHNICAL
SESSION**
TU-AM-2**COMPUTATIONAL TOOLS AND TECHNIQUES****10:30AM - 12:00PM**

LOCATION

PROMENADE 104B**Sponsored by TC 9****Co-Chairs:****Scott Piper**, General Motors, Milford, MI, USA**Yansheng Wang**, Missouri University of Science and Technology, Rolla, MO, USA**10:30AM****Virtual ESD Testing of Automotive LED Lighting System**

I. Oganezova (EMCoS Ltd. and Tbilisi State University, Tbilisi, Georgia); **R. Kado** (Fiat Chrysler Automobiles (FCA), Auburn Hills, MI, USA); **Z. Kut Chadze** (EMCoS Ltd. and Tbilisi State University, Tbilisi, Georgia); **R. Jobava** (EMCoS Ltd. and Tbilisi State University, Tbilisi, Georgia)

11:00AM**Circuit Field Coupling Model of ESD Setup for Automotive Testing**

I. Oganezova (EMCoS Ltd. and Tbilisi State University, Tbilisi, Georgia); **R. Kado** (Fiat Chrysler Automobiles (FCA), Auburn Hills, MI, USA); **Z. Kut Chadze** (EMCoS Ltd. and Tbilisi State University, Tbilisi, Georgia); **G. Gabriadze** (EMCoS Ltd. and Tbilisi State University, Tbilisi, Georgia); **R. Jobava** (EMCoS Ltd. and Tbilisi State University, Tbilisi, Georgia)

11:30AM**Radar Cross Sections of Objects with Simulated Defects using the Parallel FDTD Method**

Nicholas Oswald (USAF, Tinker AFB, OK, USA); **David R. Monismith Jr.** (USAF, Tinker AFB, OK, USA)

**CALLING ALL HAMS
(Amateur Radio Operators)!****This year's symposium provides a unique opportunity for IEEE Amateur Radio Operators (Hams)**

The Long Beach Amateur Radio Club 'W6OR' invites licensed Amateur Radio Operators to bring their current license, and their Handi Talki (HT), to the Symposium.

We have received an invitation from the Long Beach Amateur Radio Club. The club maintains the amateur radio equipment on board the Queen Mary. Symposium attendee licensed Amateur Radio Operators are invited to visit the on-board "Radio Room" station, see the 'antenna farm' and operate the equipment with the license permissions of the 'class' of license each operator holds and contact other hams around the world.

The following conditions apply:

- Guest operation is only permitted with a W6RO club member in attendance.
- Club members are available to 'supervise' guest operators between **6:00 and 9:00pm**.
- Guest operators may operate the QM equipment in one hour blocks of time.
- Guest operators contact W6RO members using 2 Meter FM Simplex on **145.510 MHz**.
- Contact W6RO on 2 Meter FM Simplex to determine if a club member is 'on duty'.
- There is much painting and refurbishing work going on the QM. It may be difficult to find your way up to the Wireless Room. Stay on Simplex to be 'talked in'.
- After 6:00pm there is no charge to board the Queen Mary to visit W6RO. However, there are some "black out" times, so check at the QM Information: **(562) 499-1739** to be sure.
- W6RO operators usually monitor **145.510 FM simplex** when on duty.

For general contact and coordination between IEEE EMC Hams try the local repeater for Ham attendee's use in downtown Long Beach: at WA6E machine. **445.000 MHz, pl 127.3.**

**TECHNICAL
SESSION**

TU-AM-3

**HIGH POWER ELECTROMAGNETICS****10:30AM - 12:00PM**

LOCATION

PROMENADE 104C**Sponsored by TC 5****Chair:****Bill Radasky**, Metatech Corporation, Goleta, CA, USA**Co-Chair:****Michael McInerney**, US Army Corp of Engineers, Champaign, IL, USA**10:30AM****ESD Interferences at the Chip- and Board-Level****Sven König** (Langer EMV-Technik GmbH, Bannewitz, Germany); **Lars Gläßer** (Langer EMV-Technik GmbH, Bannewitz, Germany)**11:00AM****Experiments and Comparisons of Power to Failure for SiGe-Based Low-Noise Amplifiers under High-Power Microwave Pulses****Xiang Chen** (Shanghai Jiao Tong University, Shanghai, China); **Liang Zhou** (Shanghai Jiao Tong University, Shanghai, China); **Wen-Yan Yin** (Shanghai Jiao Tong University and Zhejiang University, Shanghai, China); **Jun-Fa Mao** (Shanghai Jiao Tong University, Shanghai, China)**11:30AM****Hybrid Conductive Concrete Structures for EMP Protection of Resiliency Critical Infrastructure Facilities****Lim Nguyen** (University of Nebraska-Lincoln, Omaha, NE, USA); **Michael Caruso** (ETS-Lindgren, Inc., Cedar Park, TX, USA); **Matthew Bergstrom** (Omni-Threat Structures, Miami, FL, USA); **David McGaw** (Omni-Threat Structures, Miami, FL, USA)**Questions? Contact:****Bob Scully**,(Experiments & Demonstrations Co-Chair), bob.scully@ieee.org, call sign **N9RCS****Beth L Scully**(Symposium Registration Chair), call sign **KG5PJP****Transportation from Convention Center to Queen Mary:**
Consider using the free Long Beach, Downtown circular bus.www.bit.ly/2lvHDK

**TECHNICAL
SESSION**
TU-AM-4**AERONAUTICS AND SPACE EMC****10:30AM - 12:00PM**

LOCATION

PROMENADE 101A**Sponsored by SC 7****Chair:**

James Lukash, Lockheed Martin Space Systems Company, Sunnyvale, CA, USA

Co-Chairs:

Pablo Narvaez, Jet Propulsion Laboratory, Pasadena, CA, USA

Jen Dimov, NASA Goddard Space Flight Center (GSFC), Greenbelt, MD, USA

10:30AM**Power and Signal Integrity Findings in a FPGA Layout for an Aerospace Application**

Reinaldo J. Perez (Jet Propulsion Laboratory, Pasadena, CA, USA)

11:00AM**Development and Evaluation of Waveforms for EMI Radiated Susceptibility Testing of Avionic Systems****BEST EMC PAPER AWARD FINALIST**

Samuel Blanchette (Royal Military College of Canada, Kingston, ON, Canada); **Joey R. Bray** (Royal Military College of Canada, Kingston, ON, Canada); **Yahia M.M. Antar** (Royal Military College of Canada, Kingston, ON, Canada)

11:30AM**Time Domain Double-Loaded Electromagnetic Field Probe Applied to Unmanned Air Vehicles**

Marc Pous (Universitat Politecnica de Catalunya, Barcelona, Spain); **Sergio Fernández** (Aerospace Technique National Institute, Madrid, Spain); **Manuel Añón** (Aerospace Technique National Institute, Madrid, Spain); **Miguel R. Cabello** (Universidad de Granada, Granada, Spain); **Luis D. Angulo** (Universidad de Granada, Granada, Spain); **Ferran Silva** (Universitat Politecnica de Catalunya, Barcelona, Spain)

**G-46 EMC
SUBCOMMITTEE
MEETING****12:00PM - 5:00PM**

LOCATION

ROOM 204

The G46 EMC event traverses several of the EMC Society Technical Committee and Special Committee focus areas. The G46 Keynote Speaker, **Dr. Bob Scully**, Lead Engineer at NASA Johnson Space Center and Past President of the EMC Society, will be speaking on **Space Systems EMC**. There are other speaker topics that include **Autonomous Vehicle EMC** and **GPS RF Interference**. An update on MIL-STD-461, MIL-STD-464 and other E3 MIL-STDs, Handbooks and Directives will be provided. In addition to the various EMC committee update reports that are presented at the event, the much-anticipated **NASA Space Agency Update** presentation will wrap up the afternoon. Lunch is provided.

Include this event in your symposium schedule, as a must attend activity.

**TECHNICAL
SESSION**

TU-AM-5

**SHIELDING, GASKETING AND FILTERING****10:30AM - 12:00PM**

LOCATION

PROMENADE 101B**Sponsored by TC 4****Chair:****Karen Burnham**, Ford Motor Company,
Dearborn, MI, USA**Co-Chair:****Davy Pisssoort**, KU Leuven, Bruges Campus,
Bruges, Belgium**10:30AM****An Estimate of Plane Wave Leakage through
a Rectangular Aperture****Huadong Li** (Molex, LLC, Lisle, IL, USA);**Peerouz Amleshi** (Molex, LLC, Lisle, IL, USA)**11:00AM****Characterization of Novel Magnetically
Loaded Flocked Carbon Fiber
Microwave Absorber****Ha Tran** (Portland State University, Portland,
OR, USA); **Thanh Le** (Portland State University,
Portland, OR, USA); **Branimir Pejcinovic** (Portland
State University, Portland, OR, USA); **Jeffrey
Brown** (Portland State University, Portland, OR,
USA); **Robert Doneker** (TangiTek, LLC, Portland,
OR, USA); **Kent G.R. Thompson** (TangiTek, LLC,
Portland, OR, USA); **Adithya Ramachandran**
(TangiTek, LLC, Portland, OR, USA)**11:30AM****Measurement, Simulation and Mathematical
Estimation of Magnetic Field Shielding
Effectiveness of Sputtered Shielding
Materials using Spiral Coils****Kyunghwan Song** (Korean Advanced
Institute of Science and Technology, Daejeon,
Korea, Republic of (South)); **Subin Kim**
(Korean Advanced Institute of Science and
Technology, Daejeon, Korea, Republic of
(South)); **Seungtaek Jeong** (Korean Advanced
Institute of Science and Technology, Daejeon,
Korea, Republic of (South)); **Dong-Hyun Kim**
(Korean Advanced Institute of Science and
Technology, Daejeon, Korea, Republic of
(South)); **Kyungjune Son** (Korean Advanced
Institute of Science and Technology, Daejeon,
Korea, Republic of (South)); **Jin Heo** (Core &
Integration Technology, Inc., Hwaseong, Korea,
Republic of (South)); **Kyumin Han** (Core &
Integration Technology, Inc., Hwaseong, Korea,
Republic of (South)); **Yusup Jung** (Core &
Integration Technology, Inc., Hwaseong, Korea,
Republic of (South)); **Hongseok Kim** (Missouri
University of Science and Technology, Rolla,
MO, USA); **Joungho Kim** (Korean Advanced
Institute of Science and Technology, Daejeon,
Korea, Republic of (South))

**TECHNICAL
SESSION**

TU-AM-6-SIPI

**HIGH-SPEED INTERCONNECTS - 1****10:30AM - 12:00PM**

LOCATION

PROMENADE 102AB**Sponsored by TC 10****Chair:****Zhiping Yang**, Google Inc., Mountain View, CA, USA**Co-Chair:****Louann Devine**, Shure Incorporated, Niles, IL, USA**10:30AM****Differential S-Parameter De-Embedding for 8-Port Network****BEST SIPI STUDENT PAPER AWARD FINALIST**

Bichen Chen (Missouri University of Science and Technology, Rolla, MO, USA); **Jiayi He** (Missouri University of Science and Technology, Rolla, MO, USA); **Xinglin Sun** (Zhejiang University, Hangzhou, China); **Yuandong Guo** (Missouri University of Science and Technology, Rolla, MO, USA); **Shuai Jin** (Missouri University of Science and Technology, Rolla, MO, USA); **Xiaoning Ye** (Intel Corporation, Hillsboro, OR, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

11:00AM**A 20 GHz Landing Probe Design based on Pogo-Pins****BEST SIPI STUDENT PAPER AWARD FINALIST**

Xin Yan (Missouri University of Science and Technology, Rolla, MO, USA); **Yansheng Wang** (Missouri University of Science and Technology, Rolla, MO, USA); **Jianchi Zhou** (Missouri University of Science and Technology, Rolla, MO, USA); **Tun Li** (Convenient Power Systems, Chengdu, China); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

11:30AM**Mis-Registration of Sliver Type Backdrill Impact in High Speed Signal Propagation**

Han Gao (Missouri University of Science and Technology, Rolla, MO, USA); **Soumya De** (Cisco System Inc., San Jose, CA, USA); **Brent Beingessner** (Cisco System Inc., San Jose, CA, USA); **Steve Payne** (Cisco System Inc., San Jose, CA, USA); **James Drewniak** (Missouri University of Science and Technology, Rolla, MO, USA)



Photo by Jerry Ramie

**TECHNICAL
SESSION**

TU-PM-2A

**NANOMATERIALS AND NANOSTRUCTURES****1:30PM - 3:00PM**

LOCATION

PROMENADE 104B**Sponsored by TC 11****Chair:**

Emmanuel Decrossas, Jet Propulsion
Laboratory, California Institute of
Technology, Pasadena, CA, USA

Co-Chair:

Marina Koledintseva, Oracle Corporation,
Santa Clara, CA, USA

1:30PM**Influence of Higher-Order Modes in Coaxial
Waveguide on Measurements of Material
Parameters**

Dmitry A. Petrov (Institute for Theoretical and
Applied Electromagnetics, Moscow, Russia);
Konstantin N. Rozanov (Institute for Theoretical
and Applied Electromagnetics, Moscow, Russia);
Marina Y. Koledintseva (Oracle, Santa Clara,
CA, USA)

2:00PM**Experimental Analysis of the Aging Effects
on Shielding Effectiveness of Cementitious
Composites**

Luca Bastianelli (Università Politecnica delle
Marche, Ancona, Italy); **Jacopo Donnini**
(Università Politecnica delle Marche, Ancona,
Italy); **Alida Mazzoli** (Università Politecnica
delle Marche, Ancona, Italy); **Gabriele Gradoni**
(University of Nottingham, Nottingham,
United Kingdom); **Davide Micheli** (Telecom
Italia Mobile, Rome, Italy); **Valeria Corinaldesi**
(Università Politecnica delle Marche, Ancona,
Italy); **Valter Mariani Primiani** (Università
Politecnica delle Marche, Ancona, Italy); **Franco
Moglie** (Università Politecnica delle Marche,
Ancona, Italy)

**ASK THE
EXPERTS
PANEL****EMC AND WIRELESS 5G/IoT****1:30PM - 3:00PM**

LOCATION

REAR OF EXHIBIT HALL**Panelists:**

Constantine Balanis, Arizona State University, Tempe, AZ, USA
Jari Vikstedt, ETS-Lindgren, Cedar Park, TX, USA
Harry Skinner, Intel, Hillsboro, OR, USA
Ross Carlton, ETS-Lindgren, Cedar Park, TX, USA
Arien Sligar, ANSYS, Inc., Canonsburg, PA, USA

Wireless technologies are increasingly utilized in various electronic, computer, and communication devices as well as in automotive applications, especially with the advent of autonomous vehicles. EMC issues, at both the system and the intra-system levels, are increasingly important to address as we approach 5G New Radio (NR) and mmWave performance requirements.

Our panelists will address the simulation, test and measurement challenges presented by the rapid development of wireless technologies. Discussion will address reverberation chamber and anechoic chamber test environments for wireless devices, EMC test challenges and co-existence at the chip and system level, the evolution of smart antennas, novel instrumentation for wireless device testing, and simulation to simplify wireless device design and test. Bring your questions or simply listen and learn.

**TECHNICAL
SESSION**

TU-PM-2B

**EMC MEASUREMENT TECHNIQUES - 1****3:30PM - 5:30PM**

LOCATION

PROMENADE 104B**Sponsored by TC 2****Chair:**

Edward Hare, American Radio Relay League,
Newington, CT, USA

Co-Chair:

Don Heirman, Don HEIRMAN Consultants,
Lincroft, NJ, USA

3:30PM**The Problem of CAN Bus Resonance when
Performing CISPR25 Conducted Emissions
Testing and Proposed Solutions to the
Problem**

Younghun Lee (Hanon Systems, Daejeon,
34325, Korea, Republic of (South)); **Ick-Jae
Yoon** (Chungnam National University, Daejeon,
34134, Korea, Republic of (South)); **Jeonggil
Heo** (Hanon Systems, Daejeon, 34325, Korea,
Republic of (South)); **Youngduk Park** (Hanon
Systems, Daejeon, 34325, Korea, Republic of
(South))

4:00PM**Investigation of Ripple Voltage Across
Capacitor in Military CS101 Test by using
FFT-Based Time Domain Solution**

Soydan Cakir (TUBITAK UME, Kocaeli, Turkey);
Osman Sen (TUBITAK UME, Kocaeli, Turkey);
Mesut Ozturk (TUBITAK UME, Kocaeli, Turkey)

4:30PM**Assessment of an Almost Flat Stirrer using
Anisotropy and Non-Homogeneity Metrics
in a Compact Reverberation Chamber**

Haslan J.G. Pedro (Federal University of
Campina Grande, Campina Grande-PB, Brazil);
Glaucio Fontgalland (Federal University of
Campina Grande, Campina Grande-PB, Brazil);
Raymundo de Amorim Jr. (Federal University
of Campina Grande, Campina Grande-PB,
Brazil); **Idalmir de Souza Q. Junior** (Federal
University of the Semi-Arid Region, Mossoro-
RN, Brazil)

5:00PM**Far-Field Pattern Measurement and
Simulation of VHF Antenna at 60 MHz for
Europa Clipper Mission**

Yasser Hussein (Jet Propulsion Laboratory,
Pasadena, CA, USA); **Joshua Miller** (Jet
Propulsion Laboratory, Pasadena, CA, USA);
Vachik Garkanian (Jet Propulsion Laboratory,
Pasadena, CA, USA); **Emmanuel Decrossas** (Jet
Propulsion Laboratory, Pasadena, CA, USA)

**TECHNICAL
SESSION**

TU-PM-3-SIPI

**POWER DELIVERY NETWORKS/CROSSTALK
AND NOISES****1:30PM - 5:30PM**

LOCATION

PROMENADE 104C**Sponsored by TC 10****Chair:****Samuel Connor**, IBM Corporation, Research Triangle Park, NC, USA**Co-Chair:****Katherine Dang**, Jet Propulsion Laboratory, Pasadena, CA, USA**1:30PM****Filtering Techniques and Topologies with Positively and Negatively Coupled Inductors for Dense Low Cost Packages and Platforms****BEST SIPI PAPER AWARD FINALIST****Chin Lee Kuan** (Intel Corporation, Bayan Lepas, Penang, Malaysia); **Amit K. Jain** (Intel Corporation, Hillsboro, OR, USA); **Sameer Shekhar** (Intel Corporation, Hillsboro, OR, USA)**2:00PM****Transfer Impedance Drop Off in Power/ Ground Plane Cavities****Fadi Deek** (Mentor, a Siemens Business, Longmont, CO, USA); **Melinda Piket-May** (Colorado University at Boulder, Boulder, CO, USA); **Eric Bogatin** (Colorado University at Boulder, Boulder, CO, USA)**2:30PM****Inductor Energy Reduction Schemes for Overshoot Mitigation in Voltage Regulators****Sameer Shekhar** (Intel Corporation, Hillsboro, OR, USA); **Amit K. Jain** (Intel Corporation, Hillsboro, OR, USA); **Alexander Waizman** (Intel Corporation, Santa Clara, CA, USA); **Michael Zelikson** (Intel Corporation, Haifa, Israel); **Chin Lee Kuan** (Intel Corporation, Bayan Lepas, Penang, Malaysia)**3:30PM****Optimization of Far-End Crosstalk Equations and Parameters for Single-Ended Dual-Stripline****Hank Lin** (ASUSTek Computer Inc., Taipei, Taiwan); **Bin-Chyi Tseng** (ASUSTek Computer Inc., Taipei, Taiwan); **Jackson Yen** (ASUSTek Computer Inc., Taipei, Taiwan)**4:00PM****Fast Full Board Crosstalk Scan for Signal Integrity Sign-Off for High Speed PCB Designs****Feng Ling** (Xpeedic Technology, Inc., Bellevue, WA, USA); **Kevin Cai** (Cisco Systems, Inc., Milpitas, CA, USA); **Bidyut Sen** (Cisco Systems, Inc., Milpitas, CA, USA)**4:30PM****Analysis and Reduction of Coupling Noise in Embedded Wideband Data Acquisition System****Yu Guo** (Chinese Academy of Sciences, Suzhou, China); **Zheng Li** (Chinese Academy of Sciences, Suzhou, China); **Yang Wei** (Chinese Academy of Sciences, Suzhou, China); **Jian Guo** (Chinese Academy of Sciences and Shanghai University, Shanghai, China); **Yuhang Chen** (Chinese Academy of Sciences and University of Science and Technology of China, Hefei, China); **Yeming Zhao** (Chinese Academy of Sciences, Suzhou, China); **Bill Qinghua Chen** (Yangtze Delta Region Institute of Tsinghua University, Beijing, China); **Lirong Wang** (Soochow University, Suzhou, China); **Xiaohe Chen** (Chinese Academy of Sciences, Suzhou, China)

**TECHNICAL
SESSION**
TU-PM-4**WIRELESS COEXISTENCE AND INTERFERENCE - 1****1:30PM - 5:30PM**

LOCATION

PROMENADE 101A**Sponsored by TC 12****Chair:****Songping Wu**, Google Inc., Mountain View, CA, USA**Co-Chair:****Yansheng Wang**, Missouri University of Science and Technology, Rolla, MO, USA**1:30PM****Study on Influence of Electromagnetic Disturbance on Wireless Sensor Unit in Substation****Weidong Zhang** (North China Electric Power University, Beijing, China); **Bo An** (North China Electric Power University, Beijing, China)**2:00PM****Measurement-Based Characterization of Buzz Noise in Wireless Devices****Yang Zhong** (Missouri University of Science and Technology, Rolla, MO, USA); **Qiaolei Huang** (Missouri University of Science and Technology, Rolla, MO, USA); **Takashi Enomoto** (Sony Global Manufacturing and Operations Corporation, Tokyo, Japan); **Shingo Seto** (Sony Global Manufacturing and Operations Corporation, Tokyo, Japan); **Kenji Araki** (Sony Global Manufacturing and Operations Corporation, Tokyo, Japan); **Chulsoon Hwang** (Missouri University of Science and Technology, Rolla, MO, USA)**2:30PM****Desense Prediction and Mitigation from DDR Noise Source****BEST EMC STUDENT PAPER AWARD FINALIST****Qiaolei Huang** (Missouri University of Science and Technology, Rolla, MO, USA); **Yang Zhong** (Missouri University of Science and Technology, Rolla, MO, USA); **Chulsoon Hwang** (Missouri University of Science and Technology, Rolla, MO, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA); **Jagan Rajagopalan** (Amazon Lab126, Sunnyvale, CA, USA); **Deepak Pai** (Amazon Lab126, Sunnyvale, CA, USA); **Chen Chen** (Amazon Lab126, Sunnyvale, CA, USA); **Amit Gaikwad** (Amazon Lab126, Sunnyvale, CA, USA)**3:30PM****Radio Frequency Interference due to Gigahertz On-Die Clock and Package/Board-Level Mitigation in Mobile Computer Applications****Jaejin Lee** (Intel Corporation, Hillsboro, OR, USA); **Hao-Han Hsu** (Intel Corporation, Hillsboro, OR, USA); **Dong-ho Han** (Intel Corporation, Beaverton, OR, USA); **Juan Zeng** (Intel Corporation, Hillsboro, OR, USA); **Chung-Hao Chen** (Intel Corporation, Hillsboro, OR, USA)**4:00PM****A Simulation-Based Coupling Path Characterization to Facilitate Desense Design and Debugging****BEST EMC PAPER AWARD FINALIST AND BEST EMC STUDENT PAPER AWARD FINALIST****Yansheng Wang** (Missouri University of Science and Technology, Rolla, MO, USA); **Songping Wu** (Google Inc., Mountain View, CA, USA); **Jianmin Zhang** (Google Inc., Mountain View, CA, USA); **Zhiping Yang** (Google Inc., Mountain View, CA, USA); **Ken Wu** (Google Inc., Mountain View, CA, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)**4:30PM****Characterization of the RFI Rectification Behavior of Instrumentation Amplifiers****Chunyu Wu** (Missouri University of Science and Technology, Rolla, MO, USA); **Guanghua Li** (Missouri University of Science and Technology, Rolla, MO, USA); **David J. Pommerenke** (Missouri University of Science and Technology, Rolla, MO, USA); **Victor Khilkevich** (Missouri University of Science and Technology, Rolla, MO, USA); **Gary Hess** (United Technologies Aerospace Systems, Charlotte, NC, USA)**5:00PM****Co-Site Interference Modelling, Characterizing and Mitigation between Inmarsat FB and GPS Systems Onboard a Submarine****Vitor T. Klingelfus** (University of São Paulo, São Paulo, Brazil); **Ariana L.C. Serrano** (University of São Paulo, São Paulo, Brazil)

**TECHNICAL
SESSION**

TU-PM-5

**1:30PM - 5:30PM**

LOCATION

PROMENADE 101B**MODELING METHODS AND STATISTICAL ANALYSIS****Sponsored by TC 9****Chair:****Kai Xiao**, Intel Corporation, Dupont, WA, USA**Co-Chair:****Shaowu Huang**, Invensas Corporation,
San Jose, CA, USA**1:30PM****The Time-Domain Compensation Contour
Integral Method (TD-C2IM) – A New
Approach to the Analysis of Irregularly-
Shaped Parallel-Plane Circuits****Martin Štumpf** (Brno University of Technology,
Brno, Czech Republic)**2:00PM****Introduction of Artificial Neural Networks
in EMC****Felix Burghardt** (Leibniz Universität Hannover,
Hannover, Germany); **Heyno Garbe** (Leibniz
Universität Hannover, Hanover, Germany)**2:30PM****Perturbative Reformulation of the Stochastic
Galerkin Method for Statistical Analysis of
Wiring Structures with Several Random
Parameters****Xinglong Wu** (Politecnico di Milano, Milan,
Italy); **Flavia Grassi** (Politecnico di Milano, Milan,
Italy); **Sergio A. Pignari** (Politecnico di Milano,
Milan, Italy); **Paolo Manfredi** (Politecnico di
Torino, Torino, Italy); **Dries Vande Ginste** (Ghent
University, Ghent, Belgium)**3:30PM****Modeling the Electromagnetic
Field Distribution Inside an Anechoic
Chamber Lined with Different Types
of Radio-Frequency Absorbers****Viorica Voicu** (ICMET Craiova, Craiova, Romania);
Ion Pătru (ICMET Craiova, Craiova, Romania);
Paul-Adrian Nicolescu (ICMET Craiova, Craiova,
Romania); **Livia-Andreea Dina** (University
of Craiova, Craiova, Romania); **Ionut-Daniel
Smărăndescu** (University of Craiova, Craiova,
Romania); **Petre-Marian Nicolae** (University of
Craiova, Craiova, Romania); **Relu Adrian Aipu**
(Continental AG, Timisoara, Romania)**4:00PM****EMI Modeling for Antenna-Chassis System
using Characteristic Mode Analysis****Ying S. Cao** (Missouri University of Science and
Technology, Rolla, MO, USA); **Muqi Ouyang**
(Missouri University of Science and Technology,
Rolla, MO, USA); **Yansheng Wang** (Missouri
University of Science and Technology, Rolla, MO,
USA); **Jun Fan** (Missouri University of Science
and Technology, Rolla, MO, USA)**4:30PM****Electromagnetic Compatibility Analysis
using Embedded Domain Decomposition
Method****BEST EMC PAPER AWARD FINALIST AND
BEST EMC STUDENT PAPER AWARD FINALIST****Jiaqing Lu** (The Ohio State University,
Columbus, OH, USA); **Jin-Fa Lee** (The Ohio State
University, Columbus, OH, USA)**5:00PM****Human Exposure Design Considerations
for Machine Directed Microwave Dryers for
Drying Ink on Paper Webs for the Inkjet
Printing Industry****David Norte** (RICOH USA, Inc., Boulder, CO, USA)

**TECHNICAL
SESSION**

TU-PM-6-SIPI

**HIGH-SPEED INTERCONNECTS - 2****1:30PM - 5:30PM**

LOCATION

PROMENADE 102AB**Sponsored by TC 10****Chair:****Heidi Barnes**, Keysight Technologies, Santa Rosa, CA, USA**Co-Chair:****Hanqiao Zhang**, Intel Corporation, Hillsboro, OR, USA**1:30PM****Incorporating Backchannel Training into Signal Integrity SerDes Compliance****David Choe** (Cadence Design System, Inc., San Jose, CA, USA); **Ken Willis** (Cadence Design System, Inc., San Jose, CA, USA)**2:00PM****Modeling and Analysis of On-Die Decoupling Capacitance in the Power Delivery Network of an Integrated Chip****Sungwook Moon** (Samsung Electronics Co. Ltd., Gyeonggi-do, Korea, Republic of (South)); **Seonha Lee** (Samsung Electronics Co. Ltd., Gyeonggi-do, Korea, Republic of (South))**2:30PM****Physical and Technological Aspects of Microstrip EBG Filter Design****Marina Koledintseva** (Oracle, Santa Clara, CA, USA); **Sergiu Radu** (Oracle, Santa Clara, CA, USA); **Joe Nuebel** (Oracle, Santa Clara, CA, USA)**3:30PM****Dielectric Dissipation Factor (DF) Extraction based on Differential Measurements and 2-D Cross-Sectional Analysis****Shaohui Yong** (Missouri University of Science and Technology, Rolla, MO, USA); **Yuanzhuo Liu** (Missouri University of Science and Technology, Rolla, MO, USA); **Han Gao** (Missouri University of Science and Technology, Rolla, MO, USA); **Bichen Chen** (Missouri University of Science and Technology, Rolla, MO, USA); **Soumya De** (Cisco System Inc., San Jose, CA, USA); **Scott Hinaga** (Cisco Systems, Inc., San Jose, CA, USA); **Douglas Yanagawa** (Cisco Systems, Inc.,San Jose, CA, USA); **James Drewniak** (Missouri University of Science and Technology, Rolla, MO, USA); **Victor Khilkevich** (Missouri University of Science and Technology, Rolla, MO, USA)**4:00PM****Modeling and Signal Integrity Analysis of 3D XPoint Memory Cells and Interconnections with Memory Size Variation during Read Operation****Kyungjune Son** (Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)); **Kyungjun Cho** (Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)); **Subin Kim** (Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)); **Gapyeol Park** (Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)); **Kyunghwan Song** (Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)); **Joungho Kim** (Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South))**4:30PM****Systematic Approach to PCB Interconnects Analysis to Measurement Validation****BEST SIPI PAPER AWARD FINALIST****Marko Marin** (Infinera, Stockholm, Sweden); **Yuriy Shlepnev** (Simberian Inc., Westlake Village, CA, USA)**5:00PM****Analysis of High Speed Differential Pair Routing through Dense via Arrays****Mosin Mondal** (Mentor Graphics, Noida, India); **Michael A. Cracraft** (IBM Corporation, Poughkeepsie, NY, USA); **Samuel Connor** (IBM Corporation, Research Triangle Park, NC, USA); **Sam Sagan** (IBM Corporation, Poughkeepsie, NY, USA)

Does your antenna supplier do *all* this?



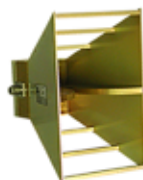
	Your Supplier	A.H. Systems
Design / build their own?		✓
99% in stock now?		✓
Next day delivery?		✓
Over a hundred items to choose from?		✓
Portable antenna kits?		✓
Still working after 10 years?		✓
Over 80 years of experience?		✓
Personal technical support?		✓
Personal Customer Service?		✓
Global support network?		✓

A.H. Systems does *all* of this, *all* of the time because we are the EMI test Antenna Specialists. We do not build "boxes". We do not build "Systems". We do design and build the highest quality, most accurate EMI test antennas (20 Hz - 40 GHz)

It may be more convenient to buy everything from one supplier, but remember "Your test system is only as good as the antenna you put in front of it!"



Log Periodics
80 MHz - 7 GHz
13 Models



DRG Horns
170 MHz - 40 GHz
6 Models



All in one small package
20 Hz - 40 GHz



Biconicals
20 MHz - 18 GHz
7 Models

The Antenna Specialists



Innovation

Quality

Performance

Phone: (818)998-0223 • Fax (818)998-6892
<http://www.AHSystems.com>

A.H. Systems



**EXPERIMENTS
& DEMOS**

LOCATION

2:00PM - 4:00PM**REAR OF EXHIBIT HALL****BULK CABLE INJECTION (BCI)
TO SIMULATE RESPONSE TO
ELECTROSTATIC DISCHARGE
(ESD) EVENTS
ON SPACECRAFT****Presenter:**

John McCloskey and Jen Dimov,
NASA/Goddard Space Flight Center,
Greenbelt, MD, USA

Protecting electronics from Electrostatic Discharge (ESD) is an ever present concern, both in space and on the ground. Although many existing standards define test and analysis methods for determining susceptibility to ESD events, there is no well-established ESD standard for checking the indirect effects of ESD events resulting from spacecraft charging-induced discharges. Traditional ESD testing addresses the risk of physical contact of the hardware by people, i.e. man/machine interfaces. Space based equipment is generally in sealed metal enclosures and faces no further risk of physical contact after the ground test program. However, it still may face ESD risks from discharge events from other equipment on the spacecraft. The main path for coupled energy from ESD events to get to potentially sensitive electronics inside such enclosures is through the interconnecting cables attached to the unit.

This demonstration provides a basis for understanding the physics of ESD events, characterizing the resulting coupling to victim hardware (primarily cables), and applying direct bulk cable injection techniques to simulate ESD events in a repeatable and consistent manner.

**EXPERIMENTS
& DEMOS**

LOCATION

2:00PM - 4:00PM**REAR OF EXHIBIT HALL****PERMEABILITY*: WHAT IS
IT, HOW IS IT MEASURED,
S-PARAMETERS, AND
WHY DO I CARE?****Presenter:**

Gary Bush, Southern Magnetics
Corporation, Milton, GA, USA

Why is magnetic permeability important, what are "S Parameters," and what are the equations to connect measurement to permeability? This demonstration will characterize the complex permeability, μ^* , of a magnetic sample by measuring the Scattering parameters ("S Parameters") using an Automatic Network Analyzer. It will be fun!

**EXPERIMENTS
& DEMOS**

LOCATION

2:00PM - 4:00PM**REAR OF EXHIBIT HALL****SIMULATION OF CONDUCTED
EMISSIONS IN A POWER
ELECTRONICS PCB AND
VERIFICATION OF RESULTS
BY MEASUREMENTS****Presenter:**

Darwin Li and Jing Zhou, CST of America,
LLC, Santa Clara, CA, USA

In modern electronic applications, a majority of devices utilize switched AC/DC or DC/DC converters in their power networks. The power provided from a source is switched by the converter in order to adjust the output voltage level (Switch Mode Power Supply - SMPS). Unfortunately, the switching always creates noise, which may be significant at higher frequencies. Furthermore, this unwanted emission can upset the source or any other device in the same supply power network, because it is easily transmitted through the power lines.

In this experiment, we will demonstrate how to simulate conducted emissions and how EMI filtering can help suppress this. The simulation model and results will be compared directly to live measurement of the physical hardware sample. With coupled 3D EM field and circuit co-simulation, early stage analysis can be performed before a prototype of the device is manufactured. The subject of this demonstration is a typical, bulk, step-down, DC/DC converter. The effect of the PCB layout will also be shown and discussed.

**ASK THE
EXPERTS
PANEL**

LOCATION

3:30PM - 5:00PM**REAR OF EXHIBIT HALL****SIGNAL/POWER INTEGRITY**

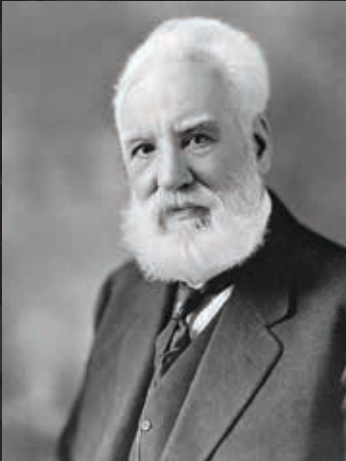
The Signal/Power Integrity Ask the Experts panel provides an excellent opportunity to have your hard-to-answer questions answered by true, knowledgeable experts in the field and to learn expert advice for resolving difficult challenges facing the SI/PI community. Part of the beauty of the symposium is the bringing together the collective knowledge of hundreds of practicing professionals from a broad spectrum of academia and industry. What better way to tap that knowledge and energy than an informal question and answer session with a panel of invited experts?

The Ask the Experts panels will be held in a dedicated area of the exhibit hall to help create a drop-in-to-chat experience and to facilitate taking your new-found knowledge with you to vendors' booths to continue the discussion with industry-leading exhibitors who provide tools and resources that could help turn your ideas into actions.

SI/PI Ask the Experts Panelists

- **Jun Fan**, Missouri University of Science and Technology, Rolla, MO, USA;
- **Eric Bogatin**, Teledyne LeCroy, Longmont, CO, USA;
- **Brice Achkir**, Cisco Systems, Inc., San Jose, CA, USA;
- **Bidyut Sen**, Cisco Systems, Inc., San Jose, CA, USA;
- **Xiaoning Ye**, Intel Corporation, Hillsboro, OR, USA

VISIT US AT
BOOTH #429
FOR YOUR
FREE T-SHIRT!



*"My knowledge of
electrical subjects was not
acquired in a methodical
manner but was picked up from
such books as I could get hold of..."*
Alexander Graham Bell

**Get a hold of free, focused, informative, practical,
technical resources.**

Monthly Magazine
Special Interest Newsletters
Daily News Coverage

Standards Updates
EERC Resource Center
Product Solutions Directory

INCOMPLIANCE

ENGINEER WITH GREATNESS

incompliancemag.com

ELECTRICAL AND ELECTRONICS ENGINEERING DESIGN, TESTING, AND COMPLIANCE
NEWS, INFORMATION, EDUCATION, AND INSPIRATION

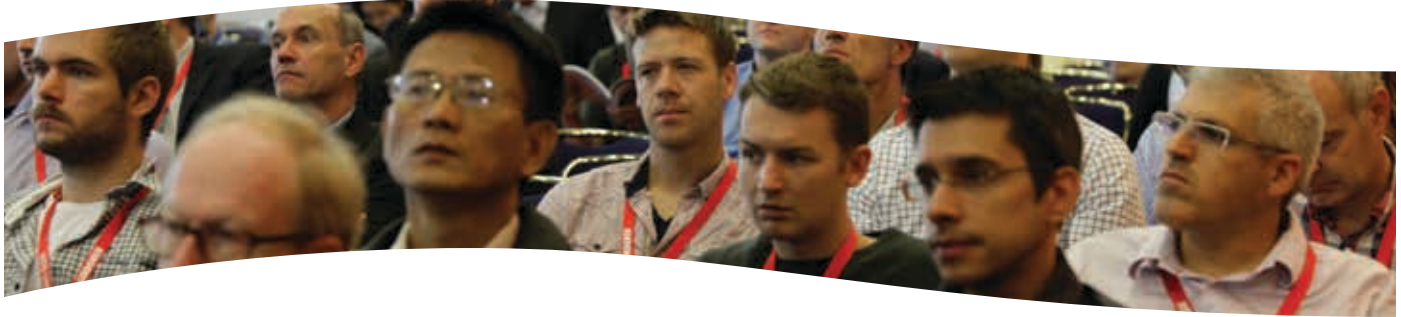
















WEDNESDAY, AUGUST 1, 2018

Photo by Richard Georgerian

TECHNICAL SCHEDULE AT A GLANCE

SPECIAL EVENT - Antennas: The Structural Elements of EMC 8:30AM - 5:30PM ROOM 203AB Pg. 50 						
8:30 AM		TECHNICAL SESSION Power Electronics EMC PROMENADE 104B Pg. 54 	TECHNICAL SESSION EM Environment and Low Frequency EMC PROMENADE 104C Pg. 55 	TECHNICAL SESSION Lightning and Aircraft EMI PROMENADE 101A Pg. 56 	TECHNICAL SESSION EMI Estimation and Mitigation PROMENADE 101B Pg. 57 	TECHNICAL SESSION Power Integrity Design and Analysis PROMENADE 102AB Pg. 58 
9:30 AM	EXPERIMENTS & DEMOS 9:30 - 11:30AM REAR OF EXHIBIT HALL Pg. 59-60 					
10:00 AM						
10:30 AM		POSTER SESSIONS 10:30AM - 12:00PM PROMENADE BALLROOM FOYER Pg. 61 				
11:30 AM						ASK THE EXPERTS 10:30AM - 12:00PM REAR OF EXHIBIT HALL Pg. 60 
12:00 PM	LUNCH BREAK					
1:30 PM		TUTORIAL Automotive EMC PROMENADE 102AB Pg. 64 	WORKSHOP System Test Setup Considerations and Space Risk Characterization Due to Space Charging PROMENADE 104A Pg. 65 	TUTORIAL Application of Reverb Chamber PROMENADE 101A Pg. 66 	TUTORIAL Introduction to Medical EMC PROMENADE 104B Pg. 67 	WORKSHOP EMC for Home Appliances, Including Power Converters Applications PROMENADE 101B Pg. 68 
2:00 PM	EXPERIMENTS & DEMOS 2:00 - 4:00PM REAR OF EXHIBIT HALL Pg. 69-70 					GLOBAL UNIVERSITY 1:30 - 5:00PM PROMENADE 203C Pg. 106 
3:00 PM						
3:30 PM						
4:00 PM						
5:00 PM						
5:30 PM						

COFFEE BREAK

**SPECIAL
EVENT****8:30AM - 5:30PM**

LOCATION

ROOM 203AB

ANTENNAS: THE STRUCTURAL ELEMENTS OF EMC

A Special Short Course with Constantine Balanis



Overview: In this NEW short course at the IEEE Symposium on EMC+SIPI, industry experts, led by noted author Professor Constantine Balanis, will provide an overview of fundamental and advanced antenna topics. Since antennas are becoming increasingly important due to the continued rapid advances in wireless technology, an understanding of antenna behavior and performance is increasingly critical to efficiently design new products as well as correctly evaluate product performance. Professor Balanis will share his decades of wisdom to set the stage for the short course with a review of antenna fundamentals.

The following speakers will separately discuss the impact of many of the antenna fundamentals on the practical application of antennas, with an emphasis on measurements. A review of the specialized technique of time gating to resolve complicating factors will be provided. To conclude the short course, Professor Balanis will discuss future applications of smart antennas for the modern world.

Antenna Fundamental Parameters and Figures-of-Merit

Constantine Balanis, *Arizona State University, Tempe, AZ, USA*

Abstract: Review of antenna fundamental parameters and figures-of-merit, which are used to describe the performance and radiation characteristics of an antenna. Most of these are based on the IEEE Standard Definitions of Terms for Antennas. In addition, some basic and classic antenna types, such as dipoles, loops, helices, microstrips, horns, reflectors, IFA, PIFA, and arrays, will be highlighted. Commercial software for antennas, and the analytical and numerical methods upon which they are based, will be reviewed.

Antenna Factor – A Deceptively Simple Parameter**Robert C. Scully**, NASA, Houston, TX, USA

Abstract: Antennas used for EMI measurements are employed as transducers that convert field strength to antenna terminal voltage. While the concept is quite simple, the reality is that antenna factors are affected by a great many characteristics of the measurement setup, including the presence or absence of a reflective “ground” plane, the height of the antenna above the ground or chamber floor, the type of antenna, the uniformity of the field being measured, the distance between the antenna used for measurement and the source being measured, and the impedance match between the antenna and its load. Multiple authors over time have investigated this parameter and the various characteristics that affect its determination for a particular measurement. Antenna factors have been defined for both receiving and transmitting. This presentation will provide a basic definition of receive and transmit antenna factors, and discuss some of the setup characteristics that may affect them.

Advanced Antenna Measurement Techniques Using Time Domain Transformation**Zhong Chen**, ETS-Lindgren, Cedar Park, TX, USA

Abstract: Time domain gating is an effective technique to remove reflections in antenna measurements. The vector frequency response is transformed to time domain via inverse Fourier transforms, and a time domain gate can be applied. This function is included in commercial vector network analyzers. Although its applications seem straightforward, the implementations and limitations can feel like a “black-box”. There are quite a few nuances in the time domain gating applications which can affect the results. This presentation strives to provide an in-depth understanding of the time domain gating algorithm. Topics discussed include aliases, time resolution, typical EMC antenna time signatures, window functions, and time domain gate shapes, etc. We then discuss the gating band edge errors (or “edge effects”), mitigation techniques and the limitations of the post-gate renormalization method used in a VNA. We introduce an alternative edge mitigation method, which can improve the accuracy for many antenna measurement applications.

EMC and Aerospace Antenna Calibration and Measurement Challenges**Dennis Lewis**, The Boeing Company, Seattle, WA, USA

Abstract: EMC emissions and immunity measurements require the characterization of antennas at reduced distances. Antenna-to-antenna interactions present during calibration, may not be present during measurements and may introduce significant errors. High Intensity Radiated Field (HIRF) measurements require the antennas be calibrated in the far field. Reference measurements must also be taken on-site and require the removal of ground reflections. Time domain techniques can be employed in both these cases but require antennas with good time domain response. Special Transvers Electromagnetic (TEM) antennas were developed to allow time domain gating. TEM antennas are simple, inexpensive and well suited for time domain applications due to their low aperture reflections and clean time domain response.

Smart Antennas: Technology Integrating Antennas, DSP, Communications and Networks**Constantine Balanis**, Arizona State University, Phoenix, AZ, USA

Abstract: As the demand for mobile communications is constantly increasing, the need for improved capacity, greater coverage and higher transmission quality rises. Therefore, a more efficient use of the radio spectrum is required. Smart antenna systems are capable of efficiently utilizing the radio spectrum, and they are a promise for an effective solution to meet the desired performance demands in network and communication systems. Smart antenna technology has been considered for mobile platforms such as automobiles, cellular phones (mobile units), and laptops. Smart antennas integrate many technologies, including antennas, digital signal processing, communications and networks. The advancement and integration of the characteristics of each of these areas is critical to the efficiency and performance of a communication system channel, as measured by Bit-Error-Rate (BER) and network Throughput. This presentation reviews the basic principles of smart antennas, and it presents and compares the BER and Throughput of different antenna array geometries, such as the uniform rectangular array (URA).

**DR. CONSTANTINE A. BALANIS**

Dr. Constantine A. Balanis (S'62 - M'68 - SM'74 - F'86 - LF'04) received the BSEE degree from Virginia Tech, Blacksburg, VA, in 1964, the MEE degree from the University of Virginia, Charlottesville, VA, in 1966, and the Ph.D. degree in

Electrical Engineering from Ohio State University, Columbus, OH, in 1969. From 1964-1970 he was with NASA Langley Research Center, Hampton VA, and from 1970-1983 he was with the Department of Electrical Engineering, West Virginia University, Morgantown, WV. Since 1983 he has been with the School of Electrical, Computer and Energy Engineering, Arizona State University, Tempe, AZ, where he is Regents' Professor. His research interests are in computational electromagnetics, flexible antennas and high impedance surfaces, smart antennas, and multipath propagation. He received in 2004 a Honorary Doctorate from the Aristotle University of Thessaloniki, the 2014 LAPC James R. James Lifetime Achievement Award (UK), the 2012 Distinguished Achievement Award of the IEEE Antennas and Propagation Society, the 2012 Distinguished Achievement Alumnus Award (College of Engineering, The Ohio State University), the 2005 Chen-To Tai Distinguished Educator Award of the IEEE Antennas and Propagation Society, the 2000 IEEE Millennium Award, the 1996 Graduate Mentor Award of Arizona State University, the 1992 Special Professionalism Award of the IEEE Phoenix Section, the 1989 Individual Achievement Award of the IEEE Region 6, and the 1987-1988 Graduate Teaching Excellence Award, School of Engineering, Arizona State University. Dr. Balanis is a Life Fellow of the IEEE. He has served as Associate Editor of the IEEE Transactions on Antennas and Propagation (1974-1977) and the IEEE Transactions on Geoscience and Remote Sensing (1981-1984); as Editor of the Newsletter for the IEEE Geoscience and Remote Sensing Society (1982-1983); as Second Vice-President (1984) and member of the Administrative Committee (1984-85) of the IEEE Geoscience and Remote Sensing Society; and Distinguished Lecturer (2003-2005), Chair of the Distinguished Lecturer Program (1988-1991), member of the AdCom (1992-95, 1997-1999) and Chair of the Awards and Fellows Committee (2009-2011) all of the IEEE Antennas and Propagation Society. He is the author of Antenna Theory: Analysis and Design (Wiley, 2016, 2005, 1997, 1982), Advanced Engineering Electromagnetics (Wiley, 2012, 1989) and Introduction to Smart Antennas (Morgan and Claypool, 2007), and editor of Modern Antenna Handbook (Wiley, 2008) and for the Morgan & Claypool Publishers, series on Antennas and Propagation series, and series on Computational Electromagnetics.

**DR. ROBERT SCULLY**

Dr. Robert Scully holds a Ph.D. from the University of Texas at Arlington in Electrical Engineering with strong emphasis in electromagnetics. He is an IEEE Fellow, a registered Professional Engineer in the state of Texas, a licensed

commercial (PG-12-27194) and amateur (N9RCS) radio operator, holds various Electromagnetic Compatibility (EMC) certifications from the University of Missouri-Rolla (now Missouri University of Science and Technology) and iNARTE, and is a member of Tau Beta Pi and Eta Kappa Nu. Dr. Scully holds a Federal GS15 rating, and is the Johnson Space Center Electromagnetic Compatibility (EMC) Group Lead Engineer, serving as the technical lead for EMC at the Center. He is also the lead for the Community of Practice for EMC within the Agency. Dr. Scully supports NASA's major programs including the International Space Station, the Multi-Purpose Crew Vehicle, and the Commercial Crew Development Program, providing expertise and guidance in development of tailored electromagnetic compatibility specifications, including control plans, interference control testing methodologies, ESD control, and lightning protection and test. Dr. Scully has been active in the IEEE EMC Society for over 20 years and is a Past President of the Society. He was Vice President of Technical Services for multiple terms, and previously served in all Officer Positions for the Technical Activities Committee, Technical Committee 1, and Technical Committee 4. He is the currently the Chair of the Education Committee, and is the founder and Chair of the Galveston-Houston EMC Society Chapter.

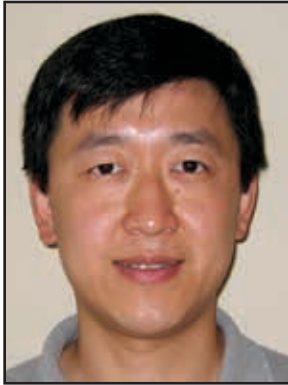
REGISTRATION FEE

Attendance to the Antenna Short Course requires a \$125 registration fee in addition to the full Symposium registration fee. On-site registration is available at the Registration desk.

DR. CONSTANTINE BALANIS BOOK SIGNING

Join us for a book signing with Professor Balanis at the IEEE Bookstore (near the symposium registration desk).

TUESDAY, JULY 31 • 3:30 PM -4:30 PM

**ZHONG
CHEN**

Zhong Chen is the Director of RF Engineering at ETS-Lindgren, located in Cedar Park, Texas. He has over 25 years of experience in RF testing, anechoic chamber design, as well as EMC antenna and field probe design and measurements.

He is an active member of the ANSI ASC C63® committee and Chairman of Subcommittee 1, which is responsible for the antenna calibration and chamber/test site validation standards. He is chair of the IEEE Standard 1309 committee responsible for developing calibration standards for field probes, and IEEE Standard 1128 for absorber measurements. His research interests include measurement uncertainty, time domain measurements for site validation and antenna calibration, and development of novel RF absorber materials. Zhong Chen received his M.S.E.E. degree in electromagnetics from the Ohio State University at Columbus.

**DENNIS
LEWIS**

Dennis Lewis received his BS EE degree with honors from Henry Cogswell College and his MS degree in Physics from the University of Washington. He has worked at Boeing for 29 years and is recognized as a Technical Fellow. He currently has leadership and

technical responsibility for the primary RF, Microwave and Antenna Metrology labs. Dennis holds eight patents and is the recipient of the 2013 and 2015 Boeing Special Invention Award. He is a member of the IEEE and several of its technical societies including the Microwave Theory and Techniques Society (MTT-S), the Antennas and Propagation Society and the Electromagnetic Compatibility (EMC) Society. He serves as a Board Member and is a past Distinguished Lecturer for the EMC Society. He is a Senior Member and past Vice President of the Board of Directors for the Antenna Measurements Techniques Association (AMTA), and chaired its annual symposium in 2012. Dennis is a part time faculty member teaching a course on Measurement Science at North Seattle College and is chair of the Technical Advisory Committee. His current technical interests include aerospace applications of reverberation chamber test techniques as well as microwave measurement systems and uncertainties.

The EMC Society's Richard R. Stoddart Award for Outstanding Performance is given annually "to recognize the outstanding performance of an

EMC Society member in contributing to the advancement of EMC technology or in contributing to the solution of a socio-technological problem."

WHO IS RICHARD R. STODDART?

In 1938, Richard R. Stoddart became one of the five-man crew accompanying Howard Hughes on his record-breaking flight around the world in a two-engine aircraft. (From left above are Tom Thurlow, Harry Connor, Howard Hughes, Richard Stoddart, and Dale Powers.) As radio operator, Richard arranged all the contacts in the countries visited and was applauded for his skill and organization of his part in the flight's success. In 1940, Richard formed Stoddart Aircraft Radio Company in Southern California which designed and manufactured radio receivers and transmitters for aircraft, principally the aircraft which were being ferried to Europe to assist the British in World War II. With the help of an Air Force contract in 1944, Richard and several of his engineers designed and manufactured the first Very High Frequency (VHF) receiver which was continuously tunable over the range 100 MHz to 400 MHz. He was made a Fellow of the IEEE in 1958 to recognize his important contribution to the field of electromagnetic interference instrumentation.



Vernon C. Olson - Howard Hughes Collection

Image ID: 0307 [folder 3] 354

Original Date: 1938-07-04

Digital Publisher: University of Nevada, Las Vegas University Libraries

Digital Collection: Welcome Home Howard

**TECHNICAL
SESSION**
WED-AM-2**POWER ELECTRONICS EMC****8:30AM - 10:00AM**

LOCATION

PROMENADE 104B**Sponsored by SC 5****Chair:****Shuo Wang**, University of Florida, Gainesville, FL, USA**Co-Chair:****Jiangqi He**, Huawei, Chandler, AZ, USA**8:30AM****Mitigation of High-Frequency CM Conducted EMI in Offline Switching Power Supplies****Ashritha Manjunath** (University Visvesvaraya College of Engineering, Bengaluru, India); **M.L. Sudheer** (University Visvesvaraya College of Engineering, Bangalore, India)**9:00AM****Modeling and Stability Analysis of Voltage Sensing based Differential Mode Active EMI Filters for AC-DC Power Converters****Balaji Narayanasamy** (University of Arkansas, Fayetteville, AR, USA); **Fang Luo** (University of Arkansas, Fayetteville, AR, USA); **Yongbin Chu** (Texas Instruments Inc., Dallas, TX, USA)**9:30AM****Modeling and Verification of Automotive Multi-Gig Ethernet Communication up to 2.5 Gbps and the Corresponding EMC Analysis****Sanaz Mortazavi** (Volkswagen AG, Wolfsburg, Germany); **Detlef Schleicher** (Volkswagen AG, Wolfsburg, Germany); **Friedel Gerfers** (Technical University of Berlin, Berlin, Germany)

Photo by Richard Georgerian

**TECHNICAL
SESSION**

WED-AM-3

**EM ENVIRONMENT AND LOW FREQUENCY EMC****8:30AM - 10:00AM**

LOCATION

PROMENADE 104C**Sponsored by TC 3 AND TC 7****Chair:****Petre-Marian Nicolae**, *University of Craiova, Craiova / Dolj County, Romania***Co-Chairs:****David Thomas**, *University of Nottingham, Nottingham, United Kingdom***Flavia Grassi**, *Politecnico di Milano, Milan, Italy***8:30AM****Direction of Arrival Estimation Algorithm for Smart Antennas based on Independent Component Analysis****Luis A.C. Filho** (*Federal University of Campina Grande and Federal Institute of Science and Tech. of Bahia (IFBA), Campina Grande, Brazil*);**Glauco Fontgalland** (*Federal University of Campina Grande, Campina Grande-PB, Brazil*);**Raymundo A. Junior** (*Federal University of Campina Grande, Campina Grande, Brazil*);**Tagleorge M. Silveira** (*Federal University of Campina Grande, Campina Grande, Brazil*);**Humberto D. Andrade** (*Federal University of the Semi-Arid Region, Mossoro, RN, Brazil*); **Paulo****I.L. Ferreira** (*Federal Institute of Science and Tech. of Paraiba (IFPB), Joao Pessoa, Brazil*)**9:00AM****Diminishing the Conducted Emissions at a Monitoring and Diagnosis Equipment****Petre-Marian Nicolae** (*University of Craiova, Craiova, Romania*); **Marian-Stefan Nicolae** (*University of Craiova, Craiova, Romania*);**Ileana-Diana Nicolae** (*University of Craiova, Craiova, Romania*); **Dumitru Sacerdotianu** (*ICMET Craiova, Craiova, Romania*); **Paul-Adrian****Nicoleanu** (*ICMET Craiova, Craiova, Romania*)**9:30AM****Measurement and Evaluation of the Conducted Emissions of a DC/DC Power Converter in the Frequency Range 2-150 kHz****Leonardo Sandrolini** (*University of Bologna, Bologna, Italy*); **David W.P. Thomas** (*University of Nottingham, Nottingham, United Kingdom*);**Mark Sumner** (*University of Nottingham, Nottingham, United Kingdom*); **Christopher Rose** (*University of Nottingham, Nottingham, United Kingdom*)

**TECHNICAL
SESSION**

WED-AM-4

**LIGHTNING AND AIRCRAFT EMI****8:30AM - 10:00AM**

LOCATION

PROMENADE 101A**Sponsored by TC 5****Chair:****Bill Radasky**, Metatech Corporation, Goleta, CA, USA**Co-Chair:****Michael McInerney**, US Army Corp of Engineers, Champaign, IL, USA**8:30AM****Analysis of the Impact of the Lightning Return Stroke Models on Overhead Transmission Lines Induced Voltages****BEST EMC STUDENT PAPER AWARD FINALIST****Daniele Mestriner** (University of Genoa, Genoa, Italy)**9:00AM****Coupling of Wideband Radiated IEMI to Wiring Harness: A Statistical Analysis of the Main Influencing Parameters****BEST EMC PAPER AWARD FINALIST****Tao Liang** (Politecnico di Milano, Milan, Italy); **Giordano Spadacini** (Politecnico di Milano, Milan, Italy); **Flavia Grassi** (Politecnico di Milano, Milan, Italy); **Sergio A. Pignari** (Politecnico di Milano, Milan, Italy)**9:30AM****EMI Characterization of Induction Brazing of Spacecraft Propulsion Lines****Michael Bodeau** (Northrop Grumman, Redondo Beach, CA, USA)**Amphenol Canada**

sales@amphenolcanada.com

+1-416-291-4401

amphenolcanada.com

OUR EMI SOLUTIONS HELP YOU**CALM THE STORM**Filtered connectors • Specialty connectors
EMP suppression • Backshells • Planar capacitors

**TECHNICAL
SESSION**

WED-AM-5

**8:30AM - 10:00AM**

LOCATION

PROMENADE 101B**EMI ESTIMATION AND MITIGATION****Sponsored by TC 4****Chair:**

John Kraemer, Rockwell Collins,
Cedar Rapids, IA, USA

Co-Chairs:

Jamal Shafii, United Technologies,
Rockford, IL, USA

8:30AM**Estimating Reverberant Electromagnetic Fields in Populated Enclosures by using the Diffusion Model****BEST EMC PAPER AWARD FINALIST**

Jiexiong Yan (University of York, York, United Kingdom); **John Dawson** (University of York, York, United Kingdom); **Andy Marvin** (University of York, York, United Kingdom)

9:00AM**System Level Electromagnetic Compatibility Remedy using Absorbing Frequency Selective Surfaces****BEST EMC STUDENT PAPER AWARD FINALIST**

Ali Khoshniat (Santa Clara University, Santa Clara, CA, USA); **Ramesh Abhari** (Santa Clara University, Santa Clara, CA, USA)

9:30AM**EMI Radiation Mitigation for Heatsinks using Characteristic Mode Analysis**

Xiong Yang (University of Electronic Science and Technology of China, Chengdu, China); **Ying S. Cao** (Missouri University of Science and Technology, Rolla, MO, USA); **Xu Wang** (University of Electronic Science and Technology of China, Chengdu, China); **Ling Zhang** (Missouri University of Science and Technology, Rolla, MO, USA); **Shiquan He** (University of Electronic Science and Technology of China, Chengdu, China); **Huapeng Zhao** (University of Electronic Science and Technology of China, Chengdu, China); **Jun Hu** (University of Electronic Science and Technology of China, Chengdu, China); **Lijun Jiang** (The University of Hong Kong, Hong Kong, China); **Albert Ruehli** (Missouri University of Science and Technology, Rolla, MO, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA); **James L. Drewniak** (Missouri University of Science and Technology, Rolla, MO, USA)

**TECHNICAL
SESSION**

WED-AM-6-SIPI

**8:30AM - 10:00AM**

LOCATION

PROMENADE 102AB**POWER INTEGRITY DESIGN AND ANALYSIS****Sponsored by TC 10****Chair:**

Bill Chen, Yangtze Delta Region Institute of
Tsinghua University, Beijing, China

Co-Chair:

Yangsheng Wang, Missouri University of
Science and Technology, Rolla, MO, USA

8:30AM**A Novel Platform Power Integrity Design
Approach with Standard PI Model (SPIM)
and Unified PI Dsgn Target (UPIT)**

Xingjian Kingor Cai (Intel Corporation, Santa
Clara, CA, USA); **Jimmy Hsiao** (Intel Corporation,
Taipei, Taiwan); **Chi-te Chen** (Intel Corporation,
Santa Clara, CA, USA); **Yun Ling** (Intel
Corporation, Hillsboro, OR, USA); **Denis Chen**
(Intel Corporation, Taipei, Taiwan); **Steven Yun Ji**
(Intel Corporation, Santa Clara, CA, USA)

9:00AM**System Level Power Integrity Analysis with
Physics-Based Modeling Methodology**

Biyao Zhao (Missouri University of Science and
Technology, Rolla, MO, USA); **Siqi Bai** (Missouri
University of Science and Technology, Rolla,
MO, USA); **Samuel Connor** (IBM Corporation,
Research Triangle Park, NC, USA); **Matteo
Cocchini** (IBM Corporation, New York, NY, USA);
Dale Becker (IBM Corporation, Poughkeepsie,
NY, USA); **Michael Cracraft** (IBM Corporation,
Poughkeepsie, NY, USA); **Albert Ruehli** (Missouri
University of Science and Technology, Rolla,
MO, USA); **B. Archambeault** (IBM Corporation,
Research Triangle Park, NC, USA); **James
Drewniak** (Missouri University of Science and
Technology, Rolla, MO, USA)

9:30AM**Reverse Power Distribution Network and
Phase Considerations for Low Power RF
Near Field Coupling in IoT Applications**

Colin Pardue (Georgia Institute of Technology,
Atlanta, GA, USA); **Anto Kavungal Davis**
(Georgia Institute of Technology, Atlanta, GA,
USA); **Mohamed L.F. Bellaredj** (Georgia Institute
of Technology, Atlanta, GA, USA); **Madvahan
Swaminathan** (Georgia Institute of Technology,
Atlanta, GA, USA)

**EXPERIMENTS
& DEMOS**

LOCATION

9:30AM - 11:30AM**REAR OF EXHIBIT HALL****A SCOPE MEASUREMENT
PUZZLE TO CHALLENGE AND
AMUSE****Presenter:****Eric Bogatin**, Teledyne LeCroy, Boulder,
CO, USA

This demonstration discusses Situational Awareness: how the instrument we use influences the interpretation of the figures of merit of a DUT. To correctly interpret a measurement, we need to have an electrical model of the DUT AND the scope, cables and probes. The object of this demonstration is a fast edge signal produced by the cal source of the oscilloscope. Attendees will see that the output rise time increases with coax cable length and will explore the root cause of this effect. A commonly held myth will be busted, and attendees will gain an understanding of why it is so important to be aware of what the scope is measuring and what it looks like electrically

**EXPERIMENTS
& DEMOS**

LOCATION

9:30AM - 11:30AM**REAR OF EXHIBIT HALL****IMPACT OF THE GUARD
TRACE AND CIRCUIT
TOPOLOGY ON CROSSTALK
BETWEEN PCB TRACES****Presenter:****Bogdan Adamczyk and Ryan Aldridge**,
Grand Valley State University, Grand
Rapids, MI, USA

This demonstration addresses the topic of inductive and capacitive coupling (crosstalk) between PCB traces. A four-layer PCB is used where the distance between the signal traces and the distance to the ground plane are varied. Additionally, a guard trace (acting as a shield) with different termination schemes is employed. A short tutorial is followed by real-time measurements to support the analytical models developed.

**EXPERIMENTS
& DEMOS**

LOCATION

9:30AM - 11:30AM
REAR OF EXHIBIT HALL**RADAR MODULE SIMULATOR
DEMONSTRATION****Presenter:**

Garth D'Abreu, ETS-Lindgren, Cedar Park,
Texas, USA

RADAR modules are an increasingly important component in many ADAS enabled vehicles and the performance of these systems is a critical part of overall occupant safety. Target size, range, distance and speed are among the main performance attributes of a module, and the ability to verify performance under varying simulated conditions is vital. This demonstration uses a radar target simulator and small anechoic chamber to assess the performance of a standalone module under different target conditions. As part of the demonstration, the size, speed, range and quantity of targets can be varied and the response of the module under test evaluated for a suitable response. A signal analyzer is used as part of the measurement system to perform peak power, sensitivity and signal quality measurements.

**ASK THE
EXPERTS
PANEL**

LOCATION

10:30AM - 12:00PM
REAR OF EXHIBIT HALL**AEROSPACE EMC**

The Ask the Experts panels provide excellent opportunities to have your hard-to-answer questions answered by true, knowledgeable experts in their fields or to get answers to questions you did not even know you had. We all get stumped occasionally by challenges from beyond our realm of expertise or situations outside our comfort zones. The Aerospace EMC Ask the Experts panel will bring together, in one forum, the collective knowledge of several of the top experts in this field, hand selected for their expertise and their ability to adroitly communicate what they know. Bring your questions or simply listen and learn.

Aerospace EMC Panelists

- **Dennis Lewis**, Boeing, Seattle, WA, USA
- **Bob Scully**, NASA Johnson Space Center and University of Texas at Arlington League City, Houston, TX, USA
- **John McCloskey**, NASA/Goddard Space Flight Center, Greenbelt, MD, USA
- **Chuck Bunting**, Oklahoma State University, Stillwater, OK, USA
- **John LaSalle**, Northrop Grumman Corp., Melbourne, FL, USA



POSTER SESSIONS**10:30AM - 12:00PM**

LOCATION

PROMENADE BALLROOM FOYER**BROWSE POSTERS AND DISCOVER THE SCIENTIFIC RESEARCH AND FINDINGS OF YOUR PEERS****Suggestion of Acceptance Criteria for EMC Immunity Testing of IEC 61850 based Smart Grid Devices**

Jungyoon Kim (Korea Electrotechnology Research Institute, Ansan-city, Korea, Republic of (South)); **Woohyun Seo** (Korea Electrotechnology Research Institute, Ansan-city, Korea, Republic of (South))

Radiation Mechanisms and Mitigation Methods in Multi-GHz RF Cable and Connector for Next Generation Mobile Applications

Tao Wang (Qualcomm Technologies, Inc., San Diego, CA, USA); **Sang-June Park** (Qualcomm Technologies, Inc., San Diego, CA, USA); **Jaemin Shin** (Qualcomm Technologies, Inc., San Diego, CA, USA); **Paul Jayne** (Qualcomm Technologies, Inc., San Diego, CA, USA); **Gerardo Romo** (Qualcomm Technologies, Inc., San Diego, CA, USA); **Tim Michalka** (Qualcomm Technologies, Inc., San Diego, CA, USA)

Suppressing Intentional Electromagnetic Interference (IEMI) in Wireless Communication System using Complex Signal Spectrum Shifting Technique

Jing-Gao Wang (Zhejiang University, Hangzhou, China); **Hao Xie** (Zhejiang University, Hangzhou, China); **Kai-Qi Xiao** (Science and Technology on Electronic Information Control Laboratory, Chengdu, China); **Ya-Zhou Chen** (National Key Lab of Science and Technology on Electromagnetic Environment Effects, Shijia Zhuang, China); **Ji-Xin Chen** (Science and Technology on Electronic Information Control Laboratory, Chengdu, China); **Yan-Yan Zhang** (Science and Technology on Electronic Information Control Laboratory, Chengdu, China); **Wenyan Yin** (Zhejiang University, Hangzhou, China)

Responses of Twisted-Wire Pairs with and without Dielectric Coatings in the Presence of High-Power Electromagnetic Pulses (HP-EMP)

He-Qing Zou (Zhejiang University, Hangzhou, China); **Hao Xie** (Zhejiang University, Hangzhou, China); **Ya-Zhou Chen** (National Key Lab of Science and Technology on Electromagnetic Environment Effects, Shijia Zhuang, China); **Kai-Qi Xiao** (Science and Technology on Electronic Information Control Laboratory, Chengdu, China); **Ji-Xin Chen** (Science and Technology on Electronic Information Control Laboratory, Chengdu, China); **Yan-Yan Zhang** (Science and Technology on Electronic Information Control Laboratory, Chengdu, China); **Wenyan Yin** (Zhejiang University, Hangzhou, China)

Suppression of Common and Differential Component of Crosstalk Coupling onto the Differential Line and Field Analysis of the Crosstalk

Theepak Shoundra Balan (Centre for Developmemnt of Telematics, Bangalore, India); **B. Devadas** (Centre for Developmemnt of Telematics, Bangalore, India); **Gaurav Kumar Srivastava** (Centre for Developmemnt of Telematics, Bangalore, India)

De-Noise Method for Electrostatic Discharge Current Waveform based on Wavelet and Kalman Filtering

Ruan Fangming (Guizhou Normal University, Guiyang, China); **Su Ming** (Guizhou Normal University, Guiyang, China); **Cao Yongfeng** (Guizhou Normal University, Guiyang, China); **Ou Weihua** (Guizhou Normal University, Guiyang, China); **Zhai Lidong** (Guizhou Normal University, Guiyang, China); **Zhou Kui** (Guizhou University, Guiyang, China); **Zhang Junhua** (Guizhou Province Institute of Monitoring and Testing Quality of Machine and Electronic Products, Guiyang, China); **Meng Yang** (Beijing University of Post & Telecomm, Beijing, China); **David Pommerenke** (Missouri University of Science and Technology, Rolla, MO, USA)

**POSTER
SESSIONS
CONTINUED****10:30AM - 12:00PM**

LOCATION

PROMENADE BALLROOM FOYER**PCB Edge Shielding Effectiveness Evaluation and Design Guidelines**

Ying S. Cao (Missouri University of Science and Technology, Rolla, MO, USA); **Yansheng Wang** (Missouri University of Science and Technology, Rolla, MO, USA); **Songping Wu** (Google Inc., Mountain View, CA, USA); **Zhiping Yang** (Google Inc., Mountain View, CA, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

The Analytical Method of Determination Parameters of Braided Shields

M.M. Tomilin (Moscow Aviation Institute (National Research University), Moscow, Russia)

Numerical Study on MRI RF Heating for Circular External Fixators under 1.5T MRI

Xin Huang (University of Houston, Houston, TX, USA); **Zhichao Wang** (University of Houston, Houston, TX, USA); **Ji Chen** (University of Houston, Houston, TX, USA); **Jianfeng Zheng** (University of Houston, Houston, TX, USA)

Modal Q Factor and Modal Overlap of Electrically Small Avionics Boxes

Paul G. Bremner (Robust Physics, Del Mar, CA, USA); **Dawn Trout** (NASA Kennedy Space Center, Cape Canaveral, FL, USA); **Gabriel Vazquaz** (NASA Kennedy Space Center, Cape Canaveral, FL, USA); **Neda Nourshamsi** (Oklahoma State University, Stillwater, OK, USA); **James C. West** (Oklahoma State University, Stillwater, OK, USA); **Charles F. Bunting** (Oklahoma State University, Stillwater, OK, USA)

RF-Power Induced Clock Jitter Degradation and Its Modeling in High-Speed I/O Interfaces

Steven G. Gaskill (Intel Corporation, Hillsboro, OR, USA); **Hao-Han Hsu** (Intel Corporation, Hillsboro, OR, USA); **Chung-Hao Chen** (Intel Corporation, Hillsboro, OR, USA)

MIL-STD-461G, Method RS103 Creative Approach to Generation of 200 V/m E-fields from 30 to 200 MHz

Robert J. Stanford (SteppIR Communication Systems, Bellevue, WA, USA)

Decoupling Capacitor Optimization for Flat Z PCB Power Distribution Networks

Heidi Barnes (Keysight Technologies, Santa Rosa, CA, USA); **Steve Sandler** (Picotest.com, Phoenix, AZ, USA)

Measurement of Wire Meshes' Shielding Effect on Ion Flow Field under HVDC Overhead Lines

Tiebing Lu (North China Electric Power University, Beijing, China); **Xiangxian Zhou** (State Grid Zhejiang Electric Power Research Institute, Hangzhou, China)

Power Integrity Challenges in IoT Applications with FIVR

Yan Fen Shen (Intel Corporation, Chandler, AZ, USA)

A Novel Design to Reduce Reflection for Bi-Directional Multi-Dimm Memory Channels

Hanqiao Zhang (Intel Corporation, Hillsboro, OR, USA); **Nan Kang** (Intel Corporation, Hillsboro, OR, USA); **Chunfei Ye** (Intel Corporation, Hillsboro, OR, USA)

A Stabilized Marching-on-in-Degree Solver of Time Domain Integral Equation for Transient Scattering Illuminated by an EMP

Dan-Mei Li (Donghua University, Shanghai, China); **Ming-Da Zhu** (Syracuse University, Syracuse, NY, USA)

Research on Disturbance Voltage of Secondary Cables Due to a Circuit Breaker Ground Fault in UHVDC Converter Substation

Lei Yan (North China Electric Power University, Beijing, China); **Weidong Zhang** (North China Electric Power University, Beijing, China); **Zhaohua Zhang** (China Electric Power Research Institute, Beijing, China); **Weidong Shi** (China Electric Power Research Institute, Beijing, China); **Peng Kang** (China Electric Power Research Institute, Beijing, China); **Lei Shi** (China Electric Power Research Institute, Beijing, China)

Investigation of Spice Models for Overvoltage Protection Devices with Respect to Fast Transients

Susanne Bauer (Graz University of Technology, Graz, Austria); **Werner Renhart** (Graz University of Technology, Graz, Austria); **Oszkár Bíró** (Graz University of Technology, Graz, Austria); **Christian Türk** (Ministry of Defense, Vienna, Austria); **Christoph Maier** (Graz University of Technology, Graz, Austria); **Gunter Winkler** (Graz University of Technology, Graz, Austria); **Bernd Deutschmann** (Graz University of Technology, Graz, Austria)

Analysis of MMC-HVDC System Structures Influence on Radiation Electromagnetic Disturbance

Jian Zhang (North China Electric Power University, Beijing, China); **Tiebing Lu** (North China Electric Power University, Beijing, China); **Weidong Zhang** (North China Electric Power University, Beijing, China); **Xiuwu Zhang** (North China Electric Power University, Beijing, China)

An Overview of Wide Bandgap Power Semiconductor Device Packaging Techniques for EMI Reduction

Boyi Zhang (University of Florida, Gainesville, FL, USA); **Shuo Wang** (University of Florida, Gainesville, FL, USA)

EMC Management and Lab Accreditations

Poojita Rao Bhattu (Cisco Systems, Inc., San Jose, CA, USA)

Design of an Enhanced Filter for a Wireless Portable Twelve-Lead Electrocardiogram Monitoring System

Jinling Zhang (Beijing University of Posts and Telecommunications, Beijing, China); **Siyi Wang** (Beijing University of Posts and Telecommunications, Beijing, China); **Ruijie Sun** (Beijing University of Posts and Telecommunications, Beijing, China)

**HALF-DAY
TUTORIAL**
WED-PM-1**AUTOMOTIVE EMC - Future Standards Updates
and New Design/Test Methodologies****1:30PM - 5:30PM**

LOCATION

PROMENADE 102AB**Chair:****Garth D'Abreu**, ETS-Lindgren, Cedar Park, TX, USA**Co-Chairs:****Robert Kado**, Fiat Chrysler Automobiles (FCA), Auburn Hills, MI, USA

The rapid development of advanced automotive features and the trend toward autonomy is driving the need for more sophisticated automotive EMC design and test scenarios. Vehicle platforms continue to become increasingly more complex with propulsion, entertainment and safety related systems all having to function reliably without impacting safety or the legacy communications infrastructure. The safety and reliability requirements for autonomous vehicles will rival the requirements for aerospace and military systems. We cannot afford to design cars the way we design aerospace vehicles, but we cannot afford to continue designing them the way we do today. New automotive safety standards are helping to redefine automotive design management; but fundamental changes will also be required to the way designs are engineered and tested. In this tutorial, experts from industry and academia will share their latest research in automotive EMC to address these emerging automotive trends. The tutorial includes an overview of global automotive EMC standards, including SAE standards in the US as well as ISO and CISPR standards in European and Asian countries. An update will be presented by the recipient of the "Best EMC Paper Award" at the 2017 IEEE EMC+SIPI Symposium on the same topic. Professor Carobbi will review the latest data taken following the publication of this paper. A primer on basic computer simulation will demonstrate how simulation tools can be

applied early to achieve compliance, using automotive EMC standards as a guide. The tutorial concludes with discussion on the future of automotive EMC design and test systems, addressing both component level and full-vehicle level radiated emission and radiated immunity.

PLANNED SPEAKERS & TOPICS**Simulation Techniques and Applications for
Multi-Scale Automotive EMC Evaluation****Jason Bommer**, ANSYS, Inc., Canonsburg, PA, USA**Reproducibility of the CISPR 25 Absorber Lined
Shielded Enclosure (ALSE) Test Method****Carlo Carobbi**, University of Florence, Firenze, Italy**An Overview of Automotive EMC Standards and
Emerging Requirements****Craig Fanning**, Elite Electronic Engineering, Inc., Downers Grove, IL, USA**Meeting the Need for Hardware-in-Loop (HIL) Type
Enhanced EMC Full Vehicle Measurements****Garth D'Abreu**, ETS-Lindgren, Cedar Park, TX, USA**Autonomous Vehicles Will Transform the Field of
Automotive EMC****Todd Hubing**, Clemson University and LearnEMC, Stoughton, WI, USA

**HALF-DAY
WORKSHOP**

WED-PM-2

**1:30PM - 5:30PM**

LOCATION

PROMENADE 104A**SYSTEM TEST SETUP CONSIDERATIONS AND SPACE RISK
CHARACTERIZATION DUE TO SPACE CHARGING****Sponsored by SC 7****Chair:****Caroline Chan**, Lockheed Martin,
Sunnyvale, CA, USA**Co-Chair:****Edward Gonzales**, NASA Jet Propulsion
Laboratory, Pasadena, CA, USA

The Space workshop will present all aspects of EMI/EMC/ESD in the testing of spacecraft, taking one step ahead in understanding EMC problems in an autonomous system at system level test, to understand space charging due to the dynamic variability of space weather and, finally, predict the electro-mechanical stress just inside exposed dielectric materials for loss electrical efficiency.

PLANNED SPEAKERS & TOPICS**Input Impedance Measurement and Power System
Stability Analysis for DC Spacecraft Buses****Manuel Martin Soriano**, Jet Propulsion Laboratory,
California Institute of Technology, Pasadena, CA,
USA**Characterization of Spacecraft Risk Through
Near-Earth Space****Nicole Pothier McGillivray**, Electro Magnetic
Applications, Inc., Lakewood, CO, USA**Eric Miller**, Electro Magnetic Applications, Inc.,
Lakewood, CO, USA**Bryon Neufeld**, Electro Magnetic Applications, Inc.,
Lakewood, CO, USA**A Possible Cause of Dielectric Degradation in
On-Orbit Solar Panels****C. Christopher Reed**, The Aerospace Corporation,
Los Angeles, CA, USA**Richard Briët**, The Aerospace Corporation,
Los Angeles, CA, USA

Photo by Jerry Ramie

**HALF-DAY
TUTORIAL**

WED-PM-3

**APPLICATION OF REVERB CHAMBERS****1:30PM - 5:30PM**

LOCATION

PROMENADE 101A**Chair:**

Vignesh Rajamani, *Exponent, Phoenix, AZ, USA*

This tutorial will provide a brief overview of Reverb Chamber (RC) theory, followed by recent applications of RCs. It is intended to provide EMC engineers who are interested in applying reverberation chambers to various measurement issues and the extension of reverberation chambers to solve a variety of EMC problems.

PLANNED SPEAKERS & TOPICS**Rationale for RC Testing - Overview of Reverberation Chamber Theory**

Vignesh Rajamani, *Exponent, Phoenix, AZ, USA*
Gustav Freyer, *Consultant, Monument, CO*

Reverb Chamber Challenges

Garth D'Abreu, *ETS Lindgren, Cedar Park, TX, USA*

Absorbing Materials - Reverberation Chamber Assessments

Charles F. Bunting, *Oklahoma State University, Stillwater, OK, USA*
Neda Nourshamsi, *Oklahoma State University, Stillwater, OK, USA*
David Green, *Oklahoma State University, Stillwater, OK, USA*
Corey Vyhldal, *Oklahoma State University, Stillwater, OK, USA*

Electromagnetic Probability-of-Effect Assessment Tool (EMPAT) for High-Power HERO/EMV Test and Evaluation

Justin Rison, *Naval Surface Warfare Center, Dahlgren, VA, USA*
Carl Hager, *Naval Surface Warfare Center, Dahlgren, VA, USA*
Greg Tait, *Naval Surface Warfare Center, Dahlgren, VA, USA*

Utilizing Reverberation Chambers as a Versatile Test Environment for Assessing the Performance of Components and Systems

Dennis Lewis, *Boeing, Seattle, WA, USA*

Direct Illumination: A Beacon for Advanced Product Testing

Jeff Viel, *NTS, Plano, TX, USA*

**HALF-DAY
TUTORIAL**

WED-PM-4

**INTRODUCTION TO MEDICAL EMC****1:30PM - 5:30PM**

LOCATION

PROMENADE 104B**Chair:****Harald Buchwald**, CSA Group, Strasskirchen, Germany

EMC compliance of medical devices is regulated differently from that of other types of equipment, for reasons of patient and operator safety. The medical device industry must work to a complex set of standards, regulations and requirements as medical devices have very stringent immunity requirements and they are required to have very low leakage current, which precludes some of the usual EMI mitigation design techniques. Moreover, testing requirements are in many cases unique.

The applicable IEC and EN standards now have requirements to manage safety risks that could foreseeably be caused by errors, malfunctions and faults that could occur as a result of EM disturbances. Medical devices are required to comply with risk management requirements that are not widely understood. Such requirements could soon become the norm for safety-related and safety-critical equipment of all types.

PLANNED SPEAKERS & TOPICS**Basics of Medical EMC****Darryl Ray**, Darryl Ray EMC Consulting, Carlsbad, CA, USA**Lab Experiences with IEC 60601-1-2 4th Edition****Harald Buchwald**, CSA Group, Germany**EMC Aspects for Neurological Implants****Curt Sponberg**, Medtronic, Minneapolis, MN, USA**Risk Management of Electromagnetic Disturbances, or EMI****Keith Armstrong**, Cherry Clough Consultants Ltd., UK**IEC TR 60601-4-2 1st Edition Overview****Darryl Ray**, Darryl Ray EMC Consulting, Carlsbad, CA, USA**Wireless Coexistence Testing at Element****Greg Kiemel**, Element Materials Technology, Hillsboro, OR, USA**An FDA Perspective on Medical Device EMC and Wireless****Jeff Silberberg**, FDA Center for Devices and Radiological Health, Silver Spring, MD, USA**Open Panel Discussion /Q&A**

**HALF-DAY
WORKSHOP**
WED-PM-5**EMC FOR HOME APPLIANCES, INCLUDING POWER
CONVERTERS APPLICATIONS****1:30PM - 5:30PM**

LOCATION

PROMENADE 101B**Sponsored by TC 7****Co-Chairs:****Petre-Marian Nicolae**, *University of Craiova,
Craiova / Dolj County, Romania***Flavia Grassi**, *Politecnico di Milano, Milan,
Italy*

This workshop is focusing on EMC for home appliances, including power converters applications with emphasis on interference between equipment for home appliances and smart meters. The scope is limited to conducted disturbances up to the range of a few hundred kilohertz. The ongoing progress in standardization will be part of the workshop.

The increased use of electronic equipment in home appliances (including public urban transportation systems that use power converters) has demonstrated the need for more wide-spread understanding of low frequency EMC issues and mitigation techniques. Low-frequency emissions from inverters used in home appliances equipment and from electronically operated luminaries interfere with the correct functioning of smart metering devices.

PLANNED SPEAKERS & TOPICS**Special issues Related to the Frequency Range 2- 150 kHz****Alex McEachern**, *Power Standards Lab, Alameda,
CA, USA***Experiences from the Field****Frank Leferink**, *University of Twente, Enschede,
Netherlands***Behavior of a Collection of Computers with Respect
to the Three-Phase Supplying Network****Ileana-Diana Nicolae**, *University of Craiova, Romania***Characterisation of Low Frequency Disturbances on
AC and DC Systems****David Thomas**, *University of Nottingham,
Nottingham, United Kingdom***M. Sumner**, *University of Nottingham, Nottingham,
United Kingdom***C. Rose**, *University of Nottingham, Nottingham,
United Kingdom***M. Rawa**, *University of Nottingham, Nottingham,
United Kingdom***P. Ivry**, *University of Nottingham, Nottingham,
United Kingdom***L. Ensini**, *University of Bologna, Bologna, Italy***L. Sandrolini**, *University of Bologna, Bologna, Italy***About Measurement in Circuits with Power Electronic
Converters at Low Frequency****Petre-Marian Nicolae**, *University of Craiova,
Craiova/Dolj County, Romania***Open Panel Discussion/Q&A**

**EXPERIMENTS
& DEMOS**

LOCATION

2:00PM - 4:00PM**REAR OF EXHIBIT HALL****USING FFT-BASED RECEIVER
FOR FAST, BROAD-SPECTRUM
MEASUREMENTS IN FULL
COMPLIANCE TESTING****Presenter:**

Arnd Frech and Stephan Braun,
Gauss Instruments, Munich, Germany

Taking reliable, repeatable, broad-spectrum measurements are frustrated in three areas - computational limits, narrow band focus and unpredictable transients. All three problems can be easily identified and solved with new capabilities in COTS Receiver technology. This presentation will show how parallel processing and FFT-enabled signal measurement path can offer a 'Single glance', 'wide Field-Of-View' solution for all full-compliant EMC testing.

**EXPERIMENTS
& DEMOS**

LOCATION

2:00PM - 4:00PM**REAR OF EXHIBIT HALL****FIXTURE DESIGN,
MEASUREMENT, AND
DE-EMBEDDING FOR
CHARACTERIZATION OF PCB
TRANSMISSION LINES UP TO
40 GHZ****Presenter:**

Jun Fan, *Missouri University of Science & Technology, Rolla, MO, USA*

In this demo, a high-speed, differential channel on a PCB is characterized using methodologies that are consistent with the IEEE P370 draft standard. Handheld microprobes will be used with a 4-port VNA to measure 2X Thru and DUT structures, and Smart Fixture De-embedding will be used to remove the fixture response from the measured response. The techniques will be demonstrated with both good and poor test fixtures so attendees can see the impact of proper fixture design.

**EXPERIMENTS
& DEMOS**

LOCATION

2:00PM - 4:00PM
REAR OF EXHIBIT HALL**FIXTURE DE-EMBEDDING
VERIFICATION WITH A
PCB PLUG AND PLAY KIT****Presenter:**

Heidi Barnes, Keysight EEsof EDA,
Santa Rosa, CA, USA

In this demo, a connectorized PCB Plug-and-Play Kit is used to show how a user can verify that a fixture de-embedding process (measured S-parameters + algorithm) is valid and effective, as described in the IEEE P370 draft standard.

**EXPERIMENTS
& DEMOS**

LOCATION

2:00PM - 4:00PM
REAR OF EXHIBIT HALL**VISUAL ELECTROMAGNETICS
OF INTERCONNECTS****Presenter:**

Yuriy Shlepnev, Simberian Inc.,
Westlake Village, CA, USA

Digital PCB and packaging interconnects operating at tens of Gbps data rates are usually designed formally with the minimization of the losses and reflections while maintaining the localization of each link. Can we better understand the major signal degradation effects by simply looking at the electromagnetic fields? This interactive demo session will introduce some basic concepts of interconnect behavior through the 3D visualization and animation of electromagnetic fields, currents and power flow densities computed with Trefftz Finite Elements in a 3D full-wave solver. You will learn how to use the field visualization to understand where the currents and power flow in uniform interconnects, what happens if reference conductors are compromised, and how traces and via holes become coupled.



Photo by Jerry Ramie

THURSDAY, AUGUST 2, 2018



Photo by Jerry Ramie

SCHEDULE AT A GLANCE - THURSDAY, AUGUST 2, 2018

TECHNICAL SCHEDULE AT A GLANCE

8:30 AM	SPECIAL SESSION Electrostatic Discharge (ESD) PROMENADE 104A Pg. 72	SPECIAL SESSION EMI/EMC Research in Power Electronics Systems PROMENADE 104B Pg. 73	SPECIAL SESSION Automotive EMC and Electric Vehicles PROMENADE 104C Pg. 75	TECHNICAL SESSION Wireless Coexistence and Interference - 2 PROMENADE 101A Pg. 78	TECHNICAL SESSION Test Facilities and Standards PROMENADE 101B Pg. 79	TECHNICAL SESSION High-Speed Interconnects - 4 PROMENADE 102AB Pg. 80	EXPERIMENTS & DEMOS 9:30 - 11:30AM REAR OF EXHIBIT HALL Pg. 81-82
9:30 AM							
10:00 AM	COFFEE BREAK						
11:30 AM							
12:00 PM	LUNCH BREAK						
2:30 PM	TECHNICAL SESSION EMC Measurement and Interference Control PROMENADE 104A Pg. 83	TECHNICAL SESSION Computer Modeling Methods PROMENADE 104B Pg. 84	TECHNICAL SESSION High-Speed Interconnects - 3 PROMENADE 104C Pg. 85	TECHNICAL SESSION EMC Management PROMENADE 101A Pg. 86	TECHNICAL SESSION EMC Measurement Techniques - 2 PROMENADE 101B Pg. 87	TECHNICAL SESSION High Speed Interconnects - 5 PROMENADE 102AB Pg. 88	GLOBAL UNIVERSITY 2:30 - 5:00PM PROMENADE 203C Pg. 106
3:30 PM							
4:00 PM	COFFEE BREAK						
5:00 PM							
5:30 PM							

**SPECIAL
SESSION 1**
TH-AM-1**ELECTROSTATIC DISCHARGE (ESD)****8:30AM - 12:00PM**

LOCATION

PROMENADE 104A**Sponsored by TC 5****Chair:**

Michael Khazhinsky, Freescale
Semiconductor, Austin, TX, USA

Co-Chair:

Mike McInerney, US Army Corps of
Engineers, Champaign, IL, USA

The special session, sponsored by the ESD Association (a sister society to the IEEE EMC Society) and the IEEE EMC-S TC5 "High Power Electromagnetics" will present papers covering aspects of system level ESD, from analytical to experimental study, as well as the development of relevant standards. The papers will be presented by leading industry and academia experts in the area. The area of work in the ESD field is relevant to the EMC community and this session highlights this unique perspective. The topics to be addresses in this special session include Measurement and Analysis of ESD Fields; the relationships between ESD and EMC testing; implementation of an algorithm for detecting secondary ESD; and ESD effects and investigation of soft failure observation.

8:30AM**Relating the Commonalities and Robustness Characteristics of EMC and ESD Tests**

Alan W. Righter (Analog Devices, San Jose, CA, USA)

9:00AM**The Case for Measurement and Analysis of ESD Fields in Semiconductor Manufacturing**

Timothy J. Maloney (Center for Analytic Insights, Palo Alto, CA, USA)

9:30AM**Implementation and Practical Experience with an Automatic Secondary ESD Detection Algorithm**

Shubhankar Marathe (Missouri University of Science and Technology, Rolla, MO, USA); **Giorgi Maghlakelidze** (Missouri University of Science and Technology, Rolla, MO, USA); **David Pommerenke** (Missouri University of Science and Technology, Rolla, MO, USA); **Mike Hertz** (Teledyne LeCroy, Chestnut Ridge, NY, USA)

10:30AM**A Preliminary Study of ESD Effects on the Process Calls Tree of a Wireless Router**

Xiaorui Liu (Missouri University of Science and Technology and Ocean University of China, Rolla, MO and Qingdao, USA and China); **Omid Hoseini Izadi** (Missouri University of Science and Technology, Rolla, MO, USA); **Giorgi Maghlakelidze** (Missouri University of Science and Technology, Rolla, MO, USA); **Martin Pommerenke** (AVM Computersystem Vertriebs GmbH, Berlin, Germany); **David Pommerenke** (Missouri University of Science and Technology, Rolla, MO, USA)

**SPECIAL
SESSION 2**
TH-AM-2**EMI/EMC RESEARCH IN POWER
ELECTRONICS SYSTEMS****8:30AM - 12:00PM**

LOCATION

PROMENADE 104B**Sponsored by SC 5****Chair:****Chulsoon Hwang**, *Missouri University of Science and Technology, Rolla, MO, USA***Co-Chair:****Shuo Wang**, *University of Florida, Gainesville, FL, USA*

The special session, sponsored by the IEEE EMC Society SC5 "Power Electronics EMC", will provide important and advanced EMI/EMC design and analysis updates. Areas being covered include: wireless power transfer, radiated EMI from power electronics systems, EMI from electric vehicles, high power density EMI filter design, etc. The principles of EMI generation, propagation and state-of-the-art of EMI/EMC research in power electronics area will be presented. The Practical side of EMI measurement, debugging and reduction techniques will be examined. The papers and presentations will greatly benefit engineers, students and researchers from both EMC and power electronics.

8:30AM**A Terminal Ground Filter between Cable and Chassis for Reduction of Conducted Emissions at a Home Appliance**

Sangyeong Jeong (*Ulsan National Institute of Science and Technology, Ulsan, Korea, Republic of (South)*); **Jingook Kim** (*Ulsan National Institute of Science and Technology, Ulsan, Korea, Republic of (South)*); **Youngjin Baek** (*LG Electronics, Changwon-si, Korea, Republic of (South)*); **Wonwoo Lee** (*LG Electronics, Changwon-si, Korea, Republic of (South)*); **Gwigeun Park** (*LG Electronics, Changwon-si, Korea, Republic of (South)*)

9:00AM**Planar Resonance Reactive Shield for Reducing the EMI in Portable WPT Device Application**

Jaehyoung Park (*Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)*); **Yujun Shin** (*Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)*); **Dongwook Kim** (*Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)*); **Bumjin Park** (*Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)*); **Seungyoung Ahn** (*Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)*)

9:30AM**Simplified Procedure to Predict the EM Emissions of Wind Energy Conversion Systems**

Sebastian Koj (*Leibniz Universität Hannover, Hanover, Germany*); **Sven Fisahn** (*Leibniz Universität Hannover, Hanover, Germany*); **Heyno Garbe** (*Leibniz Universität Hannover, Hanover, Germany*)

**SPECIAL
SESSION 2
CONTINUED**
TH-AM-2**EMI/EMC RESEARCH IN POWER
ELECTRONICS SYSTEMS CONTINUED****8:30AM - 12:00PM**

LOCATION

PROMENADE 104B**Sponsored by SC 5****10:30AM****EM Interferences between Power Converters
and FM Radio Services on Vehicles of
Security Authorities**

Sven Fisahn (Leibniz Universität Hannover, Hanover, Germany); **Sebastian Koj** (Leibniz Universität Hannover, Hanover, Germany); **Heyno Garbe** (Leibniz Universität Hannover, Hanover, Germany)

11:00AM**Reduction and Cancellation Techniques
for the Near Field Capacitive Coupling and
Parasitic Capacitance of Inductors**

Yiming Li (University of Florida, Gainesville, FL, USA); **Shuo Wang** (University of Florida, Gainesville, FL, USA); **Honggang Sheng** (Google Inc., Mountain View, CA, USA); **Srikanth Lakshmikanthan** (Google Inc., Mountain View, CA, USA)

11:30AM**Measurement Techniques of CM Currents,
Impedance and Voltages for Radiated EMI in
Isolated Power Converters**

Juntao Yao (University of Florida, Gainesville, FL, USA); **Shuo Wang** (University of Florida, Gainesville, FL, USA); **Hui Zhao** (University of Florida, Gainesville, FL, USA); **Yingjie Zhang** (University of Florida, Gainesville, FL, USA); **Qinghai Wang** (Huawei Technologies Co., Ltd, Shenzhen, China); **Yuliang Lu** (Huawei Technologies Co., Ltd, Shenzhen, China); **Dianbo Fu** (Huawei Technologies Co., Ltd, Shenzhen, China)



Photo by Richard Georgerian

**SPECIAL
SESSION 3**

TH-AM-3

**AUTOMOTIVE EMC AND ELECTRIC VEHICLES****8:30AM - 12:00PM**

LOCATION

PROMENADE 104C**Sponsored by TC7 and TC9****Chair:****Patrick DeRoy**, CST of America, LLC,
Framingham, MA, USA**Co-Chair:****Flavia Grassi**, Politecnico di Milano,
Milan, Italy

The special session, co-sponsored by the IEEE EMC Society technical committees TC7 "Low frequency EMC" and TC9 "Computational Electromagnetics", will provide insight to new developments in modeling, measurement, and mitigation of electromagnetic interference on modern vehicles, including autonomous vehicles. Specific focus will be on the conducted emissions generated by power electronics converters. These emissions propagate along the power wiring and may pose serious problems of interference with control-data lines. This wiring may be used for automotive Ethernet and is often unshielded in order to reduce the weight of the vehicle.

8:30AM**Numerical Calculation of the Near Field Shielding for Carbon Fiber Reinforced Polymer (CFRP) Panels at Wireless Power Transfer Automotive Frequencies**

T. Campi (University of L'Aquila, L'Aquila, Italy);
S. Cruciani (University of L'Aquila, L'Aquila, Italy); **V. De Santis** (University of L'Aquila, L'Aquila, Italy); **F. Maradei** (Sapienza University of Rome, Rome, Italy); **M. Feliziani** (University of L'Aquila, L'Aquila, Italy)

9:00AM**Numerical Modeling Application of ICNIRP Guidelines to Automobile Occupant Protection**

Scott Piper (General Motors, Milford, MI, USA);
Laura Ball (General Motors, Milford, MI, USA);
Michael Mandziuk (General Motors, Milford, MI, USA)

9:30AM**A Circuit Model of the Rod Antenna Automotive and Military Test Setups: Analysis and Interpretation**

Carlo Carobbi (University of Florence, Firenze, Italy)

10:30AM**Emission Reduction by Optimizing Current Return Paths in Electric Vehicles**

Matthias Tröschner (CST GmbH, Munich, Germany); **Thomas Haschberger** (AVL Software and Functions GmbH, Regensburg, Germany)

11:00AM**Sensitivity Analysis of RF Current Injection Techniques for Immunity Testing of Automotive Ethernet**

Patrick DeRoy (CST of America, LLC, Framingham, MA, USA); **Nicola Toscani** (Politecnico di Milano, Milan, Italy); **Flavia Grassi** (Politecnico di Milano, Milan, Italy); **Waldemar Schulz** (TU Dortmund, Dortmund, Germany); **Cyrous Rostamzadeh** (Robert Bosch, LLC, Plymouth, MI, USA)



Suitable for all modulation standards



Instantaneous wide bandwidth



High reliability and ruggedness



Class AB linear GaN design



Built-in protection circuits

EXODUS

ADVANCED COMMUNICATIONS

*Visit our Website for full listing of
available products:*

www.exoduscomm.com

Best in Class RF Amplifier SSPA's



about EXODUS

Exodus Advanced Communications is a multinational RF communication equipment and engineering service company serving both commercial and government entities and their affiliates worldwide.

Headquartered in Las Vegas, Nevada, the company utilizes its global network of both In-house and Outside resources to effectively serve customer requirements.

As a unique original equipment manufacturer of power amplifiers ranging from 500KHz to 51GHz with various output power levels and noise figures, we fully support custom designs and manufacturing requirements for both small and large volume levels. We bring decades of combined experience in the RF field for numerous applications including military jamming, communications, radar, EMI/EMC and various commercial projects with all designing and manufacturing of our HPA, MPA, and LNA products in-house.

With our in-house engineering capabilities and fully equipped manufacturing facilities, Exodus Advanced Communications is committed to providing the best in RF products, systems and related services.

Exodus Advanced Communications, Corp.

3674 E. Sunset Road, Suite 100

Las Vegas, Nevada 89120 USA

Tel : 1-702-534-6564

Fax : 1-702-441-7016

Email : sales@exoduscomm.com

Web : www.exoduscomm.com

Sales contacts

Inside Sales : Christy Strahan Anderson

Domestic/International Sales : Bill Liebman

New Business Development : Mike Yantz

Technical Sales : Effi Bainvoll



STATE-OF-THE-ART

18.0-26.5 GHz

26.5-40.0 GHz

High Power Solid State Modules



AMP3029
18.0-26.5 GHz
10 Watt Min



AMP3132
26.5-40.0 GHz
8 Watt Min

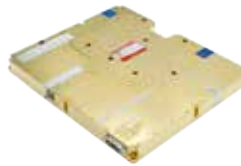
BROADBAND HIGH POWER

0.7-6.0 GHz, 100 Watt

6.0-18.0 GHz, 100 Watt



AMP1044B



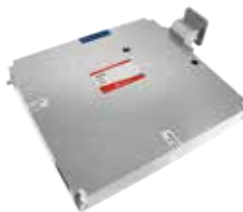
AMP1122BH

Hybrid GaAs/GaN designs for
superior linearity & P1dB

X-BAND-PULSE

8.0-10.0 GHz, 1000 Watt

10% Duty 100uS PW



AMP3063P

SUPER PULSE

1.0-2.0 GHz, 1.0-2.5 GHz,

2.0-4.0 GHz, 4.0-8.0 GHz,

1.2-1.4 GHz, 2.7-3.5 GHz



Power Levels
to 10KW

Other
frequency
ranges &
power levels
available

NEW!

AMP1002BLW

ULTRA LIGHT WEIGHT

ONLY 200GRAMS < 0.5 lbs



AMP1002BLW
0.7-6.0 GHz
15 Watt Typ

Our new small, compact, rugged & super-lightweight AMP1002BLW operates 0.7-6.0 GHz at a 10-watt P1dB minimum. This broadband module produces 15 watts typical P-sat with excellent linearity and harmonic performance. This new module has superb broadband gain flatness featuring switching speeds for enable/disable functions with our built-in protection for unprecedented ruggedness for all field applications. The module is very compact weighing less than 0.5lbs making it ideal for manpack and UAV applications.

NEW!

EXODUS 1.0-40.0 GHz

Solid State Rack Solution up to 200 V/m



Exodus Advanced Communications producing the highest quality products with the latest technologies & innovations for modules & systems up to 51 GHz!

EXIT OUT OF ORDINARY

**TECHNICAL
SESSION**
TH-AM-4**WIRELESS COEXISTENCE AND INTERFERENCE - 2****8:30AM - 12:00PM**

LOCATION

PROMENADE 101A**Sponsored by TC 12****Chair:**

Hanfeng Wang, Google Inc., Mountain View, CA, USA

Co-Chair:

Giaolei Huang, Missouri University of Science and Technology, Rolla, MO, USA

8:30AM**Spatial Uniformity Study in a Loaded Reverberation Chamber at Millimeter-Wave Frequencies**

Damir Senic (ANSYS, Canonsburg, PA, USA); **Kate A. Remley** (National Institute of Science and Technology, Boulder, CO, USA); **Maria G. Becker** (National Institute of Science and Technology, Boulder, CO, USA); **Christopher L. Holloway** (National Institute of Science and Technology, Boulder, CO, USA)

9:00AM**Electric Field Exposure Evaluation for Wireless Charging System of Vehicles**

Li Jiang (China Automotive Technology and Research Center Co., Ltd, Tianjin, China); **Haiming Liu** (China Automotive Technology and Research Center Co., Ltd, Tianjin, China); **Xu Zhang** (China Automotive Technology and Research Center Co., Ltd, Tianjin, China); **Yue Zhang** (China Automotive Technology and Research Center Co., Ltd, Tianjin, China); **Julong Feng** (China Automotive Technology and Research Center Co., Ltd, Tianjin, China)

9:30AM**Higher-Order Multipoles in the Electromagnetic Field Produced by a Wireless Power Transfer System Employing DD Polarized Couplers**

James McLean (TDK R&D Corp., Cedar Park, TX, USA); **Heinrich Foltz** (University of Texas Rio Grande Valley, Edinburg, TX, USA); **Robert Sutton** (TDK R&D Corp., Cedar Park, TX, USA)

10:30AM**An Investigation of Electromagnetic Radiated Emissions from Wireless Charging System for Mobile Device using Qi Standard**

Chunyu Wu (Missouri University of Science and Technology, Rolla, MO, USA); **Hongseok Kim** (Missouri University of Science and Technology, Rolla, MO, USA); **Anfeng Huang** (Missouri University of Science and Technology, Rolla, MO, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA); **Siming Pan** (Convenient Power Systems, Chengdu, China); **Tun Li** (Convenient Power Systems, Chengdu, China)

11:00AM**MIMO Performance Diagnosis based on the Radiated Two-Stage (RTS) Method
BEST EMC PAPER AWARD FINALIST AND
BEST EMC STUDENT PAPER AWARD FINALIST**

Yansheng Wang (Missouri University of Science and Technology, Rolla, MO, USA); **Songping Wu** (Google Inc., Mountain View, CA, USA); **Zhiping Yang** (Google Inc., Mountain View, CA, USA); **Penghui Shen** (General Test Systems Inc., Shenzhen, China); **Chunyu Wu** (Missouri University of Science and Technology, Rolla, MO, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

11:30AM**Correcting Antenna Pattern in Offset Measurements based on Equivalent Dipole Moments**

Yansheng Wang (Missouri University of Science and Technology, Rolla, MO, USA); **Songping Wu** (Google Inc., Mountain View, CA, USA); **Zhiping Yang** (Google Inc., Mountain View, CA, USA); **Shuai Jin** (Missouri University of Science and Technology, Rolla, MO, USA); **Ying S. Cao** (Missouri University of Science and Technology, Rolla, MO, USA); **Jianmin Zhang** (Google Inc., Mountain View, CA, USA); **Tun Li** (Convenient Power Systems, Chengdu, China); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

**TECHNICAL
SESSION**

TH-AM-5

**TEST FACILITIES AND STANDARDS****8:30AM - 12:00PM**

LOCATION

PROMENADE 101B**Sponsored by TC 2****Chair:****Don Heirman**, Don HEIRMAN Consultants,
Lincroft, NJ, USA**Co-Chair:****Ghery Pettit**, Pettit EMC Consulting,
Olympia, WA, USA**8:30AM****Ground Loops during Site Validation of
Anechoic Rooms Below 30 MHz****Alexander Kriz** (Seibersdorf Laboratories,
Seibersdorf, Austria)**9:00AM****Applicability of Measurement Uncertainty
Models in a Reverberation Chamber
including Frequency Stirring****Angelo Gifuni** (Università di Napoli Parthenope,
Napoli, Italy); **Luca Bastianelli** (Università
Politecnica delle Marche, Ancona, Italy); **Gabriele
Gradoni** (University of Nottingham, Nottingham,
United Kingdom); **Maurizio Migliaccio**
(Università di Napoli Parthenope, Napoli, Italy);
Franco Moglie (Università Politecnica delle
Marche, Ancona, Italy); **Valter Mariani Primiani**
(Università Politecnica delle Marche, Ancona,
Italy)**9:30AM****Tunable Intermodulation Generator for
Passive Intermodulation Tester Calibration****Xiong Chen** (Xi'an Jiaotong University and
Missouri University of Science and Technology,
Xi'an, China); **Yongning He** (Xi'an Jiaotong
University, Xi'an, China); **Wanzhao Cui** (China
Academy of Space Technology, Xi'an, China);
David J. Pommerenke (Missouri University
of Science and Technology, Rolla, MO, USA);
Jun Fan (Missouri University of Science and
Technology, Rolla, MO, USA)**10:30AM****Investigation on Difference of Radiated
Emission Measurement Reproducibility
between Two EUTs at International RRT by
using CMAD as a Terminating Device for AC
Mains Cable****Shinichi Okuyama** (VCCI Council / NEC
Platforms, Ltd., Tokyo, Japan); **Nobuo Kuwabara**
(Kyushu Institute of Technology, Kitakyushu,
Japan); **Kunihiro Osabe** (VCCI Council, Tokyo,
Japan); **Hidenori Muramatsu** (VCCI Council,
Tokyo, Japan)**11:00AM****Improving the Reproducibility of Radiated
Immunity Tests through the use of the CMAD
BEST EMC PAPER AWARD FINALIST****Spartaco Caniggia** (Consultant, Bareggio, Italy);
Carlo Carobbi (University of Florence, Firenze,
Italy)**11:30AM****Application of the Predictive Posterior PDF
to MU and Conformity Assessment in EMC****Carlo Carobbi** (University of Florence, Firenze,
Italy)

**TECHNICAL
SESSION**

TH-AM-6-SIPI

**HIGH-SPEED INTERCONNECTS - 4****8:30AM - 12:00PM**

LOCATION

PROMENADE 102AB**Sponsored by TC 10****Chair:****Mikheil Tsiklauri**, Missouri University of Science and Technology, Rolla, MO, USA**Co-Chair:****Tao Wang**, TERADYNE, Agoura Hills, CA, USA**8:30AM****Non-Target DRAM Termination in High Speed LPDDR System for Improved Signal Integrity****Sunil Gupta** (Qualcomm Technologies, Inc., San Diego, CA, USA)**9:00AM****The Isolation Effectiveness of Ground via Stitches in High-Speed Board Designs****Tao Wang** (Teradyne, Agoura Hills, CA, USA);
Roya Yaghmai (Teradyne, Agoura Hills, CA, USA);
Brian Brecht (Teradyne, Agoura Hills, CA, USA)**9:30AM****A Study of CPU Pinout for Density and Its Application****Karen Navarro** (Intel Corporation, Guadalajara, Mexico); **Raul Enriquez** (Intel Corporation, Guadalajara, Mexico); **Alfredo Cueva** (Intel Corporation, Guadalajara, Mexico); **Casey Thielen** (Intel Corporation, Chandler, AZ, USA); **Benjamin Garcia** (Intel Corporation, Zapopan, Mexico); **Henry Peng** (Intel Corporation, Portland, OR, USA)**10:30AM****Differential Integrated Crosstalk Noise (ICN) Mitigation in the Pin Field Area of SerDes Channel****BEST SIPI STUDENT PAPER AWARD FINALIST****Bichen Chen** (Missouri University of Science and Technology, Rolla, MO, USA); **Junda Wang** (Missouri University of Science and Technology, Rolla, MO, USA); **Ying S. Cao** (Missouri University of Science and Technology, Rolla, MO, USA); **Muqi Ouyang** (Missouri University of Science and Technology, Rolla, MO, USA); **Yansheng Wang** (Missouri University of Science and Technology, Rolla, MO, USA); **Shuai Jin** (Missouri University of Science and Technology, Rolla, MO, USA); **Guangyao Shen** (Missouri University of Science and Technology, Rolla, MO, USA); **Xusheng Liu** (Huawei Technologies Co., Ltd, Shenzhen, China); **Xiping Peng** (Huawei Technologies Co., Ltd, Shenzhen, China); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)**11:00AM****A Comprehensive and Practical Way to Look at Crosstalk for Transmission Lines with Mismatched Terminals****Shaohui Yong** (Missouri University of Science and Technology, Rolla, MO, USA); **Kevin Cai** (Cisco Systems, Inc., San Jose, CA, USA); **Bidyut Sen** (Cisco Systems, Inc., San Jose, CA, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA); **Victor Khilkevich** (Missouri University of Science and Technology, Rolla, MO, USA); **Chunchun Sui** (Cisco Systems, Inc., San Jose, CA, USA)**11:30AM****Experimental Assessment of Stochastic Signals through the Power Density Method****Maryna Nesterova** (Aprel Inc., Ottawa, ON, Canada); **Stuart Nicol** (Aprel Inc., Ottawa, ON, Canada); **Phillip Miller** (Intel Corporation, Chandler, AZ, USA); **Mehdi Chbihi** (Keysight Technologies, Ottawa, ON, Canada); **Yuliya Nesterova** (Queen's University, Kingston, ON, Canada)

**EXPERIMENTS
& DEMOS**

LOCATION

9:30AM - 11:30AM**REAR OF EXHIBIT HALL****A PRACTICAL METHOD TO
MEASURE GROUND BOUNCE
IN MICROCONTROLLERS****Presenter:****Eric Bogatin**, Teledyne LeCroy, Boulder,
CO, USA

In this demonstration, attendees are shown how to measure the ground bounce in a package using quiet high and quiet low I/O lines. The demo uses an instrumented microcontroller board on which the number of I/O switching simultaneously can be controlled. The oscilloscope can monitor up to 8 channels at once. Attendees will also see that the rail noise on the die is not the same as the rail noise on the board. It depends on which is the aggressor and which is the victim. Using this simple method, anyone can measure ground bounce and rail noise in a package.

**EXPERIMENTS
& DEMOS**

LOCATION

9:30AM - 11:30AM**REAR OF EXHIBIT HALL****EVALUATION OF NEAR FIELD
PROBES****Presenter:****Brendon Berg**, The EMC Shop, Roseville,
CA, USA

In this hands-on demonstration, we evaluate various near-field probes.



Photo by Richard Georgerian

**EXPERIMENTS
& DEMOS**

LOCATION

9:30AM - 11:30AM**REAR OF EXHIBIT HALL****MODELING THE COUPLING OF
TRANSIENTS THROUGH CABLE
SHIELDS ON INTEGRATED
PLATFORMS****Presenter:**

Jennifer Kitaygorsky, *Electro Magnetic Applications, Inc., Denver, CO, USA*

Various electromagnetic environmental effects (E3) can cause current transients to flow on cable shields inside integrated platforms such as aircraft and spacecraft. Lightning is one of the effects that introduces high current transients on cable shields that transfers to pins at box interfaces through transfer impedance. Spacecraft can experience electrostatic discharge events due to spacecraft charging, where charge accumulates on spacecraft surfaces and inside dielectrics due to the surrounding space plasma environment. These discharge events introduce EMI issues inside the spacecraft.

In this demonstration, we will show how to model an entire integrated platform with structures, cables and boxes, and simulate pin transients (currents and voltages) at box interfaces due to the two types of E3 events described above.

**EXPERIMENTS
& DEMOS**

LOCATION

9:30AM - 11:30AM**REAR OF EXHIBIT HALL****CONTROL OF ELECTRIC
AND MAGNETIC RADIATED
EMISSIONS AT LOW AND HIGH
FREQUENCIES****Presenter:**

Pablo Narvaez and Katherine Dang, *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA*

The Jet Propulsion Laboratory has participated in multiple projects whereby implementation of proper electric and magnetic field shielding has been a key component in successful space missions, free of electromagnetic interference. This hardware experiment/demonstration presents typical radiated electric and magnetic field shielding methods similar to those applied on JPL hardware for typical flight programs.

**TECHNICAL
SESSION**

TH-PM-1

**EMC MEASUREMENT AND INTERFERENCE CONTROL****2:30PM - 5:30PM**

LOCATION

PROMENADE 104A**Sponsored by TC 4****Chair:****Michael McInerney**, US Army Corp of Engineers, Champaign, IL, USA**Co-Chair:****Ahalya Srikanth**, US Army Corp of Engineers, Champaign, IL, USA**2:30PM****A Dual Channel Time-domain EMI Measurement System to Measure the Impedance of Conducted Disturbance****Stephan Braun** (Gauss Instruments International GmbH, Munich, Germany)**3:00PM****RFI Noise Source Quantification based on Reciprocity****Yin Sun** (Missouri University of Science and Technology, Rolla, MO, USA); **Bin-Chyi Tseng** (ASUSTek Computer Inc., Taipei, Taiwan); **Hank Lin** (ASUSTek Computer Inc., Taipei, Taiwan); **Chulsoon Hwang** (Missouri University of Science and Technology, Rolla, MO, USA)**4:00PM****Suppression of Unnecessary Radio Wave Radiated from Inverter Equipment using Noise Suppression Sheet****Koichi Kondo** (TOKIN Corporation, Sendai, Japan); **Masaki Kurimoto** (TOKIN Corporation, Sendai, Japan); **Yusuke Ohdaira** (TOKIN Corporation, Sendai, Japan); **Yasunori Miyazawa** (Tohoku University, Sendai, Japan); **Satoshi Tanaka** (Tohoku University, Sendai, Japan); **Makoto Nagata** (Kobe University, Kobe, Japan); **Yasuyuki Okiyonedo** (Showa Aircraft Industry Co., Ltd., Akishima, Japan); **Masahiro Yamaguchi** (Tohoku University, Sendai, Japan)**4:30PM****An Improved Solution on Permittivity Measurement with Single Knife-Edge Model****Cheng Yao** (Beijing University of Posts and Telecommunications, Beijing, China); **Dan Shi** (Beijing University of Posts and Telecommunications, Beijing, China); **Yixuan Liu** (Beijing University of Posts and Telecommunications, Beijing, China)**5:00PM****Filter Attenuation Measurement Method using EFTB****R. Spangenberg** (Schneider Electric, Knightdale, NC, USA); **J. Quenzer** (Würth Electronics Midcom Inc., Watertown, SD, USA)

**TECHNICAL
SESSION**
TH-PM-2**COMPUTER MODELING METHODS****2:30PM - 5:30PM**

LOCATION

PROMENADE 104B**Sponsored by TC 9****Chair:****Matthias Troescher**, CST GmbH, Munich, Germany**Co-Chair:****Albert E. Ruehli**, Missouri University of Science and Technology, Rolla, MO, USA**2:30PM****An Approximate Model for Near-Field Calculation of Phased Array****Vladimir Chtcherbakov** (ASMAR, Concepcion, Chile)**3:00PM****Hybrid Modeling Method for Railway VCB Switching Noise Simulations at Whole Train Level****Umberto Paoletti** (Hitachi, Ltd., Yokohama, Japan); **Kiyoto Matsushima** (Hitachi, Ltd., Yokohama, Japan)**4:00PM****Convergence-Accelerated Foster-Type Network Model for Skin and Proximity Effect in Arbitrarily Shaped Parallel Conductors**
BEST EMC PAPER AWARD FINALIST**Christian Bednarz** (Otto-von-Guericke University, Magdeburg, Germany); **Marco Leone** (Otto-von-Guericke University, Magdeburg, Germany)**4:30PM****Experimental Validation of a Broadband Circuit Model for Electromagnetic Interference Analysis in Metallic Enclosures****Christoph Lange** (Otto-von-Guericke University, Magdeburg, Germany); **Paul Konrad** (Otto-von-Guericke University, Magdeburg, Germany); **Marco Leone** (Otto-von-Guericke University, Magdeburg, Germany)

**TECHNICAL
SESSION**

TH-PM-3-SIPI

**HIGH-SPEED INTERCONNECTS - 3****2:30PM - 5:30PM**

LOCATION

PROMENADE 104C**Sponsored by TC 10****Chair:****Shaowu Huang**, Invensas Corporation,
San Jose, CA, USA**Co-Chair:****Kevin Pham**, Jet Propulsion Laboratory,
Pasadena, CA, USA**2:30PM****Power and Signal Integrity Analysis of
High-Speed Mixed-Signal Backplane
based on VPX****Meng Hua** (Institute of Electronic Engineering
China Academy of Engineering Physics, Mian
yang, China); **Niu Minxi** (Institute of Electronic
Engineering China Academy of Engineering
Physics, Mian yang, China); **Tan Anju** (Institute
of Electronic Engineering China Academy of
Engineering Physics, Mian yang, China); **Miao
Jianghong** (Institute of Electronic Engineering
China Academy of Engineering Physics, Mian
yang, China)**3:00PM****Hexagonal BGA Patterns for Power-Via
Resonance Minimization and Common-Mode
Suppression****BEST SIPI PAPER AWARD FINALIST****IL-Young Park** (Cisco Systems, Inc., San Jose, CA,
USA); **Iftikhar Ahmed** (Molex, LLC, Lisle, IL, USA);
David Brunker (Molex, LLC, Lisle, IL, USA); **Pu
Xie** (Molex, LLC, Lisle, IL, USA); **Peerouz Amleshi**
(Molex, LLC, Lisle, IL, USA); **Jayanthi Natarajan**
(Cisco Systems, Inc., San Jose, CA, USA)**4:00PM****An Efficient Approach to Find the Truncation
Frequency for Transmission Line-Based
Dielectric Material Property Extraction****Xinglin Sun** (Zhejiang University, Hangzhou,
China); **Lingyun Ye** (Zhejiang University,
Hangzhou, China); **Kaichen Song** (Zhejiang
University, Hangzhou, China); **Yin Sun** (Missouri
University of Science and Technology, Rolla, MO,
USA); **Shuai Jin** (Missouri University of Science
and Technology, Rolla, MO, USA); **Bichen Chen**
(Missouri University of Science and Technology,
Rolla, MO, USA); **Mikheil Tsiklauri** (Missouri
University of Science and Technology, Rolla, MO,
USA); **Xiaoning Ye** (Intel Corporation, Hillsboro,
OR, USA); **Jun Fan** (Missouri University of
Science and Technology, Rolla, MO, USA)**4:30PM****PTI Shared Interconnect in Multi-Chip
Package Designs****Maria J. Garcia** (Intel Corporation, Guadalajara,
Mexico); **Carlos Vallin** (Intel Corporation,
Hillsboro, OR, USA); **Raul Enriquez** (Intel
Corporation, Guadalajara, Mexico); **Carlos E.
Lozoya** (Intel Corporation, Guadalajara, Mexico)**5:00PM****Dense Serpentine Implementation for PTI
T-Topology at 400MT/s****Carlos E. Lozoya López** (Intel Corporation,
Guadalajara, Mexico); **Raul Enriquez Shibayama**
(Intel Corporation, Guadalajara, Mexico); **María
J. García García de León** (Intel Corporation,
Guadalajara, Mexico); **Carlos Lizalde Moreno**
(Intel Corporation, Guadalajara, Mexico)

**TECHNICAL
SESSION**
TH-PM-4**EMC MANAGEMENT****2:30PM - 5:30PM**

LOCATION

PROMENADE 101A**Sponsored by TC 1****Chair:**

Thomas Braxton, Shure Incorporated,
Bolingbrook, IL, USA

Co-Chair:

Dave Staggs, IEEE Sr. Member, Hunt, TX, USA

2:30PM**Managing 802.11n Adjacent-Channel
Interference via Efficient Carrier Spacing in
the 2.4-GHz Band**

Renny E. Badra (Universidad Simón Bolívar,
Caracas, Venezuela); **Erislandy Mozo**
(Universidad Simón Bolívar, Caracas, Venezuela);
George E. Figueras (Universidad Simón Bolívar,
Caracas, Venezuela)

3:00PM**Optimal LTE Femtocell Indoor Deployment
under External Intra-System Interference**

Renny E. Badra (Universidad Simón Bolívar,
Caracas, Venezuela); **George E. Figueras**
(Universidad Simón Bolívar, Caracas, Venezuela)

4:00PM**Prediction of Worst-Case Radiation
Immunity in Cable Harnesses**

David Nozadze (Missouri University of Science
and Technology, Rolla, MO, USA); **Yuanzhuo Liu**
(Missouri University of Science and Technology,
Rolla, MO, USA); **Victor Khilkevich** (Missouri
University of Science and Technology, Rolla,
MO, USA); **Ruijie He** (Missouri University of
Science and Technology, Rolla, MO, USA);
Kaustav Ghosh (Missouri University of Science
and Technology, Rolla, MO, USA); **Sameer Arun
Walunj** (Missouri University of Science and
Technology, Rolla, MO, USA); **Gary Hess** (UTC
Aerospace Systems, Randolph, MA, USA); **Steve
Davidson** (UTC Aerospace Systems, Randolph,
MA, USA)

4:30PM**Product Design to Meet Standards: Whose
Job is It?**

Louann M. Mlekodaj (Shure Incorporated, Niles,
IL, USA)

5:00PM**Protecting Your Reputation**

Woodrow T. Hawthorne (IEEE EMC, Merritt
Island, FL, USA)

**TECHNICAL
SESSION**

TH-PM-5

**EMC MEASUREMENT TECHNIQUES - 2****2:30PM - 5:30PM**

LOCATION

PROMENADE 101B**Sponsored by TC 2****Chair:****Ross Carlton**, ETS-Lindgren, Cedar Park, TX, USA**Co-Chairs:****Monrad Monsen**, Oracle, Broomfield, CO, USA
Ahalya Srikanth, US Army Corp of Engineers, Champaign, IL, USA**2:30PM****An Analysis of Reverberation Chamber Testing as a Radiation Problem****BEST EMC PAPER AWARD FINALIST****James C. West** (Oklahoma State University, Stillwater, OK, USA); **Charles F. Bunting** (Oklahoma State University, Stillwater, OK, USA)**3:00PM****Investigation of Electromagnetic Complex Cavities by Applying the Generalized Extreme Value Distribution****BEST EMC STUDENT PAPER AWARD FINALIST****Neda Nourshamsi** (Oklahoma State University, Stillwater, OK, USA); **James C. West** (Oklahoma State University, Stillwater, OK, USA); **Charles F. Bunting** (Oklahoma State University, Stillwater, OK, USA)**4:00PM****Effects of Aperture Dimension on Maximum Field Level Inside Nested Chambers by Applying the Generalized Extreme Value Distribution****Neda Nourshamsi** (Oklahoma State University, Stillwater, OK, USA); **James C. West** (Oklahoma State University, Stillwater, OK, USA); **Charles F. Bunting** (Oklahoma State University, Stillwater, OK, USA)**4:30PM****Noncontact Time-Domain EMI Measurement of Two Adjacent Traces on a PCB****Haimi Qiu** (The University of Hong Kong and China CEPREI Laboratory, Hong Kong, and Guangzhou, China); **Chengyang Luo** (China CEPREI Laboratory, Guangzhou, China); **Wenxiao Fang** (China CEPREI Laboratory, Guangzhou, China); **Lijun Jiang** (The University of Hong Kong, Hong Kong, China)**5:00PM****Design of TEM Transmission Line for Probe Calibration up to 40 GHz****Morten Sørensen** (Missouri University of Science and Technology, Rolla, MO, USA); **Shubhankar Marathe** (Missouri University of Science and Technology, Rolla, MO, USA); **David Pommerenke** (Missouri University of Science and Technology, Rolla, MO, USA); **Hamed Kajbaf** (Amber Precision Instruments, San Jose, CA, USA); **Jin Min** (Amber Precision Instruments, San Jose, CA, USA)

**TECHNICAL
SESSION**

TH-PM-6-SIPI

**HIGH-SPEED INTERCONNECTS - 5****2:30PM - 5:30PM**

LOCATION

PROMENADE 102AB**Sponsored by TC 10****Chair:****Chunfei Ye**, Intel, Hillsboro, OR, USA**Co-Chair:****IL-Young Park**, Cisco Systems, San Jose, CA, USA**2:30PM****Application of Deep Learning for High-Speed Differential via TDR Impedance Fast Prediction****Jun Xu** (Cisco Systems, Inc., San Jose, CA, USA);**Ling Zhang** (Missouri University of Science and Technology, Rolla, MO, USA); **Mike Sapozhnikov** (Cisco Systems, Inc., San Jose, CA, USA);**Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)**3:00PM****Development of Polynomial Chaos based Surrogate Models for Channel Simulation****Majid Ahadi Dolatsara** (Georgia Institute of Technology, Atlanta, GA, USA); **Jose Hejase** (IBM Corporation, Austin, TX, USA); **Dale Becker** (IBM Corporation, Poughkeepsie, NY, USA); **Madhavan Swaminathan** (Georgia Institute of Technology, Atlanta, GA, USA)**4:00PM****An Empirical Model for Foamed High-Speed Cable****Xin Wu** (Wandtec(Shenzhen) Optronics Technology Co. Ltd., Shenzhen, China); **Feng Ling** (Xpeedic Technology, Inc., Seattle, WA, USA)**4:30PM****A Scalable Reduced-Order Modeling Algorithm for the Construction of Parameterized Interconnect Macromodels from Scattering Responses****BEST SIPI PAPER AWARD FINALIST****T. Bradde** (Politecnico di Torino, Torino, Italy); **S. Grivet-Talocia** (Politecnico di Torino, Torino, Italy); **M. De Stefano** (Politecnico di Torino, Torino, Italy); **A. Zanco** (Politecnico di Torino, Torino, Italy)**5:00PM****Equivalent Capacitance and Multilayer Models for Effective Roughness Dielectric in PCBs****Marina Koledintseva** (Oracle, Santa Clara, CA, USA); **Tracey Vincent** (CST of America - 3DS, Framingham, MA, USA)

FRIDAY, AUGUST 3, 2018



Photo by Richard Georgerian

SCHEDULE AT A GLANCE - FRIDAY, AUGUST 3, 2018

TECHNICAL SCHEDULE AT A GLANCE

8:30 AM	TUTORIAL EMC Fundamentals 3 PROMENADE 102AB Pg. 90 	TUTORIAL Techniques and Measures to Manage Risks with Regard to Electromagnetic Disturbances PROMENADE 104A Pg. 91 	WORKSHOP Advances in SI/PI/NI and EMC Modeling Approaches PROMENADE 101A Pg. 93 	WORKSHOP Material Characterization for EMC Design PROMENADE 104B Pg. 94 	TUTORIAL Global EMC Standards Update: Test Site Validation, Instrumentation and RF Absorber PROMENADE 101B Pg. 95
10:00 AM	COFFEE BREAK				
10:30 PM		TUTORIAL EMC Leadership Training PROMENADE 104A Pg. 92/97 			
12:00 PM	LUNCH				
1:30 PM	TUTORIAL The Role of the IEC Advisory Committee on EMC (ACEC) in Coordinating IEC EMC Activities PROMENADE 104B Pg. 96 		TUTORIAL Lightning Effects on Power Distribution Systems PROMENADE 101A Pg. 98 	WORKSHOP Advanced Materials and Their Characterization for EMC and High-speed Electronics PROMENADE 101B Pg. 99 	WORKSHOP EMI/EMC for Power Electronics Systems PROMENADE 102AB Pg. 100
3:00 PM	COFFEE BREAK				
3:30 PM					
5:30 PM					

**HALF-DAY
TUTORIAL**
FR-AM-1**EMC FUNDAMENTALS - 3****8:30AM - 12:00PM**

LOCATION

PROMENADE 102AB**Sponsored by IEEE EMCS Education Committee (EdCom)****Chair:****Lee Hill**, Silent Solutions LLC. Amherst,
NH, USA**PLANNED SPEAKERS & TOPICS****Power Integrity Concepts for High-Speed Design on Multi-Layer PCBs****Chulsoon Hwang**, Missouri University of Science and Technology, Rolla, MO, USA

The impact of parasitics on the performance of decoupling capacitors; placement of decoupling capacitors depending on the board stack-up and the required frequency of performance; decoupling for EMI compared to SI; embedded capacitance. Time domain analysis vs. steady state frequency domain analysis.

ESD**David Pommerenke**, Missouri University of Science and Technology, Rolla, MO, USA

The physics of an electrostatic discharge. ESD testing. The ESD waveform (current vs. voltage), levels, protection strategies. Contact versus air discharge. Environmental, equipment, and test parameters that affect ESD test results. Integrated circuit vs. human body vs. machine models.

Antenna Fundamentals**Zhong Chen**, ETS-Lindgren, Cedar Park, TX, USA

A brief introduction to antenna theory, major types of antennas used for EMC measurements, transmit vs. receive antennas, antenna patterns, meaning of antenna factors. Near-field vs. far field. Beamwidth vs. spatial coverage, bandwidth vs. frequency coverage.

Conducted Emissions**Sam Connor**, IBM, Raleigh-Durham, NC, USA

A description of and the physics involved in conducted emissions. Overview of conducted emissions regulations. Understanding the purpose and use of a "Line Impedance Stabilization Network" (LISN). Characteristics of "intentional" differential mode current and causes of common mode current. Basic filters and methods used to suppress either differential or common mode current to meet requirements.



Photo by Richard Georgerian

**HALF-DAY
TUTORIAL**

FR-AM-2A

**8:30AM - 10:00AM**

LOCATION

PROMENADE 104A**TECHNIQUES AND MEASURES TO MANAGE RISKS WITH
REGARD TO ELECTROMAGNETIC DISTURBANCES****Sponsored by TC 1****Chair:****Thomas E. Braxton**, Shure Incorporated,
Niles, IL, USA

This tutorial will introduce IEEE EMC Society members to state of the art approach to risk-managing the effects of electromagnetic (EM) disturbances (also known as 'EM Resilience', and previously called 'EMC for Functional Safety'). This approach is increasingly being required in many projects, safety standards and Regulations, since the "IEC Basic Safety Standard" on this topic, IEC 61000-1-2, was published in 2016. Where safety risks can be increased by the effects of EM disturbances (EMI) on electronic equipment, they must be risk-managed for the equipment/system/installation concerned. This risk-management must take into account all reasonably foreseeable aging, wear, corrosion, faults, use/misuse and EM environments over the entire lifetime. This tutorial describes the new IEEE 1848 approach, which adds little to size, weight and cost, and is considered to be "resilient" because it uses multiple independent protection measures to maintain safety risks to acceptable levels, even despite the failure of one or more other protections (e.g. shielding, filtering, etc.). This new approach can also be used to help manage non-safety-related risks associated with the use of electronics, including financial risks, mission-critical risks, high-reliability, etc.

PLANNED SPEAKERS & TOPICS**Why it is Increasingly Important to Risk-Manage
Electromagnetic Disturbances****Davy Pisssoort**, KU Leuven, Bruges, Belgium**Overviews of Rugged High-Spec EM Mitigation and
New IEEE 1848 Approach****Keith Armstrong**, Cherry Clough Consultants Ltd,
Stafford, United Kingdom**Developments in Related Standards, Codes, Etc.****Keith Armstrong**, Cherry Clough Consultants Ltd,
Stafford, United Kingdom**Special Challenges for Medical Standards IEC 60601-
1-2 Ed.3:2007 and Ed.4:2014****Keith Armstrong**, Cherry Clough Consultants Ltd,
Stafford, United Kingdom**More Detailed Descriptions of the New IEEE 1848
Approach, Including Recent University Research****Keith Armstrong**, Cherry Clough Consultants Ltd,
Stafford, United Kingdom

**HALF-DAY
TUTORIAL**
FR-AM-2B



EMC LEADERSHIP TRAINING - 1

10:30AM - 12:00PM

LOCATION

PROMENADE 104A

Sponsored by TC 1

Chair:

Kimball Williams, IEEE, Dearborn, MI, USA

Co-Chair:

Thomas Braxton, Shure Incorporated,
Niles, IL, USA

Sufficient training in the 'soft skills' is often lacking in the curricula of engineers. The industry approach of 'sink or swim' can be harsh. This session will provide opportunities to learn or brush up on critical communications and business skills necessary for career success as an engineer in today's market.

PLANNED SPEAKERS & TOPICS

Effective Memos & Reports

Bob Scully, NASA Johnson Space Center and
University of Texas at Arlington League City,
Houston, TX, USA

Effective Meetings

John LaSalle, Northrop Grumman Corp., Melbourne,
FL, USA

EMC Leadership Training continues on
Friday afternoon in FR-PM-2.
See page 97 for the
planned speakers and topics



AXOS⁸
COMPACT IMMUNITY TEST SYSTEM



**HAEFELY
HIPOTRONICS**

See you in
Long Beach!



The new **AXOS⁸** integrates all of the best features of a modern conducted immunity test system into one single, user-friendly and economic solution.

- 7 kV Surge Comb. Wave
- 7 kV Telecom Wave
- 7 kV Ring Wave
- 5 kV EFT / Burst
- Voltage Dips & Interrupts
- Pulsed Magnetic Field

FP-COMB 32



Combined 3-phase Coupling/
Decoupling Network for Surge
Combination Wave, Ring Wave,
and EFT/Burst – automatically
controlled via the AXOS Series.

**HALF-DAY
WORKSHOP**

FR-AM-3

**ADVANCES IN SI/PI/NI AND
EMC MODELING APPROACHES****8:30AM - 12:00PM**

LOCATION

PROMENADE 101A**Co-Chairs:****Albert Ruehli**, *Missouri University of Science and Technology, Rolla, MO, USA***Lijun Jiang**, *The University of Hong Kong, Hong Kong*

This workshop is designed to give a general overview of critical techniques that are needed in the engineering practices for signal integrity, power integrity, noise integrity, and EMC/EMI. It provides topics from modeling methodologies to fundamental reviews closely engaged with routine exercises.

The invited speakers are all well-known experts in their respective areas for years of contributions.

In this workshop, each speaker will give a general overview of the advancements in their own fields. We hope audiences can benefit from this special workshop and take away practical skills from these talks and apply them in their daily engineering practices.

PLANNED SPEAKERS & TOPICS**Plane-Pair PEEC Modeling for Package Power Layer Nets with Inductance Extraction.****Siqi Bai**, *Missouri University of Science and Technology, Rolla, MO, USA***Biyao Zhao**, *Missouri University of Science and Technology, Rolla, MO, USA***Jonghyun Cho**, *Missouri University of Science and Technology, Rolla, MO, USA***Albert Ruehli**, *Missouri University of Science and Technology, Rolla, MO, USA***Samuel Connor**, *IBM Corporation, Research Triangle Park, NC, USA***Matteo Cocchini**, *IBM Corporation, Research Triangle Park, NC, USA***Dale Becker**, *IBM Corporation, Research Triangle Park, NC, USA***Bruce Archambeault**, *IBM Corporation and Missouri University of Science and Technology, Research Triangle Park, NC and Four Oaks, NC, USA***James Drewniak**, *Missouri University of Science and Technology, Rolla, MO, USA***Fundamentals of Power Integrity****Zhiping Yang**, *Google, Mountain View, CA, USA***Complexity Reduction: Reversing the Trend****Michel Nakhla**, *Carleton University, Ottawa, ON, Canada***20 Years of Passive Macromodeling:****State of the Art and Outlook****Stefano Grivet-Talocia**, *Politecnico di Torino, Italy***The Evolution of the PEEC Method from SI, PI to Antennas****Lijun Jiang**, *The University of Hong Kong, Hong Kong***Albert E. Ruehli**, *Missouri University of Science and Technology, Rolla, MO, USA*

**HALF-DAY
WORKSHOP**
FR-AM-4**8:30AM - 12:00PM**

LOCATION

PROMENADE 104B**MATERIAL CHARACTERIZATION FOR EMC DESIGN****Sponsored by TC 4****Co-Chairs:****Huadong Li**, Molex LLC, Lisle, IL, USA**Mark I. Montrose**, Montrose Compliance Services Inc., Santa Clara, CA, USA

Correctly understanding material performance is essential to optimizing EMC design. As simulations become more widely utilized, correctly characterizing material is now critical to ensure accurate EMC analysis due to unknown operational parameters and functionality. The issue is even complicated by the introduction of new and novel EMC materials.

This workshop will introduce several widely used as well as new EMC materials. The content covers material parameters and applications in addition to various aspects related to properly simulating these materials. The workshop topics include: Applied EMI in Plastics – Reducing Cost and Weight; Electromagnetic Characterization of Absorbers; Contact Impedance and Its EMC Impacts; and Advanced Simulation with New and Novel EMC Materials.

PLANNED SPEAKERS & TOPICS**Electromagnetic Characterization of Absorber****Paul Dixon**, Laird, Manchester, NH, USA**Applied EMI in Plastics-Reducing Cost and Weight****Ned Bryant**, RTP Company, Winona, MN, USA**Contact Impedance and Its EMC/SIPI Impacts****Huadong Li**, Molex, LLC, Naperville, IL, USA**Iftikhar Ahmed**, Molex, LLC, Lisle, IL, USA**Material Parameters and EMC Simulations****David Johns**, CST of America, Framingham, MA, USA

**HALF-DAY
TUTORIAL**

FR-AM-5

**8:30AM - 12:00PM**

LOCATION

PROMENADE 101B**GLOBAL EMC STANDARDS UPDATE:
Test Site Validation, Instrumentation and RF Absorber****Chair:****Doug Kramer**, ETS-Lindgren, Cedar Park, TX, USA**Co-Chairs:****Janet O'Neil**, ETS-Lindgren, Cedar Park, TX, USA**Alistair Duffy**, Chair, IEEE EMC Society Standards Development and Education Committee (SDECom), Leicester, UK

This tutorial will review key updates to recently published standards as well as planned revisions to standards addressing EMC measurement equipment, test facilities, and RF absorber as specified by many global standards. Specific requirements and nuances that can challenge even the most experienced EMC practitioner will be discussed, realistic and repeatable criteria will be reviewed, and methods for practical implementation for real-world application will be shared with attendees. A review will be provided of the current and proposed test methods for characterizing the absorption properties of typical anechoic chamber linings applied to a metallic surface as described in IEEE 1128. Many advances in RF absorber technology have taken place since IEEE 1128 was last published in 1998; attendees can learn about the state-of-the-art in current absorber technology that will affect the current revision. Speakers include experts who are actively involved in using, writing, maintaining and assessing the standards in which the requirements are established. The speakers will discuss the recently published standards (ANSI C63.5, CISPR 16-1-6, ANSI C63.4a, and ISO 17025) as well as the soon to be published standards (ANSI C63.25 and IEEE 1128). Attendees will quickly learn what is new in these standards, what to expect in the new revisions, and how this may influence

their current EMC test and measurement activity. Attendees will also have a chance to contribute directly to the new standards revisions.

PLANNED SPEAKERS & TOPICS**Changes to ISO/IEC 17025:2017-A High-Level Overview****Trace McInturff**, A2LA, Frederick, MD, USA**IEEE STD 1128-1998: IEEE Recommended Practice for RF Absorber Evaluation in the Range of 30 MHz to 5 GHz****Zhong Chen**, ETS-Lindgren, Cedar Park, TX, USA**ANSI C63.25.1 Validation Methods for Radiated Emission Test Sites****Zhong Chen**, ETS-Lindgren, Cedar Park, TX, USA**Update on ANSI C63.4, including Amendment ANSI C63.4a (Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz)****Dan Hoolihan**, Hoolihan EMC Consulting, Lindstrom, MN, USA**Antenna Calibration: ANSI C63.5:2017 (Calibration and Qualification of Antennas 9 kHz to 40 GHz) and CISPR 16-1-6:2017 (Specification for radio disturbance and immunity measuring apparatus and methods - Radio disturbance and immunity measuring apparatus - EMC antenna calibration)****Doug Kramer**, ETS-Lindgren, Cedar Park, TX, USA

**HALF-DAY
TUTORIAL**
FR-PM-1**THE ROLE OF THE IEC ADVISORY COMMITTEE ON
EMC (ACEC) IN COORDINATING IEC EMC ACTIVITIES****1:30PM - 5:30PM**

LOCATION

PROMENADE 104B**Sponsored by TC 2****Chair:****Donald Heirman**, Don HEIRMAN Consultants,
Lincroft, NJ, USA

This Tutorial continues to update researchers in the field of EMC of the coordination of EMC standards and activities in the International Electrotechnical Commission (IEC) by the IEC Advisory Committee on EMC known as ACEC. The members of this committee include representatives of IEC technical committees that produce EMC basic standards for measurement instrumentation/measurements and also product committees that apply the basic standards along with specific test levels, performance criteria, and emission limits. ACEC is a key advisory committee that reports directly to the technical management of the IEC which is called the Standardization Management Board.

PLANNED SPEAKERS & TOPICS**What is ACEC?****William Radasky**, Metatech Corporation, USA**Trends in CISPR and its Subcommittees****Donald Heirman**, Don HEIRMAN Consultants, USA**Recent Trends of TC77 (EMC and its Subcommittees)****William Radasky**, Metatech Corporation, USA**Emission Standardization in the 2-150 kHz Frequency Band****William Radasky**, Metatech Corporation, USA**EMC for E-mobility****William Radasky**, Metatech Corporation, USA**Recent Topics in IEC TC 62 (Medical Equipment EMC) and its Subcommittees****Donald Heirman**, Don HEIRMAN Consultants, USA**TC 106 Overview—Assessment of Human Exposure to EMF****Donald Heirman**, Don HEIRMAN Consultants, USA**TOUR THE FAMOUS
JET PROPULSION LAB (JPL)!**
California Institute of Technology • Pasadena, CA

The JPL technical tour begins in the von Karman auditorium where attendees will get an overview / history of JPL and watch the movie Journey to the Planets and Beyond. From there, visitors will enjoy the von Karman museum, which exhibits models of spacecraft, touch-screen monitors, and items such as meteorites from the comet Vesta and a moon rock. Two facilities that are often visited on a tour of JPL are the Spacecraft Assembly Facility and the Space Flight Operations Facility. The Spacecraft Assembly Facility is where the JPL technicians and engineers are currently assembling the Mars 2020 spacecraft. The Spacecraft Assembly Facility is a clean room facility. It is a class 10,000 room, which means per cubic foot there are 10,000 or fewer dust particles. Technicians and engineers wear "bunny suits" to keep the spacecraft from coming

in contact with hair and skin. The Space Flight Operations Facility is where JPL has the Deep Space Network. Developed and managed by JPL, the Deep Space Network monitors radio transmissions to determine the health and precise location of each spacecraft, as well as data from the instruments aboard. Also on the tour is the Mars Yard where the Mars Rover test bed is located. The test bed is used to test drive a Mars Rover test vehicle to simulate conditions on Mars.

The JPL tour is scheduled for 2 PM on Friday, August 3, 2018. The tour is limited to 50 people at a cost of \$40.00 per person. The tour length is estimated to be 2.5 hours. Buses will depart from the Long Beach Convention Center promptly at 12:00 PM for JPL, so be there on time. Snacks will be provided on the return trip. For more information on JPL, visit www.jpl.nasa.gov.

**HALF-DAY
TUTORIAL**

FR-PM-2

**EMC LEADERSHIP TRAINING - 2****1:30PM - 5:30PM**

LOCATION

PROMENADE 104A**Sponsored by TC 1****Chair:****Kimball Williams**, IEEE, Dearborn, MI, USA**Co-Chair:****Thomas Braxton**, Shure Incorporated,
Niles, IL, USA

This tutorial is a continuation of
FR-AM-2b EMC Leadership Training.
To read the full abstract and
session details, see page 92

PLANNED SPEAKERS & TOPICS**How to Give Effective Presentations****Bruce Archambeault**, IBM Corporation and Missouri
University of Science and Technology, Research
Triangle Park, NC and Four Oaks, NC, USA**Networking Skills****Dan Hoolihan**, Hoolihan EMC Consulting, Lindstrom,
MN, USA**IEEE Code of Ethics****David Staggs**, IEEE Sr. Member, Hunt, TX, USA**Interspecies Communication, Boomers and
Millennials in Conversation****Joanna McLellan**, JPHill, LLC, Holly, MI, USA**BUS DEPARTS FROM LONG BEACH CONVENTION CENTER AT 12:00 PM****IMPORTANT SECURITY REGULATIONS**

PLEASE NOTE: The following requirements must be met in order to participate on the tour. All tour registrants will receive an email from JPL following registration. Please reply immediately to the email to ensure you can take the tour! The email will provide a link to tour registrants who are required to enter their personal information (including passport and visa, if applicable) and submit the request to JPL directly for access to the tour areas.

DEADLINES TO SUBMIT INFORMATION:

US CITIZENS: US Citizens and Legal Permanent Residents and non-designated country foreign nationals (countries with which the US has friendly relations)

REQUIRE 3 DAYS TO PROCESS (3 days prior: July 30, 2018 submission due date).



Graphics courtesy of NASA/JPL

FOREIGN NATIONAL DESIGNATED

COUNTRIES: Countries with which the US has no diplomatic relations

REQUIRE 21 DAYS TO PROCESS (21 working days prior: June 25, 2018 submission due date).

In addition, all tour attendees are required on site to show a current photo ID or valid passport to gain entrance to JPL; there will be no exceptions.

PLEASE NOTE: No refunds will be provided due to failure of the tour attendee to submit the required personal information by the deadlines noted above.

**HALF-DAY
TUTORIAL**
FR-PM-3**1:30PM - 5:30PM**

LOCATION

PROMENADE 101A**LIGHTNING EFFECTS ON POWER DISTRIBUTION SYSTEMS****Sponsored by TC 5****Co-Chairs:****Renato Procopio**, *University of Genova, Genova, Italy***Massimo Brignone**, *University of Genova, Savona Campus, Savona, Italy*

The normal operation of transmission and distribution systems is greatly affected by lightning, which is one of the major causes of power interruptions. Lightning-caused flashovers in overhead transmission and distribution lines result in overvoltages on the line conductors that are due either to direct strikes or to nearby, indirect strikes. In particular, the computation of the overvoltages due to indirect lightning events (more frequent than the direct ones) is a much more complex task, as it requires the solution of Maxwell's equations representing the field-to-line coupling process. For that reason, many researchers have focused their attention on developing accurate and numerically efficient algorithms for the analysis of lightning induced overvoltages on power systems. Such tools have been then used to analyze and design effective protection systems both, for transmission and distribution lines.

PLANNED SPEAKERS & TOPICS**Lightning Physics****Renato Procopio**, *University of Genoa, Genoa, Italy***Elisabetta Fiori**, *CIMA Research Foundation, Savona, Italy***Current and Field Modelling****Mansueto Rossi**, *University of Genova, Genova, Italy***Massimo Brignone**, *University of Genoa, Genoa, Italy***The Field to Line Coupling Problem****Massimo Brignone**, *University of Genoa, Genoa, Italy***Lightning Performance and Protection Systems****Renato Procopio**, *University of Genova, Genova, Italy*

**HALF-DAY
WORKSHOP**

FR-PM-4

**1:30PM - 5:30PM**

LOCATION

PROMENADE 101B**ADVANCED MATERIALS AND THEIR CHARACTERIZATION
FOR EMC AND HIGH-SPEED ELECTRONICS****Sponsored by TC 11****Co-Chairs:****Marina Koledintseva**, Oracle, Santa Clara,
CA, USA**Emmanuel Decrossas**, Jet Propulsion
Laboratory, California Institute of
Technology, Pasadena, CA, USA

There are currently five proposed presentations related to the breakthrough studies in the area of engineering new advanced materials, including nanomaterials, for the purposes of electromagnetic compatibility and high-speed electronics. The objective of this workshop is to bring electrical/electronics engineers, materials scientists, and physicists together. It is important that specialists who design and manufacture electromagnetic materials would know the needs of electronics industry from EMC, SI, and PI points of view; and at the same time, electrical and electronics engineers would know which materials would be optimal to solve their practical problems, and how to characterize these materials.

PLANNED SPEAKERS & TOPICS**Microscopic Field Effects at the Nanoscale Level and
their Implications for Device Design in High-Speed
Electronics****C.M. Krowne**, Naval Research Laboratory,
Washington, DC, USA**Carbon Nanotubes for EMC Applications****Emmanuel Decrossas**, Jet Propulsion Laboratory,
California Institute of Technology, Pasadena, CA,
USA**Soft Ferrites for EMC Applications****Marina Koledintseva**, Oracle, Santa Clara, CA, USA**Quality Criteria for Electromagnetic Wave Absorbers****Konstantin N. Rozanov**, Russian Academy of
Sciences, Moscow, Russia**Marina Y. Koledintseva**, Oracle, Santa Clara, CA,
USA

**HALF-DAY
WORKSHOP**
FR-PM-5**EMI/EMC FOR POWER ELECTRONICS SYSTEMS****1:30PM - 5:30PM**

LOCATION

PROMENADE 102AB**Sponsored by SC 5****Co-Chairs:****Shuo Wang**, *University of Florida,
Gainesville, FL, USA***Jiangqi He**, *Huawei Technologies Co., Ltd.,
Chandler, AZ, USA*

Modern power electronics has become very popular in last decades. Almost all modern electronic products use power electronics. A power electronics system generates significant electromagnetic interference (EMI) due to its high current and high voltage slew rates. The EMI have been headache problems for both power electronics and EMC engineers. The trial-and-error method, which is inefficient and time-consuming, is usually employed in the EMI debugging and suppression in power electronics and EMC industries. As a result, the EMI reduction is costly and the EMI filters are bulky and heavy.

PLANNED SPEAKERS & TOPICS**EMI Modeling and Reduction in Modern Power Electronics Systems****Shuo Wang**, *University of Florida, Gainesville, FL, USA***EMC Design Considerations for Sustainable Energy Applications****Michelle Liu**, *Tesla Inc., Palo Alto, CA, USA***Satish Thuta**, *Tesla Inc., Palo Alto, CA, USA***Jan Rutkjaer**, *Tesla Inc., Palo Alto, CA, USA***Pete Krauer**, *Tesla Inc., Palo Alto, CA, USA***Design of Compact Active EMI Filters to Reduce the Common-Mode Conducted Emissions****Jingook Kim**, *Ulsan National Institute of Science and Technology, Ulsan, Korea, Republic of (South)***High Density EMI filtering and Noise Self-Containment in Power Electronics System****Fan Luo**, *University of Arkansas, Fayetteville, AR, USA*



YOUR COMPLETE SOLUTION FOR RADAR PULSE TESTING

RF/Microwave Amplifiers

300 v/m & 600 v/m

1.2 GHz - 1.4 GHz

2.7 GHz - 3.1 GHz



Broad Field
High Gain
Area Antenna

0.5 kW - 8 kW+
Pulse Amps

300
or
600
VOLTS
per meter



Model	Frequency Range	Power
S1412 - 500P	1.2 - 1.4 GHz	500 Watts Pulse
S1412 - 1 kW	1.2 - 1.4 GHz	1 kW Pulse
S1412 - 2 kW	1.2 - 1.4 GHz	2 kW Pulse
S1412 - 4 kW	1.2 - 1.4 GHz	4 kW Pulse
S1412 - 8 kW	1.2 - 1.4 GHz	8 kW Pulse
S1412 - XX kW	1.2 - 1.4 GHz	XX kW Pulse
S3127 - 500P	2.7 - 3.1 GHz	500 Watts Pulse
S3127 - 1 kW	2.7 - 3.1 GHz	1 kW Pulse
S3127 - 2 kW	2.7 - 3.1 GHz	2 kW Pulse
S3127 - 4 kW	2.7 - 3.1 GHz	4 kW Pulse
S3127 - 8 kW	2.7 - 3.1 GHz	8 kW Pulse
S3127 - XX kW	2.7 - 3.1 GHz	XX kW Pulse

INSTRUMENTS FOR INDUSTRY

903 South 2nd Street • Ronkonkoma, NY 11779
Tel: 631-467-8400 • Fax: 631-467-8558 • sales@ifi.com • www.ifi.com

AMETEK®
COMPLIANCE TEST SOLUTIONS

BEST SYMPOSIUM PAPER FINALISTS

FINALISTS FOR BEST EMC PAPER

TU-AM-4 **AERONAUTICS AND SPACE EMC** **11:00AM**

Development and Evaluation of Waveforms for EMI Radiated Susceptibility Testing of Avionic Systems

Samuel Blanchette (Royal Military College of Canada, Kingston, ON, Canada); **Joey R. Bray** (Royal Military College of Canada, Kingston, ON, Canada); **Yahia M.M. Antar** (Royal Military College of Canada, Kingston, ON, Canada)

TU-PM-4 **WIRELESS COEXISTENCE AND INTERFERENCE - 1** **4:00PM**

A Simulation-Based Coupling Path Characterization to Facilitate Desense Design and Debugging

Yansheng Wang (Missouri University of Science and Technology, Rolla, MO, USA); **Songping Wu** (Google Inc., Mountain View, CA, USA); **Jianmin Zhang** (Google Inc., Mountain View, CA, USA); **Zhiping Yang** (Google Inc., Mountain View, CA, USA); **Ken Wu** (Google Inc., Mountain View, CA, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

TU-PM-5 **MODELING METHODS AND STATISTICAL ANALYSIS** **4:30PM**

Electromagnetic Compatibility Analysis using Embedded Domain Decomposition Method

Jiaqing Lu (The Ohio State University, Columbus, OH, USA); **Jin-Fa Lee** (The Ohio State University, Columbus, OH, USA)

WED-AM-4 **LIGHTNING AND AIRCRAFT EMI** **9:00AM**

Coupling of Wideband Radiated IEMI to Wiring Harness: A Statistical Analysis of the Main Influencing Parameters

Tao Liang (Politecnico di Milano, Milan, Italy); **Giordano Spadacini** (Politecnico di Milano, Milan, Italy); **Flavia Grassi** (Politecnico di Milano, Milan, Italy); **Sergio A. Pignari** (Politecnico di Milano, Milan, Italy)

WED-AM-5 **EMI ESTIMATION AND MITIGATION** **8:30AM**

Estimating Reverberant Electromagnetic Fields in Populated Enclosures by using the Diffusion Model

Jiexiong Yan (University of York, York, United Kingdom); **John Dawson** (University of York, York, United Kingdom); **Andy Marvin** (University of York, York, United Kingdom)

TH-AM-4 **WIRELESS COEXISTENCE AND INTERFERENCE -2** **11:00AM**

MIMO Performance Diagnosis based on the Radiated Two-Stage (RTS) Method

Yansheng Wang (Missouri University of Science and Technology, Rolla, MO, USA); **Songping Wu** (Google Inc., Mountain View, CA, USA); **Zhiping Yang** (Google Inc., Mountain View, CA, USA); **Penghui Shen** (General Test Systems Inc., Shenzhen, China); **Chunyu Wu** (Missouri University of Science and Technology, Rolla, MO, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

TH-AM-5 **TEST FACILITIES AND STANDARDS**

11:00AM

Improving the Reproducibility of Radiated Immunity Tests through the use of the CMAD*Spartaco Caniggia* (Consultant, Bareggio, Italy); *Carlo Carobbi* (University of Florence, Firenze, Italy)TH-PM-2 **COMPUTER MODELING METHODS**

4:00PM

Convergence-Accelerated Foster-Type Network Model for Skin and Proximity Effect in Arbitrarily Shaped Parallel Conductors*Christian Bednarz* (Otto-von-Guericke University, Magdeburg, Germany); *Marco Leone* (Otto-von-Guericke University, Magdeburg, Germany)

FINALISTS FOR BEST SIPI PAPER

TU-PM-3-SIPI **POWER DELIVERY NETWORKS/CROSSTALK AND NOISES**

1:30PM

Filtering Techniques and Topologies with Positively and Negatively Coupled Inductors for Dense Low Cost Packages and Platforms*Chin Lee Kuan* (Intel Corporation, Bayan Lepas, Penang, Malaysia); *Amit K. Jain* (Intel Corporation, Hillsboro, OR, USA); *Sameer Shekhar* (Intel Corporation, Hillsboro, OR, USA)TU-PM-6-SIPI **HIGH-SPEED INTERCONNECTS - 2**

4:30PM

Systematic Approach to PCB Interconnects Analysis to Measurement Validation*Marko Marin* (Infinera, Stockholm, Sweden); *Yuriy Shlepnev* (Simberian Inc., Westlake Village, CA, USA)TH-PM-5 **EMC MEASUREMENT TECHNIQUES - 2**

2:30PM

An Analysis of Reverberation Chamber Testing as a Radiation Problem*James C. West* (Oklahoma State University, Stillwater, OK, USA); *Charles F. Bunting* (Oklahoma State University, Stillwater, OK, USA)TH-PM-3-SIPI **HIGH-SPEED INTERCONNECTS - 3**

3:00PM

Hexagonal BGA Patterns for Power-Via Resonance Minimization and Common-Mode Suppression*IL-Young Park* (Cisco Systems, Inc., San Jose, CA, USA); *Iftikhar Ahmed* (Molex, LLC, Lisle, IL, USA); *David Brunker* (Molex, LLC, Lisle, IL, USA); *Pu Xie* (Molex, LLC, Lisle, IL, USA); *Peerouz Amleshi* (Molex, LLC, Lisle, IL, USA); *Jayanthi Natarajan* (Cisco Systems, Inc., San Jose, CA, USA)TH-PM-6-SIPI **HIGH-SPEED INTERCONNECTS - 5**

4:30PM

A Scalable Reduced-Order Modeling Algorithm for the Construction of Parameterized Interconnect Macromodels from Scattering Responses*T. Bradde* (Politecnico di Torino, Torino, Italy); *S. Grivet-Talocia* (Politecnico di Torino, Torino, Italy); *M. De Stefano* (Politecnico di Torino, Torino, Italy); *A. Zanco* (Politecnico di Torino, Torino, Italy)

STUDENTS - BEST STUDENT PAPER FINALISTS**FINALISTS FOR BEST EMC STUDENT PAPER****TU-PM-4 WIRELESS COEXISTENCE AND INTERFERENCE - 1****2:30PM****Desense Prediction and Mitigation from DDR Noise Source**

Qiaolei Huang (Missouri University of Science and Technology, Rolla, MO, USA); **Yang Zhong** (Missouri University of Science and Technology, Rolla, MO, USA); **Chulsoon Hwang** (Missouri University of Science and Technology, Rolla, MO, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA); **Jagan Rajagopalan** (Amazon Lab126, Sunnyvale, CA, USA); **Deepak Pai** (Amazon Lab126, Sunnyvale, CA, USA); **Chen Chen** (Amazon Lab126, Sunnyvale, CA, USA); **Amit Gaikwad** (Amazon Lab126, Sunnyvale, CA, USA)

4:00PM**A Simulation-Based Coupling Path Characterization to Facilitate Desense Design and Debugging**

Yansheng Wang (Missouri University of Science and Technology, Rolla, MO, USA); **Songping Wu** (Google Inc., Mountain View, CA, USA); **Jianmin Zhang** (Google Inc., Mountain View, CA, USA); **Zhiping Yang** (Google Inc., Mountain View, CA, USA); **Ken Wu** (Google Inc., Mountain View, CA, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

TU-PM-5 MODELING METHODS AND STATISTICAL ANALYSIS**4:30PM****Electromagnetic Compatibility Analysis using Embedded Domain Decomposition Method**

Jiaqing Lu (The Ohio State University, Columbus, OH, USA); **Jin-Fa Lee** (The Ohio State University, Columbus, OH, USA)

WED-AM-4 LIGHTNING AND AIRCRAFT EMI 8:30AM**Analysis of the Impact of the Lightning Return Stroke Models on Overhead Transmission Lines Induced Voltages**

Daniele Mestriner (University of Genoa, Genoa, Italy)

WED-AM-5 EMI ESTIMATION AND MITIGATION 9:00AM**System Level Electromagnetic Compatibility Remedy using Absorbing Frequency Selective Surfaces**

Ali Khoshniat (Santa Clara University, Santa Clara, CA, USA); **Ramesh Abhari** (Santa Clara University, Santa Clara, CA, USA)

TH-AM-4 WIRELESS COEXISTENCE AND INTERFERENCE -2**11:00AM****MIMO Performance Diagnosis based on the Radiated Two-Stage (RTS) Method**

Yansheng Wang (Missouri University of Science and Technology, Rolla, MO, USA); **Songping Wu** (Google Inc., Mountain View, CA, USA); **Zhiping Yang** (Google Inc., Mountain View, CA, USA); **Penghui Shen** (General Test Systems Inc., Shenzhen, China); **Chunyu Wu** (Missouri University of Science and Technology, Rolla, MO, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

TH-PM-5 EMC MEASUREMENT TECHNIQUES -2 3:00PM**Investigation of Electromagnetic Complex Cavities by Applying the Generalized Extreme Value Distribution**

Neda Nourshamsi (Oklahoma State University, Stillwater, OK, USA); **James C. West** (Oklahoma State University, Stillwater, OK, USA); **Charles F. Bunting** (Oklahoma State University, Stillwater, OK, USA)

FINALISTS FOR BEST SIPI STUDENT PAPER

TU-AM-6-SIPI **HIGH-SPEED
INTERCONNECTS - 1**

10:30AM

**Differential S-Parameter De-Embedding for
8-Port Network**

Bichen Chen (Missouri University of Science and Technology, Rolla, MO, USA); **Jiayi He** (Missouri University of Science and Technology, Rolla, MO, USA); **Xinglin Sun** (Zhejiang University, Hangzhou, China); **Yuandong Guo** (Missouri University of Science and Technology, Rolla, MO, USA); **Shuai Jin** (Missouri University of Science and Technology, Rolla, MO, USA); **Xiaoning Ye** (Intel Corporation, Hillsboro, OR, USA); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

11:00AM

**A 20 GHz Landing Probe Design based on
Pogo-Pins**

Xin Yan (Missouri University of Science and Technology, Rolla, MO, USA); **Yansheng Wang** (Missouri University of Science and Technology, Rolla, MO, USA); **Jianchi Zhou** (Missouri University of Science and Technology, Rolla, MO, USA); **Tun Li** (Convenient Power Systems, Chengdu, China); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

TH-AM-6-SIPI **HIGH-SPEED
INTERCONNECTS - 4**

10:30AM

**Differential Integrated Crosstalk Noise
(ICN) Mitigation in the Pin Field Area of
SerDes Channel**

Bichen Chen (Missouri University of Science and Technology, Rolla, MO, USA); **Junda Wang** (Missouri University of Science and Technology, Rolla, MO, USA); **Ying S. Cao** (Missouri University of Science and Technology, Rolla, MO, USA); **Muqi Ouyang** (Missouri University of Science and Technology, Rolla, MO, USA); **Yansheng Wang** (Missouri University of Science and Technology, Rolla, MO, USA); **Shuai Jin** (Missouri University of Science and Technology, Rolla, MO, USA); **Guangyao Shen** (Missouri University of Science and Technology, Rolla, MO, USA); **Xusheng Liu** (Huawei Technologies Co., Ltd, Shenzhen, China); **Xiping Peng** (Huawei Technologies Co., Ltd, Shenzhen, China); **Jun Fan** (Missouri University of Science and Technology, Rolla, MO, USA)

BEST STUDENT PAPER FINALISTS POSTER SESSION

Chair: Tzong-Lin Wu (National Taiwan University, Taipei City, Taiwan)

Co-Chair: Bob Scully (NASA Johnson Space Center and University of Texas at Arlington League City, Houston, TX, USA)

WEDNESDAY, AUGUST 1 • 3:30PM - 5:00PM

LOCATION

PROMENADE BALLROOM FOYER

Student Finalists will have the opportunity to display their papers in a Poster Session. Judges will be reviewing their papers in this session. Come meet the students and show your support for their efforts.

GLOBAL UNIVERSITY

LOCATION

PROMENADE 203C

Global EMC University was first offered at the 2007 IEEE EMC Symposium in Honolulu to provide advanced education on a variety of topics that are an important part of EMC engineering. The overwhelming response to this program caused the EMC Society to add it to the technical program every year since 2007. It has continued to receive high praise from those who attend. The Board of Directors had voted to name the Global University in honor of Clayton R. Paul, who dedicated his career to EMC/SI education and was instrumental in setting up the initial Global University. We are pleased to be able to offer Global University once again at the 2018 IEEE Symposium on Electromagnetic Compatibility, Signal and Power Integrity in Long Beach, California.

This year's Global University curriculum addresses developing skills for the engineer that needs an understanding of EMC and SI beyond the fundamentals, so that they are ready to use and apply the knowledge. The sessions are run in parallel with the traditional technical sessions at the symposium. Classes are taught by an international panel of educators, who have been selected for this program based on their reputation for excellence in areas of practical importance to EMC and SIPI, and their demonstrated ability to communicate effectively with students who are new to the field.

The targeted audience for Global University is engineers who have been in the profession approximately five years, although past classes have included many veterans wanting to improve their understanding. Attendees should have already been exposed to the material that is currently provided in the Fundamentals Tutorials offered each year by the Education Committee. The overall objective of this sequence of lectures and activities is to provide a comprehensive exposure to the concepts and skills that are necessary to be successful in the profession.

Global University Chair

Vignesh Rajamani - vignesh@ieee.org

SCHEDULE

TUESDAY, JULY 31 • 1:30PM- 5:45PM

Transmission Lines for High-Speed Signaling

Jun Fan, Missouri University of Science & Technology, Rolla, MO, USA

Radiated Emissions

Lee Hill, SILENT Solutions, LLC, Amherst, NH, USA

Power Integrity

Madhavan Swaminathan, Georgia Institute of Technology, Atlanta, GA, USA

WEDNESDAY, AUGUST 1 • 1:30PM- 5:00PM

Myth about Ground

Zhiping Yang, Google, Inc., Mountain View, CA, USA

System Design for EMC and SI

Todd Hubing, LearnEMC, Clemson University, Emeritus, Stoughton, WI, USA

THURSDAY, AUGUST 2 • 2:30PM- 5:00PM

PCB Design for EMC and SI

Bruce Archambeault, Missouri University of Science & Technology, Emeritus, IBM, Research Triangle Park, NC, USA

Ask the Experts

Panel - All Instructors

OTHER INFORMATION

A certificate of completion will be provided to students who have signed in and signed out each day thereby confirming 100% attendance at all lectures. CEUs will be assigned to this course.

PREREQUISITES

Engineering or Technology Degree with Electrical Theory

WHO IS IT FOR

Engineers, technicians and professionals who want to gain insight into EMC and SI technology.

REGISTRATION FEE

Attendance at the Clayton R. Paul Global University requires a \$300 registration fee in addition to the full Symposium registration fee. Fee information can be found on the main registration page. Note that on-site registration may not be possible and if available will be limited to openings due to cancellations.

WHO NEEDS A PDH?

Each year, licensed *Professional Engineers* (PEs) are expected to show continuing education. This is often done by earning PDH credits and submitting evidence to the individual State Board or Certifying Body to support the claim. Some U.S. states have strict requirements for their licensed PEs on what constitutes an eligible PDH, and the IEEE EMC Society has instituted a tracking system at the annual Symposium to help fulfill these requirements.

EMC+SIPI 2018 SYMPOSIUM

The IEEE EMC Society is offering PDH credit hours to EMC+SIPI 2018 Symposium registered technical attendees. Credit hours may be earned by participating in any combination of paper sessions, workshops & tutorials, Global University, and technical meetings.

REQUIREMENTS

The IEEE is required to collect evidence that the PDH candidate attended each session for which credit is claimed. Each PDH candidate is therefore expected to:

- Sign up for PDHs on the symposium registration form or at the Registration Desk
- Pay \$30 fee (free for EMC Society members; but must be a member at the time of registration.)
- Provide P.E. credentials or similar
- Sign in and out of each session outside each meeting room (scan your badge)
- Complete an evaluation form for each session that credit is claimed
- Submit all evaluation forms to EMCS.pdhcop@yahoo.com no later than the Friday following the symposium closing.

Note to attendee: if there are no badge scanners at the Technical Committee meetings, your statement will be honored if you attend a meeting.

The evaluation forms will complete the evidence needed for the PDH requirements, and enable you to summarize your attendance at the symposium. The total hours attended will be calculated along with the total number of PDH credits earned, and a PDH Certificate will be issued by the IEEE showing the total earned PDH credits.

NEED SOMETHING BASIC?

If all that you require is a signed **Certificate of Participation** to officially document attendance at the Symposium, these are now being offered free of charge to any attendee who requests one. Please visit the Registration Desk to pick up your personalized certificate.

RATES

Rate: \$30

Special for EMC-S members: Fee Waived (must be a member at time of registration)

WORKING GROUPS, COLLATERAL MEETINGS & SOCIAL EVENTS

SATURDAY, JULY 28

2:00 PM - 5:00 PM

- IEEE EMC Society Board of Directors Operational Planning Meeting
Shoreline A Hyatt Long Beach

6:00 PM - 10:00 PM

- IEEE EMC Society Board of Directors Executive Committee (ExCom) Meeting
Private Meeting

MONDAY, JULY 30

7:00 AM - 9:00 AM

- Technical Advisory Committee (TAC) Meeting #1
Room 103AB

8:00 AM - 11:00 AM

- SDECom Standards Development and Education Committee
Room 201B

9:00 AM - 11:45 AM

- ▲ iNARTE Workshop and Exam Preparation
Room 103C

11:00 AM - 12:00 PM

- SACCom Meeting Standards Advisory and Coordination Committee
Room 201B

TUESDAY, JULY 31

7:00 AM - 8:30 AM

- Technical Committee 2 EMC Measurements
Room 103C

7:30 AM - 9:00 AM

- Technical Committee 1 EMC Management
Room 202A

8:00 AM - 11:00 AM

- P2718 Guide for Near Field Characterization of Unintentional Stochastic Radiators
Room 201B

12:00 PM - 1:00 PM

- Special Committee 5 Power Electronics EMC
Room 201A

SUNDAY, JULY 29

8:30 AM - 5:00 PM

- IEEE EMC Society Board of Directors Meeting
Seaview AB Hyatt Long Beach

9:00 AM - 11:00 AM

- Tote Bag Stuffing
103C

12:00 PM - 1:30 PM

- Technical Committee 4 Electromagnetic Interference Control
Room 103AB

12:00 PM - 2:00 PM

- Standards WG Officer Education Working Luncheon
Room 201B

12:00 PM - 2:00 PM

- Chapter Chair Training & Luncheon
Room 201A

12:00 PM - 1:30 PM

- Technical Committee 7 Low Frequency
Room 202A

12:00 PM - 1:30 PM

- Technical Committee 9 Computational Electromagnetics Subcommittee
Room 103AB

12:00 PM - 1:30 PM

- Technical Committee 11 Nanotechnology & Advanced Materials
Room 103C

12:00 PM - 5:00 PM

- ▲ G46 EMC Subcommittee Meeting
Room 204

12:00 PM - 1:00 PM

- IEEE EMC Society Board of Directors Lunch
Seaview Rotunda

2:00 PM - 3:00 PM

- Photographer's Meeting
Room 103C

2:00 PM - 4:00 PM

- 1128 - Recommended Practice for Radio-Frequency (RF) Absorber Evaluation in the Range of 30 MHz to 40 GHz
Room 201B

4:00 PM - 6:00 PM

- IEEE EMC Young Professionals Networking Event
The Yard House Restaurant (\$5 Per Person)

5:45 PM - 6:30 PM

- IEEE EMCS Special Committee SC1 on Smart Grid
Room 103C

1:00 PM - 2:00 PM

- P2715 Shielding Effectiveness of Planar Materials
Room 201B

2:00 PM - 3:00 PM

- P2716 Guide for the Characterization of the Effectiveness of Printed Circuit Board Level Shielding
Room 201B

3:30 PM - 4:30 PM

- IEEE Std 1302 Guide for the Electromagnetic Characterization of Conductive Gaskets in the Frequency Range of DC to 40 GHz
Room 201B

6:00 PM - 8:00 PM

- EMC+SIPI 2018 Welcome Reception (Ticketed Event)
The Cove

ANCILLARY MEETINGS

TECHNICAL COMMITTEES

■ **EMC Society
Sponsored Meetings**

● **EMC Society Sponsored
Technical Committee Meetings**

▲ **Non-EMC Society
Sponsored Meetings**

WEDNESDAY, AUGUST 1

7:00 AM - 9:00 AM

■ **EMC EdCom -Education
Committee Meeting**
Room 201A

7:00 AM - 9:30 AM

▲ **Tile! Users Group**
Room 204

8:00 AM - 11:00 AM

■ **P1848 Techniques & Measures
to Manage Risks With Regard to
Electromagnetic Disturbances**
Room 201B

11:00 AM - 12:30 PM

■ **IEEE Std 1597.1 Standard for
Validation of Computational
Electromagnetics Computer
Modeling and Simulations**
Room 201B

11:30 AM - 1:30 PM

■ **Founders Luncheon**
Room 202C

12:00 PM - 1:00 PM

● **SC7 Aeronautics and Space EMC**
Room 201A

12:00 PM - 1:00 PM

● **Technical Committee 10 Signal
and Power Integrity**
Room 103AB

12:00 PM - 1:30 PM

● **Technical Committee 5 High
Power Electromagnetics**
Room 202AB

12:00 PM - 1:30 PM

■ **Young Professionals Luncheon
with Guest Speaker, Caroline Chan**
Rock Bottom Restaurant & Brewery
(Ticketed Event)

1:00 PM - 5:00 PM

■ **Youth Technical Program**
Room 103C

2:00 PM - 4:00 PM

■ **P2710 Electromagnetic Shielding
Performance of Enclosures for
Portable Electronic Devices**
Room 201B

6:30 PM - 9:30 PM

■ **EMC+SIPI 2018 Evening Gala
(Ticketed Event)**
The Queen Mary

THURSDAY, AUGUST 2

6:50 AM - 9:00 AM

■ **Team EMC Bike Ride**
Meet in front of the Hyatt Long Beach

7:00 AM - 8:30 AM

■ **Technical Committee 6 Spectrum
Engineering**
Room 103C

7:30 AM - 9:00 AM

■ **Exhibitor Breakfast**
Seaview Ballroom Hyatt Long Beach

8:00 AM - 12:00 PM

■ **P370 Electrical Characterization
of Printed Circuit Board and
Related Interconnects at
Frequencies up to 50 GHz
(standard editorial session)**
Room 201B

10:00 AM - 12:00 PM

■ **TEMC-AE Meeting**
Room 103AB

12:30 PM - 2:00 PM

■ **EMC + SIPI 2018 Awards
Luncheon (Ticketed Event)**
Grand Ballroom

1:00 PM - 4:00 PM

■ **SDECom Standards Development
and Education Committee
Wrap Up**
Room 201B

4:00 PM - 6:00 PM

■ **EMC+SIPI 2018 Symposium
Wrap Up Meeting**
Room 201A

5:30 PM - 7:30 PM

▲ **ITI Technical Committee 5**
Room 201B

6:00 PM - 9:00 PM

■ **EMC Board of Directors Dinner/
Meeting**
Beacon A with Rotunda
Hyatt Long Beach

FRIDAY, AUGUST 3

7:00 AM - 9:30 AM

■ **TAC Meeting 2**
Room 103 AB

8:30 AM - 1:30 PM

▲ **iNARTE Certification Exam**
Room 103C

12:00 PM - 2:00 PM

■ **EMC+SIPI 2019 Symposium
Coordination Meeting**
Room 103 AB

All EMC Society Sponsored Technical Committee (TC) and Special Committee (SC) meetings are open to attend by anyone with an interest in contributing to standards development.

EMC COVERED

What is happening in the world of EMC?

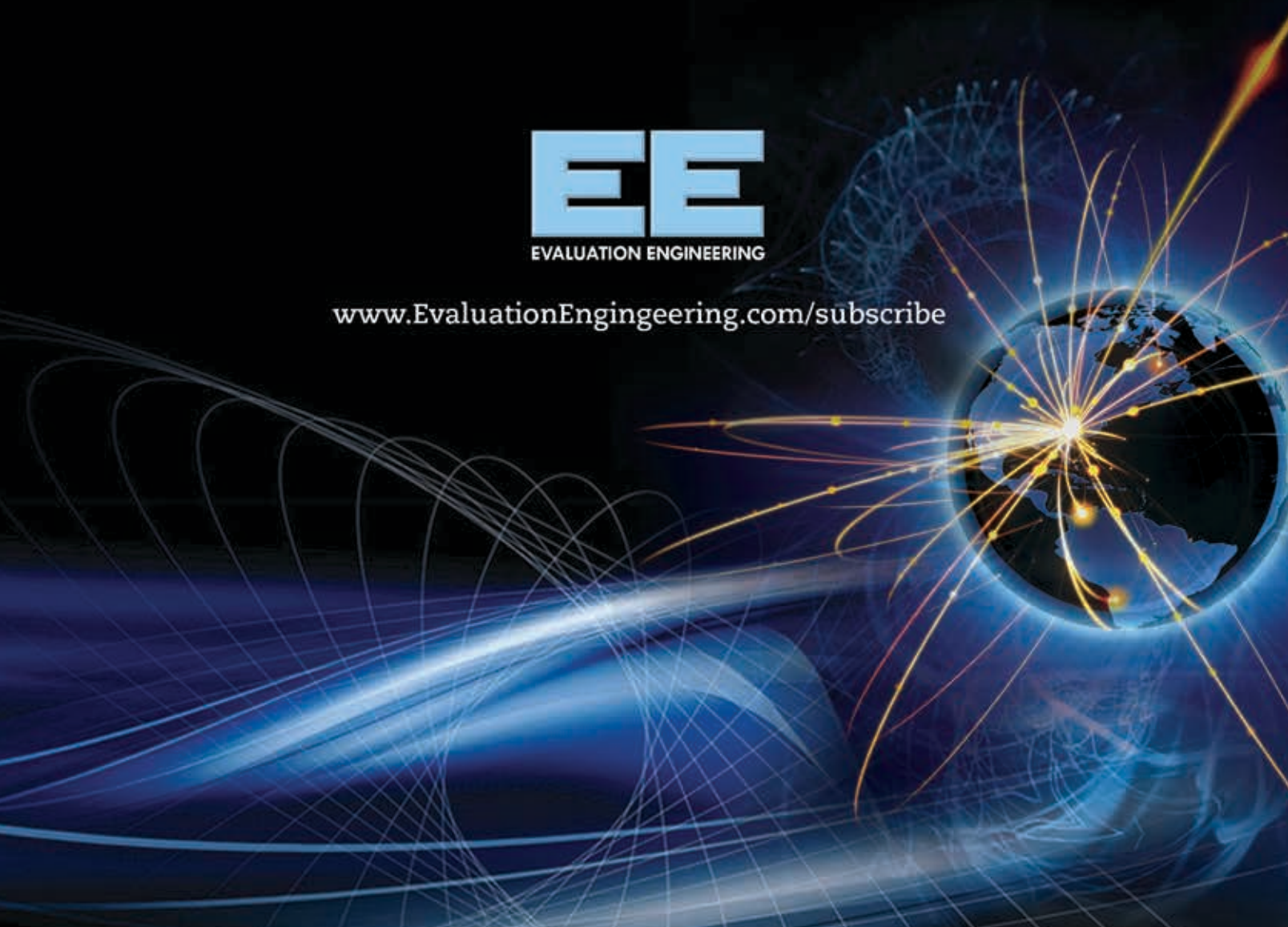
Find out by subscribing to the one magazine leading EMC engineers turn to for the latest on instrumentation, ATE, EMC test, RF and microwave, compliance, and test software in aerospace/defense, communications, medical, and automotive applications.

Attendees of EMC are qualified for a free annual subscription.

COME VISIT US AT BOOTH 232



www.EvaluationEngineering.com/subscribe



TC 1 EMC Management	This committee is concerned with the development and dissemination of Best Practices and Methodologies for the successful leadership, supervision and guidance of EMC related activities. These Best Practices and Methodologies shall be structured so as to provide assistance to all managers, and engineers. Appropriate and convenient tools shall serve as a foundation for these Best Practices and Methodologies.
TC 2 EMC Measurements	The committee reviews the adequacy of measurement procedures and measurement instrumentation specifications for radiated and conducted emission and immunity tests. Also discussed is the rationale for product emission limits and immunity test levels including performance requirements. The committee also supports EMC standards and procedures that deal with measurements and how they are interpreted.
TC 3 Electromagnetic Environment	This committee is to encourage research in the following areas: electromagnetic environment (EME), development of standards for EME measurement and characterization, natural and man-made sources of electromagnetic environment that comprise this environment, effects of noise (unwanted portions of EME) on systems performance, effects of international civil and military standards intended to control man-made intentional and unintentional emissions of electromagnetic energy.
TC 4 Electromagnetic Interference	This committee is concerned with design, analysis, and modeling techniques useful in suppressing interference or eliminating it at its source. Bonding, grounding, shielding, and filtering are within the jurisdiction of this committee. These activities span efforts at the system, subsystem, and unit levels.
TC 5 High Power Electromagnetics	This committee is concerned with the effects and protection methods for electronic equipment and systems for all types of high power electromagnetic environments. These environments include electromagnetic pulse (EMP), intentional EMI environments (i.e., narrowband and wideband), lightning electromagnetic currents and fields, electrostatic discharge and geomagnetic storms. In addition this committee deals with the commercial data security issue through electromagnetic information leakage activities. Interactions with subsystems, systems and platforms are included.
TC 6 Spectrum Engineering	This committee is concerned with the analysis, design, and measurement techniques for intentional RF transmitting and receiving equipment to prevent interference and promote efficient spectrum use through technology and operational based approaches, such as software design, dynamic spectral allocation, waveform control, as well as frequency coordination and management procedures.
TC 7 Low Frequency EMC	This committee is concerned with low-frequency EMC including Power Quality in electric power systems. The committee is focusing on the application of fundamental EMC concepts also to low-frequency conducted disturbances. EMC in power systems is expected to be increasingly important. This is due to increased use of electronics in renewables, electric vehicles, energy efficient technologies and Smart Grid applications.

**TC 9
Computational
Electromagnetics**

This committee is concerned with broad aspects of Applied Computational Electromagnetic techniques which can be used to model electromagnetic interaction phenomena in circuits, devices, and systems. The primary focus is with the identification of the modeling methods that can be applied to interference (EMC) phenomena, their validation and delineating the practical limits of their applicability. Included are low and high-frequency spectral-domain techniques and time-domain methods.

**TC 10
Signal/Power
Integrity**

This committee is concerned with the design, analysis, simulation, modeling and measurement techniques useful in maintaining the quality of electrical signals and power distribution network in printed circuit boards, ICs and within systems. These activities encompass all aspects of signal and power integrity from the integrated circuit level to the system level.

**TC 11
Nanotechnology and
Advanced Materials**

Concerned with modeling, simulation and experimental characterization of nanomaterials and nanodevices for EMC applications. Nanotechnology is the understanding and controlling of matter at atomic and molecular scale.

Nanotechnology has already found its way into various EMC applications. New materials such as single- and multi-phase composites filled with nanoparticles, nanotube and/or nanofibres have been designed and tested for gaskets and absorbing screens with outstanding performance and capabilities. Innovative nanostructured shields have shown multifunctional properties and higher efficiency than commonly used materials. Nanowires for high speed interconnects and high density integrated systems, could replace copper in the near future, but require adequate modelling and simulation approaches for signal integrity and also to avoid electromagnetic interference problems.

**TC 12
EMC for Emerging
Wireless Technologies**

This committee is concerned with the EMC design, analysis, modeling, measurement, and testing aspects of emerging wireless products. The committee encourages research including but not limited to the following areas:

Innovative Wireless Component Design for System Integration:
Wireless component design with integrated EMC functions and/or meeting certain EMC specifications.

Radio-Frequency Interference and De-sense: Characterization and mitigation of interference from digital circuits to wireless antennas.

Measurement & Testing of Wireless Systems:
Development of methods and standards for wireless performance and compliance testing.

Wireless Coexistence:
Interference control/mitigation among various wireless radios, as well as related testing methods and standard development

Wireless Product or Subsystem EMC:
Wireless-specific EMC design

RF & Microwave Amplifier

—for Electromagnetic Compatibility—

R&K is one of the world's leading manufacturers supplying Solid-State RF Power Amplifiers.



R&K - A101K501-5353R

- All Solid-State
- A or AB Class operation
- High Linearity
- Low Harmonics
- Low Distortion
- Both CW and Pulse are available
- High durability against load mis-matching

Best 2 Choices for Your BCI Test!

A009K401 Series 9kHz~400MHz

MODEL	Frequency	P1dB	AC Supply Input	Size(H, D)	Weight
A009K401-4646R	9kHz~400MHz	40W	100~240V/1 ϕ , 500VA	3U, 450mm	14kg
A009K401-4848R	9kHz~400MHz	60W	100~240V/1 ϕ , 800VA	4U, 650mm	30kg
A009K401-5050R	9kHz~400MHz	100W	100~240V/1 ϕ , 1.5kVA	5U, 650mm	32.5kg
A009K401-5353R	9kHz~400MHz	200W	170~230V/1 ϕ , 3kVA	9U, 650mm	65kg
A009K401-5656R	9kHz~400MHz	500W	170~230V/1 ϕ , 5.5kVA	16U, 853mm	185kg

A101K501 Series 100kHz~505MHz

MODEL	Frequency	P1dB	AC Supply Input	Size(H, D)	Weight
A101K501-4646R	100kHz~505MHz	40W	100~240V/1 ϕ , 500VA	3U, 450mm	14kg
A101K501-4848R	100kHz~505MHz	60W	100~240V/1 ϕ , 800VA	4U, 650mm	30kg
A101K501-5050R	100kHz~505MHz	100W	100~240V/1 ϕ , 1.5kVA	5U, 650mm	32.5kg
A101K501-5353R	100kHz~505MHz	200W	170~230V/1 ϕ , 3kVA	9U, 650mm	64kg

R&K Broadband RF Power Amplifier Series Line Up

Series	Frequency	Output Power
A009K251	9kHz~250MHz	25W~12kW
A009K401	9kHz~400MHz	25W~500W
A101K501	100kHz~505MHz	25W~250W
A001M102	1MHz~1GHz	10W~100W
A080M102	80MHz~1GHz	75W~4kW
A501M272	500MHz~2.7GHz	5W~120W

Series	Frequency	Output Power
A801M202	800MHz~2GHz	10W~2kW
GA102M252	1GHz~2.5GHz	50W~2kW
A202M402	2GHz~4GHz	10W~50W
GA701M402	690MHz~4GHz	5W~800W
GA701M602	700MHz~6GHz	10W~200W
GA252M602	2.5GHz~6GHz	10W~300W

www.rk-microwave.com

Headquarters

R&K Company Limited
 721-1 Maeda, Fuji-City, Shizuoka, 416-8577 Japan
 Tel: +81-545-31-2600 Fax: +81-545-31-1600
 Email: info@rkco.jp

US Sales Partner

CORNES Technologies USA

CORNES Technologies USA
 780 Montague Expy. Ste. 506 San Jose, CA 95131-1319 USA
 Tel: +1-408-520-4550 Fax: +1-408-520-4551
 Email: rkproducts@cornestech.com <http://www.cornestech.com>

SC 1
Smart Grid

This special committee is concerned with coordination of the EMC Society activity on providing EMC principles for those organizations and associated documentation and specifications that address the efficient use of the AC power grid including the control of power entering and in some cases exiting a house or building.

SC 5
Power Electronics EMC

This committee is concerned with power electronics converters EMI/EMC issues. These are mainly, converters that use switching frequency schemes to control the output parameters, such as voltage and current. These converters, including inverters, can be found as an interface between the raw power and the electrical grid to provide the end-user with the desired operating power. Applications can range from grid-connected PV systems, wind farms, automotive, aerospace, and communication systems.

SC 6
Unmanned Aircraft Systems EMC

This committee is concerned with design, testing, modeling/simulation required for system level EMC for unmanned aircraft systems that will be engaged in all weather autonomous single and cooperative flight. Special emphasis is on spectrum management on intra and inter-system interactions (platform integration), mission specific data security and bandwidth requirements, and robust performance in the presence of high-intensity radiated fields (HIRF). Engagement in the development of standards will be a key role of this special committee.

SC 7
Aeronautics and Space EMC

This committee is concerned with EMI/EMC issues in aircraft, spacecraft & space launch vehicles, robotic and crewed. The space environment provides unique challenges in the design, development, test and operation of space systems to avoid EMI and achieve EMC. Aeronautics & space EMC covers a wide range of topics on the part, board, box, system, multi-system, planetary and interplanetary levels. The harshness of the atmospheric, launch and space environments necessitates a broader view of EMC issues than traditional terrestrial projects, often leading to creative methods and solutions that can benefit our society's efforts elsewhere on Earth.



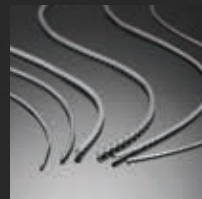
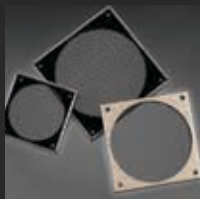
40 YEARS
ANNIVERSARY

EXCELLENCE BY DESIGN

CELEBRATING 40 YEARS OF INSPIRATION IN EMI GASKETS

- Visit Spira at EMC+SIPI 2018 in Long Beach, CA - Booth #629
- *40th Anniversary Celebration* at our booth on Tuesday, 7/31/18 @ 3-5pm

Spira was featured as one of the World's Greatest in EMI Gaskets and Shielding Products in 2017. Find out why the top manufacturers in the world choose Spira when they need the best and most reliable EMI/RFI Shielding Gaskets and Honeycomb Filters. Spira offers exceptional products, superior customer service, on-time delivery, and expert technical support.



www.spira-emi.com • (818) 764-8222 • info@spira-emi.com

COMPLIANCE TESTING OF WIRELESS DEVICES AND UNINTENTIONAL RADIATORS

(Visit www.c63.org for more information)

This workshop provides an overview of the current proposed changes to the standard C63.10 for unlicensed transmitter testing and the standard C63.26 for licensed transmitter testing. There will be specific emphasis on new procedures. These two standards capture most of the procedures for testing unlicensed and licensed wireless devices to show compliance with FCC requirements. Group discussions will be a highlight of the wireless workshop. A demonstration will supplement the lecture material, time permitting. The instructors are members of ANSI ASC C63®; they have an intimate knowledge of the technology and contributed directly to the development of these procedures.

This one-day workshop will cover many of the traditional and updated procedures in C63.10-201X and in C63.26-201X including:

- Instrumentation requirements
- Average value of pulse emissions
- Antenna requirements
- Test site requirements
- RF output power measurements
- Modulation measurements
- Occupied bandwidth procedures
- Band-edge procedures
- Direct and signal substitution radiated emission measurements
- Frequency stability measurements
- Conducted tests at antenna port
- Smart antenna system tests
- Revised MIMO procedures
- Annexes covering example of OOB masks, consumer booster requirements, ERP/EIRP guidelines, path loss characterization, sample test report, compliance tests versus regulatory requirements and other informative guidance

Who Should Attend

Those responsible for determining compliance with FCC Rules and Regulations, including:

- Product managers and developers
- EMC engineers and test technicians
- Regulatory compliance managers
- Test instrumentation developers
- Calibration and measurement accreditation bodies
- Lab quality assessors
- Test instrumentation and chamber manufacturers

Date and Location

Saturday, July 28, 2018

Element Materials Technology - 41 Tesla, Irvine, CA 92618 - +1 949-861-8918

Host Hotel – Hyatt Regency Long Beach

[See EMC Symposium website for details.](http://www.c63.org)

Expert Instructors

Mark Briggs, UL Director, Wireless Certification Program and **Bob DeLisi**, UL Principal Engineer. Speaker bios are available at: www.C63.org/workshops.

Fee Includes

Shuttle service to/from Element and the symposium host hotel, continental breakfast, lunch and refreshment breaks, and completion certificates. Soft copy of workshop notes only will be provided. (Fee does NOT include draft or published standards.)

Agenda

C63.10/C63.26 Wireless Workshop - All day, Saturday, July 28, 2018

July 28: Registration: 8:30 am - Class: 9:00 am to 5:00 pm

Contact: Janet O'Neil

REGISTRATION FORM

Telephone: +1 425-443-8106

Email: j.n.oneil@ieee.org

(Please print legibly or type)

CLICK HERE FOR A PRINTABLE REGISTRATION FORM

Ms./Mr. _____
Company _____
Address _____
City _____ State _____ Zip _____
Daytime Phone _____
Email _____

C63.10/26 Workshop: July 28 (Saturday - all day)
By June 15* \$750 USD _____
Add \$150 if registered after June 15 \$150 USD _____

Total ** \$ _____ USD

*Please do not mail after July 10.

**A 20% discount applies to ANSI ASC C63® main committee and subcommittee paid members.

NOTE: You are not registered until you receive confirmation. On site or "at the door" registrations can only be accepted with prior telephone or email confirmation only.

PAYMENT OPTIONS:

ON LINE: To pay on line, send an email to j.n.oneil@ieee.org along with a scan of this completed registration form. An invoice will be returned to you via email which you can use to pay on line with your credit card.

CHECK: Make check payable to U.S. EMC Standards Corporation in U.S. dollars drawn on a U.S. bank. Mail to:

Dan Hoolihan
P.O. Box 367
Lindstrom, MN 55045

Please visit www.c63.org/workshops.htm for more information on ANSI ASC C63®, this workshop, and speaker biographies.

The organizing committee reserves the right to substitute speakers, modify the program (or lecture notes), restrict attendance or to cancel the workshop. In the event the workshop is canceled, registration fees will be refunded. No refunds will be made to individuals who cancel after June 15. Substitutions are allowed. Workshops without a minimum of six attendees signed up by 27 June 2018 will be cancelled and registration fees returned. It is suggested that you book refundable travel arrangements as appropriate if the workshop is cancelled.



Join iNARTE at the Beach

The staff of iNARTE cordially invite you to join us at the annual EMC Society symposium in Long Beach, California. We will be exhibiting at the event from July 30-Aug 3 and would love to meet with you to discuss how iNARTE certification can help you in your career. We invite you to stop by and learn about the improvements made to the certifications and the new certifications coming. We will be running a pre-exam workshop on Monday, July 30, to help you prepare for and take the iNARTE EMC Engineer and Technician examinations, which will be held on Friday, August 3. As an added bonus for those who attend the training session, we will be giving out practice exam questions to help you study for the exam.

REGISTER FOR AN EXAM AT THE SYMPOSIUM AND RECEIVE 20% OFF APPLICATION FEES!

Prepare for iNARTE Exams:

Monday, July 30

This is a free workshop for anyone who is interested in taking an iNARTE exam. The primary focus will be on EMC but the information provided will be applicable to all exams and practice questions will be available for all certifications.

The workshop will cover:

- The scope of the exam
- Exam strategies
- Sample questions with a walk through on solving
- Question and answer session
- Additional practice questions to take with you

Register 3 ways:

1. Call 1-800-89NARTE (1-800-896-2783).
2. Visit www.inarte.org and register. Reply to the registration email that you are taking the exam in Long Beach.
3. Register on site during the symposium.

iNARTE Certification Examinations:

Friday, August 3

The iNARTE EMC, ESD, EMC Design, and Product Safety exams for all grades will be held at the symposium from 9:00 a.m. to 1:00 p.m. on Friday, August 3.

Additional information:

Also available during or after the symposium are our online exam options. Sit for your iNARTE exam in the comfort of your home or hotel room.



iNARTE Inc.

600 N Plankinton Ave.

Milwaukee, WI 53203

Phone (800) 896-2783

www.inarte.org

RENT EMC TEST EQUIPMENT

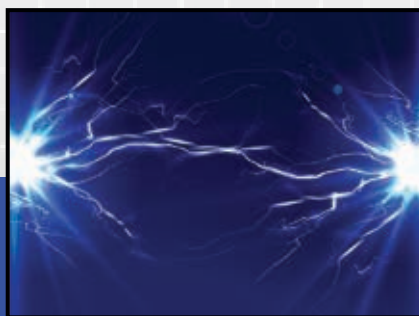
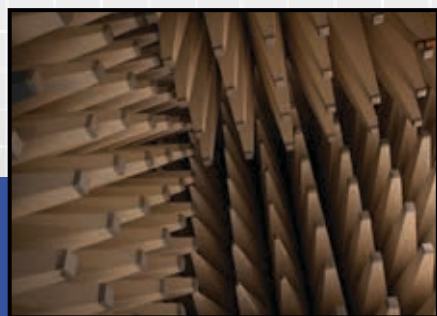
TO MEET A VARIETY OF STANDARDS

MIL-STD-461 • DO-160 • IEC 61000
IEC 60601-1-2 • ANSI C62 • ISO 7637
MIL-STD-1275 • CISPR and more...

FROM THE LARGEST SUPPLIER OF EMC TEST EQUIPMENT

Amplifiers • ESD Guns • EMI Receivers
Signal Generators • Power Meters
Field Probes & Monitors • Antennas
and more...

Rent TODAY!



**Advanced Test
Equipment Rentals**

The Knowledge. The Equipment. The Solution.

888-544-ATEC (2832)

www.atecorp.com

MEET AND NETWORK WITH LIKE-MINDED INDIVIDUALS

Network with your peers and other top industry professionals throughout the week during numerous planned events!



Photo by Kelly Scott-Olson

WELCOME RECEPTION

The Welcome Reception is a networking event to socialize and get to know the other attendees. Food will be provided with a Local Southern California Food Truck theme.

EVENING GALA

The EMC+SIPI 2018 Gala will be hosted on the historic Queen Mary, an icon in Southern California. Dinner will be served in the Grand Salon, followed by dessert on the Veranda Deck.

AWARDS LUNCHEON

Come celebrate the achievements of your colleagues during our annual awards luncheon ceremony.

SPECIAL NETWORKING OPPORTUNITIES

- **Chapter Chair Training Session and Luncheon**
Learn best practices, discuss concerns and opportunities with other Chapter Chairs.
- **Founders and Past Presidents' Luncheon**
Exchange ideas and experiences with other leading members of the society.
- **Young Professionals Socials**
Participate in the Young Professionals events at The Yard House and Rock Bottom Restaurant & Brewery.
- **Team EMC Bike Ride**
Go for a morning bike ride around beautiful Long Beach, California.

**EMC+SIPI 2018
SPECIAL DISCOUNT RATE FOR
AQUARIUM OF THE PACIFIC!**

Visit the Aquarium of the Pacific for only \$9.00 (regular price \$29.95) after 12:00pm when you present your convention badge at the ticket window.

TUESDAY, JULY 31, 2018
6:00pm - 8:00pm

WELCOME RECEPTION • THE COVE AT THE LONG BEACH CONVENTION CENTER

The Welcome Reception is a networking event to socialize and get to know the other attendees. With the symposium in Long Beach, we couldn't pass up the chance to test out some of Southern California's most coveted food trucks. Attendees will have the opportunity to indulge their guilty pleasures with local delicacies in the most basic way. Along with unique So Cal entertainment, we are looking forward to a night of fun, friendship and delicious food.

One ticket to this event is included in all 5-Day technical registrations and the Companion Program registration. Extra tickets for students and guests are available on a first-come, first-served basis for \$90 each or \$40 for youth attendees.



\$90 (adult)/ \$40 (Jr)

"THE COVE"

is Southern California's premier street party venue. It occupies the area in front of the Seaside Meeting Rooms below the Terrace Theatre and provides our guests with a unique under-the-pier fantasy scene.



To see more of this exciting venue, watch "THE COVE" video.

WEDNESDAY, AUGUST 1, 2018
6:30pm - 9:30pm

EVENING GALA • THE HISTORIC QUEEN MARY

We are excited to announce that the EMC+SIPI 2018 Gala will be hosted on the historic Queen Mary, an icon in Southern California. Dinner will be served in the Grand Salon, followed by dessert on the Veranda Deck.

One ticket to this event is included in all 5-Day technical registrations EXCEPT student registrations. This is a change from previous years, made to keep student registration costs down. Extra tickets for students and guests are available on a first-come, first-served basis for \$110 each or \$50 for youth attendees.



\$110 (adult)/ \$50 (Jr)

Photo by Richard Georgerian

THURSDAY, AUGUST 2, 2018
12:30pm - 2:00pm**AWARDS LUNCHEON • GRAND BALLROOM**

The Awards Luncheon is a wonderful opportunity to recognize achievements and network with families and EMC professionals from academia, industry, government, military, and retired sectors. The event will start off with a catered sit-down meal. Afterwards, the EMC Society will take time to recognize members and non-members for their contribution to the Society and for professional excellence.

The list of anticipated awards:

- EMC Society President's Memorial Award
- Richard R. Stoddart Award for Outstanding Performance
- Lawrence G. Cumming Award for Outstanding Service
- Hall of Fame Award
- IEEE Fellow Award
- Technical Achievement Award
- Honored Member Award
- Richard B. Schulz Transactions Prize Paper Award
- Motohisa Kanda Award for Most Cited (2011-2016) Transactions on EMC Paper
- Best Symposium Paper Award
- Best Symposium Student Paper Award
- Best Student Design Award
- IEEE James C. Klouda Memorial Scholarship Award
- Chapter Founder Award
- Most Improved Chapter Award
- Chapter of the Year Award
- Symposium Chair Award
- Certificate of Acknowledgement
- Certificate of Recognition
- Certificate of Appreciation

\$65 (adult)/ \$40 (Jr)**MONDAY, JULY 30, 2018**
12:00pm - 1:30pm**CHAPTER CHAIR TRAINING SESSION AND LUNCHEON • ROOM 201A**

Photo by Karthik Vepuri

The Chapter Chair Training Session provides a forum for focused training to the Chapter Chairs, the opportunity to discuss chapter issues and get group feedback. Additionally, the session gives the Chapter Chairs the opportunity to meet other Chapter Chairs from around the world and for the Chapter Coordinator to disseminate important information from IEEE headquarters and the EMC Society Board of Directors.

A Social Session will precede the Luncheon to give the Chapter Chairs the opportunity to socialize with the other Chapter Chairs and their Angels.

The Luncheon will be served at the end of the Social Session. Besides a great meal, each Chapter Chair or their representatives will have the opportunity to share what their chapter has been doing for the past year.

After the Luncheon, an interactive brainstorming session will conclude the meeting. This session is intended to allow participants to exchange information and new ideas for effective chapter management, as well as to discuss best practices and suggestions for future development and growth of the EMC chapters.

This is a free event open to Chapter Chairs or their representatives. Please check with your Chapter Chair, as you can be that representative for your chapter if your Chapter Chair cannot attend this event.

WEDNESDAY, AUGUST 1, 2018
11:30am - 1:00pm**FOUNDERS AND PAST-PRESIDENT LUNCHEON • ROOM 202C**

Photo by Jerry Ramie

This Luncheon is open to the Founders of the EMC Society, Past-Presidents of the EMC Society, and current members of the Board of Directors. The luncheon is a chance for the old and the new to mix, exchanging experiences of the past and challenges of the future relative to the EMC profession. A sit down lunch is provided. Founders and Past-Presidents should inform the Chair of the History Committee (danhoolihanemc@aol.com) of their interest in attending so there will be seating and food available for all.

IEEE YOUNG PROFESSIONALS

You are automatically enrolled in IEEE Young Professionals (YP) if you have received your bachelor's degree within the last 15 years. IEEE YP is a transition place for young professionals and new graduates. The IEEE Young Professionals mission is to inspire, energize, empower, and engage young professionals to envision and realize their dreams.



Photo by Jerry Ramie

MONDAY, JULY 30, 2018
4:00pm - 6:00pm

YP NETWORKING EVENT • THE YARD HOUSE

Get to know the other young members of EMC Society and come along with the local YP affinity group from Coastal LA and Orange County! All Young Professionals (BS within 15 years) and Undergraduates are invited for some food and socializing at our Networking Event at the Yard House. The social will feature a speed networking event with eight to ten seasoned professionals for the YP's to network with in three-minute sessions.



Photo by Jerry Ramie

\$5.00

WEDNESDAY, AUGUST 1, 2018
12:00pm - 1:30pm

YP LUNCHEON • ROCK BOTTOM RESTAURANT & BREWERY

EMC engineer, Caroline Chan will be presenting "The Power of Body Language" at the Rock Bottom Restaurant & Brewery. You will have time to socialize with your peers during lunch, immediately followed by the presentation.



Photo by Richard Georgerian

\$15 (INCLUDES LUNCH)

Dayton T. Brown, Inc. provides a wide range of laboratory and on-site simulation testing services. Testing is performed in accordance with the latest standards and specifications.

EMI/EMC Dynamics Environmental Structural



Product Life Cycle Support Services
Serving Military and Commercial Markets
Since 1950



Please direct all inquiries to: 1-631-244-6203 • email haim@dtb.com Visit our web site at: www.dtb.com

**ISO 9001:2008
Registered**

1195 Church Street, Bohemia, NY 11716-5014 USA



* Accredited Test Lab
767.01, 767.02, 767.03

* Please visit www.dtb.com for testing covered under our scopes of accreditation.

WEDNESDAY, AUGUST 1, 2018
1:00PM - 5:00PM

YOUTH TECHNICAL PROGRAM • PROMENADE 103C



The theme of the 2018 YTP will be Communication. Please join us as we explore how EMC impacts the way we communicate not only around the world, but also with people and spacecraft in outer space.

The YTP will include a curated tour of the exhibitor's hall, a brief presentation introducing key-concepts of electromagnetic compatibility, and a hands-on circuit building activity. Keeping with the theme of Communication, participants will build a model of a Deep Space Network tracking antenna, complete with a built-in motor, allowing the antenna to track objects crossing its path.

We encourage all interested participants to register for the Youth Program so that adequate materials can be prepared. The Youth program is recommended for ages 8 to 19. Younger children are welcome if accompanied by an adult or older, responsible sibling.

Stephanie Zajac
Youth Program Chair
stephzajac@gmail.com

Sponsored by
Bruce Archambeault



Photos by Jerry Ramie

THURSDAY, AUGUST 2, 2018
7:00am

TEAM EMC BIKE RIDE • MEET IN FRONT OF THE HYATT AT 6:50AM

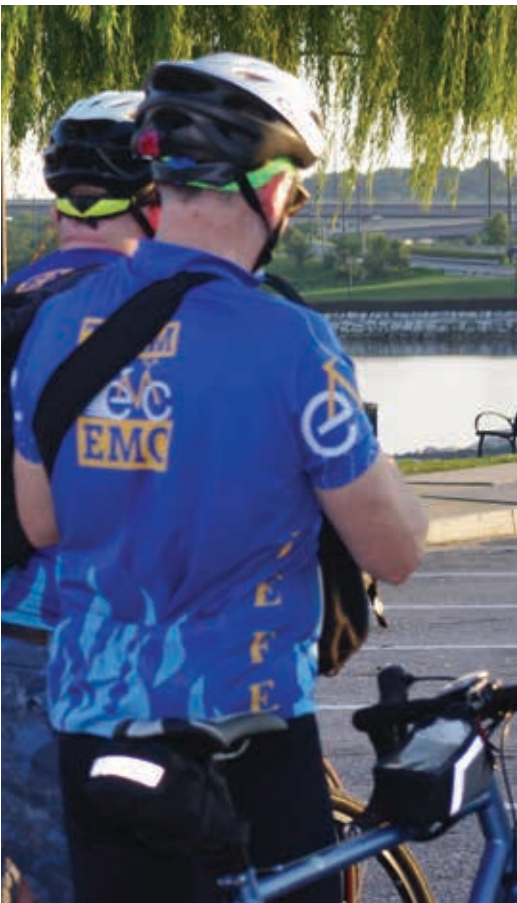


Photo by Beth Scully

Interested in exploring some of Long Beach, California on bike with your fellow EMCS members? Join us for the 7th annual Team EMC bike ride and experience the area in a refreshing way. We will host two levels of escorted riding: Leisure and Performance. This year's route includes several options: paved bike path along the beach, surface streets along the Alamitos Peninsula to a turnaround at Alamitos Park, Rainbow Harbor and the Los Angeles River Bike Path. The Performance ride is approximately 20 - 30 miles or about 1.5 to 2.0 hours. Portions of the ride are easily shortened since much of this is an out and back type route, so the Leisure riders will turn around and head back at an agreed upon location.

A Team EMC jersey will be included for 1st-time participants on a first come first serve basis, while quantities last. Rental bikes are available from Cloud of Goods with delivery to the Hyatt on Wednesday night (rental includes a hybrid bike, helmet and lock). Synaptic Cycles offers rentals of higher grade road bikes with delivery and pick-up, but a 4-day minimum rental is required.

Cloud of Goods -

www.cloudofgoods.com/rentals/men-s-hybrid-bike-32

Phone: 415-634-9141

Synaptic Cycles - www.synapticcycles.com/los-angeles-county

Phone: 949-374-6079

It is the responsibility of the rider to arrange the rental. Cycling helmets are required. This is an open ride, so no need to sign up, simply show up ready to ride.

For additional information, please contact
John LaSalle (john.lasalle@ieee.org)
or Ray Adams (r.k.adams@ieee.org) or (310) 387-7201

Searching for an Easy Way to Watch the EMC Community?

Read ENR!

In Digital or Print

Phone: 1-814-466-6559

or

Visit www.7ms.com

With Exclusive Advice
from EMC Engineers with
50+ Years of Experience



Dr. E. Thomas Chesworth, PE
Technical Editor



PRE-COMPLIANT FULLY AND SEMI ANECHOIC CHAMBERS

The pre-compliant chambers are well suited as a test site for tabletop and freestanding EUT. Cost reduction is achieved through the efficient modular design of the CDC. The excellent NSA performance of this chamber provides designers with confidence that compliance testing will be a success.

AP Americas is one of the leading global manufacturers of anechoic chambers and shielded rooms for various applications in EMC, antenna testing and high-frequency technology. Our expertise lies in the development, design and realization of test environments to verify the electromagnetic compatibility of your products according to national and international requirements. Tell us what you need – we'll have the solution.

EXPLORE THE EXHIBIT HALL AND LEARN ABOUT NEW TECHNOLOGIES, INSTRUMENTATION, AND SOLUTIONS THAT SERVICE THE INDUSTRY



Photo by Richard Georgerian

WHAT'S HAPPENING IN THE EXHIBIT HALL?

- Explore and learn from over a hundred top suppliers
- Attend Ask the Experts Speaker Panels and get your questions answered
- Enjoy Experiments and Demonstrations
- Visit exhibitor booths to participate in raffles and daily prizes

EXHIBIT HALL HOURS

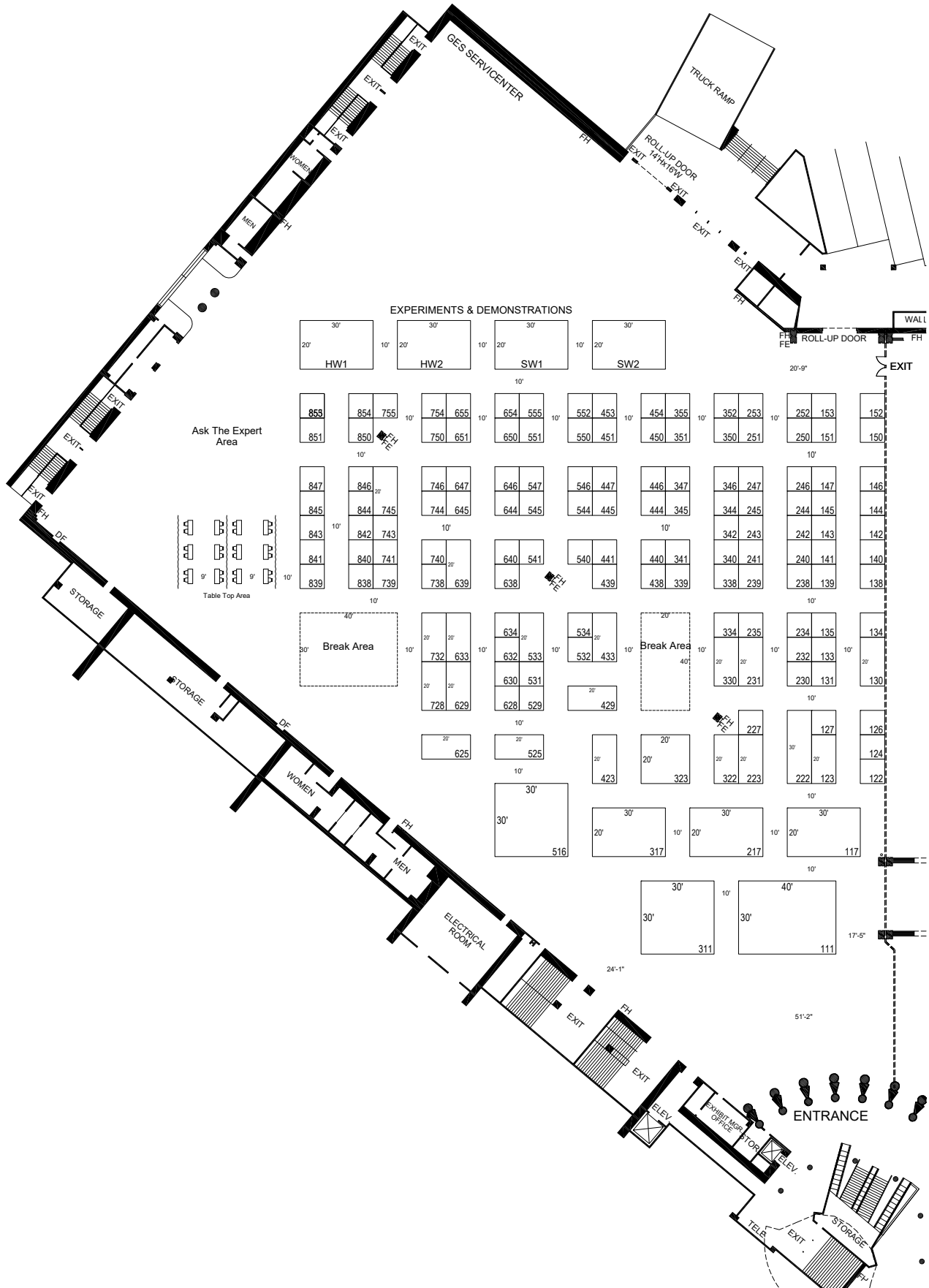
Tuesday, July 31st
10:00am-5:00pm

Wednesday, August 1st
9:00am-5:00pm

Thursday, August 2nd
9:00am-12:00pm

Entry to the Exhibit Hall is FREE!





DISCOVER OUR EXHIBITORS!

See our interactive floorplan, learn about our exhibitors and plan to visit their booth.



3ctest / The EMC Shop	423	IEEE 2019 EMC Symposium	130
A.H. Systems, Inc.	222	IEEE Antennas and Propagation Society / IEEE APS	4
A2LA - American Association for Laboratory Accreditation	840	IEEE EMC Society	134
Advanced Test Equipment Rentals	743	IEEE EMC Society History Committee	126
AE Techtron, Inc.	227	IEEE EMC Society Standards	138
A-Jin Electron	545	IEEE Product Safety Engineering Society (PSES)	124
Allied Powers LLC	244	In Compliance Magazine	429
Altair Engineering Inc.	625	iNARTE	140
Amber Precision Instruments, Inc.	145	ITEM Media	525
AMETEK CTS US	516	Jiangsu WEMC Technology Co.	131
Amphenol Canada Corp.	230	Johanson Dielectrics	240
ANSI Accredited Standards Committee C63®	127	KEMET / TOKIN	639
ANSI-ASQ National Accreditation Board (ANAB)	747	L3 Narda Safety Test Solutions	533
ANSYS	630	Langer EMV-Technik GmbH	341
Applied Physical Electronics	646	Leader Tech Inc.	139
AR RF/ Microwave Instrumentation	111	LUMILOOP GmbH	644
Astroseal Products Mfg Corp.	135	Mesago Messe Frankfurt GmbH	234
Avalon Test Equipment Corp.	241	Michigan Scientific Corporation	739
Beijing Safety Test Technology Co., Ltd.	345	MVG (Microwave Vision Group)	633
Bomatec International Corp.	1	National Technical Systems (NTS)	838
Cadence Design Systems	347	Nemko USA, Inc.	9
Changzhou Pioneer Electronic Co.Ltd.	632	Newtons4th NA	239
Compatible Electronics, Inc.	445	Nexio Technologies	438
Com-Power Corporation	330	Noisewave Corporation	242
CPI (Communications & Power Industries)	541	NVLAP	741
CST of America	323	Oak-Mitsui Technologies	122
D.L.S. Electronic Systems Inc.	235	Ophir RF Inc.	728
Dayton T. Brown, Inc.	738	Pearson Electronics Inc.	440
Detectus	640	PPG Aerospace / Cuming Lehman Chambers	334
Dexmet Corporation	839	QAI Laboratories	12
East Coast Shielding	446	R&K Company Limited	746
EE - Evaluation Engineering	232	Raymond EMC Enclosures Ltd.	544
Element Materials Technology	532	Reliant EMC LLC	444
Elite Electronic Engineering Inc.	634	RF Exposure Lab	531
EMA, Inc.	346	Rigol Technologies	322
EMC Europe 2019 Barcelona International Symposium	7	Rohde & Schwarz USA, Inc.	317
EMC Sapporo & APEMC 2019	3	Safety & EMC China	5
EMCoS Ltd.	439	Schlegel Electronic Materials Inc.	339
EMCTV	231	Select Fabricators	238
EMI Solutions Inc.	744	Shielding Integrity Services Inc.	243
Empower RF Systems	433	Shimifrez Inc.	246
ENR / Seven Mountains Scientific, Inc.	2	Siglent Technologies	344
EOS/ESD Association, Inc.	141	Simyog Technology	11
ESDEMC Technology, LLC	841	Spira Manufacturing Corporation	629
E-Song emc co., Ltd.	133	TDK-Lambda Americas	529
ETS-Lindgren	311	TDK RF Solutions, Inc.	847
Exodus Advanced Communications, Corp.	843	Techmaster Electronics	142
Fair-Rite Products Corp.	638	Tektronix, Inc.	245
Filconn Inc.	338	Teledyne LeCroy	647
Fischer Custom Communications, Inc.	217	TMD Technologies, LLC	441
Frankonia Germany EMC Solutions GmbH	342	TOYO Corporation	123
Gamma Electronics, Inc.	10	Transient Specialists, Inc.	340
Gap Wireless	645	Universal Shielding Corp.	628
Gauss Instruments International GmbH	223	V Technical Textiles Shieldex U.S.	740
HAEFELY HIPOTRONICS	732	Vectawave	534
Hitachi Metals America, LTD.	447	Vista Laboratories, Inc.	846
HV TECHNOLOGIES, Inc.	117	Wavecontrol Inc.	547
		Women in Engineering (WIE)	8

EXHIBITOR PROFILES

3CTEST / THE EMC SHOP

Booth 423www.theemcshop.com

The EMC Shop, LLC is a contemporary distributor of test equipment, with a comprehensive compare tool and online ordering available. With a technical staff that gives customers a fair opinion of any test equipment offered. Manufacturers offered include Teseq, EM Test, Haefely, EMC Partner, Solar, IFI, Amplifier Research, AH Systems and many more. We look forward to working with customers on unique applications to deliver a unique solution. New services include moving chambers and repair of legacy equipment.



A.H. SYSTEMS, INC.

Booth 222www.ahsystems.com

A.H. Systems, Inc. manufactures a complete line of affordable, reliable, individually calibrated EMC Test Antennas and Current Probes that satisfy many of the testing standards. We provide rental programs for our equipment and offer Recalibration Services, including others manufactured worldwide. Delivering high quality products at competitive prices with immediate shipment plus prompt technical support for the entire product line are goals we strive to achieve at A.H. Systems.



A2LA - AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION

Booth 840www.A2LA.org

A2LA is a non-profit membership association, established in 1978, and has accredited over 2000 organizations for various conformity assessment activities, including testing, calibration, inspection, proficiency testing, reference materials, and product certification. Please stop by our booth for further information on our accreditation programs.



ADVANCED TEST EQUIPMENT RENTALS

Booth 743www.atecorp.com

Advanced Test Equipment Rentals (ATEC) is a leading rental and sales provider of compliance and pre-compliance test equipment for international standards, such as IEC 61000, DO-160, MIL-STD-461, and more. ATEC's global offerings include ESD guns, amplifiers, receivers, current probes, transient immunity generators, antennas, and many other test equipment from the industry's leading manufacturers. ATEC is a A2LA ISO 17025 accredited company, and rents a wide variety of test equipment for diverse requirements.



AE TECHRON, INC.

Booth 227www.aetechron.com

AE Techron, Inc. is a recognized world leader of AF test systems for EMC. Used for a wide range of Automotive, Aviation and Telecom power susceptibility and conducted immunity testing, their products include the 7224 linear amplifier, which is recognized by Ford for use in FMC1278 testing. With a focus on modular testing systems and configurable amplifier solutions for difficult requirements, AE Techron meets the challenges of the EMC industry with innovative design and exacting performance.



A-JIN ELECTRON

Booth 545www.ajinelectron.co.kr

In order to shield harmful electromagnetic waves issuing from the rapid-changing information communication technology and electronic equipment, our company has been manufacturing conductive fabric for anticipating into creation of "Electromagnetic radiation free zone" since its foundation in 1991 with continuous challenging and creating through intensive technical innovations. As a leading company that has developed a conductive fabric market in domestic, A-Jin has been expanding every single year with developing its technologies and materials. With best quality, long term experience and cost reductions, A-Jin provides better competitive power for our customers. A-Jin always strives to meet customer's satisfaction.



ALLIED POWERS LLC

Booth 244www.emp10.com

ALTAIR ENGINEERING INC.

Booth 625www.altair.com

Altair transforms design and decision making by applying simulation, machine learning and optimization throughout product life cycles. Our broad portfolio of simulation technology and patented units-based software licensing model enable Simulation-Driven Innovation for our customers. With more than 2,000 employees, Altair is headquartered in Troy, Michigan, USA and operates 69 offices throughout 24 countries. Altair serves more than 5,000 customers across broad industry segments. To learn more, please visit www.altair.com.



AMBER PRECISION INSTRUMENTS, INC.

Booth 145www.amberpi.com

Amber Precision Instruments is the IC, module and system level EMC/EMS evaluation tool manufacturer and solution provider equipped with unique combination of IC level and system level expertise. We develop and manufacturer most components and accessories in-house (probes, software, mechanical parts, etc.) to ensure performance as well as quality. Combining advantages of measurement and simulation to better understand EMC behavior of electronics is our ultimate goal.



AMETEK CTS US**Booth 516**www.ametek-cts.com

AMETEK CTS unites the key EMC and RF amplifier industry leaders EM TEST, TESEQ, MILMEGA, and IFI in a single powerhouse. We are a leading manufacturer of test and measurement instrumentation for electromagnetic compatibility (EMC) testing, producing a broad range of conducted and radiated EMC compliance testing systems and RF amplifiers. We serve a wide range of industries, including automotive, consumer and industrial electronics, medical equipment, telecommunications, defense, and avionics.

**AMPHENOL CANADA CORP.****Booth 230**www.amphenolcanada.com

Amphenol Canada has pioneered many unique technologies to address the interconnect needs of increasingly demanding applications, including filtered connectors and interconnect devices for EMI and EMP protection, ruggedized connectors for Harsh Environments, used in virtually every market.

**ANSI ACCREDITED STANDARDS COMMITTEE C63®****Booth 127**www.c63.org

The American National Standards Institute (ANSI) Accredited Standards Committee (ASC) C63® on EMC is comprised of 30 organizational members and 7 individual members (EMC Consultants). The Committee is currently working on about 20 standards. Some of the Committee's standards are adopted by the U. S. Federal Communications Commission (FCC) and are "incorporated by reference" into the FCC Rules.

ANSI-ASQ NATIONAL ACCREDITATION BOARD (ANAB)**Booth 747**www.anab.org

Providing accreditation for ISO/IEC 17025 testing, calibration, and forensics laboratories, ISO/IEC 17020 inspection bodies and forensic inspection agencies; ISO/IEC 17043 proficiency testing providers, ISO Guide 34 reference material producers, and industry-specific programs. Including an FCC accreditation program for testing of telecommunication equipment subject to FCC rules. Those laboratories are entered in an FCC database of laboratories qualified to conduct FCC testing.

ANSYS**Booth 630**www.ansys.com

ANSYS is the leading provider of electronic cooling, electromagnetic field, circuit and system simulation software for the design of high-performance electronic equipment. Companies rely on ANSYS software to solve thermal integrity, mechanical reliability, signal integrity, power integrity and EMI challenges in IC, package and PCB and perform power optimization in custom IC's.

**APPLIED PHYSICAL ELECTRONICS****Booth 646**www.apelc.com

APELC specializes in EMP simulator solutions and offers complete EMP simulator systems and current-injection test systems that abide by the latest MIL-STD requirements. APELC also offers trigger-pulse generators, solid-state Marx generators, coaxial high-voltage connectors, and other accessories for high-power electronics.

**AR RF/ MICROWAVE INSTRUMENTATION****Booth 111**www.arworld.us

Whether you need RF amplifiers, transient generators, amplifier modules, complete EMC test systems, EMI receivers, any engineering help with EMC & Wireless and beyond, there's one source to turn to: AR.



- RF Solid State Power Amplifiers 1-50,000 watts
- Microwave Amplifiers 1-10,000 watts
- Antennas
- Hybrid Power Modules
- RF Conducted Immunity Test Systems
- EMC/RF Test Systems
- Accessories and Software
- Electromagnetic Safety Products
- Sunar positioning equipment and antennas for EMC & Wireless testing

ASTROSEAL PRODUCTS MFG CORP**Booth 135**www.astrosealproducts.com

Manufacturer of expanded copper and aluminum mesh used for lightning strike protection for composite structures.

**VIEW OUR INTERACTIVE FLOORPLAN AND PROFILES
ONLINE OR IN THE MOBILE APP****EXHIBIT HALL HOURS****Tuesday, July 31st • 10:00am-5:00pm****Wednesday, August 1st • 9:00am-5:00pm****Thursday, August 2nd • 9:00am-12:00pm***Entry to the Exhibit Hall is FREE!*

AVALON TEST EQUIPMENT CORP.**Booth 241**www.avalontest.com

Since 1998, Avalon Test Equipment has built a reputation on client trust earned from timely action and quality results. CEO Steve McIlhon's philosophy, "to provide our customers with the best products and services delivered in a friendly and professional manner" is the culture of Avalon. When you choose Avalon, we want you to feel like a part of our family.

Avalon offers a complete range of electronic test equipment and accessories for immediate sale or rental. Our sales team is always available for whatever you may need. We value our customers and promise to provide you with the best products and services. We are confident that Avalon will meet your electronic test equipment needs.

To better meet the needs of our customers, we have recently opened a second office in Dallas, Texas. We are constantly looking for ways to grow and innovate our business and give the best experience to our customers.

**BEIJING SAFETY TEST TECHNOLOGY CO., LTD.****Booth 345**www.safetytech.cn

Beijing Safety Test Technology Co., Ltd. (STT), was founded in 2002, has been providing the customer with advanced, reliable, standards-compliant products and services for over 16 years in electromagnetic testing industry. As one of the leading companies in electromagnetic testing industry in China, our core business includes: R & D, Production and Sales of electromagnetic field testing instruments(EMF Safety Meters series) and electromagnetic interference testing instruments(EMI Receivers) and providing electromagnetic field detection services.

**BOMATEC INTERNATIONAL CORP****Booth 1**www.bomatec.com

Bomatec supplies below products from its head office in Switzerland and facilities in Canada, China and Malaysia.

1. NdFeB, SmCo, AlNiCo, SmFeN, ferrite and other permanent magnets
2. Ferrite, Nanocrystalline, amorphous and other soft magnets
3. Transformers, inductors, filters and chokes

**CADENCE DESIGN SYSTEMS****Booth 347**www.cadence.com

Cadence® technologies provide powerful and scalable solutions for designing electronics products. At EMC/SIPI, Cadence will be showcasing its Sigrity™ 2017 portfolio, proven analysis tools integrated with PCB design tools to provide unique PCB power and signal integrity signoff solutions. Check out our new Compliance Kit for PCI Express® (PCIe®) 4.0, and learn how Sigrity products work together with Cadence Allegro® solutions for fast, efficient product creation. Visit us for help with your signal and power integrity analysis challenges.

**CHANGZHOU PIONEER ELECTRONIC CO.LTD.****Booth 632**www.emc-emi.com

CHANGZHOU PIONEER ELECTRONIC is one of the China leading manufacturers and suppliers focused on the EMC (electromagnetic compatibility) markets.

We offer a wide range of EMC products, including RF Shielded Enclosure, Anechoic Chambers, MRI Cage and the related shielding components, such as RF Shielding Door, Honeycomb Vent, Power Filter, RF Window, Wire Mesh, Beryllium Copper Finger Gaskets, etc.

High quality products and excellent service help us earn many stable and creditable customers all over the world.

Credible, Professional & Efficient

COMPATIBLE ELECTRONICS, INC.**Booth 445**www.celectronics.com

EMC, wireless device and product safety compliance testing and product certifications. Serving a wide range of industries such as aerospace, consumer electronics, defense, energy, IoT, medical, telecom and wireless devices.

For over 30 years Compatible Electronics has been helping manufacturers and developers of electronic equipment meet their market window. Our many Southern California locations can accommodate any schedule with our rapid turnaround, expert service and competitive pricing.

ISO/IEC 17025 and ISO/IEC 17065 accredited.

**COM-POWER CORPORATION****Booth 330**www.com-power.com

Com-Power is a leading supplier of EMC test instrumentation. We are a resource for EMC engineers looking wide selection of products and unique solutions. Our products are well suited for an accredited EMC laboratory for compliance testing and also for performing pre-compliance EMC testing and debugging at the factory. Com-Power product line includes antennas up to 40 GHz, Comb Generators, LISN, ISNs, CDNs, power amplifiers for conducted immunity, Surge Generators, near field probes, preamplifiers and much more. All our products are calibrated to the latest test standards and is usually available from stock for immediate delivery. For added confidence, we offer industry's best three year warranty. Please visit our website for additional details and product specifications. All products can be ordered directly from Com-Power or from distributors listed on our website.

**CPI (COMMUNICATIONS & POWER INDUSTRIES)****Booth 541**www.cpii.com/emc

EMC facilities worldwide depend on CPI amplifiers for superior performance, reliability and quality. CPI has a proven track record of consistent performance, service and support. For EMC testing, CPI is the only manufacturer of both the TWT and the amplifier, ensuring quality designs and smooth operation. CW and pulsed amplifiers are available from 1 to 95 GHz, with power levels exceeding 2 kW over selected frequencies. New offerings include a 40-50 GHz TWT up to 150 W.



CST OF AMERICA**Booth 323**www.cst.com

CST develops CST STUDIO SUITE, a market-leading package of high-performance software for the simulation of EM fields in all frequency bands. CST solutions are used by leading companies across many industries, including aerospace, automotive, defense, electronics, healthcare and telecommunications. CST is part of SIMULIA, a Dassault Systèmes brand. www.cst.com

**D.L.S. ELECTRONIC SYSTEMS INC.****Booth 235**www.dlsemc.com

DLS provides global EMI and EMC, Environmental, Product Safety compliance testing & consulting services for commercial, industrial, wireless, military & avionics industries. DLS is NVLAP & ANAB certified & supports MIL STD, RTCA DO 160, FCC, EU, CE, VCCI, IC, BSMI, R & other worldwide EMC specifications. DLS also performs Environmental testing to MIL-STD, RTCA, NEMA, IEC/EN, ISO, ANSI, SAE & other standards. DLS offers safety testing, including to UL, CE, LVD, MDD, IEC/EN, CCC & other specifications. www.dlsemc.com

**DAYTON T. BROWN, INC.****Booth 738**www.dtb.com

DTB is an A2LA and NVLAP* accredited laboratory in accordance with ISO/ IEC 17025 requirements and is ISO 9001:2008 registered. We stand apart from the rest by providing a full spectrum of engineering and testing services that your project needs, with the innovation, integrity and dependability that you deserve, all under one roof.

**Please refer to our website for testing covered under our scopes of accreditation.*

**DETECTUS****Booth 640**www.detectus.com

Automated E- & H-Field measurement solutions - measure intensity & location of radiating sources from box level down to component level. Measurement results are shown as 3-dimensional color contour maps. System provides movement in XYZ axis to measure more than just flat boards. This solution replaces traditional hand-held techniques to ensure repeatable measurements. The software provides test reports & data to document product & component changes. Diagnose compliance & interference issues. Also offering near field probes and EMI troubleshooting tools for DUTs, PCBs and chips.

**TAILOR MADE SOLUTIONS FOR YOUR UNIQUE APPLICATION****Advanced EMI/RFI Absorber Materials and Anechoic Chambers**

From the formulation of advanced materials in our laboratory to the design and construction of test facilities in the field, we are one of the world leaders in technology development pertaining to anechoic chambers, microwave and EMC absorbers, dielectrics and suppression materials.

**PPG Aerospace**
Cumming Microwave

Pyramidal & Specialty
Absorber Materials
T 508.521.6700
Avon, MA 02322
CummingMicrowave.com

**PPG Aerospace**
Cumming-Lehman Chambers

Anechoic Chamber Design,
Engineering and Construction
T 717.263.4101
Chambersburg, PA 17202
CummingLehman.com

DEXMET CORPORATION

Booth 839

www.dexmet.com

The Dexmet MicroGrid® EM series of expanded metal foils (EMFs) are versatile, effective materials for shielding against electromagnetic interference (EMI). EMFs are formed from solid metal foil in a proven, economical "slit-and-stretch" process. Thin, strong, flexible and lightweight, EMFs will not fray or unravel, and conform readily to complex surfaces, making them well-suited to composite manufacturing processes.



EAST COAST SHIELDING

Booth 446

www.eastcoastshielding.com

Our EMI Shield, EMI Gaskets products, RFI materials, Shield Materials, gaskets, and die-cutting materials are an excellent choice for a wide range of companies & applications. We specialize in designing custom parts for difficult tasks & unique applications.

East Coast Shielding has been providing high-quality parts & materials for the better part of a decade, and the professional expertise of our highly-trained and certified staff stretches back over twenty years. We have a calibrated perspective on the EMI shielding and RFI materials services industry that sets us apart from other providers in the professional advantages we offer on a daily basis.



EE - EVALUATION ENGINEERING

Booth 232

www.evaluationengineering.com

EE publishes in-depth technical information to the engineering test market. Since 1962, EE has served engineers, engineering managers, and corporate managers responsible for the test and quality of electronic products and systems, delivering a monthly magazine and digital edition, daily e-newsletters, e-product showcases, special reports, and a comprehensive website to buyers and specifiers of test equipment in semiconductors, medical, communication, RF, microwave, and wireless applications. Free subscription at <https://www.evaluationengineering.com/subscribe>.



ELEMENT MATERIALS TECHNOLOGY

Booth 532

www.nwemc.com

Element strives to provide certainty by delivering accurate and reliable results for our clients from start-up ventures to blue chip manufacturers. As a comprehensive global testing partner, we are a single supplier source for testing and compliance, from materials testing, EMC compliance to wireless device testing. Contact our engaged experts for assistance on your next project.



ELITE ELECTRONIC ENGINEERING INC.

Booth 634

www.elitetest.com

Elite Electronic Engineering is a leading EMC & environmental stress test laboratory specializing in Automotive Component & Whole Vehicle EMC, Military & Commercial Aviation, and FCC & CE Mark Testing/Certification services. Elite capabilities: Approved lab for all automotive OEMs including Truck/Construction; High Powered RF Immunity Testing up to 5,000V/m; FCC, Canadian & EU Wireless Certification; Combined EMI & Environmental Stress Testing. Contact us today for your compliance needs.



EMA, INC.

Booth 346

www.ema3d.com

EMA, Inc. provides global expertise in commercial applications of electromagnetics. Such applications include (but are not limited to): full-size aircraft coupling analyses down to the pin level, lightning and protection, HIRF, spacecraft charging, EMI/EMC and mitigation of power line induction effects for railroad signal and communications systems. EMA's experience in EM analysis is also available on a wider basis through the development and sales of powerful, user-friendly EM simulation software and consultancy on electromagnetic R&D matters.



EMC EUROPE 2019 BARCELONA INTERNATIONAL SYMPOSIUM

Booth 7

www.emceurope2019.eu

Welcome to the major European conference on Electromagnetic Compatibility, on 2-6 September 2019 in Barcelona, an enchanting seaside city with boundless culture, fabled architecture and a world-class gastronomic scene.



EMC Europe 2019 focuses on the high quality of scientific and technical contributions providing a forum for the exchange of ideas and latest research results from academia, research laboratories and industry from all over the world.

Special sessions, workshops, tutorials and an exhibition will be organized along with regular sessions.

EMC SAPPORO & APEMC 2019

Booth 3

www.ieice.org/~emc2019/

The "2019 Joint International Symposium on Electromagnetic Compatibility and Asia-Pacific International Symposium on Electromagnetic Compatibility, Sapporo" (EMC Sapporo & APEMC 2019) will be held at "Sapporo Convention Center", Sapporo, Hokkaido, Japan, from June 3 to 7, 2019. EMC Sapporo & APEMC 2019 is the 8th "International Symposium on Electromagnetic Compatibility" organized by IEICE-CS, and the first joint symposium under technical co-sponsorship by Asia-Pacific EMC (APEMC). We would like to invite all engaged in research and development in the various fields of electromagnetic compatibility to participate in this Symposium.

EMCoS LTD

Booth 439

www.emcos.com

EMCoS focuses on problems related to electromagnetic fields, data visualization and generation of special simulation software. Application areas include: EMC/EMI in large systems, complex harness processing, solutions for hybrid vehicles, shielding study, antenna simulations, and PCB simulations.



EMCTV

Booth 231

www.emctv.tv

Cancel your streaming account and come join us over at EMCTV! We're covering the show everyday with updates from icons, chats with your favorite EMC celebrities, not noted and notorious, and having some fun on the show floor. Tune in to EMCTV @emctv.tv.



INVITE COOPERATION PARTNERS

PAPER

Show your papers or
articles to our
500'000 readers

TRAINING

Show your philosophy to
the engineers thirsty
for knowledge

PROMOTION

Propagandize your
organizations by our
professional
channels

CONSULTATION

Help your company enter
the Chinese market
smoothly



Account: Safety EMC
E-mail: xiehong@cesi.cn
[http: //www.semccesi.cn](http://www.semccesi.cn)

EMI SOLUTIONS INC

Booth 744

www.4emi.com

EMI Solutions Inc. is the leading WOSB manufacturer of EMI filter inserts, filtered connectors, feed-thru filters and custom filtering products. Since 1996, we have delivered the highest quality filters and filtered connectors to the world's largest manufacturers of defense systems, military and commercial aviation, and large scale medical equipment to meet the most rigid EMI compliance requirements. An AS9100D and ITAR certified manufacturer, EMI Solutions has the most comprehensive EMI filtering product line available, including our innovative FlexFilter inserts.



EMPOWER RF SYSTEMS

Booth 433

www.empowerrf.com

We provide Broadband Solid State High Power Amplifier Systems for Radiated Immunity CW and Pulsed applications including CE, Automotive, DO-160, and Mil Std 464. For the EMC market the size and weight advantages of our Multi-Kilowatt amplifiers are superior to anything in the market 6 Ghz and below, thanks to a patented design architecture born from our technology leadership in supplying light weight High Power SSPA's into mobile and airborne military applications.



ENR / SEVEN MOUNTAINS SCIENTIFIC, INC.

Booth 2

www.7ms.com

The Electromagnetic News Report (ENR) is the oldest commercial EMC publication, serving the industry since 1972. Read the latest industry news, exclusive consulting EMC engineer expert advice, products, publications & upcoming events. Published by Seven Mountains Scientific & EMC expert Dr. E. Thomas Chesworth, ENR is a bi-monthly available in Digital PDF with digital archives OR in Print. Contact us for a free trial subscription.



EOS/ESD ASSOCIATION, INC.

Booth 141

www.esda.org

EOS/ESD Association is a professional voluntary association dedicated to advancing the theory and practice of electrostatic discharge (ESD) avoidance. From an initial emphasis on the effects of ESD on electronic components, the Association has broadened its horizons to include areas such as textiles, plastics, web processing, cleanrooms, and graphic arts. To meet the needs of a continually changing environment, the Association is chartered to expand ESD awareness through standards development, educational programs, local chapters, publications, tutorials, certification, and symposia.



ESDEMC TECHNOLOGY, LLC

Booth 841

www.esdemc.com

ESDEMC Technology develops, manufactures, and markets ESD and EMC related products. We are devoted to delivering creative, flexible, and cost effective ESD and EMC solutions and top-level consulting services. We also offer customized design services to satisfy all of our customers' needs.



E-SONG EMC CO., LTD.

Booth 133

www.esongemc.com

We have been developing and manufacturing electromagnetic shielding materials in Korea for over 20 years, supplying to the world-wide electronics manufacturers for a long time. There are various components for EMI shielding, grounding and thermal conduction, including surface mounted grounding gaskets, high permeability EM absorber sheets, and thermally conductive gaskets. Our products are used not only in consumer electronics, but also in various kinds of equipment including shielded room. The R&D center has developed various patented products.



ETS-LINDGREN

Booth 311

www.ets-lindgren.com

ETS-Lindgren designs, manufactures, and installs EMC/EMI, RF/Microwave, MIMO/OTA, and Acoustic test and measurement systems and components. Our patented technology has resulted in many milestones: the world's first CTIA Authorized Test Lab and the first oversized RF shielded sliding door for full vehicle test chambers. Our full line of EMP/IEMI products is the first to be independently tested and certified. We also offer a full line of services, including calibration.



EXODUS ADVANCED COMMUNICATIONS, CORP.

Booth 843

www.exoduscomm.com

Exodus Advanced Communications is a multinational RF communication equipment and engineering service company serving both commercial and government entities and their affiliates worldwide.



Our In-house resources include RF circuit designs up to 51GHz, prototype verification, system level mechanical & electrical design, digital circuit design, and control software development. We bring over 100 years of combined experience in the RF field - designing RF SSPA's in numerous applications including military jamming, communications, radar, EMI/EMC and various commercial projects.

FAIR-RITE PRODUCTS

Booth 638

www.fair-rite.com

For 65 years, Fair-Rite has and continues to be a leader in the ferrite industry committed to quality. We will DESIGN your custom components utilizing our machine shop, DEVELOP a robust process, and DELIVER a cost-effective solution. For all of your needs, Fair-Rite is Your Signal Solution.



FILCONN INC.

Booth 338

www.filconn.com

FilConn provides Custom Connector Solutions and Industry Expertise to the Military and Aerospace Markets. Our Primary focus is Filter & Transient Suppression Connectors, but we make a wide variety of unique devices that are engineered for specific applications.



EXHIBITS

EXHIBITOR PROFILES

FISCHER CUSTOM COMMUNICATIONS, INC.

Booth 217
www.fischercc.com

Since 1971, Fischer Custom Communications, Inc. has pioneered the development of state of the art EMC test and measurement equipment. Our RF current probes, bulk current injection probes, LISNs, CDNs, EM Injection Clamps, Telecom ISNs, Telecom Surge CDNs are used to insure that appliances, tools and instrumentation meet FCC, FAA, Military, Aerospace, European and Asian regulations for electromagnetic emissions and immunity. Our calibration laboratory is accredited to ISO/IEC 17025:2005.

FRANKONIA GERMANY EMC SOLUTIONS GMBH

Booth 342
www.frankoniagroup.com

The Frankonia Group was founded in 1987 as a solution provider for EMC laboratories, meeting the increasing demand for highly specialized testing environments for the electronic and automotive industry.

Without limitations in its capabilities, Frankonia develops future-oriented concepts for our complete product range, which guarantee the optimal use of resources, as well as the best possible customized solutions. Frankonia offers complete solutions for the electronic, military and automotive industry, which meet customers' individual requirements.



GAMMA ELECTRONICS, INC.

Booth 10
www.gammaelectronics.net

Gamma Electronics is a market leading manufacturer of high performance low PIM low loss RF cable assemblies. We also produce outdoor weather proof solutions for our cable assemblies and power cable applications. We offer these products kitted together or purchased independently. We also specialize in wire and cable identification and connector protection through our line of shrink tube.



GAP WIRELESS

Booth 645
www.gapwireless.com

Gap Wireless is a leading provider of products and solutions to the EMC/EMI industry. From "chambers on a bench" to the industry's only fireproof and crumble resistant absorbers, Gap Wireless has your needs met. The company also offers RF safety devices, cabling to 110 GHz and Anechoic Chamber Filters.



emv

International Exhibition with Workshops
 on Electromagnetic Compatibility (EMC)
 Stuttgart, Germany, 19–21 March 2019

Be part of Europe's leading event
 on electromagnetic compatibility!

Visit us at
 booth 234 in
 Long Beach!



More information:
 web: e-emc.com
 phone: +49 711 61946 63
 email: emv@mesago.com

mesago
 Messe Frankfurt Group

**GAUSS INSTRUMENTS
INTERNATIONAL GMBH****Booth 223**www.gauss-instruments.com

GAUSS INSTRUMENTS manufactures highest performance EMC test equipment and provides advanced EMI test solutions and instrumentation pushing your product development and testing capabilities ahead, and speeding up your time to market cycles. GAUSS offers a wide range of solutions from DC to 40 GHz for all kind of test requirements – full-compliance as well as pre-certification or even customized solutions perfectly fitting to your specific requirements pushing your testing capabilities ahead.

Driven by our ultimate mission: Smarter testing for smarter products.

HAEFELY HIPOTRONICS**Booth 732**www.haefely-hipotronics.com

At HAEFELY HIPOTRONICS, we provide innovative and dependable test and measurement solutions to our customers around the world. As a subsidiary of Hubbell Incorporated (HUBB), we employ over 260 people worldwide and hold numerous U.S. and international patents. With production areas in both the United States and Switzerland, HAEFELY HIPOTRONICS brings 110 years of combined history and experience to our work focusing on total quality.

HITACHI METALS AMERICA, LTD.**Booth 447**www.hitachimetals.com

Hitachi Metals manufactures and markets a diverse portfolio of high-grade metal products and materials, magnetic materials and applications, high-grade functional components and equipment, wires, cables and related products. Hitachi Metals is a leading provider of Nanocrystalline cores for EMC suppression.

HV TECHNOLOGIES, INC.**Booth 117**www.hvtechnologies.com

The staff of HV TECHNOLOGIES, Inc. are focused on providing clients with top quality, full compliant test instruments. We support the EMC testing community by designing, producing, and distributing the best in EMC test instruments for over 2 decades. Customers experience the most reliable test instruments made possible through innovative product design and the deployment of unique leading-edge technologies. The highest level of support is our main focus and part of every product.

IEEE 2019 EMC SYMPOSIUM**Booth 130**www.emc2019.emcss.org

The IEEE EMC+SIPI 2019 Symposium in New Orleans is a solutions destination for the Engineering Community. Whether your interests involve the EMC, signal and power integrity, health and safety, wireless, and/or automotive disciplines, you'll find a top-notch, peer-reviewed technical program on these topics. You'll also find the experts in these areas for networking to further your career AND an exhibition of leading manufacturers and service providers to assist you with your R&D requirements. July 22 – 26, 2019 EMC+SIPI 2019 International Symposium

**IEEE ANTENNAS AND
PROPAGATION SOCIETY / IEEE APS****Booth 4**www.ieeeaps.org

The field of interest of the AP-S encompasses: antennas, including analysis, design, development, measurement, and testing; radiation, propagation, and the interaction of electromagnetic waves with discrete and continuous media; and applications and systems pertinent to antennas, propagation, and sensing, such as applied optics, millimeter- and sub-millimeter-wave techniques, antenna signal processing and control, radio astronomy, and propagation and radiation aspects of terrestrial and space-based communication, including wireless, mobile, satellite, and telecommunications.

IEEE EMC SOCIETY**Booth 134**www.emcs.org

The IEEE Electromagnetic Compatibility Society is the world's largest organization dedicated to the development and distribution of information, tools and techniques for taming electromagnetic interference beasts. The society's field of interest includes standards, measurement techniques and test procedures, instrumentation, equipment and systems characteristics, interference control techniques and components, education, computational analysis, and spectrum management, along with scientific, technical, industrial, professional or other activities that contribute to this field.

Explore the many benefits of EMC Society membership, from being part of the Young Professionals, the many Standards resources, Distinguished Lecturer and engagement at the local Chapter level. Join today and give your career a much-needed zap!

IEEE EMC SOCIETY HISTORY COMMITTEE**Booth 126**www.emcs.org

The EMC Society History Committee is responsible for recording and maintaining the historical records of the EMC Society.

That includes photos and papers as well as equipment artifacts.

The Committee has digitized old EMC Symposium records and has distributed them via USB memory sticks and CDs.

IEEE EMC SOCIETY STANDARDS**Booth 138**www.emcs.org/standards

IEEE EMC Standards Development is comprised of several subgroups, SDECom and SACCom. We have a very active program of standards development covering a broad range of EMC and Signal Integrity. A separate program of working and study group meetings will be taking place during the symposium week. These are open meetings - if you are interested, come along. SACCom provides liaison with non-IEEE EMC SDOs. Speak to us on the booth to find out more about standards and standards liaison.



CALL FOR PAPERS



New Orleans is already famous for its unique culture, music, food and art, but did you know the city has developed into one of the most exciting technology markets in the United States? With the support of city and statewide initiatives to encourage business growth, New Orleans has been leading the USA in startups-per-capita, attracting college graduates and those seeking career opportunities in the tech world. With accolades such as “America’s #1 Brainpower City” from Forbes Magazine and “Coolest Start-up City in America” from Inc. Magazine, New Orleans is the perfect site to inspire our minds and re-energize our spirits.

2019 IEEE INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY, SIGNAL & POWER INTEGRITY

FOR MORE INFORMATION. SEE THE SYMPOSIUM WEBSITE:
WWW.EMC2019.EMCSS.ORG

GET YOUR WORK PUBLISHED!

EMC+SIPI 2019 is a Technical Symposium with Technical Papers at its heart. Original, unpublished papers on all aspects of EMC & SIPI are invited.

- Preliminary Full Paper Manuscript Submission Period:
October 1, 2018 – January 6, 2019
- Notification of Acceptance: February 16, 2019
- Final Paper Due: April 19, 2019

CALL FOR EXPERIMENTS & DEMONSTRATIONS

Experiments and demonstrations utilize hardware and software to demonstrate a principle or phenomenon of EMI/EMC. The presentations are informal and non-commercial and will be conducted in a specific area at the symposium.

For more information, contact:

Bob Scully – bob.scully@ieee.org
Sam Connor – sconnor@ieee.org

CALL FOR ABSTRACT REVIEWED PAPERS

Abstract Reviewed Papers provide opportunities to exchange experiences and ideas. Only an abstract is required for initial submission, papers are included in the conference proceedings. However, these papers are not published in the IEEEExplore (although there will be an opportunity to submit an extended version after the symposium for a Special Issue of the new Journal of EMC Practical Applications).

- Proposals Accepted: October 1, 2018 – February 16, 2019
- Acceptance Notification: March 23, 2019
- Final Paper Due: April 19, 2019

For more information, contact: Alistair Duffy – apd@dmu.ac.uk

CALL FOR SPECIAL SESSIONS

Special Sessions focus on targeted areas of interest. Acceptance criteria are the same as for Technical Papers, and Special Session papers are published in IEEEExplore.

- Proposals Accepted:
October 1, 2018 – December 12, 2018
- Notification of Acceptance: January 6, 2019
- Preliminary Papers Due: February 16, 2019
- Final Papers Due: April 19, 2019

For more information, contact:

Colin Brench – colin.brench@ieee.org

CALL FOR WORKSHOPS & TUTORIALS

Workshops and Tutorials are informal, interactive educational presentations, typically addressing the practical side of understanding and solving EMC issues. These sessions typically are held on Monday and Friday.

- Proposals Accepted:
October 1, 2018 – January 6, 2019
- Notification of Acceptance: February 16, 2019
- Final Presentations Due: April 19, 2019

For more information, contact:

Francesca Maradei – francesca.maradei@uniroma1.it
Flavia Grassi – flavia.grassi@polimi.it

STANDARDS WEEK

For a number of years, Working Groups for EMC Society sponsored standards projects have met in parallel with the Technical symposium. This year, many standards related activities will take place as part of the Technical program. Proposals for standards related sessions are invited focusing on all aspects of standards contributions, including tutorial material, workshops on existing standards, novel contributions to standards projects or appraising the need for new standards.

- Proposals Accepted: October 1, 2018 – December 12, 2018
- Notification of Acceptance: January 6, 2019
- Preliminary Papers Due: February 16, 2019
- Final Papers Due: April 19, 2019

For more information, contact:

Alistair Duffy – apd@dmu.ac.uk



IEEE

EMC
SOCIETY®

**IEEE PRODUCT SAFETY
ENGINEERING SOCIETY (PSES)****Booth 124**www.ewh.ieee.org/soc/pSES/

The IEEE Product Safety Engineering Society focuses on the theory, design, development and practical implementation of product safety engineering methodologies and techniques for equipment and devices. This includes the study and application of analysis, techniques, construction topologies, testing methodologies, conformity assessments and hazard evaluations. The Society provides a focus for cooperative activities, including the promotion of product safety engineering for the benefit of humanity.

**IN COMPLIANCE MAGAZINE** **IN COMPLIANCE****Booth 429**www.incompliancemag.com

In Compliance is a leading source of news, information, and resources for electrical engineering professionals. We deliver coverage on the latest standards updates, global compliance news, and technical explanations & guidance. Visit incompliancemag.com to discover the latest design practices and testing tips, stay current with important updates, learn fundamental concepts, and explore our many resources. Activate your free subscription and join our community of over 19,000 engineers world-wide.

INARTE**Booth 140**www.inarte.org

iNARTE Professional Certifications are for qualified engineers and technicians in the fields of Telecommunications, Electromagnetic Compatibility/Interference (EMC/EMI), Product Safety (PS), Electrostatic Discharge control (ESD), and Wireless Systems Installation.

**ITEM MEDIA****Booth 525**www.item-media.net

ITEM Media is a triple threat in the media world – equal parts publisher, marketing services agency, and online event host. For over 40 years we've been bringing the latest in engineering solutions worldwide from our digital and print publications, Interference Technology, Electronics Cooling, and Environmental Test & Design, and through our online events, EMC Live and Thermal Live. We also offer a full list of marketing services to engineering companies.

**JIANGSU WEMC TECHNOLOGY CO.****Booth 131**www.wemctech.com

Jiangsu WEMC Technology is a world class supplier of EMI/EMC filters for anechoic chambers, Tempest rooms, MRI and Industrial applications. It has delivered filters for over a hundred customers for their more than thousand projects worldwide.

**JOHANSON DIELECTRICS****Booth 240**www.johansondielectrics.com

Johanson Dielectrics specializes in power electronics solutions. Applications are for both high voltage & high power electronics. Our broad product offering includes capacitors (high voltage, high temp, with numerous leaded configurations & custom form factors), X2Y EMI Filters, planar array filters & precision resistors. Bring us your questions & requirements.

**KEMET / TOKIN****Booth 639**www.kemet.com

KEMET Corporation is a leading global supplier of electronic components. We offer our customers the broadest selection of capacitor technologies in the industry, along with an expanding range of electromechanical devices, electromagnetic compatibility solutions and supercapacitors.

**L3 NARDA SAFETY
TEST SOLUTIONS****Booth 533**www.narda-sts.us

L3 PMM/Narda Safety Test Solutions - A world class leader in EMC/EMI Test Equipment.



We offer a full line of LISN'S, Field Probes, Full CISPR Compliant Receivers, and Pre Compliance CISPR Receivers.

LANGER EMV-TECHNIK GMBH**Booth 341**www.langer-emv.com

Langer EMV-Technik is in the forefront of research, development, and production in the field of EMC. The Langer interference emission and interference immunity EMC/EMI measurement tools for PCB, as well as the EMC/EMI test system for IC's are used in the development stage and are in worldwide demand. Through EMC experimental seminars and EMC workshops we offer our comprehensive knowledge to our customers.

**LEADER TECH INC.****Booth 139**www.leadertechinc.com

Leader Tech Inc. is a US manufacturer specializing in EMI/RFI Shielding and Thermal products. We offer the largest number of standard off-the-shelf and custom circuit board shields. We also offer a wide variety of enclosure gaskets ranging from BECU fingerstock, fabric over foam gaskets, surface mount gaskets, conductive elastomers - sheets, extrusions and die-cuts, mesh gaskets and combo gasket frames, vent panels, RF absorber sheet materials and cable ferrites. Our newest product line is our full thermal solutions product offering.



EXHIBITS

EXHIBITOR PROFILES

LUMILOOP GMBH

Booth 644

www.lumiloop.de

The LUMILOOP GmbH is a manufacturer of optically powered measurement devices.

LUMILOOP's laser-powered E-field probes combined with LUMILOOP's power meters offer a significant reduction in measurement time for EMS testing. The LSProbe 1.2 combines the applicability of an oscilloscope with an easy-to-handle optically powered E-field probe. The miniaturized system enables pulse detection from pulse width of 1 Qs on all three axes simultaneously. Especially for IEC 61000-4-3/ISO 11451-2 and IEC 61000-4-21/ISO 11452-11, a synchronously measuring multi-probe system is available.



MESAGO MESSE FRANKFURT GMBH

Booth 234

www.e-emc.com

Mesago Messe Frankfurt GmbH is organizing EMV - Europe's leading exhibition with workshops on electromagnetic compatibility which will take place 19 - 21 March 2019 in Stuttgart, Germany. More than 100 exhibitors present their EMC-specific products and services. Parallel user-oriented workshops are held. It is the ideal platform for the dialogue between research, product development and application. EMV is the perfect opportunity to get the latest information on trends in the EMC industry!



MICHIGAN SCIENTIFIC CORPORATION

Booth 739

www.michsci.com

Michigan Scientific Corporation (MSC) is a leading manufacturer of Fiber-Optic Systems with high RF immunity. Engineered to form dependable signal links to/from equipment under test during automotive component and full-scale vehicle EMC testing, our products continue to earn a reputation of unmatched stability and immunity. We exceed customer's expectations with reliable products and services, technical acumen, continual improvement, quality standard, and superior customer service.



MVG (MICROWAVE VISION GROUP)

Booth 633

www.mvg-world.com

MVG specializes in Antenna Measurements and EMC Testing Solutions. Particularly for EMC, we design, manufacture, supply and install shielded enclosures, anechoic chambers, shielded doors, absorbers and more. In partnership with Amplifier Research (AR), we can provide exceptional turnkey solutions for the most demanding EMC requirements. Our manufacturing knowledge from over 30 years of experience ensures you quality and durability in our products and expertise from our team.



CUSTOM BY DESIGN

YOUR SOLUTION
PROVIDER SINCE 1971

Providing a complete family of EMC testing solutions

Anticipating customer needs and desires is a key part of our customer relationship. We design, develop and manufacture specialized transient protection devices, RF test and measurement instruments and EMP test systems.

20603 Earl St., Torrance, CA 90503
 p: 310 303 3300 | f: 310 371 6268
sales@fischercc.com | fischercc.com

FCC®

Fischer Custom Communications, Inc.



**Bulk Current
Injection Probes**

LISN's



Current Probe



TLISN



CDN's

Applications Mil-Std 461/462, CISPR, FCC, VDE,
 IEC 61000-4-5, IEC 61000-4-6, ESD, HIRF,
 TREOP Bellcore, SAE J1547, RTCA DO-160



NATIONAL TECHNICAL SYSTEMS (NTS)**Booth 838**
www.nts.com

NTS provides test, inspection and certification services to help clients build better, stronger, safer, products and bring them to market quickly and efficiently. NTS engineers and technicians have extensive knowledge of current test and conformity requirements, domestic and international, over a range of industries including aerospace, defense, telecom and energy.

**NEMKO USA, INC.****Booth 9**
www.nemko.com

The Nemko Group offers testing, inspection and certification services concerning products, machinery, installations and systems worldwide.

**NEWTONS4TH NA****Booth 239**
www.newtons4th.com

Newtons4th's range of IEC61000 EMC test systems offer a complete turn key solution for EMC immunity testing. The combination of the New N4AX AC+DC Power Source, PPA55x1 and Impedance Networks, as well as intuitive EMC test software (IECSOFT) result in a simple, convenient, compliant test package.



N4L are the only IEC61000 EMC test system manufacturer in the world with an on site UKAS ISO17025 calibration laboratory offering accreditation to IEC61000-3-2, IEC61000-3-3, IEC61000-4-7 and IEC61000-4-15.

NEXIO TECHNOLOGIES**Booth 438**
www.nexiogroup.com

NEXIO creates, develops and commercializes a wide range of Test and Measure Automation softwares as well as innovative measurement systems such as the near-field scanner. BAT-EMC automation software meets a wide range of current EMC emissions and immunity testing needs and offers a full range of functions for the management of a global EMC lab activity as well as having the flexibility to adapt to your specific testing environment.

**NOISEWAVE CORPORATION****Booth 242**
www.noisewave.com**NVLAP****Booth 741**
www.nist.gov/nvlap

NVLAP provides unbiased third party accreditation services through various laboratory accreditation programs for testing and calibration activities. NVLAP accreditation signifies that a laboratory has demonstrated that it operates in accordance with ISO/IEC 17025. NVLAP operates an accreditation system that is compliant with ISO/IEC 17011 and is a recognized signatory for testing and calibration under the ILAC, APLAC, and IAAC mutual recognition arrangements (MRA).

**OAK-MITSUI TECHNOLOGIES****Booth 122**
www.faradflex.com

Oak-Mitsui Technologies is a wholly owned subsidiary of Mitsui Kinzoku located in Hoosick Falls, NY. Headquartered in Tokyo, Mitsui Kinzoku has global presence with offices in Taiwan, China, Hong Kong, Korea, and Malaysia. The company's strengths include expertise in copper foil manufacturing and resin technology. Oak-Mitsui Technologies offers FaradFlex®, a high performance ultra-thin laminate that can optimize signal/power integrity, minimize EMI, lower inductance, improve RF properties, reduce surface mount passives and enhance PCB reliability.

**OPHIR RF INC****Booth 728**
www.ophirrf.com

Manufacturer of comprehensive array of high power RF Systems for Electromagnetic Compatibility, and Laboratory Test and Measurement. Core products include RF Amplifiers from 10 kHz and 40 GHz up to 25KW.



Through our Ophir EMC Division, we have designed and developed an extensive range of EMC products including Transient Generators, Indirect Lightning Generators, LISN's, Current and Injection Probes, Loops, Transformers and Audio Amplifiers.

PEARSON ELECTRONICS INC.**Booth 440**
www.pearsonelectronics.com

Manufacturer of Current Probes, Injection Probes and the Powerline Ripple Detector for various EMC tests and current measurements. New Probes designed for MIL-STD-461, CS 114,115,116, plus other EMC standards. 10 kHz to 400 MHz bandwidth, compact design and one fixture holds both probes. The Powerline Ripple Detector, Models PRD-120 & 240, simplifies the measurement for CS 101 in MIL-STD-461G. Precision Wide Band Current Probes used for accurate measurements of EMI, surge, lightning, pulse and other complex current wave shapes.

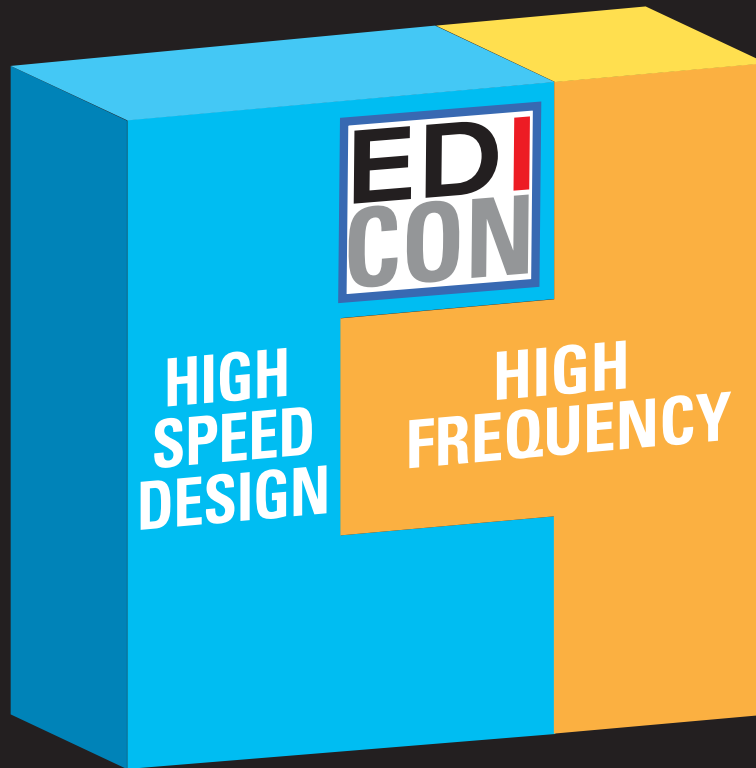
**PPG AEROSPACE / CUMING LEHMAN CHAMBERS****Booth 334**
www.cuminglehman.com

Cuming-Lehman Chambers specializes in the design and construction of anechoic chambers and host buildings "tailor made" to fit the customer's performance needs and personal preferences. Our highly skilled project managers provide Cuming-Lehman Chambers with the capacity to be the total turnkey solution for all of your test facility needs.



Register Now! @ EDICONUSA.COM

Register by August 31 to take advantage of early bird discounts.



The Only Event That Brings Them Both Together

Hands-On, Practical, Problem Solving...Let's Get To Work

- Exhibition of Industry Leading Exhibitors
- Technical Conference with Papers, Workshops, Panels, Plenary Keynotes and EDI CON University

**October 17-18, 2018
Santa Clara
Convention Center
Santa Clara, California**



**EDI
CON** 2018
Electronic Design Innovation
Conference & Exhibition
Where high frequency meets high speed.

Microwave
Journal

Signal Integrity
Signal Integrity - Power Integrity - EMC/EMI
Journal

**h
h** horizon
house®

QAI LABORATORIES**Booth 12**
www.qai.org

QAI Electromagnetic Compatibility Testing is your one-stop regulatory compliance partner for electromagnetic compatibility (EMC) and electromagnetic interference (EMI). Products are tested to the latest and applicable EMC/EMI requirements for domestic and international markets. QAI testing goes above and beyond being a testing facility—we are your regulatory compliance partner. QAI Electromagnetic Compatibility (EMC) Testing has the capability to perform RF Emissions and Immunity for all types of electronics manufacturing including Industrial, Scientific, Medical, Information Technology, Telecom, Wireless, Automotive, Marine and Avionics.

**R&K COMPANY LIMITED****Booth 746**
www.rk-microwave.com

R&K is a Japanese manufacturer of "RF Solid State Power Amplifier" and "Other Functional RF Components" which is established in 1977. Our product line-up includes broadband power amplifiers, connectorized components of both active and passive, analog phase shifters of both narrow and broadband, surface-mountable products, and 8-pin packaged products.

**RAYMOND EMC ENCLOSURES LTD.****Booth 544/546**
www.raymondemc.com

Raymond EMC is a manufacturing company specializing in the design, fabrication, installation and testing of radio frequency shielded enclosures, anechoic chambers and hybrid secure discussion facilities for military, government, high tech, medical and industrial applications. We have established an international reputation for quality products, installations and customer service. Our broad range of products and services can all be tailored to meet your specific application and requirements. Contact our dedicated staff for more information on how we can satisfy your requirements.

**RELIANT EMC LLC****Booth 444**
www.reliantemc.com

Reliant EMC LLC is your top source for the EMC test equipment that will enable you to reduce cost and time by self testing and self certifying your products for Electromagnetic Compliance (EMC). Reliant EMC LLC provides cost effective and pragmatic solutions for EMC testing. Located in San Jose, California, in the heart of Silicon Valley, Reliant EMC offers first class support for all of your Emission and Immunity Testing requirements.

**RF EXPOSURE LAB****Booth 531**
www.rfexposurelab.com

RF Exposure Lab, LLC is a privately owned independent A2LA Accredited SAR testing facility located in Southern California. We provide radio frequency device manufacturers and existing FCC test laboratories with a testing and certified report laboratory.

We provide support by selling a total solution with both SAR testing and design suggestions to ensure your product can meet SAR testing limits. We communicate issues to you promptly to support the timely completion of your project. We remain adaptable to the rapidly changing technology of radio frequency devices, and their testing requirements.

RF Exposure Lab**RIGOL TECHNOLOGIES****Booth 322**
www.rigolna.com

RIGOL Technologies is transforming the Electronics Test and Measurement Market. Our broad portfolio of test solutions, our uncompromised product performance, proven quality, and advanced product features are all delivered at extremely attractive price points. This transformational price/performance provides our customers with unprecedented value for their investment, reducing their total cost of test for their projects. Uncompromised Performance. Unprecedented Value.

**ROHDE & SCHWARZ USA, INC.****Booth 317**
www.rohde-schwarz.com

For more than 80 years, Rohde & Schwarz has stood for quality, precision and innovation and is one of the world's largest manufacturers of electronic test & measurement equipment. We offer a broad range of EMC, EMI, EMS and EMF test equipment for pre- and full compliance measurements, including receiver, amplifier, chambers, antennas and more. Rohde & Schwarz also provides complete turnkey systems, significantly enhancing productivity and enabling precise results when measuring complex waveforms.

**SAFETY & EMC CHINA****Booth 5**
www.semc.cesi.cn

SAFETY & EMC magazine started their first publication twenty eight years ago. It is the unique official publication (CN 11-3452/TM, ISSN 1005-9776) synthetically introducing the safety and EMC technology of electronic and electric industry at present in China, which is supervised by the Ministry of Industry and Information Technology of PRC and sponsored by the China Electronic Standardization Institute (CESI).

**SCHLEGEL ELECTRONIC MATERIALS INC.****Booth 339**
www.schlegelemi.com

SCHLEGEL ELECTRONIC MATERIALS, INC. is announcing our new ABSOBERS line and new THERMAL INTERFACE MATERIALS products. As always our R&D team is working on developing new FABRIC OVER FOAM & EMI products in line with your Mechanical and Electrical needs.



NEW and VERY SOON!!!! You will see our newest ENVIRONMENTAL AND AIR SEALING GASKETS developed and directed to commercial, industrial, medical and automotive markets.

SELECT FABRICATORS**Booth 238**www.select-fabricators.com

Select Fabricators Inc. (SFI) is a growing Company located in Canandaigua, NY that serves Defense, Technology, Law Enforcement, Commercial, and Industrial Industries. SFI is an expert in the field of RF shielding, using innovative high technological materials to fabricate RF/EMI shielded tents, closures, test boxes, pouches, and rooms. Our enclosures shield at high attenuation, and provide our customers with a quality portable shielding option.

**SHIELDING INTEGRITY SERVICES INC.****Booth 243**www.chambertest.com

Shielding Integrity Services, Inc., (SIS) was founded in 1988. We offer over 75 years of combined staff field experience in performance testing of all types of radio frequency shielding, semi-anechoic and fully anechoic chambers, as well as open area test sites on a worldwide scale. We are not affiliated with any chamber manufacturers or contractors. We are a completely independent third party performance evaluator. SIS is success oriented: We will troubleshoot performance anomalies and go quickly and directly to the source of the problem. SIS is not affiliated with any chamber manufacturers or contractors. We are a completely independent third party performance evaluator and are accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

**SHIMIFREZ INC.****Booth 246**www.shimifrez.com**SIGLENT TECHNOLOGIES****Booth 344**www.SiglentAmerica.com

Manufacturer of electronic testing instrumentation including digital oscilloscopes, DMMs, power supplies, arbitrary/function generators and spectrum analyzers. The best value in electronic test & measurement.

**SIMYOG TECHNOLOGY****Booth 11**www.simyog.com

Simyog Technology is a startup focused on Design and Sign-off tools for Automotive Electronics. Compliance Scope (CompScope) is the flagship product of Simyog - it is a "Virtual EMI/EMC laboratory" for Radiated Emissions (RE), Bulk Current Injection (BCI), Radiated Immunity (RI) and Conducted Emissions (CE), where designers can validate and improve their hardware at an early stage by uploading their design files. This saves valuable time-to-market owing to reduced sample spins and reduced bill-of-materials by precluding late stage addition of shielding and noise suppressing components.

**SPIRA MANUFACTURING CORPORATION****Booth 629**www.spira-emi.com

Spira has been providing the finest most reliable EMI/RFI shielding gaskets for 40 years! Find out why the top manufacturers choose Spira when they need the best EMI/RFI Shielding Gaskets and Honeycomb Filters - exceptional products, superior customer service, on-time delivery and expert technical support. The patented Spira gasket offers extremely low compression set, long life and high shielding. Groove or surface mount, EMI & Environmental protection, Honeycomb Filters, Connector-Seal Gaskets, O-Rings, Die-Cut Gaskets, and custom. AS9100/ISO-9001 certified.

**TDK RF SOLUTIONS, INC.****Booth 842**www.tdkrfsolutions.com

TDK RF Solutions is a world leader in the design, development & manufacture of technical solutions for the EMC testing and Antenna measurement industries. We offer a complete range of solutions including automated test systems, anechoic chambers, RF absorber, antennas, software, RF filters, and a wide range of test products & accessories. We call it Total System Technology®, and it means TDK RF Solutions is your best choice of partner for proven solutions & services. If you are in the market for a complete turnkey solution or looking to expand your test capabilities with a new antenna, contact us to see what TDK can do for you.

**TDK-LAMBDA AMERICAS****Booth 529**www.us.tdk-lambda.com/hp

TDK-Lambda Americas Inc. is a leading producer of high current and high voltage power sources. Ranging in output from 200W to over 100kW, TDK-Lambda Americas' products provide power to many of today's semiconductor, automotive and component burn-in systems. TDK-Lambda Americas' power supplies are also used in medical applications, oil well logging, electroplating, particle physics research and other general laboratory and in industrial processes.

**TECHMASTER ELECTRONICS****Booth 142**www.techmastertest.com

Techmaster Electronics was established in 1989 with the mission to provide calibrations performed through sound, ethical workmanship and to accommodate customer satisfaction. We have grown to a multi-faceted company providing Test and Measurement Sales, Rentals, Calibration and Repair. All facilities are ISO/IEC 17025:2005 accredited. With laboratories in San Diego, Silicon Valley, Florida, Tijuana, Mexicali, Monterey, Juarez and Bangkok (Thailand) we are a worldwide leader in electronic test equipment repair, calibration, sales and maintenance.

**TEKTRONIX, INC.****Booth 245**www.tek.com

Headquartered in Beaverton, Oregon, Tektronix delivers innovative, precise and easy-to-operate test, measurement and monitoring solutions that solve problems, unlock insights and drive discovery. Tektronix has been at the forefront of the digital age for 70 years. Join us on the journey of innovation at www.tek.com.



TELEDYNE LECROY**Booth 647**www.teledynelecroy.com

Teledyne LeCroy is a leading manufacturer of advanced oscilloscopes, protocol analyzers, and other test instruments that verify performance, validate compliance, and debug complex electronic systems quickly and thoroughly. Since its founding in 1964, the Company has focused on incorporating powerful tools into innovative products that enhance "Time-to-Insight." Faster time to insight enables users to rapidly find and fix defects in complex electronic systems.

**TMD TECHNOLOGIES, LLC****Booth 441**www.TMDUS.com

Since launching our range of compact, lightweight broadband TWT amplifiers in the early 1990s, TMD has been very successful in supplying products for EMC applications worldwide. These products have evolved and benefited from our expertise in high power military radar amplifiers. TMD's standard amplifier range covers 1 - 40 GHz at up to 1000 W CW and 40 kW pulsed and has gained a worldwide reputation for design innovation; including many unusual, high performance products.

**TOYO CORPORATION****Booth 123**www.toyotechus.com

TOYO offers an "EMC Total Solutions" from EMC design to EMC test carrying TOYO EMC test software with powerful debugging features, EMI test systems with multi receiver compatible and immunity test systems, EMISstream (EMI simulation) from NEC, EM-ISight (near-field EMI scanner) from Aprel and PCB materials from Risho and Oak-Mitsui Technologies.

**TRANSIENT SPECIALISTS, INC.****Booth 340**www.transientspecialists.com

EMC test equipment rentals. Transient generators for compliance testing to IEC, UL, Automotive, Military and Telecom standards. Standards supported include: EN/IEC 61000-4-X, Mil Std. 461, ISO 7637 and many more. We carry Thermo Keytek, Teseq, Solar Electronics, HVT/EMC Partner EMC equipment. Most equipment rentals include accredited calibrations. Technical support and weekly, monthly, and longer term rentals are available. Large inventory and fast shipping. Recent additions include a solution for IEC 61000-4-16 and a 100A battery simulator for automotive EMC testing.

**UNIVERSAL SHIELDING CORP****Booth 628**www.universalshielding.com

Founded in 1972, Universal Shielding Corp. (USC), has been a pioneer in developing products and systems for Radio Frequency Interference and Electromagnetic Interference (RFI/EMI). Our company devotes itself to the RFI/EMI shielding problem: the design, manufacture, installation and certification of shielded enclosures. Since 1972, USC has engineered, erected, and tested in excess of 19,000 installations throughout the world, for government agencies, industrial corporations, universities and medical facilities.

**V TECHNICAL TEXTILES
SHIELDEX U.S.****Booth 740**www.vtechtextiles.com

V Technical Textiles Inc. (VTT) is a woman owned small business and a USA manufacturing company of products made from conductive textiles. We are the leading manufacturer of RF/EMI/EMC portable shielded enclosures, RF shielded curtains, RF pouches, and RF shielding/Anti-Microbial garments. We are also a supplier of the world's largest selection of conductive textiles, yarns, and fasteners. With a broad range of products, 20+ years of development, and application experience

**VECTAWAVE****Booth 534**www.vectawave.co.uk

Vectawave Technology Ltd is a manufacturer of class A broadband power amplifiers for use in industrial, military and medical applications. Our amplifier range covers 10kHz-6GHz with powers up to 4kW. Vectawave have been designing and manufacturing power amplifiers for 21 years. These amplifiers, based on proven technology, are in daily use in EMC labs and test houses around the world. Most of our amplifiers have been designed to meet the specific needs of EMC applications.

**VISTA LABORATORIES, INC.****Booth 846**www.vista-compliance.com**WAVECONTROL INC.****Booth 547**www.wavecontrol.com

Wavecontrol is an engineering company, founded in 1997 and specialising in the measurement of electromagnetic fields. With a clearly international calling, our company has headquarters in Europe and the United States. Our network of distributors operates in over 50 countries on five continents, and we have implemented ISO 9001 and ISO 17025 quality control systems for the ongoing improvement of processes, products and services. We have a calibration laboratory accredited ISO 17025 by ENAC.



Wavecontrol designs and develops professional instruments for measurement, monitoring and assessment of human exposure to electromagnetic fields.

Please, visit our booth to find further information.

WOMEN IN ENGINEERING (WIE)**Booth 8**www.wie.ieee.org

IEEE WIE is one of the world's leaders in changing the face of engineering. Our network connects over 20,000 members in over 100 countries to professional women around the world. IEEE WIE membership gives you access to a global network that advances professional women in technology at all points in their life and career. IEEE WIE members make lifelong friendships, acquire influential mentors and make a difference for the benefit of humanity.





THE EMC SOCIETY SPANS THE CULINARY GLOBE.
Our members enjoy dining on many varieties of food, drink and replenishment. Presenting this month's specials from around the World!

Bon Appetit!

Albuquerque	Everett's Southwest Rattlesnake Bites	Montreal	Amy's tarte a l'oignon avec du vin blanc
Algeria	Abdelber's Makroudh, dipped in honey	Nanjing	Wei's duck blood soup (鸭血粉丝汤)
Argentina	Gustavo's Gaucho flank steak w/chimichurri	New Jersey	Krish's poached salmon with Brussels sprouts
Atlanta	Scott's Gigantic Southern Clam Bake	New South Wales	J.A.'s Roasted Mutton w/chips
Austria	Kurt's Tafelspitz w/horseradish & chives	Nigeria	Tunde's Edikaikong w/pumpkin & periwinkle
Baltimore	Bob's Chesapeake Blues w/Old Bay & Natty Bo'	Oregon	Benitez's beef & Guinness pie w/chocolate
Bangalore	Devandra's Masala Dosa, w/naan & yogurt	Ottawa	Syed's handmade pork & cabbage dumplings
Beijing	Dan's 麻婆豆腐 spicy beef, tomato & tofu	Philadelphia	Kilshaw's Killer Cheesesteak, what else?
Benelux	Frank's Carbonade flamande stoofvlees	Phoenix	Gassaway's Hopi Corn & Beef Stew w/hominy
Boston	Boris' New England clam chowdah	Poland	Grzegorz's Polish dill pickle soup
Cedar Rapids	Dale's delicious stroganoff sandwich	Rochester	Nick Tahou's own Garbage Plate. Gotta try!
Central Texas	Todd's flautas de pollo w/salsa & guacamole	Rock River Valley	Jamal's cheese curds, plain and simple
Chengdu	Jun's special Dan Dan Mian 担担面	Romania	Milhaela's ciorbă de Perisoare: meatball soup
Chicago	Jack's classic Deep-Dish Chicago Pie (loaded!)	Russia	Dmitry & Irina's Russian beet salad w/herring
Coastal Los Angeles	Ray's habanero Hellfire chili	San Diego	Mr. Frankfurth's Baja style fish tacos
Colombia	Roberto's papas rellenas Colombianas	Santa Clara Valley	Sea Chan's Roasted Kabocha Squash w/ghee
Croatia	Vicko's Octopus Peka w/potatoes & shallots	Seattle	Dennis' Baked Salmon Dijonese
Czechoslovakia	Jan's Grandma's secret weinerschnitzel	Sendai	Yamaguchi's sauteed gyutan
Dallas	Jeremiah's Cowboy Caviar w/beans, corn & cilantro	Serbia/Montenegro	Vesna's Negushsky prshut
Colorado	Randy's Loaded Western Tater Skins w/green chilis	Singapore	Gao's hong dou tang 红豆汤
Eastern N. Carolina	Stuart's East Carolina BBQ ribs	South Africa	Wiid & Gideon's Bobotie Meatloaf w/curries
France	Escargots Francois au beurre d'ail	South Brazil Section	Carlos' Famous Feijoada w/beef & black beans
Galveston/Houston	Dr. Bob's grilled gulf red snapper	Michigan	Scott & Bogdan's Detroit hot honey wings
Germany	Christian's Giant Schweinshaxe w/potatoes	Spain	Fernando's Tutto Bene w/shrimp & mussels
Harbin	Wu's Harbin Sausage 哈尔滨红肠	Sweden	Christer's famous Swedish meatballs
Hong Kong	Kam's Hong Kong roast duck 香港烤鸭	Switzerland	Mora's Raclette, fromage et pommes de terre
Hungary	Lajos' Chicken Paprikash, just like your nagymama's	Syracuse	Mary's Buffalo Chicken Wings w/blue cheese
Huntsville	Thomas' Alabama Mud Cake	Taipei	Tin Ding-Bing Taiwanese salt & pepper chicken
Hyderabad	Srini's Hyderabad slow-cooked Dumka Murgh	Tokyo	Taki-san's Mentaiko noodles w/spicy cod roe
Israel	Jacob's Kataifi Nests w/Mauritanian lamb	Toronto	George's Greek pan fried whole trout
Italy	Luigi's Brasata al Barola, braised in red wine	Tucson	Hao's sweet mesquite taco soup
Kitchener-Waterloo	Huanhuan's German-style sausage	Turkey	Bolu Pilic Ozgur, w/chicken, tomato & yogurt
Long Island	Santo's weekend Long Island iced tea	Twin Cities	Dave's Center-cut Filet Mignon au jus
Madras	Bandaru's chicken Madras	UK and Ireland	Roy's Full English w/bangers & blood sausage
Madras Student (PIT)	Mr. Arun's sambar and rasam rice	Ukraine	Marya's borscht beet & cabbage soup
Malaysia	Chicken Rendang, w/spices and coconut milk	Vancouver	David's fresh bumbleberry pie
Melbourne	Woody's One Pot Kangaroo Bolognese	Victoria	Mark's Saturday Syllabub, sherry-spiked pie
Milwaukee	Blaha's brauts, just big brauts. And beer.	Washington DC	Mike's spaghetti pizza
		Xian	Yingsan's Spicy Cumin Lamb 扁扁面

EMC+SIPI 2018 COMMITTEE MEMBERS



GENERAL CHAIR
Ray Adams



VICE GENERAL CHAIR
Janet O'Neil



**TREASURER/
FINANCE CHAIR**
John LaSalle



SECRETARY
Dana Craig



**TECHNICAL
PROGRAM CHAIR**
John Maas



**TECHNICAL PROGRAM
CO-CHAIR,
ONLINE SYMPOSIUM
CHAIR**
Bruce Archambeault



**SPECIAL
SESSIONS CHAIR**
Colin Brench



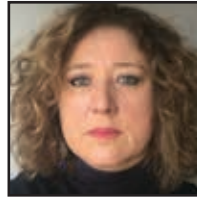
**TECHNICAL PAPERS
CO-CHAIR**
Alistair Duffy



**TECHNICAL PAPERS
CO-CHAIR**
Xiaoning Ye



**WORKSHOPS &
TUTORIALS
CO-CHAIR**
Flavia Grassi



**WORKSHOPS &
TUTORIALS
CO-CHAIR**
Francesca Maradei



**GLOBAL UNIVERSITY
CHAIR**
Vignesh Rajamani



**DEMONSTRATIONS
& EXPERIMENTS
CO-CHAIR**
Bob Scully



**DEMONSTRATIONS
& EXPERIMENTS
CO-CHAIR**
Sam Connor



**YOUTH
PROGRAM CHAIR**
Stephanie Zajac



**MARKETING
CO-CHAIR**
Mike Violette



**MARKETING
CO-CHAIR,
YOUNG
PROFESSIONALS
CHAIR**
Caroline Chan

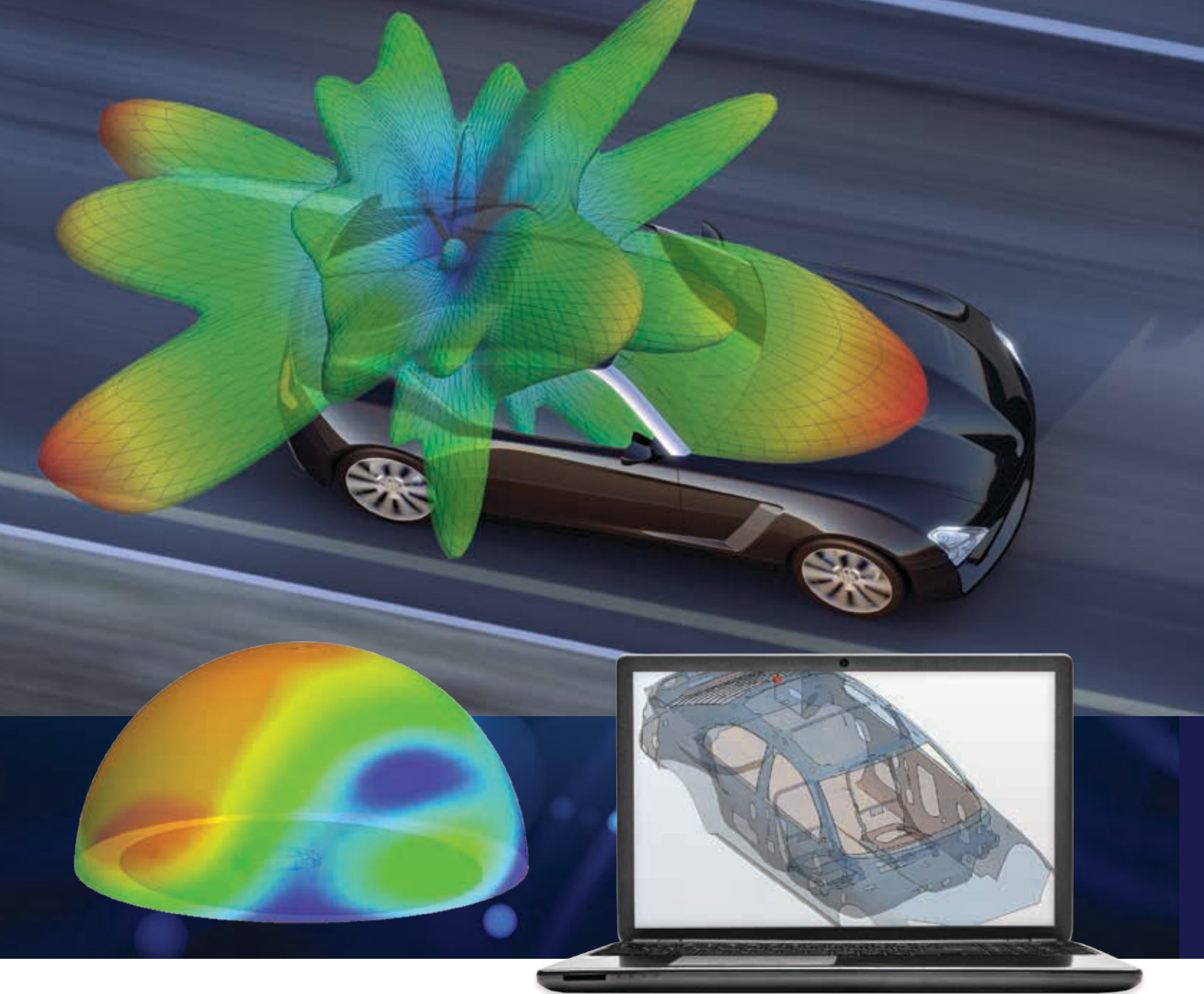


**YOUNG
PROFESSIONALS
CHAIR**
Louann Devine

**REGISTRATION
CHAIR**
Beth Scully**PUBLICATIONS
CHAIR**
John Rohrbaugh**COMPANION
CHAIR**
Judy Rohrbaugh**ARRANGEMENTS/
SOCIAL CHAIR**
Gabe Alcala**VOLUNTEER
CO-CHAIR**
Stephen Searce**VOLUNTEER
CO-CHAIR**
Alpesh Bhobe**EXHIBITS CHAIR**
Alea Langford**JPL TOUR
COORDINATOR/
JPL VOLUNTEERS
SUPPORTER**
Pablo Narvaez**CONFERENCE
MANAGEMENT**
John Vanella**WEBSITE/DESIGN**
Kelly Scott-Olson**EMC+SIPI 2018
ONLINE
SYMPOSIUM****ONLINE
SYMPOSIUM
EVENT LEAD**
Graham Kilshaw**ONLINE
SYMPOSIUM
EVENT TEAM**
Geoff Forman**ONLINE
SYMPOSIUM
EVENT TEAM**
Erica Osting**ONLINE
SYMPOSIUM
EVENT TEAM**
Michele Stankunas

THANK YOU FROM THE COMMITTEE

2018 IEEE EMC+SIPI ONLINE	16
2019 IEEE EMC+SIPI	139
ADVANCED TEST EQUIPMENT RENTALS	118
AH SYSTEMS	45
ALTAIR	151
AMPHENOL CANADA	56
AP AMERICAS	126
AR RF MICROWAVE	Back Cover
DAYTON T. BROWN	123
ETS-LINDGREN	6
EVALUATION ENGINEERING	110
EXODUS ADVANCED COMMUNICATIONS, CORP.	76-77
FISCHER CUSTOM COMMUNICATIONS	141
GAUSS INSTRUMENTS INTERNATIONAL GMBH	4
HAEFELY HIPOTRONICS	92
IEEE EMC SOCIETY	147
IFI (INSTRUMENTS FOR INDUSTRY)	101
IN COMPLIANCE MAGAZINE	48
ITEM MAGAZINE/INTERFERENCE TECHNOLOGY	12
ITG ELECTRONICS	10
MESAGO MESSE FRANKFURT GMBH	137
MICROWAVE JOURNAL	143
PEARSON ELECTRONICS	2
PPG CUMING LEHMAN	133
RETLIF TESTING LABS	14
R&K COMPANY LIMITED	113
ROHDE & SCHWARZ	31
SAFETY & EMC MAGAZINE	135
SEVEN MOUNTAIN SCIENTIFIC/ENR	125
SPIRA MANUFACTURING	115
TMD	28



FEKO for EMC/EMI Compliance

Fully Hybridized Tools for Electromagnetic Simulation

Simulation of cables, electrical systems and sub-systems leads to an understanding of the interaction and ultimately to designs which comply with the increasing demands of radiation emission and immunity standards. FEKO includes several computational methods, each optimized for different problem types and hybridized for the efficient analysis of complex, low and high frequency problems.

With Altair's patented licensing system, access to simulation software is now more affordable for companies of all sizes. Join the thousands of Altair customers applying simulation-driven innovation to their design challenges in the defense industry.

Learn more at altairhyperworks.com/FEKO

AR EMC Systems Are Only Matched By Our Support



Any system is only as good as the support and service you receive before, during and after delivery. We provide the best support and service in the industry to insure that any AR radiated or conducted immunity or emission system exceeds your requirements to give you easy, trouble free operation.

We worry about every detail so you don't have to. From cabinet shielding and wiring harnesses to the bolts and screws for the final assembly. And did we mention free automated test software to make testing easier, faster, and more accurate than ever?

Additional reasons to only specify AR EMC systems are:

- Performance guarantee - AR manufactures the critical components for each system
- Entire system fully tested before leaving facility & upon installation
- Single source for service and support
- Radiated Immunity test systems to 50 GHz with high field strengths
- Conducted Immunity systems from 4 kHz to 3 GHz
- Emission systems to 40 GHz
- Built to meet numerous standards including IEC, CISPR, MIL-STD-461/464, DO-160, ISO, Wireless, HIRF, & HERO

To learn more, visit www.arworld.us/systems or call us at 215-723-8181.

Come See Us at EMC+SIPI
Long Beach, CA, July 30 - August 3, 2018, Booth 111

ISO 9001:2015
Certified

*We don't just build great products.
We build great products that last.*



rf/microwave instrumentation

Other **ar** divisions: modular rf • sunar rf motion • receiver systems • ar europe

USA 215-723-8181. For an applications engineer, call 800-933-8181.

In Europe, call ar United Kingdom +44 1908 282766 • ar France +33147917530 • ar Deutschland +49 6101 802700 • ar Benelux +31 172 423000

www.arworld.us
Download the AR RF/Microwave Mobile App: www.arworld.us/arApp

Copyright © 2018 AR.

The orange stripe on AR products is
Reg. U.S. Pat. & TM. Off.

