47th Annual Meeting and Symposium of the
Antenna Measurement Techniques Association

AMTA 2025

November 2 - 7, 2025
Tucson, Arizona



Preliminary Program

Hosted by

Raytheon
An RTX Business

Welcome

Welcome to the 47th Annual Symposium of the Antenna Measurement Techniques Association! Our host committee has prepared an outstanding Tucson area event. We continue the AMTA tradition of featuring a strong technical program and exhibition, as well as an exciting social program.

The technical program kicks off with both an AMTA Boot Camp and Short Course. Boot Camp is a 1-day course on antenna and related measurement fundamentals taught by a group of six industry and academic professionals. The short course is an intensive 1-day focus on modern near-field antenna measurements taught by industry experts. The technical sessions will be launched by keynote speaker Dr. Raymod Rumpf, Professor Electrical & Computer Engineering, University of Texas at El Paso. Dr. Rumpf will discuss disruptive technologies in electromagnetics and additive manufacturing. Our IEEE Invited Speaker, Dr. Christophe Fumeaux of The University of Queensland, will discuss beamforming with compact multi-port, multi-mode antennas. Our EurAAP Invited Speaker, Dr. Elena Saenz of the European Space Agency, will provide an overview of the latest antenna measurement developments and techniques at the European Space Agency. Mr. Chuck Penson, a Fellow of the Antique Wireless Association, presents our Thursday Lunch and Learn. This compelling presentation steps back to Cold War history to review the communication systems associated with the Titan II ICBM program. In between sessions, make sure you spend time in the Exhibits Hall meeting colleagues from over 30 industry companies. We close our week with a technical tour of the Pima Air and Space Museum, including a drive-by view of the largest aircraft boneyard in the world.

We have a full social calendar for you! Enjoy cocktails and mingle with friends and colleagues at the Welcome Reception Sunday evening. Relax and take in the views during our Monday Night Outing, a show and dinner at Old Tucson, an old west film set and entertainment park. Companion tours offer the chance to tour downtown Tucson, visit the Sonoran Desert Museum, and participate in a Tucson food tour.

Our venue is The Westin La Paloma Resort & Spa in the foothills of the Santa Catalina Mountains. The AAA Four-Diamond property offers 27-holes of Jack Nicklaus Signature Design golf, a full fitness center, a world-class spa, 5 swimming pools, and multiple on-site restaurants and bars.

On behalf of the AMTA 2025 Host Committee and Raytheon, we look forward to seeing you in the city known as The Old Pueblo in November.

Justin Dobbins,
Raytheon,
An RTX Business



Who is Exhibiting?

The following companies will be exhibiting this year:

- Advanced Test Equipment Corp (ATEC)
- Altair
- AMTA 2026
- Anechoic Solutions, Inc.
- Anritsu
- AP Americas
- Braden Shielding Systems
- Chamber Services, Inc.
- Delta Sigma Company (DSC)
- ETS-Lindgren
- Hiller Fire Protection
- Impulse Technologies, Inc.
- Junkosha
- Keysight
- Kraetonics
- MVG, the Microwave Vision Group
- Next Phase Measurements (NPM)
- NSI-MI Technologies
- Ophir RF
- PPG Cuming-Lehman Chambers
- Quantic PMI
- Raymond EMC
- Raytheon
- Resonant Sciences
- Rohde & Schwarz USA
- Samtec, Inc.
- Sensor Concepts, a Raptor Scientific Company
- SPEAG -Schmid & Partner Engineering AG
- Sprinkler Innovations
- STAR Dynamics
- TDK RF Solutions
- TEVET
- Virginia Diodes, Inc. (VDI)

Future Symposia

2026	Austin, TX	Hosted by ETS-Lindgren
2027	San Francisco, CA	Hosted by Quarterwave
2028	Savannah, GA	Hosted by NSI-MI Technologies
2029	Detroit, MI	Hosted by Oakland University
2030	Dallas, TX	Hosted by Rohde & Schwarz

Symposium Benefits

- High-quality technical papers presented on a continuous basis over four days
- A short course and boot camp led by world-class experts in antenna measurements
- Exhibits showcasing antenna and measurement related products and services
- The latest innovations in antenna and RCS measurements
- Known leading companies related to antenna measurements products and services
- Networking opportunities with industry experts
- A lunch and learn and technical tour showcasing historical programs that benefitted from industry techniques
- Unique social events in and around the Tucson, Arizona area
- Daytime guest tours to area highlights

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About the Hotel - Venue for AMTA 2025

The Westin La Paloma Resort & Spa

3800 E Sunrise Dr, Tucson, AZ 85718
Phone: +1 (520) 742-6000
lapalomaresort.com

Rooms are available at the AMTA group rate of $249 USD plus tax for single or double occupancy, available on a first come, first served basis for reservations made by October 10, 2025. The AMTA group rate includes high-speed internet access in the guest room, unlimited admission to the WestinWORKOUT® Powered by Reebok Fitness Center with regularly scheduled fitness classes, and complimentary shuttle service to La Encantada Shopping Center. Click here to reserve your room **https://book.passkey.com/e/51013220**

This oasis is no mirage. The Westin La Paloma Resort & Spa, a AAA Four-Diamond property, is nestled at the base of the Santa Catalina Mountains in the breathtaking foothills of Tucson, Arizona, and is proudly recognized as a Top Resort by Condé Nast Traveler readers. Whether you're seeking relaxation or adventure, La Paloma offers something for everyone. Enjoy five outdoor pools with cabanas, chaise lounge chairs, and a thrilling 177-foot waterslide. Tee off at the prestigious 27-hole Jack Nicklaus Signature Golf Course or indulge in a rejuvenating treatment at the world-renowned La Paloma Spa & Salon. Take advantage of the on-site fitness center with 10 tennis courts and a yoga and Pilates studio. After a productive day, savor a delicious meal at La Luz Restaurant, enjoy hand-crafted cocktails at Casa 71 Tequila Lounge, and then retreat to your room and unwind in the luxurious Westin Heavenly® Bed. At The Westin La Paloma, exceptional service is not just a promise – it's our standard.

Early November marks the end of the Tucson summer temperatures and finally brings the cooler weather of Fall to the Sonoran Desert. Expect average daytime high temperatures around 80°F (27°C) and overnight lows near 50°F (10°C). The dry, sunny climate and nearby mountains create breathtaking sunsets and crisp, starry nights. We hope you'll join us for a memorable week with friends and colleagues in an unforgettable setting that showcases the beauty of the American Southwest.







Social Calendar

Sunday, November 2

Welcome Reception

6 - 7:30 p.m.

Sponsored by NSI-MI Technologies

Cost: Complimentary with Registration

Enjoy drinks and appetizers with friends and colleagues in the Arizona Foyer, while enjoying a dusk* view of the resort and the Santa Catalina Mountains from the adjacent Arizona Deck. This event is complementary to all registered symposium participants and their guests.
*Sunset is at 5:30 pm

Monday, November 3

Old Tucson 5:45 - 9:30 p.m.

Sponsored by Microwave Vison Group (MVG) and Next Phase Measurements (NPM)

Cost: $110

Built in 1939, Old Tucson is a renowned film set and family theme park located just outside Tucson, AZ. Nestled between Saguaro National Park and Tucson Mountain Park, this beautiful desert setting has been the filming location for hundreds of classic western films and TV shows. Join us for a wild west experience followed by a catered cowboy dinner. Buses will depart the hotel at 5:45 p.m.

Tuesday, November 4

Student Day 11 a.m. - 7 p.m.

Dinner Sponsored by STAR Dynamics

Team Prize Sponsored by IEEE AP-S TCAM

Location: Lantana Meeting Room

Cost: Complimentary

Student Day will provide an opportunity for local university students to get a taste of antenna engineering and related disciplines by interacting with practicing engineers in a variety of venues. As in previous years, students will be able to tour vendor exhibits, sit in on papers, and enjoy a complimentary meal while listening to a presentation targeting issues relevant to those soon entering the engineering profession. In addition, AMTA will host a hands-on Student Day Design Contest. This will give students an opportunity to show off their engineering skills to recruiters (students should bring their resumes!) and have fun at the same time. Details are forthcoming, so keep checking the AMTA 2025 website for the latest updates. Please register in advance on the AMTA 2025 website.

Tuesday, November 4

Young Professionals Reception 6 - 8 p.m.

(New for AMTA 2025!)

Sponsored by ETS-Lindgren

Cost: $24 per person,
Verbena Meeting Room

AMTA would like to invite all Young Professionals (BS within 15 years) and Undergraduates to our inaugural Networking Event at the AMTA 2025 Symposium! During the 2025 Symposium we will hold "AMTA Jeopardy!" – Trivia, with a Twist! This event is great at building your expertise in antenna measurement techniques as well as providing a welcoming, informal environment to network with Young Professional (YP) colleagues and experienced professionals alike. You'll have the opportunity to play alongside AMTA Experts and prizes will be awarded to the winners! Come mingle with your fellow YPs and the AMTA gurus, who will share their experiences and insights from volunteering within the AMTA community. We'll also be highlighting the student papers on the AMTA technical program! Heavy appetizers with beer and wine service included.

Wednesday, November 5

Banquet Reception 6:30 - 7:30 p.m., Arizona Deck

Banquet Dinner & Awards

7:30 - 9:30 p.m., Sonoran Ballroom

Banquet Wine Sponsored by the Microwave Vison Group (MVG).

Cost: Included in full registration; $90 per additional ticket.

We will start the Awards Banquet with a Reception on the Arizona Deck and Arizona Foyer at 6:30, then at 7:30 move into the Sonoran Ballroom for the Dinner and Awards. The Banquet is included with full registration; additional tickets can be purchased at a cost of $90.

Thursday, November 6

Women in Engineering Reception 6 - 8 p.m.

Sponsored by ETS-Lindgren

Cost: $25 per person, Verbena Meeting Room

This event welcomes all members of AMTA and IEEE, men and women, to promote collaboration. Join speakers Janet O'Neil with ETS-Lindgren, Colonel Carey "Mamba" Jones, US Air Force Retired, and Roger Richardson with Delta Sigma Company for enlightening presentations on innovation, leadership, and teamwork, then enjoy the networking opportunities during the reception! See the website for more information. Heavy appetizers with wine tasting and beer included.



Friday, November 7

Technical Tour – Pima Air & Space Museum

8 a.m. - 1:30 p.m.

Cost: $85 per person

The Pima Air & Space Museum is one of the largest non-government funded aviation & space museums in the world! It features about 400 historic aircraft, from a Wright Flyer to a 787 Dreamliner. Choose from a guided walking tour, a narrated driving tour, or a self-guided tour. Lunch is included.

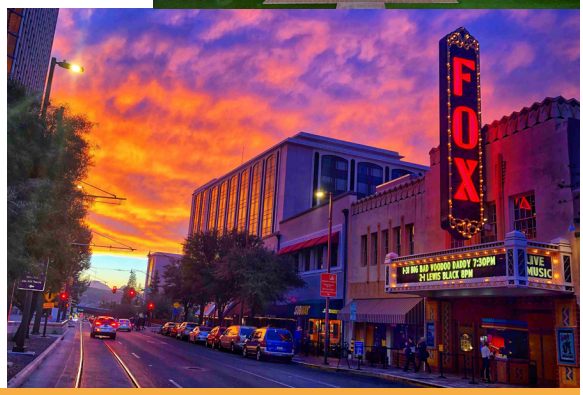


Companion Tours*

Tour of Historic Downtown Tucson

Monday, November 3
8:30 a.m. – 2 p.m.





We will start at the Pima County Historic Courthouse which is among Tucson's most beloved landmarks. Designed by architect Roy Place, this iconic Spanish Colonial Revival-styled structure was built in 1929 and remained in service for an 86-year span during which time it served as the backdrop for numerous wedding proceedings and became home to several County departments.

In 1978, this building obtained its "Historic" designation from the National Register of Historic Places. It was dubbed the "most outstanding Spanish Colonial Revival building in Arizona" with its "elegant blue-tiled dome" recorded as the most prominent feature. Lunch is on your own at El Charro, the Nation's Oldest Mexican Restaurant in continuous operation by the same family. Remember to bring your walking shoes, water bottle, and sunscreen.

Arizona-Sonora Desert Museum

Tuesday, November 4
9 a.m. – 3 p.m.





The 98-acre Desert Museum is a fusion experience: zoo, botanical garden, art gallery, natural history museum, and aquarium with 2 miles of walking paths through the Sonoran Desert. You will need to bring your walking shoes, water bottle, hat, and sunscreen. Lunch at one of the restaurants on site is included.

Tucson Food Tour

Wednesday, November 5
10:30 a.m. – 3:30 p.m.





There's a reason Tucson is a star on the culinary map—not just in Arizona, but around the world. In 2015, UNESCO designated Tucson as the first Creative City of Gastronomy in the United States, celebrating an unparalleled agricultural tradition, a rich tapestry of cultures, and some of the most inspiring food experiences available anywhere. Here in Tucson, food isn't just about what's on your plate—it's about deep roots and bold flavors. Remember to bring your walking shoes, water bottle, and sunscreen.

* Attendance is limited at all Companion Tours; tours will be filled on a first come, first served basis. Comfortable walking shoes are recommended for all tours. Please bring money for lunch on Monday and any incidentals throughout the week.

Boot Camp

Sunday, November 2

7:15 - 8 a.m. Registration

8 a.m. - 5:20 p.m. Technical Program

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 academic and industry experts who were selected based not only on their expertise, but for their ability to communicate effectively.

The AMTA Boot Camp Back-to-Basics Topics Include:

- General RF Measurements
- Material Measurements
- Antenna Measurements
- RCS Measurements
- EMC/EMI Measurements
- New Innovations and Trends

Technical Goals and Objectives of the AMTA Boot Camp Include:

- 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.)

Attendance at the Boot Camp is limited.
Space will be filled on a first come, first served basis.

Short Course

Sunday, November 2

7:15 - 8 a.m. Registration

8 a.m. - 5:15 p.m. Technical Program

A Practical Intuitive Approach to Modern Near-Field Antenna Measurements

One-Day Summary of a Career of Study into Near-Field Metrology

This one-day short course provides a grounded, measurement orientated, introduction to classical near-field theory. The planar, cylindrical and spherical transformations are developed from a practical, intuitive, measurement-oriented point of view that provides the attendee with the necessary foundations and understanding that are then harnessed to develop several important modern measurement techniques. These techniques place an emphasis on key developments in the last 15 years including near-field imaging, reflection suppression, and the use of sparse sampling and compressive sensing in antenna measurements that highlight the use of modern industrial, multi-axis, robotic antenna measurement systems. The course includes extensive data and numerous practical examples of real-world applications.

Keynote Speaker



Dr. Raymond C. Rumpf

FSPIE, SMIEEE

Monday, November 3

8:15 - 8:55 a.m.

Pursuing Disruptive Technologies in Electromagnetics & Additive Manufacturing

Pursuing high-risk/high-reward technologies is motivating and exciting, but it is plagued with frustrations in the lab, embarrassing failures of “crazy” ideas, and challenges obtaining funding for high-risk ideas. This presentation will cover some of my pursuits of highly ambitious technologies, and the experiences and lessons they gave me. The purpose of the presentation is not to encourage or discourage the most ambitious research, but to motivate all types of research and to help people get through the struggles using humor, humility, and tenacity.

Topics will include my team’s exploration of antenna technologies including ultra-thin all-dielectric antennas, 3D printed volumetric antennas, and antennas approaching and exceeding fundamental limits. It will include my team’s contributions to additive manufacturing in the pursuit of 3D volumetric circuits and electromagnetic devices. It will cover preservational spatially-variant lattices (PSVLs) and the numerous breakthroughs this new concept has enabled. A PSVL is a periodic structure (array antenna, frequency selective surface, metamaterial, photonic crystal, etc.) that is bent, twisted, conformed, or otherwise adjusted as a function of position in a special way that preserves the electromagnetic properties by minimizing deformations to the unit cells. The presentation will include my beginnings in electromagnetics, as well as the various skills and practices I have observed that help advance people’s careers and contribute to their success.

Dr. Raymond C. Rumpf is a pioneer in electromagnetics, photonics and additive manufacturing. He founded the EMLab at the University of Texas at El Paso to focus exclusively on developing disruptive technologies in these areas. He co-founded Kraetonics LLC to commercialize the breakthrough technologies and develop the tools to put these new capabilities in the hands of others. Key achievements include a 3D printed antenna operating closer to the fundamental limit than any other known 3D printed antenna, developing the first-ever layout and routing tool for 3D volumetric circuits, automating hybrid 3D printing to build 3D parts with any distribution of conductors and dielectrics, constructing the world’s highest power frequency selective surface (> 2.0 GW), inventing a new mechanism to control light that led to world’s tightest bend of an unguided optical beam and Best Photonics Technology 2015, and more. Rumpf is currently working on many other exciting topics in the areas of antennas, frequency selective surfaces, hybrid 3D printing, 3D volumetric circuits, new CAD tool capabilities, metamaterials, metasurfaces, photonic crystals, and computational electromagnetics.

Dr. Rumpf is a Professor of Electrical and Computer Engineering at The University of Texas at El Paso (UTEP) and has a joint appointment in the Computational Science program. He is a Founder and Chief Technology Officer of Kraetonics LLC. Prior to these positions, Rumpf was the Chief Technology Officer for Prime Photonics and a senior electrical engineer for Harris Corporation (now L3Harris). Raymond earned his BS and MS in Electrical Engineering from the Florida Institute of Technology in 1995 and 1997 respectively. He earned his Ph.D. in Optics in 2006 from CREOL at the University of Central Florida. In 2010, Raymond was awarded the prestigious DARPA Young Faculty Award that seeded multiple breakthroughs. In 2015, Raymond was awarded the highly esteemed University of Texas Regents’ Outstanding Teaching Award, the top teaching award offered by the largest university system in the United States. In 2020, he was inducted into the Florida Tech Career Hall of Fame. Rumpf has been awarded over a dozen United States patents and has authored dozens of peer-reviewed journal articles. He published a Best-Selling book through Artech House that teaches the art of computational electromagnetics to the complete beginner through the finite-difference frequency-domain method. He is a Fellow of SPIE, Senior Member of IEEE, and a member of the Optical Society (Optica). He is a member of ARRL and an Extra Class amateur radio operator (call sign is AG4YV). He holds five world records in skydiving for largest parachute formation. Raymond is active in outreach and philanthropy, including coaching of numerous students in third-world countries and throughout the world.

Featured Speaker
IEEE AP-S



Prof. Christophe Fumeaux

University of Queensland

Tuesday, November 4

8 - 8:25 a.m.

Beamforming with Compact Multi-Port Multi-Mode Antennas

The growing requirements of wireless communications technologies place unique challenges on antenna design. Antenna systems with increasing complexity and multiple dynamically accessible functionalities are required to enhance capacity and/or serve various purposes, such as simultaneous communications and sensing.

This presentation will focus on the concept of multi-port multi-mode antennas, where several independent radiating modes operating in the same frequency band are generated in a shared aperture (or a shared volume). Such uncorrelated modes packed in a compact form factor can be exploited to enhance the agility and capacity of a communications link, either through pattern diversity or Multiple-Input Multiple-Output operation (MIMO).

In this context, this presentation will describe various techniques for packing multiple independent modes in a limited volume. It will then demonstrate how a large number of collocated radiating modes can enable beam-steering and nulling in a full hemisphere, with high consistency and in any polarization. The presented concept opens new perspectives for future distributed sensing and communications systems.

Featured Speaker
EurAAP



Dr. Elena Saenz

European Space Research and Technology Centre (ESTEC) European Space Agency (ESA)

Wednesday, November 5

8 - 8:25 a.m.

Overview of the latest antenna measurement developments and techniques at the European Space Agency

The ESA/ESTEC Antenna Laboratory is committed to the mission of developing new state-of-art RF testing facilities in collaboration with European companies aiming at supporting the growth of the European industry in this domain. Subsequent ESA missions will benefit from these R&D activities, allowing a better definition and validation of their requirements.

During recent years, the ESA/ESTEC Antenna Laboratory has been working on several projects: The Low-temperature Nearfield Terahertz chamber (LORENTZ), which supports planar nearfield measurements from 50 GHz up to 1.5 THz at cryogenic temperatures. In addition, a submmVAST (Validation Standard) antenna has been developed which is stable and robust at cryogenic temperatures.

Deployable antennas of several meters (between 10 and 20 meters) are currently under development and measurement, as well as high-accuracy L-band antennas for navigation. Several other R&D activities are planned to start very soon or have shortly started.

This presentation gives an overview of these activities and explains how they effectively support future space missions. It concludes with a discussion of recent trends, challenges in antenna and RF material characterization measurement for space applications, and approaches to cope with them.

Lunch & Learn Featured Speaker



Chuck Penson

Fellow, Antique Wireless Association (AWA)

Thursday, November 6

Noon - 1:30 p.m.

Waiting for the Go Code: Communications in the Titan II ICBM Program

Titan II was the nation's preeminent nuclear deterrent and a cornerstone of the United States' Cold War deterrence strategy, standing guard for 25 years from 1963 to 1987. The missile represented a significant leap in nuclear capabilities, with storable propellant, a 58-second response time, and a nuclear punch more than 600 times that of the bomb dropped on Hiroshima. Titan II was designed specifically to convince the Soviets that any nuclear attack on the United States would be answered with a counterstrike of unspeakable devastation.

This talk will explore the critical role of command and control systems in the Titan II program and how its effectiveness hinged on robust, reliable, and secure communication.

We will delve into the various layers of communication infrastructure, from the hardened underground launch control center to the missile itself, and discuss the wireline and redundant radio links designed to ensure command and control even under duress.

By analyzing the Titan II's communication architecture, this presentation aims to shed light on the complex interplay of technology, strategy, and human factors in maintaining nuclear readiness during a pivotal period in global history.

For added clarity and context we will also review key design features of the complex and talk about the very simple but extremely secure process of launching the missile.

I would like to dedicate this presentation to the men and women of the United States Air Force who worked in the Titan II program, to the civilians who built the system, and to those who died in several accidents.

Chuck Penson served as archivist and historian for the Titan Missile Museum and National Historic Landmark from 1997 to 2020, retiring at the onset of the pandemic. He is regarded as the world's foremost authority on the Titan II missile weapon system, and is the author of The Titan II Handbook: A Civilian's Guide to the Most Power ICBM American Ever Built. He also scripted, directed, and presented an hour-long film–Big, Fast, Deadly: Titan II, America's Biggest ICBM.

In addition to his work in the archives, Penson wrote, produced, and presented the museum's visitor orientation video; wrote docent training manuals; wrote, produced, and presented numerous informal docent training videos (many of which are still on YouTube); developed a browser-based information kiosk for visitors; engineered the construction of a full-scale replica nuclear warhead; and provided extensive technical support for both topside and underground structures and artifacts. Over time, these efforts transformed the museum from a simple tourist attraction to a sophisticated educational experience.

Penson has also acted as technical advisor to two PBS documentaries, Uranium (2015) and Command and Control (2016); numerous History Channel programs; and a soon-to-be-released Hollywood feature film–a fictional story based on an actual missile silo crisis.

From 1981 to 1997 Penson worked as director of the Computer Education Center at the Science Museum of Minnesota, in St. Paul. He started the Center from scratch and grew it into a multi-million dollar program. He also served as the museum's unofficial astronomer, writing for its monthly magazine and leading various field trips.

Penson holds an amateur radio license, and in 2020 was invited to sit on the Historical Committee of the ARRL: The National Association for Amateur Radio. In 2021 he was named a Fellow of the Antique Wireless Association.

With a life-long passion for the history of science and technology, Penson has done extensive research into the history of twentieth century electronics, resulting in five books on the subject. Currently, he is developing an online research library documenting the history of amateur radio, on behalf of the ARRL.

A native of St. Paul Minnesota, after herniating a disk in his back while shoveling snow, he made the decision to move to sunny Arizona where he lives with his wife on a small ranch west of Tucson.

Invited Session Speakers

New this year



Monday, November 3

3:00- 3:20 p.m.
Session 4: Antenna Measurements I

Vince Rodriguez, Ph.D.

AMTA Fellow
IEEE Senior Member
ACES Fellow
Manager, Electromagnetic Engineering Analysis and Senior Staff Electromagnetics Engineer at NSI-MI Technologies

Modeling The Effect Of Disruptions On The Absorber Treatment On Antenna Measurements

Abstract:
Anechoic ranges require constant temperature and humidity control, proper lighting for safe work inside the chamber, and closed-circuit television (CCTV) cameras to monitor the system during measurements. In addition, anechoic chambers require fire detection and suppression systems. Traditionally, such penetrations are minimized and placed in non-critical areas, with the assumption that their effects would be negligible if located away from sensitive regions. However, the true impact has not been fully investigated.

In this study, antenna measurements are simulated in an indoor far-field range. A range antenna (or near-field probe) and an antenna under test (AUT) are placed in free space, and the AUT is rotated at discrete angles. A second model then introduces CCTV cameras, HVAC vents, light fixtures, air sampling tubes, and fire suppression nozzles positioned around the chamber. The simulation with these added features is repeated at the same discrete angles.

The model assumes a perfect absorber and does not account for the potential shadowing effects of pyramidal absorbers. While approximate, the results provide a worst-case estimate of the measurement error introduced by necessary chamber penetrations. These results can be used to assess potential uncertainties in measurements caused by support systems within the anechoic enclosure. The technique is demonstrated for indoor far-field ranges but can also be applied to near-field and compact ranges. Results show that, for a typical roll-over-azimuth positioner, the effects of ceiling penetrations are minimal, with differences in the -35 to -40 dB range.

Bio:
Dr. Vince Rodriguez earned his B.S.E.E. (1994), M.S. (1996), and Ph.D. (1999) in engineering science with emphasis in electromagnetics from the University of Mississippi. He began his career at ETS-Lindgren, contributing to RF design of anechoic chambers and later advancing to senior antenna design engineer and antenna product manager, where he introduced the open-boundary quad-ridged horn. In 2014, he joined NSI-MI Technologies, where he has led projects in antenna design, RCS, radome measurement, and absorber development, rising to senior staff engineer and later manager of chamber engineering and electromagnetic analysis groups.

Dr. Rodriguez has authored over 30 journal papers, 70+ conference papers (25+ at AMTA), and a well-regarded book on anechoic chamber design. He is a senior IEEE member, ACES Fellow, and has served on multiple IEEE and ACES boards and standards committees. He is also an Adjunct Research Professor at Ole Miss, a reviewer for leading journals, and a long-time AMTA member, serving on its Board of Directors, including Vice President in 2012.



Tuesday, November 4

10:00-10:20 a.m.
Session 6: Robotic and UAV Antenna Measurements II

Goutam Chattopadhyay

President, IEEE Microwave Theory and Technology Society (MTT-S)
Visiting Professor, California Institute of Technology, Pasadena, California USA

Space Exploration and Our Place in the Universe

Abstract:
Space exploration captivates us because it speaks to one of humanity's deepest instincts—the desire to understand our origins and our place in the cosmos. By venturing beyond Earth, we not only uncover the mysteries of distant planets, stars, and galaxies but also gain profound insights into our own world. From searching for signs of life on other planets to studying the birth of stars and the evolution of galaxies, each discovery reshapes our understanding of the universe and ourselves. Space exploration challenges us to innovate, to collaborate across borders, and to dream beyond what we think is possible. Ultimately, it reminds us that while we are a tiny part of the universe, we are also a curious and resilient species capable of reaching for the stars.

Space exploration is driven by fundamental scientific questions and the pursuit of innovative instruments to answer them. Our work focuses on designing and building advanced instruments that enable precise measurements to support these scientific investigations. In this presentation, we will provide an overview of the state-of-the-art instruments currently under development and highlight the key science questions they are designed

New this year

to address. Rapid advancements in areas such as commercial modeling software, low-loss circuit and interconnect technologies, mobile device innovations, and submicron scale lithography are now making it possible to develop smart, low-power, and highly capable instruments—many of which are compact enough to be deployed on Small Sat or CubeSat platforms. We will also explore the challenges and opportunities associated with next-generation instruments and their role in meeting the demands of future scientific missions.

Bio:
Goutam Chattopadhyay is the 2025 President of the IEEE Microwave Theory and Technology Society (MTT-S). He is a Senior Scientist at NASA's Jet Propulsion Laboratory (JPL) at the California Institute of Technology (Caltech) and a Visiting Professor at Caltech in Pasadena, USA. Dr. Chattopadhyay earned his Ph.D. in Electrical Engineering from Caltech in 2000. He is a Fellow of both IEEE (USA) and IETE (India), serves as a Track Editor for the IEEE Transactions on Antennas and Propagation, and is an IEEE Distinguished Lecturer. His research interests include microwave, millimeter-wave, and terahertz receiver systems and radars, as well as the development of space instruments for the search for life beyond Earth. Dr. Chattopadhyay has published over 400 papers in international journals and conferences and holds more than 20 patents. He has received over 35 NASA Technical Achievement and New Technology Invention Awards. In 2024, he was honored with the Armstrong Medal from the Radio Club of America (RCA) for his outstanding contributions for radio science. He also received the NASA-JPL People Leadership Award in 2023. He was named IEEE Region-6 Engineer of the Year in 2018 and received the Distinguished Alumni Award from the Indian Institute of Engineering Science and Technology (IIEST), India, in 2017. Additionally, he has won the Best Journal Paper Award from IEEE Transactions on Terahertz Science and Technology in both 2020 and 2013, the Best Paper Award for Antenna Design and Applications at the European Antennas and Propagation Conference (EuCAP) in 2017, the IETE Prof. S. N. Mitra Memorial Award in 2014, and the IETE Biman Bihari Sen Memorial Award in 2022.



Tuesday, November 4
3:00-3:20 p.m.
Session 8: Advanced Measurements

Dirk Heberling

AMTA Fellow and IEEE Senior Member
Full Professor at RWTH Aachen University Director, Fraunhofer FHR

Exploring the Potential of Robotic Systems for Antenna Measurements

Abstract:
Industrial robots offer significant potential for advancing antenna measurement methodologies, due to their high flexibility, precision, and reliability. Their ability to follow complex trajectories and accommodate unconventional test setups enables innovative approaches for both production testing and the development of multifunctional measurement facilities, especially in spatially constrained scenarios. Although the use of robotics in antenna measurements is still relatively new, the increasing maturity of robotic antenna measurement systems is driving their adoption in both industrial and academic settings. These systems are being applied not only to standard pattern measurements but also to more advanced and customized testing scenarios. In particular, robotic systems show great potential in spherical near-field (SNF) antenna measurements. The flexibility in defining arbitrary sampling grids allows for the application of irregular sampling schemes and compressed sensing (CS) techniques. These approaches can substantially reduce the number of required measurement points, thereby decreasing the overall measurement time, an improvement that is often not feasible with conventional mechanical positioning systems. Despite these benefits, unlocking the full potential of robot-based antenna measurement systems involves overcoming several technical challenges like ensuring precise alignment, optimizing trajectory planning algorithms, and integrating radio frequency (RF) subsystems with robotic motion control. This talk presents current developments in robotic antenna measurements and showcases practical implementations using the robot-based millimeter-wave test facility at the Institute of High Frequency Technology, RWTH Aachen University.

Bio:
Dirk Heberling (Senior Member, IEEE) received the Ph.D. degree (Dr.-Ing.) in 1993. In 1993, he joined IMST GmbH, Kamp-Lintfort, Germany, to establish a new antenna section. From 1995 to 2003, he was the Head of the Antennas Department. He has been a member of European Competence Projects for Antennas COST 260, COST 284, IC0603, and IC1102. From 2003 to 2008, he took over the Department of Information and Communication Systems, IMST GmbH, and in 2008, he moved to RWTH Aachen, where he is currently the Head of the Institute and the Chair of High Frequency Technology. In 2016, he became the Head of the Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR. Dr. Heberling is a member of VDE and from 1998 to 2017 he has been a member of the ITG expert group 7.1 "Antennen" which he directed as a chairman from 2002 to 2003 and from 2014 to 2017 again. He is a member of VDE and is the German delegate to IC1102. He is a member of the Steering Committee and Organizing Committee of European Conference on Antennas and Propagation. During this time he was responsible as General Chairman and organizer of the international antenna conference INICA 2003, September 2003, Berlin and the

Invited Session Speakers

New this year

German Microwave Conference GeMiC 2014, March 2014, Aachen. Since 1998 he has been a member of the European competence projects for antennas COST 260, COST 284, IC0603 and IC1102, from 2002 to 2007 he was the German delegate of COST 284 and from 2011 to 2016 the German delegate and secretary of IC1102. From 2002 to 2003 he was co-organizer of the European network of excellence on antennas ACE. He is member of the steering committee and organizing committee for the European Conference on Antennas and Propagation, EuCAP. From 2016 to 2019 he was member of the Board of Directors of the Antenna Measurement Techniques Association (AMTA) and became president in 2018 and senior member since 2020. In 2016, he was elected for four years in the technical decision board (Fachkollegiat) of the German Research foundation DFG.



Wednesday, November 5
3:00- 3:20 p.m.
Session 11: RF Material Design and Characterization

Dr. Mauro Ettorre

Professor, Electrical and Computer Engineering, Michigan State University, East Lansing, Michigan
IEEE Fellow

Wideband Long Slot Arrays: Analysis, Design, and Applications for Next Generation Communication Networks and Beyond

Abstract:
In the near future, high-speed wireless networks will leverage the abundant bandwidth available in the sub- and millimeter frequency ranges, mainly through XG systems and New Space technologies. Innovations in antenna technology are essential to fully exploit these wide bandwidths and provide efficient data links for mobile users. Long slot arrays present a very attractive solution, offering decade-wide bandwidths, a very large field of view, and a low-profile design. During this presentation, I will discuss the modeling of long slot arrays and highlight their advantages in terms of bandwidth and scanning capabilities, as well as their physical implementation. We will explore how quasi-optical planar systems can be used to feed these arrays, functioning as efficient beamformers for multi-beam, wide-scanning antennas. Quasi-optical systems help to minimize the losses and costs associated with beamforming networks for arrays operating at higher frequencies while maintaining the flexibility of the radiating unit. I will also cover the implementation of long slot arrays across various technologies, particularly in millimeter and sub-millimeter frequency bands, aimed at next-generation terrestrial and non-terrestrial networks. Finally, I will showcase the capability of these arrays to radiate short, high-power pulses, extending their applications into high-power scenarios.

Bio:
Dr. Mauro Ettorre received a Laurea degree summa cum laude in Electrical Engineering and a Ph.D. in Electromagnetics from the University of Siena, Italy, in 2004 and 2008, respectively, with part of his Ph.D. work carried out at TNO, the Netherlands. Since 2023, he has been a Professor at Michigan State University, USA. Previously, he was a Research Scientist at CNRS, IETR laboratory, France, where he co-led the multi-beam antenna activity with Thales Alenia Space (2014–2020), served on the French National Committee for Scientific Research (2016–2021), led the mm/sub-mm waves team (2016–2021), and co-chaired the Antennas and Microwave Devices Department (2021–2023).

His research interests include quasi-optical systems, periodic structures, wideband arrays, millimeter-wave antennas, non-diffractive radiation, and localized waves. He has authored over 95 journal papers, 230 conference papers, and holds 14 patents (2 licensed). An IEEE Fellow, he served as Associate Editor (2017–2023) and now Track Editor for the IEEE Transactions on Antennas and Propagation. He is the 2024 IEEE MTT-S and AP-S Inter-Society Distinguished Lecturer.

His work has received several prizes, including the 2009 French Ministry of Research Award, the 2014 Young Investigator Award from the French National Research Agency, the 2018 ESA Antenna Workshop Innovation Award, Best Paper Awards at EuCAP 2018 (UK), EuCAP 2021 (Germany), and iWAT 2023 (Denmark).



Wednesday, November 5
3:00-3:20 p.m.
Session 13: Imaging, Algorithms, and Processing Techniques

Dr. Olav Breinbjerg

AMTA Distinguished Speaker
ElMaReCo, Copenhagen, Denmark

Correction of Smearing Error due to Signal Averaging with On-The-Fly Sampling for Electromagnetic Field Measurements

Abstract:
Measurements of spatially distributed fields require a relative motion between the field source and the sampling probe to reach the designated sampling points distributed over the spatial extent of the field. For stop-go sampling, where the motion is stopped at the sampling points while the data acquisition system

New this year

samples the probe signal, the measurement time can become unacceptably long due to the mechanical deacceleration, fine-positioning, and acceleration of the positioning system at each sampling point. For on-the-fly sampling, where the motion is continuous and the data acquisition system is triggered-by-position as the sampling points are reached, the measurement time can be significantly shorter. Since all measurements are affected by random measurement noise, the sample of the probe signal at the individual sampling point is almost always formed by combining multiple individual A/D conversions in the measurement receiver. Here, we refer to this as signal averaging; it is well known that by averaging N independent A/D conversions, the signal-to-noise power ratio increases by a factor N; e.g. averaging 1000 A/D conversions increases the signal-to-noise ratio by 30 dB. With go-stop sampling, all A/D conversions are made at the same spatial point, the sampling point, and thus for the same field; this corresponds to coherent sampling. However, for on-the-fly sampling, the A/D conversions are – due to the continuing relative motion between source and probe – made at slightly different spatial points and thus for slightly different fields; this corresponds to incoherent sampling and it results in smearing of the probe signal. For increasing number of averaged A/D conversions or for increasing speed of the positioner, the resulting smearing error may become unacceptably large. This presentation will demonstrate how the smearing error due to signal averaging for on-the-fly sampling can be exactly quantified and also exactly corrected - for both non-periodic and periodic bandlimited signals.

Bio:
Dr. Olav Breinbjerg received the M.Sc. and Ph.D. degrees in electrical engineering from the Technical University of Denmark (DTU) in 1987 and 1992, respectively. He was on the Faculty of DTU's Department of Electrical Engineering as Assistant Professor from 1991 to 1995, Associate Professor from 1995 to 2005, and Full Professor from 2006 to 2021. From 1997 to 2021 he was also Head of the Electromagnetic Systems Group and the DTU-ESA Spherical Near-Field Antenna Test Facility, and he founded the DTU Electromagnetic Test Centre. He resigned his position at DTU in 2021 and founded ElMaReCo for independent research consultancy. Olav Breinbjerg was a Visiting Scientist at Rome Laboratory in 1988, a Fulbright Research Scholar at the University of Texas at Austin in 1995, and a Visiting Professor at the University of Siena in 2011 and 2022. His research is generally in applied electromagnetics - and particularly in antennas, antenna measurements, computational techniques, and scattering - for applications in wireless communication and sensing technologies. He is the author or co-author of more than 75 journal papers, 250 conference papers, and 250 technical reports. Dr. Breinbjerg was a recipient of a U.S. Fulbright Research Award in 1995, the 2001 AEG Elektron Foundation's Award, the 2003 DTU Student Union's Teacher of the Year Award, the 2013 and 2015 European School of Antennas Teacher of the Year Awards, the 2020 Hans Christian Ørsted Award, and the 2023 AMTA Distinguished Achievement Award. Dr. Breinbjerg is Fellow of AMTA, Fellow of IEEE, Knight of the Order of Dannebrog, and the 2024-2025 AMTA Distinguished Speaker.



Thursday, November 6
10:30-10:50 a.m.
Session 15: Antenna Design and Analysis

Oscar Quevedo-Teruel
Professor at KTH Royal Institute of Technology
EurAAP vice-chair
IEEE Fellow

Efficient and Fast Ray Tracing Method for Antenna Performance Simulation

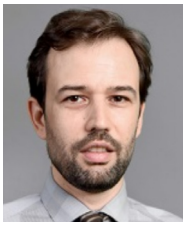
Abstract:
In recent times, we have become familiar with the use of commercial software for designing our antennas and microwave devices. This is very common since it is easy to find high-performance desktop computers at affordable prices in our daily lives. The use of general-purpose commercial software is widespread because it allows for the simulation of any arbitrary configuration. However, many of us have experienced, given the ease of using commercial software, trying to simulate electrically large electromagnetic devices which take days or, in some cases, cannot be completed at all. While it is true that we now have very powerful simulation tools, by making a few simple assumptions, we can significantly reduce computational time without sacrificing accuracy.

In this talk, I will introduce a simple ray-tracing technique that can be used, in combination with physical optics, to calculate the radiation pattern of antennas, as well as directivity, gain, mutual coupling, and even early-time response in complex configurations. The results are not only faster than those produced by conventional commercial software, but also more accurate, as they avoid many of the numerical errors that typically arise when computing electrically large structures.

Bio:
Oscar Quevedo-Teruel received his Telecommunication Engineering and Ph.D. degrees from Carlos III University of Madrid, Spain, in 2005 and 2010. From 2010-2011, he joined the Department of Theoretical Physics of Condensed Matter at Universidad Autonoma de Madrid as a research fellow and went on to continue his postdoctoral research at Queen Mary University of London from 2011-2013. In 2014, he joined KTH Royal Institute

New this year

of Technology in Stockholm, Sweden, where he is a Professor in the Division of Electromagnetic Engineering and Fusion Science and Director of the Master Programme in Electromagnetics Fusion and Space Engineering. He has been an Associate Editor of the IEEE Transactions on Antennas and Propagation from 2018-2022 and Track Editor since 2022. He has been a member of the European Association on Antennas and Propagation (EurAAP) Board of Directors since January 2021. Since January 2022, he has been the vice-chair of EurAAP. He was a distinguished lecturer of the IEEE Antennas and Propagation Society for the period 2019-2021. He is an IEEE Fellow for contributions to glide symmetry based metasurfaces and lens antennas. He has made scientific contributions to periodic structures, higher symmetries, transformation optics, lens antennas, physical optics, and high-impedance surfaces. He is the co-author of more than 150 papers in international journals and 250 papers at international conferences.



Thursday, November 6
3:00-3:20 p.m.
Session 17: Range Design, Instrumentation, and Characterization

Georgios Trichopoulos

Associate Professor, Electrical, Computer & Energy Engineering
Arizona State University

Reconfigurable Intelligent Surfaces for Antenna Measurements

Abstract:
Reconfigurable intelligent surfaces (RISs) - or programmable metasurfaces- have recently attracted the attention of several diverse research communities, mostly for applications related to wireless communications and sensing. RISs are relatively low-cost structures that are scalable to large apertures and provide electronic beam reconfiguration (focusing, beamscanning, etc.). As such, RISs exhibit many attributes that could be used to simplify the antenna measurements. By leveraging its ability to steer reflections dynamically in both azimuth and elevation planes, the RIS can act as a programmable probe to illuminate the antenna under test (AUT) from multiple incident angles without requiring mechanical movement. In this way, the RIS can generate a diverse set of measurement bases that, when combined with near-field scanning or a compact sensor array, enable efficient reconstruction of the AUT's far-field radiation pattern. Compared to conventional mechanical goniometers or large anechoic chambers, this approach provides a more compact and reconfigurable testbed.

Our group has designed and prototyped several RISs in the microwave and millimeter wave bands. In a recent work, we devised a mmWave (28 GHz) RIS that offers electronically controllable high-resolution beam steering with strong suppression of quantization lobes. The scalability of our tiled RIS architecture provides flexibility for measurement setups. Larger apertures can generate narrower beams with finer angular selectivity, which is advantageous for high-directivity antenna characterization. At the same time, the low-cost PCB-compatible fabrication of RIS allows deployment in practical over-the-air (OTA) test environments for 5G/6G antennas, user equipment, or phased arrays. Furthermore, the pseudo-random pre-coding of the RIS suppresses spurious lobes that could otherwise corrupt measurements, ensuring that only the desired beam is used to interrogate the AUT. This feature enhances measurement accuracy and reduces ambiguities in pattern reconstruction—an advantage over traditional binary RISs. During the conference, we will present the design of the scalable mmWave RIS and discuss the measured radiation and beam shaping properties. Then, we will present various approaches in using the RIS as a component of a measurement system to characterize directive mmWave antennas.

Bio:
Georgios Trichopoulos is currently an Associate Professor with the School of Electrical, Computer, and Energy Engineering, Arizona State University, Tempe, AZ, USA. From 2013 to 2015, he was a Postdoctoral Researcher with the ElectroScience Laboratory, The Ohio State University. His research areas include antenna engineering, terahertz imaging, antenna design for millimeter-wave and terahertz sensors, and high-frequency device and circuit characterization methods. He has led the design and fabrication of the first real-time terahertz camera that operates in extremely high frequencies (600 GHz – 1.1 THz) and is comprised of more than 5,000 on-chip miniaturized antennas. Additionally, he has designed and tested various programmable metasurfaces for wireless communications and sensing applications. Dr. Trichopoulos has been the recipient of several awards, including the Best Student Paper Award of the 2013 IEEE Antennas and Propagation Symposium and the NSF CAREER. He is currently serving as an Associate Editor for IEEE Transactions on Antennas and Propagation.

Preliminary Technical Program

This program is preliminary and is subject to change. Updated listings can be found at **2025.amta.org**.

Monday, November 3

8:00–9:00 am Meeting Opening/Keynote Address

8:00–8:10 am Welcome and Introduction of Keynote Speaker: Michelle Lepage (AMTA President)

8:15–8:55 am Keynote Speaker: "Pursuing Disruptive Technologies in Electromagnetics & Additive Manufacturing": Dr. Raymond C. Rumpf, FSPIE, SMIEEE

8:55–9:00 am Opening Remarks and Technical Session Overview: Dr. Jorge L. Salazar-Cerreno (Technical Coordinator)

Session 1

9:00–10:00 am Robotic and UAV Antenna Measurements I
Chair: Olav Breinbjerg (ElMaReCo)

9:00–9:20 am 000079: *Linear Rail Kinematic Calibration Using a Legendre Polynomial Model,* Benjamin L. Moser[1], Joshua A. Gordon[1], Andrew J. Petruska[2] ([1]National Institute of Standards and Technology, NIST, [2]Colorado School of Mines).

9:20–9:40 am 000102: *Automated Scan Plane Alignment for Robot-Based Planar Near-Field Antenna Measurements,* Roland Moch, Quang Ton, Patrick Pelland (NSI-MI Technologies).

9:40–10:00 am 000105: *Drone-Based Measurement of Patterns in HF Band,* Gabriel F. Altman, Songyi Yen, Dejan S. Filipovic (University of Colorado Boulder).

10:00–10:30 am MORNING BREAK

Session 2

10:30am–12:10 pm Near-Field Measurements I
Chair: Daniel Aloi (Oakland University)

10:30–10:50 am 000069: *A Study on the 3-D Probe Position Errors Correction in a Non-Redundant Spherical NF/FF Transformation For Quasi-Planar Antennas,* Francesco D'Agostino, Flaminio Ferrara, Claudio Gennarelli, Rocco Guerriero, Massimo Migliozzi, Luigi Pascarella (Department of Industrial Engineering, University of Salerno - Italy).

10:50–11:10 am 000083: *Derivative Probes and Optimized Sampling in Planar Near-Field Antenna Characterization,* Florindo Bevilacqua[1], Olav Breinbjerg[2], Amedeo Capozzoli[1], Claudio Curcio[1], Angelo Liseno[1] ([1]Dipartimento di Ingegneria Elettrica e delle Tecnologie dell'Informazione, DIETI, Università di Napoli Federico II, [2]ElMaReCo).

11:10–11:30 am 000086: *Efficient Spherical Near-Field Characterization by Means of Singular Value Optimization,* Amedeo Capozzoli, Claudio Curcio, Angelo Liseno, (Dipartimento di Ingegneria Elettrica e delle Tecnologie dell'Informazione, DIETI, Università di Napoli Federico II).

11:30–11:50 am 000062: *Exploration of a More Conformal AUT Volume for Wide-Mesh PNF Sampling,* Scott T. McBride (NSI-MI Technologies).

11:50am–12:10 pm 000121: *Investigating the Uncertainty Contribution of the NF/FF Transformation Processing for Electrically Large Antennas,* Francesco Saccardi[1], Stephane Issartel[2], Nicolas Gross[2], Lars J. Foged[1] ([1]Microwave Vision Group, MVG, Italy, [2]Microwave Vision Group, MVG, France).

12:10–1:30 pm EXHIBITOR SPONSORED LUNCH

Session 3

1:30–2:30 pm Poster Session I (Best Paper Competition)
Chair: Peter Collins (Resonant Sciences)

2:30–3:00 pm AFTERNOON BREAK

Session 4

3:00–5:00 pm Antenna Measurements I
Chair: Fabian Bette (Rohde & Schwarz)
Invited Speaker: Vince Rodriguez (NSI-MI Technologies)

3:00–3:20 pm 000046: *Modeling the Effect of Disruptions on the Absorber Treatment on Antenna Measurements,* Vince Rodriguez (NSI-MI Technologies).

3:20–3:40 pm 000064: *Enhanced Gain Extrapolation,* Joshua A. Gordon, Benjamin L. Moser (National Institute of Standards and Technology, NIST).

3:40–4:00 pm 000152: *Efficient Phase-Only Pattern Optimization for Phased Array Apertures,* Brendan W. Wilson, Spencer Wallentine, Ian J. Gecse, R. Jerry Jost (STAR Dynamics).

4:00–4:20 pm 000120: *Planetary Radar High Power Array Feed Calibration,* Zachary Dunn[1], Domingo Cruz-Pagan[1], Steven Wilkinson[1], Patrick Taylor[2] ([1]RTX Raytheon, [2]National Radio Astronomy Observatory).

4:20–4:40 pm 000054: *How Pink Noise Limits the Achievable SNR of an Antenna Measurement System,* Ryan T. Cutshall (Raytheon, An RTX Company).

4:40–5:00 pm 000126: *NASA's Horizontal Planar Near-Field Facility: A Large-Scale, High-Accuracy System for Spaceborne Antenna Testing,* Domenic Belgiovane[1], Jim Downey[2], Bryan Schoenholz[2], Felix Miranda[2], Evan Beers[1], James Caputo[1] ([1]MVG - OATI, [2]NASA Glenn Research Center).

Tuesday, November 4

8:00–8:25 am IEEE AP-S Invited Speaker: Prof. Christophe Fumeaux, The University of Queensland, "Beamforming with Compact Multi-Port Multi-Mode Antennas"

8:25–8:30 am Daily Announcements and Technical Session Overview: Dr. Jorge L. Salazar-Cerreno (Technical Coordinator)

Session 5

8:30–9:30 am Antenna Measurements II
Chair: Stuart Gregson [1,2] ([1]Next Phase Measurements, [2]Queen Mary University of London)

8:30–8:50 am 000104: *Spatial Averaging Technique For Improved Mimo Radar Calibration In Compact Antenna Test Ranges,* Simon Heining[1], Reinhard Feger[1,2], Christoph Wagner[3], Andreas Stelzer[1] ([1]Johannes Kepler University Linz, [2]Christian Doppler Laboratory for Distributed Microwave- and Terahertz-Systems for Sensors and Data Links, [3]Silicon Austria Labs).

8:50–9:10 am 000142: *Technique For Antenna Gain Correction Based On Return Loss Compensation,* Aidan Hynes[1], Greg Brzezina[2], Ken Oueng[2], Adrian Momciu[2] ([1]University of Waterloo, [2]Canadian Space Agency).

9:10–9:30 am 000146: *IEEE Std 1720: Near-Field Measurement Standard 2025 Update,* Lars Jacob Foged[1], Vicente Rodriguez[2], Jeffrey Fordham[3], Justin Dobbins[4], Vikass Monebhurrun[5] ([1]Microwave Vision Group, MVG, Italy, [2]NSI-MI Technologies, [3]Retired, AMTA, [4]Raytheon Technologies, [5]CentraleSupélec).

9:30–10:00 am MORNING BREAK

Session 6

10:00am–12:00 pm Robotic and UAV Antenna Measurements II
Chair: Lars Jacob Foged (Microwave Vision Group)
Invited Speaker: Goutam Chattopadhyay[1,2] ([1]President, IEEE Microwave Theory and Technology Society, [2]California Institute of Technology)

10:00–10:20 am Invited: *Space Exploration and Our Place in the Universe,* Goutam Chattopadhyay (California Institute of Technology)

10:20–10:40 am 000063: *Compressive Sensing Techniques For Rapid Production Test And Diagnostics Of Electrically Large Nose-Mounted Commercial Radomes,* Stuart F. Gregson[1,2], Clive G. Parini[2] ([1]Next Phase Measurements, [2]Queen Mary University of London).

10:40–11:00 am 000158: *Multi-Functional Robotic Antenna Measurement System Automated Probe Changer,* Patrick Schluper, Bert Schluper, Kim Hassett, Greg Masters (Next Phase Measurements).

11:00–11:20 am 000047: *On The Effects Of Industrial Robotic Arms On The Pattern Of The Probe For Near-Field Measurements,* Vicente Rodriguez[1], P. Mark Ingerson[1], Gwenaël Dun[2], Esra Celenk[1] ([1]EM Analysis Group, NSI-MI Technologies, USA, [2]EM Analysis Group, NSI-MI Technologies, France).

11:20–11:40 am 000115: *Robot-Based Near-Field Antenna Measurements On Polyhedral Sampling Surfaces,* Henrik Jansen[1], Adrien A. Guth[1], Dirk Heberling[1,2] ([1]Institute of High Frequency Technology, RWTH Aachen University, [2]Fraunhofer Institute for High Frequency Physics and Radar Techniques, FHR).

11:40am–12:00 pm 000080: *Autonomous Adaptive Sampling For Planar Antenna Measurements With A Robotic-Arm System,* Celia Fontá Romero[1,2] Ana Arboleya[2], Manuel Sierra Castañer[1] ([1]Information Processing and Telecommunications Center, Universidad Politécnica de Madrid, [2]Microwave Engineering and Radiocommunication Systems Group, Universidad Rey Juan Carlos).

12:00–1:30 pm BUSINESS LUNCH

Session 7

1:30–2:30 pm Poster Session I
Chair: Elizabeth Joyce (Raytheon, An RTX Business)

000101: *Design of 2P3T Switch Modules for a Multiple Probe Near-Field Measurement System,* Hui-Jun Woo[1], Kyeong-Min Na[1], Jeong-An Le[2], Jong-Hyuk Lim[2], Soon-Soo Oh[1] ([1]Dept. of Electrical Engineering, Chosun University, [2]Communications Conformity Assessment Center, National Radio Research Agency, RRA).

000133: *A Novel Multi-Functional Lens-Integrated Metasurface Antenna for Sub-THz 6G Communication,* Awais K. Bangash, Syed S. Jehangir (Materials, Antennas, Radar, and Sensors, MARS, Lab, School of Electrical and Computer Engineering, ECE, Oklahoma State University).

000053: *Advanced Multi-Probe Near-Field Scanner System Utilizing Bi-Polar and Phased Array Antenna Technology,* Edgar A. Oblitas[1,2], Luis Felipe Moncada-Calmet[1,2], Jorge L. Salazar-Cerreño[1,2,3] ([1]Advanced Radar Research Center, ARRC, [2]The University of Oklahoma, [3]eMWave-Tech).

000138: *An Integrated UWB Grin Lens Probe for UAV-Based In-Situ Characterization Of Radars And Communication Systems,* Syed S. Jehangir[1], Jorge L. Salazar-Cerreño[2,3,4] ([1]Materials, Antennas, Radar, and Sensors, MARS, Lab, School of Electrical and Computer Engineering, ECE, Oklahoma State University, [2]Advanced Radar Research Center, ARRC, [3]The University of Oklahoma, [4]eMWave-Tech).

000100: *Anechoic Chamber Reflection Localization Using Range Estimation and Trilateration,* Oren Longman, Igal Kotzer (General Motors Corporation).

000098: *Antenna-Coupled Electrode Electro-Optic Modulator for 80 GHz Band Time Domain Measurement,* Satoru Kurokawa[1,2], Michitaka Ameya[1], Masahiro Sato[3], Masatoshi Onizawa[3], Hiroshi Murata[4] ([1]National Institute of Advanced Industrial Science and Technology, AIST, [2]7G aa, Tsukuba, [3]Seikoh Giken, [4]Mie University).

000108: *Design and Analysis of a mmWave 5G-DSRC MIMO-Array Antenna for Automotive V2X Applications,* Mohammad Shahed Pervez[1], Amanpreet Kaur[2], Daniel N. Aloi[3] ([1]Vice President, AMTA, PhD Student, Oakland University, [2]Assistant Professor, Oakland University, [3]Director of Research, Oakland University).

000056: *Enhanced Transmission Measurements Using Gaussian Far Field Weighting,* Garrett Harris, Carl Pfeiffer (Air Force Research Laboratory).

000067: *High-Resolution mmWave Imaging Using MIMO Antenna Arrays for Non-Invasive Diagnostics,* Mohammad Shahed Pervez[1], Amanpreet Kaur[2] ([1]PhD Student, Oakland University, Assistant Professor, [2]Oakland University).

000135: *Improving Simulation Accuracy of Printed Antennas Via Frequency-Dependent Permittivity Adjustment,* Emiliano Campitelli[1], Indra Fuentes[1], Javier Areta[1], Mariano Gomez Berisso[2] ([1]Universidad Nacional de Rio Negro, CITTECA, [2]Instituto Balseiro, CNEA-CONICET).

000057: *In-Situ Radome Measurement with USRP,* Garrett Harris[1], Matthew Stepaniak[2], Chad Shaffer[3] ([1]Air Force Research Laboratory Sensors Directorate, AFRL/RY, [2]Rose-Hullman Institute of Technology, [3]Defense Engineering Corporation).

000141: *Impact Assessment of Wet Radomes on Radar Signal Integrity and Calibration,* Jorge L. Salazar-Cerreño[1,2,3] ([1]Advanced Radar Research Center, ARRC, [2]The University of Oklahoma, [3]eMWave-Tech).

000154: *Reconstruction of Scattering Signatures via Computational Imaging Using a Metasurface-Based Transmitting Antenna,* Yeonghoon Noh[1], Aaron Diebold[2], David R. Smith[1] ([1]Department of Electrical and Computer Engineering, Duke University, [2]Metacept Inc).

000065: *Wall-Reflectivity Technique; Improvements in the Instrumentation,* Marc Dirix[1,2], Amin Enayati[1], Joachim Vanwesemael[1] ([1]E&C Anechoic Chambers NV, [2]Institute of High Frequency Technology).

2:30–3:00 pm AFTERNOON BREAK

Session 8

3:00–4:00 pm Advanced Measurements
Chair: Jeffrey Fordham (NSI-MI Technologies, Retired)
Invited Speaker: Dirk Heberling (Institute of High Frequency Technology, RWTH Aachen University & Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR)

3:00–3:20 pm 000112: *Exploring the Potential of Robotic Systems for Antenna Measurements,* Dirk Heberling[1,2], Henrik Jansen[1] ([1]Institute of High Frequency Technology, RWTH Aachen University, [2]Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR).

3:20–3:40 pm 000165: *Free-Space Characterization of Modulation Effects on Reflective Reconfigurable Metasurfaces,* Christopher T. Howard, David R. Reid, Christopher W. Peterson, Kenneth W. Allen (Advanced Concepts Laboratory, Georgia Tech Research Institute).

3:40–4:00 pm 000143: *Near-Field Nondestructive Measurements of Complex Permittivity for Woody Breast Detection in Chicken Meat,* Ren D. Geryak[1], Samir Trabelsi[2], Brian Bowker[2], Zachary Jones[3] ([1]Compass Technology Group, LLC, [2]Quality and Safety Assessment Unit, U.S. National Poultry Research Center, [3]Hacu Student, Quality and Safety Assessment Unit, U.S. National Poultry Research Center).

Session 9

4:00–6:00 pm Antennas and Measurements for 5G and Future Communication Systems
Chair: Ryan T. Cutshall (Raytheon, An RTX Business)

4:00–4:20 pm 000110: *Cost Effective Ku-Band Antenna Passive Positioning and Navigation Using LEO Satellites,* Chi-Chih Chen (Electroscience Lab, The Ohio State University).

4:20–4:40 pm 000092: *Cellular Vehicle to Vehicle Antenna Placement Measurement on a Motorcycle,* John F. Locke[1], Daniel N. Aloi[2], Zahra Katbay[1] ([1]Molex CVS, [2]Oakland University).

4:40–5:00 pm 000172: *Demonstration of Accurate Near-Field Pattern Measurement on Satellite Payloads Driven by External 10 MHz Reference Signal,* Antonio Riccardi[1], Giulia Putortì[2], Luis Rolo[1], Damiano Trenta[1] ([1]ESA-ESTEC, [2]Thales Alenia Space).

5:00–5:20 pm 000131: *Evaluating Reconfigurable Intelligent Surfaces Under Plane Wave Conditions,* Michael D. Foegelle (Keysight Technologies).

5:20–5:40 pm 000148: *Experimental Validation of a Plane Wave Generator for Low Frequency Applications,* Francesco Saccardi, Vincenzo Schirosi, Andrea Giacomini, Jaydeep Singh, Lars Foged, Nicolas Gross, Evgueni Kaverine, Edward Szpindor, Tom McKeown (Microwave Vision Group, MVG).

5:40–6:00 pm 000140: *Integrated mm-Wave Pyramidal Horn Antenna with Artificial Magnetic Conductor (AMC) Surface,* Desalegn Kassaw Belete, Marc Thevenot, Cyrille Menudier (UMR 7252 Xlim, CNRS, Université de Limoges).

5:30-6:30pm IEEE 1720 (Near-Field) Working Group

Wednesday, November 5

8:00–8:25 am EurAAP Invited Speaker: Dr. Elena Saenz, European Space Research and Technology Centre (ESTEC), European Space Agency (ESA), "Overview of the latest antenna measurement developments and techniques at the European Space Agency"

8:25–8:30 am Daily Announcements and Technical Session Overview: Dr. Jorge L. Salazar-Cerreno (Technical Coordinator)

Session 10

8:30–9:30 am Near-Field Measurements II
Chair: Pat Pelland (NSI-MI Technologies)

8:30–8:50 am 000159: *Investigation of the Optimal Sampling Criteria for Antenna Measurements in the Reactive Near-field Region,* William D. Dykeman[1] , Ryan B. Green[1], Dale Canterbury[2], Christopher Headrick[2], Ali Sabet[3] ([1]Department of Electrical and Computer Engineering, Mississippi State University, [2]Raytheon Technologies, [3]EMAG Technologies, Inc.).

8:50–9:10 am 000155: *Low-Cost Modular Planar Near-Field Scanner,* Jacob Stewart, Jeremiah Schwartz, Cody Scarborough (The University of Colorado Boulder).

9:10–9:30 am 000150: *Predicting Near-Fields from Wave Parameter Measurements of Microwave Devices,* Vishnuvardhan V. Iyer[1,2], Jacob D. Rezac[1], James C. Booth[1] ([1]Communications Technology Laboratory, [2]Dept. of Physics, CU Boulder).

9:30–10:00 am MORNING BREAK

Session 11

10:00am–12:00 pm RF Material Design and Characterization
Chair: Hirsch Chizever (Delta Sigma Company)
Invited Speaker: Mauro Ettorre (Michigan State University)

10:00–10:20 am Invited: *Wideband Long Slot Arrays: Analysis, Design, and Applications for Next Generation Communication Networks and Beyond,* Mauro Ettorre (Michigan State University)

10:20–10:40 am 000061: *A Microwave Spot-Probe Method For Tuning Aircraft Radomes,* John Schultz (Compass Technology Group).

10:40–11:00 am 000157: *Enhancing the Electromagnetic Interference Shielding of Exfoliated-Graphite-Based Flexible Graphite Sheet by Engineering a Monotonic Density Gradient Along the Thickness of the Sheet,* Akshita Yadav, Deborah Chung (Composite Materials Research Laboratory, Department of Mechanical and Aerospace Engineering, University at Buffalo, The State University of New York).

11:00–11:20 am 000171: *Measuring Scattering Characteristics Caused by Imperfections in CATR Panel Gaps with Conductive Filler,* Antonio Riccardi, Luis Rolo, Damiano Trenta (ESA-ESTEC).

11:20–11:40 am 000122: *PiCi For Stripline,* Seth Myers, Michael Havrilla (Air Force Institute of Technology, AFIT).

11:40am–12:00 pm 000078: *Properties of Iron Nitride Based Materials for Antenna Applications,* David A. Tonn[1], Todd C. Monson[2], Melinda R. Hoyt[2], Charles J. Pearce[2], Nathan R. Sorenson[2] ([1]Naval Undersea Warfare Center, NUWC, [2]Sandia National Laboratory).

12:00-1:30pm IEEE 1128 EMC Standard (Absorber) Working Group

12:00–1:30 pm LUNCH

Session 12

1:30–2:30 pm Poster Session II
Chair: Brendan Wilson (STAR Dynamics)

000090: *International Comparison of Antenna Calibration Results for EMC Applications in 18-40 GHz Band,* Jerdvisanop Chakarothai[1], JeongAn Lee[2], Lira Hamada[1], Jong-Hyuk Lim[2], Katsumi Fujii[1] ([1]National Institute of Information and Communications Technology, NICT, [2]National Radio Research Agency, RRA).

000167: *Microwave Non-Destructive Sensing Using Conformal Metasurface Antennas,* Michael Inman, Sajedeh Keshmiri, Mohammadreza F. Imani (Arizona State University).

000103: *Over-The-Air Testing of Automotive UEs in an Anechoic Chamber,* Igal Kotzer (General Motors Corporation).

000161: *Point Cloud Generation with mmWave MIMO Radar: Measurements And Analysis,* L. Felipe Moncada Calmet[1,2], Nathan Goodman[1,2], Jorge L. Salazar-Cerreño[1,2] ([1]The University of Oklahoma, [2]Advanced Radar Research Center, ARRC).

000073: *Practical Implementation of a 3-Axis, Dual-Feed, Shielded Loop Probe Incorporating a Re-Entrant Infinite Balun,* James McLean, James Wooten, Ted Harmon, Robert Sutton (TDK Corp).

000168: *Reconstructing Microwave Synthetic Aperture Images Using Neural Fields,* Cecilio Obeso, Kavian Zirak, Omkar Shailendra Vengurlekar, Suren Jayasuriya, Mohammadreza F. Imani (School of Electrical, Computer and Energy Engineering, Arizona State University).

000137: *RF Energy Harvesting in Connected Vehicles: A Dual-Use Antenna Approach for V2X and Power Collection,* Mohammad Shahed Pervez[1], Amanpreet Kaur[2] ([1]PhD Student, Oakland University, [2]Assistant Professor, Oakland University).

000094: *Spain AMTA Node: Promoting Antenna Measurement Activities in Spain,* Manuel Sierra Castañer[1], Tony Sánchez[2], Javier Portilla[2], Fernando Las-Heras[3], Jorge Calatayud-Maeso[1], Celia Fontá-Romero[1], Ana Arboleya[4], Pablo Padilla[5], Juan Francisco Valenzuela[5] ([1]Universidad Politécnica de Madrid, [2]Antenna Systems Solutions, [3]Universidad de Oviedo, [4]Universidad Rey Juan Carlos de Madrid, [5]Universidad de Granada).

000113: *System-Level Simulation of Large Active Antenna Arrays Using Load-Pull-Based Power Amplifier Measurements,* Wissam Saabe[1], Md Khadimul Islam[2], Enow Tanjong[2] ([1]Dassault Systèmes SE, [2]Dassault Systèmes Americas Corp.).

000106: T*rue Far-Field Distance of Lens Antennas,* Jaegeun Ha (Nokia Bell Labs, NBL).

000089: *Updating Antenna Ranges for Improved Performance and Extended Lifetime,* Michael Ungureanu, Christopher G. Hynes, Rodney G. Vaughan (Sierra Wireless Lab, Simon Fraser University).

000097: *Machine Learning Methods Applied to Broadband Electromagnetic Characterization,* Aymar Cublier Martínez[1], Jorge Frövel de la Torre[2], Ruy Sanz González[1], Borja Plaza Gallardo[1], David Poyatos Martínez[1] ([1]National Institute for Aerospace Technology, [2]Universidad Politecnica de Madrid).

000170: *Characterization of an On-Chip THz Hybrid-Fed Dual-Polarized Antenna,* Russell W. Raldiris Torres, Georgios C. Trichopoulos (School of Electrical, Computer, and Energy Engineering, Arizona State University).

2:30–3:00 pm AFTERNOON BREAK

Session 13

3:00–5:40 pm Imaging, Algorithms, and Processing Techniques
Chair: Amedeo Capozzoli (Università di Napoli Federico II)
Invited Speaker: Olav Breinbjerg (ElMaReCo)

3:00–3:20 pm 000074: *Correction of Smearing Error due to Signal Averaging with On-The-Fly Sampling for Electromagnetic Field Measurements,* Olav Breinbjerg (ElMaReCo).

3:20–3:40 pm 000134: *A Novel Method for Anechoic Chamber Evaluation Using Convenient Circular Movement and Modal Analysis in Place of Linear Scanning,* Yibo Wang, Zhong Chen, Garret McKerricher (ETS-Lindgren).

3:40–4:00 pm 000129: *A Numerical Investigation of the Application of Compressed Sensing in Spherical Mode Filtering for Near- or Far-Field Antenna Measurements,* Zhong Chen[1], Stuart F. Gregson[2,3], Yibo Wang[1], Rostyslav F. Dubrovka[3] ([1]ETS-Lindgren, [2]Next Phase Measurements, [3]Queen Mary University of London).

4:00–4:20 pm 000162: *Adaptive and Compressive Near-Field Sampling of Embedded Systems,* Jacob D. Rezac[1], Vishnuvardhan V. Iyer[1,2], James C. Booth[1] ([1]Communications Technology Laboratory, National Institute of Standards and Technology, NIST, [2]Department of Physics, University of Colorado).

4:20–4:40 pm 000109: *Assessing the Accuracy of Huygens Boxes for Flush Mounted Antenna Placement Applications from VHF Measurements,* Zain Haider[1], Francesco Saccardi[2], Lars J. Foged[2] ([1]Microwave Vision Group, MVG, France, [2]Microwave Vision Group, MVG, Italy).

4:40–5:00 pm 000164: *C2MI: A Covariance-Coupling Sparse Recovery Algorithm for Metasurface-Based Microwave Imaging,* Firas Slewa Dawod[1], Mohammed H. Arif[2], Renato Negra[2], Sayan Roy[1] ([1]AERIAL Lab, School of Science and Engineering, University of Missouri-Kansas City, [2]Chair of High Frequency Electronics, RWTH Aachen University).

5:00–5:20 pm 000139: *Traceable Designer Channels for Device Testing in Reflective Environments at 60 GHz,* Iyemeh E. Uchendu[1,3], Mohamed Kashef[2], Kate A. Remley[1], Joshua M. Kast[1], Richard Candell[2], Robert D. Horansky[1] ([1]National Institute of Standards and Technnology, NIST, Colorado, [2]National Institute of Standards and Technnology, NIST, Maryland, [3]University of Colorado).

5:20–5:40 pm 000160: *Emissivity Measurements Of Microwave Blackbody Using Terahertz Focusing Lenses,* Rixi Peng[1], Dazhen Gu[1], Benjamin L. Moser[2], Joshua A. Gordon[2] ([1]National Institute of Standards and Technology, NIST, Communications Technology Laboratory, CTL, Spectrum Technology and Research Division, [2]National Institute of Standards and Technology, NIST, Communications Technology Laboratory, CTL, RF Technology Division).

Thursday, November 6

8:15–8:20 am Daily Announcements and Technical Session Overview: Dr. Jorge L. Salazar-Cerreno (Technical Coordinator)

Session 14

8:20–10:00 am Recent European Activities on Antenna Measurements
Chair: Tian Hong Loh[1] and Francesco Saccardi[2] ([1]National Physical Laboratory, [2]Microwave Vision Group)

8:20–8:40 am 000076: *A Rigorous Evaluation of Total Active Reflection Coefficient-Based Radiation Efficiency for MIMO Antennas in a Reverberation Chamber,* Jerdvisanop Chakarothai[1,2], Tian Hong Loh[2] ([1]National Institute of Information and Communications Technology, NICT, [2]National Physical Laboratory, NPL).

8:40–9:00 am 000075: *Automotive OTA Near-Field Measurements with SDR-Enabled Phase Retrieval,* Alejandro Antón Ruiz[1], Lukas Berkelmann[2], Andrés Alayón Glazunov[1,3] ([1]Department of Electrical Engineering, University of Twente, [2]Volkswagen AG, [3]Department of Science and Technology, Linköping University).

9:00–9:20 am 000111: *Extended Uncertainty Analysis of a Multiprobe Antenna Measurement System for Complex Platform Testing,* Francesco Saccardi[1], Andrea Giacomini[1], Jaydeep Singh[1], Lars Foged[1], Thierry Blin[1], Nicolas Gross[1], Arthur Romeijer[2] ([1]Microwave Vision Group, MVG, [2]Pulsaart by AGC).

9:20–9:40 am 000077: *RF Assessment of the Mechanical Design of the Compact Antenna Test Range for HERTZ 2.0,* Cecilia Cappellin[1], Pasquale Nicolaci[1], Giuseppe Valsecchi[2], Claudio Franchini[2], Mauro Maggioni[2], Luis Rolo[3], Antonio Riccardi[3] ([1]TICRA, [2]MediaLario SRL, [3]ESA ESTEC).

9:40–10:00 am 000051: *Use of the Generalized Addition Theorem for Spherical Waves for the Reflection Suppression by Spherical Mode Filtering,* Marc Dirix[1,2], Stuart Gregson[3,4], Rostyslav Dubrovka[4] ([1]Emerson & Cuming Anechoic Chambers, [2]Institute of High Frequency Technology, [3]Next Phase Measurements, [4]Queen Mary University of London).

10:00–10:30 am **MORNING BREAK**

Session 15

10:30am–12:10 pm Antenna Design and Analysis
Chair: John Schultz (Compass Technology Group)
Invited Speaker: Oscar Quevedo-Teruel (KTH Royal Institute of Technology)

10:30–10:50 am 000059: *Efficient and Fast Ray Tracing Method for Antenna Performance Simulation,* Oscar Quevedo-Teruel (Division of Electromagnetic Engineering and Fusion Science, KTH Royal Institute of Technology).

10:50–11:10 am 000156: *Design of Radar Antenna and Performance Analysis for V2V and V2I Communications,* Apurva Shekar[1], Anudeep Bellary[1], D.V.B. Murthy[2] ([1]Altair Engineering India Pvt. Ltd., [2]Altair Engineering, Inc.).

11:10–11:30 am 000145: *Mechanical Antennas for HF Sensing on Vehicle Platforms,* Jesse Rivera, Richard Rose (Northrop Grumman Aerospace Systems).

11:30–11:50 am 000123: *Modeling of Standard Gain Horns Using Advanced Electromagnetic Simulation Techniques,* D.V.B. Murthy[1], C.J. Reddy[1], Afifeh Khatabi[2], Justin Dobbins[2], Domenic Belgiovane[3] ([1]Altair Engineering, Inc., [2]Raytheon, [3]MVG - Orbit Advanced Technologies, Inc.)

11:50am–12:10 pm 000044: *Optimizing Wi-Fi Access Points in an Airplane Fuselage,* Shriya Kapoor[1], Gopinath Gampala[2] ([1]School of Electrical and Computer Engineering, Georgia Institute of Technology, [2]Altair Engineering, Inc.).

12:10–1:30 pm **LUNCH & LEARN**
Speaker: Chuck Penson, Fellow, Antique Wireless Association (AWA), "Waiting for the Go Code: Communications in the Titan II ICBM Program"

Session 16

1:30–2:30 pm RCS Measurements
Chair: Benjamin Moser (National Institute of Standards and Technology)

1:30–1:50 pm 000084: *Full Wave Monostatic Radar Cross Section Computation for Challenging RF Problems,* Mark Whale, Edoardo Baldazzi, Cecilia Cappelin, Martin Haulund Gaede, Oscar Borries (TICRA).

1:50–2:10 pm 000068: *Monostatic to Bistatic Equivalence Theorem for 2-Dimensional Reflection Pattern Measurements of Reconfigurable Intelligent Surfaces,* Fabian T. Bette[1], Onur Kasap[1], Thomas M. Gemmer[1], Hendrik Bartko[1], Benoit Derat[1], Wilhelm Keusgen[2] ([1]Rohde & Schwarz GmbH & Co. KG, [2]Technische Universitaet Berlin).

2:10–2:30 pm 000050: *Validating the Forward Scattered Wave in Bistatic Radar Geometries,* Donald P. Hilliard1[1], Michael S. Emire[1], Kenneth Vaccaro[1], Gary Salvail[2], David Marron[2], Jose Cahue[2], Javier Godina[2], Joseph Mesa[2], Lizet Ramirez[2] ([1]Advanced Research and Technology Corporation, [2]Naval Air Warfare Center Weapons Division).

2:30–3:00 pm **AFTERNOON BREAK**

Session 17

3:00–4:40 pm Range Design, Instrumentation, and Characterization
Chair: Yibo Wang (National Institute of Standards and Technology)
Invited Speaker: Georgios C. Trichopoulos (Arizona State University)

3:00–3:20 pm **Invited:** *Reconfigurable Intelligent Surfaces for Antenna Measurements,* Georgios C. Trichopoulos (School of Electrical, Computer, and Energy Engineering, Arizona State University).

3:20–3:40 pm 000060: *Beyond Conventional Probes: Comparing the Impact of the Geometry on Coaxial Probe Aperture for Medical Applications,* Francisco Escobedo-Segovia[1], Elizabeth Fernandez-Aranzamendi[1,2], Patricia Castillo-Araníbar[1], Ebert San Roman Castillo[1], Adrián Amor-Martín[2], Daniel Segovia-Vargas[2] ([1]Electrical and Electronics Engineering Department, Universidad Catolica San Pablo, [2]Dept. Signal Theory and Communications, Universidad Carlos III de Madrid).

3:40–4:00 pm 000147: *Comparison of Compact Range Quiet Zone Performances as Predicted by Asymptotic Methods vs.*

Preliminary Technical Program

Method of Moments, P. Mark. Ingerson, Vicente Rodriguez (NSI-MI Technologies).

4:00–4:20 pm 000082: *Controlling Undesired Effects in the Design of Complex Waveform Generators,* Amedeo Capozzoli, Claudio Curcio, Angelo Liseno (Dipartimento di Ingegneria Elettrica e delle Tecnologie dell'Informazione, Università di Napoli Federico II).

4:20–4:40 pm 000132: *A Novel Wide-Beam Broadband Feed Enabling Ultra-Compact Antenna Test Ranges,* Adam Tankielun, Shreyas S. Bharadwaj, Ramy A. Gerguis, Fabian Bette, Benoit Derat (Rohde & Schwarz GmbH and Co. KG, Munich, Germany).

Session 18

4:40–5:40 pm The Evolution of Instrumentation and its Impact in Antenna Measurement Techniques
Chair: Tony Sánchez (Antenna Systems Solutions)

4:40–5:00 pm 000136: *Over-The-Air Group Delay Measurements of Frequency-Converting Devices Using a Harmonic Phase Reference,* Benoit Derat[1], Daniel Mueller-Renner[1], Thorsten Lueck[1], Jaydeep Singh[2], Andrea Giacomini[2], Francesco Saccardi[2], Nicolas Gross[2], Lars Jacob Foged[2] ([1]Rohde & Schwarz GmbH and Co. KG, Munich, Germany, [2]MVG, Microwave Vision Group).

5:00–5:20 pm 000116: *The Evolution of RF Instrumentation and Antenna Measurements: Bridging the Gap in Active Device Testing,* Lars Jacob Foged[1], Francesco Saccardi[1], Nicolas Gross[2] ([1]Microwave Vision Group, MVG, Italy, [2]Microwave Vision Group, MVG, France).

5:20–5:40 pm 000095: *Thirty Years of Antenna Characterization in the Millimeter Wave Range at IETR,* Laurent Le Coq (Université de Rennes - IETR).



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