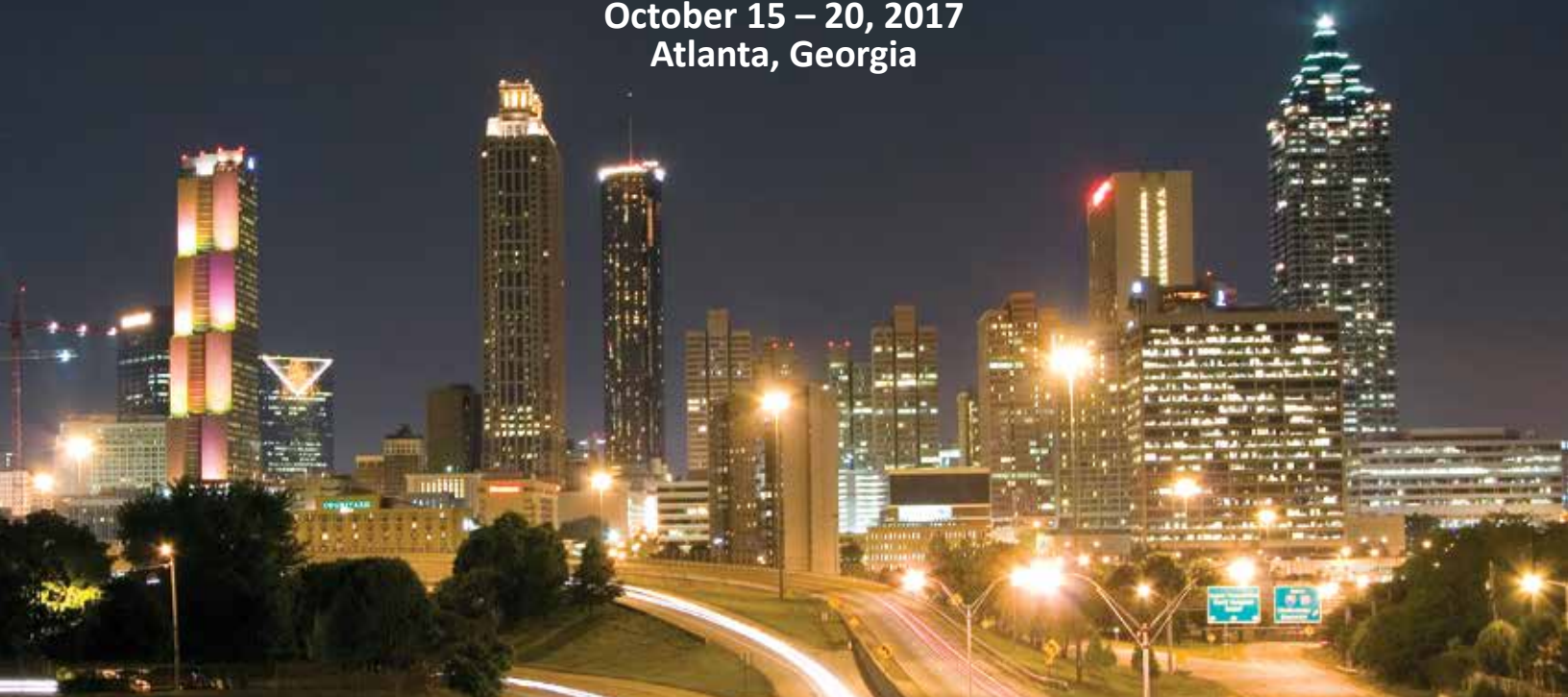




# Final Program

39<sup>th</sup> Annual Symposium of the Antenna Measurement Techniques Association

October 15 – 20, 2017  
Atlanta, Georgia



Hosted by



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# FROM THE HOST

## JOIN US IN ATLANTA!



On behalf of the 2017 Host Committee, I would like to invite you to Atlanta, GA for the 39<sup>th</sup> Annual Symposium of the Antenna Measurement Techniques Association (AMTA). We are excited about the high quality of technical papers, featured speakers, and the fun social events that are planned.

The technical program kicks off on Sunday, October 15, with an AMTA Boot Camp and Short Course. The Boot Camp is ideal for those that are new to the antenna measurements community or for those that just need a refresher course. The Short Course topic this year is "Modern Compact Antenna Test Range Measurements" and is intended for researchers, practicing engineers and technicians. The technical program and exhibition start on Monday and will run throughout the week. Wednesday is "IEEE FREE DAY". IEEE members are welcome to visit the exhibit hall only at no charge. You must provide your IEEE membership card upon arrival. We will end the week with the Friday Technical Tour.

Join your AMTA colleagues for the 2<sup>nd</sup> annual 5K run/walk Sunday morning sponsored by ETS-Lindgren. The Welcome Reception sponsored by NSI-MI Technologies follows that evening. Walk back in time Monday night at The Estate, an authentic antebellum mansion, for Casino Night sponsored by MVG. Wednesday evening is the Pre-Banquet Reception and Awards Banquet, sponsored by NSI-MI Technologies and MVG. Our companion tours include a guided tour of Atlanta landmarks, a trip to Centennial Olympic Park, a stroll through the Atlanta Botanical Gardens and an upscale shopping experience in the exclusive Buckhead district.

October is a wonderful time to visit Atlanta as the heat of the summer has diminished and the foliage emerges with a beautiful spectrum of autumn shades. The Grant Hyatt Atlanta is located in the Buckhead district within walking distance to Atlanta's finest restaurants, theaters, shopping, and other attractions.

On behalf of Host NSI-MI Technologies and Co-hosts Georgia Tech, GTRI and Kennesaw State, we look forward to seeing you in Atlanta!

Warmest Regards,



Michelle Taylor  
AMTA 2017 Host Committee Chair

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## AMTA BOARD OF DIRECTORS

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**Social Events** / Talisa Flynn / [events@amta.org](mailto:events@amta.org)  
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## FUTURE AMTA SYMPOSIA

**AMTA 2018** / Williamsburg, Virginia / Altair Engineering  
**AMTA 2019** / San Diego, California / Microwave Vision Group (MVG)

## SATURDAY, OCTOBER 14

8:00 AM – 6:00 PM	Exhibit Room Set-up (for Exhibitors with private rooms and 4 or more booths)	Grand Ballrooms II & III, Buckhead Ballrooms
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## SUNDAY, OCTOBER 15

7:00 AM – 8:30 AM	5k Run	Buckhead Atlanta
8:00 AM – 5:00 PM	Registration	Meeting Planner Office I
8:00 AM – 5:00 PM	Short Course	Library
9:00 AM – 5:00 PM	Boot Camp	Azalea
11:00 AM – 6:00 PM	Exhibit Room Set-up (for all Exhibitors)	Grand Ballrooms II & III, Buckhead Ballrooms, Prefunction
6:00 PM – 7:30 PM	Welcome Reception	East/West Terrace

## MONDAY, OCTOBER 16

7:00 AM – 8:00 AM	Breakfast	Azalea
8:00 AM – 8:48 AM	Opening Keynote Speech	Grand Ballroom I
8:00 AM – 5:00 PM	Registration	Meeting Planner Office I
8:00 AM – 5:00 PM	Technical Sessions	Grand Ballroom I
10:00 AM – 10:30 AM	Morning Break	Prefunction
10:00 AM – 3:00 PM	Companion Tour	Library
10:00 AM – 5:00 PM	Exhibits	Grand Ballrooms II & III, Buckhead Ballrooms, Prefunction
11:45 AM – 1:30 PM	Exhibitors' Lunch	Grand Ballrooms II & III, Buckhead Ballrooms, Prefunction
3:00 PM – 3:30 PM	Afternoon Break	Prefunction
6:00 PM – 10:00 PM	Monday Night Outing	The Estate

## TUESDAY, OCTOBER 17

7:00 AM – 8:00 AM	Breakfast	Azalea
8:00 AM – 5:00 PM	Registration	Meeting Planner Office I
8:00 AM – 5:00 PM	Technical Sessions	Grand Ballroom I
9:00 AM – 5:00 PM	Exhibits	Grand Ballrooms II & III, Buckhead Ballrooms, Prefunction
9:30 AM – 10:00 AM	Morning Break	Prefunction
10:00 AM – 3:00 PM	Companion Tour	Library
11:00 AM – 7:00 PM	Student Day	Azalea
11:30 AM – 1:30 PM	Business Lunch	Highland Ballroom
3:00 PM – 3:30 PM	Afternoon Break	Prefunction
5:15 PM – 6:15 PM	IEEE Working Group	IVY II
5:30 PM – 6:30 PM	Exhibitors' Reception	Library

## WEDNESDAY, OCTOBER 18

7:00 AM – 8:00 AM	Breakfast	Azalea
8:00 AM – 5:00 PM	Registration	Meeting Planner Office I
8:00 AM – 5:00 PM	Technical Sessions	Grand Ballroom I
9:00 AM – 3:00 PM	Companion Tour	Library
9:00 AM – 4:00 PM	Exhibits	Grand Ballrooms II & III, Buckhead Ballrooms, Prefunction
9:30 AM – 10:00 AM	Morning Break	Prefunction
11:30 AM – 12:30 PM	Lunch	Highland Ballroom
3:00 PM – 3:30 PM	Afternoon Break	Prefunction
4:00 PM – 7:00 PM	Exhibit Dismantle	Grand Ballrooms II & III, Buckhead Ballrooms, Prefunction
6:00 PM – 7:00 PM	Pre-Banquet Reception	East/West Terrace
7:00 PM – 10:00 PM	Awards Banquet	Highland Ballroom

## THURSDAY, OCTOBER 19

7:00 AM – 8:00 AM	Breakfast	Azalea
8:00 AM – 12:00 PM	Registration	Meeting Planner Office I
8:00 AM – 3:00 PM	Exhibit Dismantle	Grand Ballrooms II & III, Buckhead Ballrooms, Prefunction
8:00 AM – 5:00 PM	Technical Sessions	Highland Ballroom
9:30 AM – 10:00 AM	Morning Break	Prefunction
10:00 AM – 3:00 PM	Companion Tour	Library
11:30 AM – 1:30 PM	Lunch & Learn	Azalea
3:00 PM – 3:30 PM	Afternoon Break	Prefunction
6:00 PM – 9:00 PM	Topgolf Outing	Topgolf

## FRIDAY, OCTOBER 20

9:00 AM – 1:00 PM	Technical Tour	Georgia Tech
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# SOCIAL CALENDAR

Whether you like to network, engage in fun activities or simply enjoy catching up with colleagues - connect with the crowd at AMTA's social events!

## 5K RUN OR WALK

**Sunday, October 15 | 7:00 AM – 8:30 AM**

\$25, includes hat, finisher medal and post-race celebration



Sponsored by: ETS-Lindgren

Ready. Set. GO! An awesome way to start the symposium week is to join your AMTA colleagues for a good morning 5K! Our host hotel is conveniently located on Peachtree Street in the heart of Atlanta's exclusive Buckhead neighborhood. During our morning jaunt (run or walk), you will get a memorable sunrise view of Lenox Square and Phipps Plaza malls, as well as the vibrant Buckhead Atlanta retail and dining districts. All participants will receive a stylish hat and finisher medal, plus we will celebrate with an after-race party complete with water, morning snacks and what every winner deserves... GATORADE! Topping it all off, we'll take our annual post-race photograph so you have proof that you indeed "Survived the AMTA 5K"!

## WELCOME RECEPTION

**Sunday, October 15 | 6:00 PM – 7:30 PM**

Included in registration



Sponsored by: NSI-MI Technologies

Gather on the East and West Terraces at the Grand Hyatt for appetizers, cocktails, and some casual socializing while catching up with old friends and making new acquaintances! Stroll through the Japanese Zen Gardens, designed by an award-winning Kyoto architect, including the Main Gate, bridge, Azumaya (open tea house), bamboo fence in the traditional Japanese carpentry style, Kakeni (well type basin), Karesansui (dry landscape) and the rock arrangements. The water running through the garden from East to West Terraces symbolizes Luck and Prosperity.

## MONDAY NIGHT OUTING

**Monday, October 16 | 6:00 PM – 10:00 PM**

\$90, includes transportation, appetizers, meal and entertainment

Cash bar available



Sponsored by: Microwave Vision Group (MVG)

The Estate is a stunning, 14,000 square foot venue located in the heart of Atlanta's Buckhead district, just minutes from the Grand Hyatt. Originally built in 1797, the property combines the best of southern charm with all the stylish comfort needed to sit, relax and enjoy an evening of leisure and Casino fun! We will have Roulette, Black Jack, Craps, and Poker tables and lots of 'funny' money to spend! If you aren't feeling lucky at the tables, dance the night away on the ballroom floor with the DJ playing your favorite tunes, partake in the Wine Tastings, sit in the beautiful enclosed sun porch or browse the 2 well stocked wine cellars which are quite the sight to see. We will also have a seated dinner for mixing and mingling with your fellow AMTA symposium attendees. There will be something for everyone!



## STUDENT DAY

**Tuesday, October 17 | 11:00 AM – 7:00 PM**

Sponsored by: STAR Dynamics Corporation & Denmar Technical Services  
Free for students



During AMTA's Student Day, students will participate in presentations and discussions related to antenna measurement technology culminating in a design and measurement contest with prizes awarded to the winning team. They will also have the opportunity to tour the vendor exhibit hall and view several technology demonstrations. As these vendors are typically looking to hire science and technology professionals, it is recommended that students bring several copies of a current résumé to share.

AMTA will provide lunch and dinner to students on the day of the event. AMTA will also provide transportation from local Universities to the conference and back. More information will be provided through email to registered students.

## AWARDS BANQUET

**Wednesday, October 18 | 7:00 PM – 10:00 PM**

Included in full registration, extra tickets \$75 per person



Wine Sponsored by: Microwave Vision Group (MVG)  
Pre-Banquet Reception Sponsored by: NSI-MI Technologies  
Bingo Prizes Sponsored by: Compuquest & Denmar Technical Services  
Award Gift Sponsored by: Altair Engineering



Join us on the East and West Terraces for a Cocktail Reception prior to the Banquet from 6 PM – 7 PM. The Awards Banquet will begin at 7 PM in the Highland Ballroom for a seated dinner, presentation of annual awards and bingo prize drawings.

## TOPGOLF

**Thursday, October 19 | 6:00 PM – 9:00 PM**

\$80, includes transportation, light dinner and golfing experience  
Cash bar available

Feeling competitive? Topgolf is a 65,000 sf, tri-story Golf Entertainment Facility with 102 hitting bays. Players hit micro-chipped golf balls that track each shot's accuracy and distance while awarding points for hitting targets on the outfield. Anyone can play Topgolf, from aspiring golf pros to those who have never walked 18 holes. It's competitive and it's FUN! For those who don't want to play, there are plenty of TV screens for watching most any current sporting event, a lounge, lots of fresh air and pool tables. Light dinner and non-alcoholic beverages are included.



## TECHNICAL TOUR - GEORGIA TECH RESEARCH LABS

**Friday, October 20 | 9:00 AM – 1:00 PM**

\$65, includes transportation and tour

Georgia Tech consistently ranks among the top U.S. universities in the volume of research conducted. Georgia Tech's labs are in the front lines of scientific and technological progress.

On this tour, we will visit just a portion of Georgia Tech's diverse portfolio of ground breaking fundamental research. Additional details may be found at [www.amta2017.org/technicaltour](http://www.amta2017.org/technicaltour)



# COMPANION TOURS



## WELCOME TO ATLANTA CITY TOUR/ATLANTIC STATION

**Monday, October 16 | 10:00 AM – 3:00 PM**

Our guided tour begins in Buckhead, learning interesting and fun facts while driving past the Governor's Mansion and the Swan House. We will then travel along the infamous Peachtree Street through midtown and downtown, with a stop at the The King Center, where nearly a million people each year make pilgrimage to the National Historic Site to learn, be inspired and pay their respects at the final resting place of Dr. King and his wife Coretta. After seeing the downtown attractions and highlights, we'll stop for lunch at Atlantic Station and tour this eclectic assortment of more than 50 shops, featuring a walkable streetscape-style setting with brick paved streets and a Central Park. The compact setting features great boutiques, sidewalk cafes, hip restaurants and a boutique hotel, making it the perfect destination for the final leg of the tour.



## CENTENNIAL OLYMPIC PARK

**Tuesday, October 17 | 10:00 AM – 3:00 PM**

Centennial Olympic Park not only serves as a legacy of the 1996 Summer Olympic Games, but is the center of a thriving tourist district with neighbors that include the College Football Hall of Fame, the Center for Civil & Human Rights, the World of Coca-Cola, Georgia Aquarium, CNN Center and Imagine It! The Children's Museum. This downtown Atlanta park is an urban oasis offering an abundance of activities and things to do!

On this day, you will have the chance to split off into groups with local chaperones and enjoy all the different venues Centennial Olympic Park offers or just relax and enjoy the park itself. There are several places to enjoy lunch within the park and other venues.



## ATLANTA BOTANICAL GARDENS/MARY MAC'S RESTAURANT

**Wednesday, October 18 | 9:00 AM – 3:00 PM**

Explore more than 30 acres of breathtaking botanical bliss at the Atlanta Botanical Gardens. Since the Garden opened more than 35 years ago, there's been more than 50 different updates, new exhibits and upgrades applied to the facility, making these gardens a must see in Atlanta. The Botanical Gardens and Conservatories boasts the longest (600 feet) canopy walk through the treetops of Storza Woods, a rare collection of high-elevation orchids never before grown in the Southeast, plus the exciting new Skyline Garden, offering a perfect way to visit Atlanta on a beautiful October day. For lunch, we will dine at nearby Mary Mac's Tea Room, an Atlanta landmark, to enjoy authentic Southern cooked cuisine served family style.



## SHOPPING – LENOX SQUARE MALL & PHIPPS PLAZA

**Thursday, October 19 | 10:00 AM – 3:00 PM**

Since 1959, Lenox Square® has been the premier shopping destination for fashionistas throughout the Southeast. Located in the heart of Buckhead, Lenox Square offers an unparalleled shopping experience. An impressive two-story glass facade provides a dramatic entrance showcasing the iconic property's street side presence, including a glass covered porte-cochere and valet amenities for easy access. The property boasts Bloomingdale's, Neiman Marcus and Macy's and features nearly 250 specialty stores including FENDI, Burberry, Cartier, David Yurman, Louis Vuitton, Diane von Furstenberg, and Vineyard Vines.

Phipps Plaza is the southeast's premier, upscale shopping destination. It is a beautiful, climate-controlled indoor shopping mall which boasts 100+ stores including Saks Fifth Avenue, Nordstrom, Belk, Tiffany & Co., Gucci and more. In addition to being able to shop categories like women's and men's apparel, children's apparel and jewelry, Phipps Plaza offers plenty of entertainment with a 14-screen AMC movie theatre and LEGOLAND Discovery Center attraction.

Several dining options are available at both locations for lunch catering to any taste at any price. Transportation for this elite shopping experience includes picking up from the Grand Hyatt, travel to both malls, and the return trip back to the Grand Hyatt.

**COMPANION TOUR  
TICKETS MAY BE  
PURCHASED AT THE  
REGISTRATION DESK**

## 2017 TECHNICAL PROGRAM COMMITTEE

**Dirk Heberling (Chair)**  
RWTH Aachen University

**Jeffrey Bean**  
Georgia Tech Research Institute (GTRI)

**Olav Breinbjerg**  
Technical University of Denmark

**Chi-Chih Chen**  
Ohio State University (OSH)

**Zhong Chen**  
ETS – Lindgren

**Peter Collins**  
Air Force Institute of Technology

**Francesco D'Agostino**  
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**Christer Larsson**  
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**Teh-Hong Lee**  
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**David Novotny**  
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**Luis Rolo**  
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**Manuel Sierra-Castañer**  
Politécnica de Madrid

**David A. Tonn**  
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**Ed Urbanik**  
BerrieHill Research Corporation

**Brett T. Walkenhorst**  
NSI-MI Technologies

**Jin-Seob Kang**  
Korea Research Institute of Standards and Science (KRISS)

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## 2017 AMTA STUDENT PAPER AWARD COMMITTEE

**Eric Walton (Chair)**  
Independent Consultant

**Marion Baggett**  
NSI-MI Technologies

**Edward Joy**  
Georgia Tech Research Institute (GTRI)

**Lydell Frasch**  
Boeing

**Teh-Hong Lee**  
Ohio State University (OSH)

**Fernando Las-Heras**  
Oviedo University

**Tracy Johnson**  
Raytheon

**Edward Urbanik**  
BerrieHill Research Corporation

**Brian Fischer**  
Integrity Applications Incorporated (IAI)

**Luca Salghetti Drioli**  
European Space Agency (ESA)

**Massimiliano Simeoni**  
European Space Agency (ESA)

**Jeffrey Bean**  
Georgia Tech Research Institute (GTRI)

**Peter Collins**  
Air Force Institute of Technology (AFIT)

**Randy Jost**  
Ball Aerospace



# BOOT CAMP & SHORT COURSE

## BOOT CAMP

**Sunday, October 15 | 9:00 am – 5:00 pm**

The AMTA Boot Camp is a 1-day course on antenna and related measurement fundamentals. Live hands-on demonstrations complement the material presented. The Boot Camp is an ideal training opportunity for those new to the antenna and related measurements community and for those who would appreciate an update or “refresher” course on these topics. Instructors are industry experts who were selected based not only on their expertise, but for their ability to communicate effectively.

### Instructors:

Dave Pinnell; Mike Havrilla, PhD; Hirsch Chizever; Lydell Frasch, PhD; Per Iversen; Stephen Blalock; and Vince Rodriguez, PhD

### Goals and Objectives

- Gain basic understanding of the AMTA-relevant measurement systems and associated equipment
- Obtain basic understanding of the theory and physical principles of each measurement system
- Acquire technical vocabulary for each measurement system
- Gain appreciation for similarities and differences of each measurement system
- Establish appreciation for the challenges/applications that are driving the need for each measurement system
- Identify common themes in each measurement system (calibration, standards, best practices, uncertainties, etc.)

### Boot Camp Outline

8:00 AM – 9:00 AM	Breakfast
9:00 AM – 9:20 AM	Introduction
9:20 AM – 9:45 AM	General RF Measurements
9:45 AM – 9:55 AM	General RF Measurements Demo
9:55 AM – 10:10 AM	Break
10:10 AM – 10:55 AM	Material Measurements
10:55 AM – 11:10 AM	Material Measurements Demo
11:10 AM – 11:25 AM	Break
11:25 AM – 12:20 PM	Antenna Measurements
12:20 PM – 12:45 PM	Antenna Measurements Demo
12:45 PM – 1:45 PM	Lunch
1:45 PM – 2:40 PM	RCS Measurements
2:40 PM – 3:05 PM	RCS Measurements Demo
3:05 PM – 3:20 PM	Break
3:20 PM – 4:15 PM	EMC/EMI Measurements
4:15 PM – 4:40 PM	EMC/EMI Measurements Demo
4:40 PM – 5:00 PM	Conclusion

## SHORT COURSE

**Sunday, October 15 | 8:00 am – 5:00 pm**

This course will provide an introduction to all aspects of modern compact antenna test range measurements including an introduction to antennas, far-field antenna measurements, compact ranges, scattering measurements and radome testing including an introduction to some of the most recent developments in post-processing and error correction techniques. This one day short course is intended for researchers, practicing engineers and technicians who want to obtain a better understanding of antenna measurement concepts, theory and techniques.

### Instructors:

Anil Tellakula, Jeff Fordham, Marion Baggett, Stephen Blalock, Steve Nichols, and Daniël Janse van Rensburg, PhD

### Goals and Objectives

- Gain basic understanding of the fundamentals of antenna measurement theory and CATRs
- Obtain basic understanding of the theory and physical principles of CATR measurements
- Acquire technical vocabulary for CATR design
- Gain appreciation for similarities and differences of each CATR measurement
- Establish appreciation for the challenges/applications that are driving the need for each CATR measurement
- Identify common themes in CATR measurements (calibration, standards, best practices, uncertainties, etc.)

### Short Course Outline

8:00 AM – 8:30 AM	Introduction to CATRs
8:30 AM – 9:30 AM	Part I Implementation of CATRs
9:30 AM – 9:45 AM	Break
9:45 AM – 11:15 AM	Part II Implementation of CATRs
11:15 AM – 11:30 AM	Break
11:30 AM – 12:30 PM	CATR Design and Manufacture
12:30 PM – 1:15 PM	Lunch Break
1:15 PM – 2:45 PM	Applications
2:45 PM – 3:00 PM	Break
3:00 PM – 4:30 PM	Advanced CATR Topics

# INSTRUCTORS

## Anil Tellakula



Anil Tellakula is a Senior Applications Engineer at NSI-MI. He provides technical leadership and support to the sales, business, and engineering teams. Anil was the primary designer of several reflectors which have all been manufactured, installed, and tested successfully.

He has significant experience in using metrology equipment, such as the Laser Tracker and Laser Radar, for reflector surface evaluation as well as to align and install the various sub-systems of compact range systems. He has significant experience in installing and aligning compact range systems, as well as near-field and far-field systems for antenna measurements.

In addition to his Compact Range Reflector work, he has successfully designed various complex mechanical systems for hardware-in-the-loop simulation systems for missile testing. He has also developed mechanical systems for testing commercial and military aircraft radomes.

Anil worked at HVS Technologies as a Project Manager & Engineer. At HVS, he gained more than 10 years of experience in diverse fields such as project management, mechanical design and automation, electromagnetic test and measurement systems, instrumentation, and software development. He was instrumental in conceptualizing and designing automated systems for electromagnetic characterization of materials at up to 110 GHz. Anil holds a Master of Science Degree in Engineering Science from the Pennsylvania State University and a Bachelor of Engineering Degree in Mechanical Engineering from Bangalore University, India.

## Jeff Fordham



Jeff Fordham is Vice-President, Business Development of NSI-MI.

Jeff has years of experience in the design and evaluation of antennas and systems, working with such organizations as the Georgia Tech Research Institute's Electromagnetic Environmental Effects Laboratory and EMS Technologies Inc., before joining Scientific-Atlanta Inc. in 1996 and subsequently NSI-MI after the company was formed in 1997.

Jeff's primary management and design experiences have been in the areas of spacecraft antennas, millimeter wave aircraft antennas, tracking and communication ground station systems, antenna measurement instrumentation, and electromagnetic analysis of radiating apertures and components.

Jeff is active in a number of industry and community service organizations. He has been a member of the IEEE Antennas and Propagation Society and the Microwave Theory and Techniques Society since 1987. He also served as Chapter Chair for the Atlanta Chapter, Antennas and Propagation/Microwave Theory and Techniques Society in 2001. He is a member of the Antenna Measurements Techniques Association and served on the AMTA Board of Directors as the Host of the AMTA 2004 Symposium.

Jeff holds a Master of Science Degree in Electrical Engineering and a Bachelor of Science Degree in Electrical Engineering, both from Georgia Institute of Technology. He has authored and presented papers at various conferences including, AMTA and EuCAP. He has published additional articles and technical papers in Antennas and Propagation Magazine, Antenna Systems & Technology and other journals.



## Steve Nichols



Steven R. Nichols is the Manager of Applications and Systems Engineering at NSI-MI. He was named to this position in July 2014 after having served as the Manager of Product Engineering for 11 years, where he led the development of the company's new microwave measurement system architecture and a new line of instrumentation products that compose the system.

Steve has over 30 years of experience in engineering design and technical management, much of it spent advancing the state of the art in antenna, radar cross section, and radome measurement instrumentation and systems at both NSI-MI and as part of the Microwave Instrumentation Division of Scientific Atlanta. He also served as Director of R&D for Satellite Networks for several years, managing product development for telephony and data VSAT systems, and he continued in this role after the business was sold to ViaSat.

Steve is currently serving his fourth year on the Board of Directors for the Antenna Measurement Techniques Association. He is also a Senior Member of the IEEE and has served on the Board of Directors for the IEEE Atlanta section.

Steve received a Bachelor of Electrical Engineering from the Georgia Institute of Technology, graduating with highest honors. He has also published several technical papers on antenna measurement topics and has given presentations as an invited speaker at industry events, including AMTA, ATMS India, and EuCAP.

## Daniël Janse van Rensburg



Dr. Daniël Janse van Rensburg is CTO of NSI-MI Technologies. He was named to this position in 2016 following the merger of NSI and MI Technologies. Daniel brings 25 years of RF measurement experience in the aerospace industry. He has worked extensively on antenna, radome and radar cross-section applications, spanning both far-field and near-field techniques.

He received the B.Eng (cum laude), M.Eng and Ph.D degrees in Electrical Engineering in 1985, 1987 & 1991 respectively, from the University of Pretoria, Pretoria, South Africa after which he was appointed Associate Professor in the department of Electrical Engineering. He joined the Canadian Space Agency in Ottawa, Canada as Research Engineer in 1994 and in 1996 he was appointed as Senior Member of Technical Staff at COMDEV in Cambridge, ON, Canada. He joined NSI in 1998 as Applications Engineer and in 2001 assumed the role of Sales Manager.

He remains actively involved in academia and was appointed as Adjunct Professor in the School of Information Technology and Engineering (SITE), University of Ottawa, Ottawa, ON, Canada in 2005 where he provides post graduate student supervision. He is the author of more than 60 journal and conference papers, regularly contributes to industry courses on near-field test technology and is co-author of the IET text: Theory & Practice of Modern Antenna Range Measurements, which was published in 2014.

His research interests include near-field test methods, measurement uncertainty analysis and the coupling of measurement and computational techniques. He is a Fellow of the Antenna Measurement Techniques Association (AMTA), served on the AMTA Board of Directors from 2007 – 2010 and as President in 2009. He received an Outstanding Service award from the AMTA in 2009 and received the AMTA Distinguished Achievement Award in 2015. He is a Senior Member of the IEEE and Licensed Professional Engineer in Ontario, Canada.

## Stephen Blalock



Stephen Blalock is Vice-President, Engineering of NSI-MI. In this role, he oversees all engineering activity for the development of sophisticated measurement systems. The company's engineering department is responsible for the design, integration, verification, and deployment of advanced microwave measurement systems used for characterizing antennas and radomes from the UHF to millimeter wave frequency regimes. Stephen is responsible for the electrical, mechanical, software and project engineering activity needed to bring these systems to market.

Stephen has more than 20 years of experience in antenna, radar signature, and materials characterization using a variety of test systems including compact range, free space and resonant cavity materials measurement apparatus, image plane antenna range, and farfield antenna ranges. In addition to system development and operation, he lectured for a Radar Cross Section Reduction short course for 12 years and developed a hands-on compact range laboratory as part of the capstone to the short course.

Stephen is a vetted reviewer for the National Radar Cross Section Measurement Facility Certification program. This national level program consists of national experts who review and certify the nation's premier radar signature measurement ranges.

Stephen holds a Master's degree in Applied Systems Engineering from the Georgia Institute of Technology as well as a Master's degree in Electrical Engineering Technology from the Southern Polytechnic State University.

## Marion Baggett



Marion Baggett is an Applications and Systems Engineer at NSI-MI. This group includes engineers responsible for customer applications development and systems engineering.

During previous service at Scientific-Atlanta, Marion spent ten years with the Microwave and Radar Cross-Section Instrumentation products from 1984 through 1994. Marion's engineering and management career includes twenty years with Scientific-Atlanta and ViaSat, Inc. in the tracking systems, microwave instrumentation, radar cross-section and satellite gateway product lines. From 1982 through 2000, Marion held various staff engineer and management positions at Scientific-Atlanta, including participating in the founding of the radar cross-section product group in 1984. Among his assignments were Manager of RCS Software Engineering, Staff Engineer in Microwave Products and Staff Engineer in Satellite Ground Systems. During the period from 1994 through 2000, Marion was initially the lead software engineer and later project engineer for the Iridium Earth Terminals. In 2000, ViaSat, Inc. purchased the Satellite Ground Systems group from Scientific-Atlanta. At ViaSat, Marion was Manager of Satellite Ground System Software Engineering and a Principal Engineer for the company.

Marion is a Senior Member of the Antenna Measurement Techniques Association (AMTA), a member of IEEE and is also a registered Professional Engineer. Marion has been a member of the AMTA student paper evaluation committee for the last 8 years. He has authored or co-authored 14 technical publications in the areas of microwave measurements.

Marion holds a Bachelor of Electrical Engineering Degree and Master of Science in Electrical Engineering Degree from the Georgia Institute of Technology. He also holds a Master of Science in Engineering Management from the University of Alabama in Huntsville.



# FEATURED SPEAKERS



## KEYNOTE SPEAKER

**8:00 AM – 8:48 AM | MONDAY, OCTOBER 16**

**Gabriel M. Rebeiz, PhD**  
Professor at University of California San Diego

Gabriel M. Rebeiz is one of the fathers of silicon RFIC phased-arrays. Starting in 2001, Prof. Rebeiz has taken this technology from its infancy to SATCOM phased-arrays, 60 GHz base-station phased-arrays, automotive radar phased-arrays, and now, 28 GHz and 39 GHz 5G systems. He holds a PhD in electrical engineering from the California Institute of Technology (Caltech), and is currently the Wireless Communications Industry Chair Professor at UCSD. He has graduated 90 PhD students and post-docs, has more than 650 IEEE publications, and has received the Microwave Prize twice, both on phased-array topics. In 2016, Prof. Rebeiz was elected to the National Academy of Engineering for his contribution to low-cost phased arrays.

### **"RFIC/Silicon-based Phased Arrays and Transceivers for 5G"**

The 5G standard promises a revolution in wireless data transfer with Gbps links over kilometers at millimeter-wave frequencies. This is possible using high-gain antenna arrays resulting in "directive communications" between the base-station and the user, either in a phased-array or in a MIMO configuration. A key challenge is the construction and test of low-cost phased-arrays and transceivers at the 5G bands: 24-30 GHz, 36-42 GHz and 57-70 GHz. Prof. Rebeiz will present the progression of phased-array systems from defense-oriented applications to becoming the cornerstone of millimeter-wave commercial 5G systems, and the role of silicon RFICs, built-in-test, and antenna design and calibration, to making this happen.



## LUNCH & LEARN

11:30 AM – 1:30 PM | THURSDAY, OCTOBER 19

### Ryan Westafer, PhD

Electromagnetics Division, Advanced Concepts, GTRI, Atlanta, GA

Dr. Ryan Westafer is a Senior Research Engineer and Chief Scientist of the Electromagnetics Division of the Advanced Concepts Laboratory (ACL) at Georgia Tech Research Institute (GTRI). He received the BS (CMPE), MSECE, and PhD (EE) degrees from Georgia Tech, with a research focus in dispersion engineering of surface waves in piezoelectric phononic crystals for a multiplexed passive RF backscatter sensor. Since joining GTRI, Ryan has supported or led many programs ranging from RF devices to antenna applications. Most recently, he has served as lead engineer of GTRI's team creating a Reconfigurable Electromagnetic Interface (REI) for the DARPA ACT program. Ryan's ongoing research interests include optimized W-band apertures and full-wave simulation of time-varying antennas and systems.

#### "Adaptive Electromagnetics – Closed-Loop Demonstrations of Reconfigurable Antennas"

Over more than a decade of research and development, reconfigurable antennas have been characterized and demonstrated in several different closed loop systems. These antennas typically are wavelength-sized single-feed apertures capable of tuning over an octave in frequency, reaching any point on the Poincaré sphere, and steering in two dimensions. Prior to the DARPA RECAP program in 1999, genetic algorithms were used to optimize pixelated or "fragmented aperture" antennas in simulation, i.e. before construction. Since that time, electronically reconfigurable antennas have been optimized in situ using closed-loop measurement systems. This approach produces optimized personalities accounting for variations in manufacturing. Such measurement systems are general purpose and precise but relatively slow. Fortunately, the increasing popularity and availability of software defined radio equipment since 2004 has enabled higher speed closed loop demonstrations taking advantage of baseband processing. The increase in speed and cooperation with radio hardware has enabled real-time closed loop control ranging from multi-mode operation to blind adaptation to propagation channels. This talk describes several systems, results, and demonstrations conducted recently at GTRI.



## INVITED SPEAKERS

### Aubrey Beal, PhD

US Army Research - Redstone Arsenal, Huntsville, AL  
1:30 PM – 3:00 PM | TUESDAY, OCTOBER 17



Dr. Aubrey Beal received B.E.E., M.S. and PhD degrees in Electrical Engineering from Auburn University in Auburn, AL. He has industry experience in bulk power systems with Southern Company, power electronics for high performance computers with IBM as well as metal detection for biomedical applications. Dr. Beal is a researcher and Electronics Engineer with the U.S. Army Charles M. Bowden Laboratory at Redstone Arsenal, Alabama. His current research interests include nonlinear dynamics and chaos for applications in communications and radar.

#### "Naturally Compressive Noise Radar Using Chaos"

Chaos is a deterministic phenomenon that causes unpredictable oscillations. It has been shown that chaos has a surprising and necessary role in optimal waveform detection when simple matched filters are used. This result paired with the noise-like behavior of chaotic systems encourages their candidacy for noise radar systems. This work outlines the benefits of using solvable chaos to realize a noise radar scheme that consists of simple components, optimal detection of the transmitted waveform and sub-Nyquist sampling. The result is a noise radar system that is inexpensive, easy to

characterize and has potential for less demanding memory, sampling and power requirements. A treatment of noise radar, simple matched filters for chaos and natural compressive sampling of chaotic signals is provided.

### Martin Heimbeck, PhD

US Army Research - Redstone Arsenal, Huntsville, AL  
8:00 AM – 9:30 AM | THURSDAY, OCTOBER 19



Dr. Martin Heimbeck received his M.S. and PhD degrees in Physics and Optical Science and Engineering from The University of Alabama in Huntsville, Huntsville, AL in 2008 and 2016 respectively. Dr. Heimbeck conducts basic and applied research activities at the Charles M. Bowden Research Laboratory in the Army's Aviation & Missile RD&E Center located at Redstone Arsenal, AL, USA. His research interests include millimeter wave research at 60 GHz for communication applications and extremely high frequency (100 - 1000 GHz) research for coherent imaging radar applications including digital holography and computational tomography.

#### "Extremely High Frequency Technologies for Imaging Radar & High-Bandwidth Datalinks"

Millimeter wave and Terahertz (sub-millimeter wave) radiation are emerging technologies with many applications ranging from imaging radar for nondestructive testing and security screening to high-bandwidth datalinks as a wireless alternative to fiber optics and robust alternative to free space optical datalinks. However, as an

emerging technology, the availability of commercial products to support the development of these extremely high frequency applications is limited. Test instrumentation to include antenna products and absorbing materials are hard to find as a product line, and turn-key instrumentation is still highly specialized and usually offered only by a small size of businesses trying to fill a product niche. In this talk, several promising applications for coherent millimeter wave and Terahertz radiation to include holographic imaging, coherent tomography, radar signature studies, and high-bandwidth datalinks will be presented along with supporting instrumentation ranging from compact radar ranges, system-on-chip technology, ellipsometers, inexpensive absorbers, metamaterials, sources and heterodyne detectors.

## EURAAP SPEAKER

**Luca Salghetti Drioli, PhD**  
European Space Agency, (ESA)  
8:00 AM – 9:30 AM | WEDNESDAY, OCTOBER 18



Dr. Luca Salghetti Drioli received the MSc and PhD degrees from the University of Florence, Italy, in 1997 and 2001, respectively, both in electrical engineering. During his PhD coursework, he joined CSELT laboratories in Turin, Italy working on the design and test of frequency selective surfaces for high-gain antennas and focusing on extension and application of the Generalized Admittance Matrix Method to the electromagnetic characterization of complex geometry structures, such as polarizers, and orthomode transducers (OMTs). Further, he spent four months with the Earth Station Operation Center of the European Space Agency (ESA-ESOC) in Darmstadt, Germany, working on the optimization of the deep space antenna for the Rosetta Mission. In 2003, he joined the Antenna and Sub-mm wave section at ESA-ESTEC where is currently supporting the antenna developments in several ESA projects (e.g. GALILEO, BIOMASS). His research interests include waveguide components for feed-systems, numerical and asymptotic methods in electromagnetic scattering and radiation problems, frequency selective surfaces and antennas for navigation applications. Since 2006, he is also the coordinator of the course on Antennas for Space Applications organized in the frame of the European School of Antennas. Dr. Salghetti Drioli is supporting the

antenna measurement facilities of the Electromagnetic Division of European Space Agency. He was the responsible of the upgrade of the already existing Compact Test Range to an hybrid facility including a near-field system in the same anechoic room. He has been leading the GALILEO Satellite Antenna farm test campaign and he is supporting all 'low frequency' antenna measurement activities in ESA.

### "Challenges in Space Antenna Testing"

The European Space Agency (ESA) is one of the few space agencies in the world to combine responsibility in nearly all areas of space activity. Covering applications from Space Science, Telecommunication, Earth Observation to Navigation, testing space antennas asks for measurement capabilities in a very broad frequency range and for test objects of very different size. To reduce mass and power on board of satellites and/or interplanetary probes, all space missions are characterized by extremely reduced margin in link budgets and for this reason antenna's efficiency as well as measurement accuracy are crucial. All the above puts strong constraints on space antenna test ranges and techniques. New domains requiring further development with respect to the state of the art are innovative approaches for efficient antenna and payload RF characterization, radiated high power testing, radiated PIM testing in the near field with processing to localize the PIM sources, accurate characterization of radiated phase for interferometric instruments and navigation antennas, test techniques for sub-mm wave antenna measurements (e.g. Phaseless Near-Field) and characterization of the RF properties of material and processes involved in antenna design. ESA is active in all the above mentioned areas promoting ideas and funding activities. With respect to support to current space missions and their challenges in antenna testing, space industry is facing the problem of accurately characterizing large objects at low frequencies (e.g. BIOMASS, MTG), where measurement capabilities of existing ranges might not be sufficient and leading to the need of elaborating ad hoc verification methodologies. Also, for telecom satellites, moving from single beam to multiple beam antennas, where measurement time increase dramatically, is leading to prohibitive cost of the test campaign and efficient test approaches need to be developed and validated. Moreover, next generation telecom satellite systems are moving from one unique satellite to mega constellations (e.g. OneWeb) where different verification scenarios need to be elaborated to reduce the cost of the system development and deployment. In case of large telecom platforms, there is the need of making available testing facilities with very large quiet zones and complex zero-g devices to allow accurate testing of antenna farms. Alternatively, new, portable, antenna measurement systems to allow unconventional measurements of the large platforms could be utilized (e.g. Airbus PAMS). In more and more application domains (e.g. Earth Observation and Navigation) project teams welcome payload/instrument end-to-end radiated testing, performing quality analysis on the signal radiated by the payload/instrument connected to the antenna. To allow for this, efficient (Near-Field) payload test procedures and processing need to be further consolidated. The talk will provide an overview of the above mentioned challenges in space antenna measurements with reference to past and running ESA projects, highlighting state of the art solutions and achievements.



# TECHNICAL PROGRAM

## MONDAY, OCTOBER 16

### 8:00 AM – 8:48 AM | Meeting Opening/Keynote Address

**Welcome and Introduction of Keynote Speaker:** Dave Pinnell, AMTA President

**Keynote Address: "RFIC/Silicon-based Phased Arrays and Transceivers for 5G"**  
Professor Gabriel Rebeiz (University of California San Diego)

**Opening Remarks and Instructions:** Dirk Heberling

## SESSION 1

### 8:48 AM – 10:00 AM | General Antenna Measurements 1

**Chair:** Jeffrey Bean (Georgia Tech Research Institute)

**A17-0026: "Development of A New Atom-Based SI Traceable Electric-Field Metrology Technique"**  
Christopher Holloway, Matt Simons, Josh Gordon (National Institute of Standards and Technology (NIST))

**A17-0031: "Accuracy Enhancement of Ground Reflection Range Measurements Using a Two-Element Array Source Antenna"**  
Artem Saakian, Frederick Werrell (NAVAIR-4.5.5)

**A17-0044: "Application of the Translated-SWE Algorithm for the Characterization of Antennas Installed on Cars Using a Minimum Number of Samples"**  
Francesco Saccardi<sup>1</sup>, Francesca Rossi<sup>1</sup>, Francesca Mioc<sup>1</sup>, Lars Foged<sup>1</sup>, Per Iversen<sup>2</sup>  
(<sup>1</sup>Microwave Vision Italy, <sup>2</sup>Orbit/FR Inc.)

**A17-0028: "Common Microwave Absorbers Evaluations in W-band (75-100 GHz)"**  
Zhong Chen (ETS-Lindgren)

### 10:00 AM – 10:30 AM | MORNING BREAK

## SESSION 2

### 10:30 AM – 11:45 AM | General Antenna Measurements 2

**Chair:** Olav Breinbjerg (Technical University of Denmark)

**A17-0095: "Thermal Testing of Small Antennas in Multi-Probe Spherical Near-Field Systems"**  
Andrea Giacomini<sup>1</sup>, Jim Acree<sup>2</sup>, John Estrada<sup>2</sup>, Per Iversen<sup>3</sup>, Roberto Morbidini<sup>1</sup>, Lars Foged<sup>1</sup>, Edward Szpindor<sup>3</sup>  
(<sup>1</sup>Microwave Vision Italy, <sup>2</sup>MVG Inc., <sup>3</sup>Orbit/FR)

**A17-0083: "A 60 GHz Dual-Polarized Probe for Spherical Near-Field Measurements"**  
Paula Popa, Olav Breinbjerg (Technical University of Denmark)

**A17-0100: "The 7 Common Habits of Highly Effective RF Target Simulators"**  
David Wayne (NSI-MI Technologies)

**A17-0033: "An RCS-based Wall-reflectivity Technique; The First On-site Test Results"**  
Amin Enayati, Joachim Wesemael (E&C Anechoic Chamber)

### 11:45 AM – 1:30 PM | EXHIBITORS' LUNCH – Exhibit Areas

## SESSION 3

### 1:30 PM – 3:00 PM | General Near-Field Measurement

**Chair:** Manuel Sierra-Castañer (Politécnica de Madrid)

**A17-0020: "Nearfield Antenna Measurements over Seawater – Some Preliminary Thoughts"**  
David Tonn (NUWC Newport)

**A17-0093: "Dual-Polarized Probe with Full Octave Bandwidth and Minimum Scattering for Planar Near Field Measurements"**  
Andrea Giacomini<sup>1</sup>, Jim Acree<sup>2</sup>, John Estrada<sup>2</sup>, Roberto Morbidini<sup>1</sup>, Luca Tancioni<sup>3</sup>, Lars Foged<sup>1</sup>, Vincenzo Schirosi<sup>1</sup>  
(<sup>1</sup>Microwave Vision Italy, <sup>2</sup>MVG Inc., <sup>3</sup>Orbit/FR)

**A17-0080: "Measurement of Antenna System Noise Temperature Using Planar Near-Field Data"**  
Allen Newell, Patrick Pelland, Stuart Gregson, Daniël Janse van Rensburg (NSI-MI Technologies)

**A17-0088: "Characterization of a Photonics E-Field Sensor as a Near-Field Probe"**  
Brett Walkenhorst<sup>1</sup>, Vince Rodriguez<sup>1</sup>, James Toney<sup>2</sup>  
(<sup>1</sup>NSI-MI Technologies, <sup>2</sup>Srico)

**A17-0101: "Near-Field Far-Field Transformation for Circular Aperture Antennas using Circular Prolate Wave Functions"**  
Amedeo Capozzoli, Claudio Curcio, Angelo Liseno (Università di Napoli Federico II)

**3:00 PM – 3:30 PM | AFTERNOON BREAK**

## SESSION 4

**3:30 PM – 5:00 PM | RCS Measurement**  
Chair: Brian Fischer (Integrity Applications Inc.)

**A17-0025: "RCS Measurements and Imaging on Arrays of Retro-reflectors"**  
Pax Wei (The Boeing Company (retired))

**A17-0041: "Analysis of Near-Field RCS Behavior for mm-Wave Automotive Radar Testing Procedures"**  
Domenic Belgiovane, Chi-Chih Chen (The Ohio State University)

**A17-0066: "Advances in SAR-ISAR Blending"**  
Christer Larsson<sup>1</sup>, Johan Jersblad<sup>2</sup>  
(<sup>1</sup>Saab Dynamics and Lund University, <sup>2</sup>Saab Barracuda)

**A17-0075: "Automating RCS Measurements for High Speed Production Line In-Process Verification"**  
Roger Richardson, Brett Haisty (Delta Sigma Company)

**A17-0087: "Specular Reflectance Measurement of Dielectric Plates in 110-325 GHz Frequency Range"**  
Jin-Seob Kang<sup>1</sup>, Jeong-Hwan Kim<sup>1</sup>, Kwang Yong Kang<sup>2</sup>, Dae Hwan Yoon<sup>3</sup>, Sung Won Park<sup>3</sup>  
(<sup>1</sup>Korea Research Institute of Standards and Science (KRISS), <sup>2</sup>Panoptics, <sup>3</sup>National Radio Research Agency (RRA))

## TUESDAY, OCTOBER 17

### SESSION 5

**8:00 AM – 9:30 AM | Novel Antenna Design**  
Chair: John Estrada (Microwave Vision Group)

**A17-0032: "A Cylindrical Reconfigurable Antenna Technology with Full Hemispherical Coverage"**  
Gregory Kiesel, Efstrateos Strates (Georgia Tech Research Institute)

**A17-0074: "A Broadband Patch Antenna with an Anisotropic Superstrate - Design and Measurement Challenges"**  
David Tonn, Susan Safford (NUWC Newport)

**A17-0098: "A Low-sidelobe Ka-Band Array Antenna Design"**  
Erda Wen, Chi-Chih Chen (The Ohio State University)

**A17-0107: "A Novel Near-field Gregorian Reflectarray Antenna Design with a Compact Deployment Strategy for High Performance CubeSats"**  
Yahya Rahmat-Samii, Joshua Kovitz, Jordan Budhu, Vignesh Manohar (UCLA)

**A17-0112: "Broadband Additive Spiral Antenna"**  
Tommy Lam (Lockheed Martin)

**9:30 AM – 10:00 AM | MORNING BREAK**



## SESSION 6

**10:00 AM – 11:30 AM | Range Design and Quiet Zone**

**Chair: Jin-Seob Kang (KRISS)**

**A17-0090: "International Facility Comparison Campaign at L/C Band Frequencies"**

Maria Saporetti<sup>1</sup>, Lars Foged<sup>1</sup>, Yasar Kurdi<sup>2</sup>, Antonis Alexandridis<sup>3</sup>, Cosme López<sup>4</sup>, Fernando Las-Heras<sup>5</sup>, Manuel Castañer<sup>2</sup>  
(<sup>1</sup>Microwave Vision Italy, <sup>2</sup>Universidad Politécnica de Madrid, <sup>3</sup>Institute of Informatics & Telecommunications NCSR  
"Demokritos, <sup>4</sup>RWTH Aachen University, <sup>5</sup>Universidad de Oviedo)

**A17-0069: "Comparing Predicted Performance of Anechoic Chambers to Free Space VSWR Measurements"**

Vince Rodriguez (NSI-MI Technologies)

**A17-0071: "On the Disadvantages of Tilting the Receive End-Wall of a Compact Range for RCS Measurements"**

Vince Rodriguez (NSI-MI Technologies)

**A17-0079: "Reverberation Chamber Techniques for Wireless Avionics Intra-Communication Testing"**

Truong Nguyen, Omar Torres (NASA Langley Research Center)

**A17-0086: "A Novel and Innovative Near Field System for Testing Radomes of Commercial Aircrafts"**

Marc Le Goff, Nicolas Adnet, Nicolas Gross, Luc Duchesne, Arnaud Gandois, Ludovic Durand (Microwave Vision Group (MVG))

**11:00 AM – 7:00 PM | STUDENT DAY**

**11:30 AM – 1:30 PM | BUSINESS LUNCH**

## SESSION 7

**1:30 PM – 3:00 PM | Innovative Measurement Approaches**

**Chair: Justin Dobbins (Raytheon)**

**Featured Talk: "Naturally Compressive Noise Radar Using Chaos"**

Dr. Aubrey Beal (US Army Research, Redstone Arsenal)

**A17-0012: "Analysis of Time and Direction of Arrival (TADOA) Data using Basis Pursuit in the AFRL One-RY Antenna Measurement Range"**

Brian Fischer<sup>1</sup>, Ivan LaHaie<sup>1</sup>, Michael Blischke<sup>1</sup>, Brian Kent<sup>2</sup>, Brittany Wells<sup>3</sup>, James Stewart<sup>3</sup>  
(<sup>1</sup>Integrity Applications Incorporated, <sup>2</sup>Applied Research Associates, <sup>3</sup>Air Force Research Laboratory)

**A17-0017: "Comparison of Facilities for Low Level Coupling Tests in UAV EMC Certification"**

David Escot Bocanegra<sup>1</sup>, Sergio Fernández Romero<sup>1</sup>, Patricia López Rodríguez<sup>2</sup>, Manuel Jesús Añón Cancela<sup>1</sup>, David Poyatos Martínez<sup>1</sup>  
(<sup>1</sup>National Institute for Aerospace Technology (INTA), <sup>2</sup>AKKA Technologies)

**A17-0021: "Cost Functions in Near-Field Spherical Scanning Data Processing Algorithms"**

Michael Francis, Ronald Wittmann (Protiro (NIST))

**3:00 PM – 3:30 PM | AFTERNOON BREAK**

## SESSION 8

**3:30 PM – 5:00 PM | Poster Session**

**Chair: David A. Tonn, Ed Urbanik, Lydell Frasch (Naval Undersea Warfare Center, BerrieHill Research Corporation, Boeing Co.)**

**A17-0014: "Determination of the Far-Field Radiation Pattern of a Vehicle Mounted VHF Antenna From a Set of Sparse Near-Field Measurements"**

Scott Kordella<sup>1</sup>, Kenneth Grimm<sup>2</sup>  
(<sup>1</sup>The MITRE Corporation, <sup>2</sup>Consultant)

**A17-0024: "Using Small Unmanned Aerial Systems (sUAS) and Helium Aerostats to Perform Far-Field Radiation Pattern Measurements of High-Frequency Antennas"**

Joshua Miller, Emmanuel Decrossas (California Institute of Technology)

**A17-0038: "Dual Surface Source Reconstruction on Arbitrary Shape for Interference Elimination"**  
Yoshiki Sugimoto, Hiroyuki Arai (Yokohama National University)

**A17-0056: "Additive Manufacturing Metallic Sphere as a RCS Measurement Standard"**  
Pierre Massaloux (CEA/CESTA)

**A17-0055: "Design of a Cylindrical Conformal Fractal Antenna for GPS Application"**  
Ratikanta Sahoo, Damera Vakula, NVSN Sarma (National Institute of Technology (NIST))

**A17-0063: "Optimizing Installed Antenna Performance on Electrically-Large Platforms"**  
Derek Campbell, C.J. Reddy (Altair Engineering, Inc.)

**A17-0065: "PCB-Side Matching Networks for coaxial connectors"**  
Andreas Diewald<sup>1</sup>, Simon Mueller<sup>2</sup>, Andreas Olk<sup>3</sup>  
(<sup>1</sup>Hochschule Trier, <sup>2</sup>IFARUS, <sup>3</sup>IEE S.A.)

**A17-0030: "Improving Precision of RCS Measurement Based on Spectral Extrapolation Technique"**  
Chufeng Hu, Nanjing Li (Northwestern Polytechnical University)

**A17-0092: "Multi-Band Compact MIMO Antenna System for LTE and WLAN Communications"**  
Jiukun Che, Chi-Chih Chen (The Ohio State University)

**A17-0042: "Nonredundant NF-FF Transformation with Spherical Spiral Scan for a Non-Centered Quasi-Planar Antenna Under Test"**  
Francesco D'Agostino, Flaminio Ferrara, Claudio Gennarelli, Rocco Guerriero, Massimo Migliozzi (University of Salerno)

**5:15 PM – 6:15 PM | IEEE Working Group**

**WEDNESDAY, OCTOBER 18**

**SESSION 9**

**8:00 AM – 9:30 AM | Measurements for Space Applications**  
Chair: Luca Salghetti Drioli (European Space Agency)

**Invited Talk from EurAAP: "Challenges in Space Antenna Testing"**  
Luca Salghetti Drioli (European Space Agency, The Netherlands)

**A17-0016: "A High Precision Group Delay Measurement Method for Circular Polarized High Gain Antennas"**  
Georg Strauss (Munich University of Applied Sciences)

**A17-0073: "Group Delay Measurement For Satellite Payload Testing"**  
Daniel Janse Van Rensburg, Allen Newell, Stuart Gregson, Pat Pelland (NSI-MI Technologies)

**A17-0053: "The NASA Langley's Intelligent Flight Systems Product line - Experimental Test Range (ETR) Novel Capability Enhancements"**  
George Szatkowski, George Szatkowski, Charmaine Franck, Larry Ticatch, Eddie Ford, Angelo Cavone, Howard Knight, Michael Scherner (NASA LaRC)

**9:30 AM – 10:00 AM | MORNING BREAK**

**SESSION 10**

**10:00 AM – 11:30 AM | Measurements for Wireless and Medical Applications**  
Chair: Zhong Chen (ETS – Lindgren)

**A17-0015: "Measurements of Incident Radio Frequency Power levels from the L3 Technologies ProVision Body Scanner for the National Academy of Science"**  
Brian Kent<sup>1</sup>, Tri Van<sup>2</sup>, Ton Van<sup>2</sup>, Kevin Hamblin<sup>2</sup>, Jennifer Westhoven<sup>2</sup>  
(<sup>1</sup>Applied Research Associates, <sup>2</sup>BerrieHill Research Corporation)



**A17-0029: "An Implantable Dual Band Antenna for ISM and WMTS Biomedical Wireless Telemetry Applications"**

İlhami Ünal<sup>1</sup>, Hasen Werfali<sup>2</sup>, Bahattin Türetken<sup>2</sup>  
(<sup>1</sup>TÜBİTAK Marmara Research Center, <sup>2</sup>Karabük University)

**A17-0084: "Channel De-embedding and Measurement System Characterization for MIMO at 75 GHz"**

Alexandra Curtin, David Novotny, Alex Yuffa, Selena Leitner  
(National Institute of Standards and Technology (NIST))

**A17-0111: "Effects due to Antenna Mount in Base Station Antenna Measurements"**

John McKenna, Vivek Sanandiya, Larry Cohen (NSI-MI Technologies)

**A17-0114: "Testing the 5G New Radio"**

Michael Foegelle (ETS-Lindgren)

**11:30 AM – 12:30 PM | LUNCH**

## SESSION 11

**1:30 PM – 3:00 PM | Near-Field Measurement: Grids & Probes**

Chair: Francesco D'Agostino (University of Salerno)

**A17-0040: "Nonredundant Near-Field-Far-Field Transformation from Probe Positioning Errors Affected Bi-Polar Data"**

Francesco D'Agostino, Flaminio Ferrara, Claudio Gennarelli, Rocco Guerriero, Massimo Migliozi (University of Salerno)

**A17-0043: "Truncation Error Mitigation in Free-Space Automotive Partial Spherical Near Field Measurements"**

Francesco Saccardi, Francesca Rossi, Lucia Scialacqua, Lars Foged (Microwave Vision Italy)

**A17-0050: "Free-Space Antenna Far-Field Extraction from Near-Field Measurements Above Metallic Ground"**

Raimund Mauermayer, Thomas Eibert (Technical University of Munich)

**A17-0082: "Acquisition, Reconstruction, and Transformation of a Spiral Near-Field Scan"**

Brett Walkenhorst, Scott McBride (NSI-MI Technologies)

**A17-0076: "Measurements of Low Gain VHF Antennas in Spherical Multi-Probe NF Systems"**

Andrea Giacomini<sup>1</sup>, Francesco Saccardi<sup>1</sup>, Vincenzo Schirosi<sup>1</sup>, Francesca Rossi<sup>1</sup>, Stephane Dooghe<sup>2</sup>, Arnaud Gandois<sup>2</sup>, Lars Foged<sup>1</sup>  
(<sup>1</sup>Microwave Vision Italy, <sup>2</sup>Microwave Vision Group (MVG))

**3:00 PM – 3:30 PM | AFTERNOON BREAK**

## SESSION 12

**3:30 PM – 5:00 PM | General Antenna Measurements 3**

Chair: Chi-Chih Chen (The Ohio State University)

**A17-0018: "Radiation Center Estimation from Near-Field Data Using a Direct and an Iterative Approach"**

Cosme Culotta-López, Kui Wu, Dirk Heberling (RWTH Aachen University)

**A17-0070: "On The Design of Door-Less Access Passages to Shielded Enclosures"**

Vince Rodriguez (NSI-MI Technologies)

**A17-0008: "Offset Reflectarray Antennas for Near-Field Plane Wave Generation in Compact Ranges"**

Payam Nayeri (Colorado School of Mines)

**A17-0096: "Low-Profile Endfire Radiating Wideband Antenna for Ka Band Applications"**

Joseph Ellis, Peter Collins (Air Force Institute of Technology (AFIT))

**A17-0097: "An Experimental and Computational Investigation of High-Accuracy Calibration Techniques for Gain Reference Antennas"**

Olav Breinbjerg, Kyriakos Kaslis, Jeppe Nielsen (Technical University of Denmark)

**6:00 PM – 7:00 PM | Pre-Banquet Reception**

**7:00 PM – 10:00 PM | Awards Banquet**

## THURSDAY, OCTOBER 19

### SESSION 13

#### 8:00 AM – 9:30 AM | mm-Wave Antenna Measurement

Chair: Brett T. Walkenhorst (NSI-MI Technologies)

#### Featured Talk: "Extremely High Frequency Technologies for Imaging Radar and High Bandwidth Data Links"

Dr. Martin Heimbeck (US Army Research, Redstone Arsenal)

#### A17-0011: "Highly Accurate Fully-polarimetric Radar Cross Section Facility for Mono- and Bistatic Measurements at W-band Frequencies"

Andreas Olk, Kais-Ben Khadhra, Thiemo Spielmann (IEE S.A.)

#### A17-0105: "High Performance Dual Polarized Near-Field Probe at V-Band Provides Increased Performances for Millimeter Wave Spherical Near-Field Measurements"

Andrea Giacomini<sup>1</sup>, Lars Foged<sup>1</sup>, Edward Szpindor<sup>2</sup>, Wenji Zhang<sup>2</sup>, Per Iversen<sup>2</sup> (<sup>1</sup>MVG-Italy, <sup>2</sup>MVG-Orbit/FR)

#### A17-0023: "Assessment of a 3D-Printed Aluminum Corrugated Feed Horn at 118.7503 GHz"

Joshua Gordon<sup>1</sup>, Lavanya Periasami<sup>2</sup>, Albin Gasiewski<sup>2</sup>, David Novotny<sup>1</sup>, Michael Francis<sup>1</sup>, Ronald Wittmann<sup>1</sup>, Jeffrey Guerrieri<sup>1</sup> (<sup>1</sup>National Institute of Standards and Technology (NIST), <sup>2</sup>Electrical, Computer and Energy Engineering)

#### 9:30 AM – 10:00 AM | MORNING BREAK

### SESSION 14

#### 10:00 AM – 11:30 AM | mm-Wave Antenna & RF Material Measurement

Chair: David Novotny (NIST)

#### A17-0037: "The Performance of Modal Filtering in Passive and Active Integrated Antenna Measurements at 160 GHz"

Linus Boehm, Martin Hitzler, Alexander Foerstner, Christian Waldschmidt (Ulm University)

#### A17-0068: "MIMO Radar Scheme for mm-wave Portable Scanners"

Jaime Laviada<sup>1</sup>, Ana Arboleya-Arboleya<sup>2</sup>, Fernando Las-Heras<sup>1</sup> (<sup>1</sup>Universidad de Oviedo, <sup>2</sup>Université Nice Sophia Antipolis)

#### A17-0034: "Rotated Uniaxial Anisotropic Material Characterization - Theory"

Alexander Knisely, Michael Havrilla, Milo Hyde IV, Peter Collins, William Baker (Air Force Institute of Technology (AFIT))

#### A17-0035: "Rotated Uniaxial Anisotropic Material Characterization - Experiment"

Alexander Knisely, Michael Havrilla, Milo Hyde IV, Peter Collins, William Baker (Air Force Institute of Technology (AFIT))

#### A17-0057: "Intermodulation Analysis and Detection of Radio Broadcasting Services Using Real-Spectrum Monitoring Systems"

Andres Navarro<sup>1</sup>, Marcos Pineda<sup>2</sup>, Gilma Angel<sup>2</sup> (<sup>1</sup>Universidad Icesi, <sup>2</sup>TESAmerica Andina)

#### 11:30 AM – 1:30 PM | LUNCH & LEARN

### SESSION 15

#### 1:30 PM – 3:00 PM | Robotic Near-Field Measurement

Chair: Peter Collins (Air Force Institute of Technology)

#### A17-0062: "Serial-Robotic-Arm-Joint Characterization Measurements for Antenna Metrology"

Michael Allman<sup>1</sup>, David Novotny<sup>1</sup>, Scott Sandwith<sup>2</sup>, Alexandra Curtin<sup>1</sup>, Josh Gordon<sup>1</sup> (<sup>1</sup>National Institute of Standards and Technology (NIST), <sup>2</sup>New River Kinematics)

#### A17-0049: "Ka-Band Measurement Results of the Irregular Near-Field Scanning System PAMS"

Alexander Geise<sup>1</sup>, Torsten Fritzel<sup>1</sup>, Maurice Paquay<sup>2</sup> (<sup>1</sup>Airbus Defence and Space GmbH, <sup>2</sup>ESA-ESTEC)

#### A17-0005: "Correction of Non-ideal Probe Orientations for Spherical Near-Field Antenna Measurements"

Rasmus Cornelius, Dirk Heberling (RWTH Aachen University)



**A17-0110: "A Multi-Robot Large Antenna Positioning System for Over-The-Air Testing at the National Institute of Standards and Technology"**

David Novotny<sup>1</sup>, Joshua Gordon<sup>1</sup>, Alexendra Curtin<sup>1</sup>, Michael Allman<sup>1</sup>, Jeffrey Guerrieri<sup>1</sup>, Kim Hassett<sup>2</sup>, Quang Tom<sup>2</sup>, George McAdams<sup>2</sup> (<sup>1</sup>National Institute of Standards and Technology (NIST), <sup>2</sup>NSI-MI Technologies)

**A17-0094: "Antenna Near-Field Measurement within Electrically Close Distance Using a Novel Probe Design"**

Chung-Huan Li<sup>1</sup>, Cheng-Jian Lin<sup>2</sup>, Rong-Chung Liu<sup>1</sup> (<sup>1</sup>WavePro Inc., <sup>2</sup>Poseidon Microwave)

**3:00 PM – 3:30 PM | AFTERNOON BREAK**

## **SESSION 16**

**3:30 PM – 5:00 PM | Numerical Methods and Data Processing**

Chair: C.J. Reddy (Altair Engineering)

**A17-0046: "Validation of Measured Source Antenna Representation in the Numerical Simulation of a GNSS Antenna on Sentinel Satellite"**

Maria Saporetti<sup>1</sup>, Lucia Scialacqua<sup>1</sup>, Francesco Saccardi<sup>1</sup>, Lars Foged<sup>1</sup>, Jan Zackrisson<sup>2</sup>, Luca Salghetti Drioli<sup>3</sup>, Damiano Trenta<sup>3</sup> (<sup>1</sup>Microwave Vision Italy, <sup>2</sup>RUAG Space AB, <sup>3</sup>European Space Agency, ESTEC)

**A17-0052: "Verification of Spherical Mathematical Absorber Reflection Suppression in a Combination Spherical Near-Field And Compact Antenna Test Range"**

Stuart Gregson<sup>1,2</sup>, Clive Parini<sup>2</sup>, Allen Newell<sup>1</sup> (<sup>1</sup>NSI-MI Technologies, <sup>2</sup>Queen Mary University of London)

**A17-0060: "Regarding Network Characteristics of Flared Notch Arrays"**

James Stamm, Ryan Gough, Austin Bowman (North Star Scientific Corporation)

**A17-0067: "Filtering Antenna-to-Antenna Reflections in Antenna Extrapolation Measurements"**

Robert Horansky, Mohit Mujumdar, Dylan Williams, Kate Remley, Joshua Gordon, David Novotny, Michael Francis (National Institute of Standards and Technology (NIST))

**A17-0085: "Parametric Modeling of Antenna Radiation Patterns in Both Spatial and Frequency Domains"**

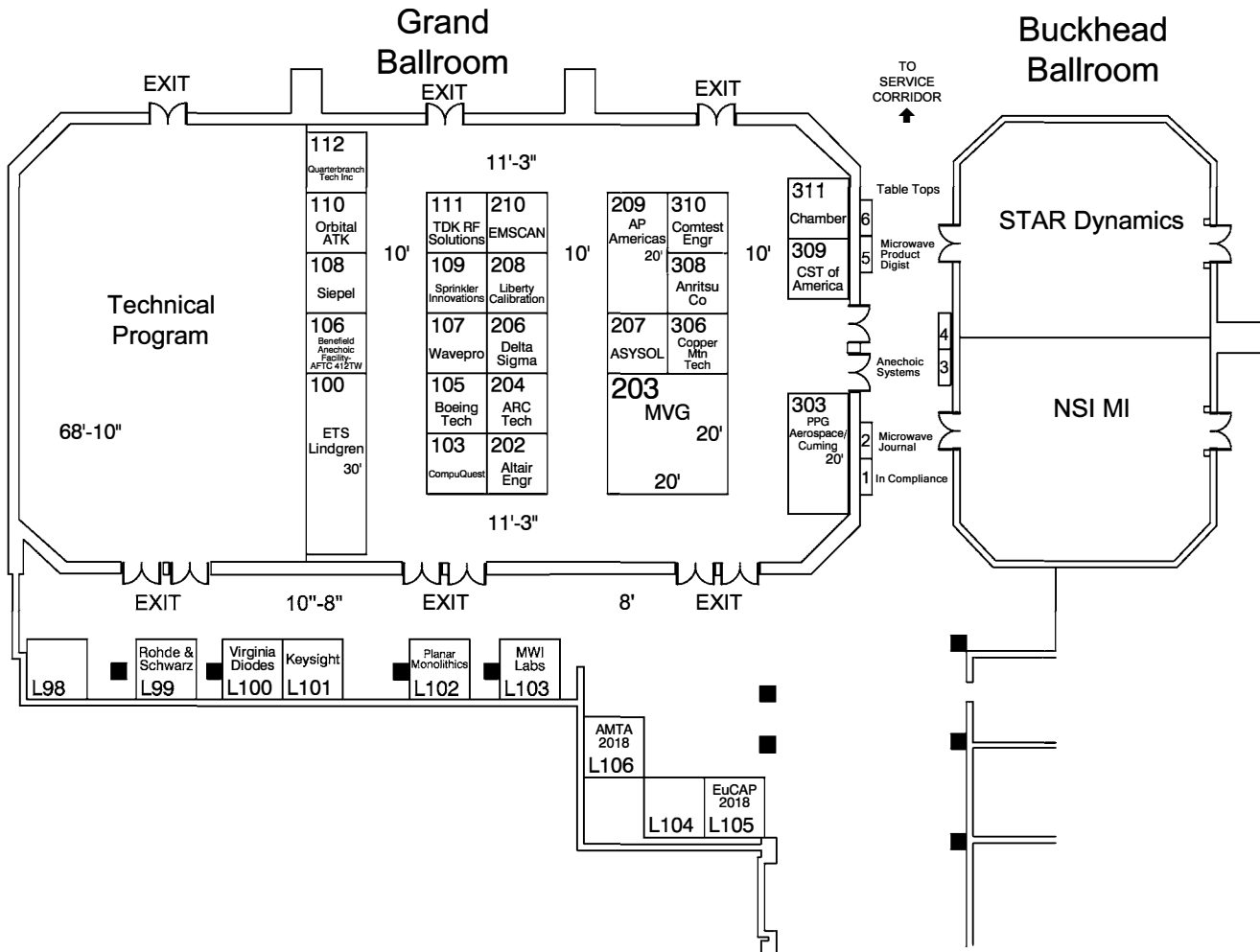
Zubiao Xiong (ETS-Lindgren)

# EXHIBITORS

Altair Engineering  
 AMTA 2018  
 Anechoic Systems  
 Anritsu Company  
 Antenna Systems Solutions S.L. (ASYSOL)  
 AP Americas, Inc.  
 ARC Technologies Inc.  
 Benefield Anechoic Facility  
 Boeing Technology Services  
 Chamber Services, Inc.  
 CompuQuest  
 Comtest Engineering BV  
 Copper Mountain Technologies  
 CST of America, Inc.  
 Delta Sigma Company  
 EMSCAN  
 ETS-Lindgren, Inc.  
 EuCAP 2018  
 In Compliance

Keysight  
 Liberty Calibration  
 Microwave Journal  
 Microwave Product Digest  
 Microwave Vision Group (MVG)  
 MWI Lab  
 NSI-MI Technologies  
 Orbital ATK  
 Planar Monolithics Industries  
 PPG Aerospace/Cuming Microwave  
 QuarterBranch Technologies, Inc.  
 Rohde & Schwarz  
 Siepel  
 Sprinkler Innovations  
 STAR Dynamics Corporation  
 TDK RF Solutions  
 Virginia Diodes Inc.  
 Wavepro, Inc.

## EXHIBITOR FLOOR PLAN Grand Hyatt Atlanta





FEKO, part of Altair's HyperWorks® suite is a comprehensive electromagnetic simulation software tool, based on state of the art computational electromagnetics (CEM) techniques, enabling users to solve a wide range of electromagnetic problems. FEKO's multiple solution techniques make it applicable to a wide range of problems for a large array of industries. Typical applications include analyses of horns, wire, reflector, conformal, and broadband antennas, microstrip patches, arrays, antenna placement & design. Analyses related to EMC (including shielding & cable coupling), RCS (scattering problems), waveguide structures (RF components), SAR extraction (Bio-electromagnetics), and multiple dielectric layers (Radomes). **Booth #202**



Altair is proud to host the 40th Annual Meeting and Symposium of the AMTA in historic Colonial Williamsburg, Virginia, USA from November 4-9, 2018. For 81 formative years, from 1699 to 1780, Williamsburg was the political, cultural, and educational center of what was then the largest, most populous, and most influential of the American colonies.

Altair and co-hosts NASA Langley Research Center, Virginia Tech, and Old Dominion University cordially invite you to attend and participate in this annual event. **Booth #L106**



Anechoic Systems LLC was formed to allow for more flexibility to design and build new technically advanced measurement systems utilizing state of the art chamber technology. Our resources are not limited to only what we manufacture, instead we search the world for the right material to suit our customer's needs. We offer TURNKEY SOLUTIONS, RELOCATIONS and RECONFIGURATION solutions to fit your needs. **Tabletop #3**



Anritsu is a global leader in innovative communications test and measurement solutions for more than 110 years. We provide solutions for wired and wireless communication systems and operators. **Booth #308**



Antenna Systems Solutions S.L. (ASYSOL) a Celestia Technologies Group company, is a leading and cost effective European supplier of antenna measurement and RCS systems, delivering state of the art positioning equipment, antenna design and manufacturing, near-field/compact antenna range systems and microwave anechoic chambers. ASYSOL leads in the invention, development and manufacturing of the RF industry's most advanced antenna test systems, translating these advanced technologies into value for our customers through our range of professional solutions, services, consultancy, professional training and valued employees worldwide. **Booth #207**



The Texas-based AP Americas and the Belgium-based Emerson & Cuming offer state-of-the-art microwave chambers for near- and far-field antenna measurements, compact range chambers, anechoic chambers for RCS testing, wireless applications and general RF measurements. Recently, Emerson & Cuming launched advanced WAVASORB absorbers, showing outstanding performance even above 100 GHz. The absorbers also conform to ROAHS and REACH and have outstanding extended performance stability. The chamber manufacturer AP Americas is the distributor of Emerson & Cuming and has its own production for shielding. AP Americas has years of experience in project management and installation. **Booth #209**



ARC Technologies Inc. offers a complete range of custom and standard absorber products that provide solutions to the diverse RF and EMI problems facing today's military, aerospace, and commercial electronics design engineers. We are dedicated to understanding our customer's needs, delivering quality products on-time, and engineering innovative solutions. Whether a customer is facing interference problems at 50 MHz or 110 GHz, nearfield or farfield, narrowband or broadband, we have an absorber product or will develop an application-specific product to meet its requirements. **Booth #204**



The BAF provides a robust RF T&E infrastructure to ensure system survivability and mission effectiveness for the DoD, industry and allies. The largest anechoic test facility provides a secure "virtual open-air RF range within four walls" — a valuable tool providing test engineering applied to the development and the T&E of RF systems. We conduct Antenna Pattern, EW/IO, Survivability, Electromagnetic Interoperability and Electromagnetic Environmental Effects (E3) tests. The uniquely large and well-equipped BAF offers a highly flexible and scalable indoor antenna range and test capability for installed and uninstalled antenna systems across a wide spectrum. **Booth #106**



Boeing Technology Services provides access to testing facilities, equipment and technical expertise that have produced some of today's most innovative products. No other company can provide the same range of competitively-priced, high-quality testing capabilities. Timely, accurate, consistent and repeatable test results can be the differentiators that produce sales. Capitalize on access to proven expertise and resources in aerodynamics, propulsion, acoustics, environmental, electromagnetics, structures, metrology, and simulation. **Booth #105**



Chamber Services, Inc. is a forward - thinking, Anechoic Facility Design, Construction and Services Company committed to delivering the highest level of service and superior quality products to valued customers. Our services include Anechoic Chamber Design, Consultation and Construction. Including Architectural, Modular and Welded RF Shielded Enclosure Installations/Relocations, RF Shielded Enclosure Maintenance, RF Absorber Material Removal/ Installation, RF Absorber Material Maintenance, RCM and Pneumatic RF Shielded Door Installation and Maintenance, Zinc and Copper Coatings Flame Spray Service. Chamber Services Inc. association with the leading RF Shielding and RF Absorber manufactures provides a factory direct source for RF Shielded Enclosures, RF Shielded Doors, RF Absorber Materials, Power and Signal Line Filters, Waveguides, Pipe Penetrations, Custom Test Fixtures, Portable RF Absorber Panels and much more. **Booth #311**



CompuQuest, inc provides custom, high quality instrument control, data acquisition, and signal processing software, emphasizing radar cross section (RCS) and antenna measurement applications. The Quest series of data acquisition systems contain drivers for controlling hardware devices ranging from obsolete network analyzers to the latest Agilent PNA systems. CompuQuest data analysis systems process and display data from an industry-wide selection of raw data files. CompuQuest works closely with many radar manufacturers, including ECS Federal, Quarterbranch and MI Technologies, to add unparalleled realtime capabilities to the industry's top radar systems. This product base, and extensive hardware and software backgrounds, makes CompuQuest uniquely qualified to handle the needs of the measurement community. **Booth #103**



Comtest Engineering supplies high performance antenna test ranges, EMC test chambers and RF shielded rooms. Our organization and product portfolio is well known for quality and flexibility. With offices in both Europe and USA we provide excellent customer support and strive to gain 100% customer satisfaction. Our skilled and experienced team has more than 32 years' experience in both EMC and RF. During AMTA 2017 we will introduce our new and innovative closed cell polystyrene absorber model MT45-JT. We welcome you to stop by our booth and learn more about the advantages and performance of our new microwave absorber model. **Booth #310**



Copper Mountain Technologies develops innovative and robust RF test and measurement solutions for engineers all over the world. The company was created in 2011 and is based in Indianapolis, IN with a sales office in Singapore. Our innovative products and partnership approach enable RF and Microwave engineers to realize their potential through access to lab-grade instrumentation at affordable prices. Our world-class metrology and engineering resources work as an extension of your team. **Booth #306**



CST is a market leader in providing 3D electromagnetic (EM) field simulation tools through a global network of sales and support staff and representatives. CST develops CST STUDIO SUITE, a package of high-performance software for the simulation of EM fields in all frequency bands. Its growing success is based on a combination of leading edge technology, a user-friendly interface and knowledgeable support staff. CST solutions are used by market leaders in a diverse range of industries, including aerospace, automotive, defense, electronics, healthcare and telecommunications. CST is part of SIMULIA, a Dassault Systèmes brand. Further information about CST is available on the web. **Booth #309**



Delta Sigma Company began operations in January of 1990. We have almost 100 man-years of experience in-house for all kinds of specialized low observables testing. DSC designs and builds radar antennas, calibration targets, specialized data collection & processing software, low RCS pylons, pylon elevators, pylon tilting mechanisms, multi-axis target positioners, low RCS target fixtures, foam columns, single-axis positioners, and motion controls for moving parts in/on the positioning system. DSC also builds automated systems for aircraft production lines. DSC's has significant expertise in building in-process RCS test systems for aircraft production lines, integrating the production world with the RCS testing world. **Booth #206**





EMSCAN is a world leading developer of fast magnetic very-near-field measurement tools. We provide real-time low-cost desktop chambers that are efficient and cost-effective, eliminate the need for an anechoic chamber for pre-compliance and performance tests and offer accelerated time-to-market. EMSCAN solutions are 1/10th of a chamber's cost and operate 100 times faster. RFXpert is the only real-time, compact, bench-top antenna measurement equipment. Under a second, unique array of automatically switched probes calculates accurate far-field patterns and radiated power. EMxpert is a real-time, compact, bench-top EMC/EMI diagnostic tool enabling designers to rapidly diagnose and solve EMC/EMI problems in a single design cycle. **Booth #210**



ETS-Lindgren offers world-class RF and Microwave test systems, including Far Field, Near Field, and Compact Range chambers for RCS and antenna measurement testing. We provide high performance biconical, dipole, quad- and double-ridged horn antennas in standard and custom designs. Quality components include RF and Microwave absorber plus multi-axis positioners, among others. Wireless Systems enable 5G, OTA, and MIMO OTA testing of mobile devices featuring EMQuest™ software for fully automated 2- and 3-D antenna pattern measurement for passive antennas and active wireless devices. Services include calibration at our A2LA accredited lab and wireless testing at our CTIA Authorized Test Lab (CATL). **Booth #100**

The 12th European Conference on Antennas and Propagation  
9 - 13 April 2018 | ExCeL London, UK



EuCAP is a flagship conference on antennas and propagation, attracting researchers from across the world. With approximately 1200 attendees it is the largest conference of its type in Europe. We will be pleased to welcome you to London for EuCAP 2018. The conference will feature 5 busy days jam-packed with regular, plenary, poster and convened sessions. **Booth #L105**  
Highlights include:

- Plenary keynote speeches and semi-plenary talks from top-level academic and industry experts
- Scientific workshops and short courses, which are an excellent educational opportunity for all aspiring and practicing researchers
- Extensive peer-reviewed presentations, showcasing the latest research from around the world



In Compliance Magazine features in-depth coverage of worldwide regulatory compliance issues for the electronics industry. Each month you'll find technical articles from industry leading authors on topics related to test, measurement, and design, standards updates and changes, products, services, and more! Available in print or digitally, we offer a variety of informational resources for the electrical engineering professional. Visit our website, activate your free subscription, and join one of our many eNewsletters for regular updates. **Tabletop #1**



Keysight Technologies (NYSE: KEYS) helps customers bring breakthrough electronic products and systems to market faster and at a lower cost. Keysight's solutions go where the electronic signal goes, from design simulation, to prototype validation, to manufacturing test, to optimization in the network. Customers span the worldwide communications ecosystem, internet infrastructure, aerospace & defense, automotive, semiconductor, and general electronics end markets. **Booth #L101**



With locations in the Midwest and Canada, Liberty Calibration provides a solution for all of your accredited calibration needs from mechanical/dimensional and general electronic instrumentation to RF/EMI/EMC instrumentation. We provide these services at one of our locations or on-site at your facility, and we work to build long lasting relationships with our customers to ensure the highest quality in our services. We offer quality calibrations with documentation that satisfies your industry and regulatory requirements, and 24/7 web access to your calibration certificates. Please contact us at 712-764-2197 for any of your calibration needs. **Booth #208**



Microwave Journal has served the RF/microwave industry for nearly 60 years with practical design information for engineers working in military, satellite and commercial applications. Sign up today for your FREE subscription to the monthly print/digital edition. If Signal Integrity/Power Integrity/EMC is your thing, check out our new resource at [www.signalintegrityjournal.com](http://www.signalintegrityjournal.com) and register for all-access content and our newly launched newsletter. **Tabletop #2**

Microwave Product Digest serves RF and microwave design engineers, research and development engineers, applications engineers, and engineering managers. These professionals, working in facilities that serve both the commercial and government markets, are involved with the design, development, application, and use of systems and subsystems, devices, and techniques involving frequencies from RF to light. **Tabletop #5**



The Microwave Vision Group (SATIMO, ORBIT/FR, AEMI and REMC), specialists in microwave scanning technology, delivers a range of innovative measurement solutions for antenna, RCS, and radome testing as well as EMC testing and wireless device certification. We provide a large range of near-field or far-field test systems. Turn-key or various components: multi-probe or mono probe scanners, chambers, antennas, positioners, controllers, RF absorbers, and more. Our know-how also expands into industrial material inspection and RF monitoring. MVG strengths are a broad product portfolio, worldwide presence, and integrated project management. We are dedicated to supporting the Aerospace and Defense, Satellite, Telecom, and Automotive industries and well as academic R&D. **Booth #203**



Premier provider of "Non-Destructive" In-Process QC/QA, hand-held Radio Frequency testing services/ systems using revolutionary Gaussian Beam Technology for testing composite materials from the "cradle to the grave" (powders, resins, to final structures). We rent/ sell devices for measuring anisotropic/ dielectric/ magnetic properties including; honeycomb, R-films, radome materials, defect inspection (FOD, voids, moisture, faulty repairs or RF leakage) of antennas and composite structures. Our customers in the Aerospace, Automotive, Food & Drug industries received superior ROI for reduction of material waste, and increased production efficiencies. **Booth #L103**



NSI-MI Technologies offers a comprehensive range of industry leading microwave test systems. These systems cover antennas, radomes and RCS and our unique blend of mechanical, RF and software engineering capabilities allow us to customize test systems to offer specialized solutions. NSI-MI supports the automotive, aerospace/defense, wireless and academic industries. Our wide range of products also allow us to offer solutions for material, production line or general automated component testing. Our global presence enables us to offer the highest quality service and support to ensure long term use of all test products supplied. We also offer extensive in-house test and measurement facilities covering frequencies from 250 MHz to 110 GHz.

**Booth: Buckhead Ballroom II**



As a global leader in aerospace and defense technologies, Orbital ATK designs, builds and delivers space, defense and aviation-related systems to customers around the world both as a prime contractor and as a merchant supplier. Our main products include launch vehicles and related propulsion systems; satellites and associated components and services; composite aerospace structures; tactical missiles, subsystems and defense electronics; and precision weapons, armament systems and ammunition. Headquartered in Dulles, Virginia, Orbital ATK employs approximately 13,000 people in 18 states across the U.S. and several international locations. **Booth: #110**



Planar Monolithics Industries (PMI) manufacturers and markets a variety of MIC/MMIC Components, Supercomponents, Modules, Assemblies and Subsystems for applications in Telecommunications, Terrestrial, Satellite, and Mobile-Radio Communications, Defense (ECM, ECCM, ESM, Radars, and Electronic Warfare), Cable-TV, Navigation and Marine Electronics, FAA/DOT-Avionics, Ground Based Systems, and Microwave Landing Systems. These products cover the DC to 50 GHz frequency band and include amplifiers, attenuators, switches, switch matrices, SDLVAs, power dividers/combiners, detectors, limiters, equalizers, couplers, vector modulators, USB style products, filters & filter banks. **Booth: #L102**



PPG Cuming Microwave is a worldwide leader in the manufacture of RF materials for over 35 years. We design, manufacture, install and test anechoic chambers. We manufacture standard and customized materials and fabrications using RF absorbing, low loss, and conductive materials for the telecom, automotive, medical, and defense industries. **Booth: #303**





QuarterBranch Technologies, Inc. was founded in 1998 to provide technical support and design services to the Radar Cross Section measurement community. Today, we have grown into the premier provider of these systems and support services. Our flagship system, RadarMan™, is the industry leading high-speed, broadband pulsed-IF radar system covering up to 0.1-40GHz. **Booth #112**



The Rohde & Schwarz electronics group offers innovative solutions in all fields of wireless communications as well as in IT security. Founded more than 80 years ago, the independent company has an extensive sales and service network with subsidiaries and representatives in more than 70 countries. The company is headquartered in Munich, Germany, with regional hubs in Asia and the USA. **Booth #L99**



SIEPEL has been a leading manufacturer of anechoic chambers since 1986 and is one of the rare producers of microwave absorbers dedicated to antenna testing: near-field, far-field, compact ranges, ... Our range covers many fields of applications for academic, commercial or defence customers such as satellite, telecom, automotive. SIEPEL offers in-house chamber design capabilities worldwide associated to project management, testing (FAT / SAT) & commissioning. Our references list of prestigious customers and partners is available on demand. Our extended range includes standard and custom-made absorbers with long life expectancy and high absorption level, high power absorbers, ... **Booth #108**



Sprinkler Innovations makes the only FM approved retractable telescoping sprinkler heads for anechoic chambers. These sprinklers bring effective, time-saving fire control technology to the anechoic chambers by automatically retracting after a system test or false activation and resetting itself above the ceiling. This allows you to test the entire sprinkler system without anyone entering the chamber. Start-to-finish trip test time is only two hours! Minimize disruptions and maximize profits with an extraordinary fire protection solution for anechoic chambers. Sprinkler Innovations offers fire protection for the most demanding environments. **Booth #109**



STAR Dynamics Corporation, under new ownership as a Veteran Owned Small Business, has re-energized as the key provider of leading-edge Instrumentation Radars for several defense industries. STAR has strengthened its commitment to the Low-Observable community with highly enhanced BlueMax RCS/Imaging Radars and KNOWBELL™ Signal Processing technologies. Precision, multi-object tracking radars for flight-test ranges are being introduced, leveraging industry-recognized subject matter expertise to enhance defense technology development/validation. STAR continues to provide premium aftermarket support with unmatched product capability/reliability. Heavy reinvestment the past year, provides a decade of innovation for leading-edge technology in the best interest of its customers and national defense. **Booth: Buckhead Ballroom I**



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. **Booth #111**



Virginia Diodes Inc. manufactures state-of-the-art test and measurement equipment for mm-wave and THz applications. These products include Vector Network Analyzer, Spectrum Analyzer and Signal Generator Extension Modules that extend the capability of high performance microwave measurement tools to higher frequencies. VDI's component products include detectors, mixers, frequency multipliers and custom systems for reliable operation at frequencies between 50 GHz and 2 THz. VDI components include in-house fabricated GaAs Schottky diodes and Microelectronic. **Booth #L100**



WavePro was established in 1993 by Richard Liu, starting from cooperation with Flam&Russell, the first Microwave Testing Range System Integration Company in Taiwan. Later with WavePro value added range design and low interaction design, pushing NSI farfield and swing arm SNF into market. WavePro/EMtrek started developing own AMS and OTA systems also CATR from 2009. First 4 feet blended Roll-edged compact range was built in 2010. A 10 feet single body CATR was successfully installed for DirectTV Antenna test application in Taiwan 2014. Precise SNF for large AUT launched. Till 2017, we installed over 80 EM test ranges and over 12 CATRs. **Booth #107**

## Exhibit Room Set-up

Saturday, October 14 / 8:00 AM – 6:00 PM for exhibitors with private rooms and 4 or more booths  
Sunday, October 15 / 11:00 AM – 6:00 PM for all exhibit spaces

## Exhibit Dates and Hours

Monday, October 16 / 10:00 AM – 5:00 PM

Tuesday, October 17 / 9:00 AM – 5:00 PM

NOTE: Exhibits are closed during Tuesday's AMTA Business Lunch from 11:30 AM–1:30 PM and may be slightly extended for Tuesday Student Day, exclusively for students/speakers following the close of the technical session. Stamping of bingo cards will begin at 9:00 AM on Tuesday, October 17.

Wednesday, October 18 / 9:00 AM – 4:00 PM

NOTE: October 18 is "IEEE FREE DAY". IEEE members are welcome to visit the Exhibit Hall ONLY at no charge. You must provide your IEEE membership card upon arrival.

## Exhibit Dismantle

Wednesday, October 18 / 4:00 PM – 7:00 PM

Thursday, October 19 / 8:00 AM – 3:00 PM

NOTE: No Empty Crates will be delivered prior to Thursday morning, October 19 at 8:00 AM

## Exhibitors' Reception

An Exhibitors' Reception will be held on Tuesday, October 17, from 5:30 PM to 6:30 PM. The purpose of the reception is to thank the exhibitors for their support of AMTA and solicit feedback on how AMTA can improve the exhibitor experience at its annual symposium. An overview of AMTA will be provided and the symposium attendee list will be distributed as a print copy. An invitation to the reception along with the specified meeting location at the Grand Hyatt Atlanta will be provided to each exhibitor on site at AMTA 2017.

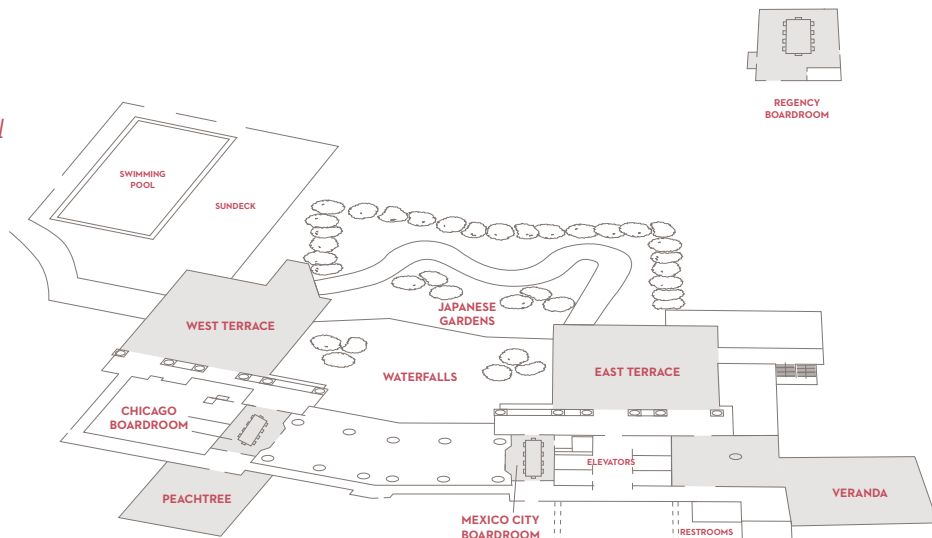


# HOTEL FLOOR PLAN

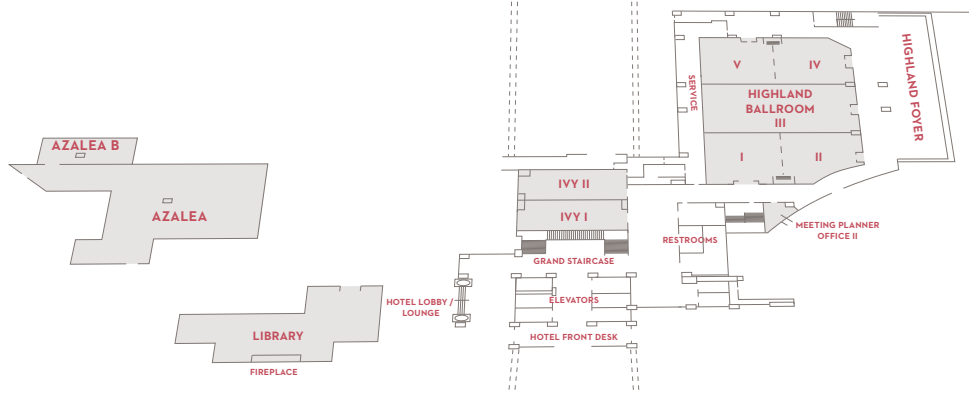
## 3-D FLOOR PLAN

24th Floor

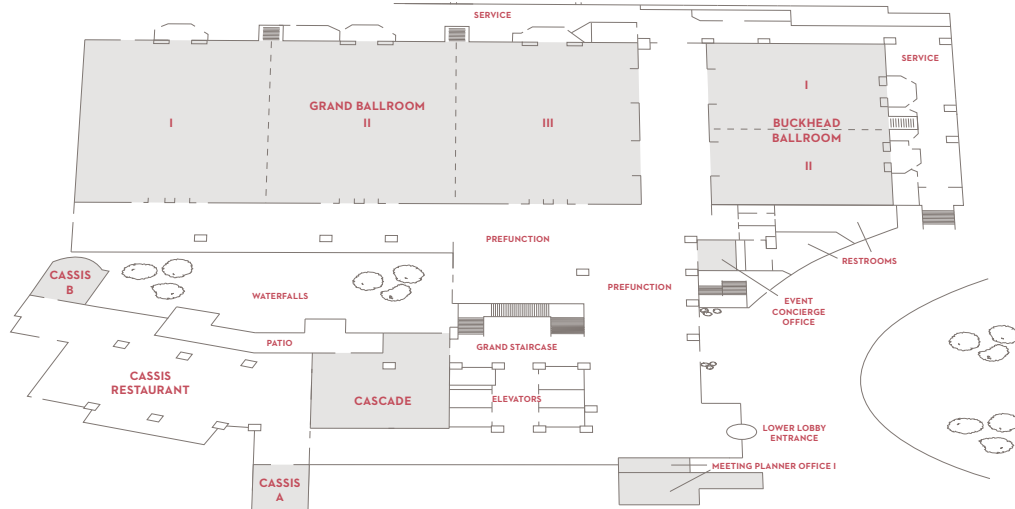
Garden Level



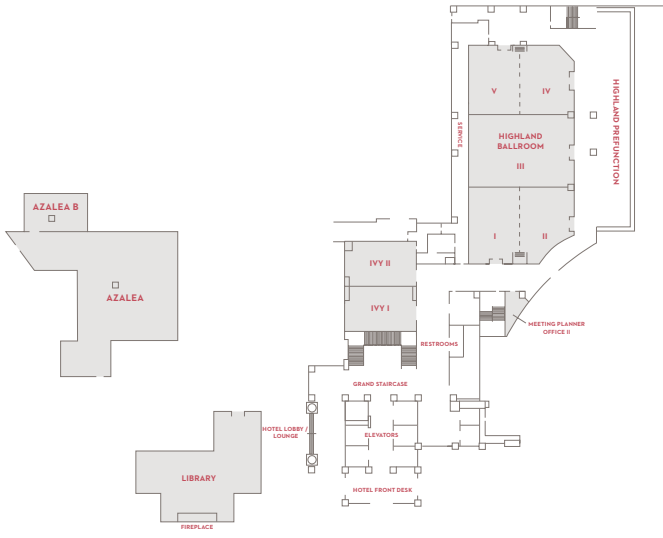
Lobby Level



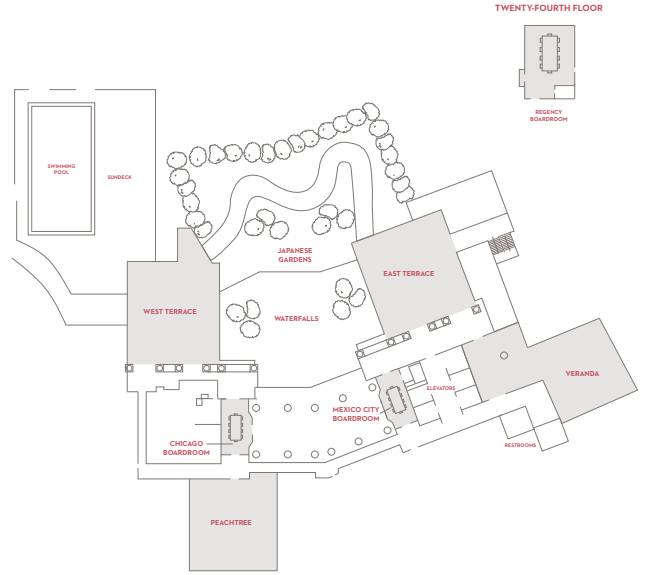
Lower Lobby Level



**FLOOR PLANS**  
Lobby Level



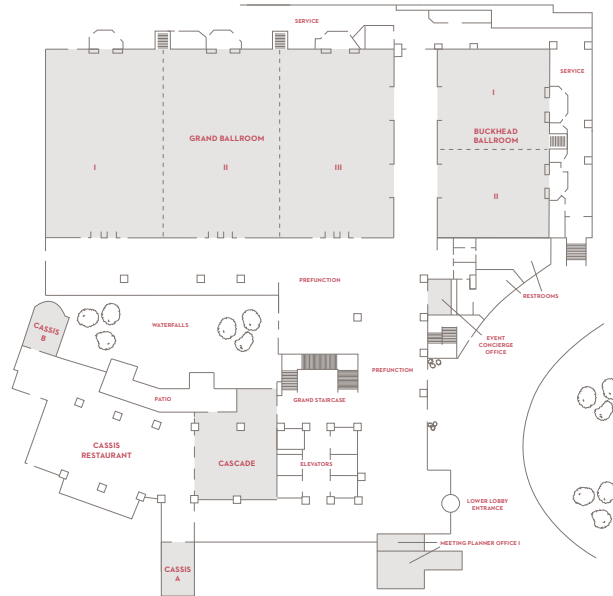
Garden Level—Third Floor



TWENTY-FOURTH FLOOR



**FLOOR PLANS**  
Lower Lobby Level



# AMTA 2017 SPONSORS

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