2022 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting

10-15 July 2022
Denver, Colorado, USA

Program Summary

IEEE

U.R.S.I.

Board on International Scientific Organizations
U.S. National Committee for the International Union of Radio Science
National Academy of Sciences

Conference Overview

GHCC	Grand Hyatt Conference Center (Floors 2 & 38), 555 17th Street
GHD	Grand Hyatt Denver (Floor 2), 1750 Welton Street
HR	Hyatt Regency Denver (Floors 3, 4, 25 & 26), 650 15th Street

Saturday, 9 July

12:00 - 16:00	AP-S Strategic Planning Meeting	Mt. Elbert A (GHCC)
16:15 - 17:15	AP-S Meetings Committee	Mt. Evans (GHCC)
17:15 - 18:15	AP-S Joint Meetings Committee	Mt. Evans (GHCC)
18:15 - 21:30	AP-S Joint Meetings Committee -Presenatations and Dinner	Mt. Evans (GHCC)

Sunday, 10 July

07:30 - 09:00	AP-S Past Presidents' Breakfast	Capitol Peak B (GHCC)
09:00 - 18:00	AP-S AdCom Meeting	Crystal Peak A (GHCC)
08:20 - 12:00	Morning Short Courses	Grand Hyatt Conference Center
10:00 - 10:20	Coffee Break	
12:00 - 13:20	Lunch	Capitol Ballroom
13:00 - 17:00	Afternoon Short Courses	Grand Hyatt Conference Center
15:00 - 15:20	Coffee Break	

Monday, 11 July

07:00 - 08:00	Amateur Radio Breakfast Meeting	Quartz (HR)
07:00 - 08:00	Young Professionals' Committee Meeting	Limestone (HR)
08:00 - 11:40	Technical Sessions	Hyatt Regency
09:40 - 10:00	Coffee Break	Centennial Foyer (HR)
12:00 - 13:20	Lunch (on your own)	
12:00 - 13:20	Transactions Editorial Board Meeting	Quartz (HR)
12:00 - 13:20	Master Class - Speaker, Susan Hagness	Centennial A/B/C (HR)
13:20 - 17:00	Technical Sessions	Hyatt Regency
15:00 - 15:20	Coffee Break	Centennial Foyer (HR)
17:00 - 18:00	URSI Commissions C and E Meeting	Mineral B (HR)
17:00 - 18:00	URSI Commission F Meeting	Mineral D (HR)
17:00 - 18:00	URSI Commission K Meeting	Mineral F (HR)
18:00 - 21:30	Welcome Reception *Depature from Hyatt Regency at 18:00*	Wings Over the Rockies

Tuesday, 12 July

07:00 - 08:00	AP-S 2023 Committee Meeting	Silver (HR)
07:00 - 08:00	AP Magazine Staff Meeting	Quartz (HR)
07:00 - 08:00	Industrial Initiatives	Marble (HR)
07:00 - 08:00	IEEE AP-S Antenna Measurements Committee Meeting	Sandstone (HR)
07:00 - 08:00	Membership Committee	Limestone (HR)
07:00 - 08:00	Student Design Contest Set Up (Closed to Public)	Centennial Foyer (HR)
08:00 - 11:40	Student Paper Competition	Centennial Foyer (HR)
08:00 - 11:40	Technical Sessions	Hyatt Regency
08:30 - 14:00	Standards Committee Meeting and Lunch	Limestone (HR)
09:30 - 12:00	Student Design Contest - Public Demos	Centennial Foyer (HR)
09:40 - 10:00	Coffee Break	Exhibit Hall (HR)
09:40 - 11:40	Student Design Contest Judges Meeting	Quartz (HR)
12:00 - 13:20	Lunch (on your own)	
12:00 - 13:00	Student Design Contest Luncheon (Judges and Teams)	Quartz (HR)
12:00 - 13:20	Women In Engineering and Radio Science Lunch and Speaker, Zoya Popovic	Centennial A/B/C (HR)
12:00 - 13:20	NDTC Meeting and Lunch	Marble (HR)
13:20 - 17:00	Technical Sessions	Hyatt Regency
15:00 - 15:20	Coffee Break	Exhibit Hall (HR)
16:00 - 17:00	Future Symposia Meeting	Quartz (HR)
17:00 - 18:00	URSI Commission A	Mineral B (HR)
17:00 - 18:00	URSI Commission B	Mineral D (HR)
17:00 - 18:00	URSI Commission D	Mineral F (HR)
18:30 - 21:30	Student and Young Professionals' Dinner and Networking Event	Wynkoop Brewery

Wednesday, 13 July

07:00 - 08:00	AWPL Editorial Board Meeting	Silver (HR)
07:00 - 08:00	Student Paper Competition Judges Committee Brekafast Meeting	Limestone (HR)
08:00 - 11:40	Technical Sessions	Hyatt Regency
08:30 - 11:30	Technical Tour - Behind the Scenes Engineers' Tour of Coors Field, Home of the Colorado Rockies *Departure from Hyatt Regency at 08:30*	Coors Field
09:40 - 10:00	Coffee Break	Exhibit Hall (HR)
12:00 - 13:20	AP-S Reviewers' Lunch	Centennial A/B/C (HR)

Conference Overview

Wednesday, 13 July (cont.)

12:00 - 13:20	Lunch (on your own)	
13:00 - 16:00	FCC Amateur Radio License Exam	Marble (HR)
13:20 - 17:00	Technical Sessions	Hyatt Regency
15:00 - 15:20	Coffee Break	Exhibit Hall (HR)
17:30 - 19:30	Awards Presentation	Aspen Ballroom (GHD)
19:30 - 22:30	Conference Banquet	Centennial A/B/C (HR)

Thursday, 14 July

08:00 - 09:00	Exhibitor Breakfast	Centennial D-H (HR)
08:00 - 11:40	Technical Sessions	Hyatt Regency
09:40 - 10:00	Coffee Break	Exhibit Hall (HR)
12:00 - 13:20	Lunch (on your own)	
12:00 - 13:20	Young Professionals' Career Development and Growth Conversations	Centennial A/B/C (HR)
12:00 - 13:20	IEEE Press Liaison Meeting and Lunch	Marble (HR)
12:00 - 13:20	Education Committee	Quartz (HR)
12:00 - 16:00	AP-S Chapter Chairs and AP-S COPE Meeting and Lunch	Silver (HR)
13:20 - 15:00	Technical Sessions	Hyatt Regency
15:00 - 15:20	Coffee Break	Exhibit Hall (HR)
15:20 - 17:50	Plenary Session	Centennial A/B/C (HR)
17:50 - 19:20	University and Industry Reception	Centennial Foyer (HR)
19:10 - 21:00	AP-S MGA and AP-S SIGHT Meeting and Dinner	Silver (HR)

Friday, 15 July

08:00 - 11:40	Technical Sessions	Hyatt Regency
09:40 - 10:00	Coffee Break	Centennial Foyer (HR)
12:00 - 13:20	Lunch (on your own)	
12:00 - 13:20	Panel with IEEE and AP-S Awardees	TBC (HR)
13:20 - 17:00	Technical Sessions	Hyatt Regency
15:00 - 15:20	Coffee Break	Centennial Foyer (HR)
17:00 - 18:00	AP-S 2022 Closing Reception	Capitol Foyer (HR)

Saturday, 16 July

08:00 - 18:00	Conference Networking Event: A Private AP-S/URSI 2022 Organized Tour of the Rocky Mountains *Departure from Hyatt Regency at 08:00*	Rocky Mountains

Welcome from the General Chair

Welcome the 2022 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting in the "Mile High City"!

On behalf of the IEEE Antennas and Propagation Society and the US National Committee for the International Union of Radio Science, as well as the entire AP-S/URSI 2022 Steering and Organizing Committee, it is my utmost pleasure and honor to welcome you to the 2022 edition of our joint conference in Denver, Colorado, the Mile High City. I would like to thank you for choosing to participate in our conference and to assure you that we have done and will do everything possible to make your visit to Denver a most technically productive and socially enjoyable one. It is exciting to have our conference in Denver, for the first time ever, and back in Colorado after 50 years.

Our conference is intended to provide an international forum for the exchange of information on state-of-the-art research in antennas, propagation, electromagnetic engineering, and radio science. We are preparing a comprehensive range of technical sessions, keynotes, invited talks, special sessions, student paper and design competitions, short courses, tutorials, exhibits, demonstrations, professional meetings, open forum discussions, and networking events. With its central location within the US, an extremely well-connected airport, and an exceptional multifaceted social program with many events, live entertainment, fun activities, and organized tours within the city and its spectacular surroundings, our 2022 edition in Denver promises to be a great success.

Our conference venue consists of two outstanding nearby hotels in historic LoDo (Lower Downtown) Denver, the Hyatt Regency and Grand Hyatt, with spectacular conference spaces, ballrooms, meeting rooms, and excellent guestrooms at great conference rates. Our venue is at 5280 feet or 1609 meters (a mile) above sea level. You will also enjoy unforgettable views of nearby mountain peaks, some reaching "14k" (fourteen thousand feet). Denver is a technological and touristic hub of the American West, an American metropolis dating to the Old West era. Many saloons once thrived in the "Mile High City," and LoDo is Denver's oldest neighborhood, home to some of the city's best-known restaurants, microbreweries, galleries, museums, shops, and entertainment venues.

Denver is also a gateway for world-famous winter and summer resorts, hiking and walking trails, glacier lakes, and other natural wonders in the nearby Rocky Mountains. Please consider bringing your family and friends for a great combination of work and play.

Welcome to AP-S/URSI 2022 and the Mile High City!

General Chair
Branislav M. Notaros
Colorado State University

Sessions at a Glance — Monday

Location	Morning	Afternoon	
Capitol Ballroom 4	MO-SP.2A: State-of-the-Art Techniques and Application of Dielectric Resonator Antennas	MO-SP.2P: Recent Developments in the Theory of Characteristic Modes and Its Applications to Modern Antenna Systems	
Capitol Ballroom 2/3	MO-A2.2A: Metamaterial-Inspired Antennas	MO-UB.1P: Metamaterials and Complex Media	
Agate A/B/C	MO-A2.1A: Analysis and Design of Metamaterials	MO-A2.1P: Metasurfaces for 5G and MIMO applications	
Granite A/B/C	MO-A5.1A: Millimeter Wave Antenna for 5G Applications	MO-A1.1P: Dielectric Resonator Antennas	
Capitol Ballroom 1	MO-A3.1A: Optimization Methods in EM Designs	MO-A2.2P: Theoretical Analysis of Nascent Electromagnetic Structures	
Capitol Ballroom 5	MO-A4.1A: RCS and Wireless Sensing	MO-A3.1P: Optimization Methods for Integral Equations	
Capitol Ballroom 6	MO-A5.2A: Antennas for Biomedical Applications	MO-A4.1P: Propagation Modeling and Applications of Wireless Systems	
Capitol Ballroom 7	MO-UB.3A: Material Effects and Unique Antennas	MO-A5.1P: Planar Millimeter Wave Antennas	
Mineral Hall A	MO-A5.3A: RFID Antennas and Sensors	MO-A5.2P: Computational Electromagnetics and Multiphysics Simulation for Biomedical Applications	
Mineral Hall B	MO-A1.2A: Reflector and Reflectarray Antennas I	MO-UF.1P: Microwave Remote Sensing of the Earth	MO-UF.2P: Propagation and Remote Sensing in Complex and Random Media II
Mineral Hall C	MO-A1.1A: Wideband Phased Array Antennas I	MO-A1.2P: Reflector and Reflectarray Antennas II	
Mineral Hall D	MO-A1.3A: Novel Radiator Shapes and Geometries	MO-A1.4P: Phased-Array Antennas I	
Mineral Hall E	MO-UB.2A: Microwave and Millimeter Wave High Gain Antennas	MO-A1.5P: Reconfigurable Antennas I	
Mineral Hall F	MO-UF.1A: Propagation and Remote Sensing in Complex and Random Media I	MO-UA.2P: Antennas and Propagation	MO-UA.1P: Electromagnetic Measurement Techniques and Materials Characterization
Mineral Hall G	MO-UB.1A: Numerical Methods I	MO-A1.3P: Microstrip Antennas	
Centennial A/B/C	MO-SP.1A: Machine Learning and Advanced Statistical Methods for Millimeter-Wave Measurements and Modeling	MO-SP.1P: Design and Optimization of Antennas using Machine Learning	

Sessions at a Glance — Tuesday

Location	Morning		Afternoon	
Capitol Ballroom 4	TU-SP.1A: Recent Advances in Conformal Metasurfaces		TU-SP.1P: International Standards Development and Applications	
Capitol Ballroom 2/3	TU-SP.2A: Quantum Technology Related to Electromagnetics I		TU-SP.2P: In Remembrance of Allen Taflove: FDTD Pioneer and Educator	
Agate A/B/C	TU-SP.4A: Special Session on High-Gain Antenna Systems with Complete Beam Steering	TU-SP.3A: Automobile Antennas and Propagation Effects	TU-A2.1P: Tunable and Reconfigurable Metamaterials	
Granite A/B/C	TU-A1.1A: Design and Optimization of Antennas using Machine Learning I		TU-A1.2P: Advance Applications of Artificial Intelligence and Deep Learning	TU-A1.1P: Design and Optimization of Antennas using Machine Learning II
Capitol Ballroom 1	TU-A3.1A: Integral Equations for Penetrable Media		TU-A1.3P: Quantum Technology Related to Electromagnetics II	
Capitol Ballroom 5	TU-A4.1A: Remote Sensing		TU-A1.4P: Broadband Antennas II	
Capitol Ballroom 6	TU-A5.1A: Millimeter Wave Antennas in Non-planar Structures		TU-A4.1P: Scatterer Imaging	
Capitol Ballroom 7	TU-A2.1A: Metantennas and Related Metadevices		TU-A4.2P: Refraction, Propagation and Scattering	
Mineral Hall A	TU-A1.2A: Reflector and Reflectarray Antennas III: Synthesis and Modelling		TU-A5.1P: Advances in Automotive Antennas	
Mineral Hall B	TU-A1.4A: Microstrip Antenna Arrays I		TU-UK.1P: Medical Imaging and Electromagnetics	TU-UK.2P: Therapeutic and Rehabilitative Applications
Mineral Hall C	TU-A1.3A: Broadband Antennas I		TU-A1.5P: Reflector and Reflectarray Antennas IV: 5G and beyond	
Mineral Hall D	TU-A1.5A: Antenna Measurements		TU-A1.7P: SIW Antennas and Feed Circuits	TU-A1.8P: Microstrip Antenna Arrays II
Mineral Hall E	TU-UB.2A: Antenna Theory, Design and Measurements		TU-UB.1P: Numerical Methods III	
Mineral Hall F	TU-UK.1A: Human-Body Interactions with Antennas and other Electromagnetic Devices		TU-UA.1P: Electromagnetic Compatibility and Metrology	TU-UB.2P: Electromagnetic Theory
Mineral Hall G	TU-UB.1A: Numerical Methods II		TU-A1.6P: Reconfigurable Antennas II	

Sessions at a Glance — Wednesday

Location	Morning	Afternoon	
Capitol Ballroom 4	WE-SP.2A: Enduring Impact and Legacy of Prof. Tapan K. Sarkar I	WE-SP.2P: Enduring Impact and Legacy of Prof. Tapan K. Sarkar II	
Capitol Ballroom 2/3	WE-SP.1A: Emerging Technologies for Biomedical Applications	WE-SP.1P: Frontier Biomedical Technologies and Applications	
Agate A/B/C	WE-SP.3A: Frontiers and Challenges in Electromagnetic Imaging Enabled by Artificial Intelligence and Deep Learning	WE-A2.1P: Absorbing Metamaterials	
Granite A/B/C	WE-A2.1A: Spoof Plasmon Polariton and Metasurfaces	WE-A5.1P: Aerospace Antennas	WE-A5.2P: On-Chip Antennas & Technologies
Capitol Ballroom 1	WE-A3.1A: Multiphysics and Multiscale Simulation Techniques	WE-A3.1P: FDTD Methods	
Capitol Ballroom 5	WE-A5.1A: Ultra-Wideband Systems	WE-A3.2P: Stable and Efficient Discretizations for Integral Equations	
Capitol Ballroom 6	WE-A2.2A: Metamaterials and Metasurfaces for Extreme Wave Control	WE-A4.1P: Radar	
Capitol Ballroom 7	WE-A2.3A: FSS for Reconfigurable and Antenna Applications	WE-A5.3P: Antenna Design for MIMO and Millimeter-Wave Applications	
Mineral Hall A	WE-A1.1A: Slotted and Guided Wave Antennas I: Fundamental Operation and Design	WE-A1.1P: Reconfigurable Arrays II	
Mineral Hall B	WE-A1.3A: Wearable, Flexible and Conformal Antennas	WE-UF.1P: Point-to-Point Propagation Effects	
Mineral Hall C	WE-A1.2A: Antenna Theory I	WE-A1.2P: Slotted and Guided Wave Antennas II: Optimization and Performance Ehancement	
Mineral Hall D	WE-A1.4A: Antennas for 5G and WIFI	WE-A1.4P: Wideband Phased Array Antennas II	
Mineral Hall E	WE-UB.2A: Antenna Arrays and Systems	WE-UB.1P: Microstrip Antennas and Printed Devices	
Mineral Hall F	WE-UE.1A: Simulation in Electromagnetic Noise and Interference Control	WE-A2.2P: FSS Absorbers, Filters and Sensors	
Mineral Hall G	WE-UB.1A: Propagation, Scattering and Sensing I	WE-A1.3P: Antenna Theory II	

Sessions at a Glance — Thursday

Location	Morning		Afternoon
Capitol Ballroom 4	TH-SP.1A: Time-Variant Metamaterials and Devices: Effective Properties, Dynamics and Applications		TH-SP.1P: Emerging Intelligent Antenna and Radio Systems: LF to THz (in memory of Professor Safieddin (Ali) Safavi-Naeini)
Capitol Ballroom 2/3	TH-SP.2A: Ultrawideband and mm-Wave Multi-Beam Phased-Array Antennas for the Next Generation of Autonomous Systems		TH-SP.2P: Analytical and Numerical Methods for 2D Materials
Agate A/B/C	TH-A1.1A: Adaptive, Active and Smart Antennas		TH-SP.3P: Towards a Smart EM Environment: Network, Hardware and Electromagnetic Perspectives
Granite A/B/C	TH-A5.1A: Microwave Engineering and Design for Biomedical Applications		TH-A1.1P: Enduring Impact and Legacy of Prof. Tapan K. Sarkar III
Capitol Ballroom 1	TH-A3.1A: Finite Element Methods I		TH-A3.1P: Finite Element Methods II
Capitol Ballroom 5	TH-A2.1A: Metamaterials for RCS Reduction and Cloaking		TH-A3.2P: Macromodeling and Optimization Methods
Capitol Ballroom 6	TH-A2.2A: Electromagnetic Bandgap Materials		TH-A4.1P: RCS Reduction and Cloaking
Capitol Ballroom 7	TH-A2.3A: Microwave Characterization of Material Properties		TH-A5.1P: Terahertz and Optical Antennas
Mineral Hall A	TH-A1.2A: Electrically Small Antennas		TH-A5.2P: Software-Defined/ Cognitive Radio
Mineral Hall B	TH-A1.5A: Novel Microstrip Circuits, Feeds and Surrounding Structures		TH-A1.2P: Reconfigurable Arrays I
Mineral Hall C	TH-A1.3A: Slotted and Guided-Wave Antennas III: Beam Scanning, Steering and Switching	TH-A1.4A: Agile Antennas	TH-A2.1P: Educational Tools and Laboratories in Electromagnetics
Mineral Hall D	TH-A1.6A: Reconfigurable Antennas and Arrays		TH-A5.3P: Additively Manufactured Antennas and Filters
Mineral Hall E	TH-UB.2A: Propagation, Scattering and Sensing II		TH-UB.2P: Numerical Analysis of Devices I
Mineral Hall F	TH-UK.1A: Implantable and Ingestible Devices	TH-UK.2A: Medical Applications of Electromagnetics	TH-UC.1P: Emerging Applications of Machine Learning in Sensing and Communication
Mineral Hall G	TH-UB.1A: Numerical Methods IV		TH-UB.1P: Propagation, Scattering and Sensing III

Sessions at a Glance — Friday

Location	Morning	Afternoon	
Capitol Ballroom 4	FR-SP.1A: Emerging Metasurface and Reconfigurable Intelligent Surface (RIS) for Beyond 5G and 6G	FR-SP.1P: Controlling Electromagnetic Waves in Complex Scattering Media: From Theory to Applications	
Capitol Ballroom 2/3	FR-SP.2A: Trends and Evolution of Unconventional Antenna Arrays towards 6G Communications and Multifunction Radars	FR-SP.2P: 5G and 6G Antenna Systems for Metaverse and Mobile Devices: Challenges and Future Opportunities	
Agate A/B/C	FR-UC.1A: Software Defined and Agile Radio Systems	FR-A2.1P: Metamaterials and Metasurfaces for Antenna Applications	
Granite A/B/C	FR-A1.1A: High-Gain Antenna Systems with Beam Steering	FR-A1.1P: Ultra-Wideband Antennas and Systems II	
Capitol Ballroom 1	FR-A3.1A: Hybrid Methods	FR-A4.1P: Advanced Propagation Modeling Techniques	
Capitol Ballroom 5	FR-A3.2A: Techniques for Transient Simulations	FR-A3.1P: Fast and Rapidly Converging Integral Equation Solvers	
Capitol Ballroom 6	FR-A4.1A: Propagation Modeling for 5G and Beyond	FR-A4.2P: Numerical and Analytical Techniques of Scattering and Diffraction Phenomena	
Capitol Ballroom 7	FR-A4.2A: Dielectric Profile Reconstruction	FR-A5.1P: Recent Advances in Smart, Distributed and MIMO Antenna Arrays	
Mineral Hall A	FR-A5.1A: Microwave Imaging and other Topics in Biomedical Applications	FR-A5.2P: 3D Printed Antennas and Filters	
Mineral Hall B	FR-A1.5A: Multi-Band Antennas I	FR-UC.1P: Parameter Estimation and Detection	
Mineral Hall C	FR-A5.2A: Advances in Wireless Power Transfer	FR-A5.3P: WPT for Biological Applications and Energy Harvesting	
Mineral Hall D	FR-A1.6A: Phased-Array Antennas II	FR-A1.4P: Antennas and Mutual Coupling	
Mineral Hall E	FR-A1.3A: Mutual Coupling in Antenna Arrays	FR-A1.3P: Multi-Band Antennas II	
Mineral Hall F	FR-A1.4A: Ultra-Wideband Antennas and Systems I	FR-A5.4P: 3D Printed Lens Antennas	FR-UB.1P: Numerical Analysis of Devices II
Mineral Hall G	FR-A1.2A: Antenna Feeds and Matching Circuits I	FR-A1.2P: Antenna Feeds and Matching Circuits II	

Registration

Sunday, July 10	07:00 – 17:00	Main Lobby — Packet Pickup Only
Monday, July 11	07:00 – 18:00	Centennial Foyer (Floor 3)
(17:00 – 18:00 Packet Pickup Only)		
Tuesday, July 12	07:00 – 18:00	
Wednesday, July 13	07:00 – 18:00	
Thursday, July 14	07:30 – 17:00	
Friday, July 15	07:30 – 17:00	

Important: Registration on Sunday, July 10 will be located in the Main Lobby and will only be available for registration packet pickup. Registration for the rest of the week will be located in the Centennial Foyer on Floor 3.

Devotions

Summit 26, Hyatt Regency, Floor 26 is available for Devotions from 08:00–09:00 Monday, July 11–Friday, July 15.

Speaker Preparation Room

Summit 25, Hyatt Regency, Floor 25 is the Speaker Preparation Room and is available from 08:00–17:00 daily Monday, July 11–Friday, July 15. The room contains a computer identical to those used in the presentation rooms. The speakers may use this room and equipment to test presentations prior to the scheduled presentation.

Internet Access

Wireless internet access (Wi-fi) is provided to all participants throughout the meeting space at the Hyatt Regency. Attendees can connect to the **AP-S2022** network. The access password is **AP-S2022**.

Morning and Afternoon Refreshment Break Locations

On Monday, July 11 & Friday, July 15, morning and afternoon breaks will be offered in the **Centennial Foyer, Hyatt Regency Floor 3**.

On Tuesday–Thursday, the morning and afternoon breaks will be held in the exhibit hall, **Centennial Ballroom D-H, Hyatt Regency Floor 3**.

Lockheed Martin is a global security and aerospace company principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services.

Lockheed Martin has been at the forefront of RF technology in payload design for decades. With the world depending on RF communications to drive commerce, connect people and strengthen global security, the Lockheed Martin RF Center of Excellence (RFCoE) is the driver for these invaluable missions.

Communication missions across space are conducted by the Lockheed Martin RFCoE space-to-ground links and intersatellite links, specializing in wideband, narrowband, protected and commercial communications. The Lockheed Martin RFCoE designs and produces state-of-the-art RF systems and antennas for hundreds of payloads, solving complex challenges, advancing scientific discovery and delivering innovative solutions to help our customers keep people safe.

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Exhibitors


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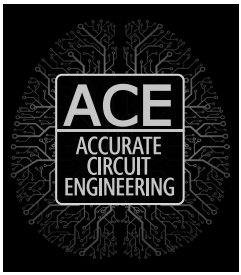
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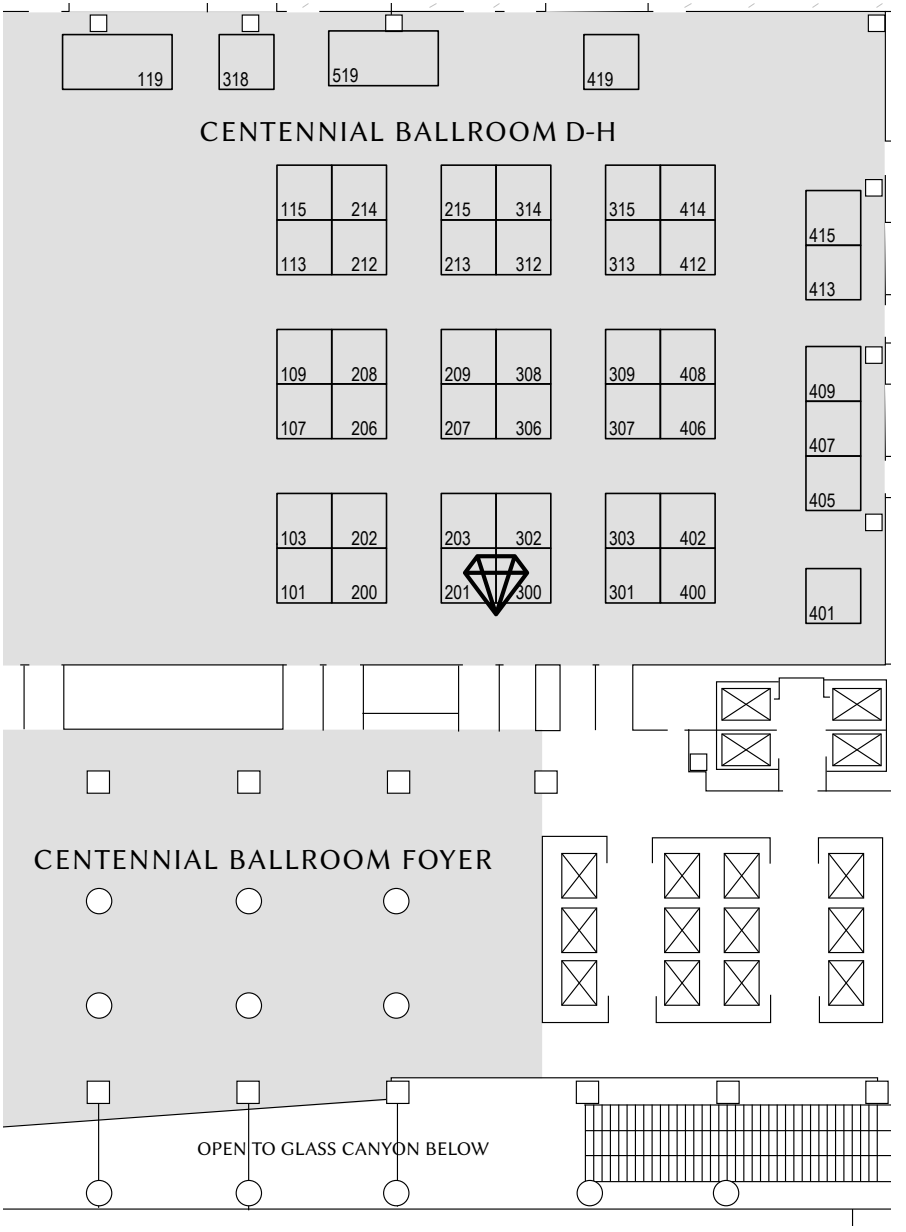
Exhibit Layout

Hyatt Regency — Floor 3: Centennial Ballroom D-H



Exhibitors

Exhibitor	Sponsorship	Booth
412 TW Benefield Anechoic		109
Accurate Circuit Engineering		212
Advanced Test Equipment Corp		419
Agile RF Systems		308
ALTAIR Engineering, Inc	BRONZE	301
Amazon Inc	SILVER	303
ANSYS		101
Antenom Antenna Technologies		215
AP Americas Inc		315
Apple Inc		408
Ball Aerospace		115
BluFlux, LLC		209
CAES AT&E		203
CMI - Custom Microwave Inc	BRONZE	302
Copper Mountain Technologies		208
Delta Sigma Company		314
Ford Motor Company	Women in Engineering Sponsor	
Fine-Line Circuits Limited		405
FIU College of Engineering & Computing	BRONZE	409
Fortify	SILVER	113
IMST GmbH		206
JMA Wireless		406
Keysight		207
L3 Harris	BRONZE	202
Lockheed Martin Space	DIAMOND	201 & 300
MathWorks		313
MVG - Microwave Vision Group	BRONZE	200
Next Phase Measurements (NPM)		214
Nokia Bell Labs		414
Northrop Grumman Corporation		103
NSI-MI Technologies Inc		307
Ohmega / Ticer Technologies		401
PPG Cuming Microwave & Cuming Lehman Chambers	BRONZE	213
Reality Labs / Meta Platforms, Inc		402
ROGERS Corporation		400
Space Exploration Technologies Corp		312
TMYTEK - TMY Technology Inc.		306
Trackonomy System		413
University of Colorado, Boulder Antenna Research Group (ARG)	BRONZE	107
WavePro		407
Wiley		309
WIPL-D d.o.o.		412

Tabletop Exhibitors

Exhibitor	Table
IEEE Electromagnetic Compatibility Society (EMC)	TT1
IEEE Microwave Theory and Techniques Society (MTT)	TT2
IEEE Foundation	TT5
Amateur Radio Relay League (ARRL)	TT3
AMTA 2022	TT4

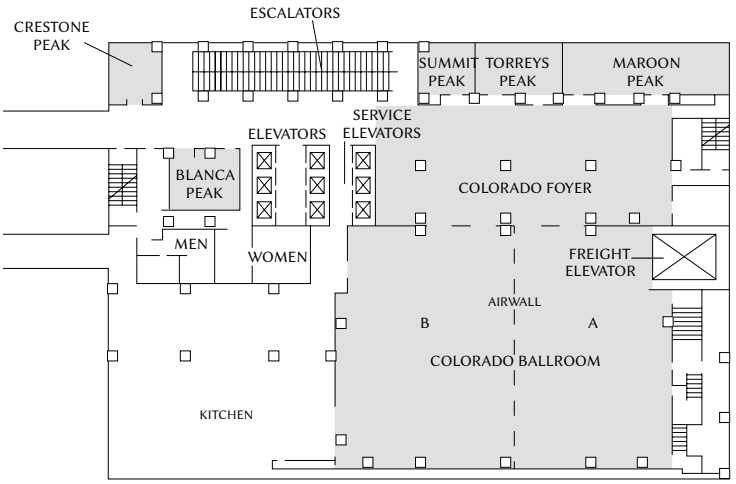
Technology Demonstrations

Visit technology demonstrations in the Exhibit Hall (Centennial Hall D-H)

	Tuesday, 12 July	Wednesday, 13 July	Thursday, 14 July
09:00 - 09:45	TMYTEK	Keysight	
10:00 - 10:40	Lockheed Martin	3DFortify	L3Harris
11:00 - 11:45	Ohmega/Ticer	Ansys	WPIL-D
13:30 - 14:15	MathWorks	Altair	3DFortify
15:15 - 16:00	Altair		

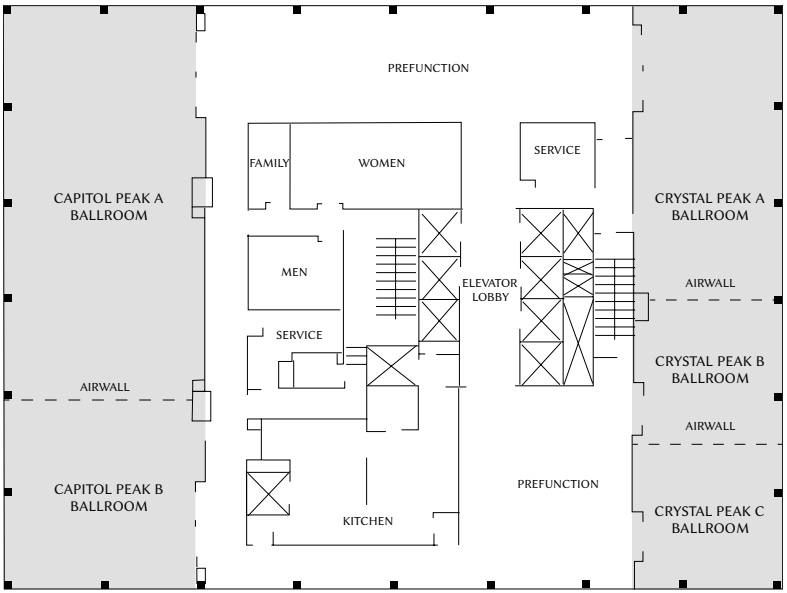
Grand Hyatt Denver

Floor 2



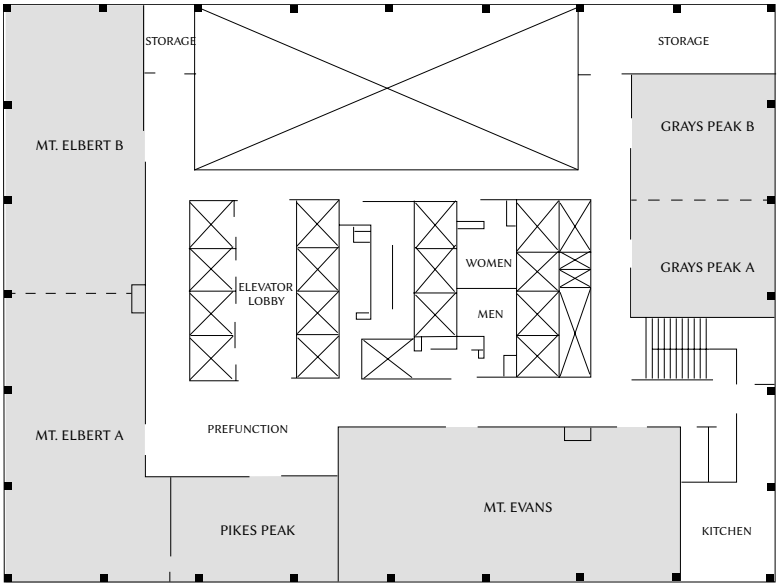
Grand Hyatt Denver (cont.)

Atrium Tower, Floor 38



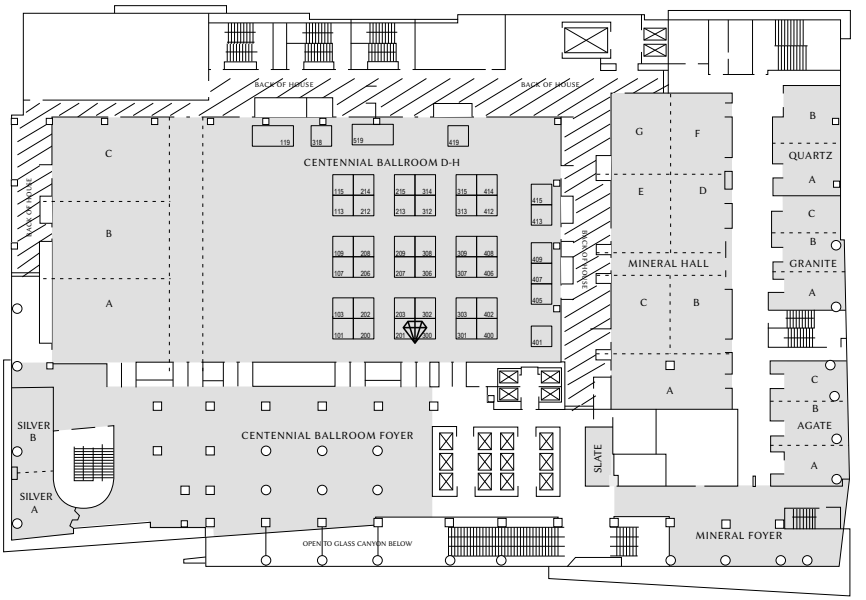
Grand Hyatt Conference Center

Grand Hyatt Conference Center (Floor 2)



Hyatt Regency

Floor 3



Hyatt Regency

Floor 4