North American Power Symposium

2023

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Program at a Glance

Sunday, October 15

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2:00-3:00 pm	Technical presentation: Michael McGraw, IEEE-WNC	Vanderbilt I
3:00-4:00 pm	Technical presentation: Prashanth Rajagopalan, Tanzim Jim Hassan, UND Center for Cybersecurity Research (C2SR): Projects & Upcoming Events	Vanderbilt II
5:00-8:00 pm	Poster Competition	Gallery (near front desk check-in)
5:00-6:00 pm	IEEE PEEC Meeting	Stuyvesant
5:00-8:00 pm	Career Fair	Gallery (near front desk check-in)
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6:00-7:00 pm	NAPS Steering Committee Meeting	Stuyvesant

Monday, October 16

7:00-12:00pm	Registration	
7:00-8:00 am	Breakfast	Burghley
8:00-8:10 am	Welcome and Opening Remarks	Burghley
8:10-9:00 am	Plenary Session: Sam Holeman, Duke Energy	Burghley
9:00-9:15 am	Break	
9:15-10:45 am	Session 1	Various Rooms
10:45-11:00 am	Break	
11:00 am-12:30 pm	Session 2	Various Rooms
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4:45-5:00 pm	Break	
5:15 pm	Buses depart for WCU	Front Hotel Parking Lot
6:30 pm-8:30 pm	NAPS Banquet Dinner and Keynote Speech by Ray Furstenau, Nuclear Regulatory Commission	WCU Campus
After dinner	Buses return to Asheville	

Program at a Glance

Tuesday, October 17

7:00-8:00 am	Registration	
7:00-8:00 am	Breakfast	Burghley
8:00-9:30 am	Session 5	Various Rooms
9:30-9:45 am	Break	
9:45-10:45 am	Plenary Session: Kevin Landis and Jordan Ambers, Eaton Corp.	Burghley
10:45-11:00 am	Break	
11:00-12:30 pm	Session 6	Various Rooms
12:30-2:00 pm	Lunch and Awards	Burghley

How to connect to Wi-fi 📶

1. Select *hhonors_doubletree*
2. Select *I have a coupon code*
3. Enter *DTCOOKIE* **to connect**

For questions on Wi-Fi connections, please see the DoubleTree Hotel Staff

Map of DoubleTree

First Floor

John Cecil Terrace

John Cecil Room

Entrance

Burghley Terrace

Stuyvesant

Burghley Terrace

Burghley B

Burghley A

Fitness Center

Pool

Exeter Board-room

Amherst

Breakfast Room

ATM

Garden Terrace

Gallery

Vanderbilt II

Vanderbilt I

Courtyard

Front Desk

Entrance

Cornelia Patio

Parking and Main Entrance

Hendersonville Road Entrance

Best Poster Award

Don't miss the Poster Presentation Competition on Sunday night from 5:00-8:00 pm in the Burghley room. During this time you will have the opportunity to vote for your favorite posters! The top three will be recognized at the award ceremony at Tuesday's lunch. Scan the QR code and follow the instructions to vote!
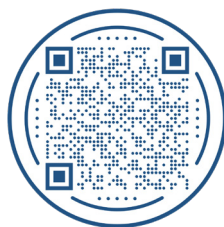
Career Fair

Sunday night, from 5:00-8:00 pm near the Burghley room you can meet and network with partnering employers and sponsors of the 2023 NAPS Conference. Check out what job shadowing, internship and job opportunities they have to offer! Stop by and introduce yourself and learn more about what their companies have to offer!

Pizza Reception

Sunday October 15
6:00-8:00 pm
Burghley Room

Banquet

Monday, October 16
Buses depart at 5:15
Western Carolina University's Campus

Please be **ON TIME** to meet the buses at the front of the hotel (5:15) to enjoy a scenic bus ride through Western North Carolina to Western Carolina University's Campus in Cullowhee, NC! You will enjoy dinner, views, and a keynote address from Ray Furstenau. Buses will return you back to Asheville after dinner.

Technical Tour Information

Duke Energy - Bad Creek Hydroelectric Station

Sunday, October 15
10:30 am - 3:30 pm
Depart from front of DoubleTree Hotel
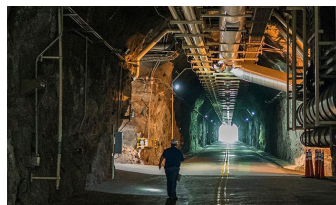
Duke Energy - Hot Springs, NC Microgrid

Sunday, October 15
1:00 - 4:00 pm
Depart from front of DoubleTree Hotel

Plenary Speaker (Monday 8:10-9:00 AM)

Sam Holeman

Vice President of Transmission System Planning and Operations for Duke Energy

Sam Holeman is vice president of transmission system planning and operations for Duke Energy. He leads the group responsible for the real-time monitoring and control of the company's bulk electric transmission system. The other functional areas of system planning and operations include operations engineering, operations training, transmission planning, operational technology, operations services, transmission tariff and customer support. He assumed his current position in October 2016.

Previously, Holeman was Duke Energy's director of engineering and training for the system planning and operations function. During his 37-year career with the company, Holeman has held leadership positions in various areas of system planning and operations, including system operations, engineering and training.

Holeman holds master's and bachelor's degrees in electrical engineering from Clemson University. He also earned a Master of Business Administration degree from Queens University.

Holeman is certified by the North American Electric Reliability Corporation (NERC) as a system operator and is a registered professional engineer in North Carolina and South Carolina. He is a past chairman of the operating committees for both NERC and the SERC Reliability Corporation. SERC is a nonprofit regulatory authority that promotes effective and efficient administration of bulk power system reliability in all or parts of 16 central and southeastern states.

Holeman grew up in North Augusta, S.C. He and his wife, Jodi, have three daughters and five grandchildren. In addition to spending quality time with his family, Holeman enjoys teaching children's Life Group at his church.

Keynote Speaker (Monday Dinner)

Raymond Furstenau
Director of Nuclear Regulatory Research for U.S. Nuclear Regulatory Commission

Raymond Furstenau has been the Director of Nuclear Regulatory Research at the U.S. Nuclear Regulatory Commission since July 2018. Prior to joining the NRC, from 1987 to 2018, he held several leadership positions in the U.S. Department of Energy's Office of Nuclear Energy. During most of those years, Mr. Furstenau provided U.S. government oversight of nuclear facility operations, and nuclear energy research & development programs at the Idaho National Laboratory.

Mr. Furstenau holds a B.S. degree in Applied Science and Engineering from the U.S. Military Academy and a M.S. degree in Nuclear Science and Engineering from Idaho State University. He is a registered professional nuclear engineer.

Plenary Speaker (Tuesday 9:45-10:45 AM)

Jordan Ambers
Product Line Manager - Eaton's Medium Voltage Motor Control line

Jordan Ambers currently serves as the Product Line Manager for Eaton's Medium Voltage Motor Control product line based in Arden, NC. In this role, he is responsible for marketing, new product development, and support of the product portfolio including medium voltage starters and medium voltage variable frequency drives. He assumed this position in November 2022. Prior to his current role, Jordan was the sales manager for South Carolina. In his 9 years with Eaton, he's held various roles in the North American Sales organization in addition to leading the Custom Switching Devices Product Line at Eaton's Cleveland, TN manufacturing facility. Jordan is passionate about aligning market requirements and operational execution to meet customer expectations.
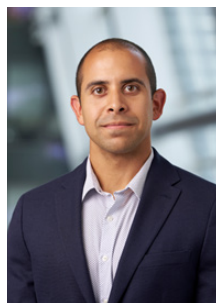
Jordan holds a Bachelor's degree in aerospace engineering from Virginia Tech and is pursuing a Master of Business Administration degree from the University of South Carolina.

Plenary Speaker (Tuesday 9:45-10:45 AM)
Kevin Landis
Director of Marketing for Eaton's Power Distribution and Control Assemblies Division

Kevin Landis currently serves as the Director of Marketing for Eaton's Power Distribution and Control Assemblies Division. In this role, he is responsible for the sales, marketing, new product development, and overall strategic direction of the division's product portfolio including medium and low voltage switchgear, medium and low voltage motor control assemblies, substation transformers, and integrated power assemblies. He assumed this position in September 2022.
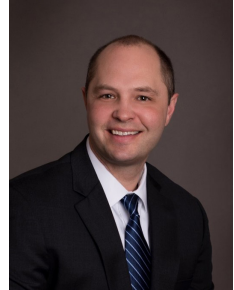
Prior to his current role, Kevin was the Vice President of Eaton's Project Management Organization. In this role, he led a team that was responsible for the pre-order project configuration and pricing, and post-order project management support for Eaton's North American Sales Organization. In his 24 years with Eaton, he's held various leadership roles in sales, marketing, and manufacturing operations.

Kevin holds a bachelor's degree in mechanical engineering from the University of Pittsburgh and a Master of Business Administration from Temple University.

Technical Program Schedule

Monday, October 16th

9:15-10:45 Sessions

9:15-10:45 Session 1A: Power System Operation and Planning
CHAIR: Chee-Wooi Ten
LOCATION: Stuyvesant

125 *Kolten Oberg*, *Ajit Srinivas*, *Farishta Rahman*, *Zongjie Wang* and *Prakash Ranganathan*
Strengthening Grid Resilience: Lessons from the Texas Power Blackout and Implications for Energy Communities

165 *Timothy Donnelly*, *David Wilson*, *Rush Robinett* and *Wayne Weaver*
Dynamic Model of a 20-Bus Power System for HEMP/GMD Controls-based Mitigation Design

100 *Xinyang Rui*, *Omid Mirzapour*, *Brittany Pruneau* and *Mostafa Sahraei-Ardakani*
A Review of Economic Incentives for Efficient Operation of Flexible Transmission

50 *Sujay Kaloti* and *Badrul Chowdhury*
Optimal Scheduling Strategies for Post-Extreme Events Using Deep Q-Network for Improving Operational Resilience

2 *Hussain Alghamdi*, *Midrar Adham* and *Robert Bass*
An Application of Wavelet Transformation and Statistical Analysis for Frequency Event Detection

122 *Abdullah Al Mamun*, *Oussama Zenkri*, *Santhosh Madasthu*, *Robert Cox* and *Badrul Chowdhury*
Outage Data Analytics for Correlating Resilience and Reliability

9:15-10:45 Session 1B: Emerging Topics in Modern Power Systems
CHAIR: Timothy Hansen
LOCATION: Amherst

57 *Andrew Musgrave*, *Roohallah Khatami* and *Christine Chen*
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9:15-10:45 Session 1C: Analysis of Distribution Systems and Distributed Energy Resources
CHAIR: Tarek Kandil
LOCATION: Burghley

9:15-10:45 Session 1D: Renewable and Clean Energy Systems and Energy Storage
CHAIR: Saurav Basnet
LOCATION: Vanderbilt II

1   *Gerald Thomas Heydt*
   Power, Energy, and Load Factor in California after the Mandated 2030 Adoption of Electric Vehicles

129   *Sarangan Rajendran*, *Esther Liu*, *Mary Peterson*, *Visvakumar Aravinthan*, *Al Tamimi* and *Charles Yokley*
   Dynamic Charge Scheduling of Solar PV-Storage Hybrid Systems Based on Solar-Load Correlation

59   *Mariela Colombo* and *Sarah Kurtz*
   Value of long-duration energy storage and oxy-combustion in renewables-driven grids

71   *Farzan Zareafifi* and *Sarah Kurtz*
   Powering the future: electric vehicle charging profile impact on California's future energy storage needs

145   *Shree Bade* and *Olesugun Tomomewo*
   Control Strategy for Utility-Scale Wind-Based Hybrid Power Plants

64   *Amirhossein Nazeri*, *Roghieh Abdollahi* and *Pierluigi Pisu*
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9:15-10:45 Session 1E: Power Electronics and Electrical Machines
CHAIR: Bora Karayaka
LOCATION: Vanderbilt I

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   Identifying Trends Between Source Unbalance and Harmonic Emissions of an AC-DC Rectifier

138   *Reza Asrar Ghaderloo*, *Ali Parsa Sirat* and *Abbas Shoulaie*
   A High Frequency Active Clamp Forward Converter with Coreless Transformer

134   *Chikezie Emeghara*, *Satish Mahajan*, *Ali Arzani* and *Ejikeme Amako*
   Evaluating Grid Support Features of Voltage Source Inverter: An Analysis of Direct Power Control

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Comparative Study of Single Source Boosted Bipolar PWM Half-bridge Inverter and Single Source Boosted Multilevel Half-Bridge Inverter

133 *Ali Parsa Sirat*, *Zachary Matheson* and *Babak Parkhideh*
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12   *Yasha Pirani* and *Hossein Salehfar*
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11:00-12:30 Session 2A: Power System Operation and Planning
CHAIR: Badrul Chowdhury
LOCATION: Stuyvesant

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CHAIR: G. Thomas Heydt
LOCATION: Amherst

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CHAIR: Randy Collins
LOCATION: Burghley

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106 *Ethan Cantor*, *William Riddell*, *Jess Everett* and *Jie Li*
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92 *Rakesh Kumar Belchandan* and *Aamir Akhtar*
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CHAIR: Hugh Jack
LOCATION: Vanderbilt II

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CHAIR: Yuanrui Sang
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CHAIR: G. Thomas Heydt
LOCATION: Amherst

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LOCATION: Burghley

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CHAIR: Sarah Kurtz
LOCATION: Vanderbilt II

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   Undergraduate Research on Improving Power Grid Planning Models

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73   *Mary Peterson, Olivia O'Reilly, Arun-Kaarthick Manoharan, Sarangan Rajendran, Adithya Melagoda, Visvakumar Aravinthan, Esther Liu, Al Tamimi* and *Charles Yokley*
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3:15-4:45 Sessions

3:15-4:45 Session 4A: Power System Operation and Planning
CHAIR: Aaron St. Leger
LOCATION: Stuyvesant

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177 *Kseniia Zhgun, Farnaz Safdarian, Jack Griffin* and *Thomas Overbye*
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CHAIR: Hugh Jack
LOCATION: Amherst

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CHAIR: Sara Eftekharnejad
LOCATION: Burghley

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3:15-4:45 Session 4D: Power Electronics and Electrical Machines
CHAIR: Andy Ritenour
LOCATION: Vanderbilt II

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CHAIR: Randy Collins
LOCATION: Vanderbilt I

175 *Kelli Galbraith*, *Ozgur Alaca*, *Ali Riza Ekti*, *Aaron Wilson*, *Isabelle Snyder* and *Nils Stenvig*
   On the Investigation of Phase Fault Classification in Power Grid Signals: A Case Study for Support Vector Machines, Decision Tree and Random Forest

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184 *John Yonce*, *Michael Walters* and *Ganesh K. Venayagamoorthy*
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LOAD BUSES FOR DINNER AT WCU - 5:15

Tuesday, October 17th

8:00 - 9:30 Sessions

8:00-9:30 Session 5A: Power System Operation and Planning
CHAIR: *Chee-Wooi Ten*
LOCATION: Stuyvesant

120 *Nathalie Uwamahoro* and *Sara Eftekharnejad*
   A Comparative Study of Data-Driven Power Grid Cascading Failure Prediction Methods

8:00-9:30 Session 5B: Emerging Topics in Modern Power Systems
CHAIR: Yuanrui Sang
LOCATION: Amherst

84 *Mario Daniel Baquedano-Aguilar*, *Sean Meyn* and *Arturo Bretas*
Reduced-Order Models of Static Power Grids based on Spectral Clustering

44 *Rubaiyat Islam Shupty* and *Badrul Chowdhury*
A Review of Inertia Estimation in Power Systems Using Measurement-Based Approaches

96 *Taha Saeed Khan* and *Hamidreza Nazaripouya*
Analyzing the Implementation of the Newton Raphson Based Power Flow Formulation in CPU+GPU Computing Environment

110 *Zhenrui Wang*, *Weiping Shi*, *Jiang Hu* and *Le Xie*
A Parallel Approach for Solving Network Equations in EMT simulation Based on Branch Partition

8:00-9:30 Session 5E: Power System Economics
CHAIR: Badrul Chowdhury
LOCATION: Vanderbilt I
22 *Liudong Chen* and *Bolun Xu*
Saturation Effects in Equitable Demand Response Tariff Design

76 *Dana Marina Gálvez García*, *Sergio Ramirez Lopez*, *Guillermo Gutierrez Alcaraz* and *Jose Horacio Tovar Hernandez*
Prosumers' Participation in Day-Ahead Electricity Markets through Aggregators by Generic Demand Model

104 *Hualong Liu* and *Wenyuan Tang*
Decomposing Locational Marginal Prices in Look-Ahead Economic Dispatch

196 *Omid Daniel Pourkhalili*
Applying FB-Prophet Forecasting Method on Electric Grid Systems Day-ahead Order

9:45- 10:45 - Plenary Session- Burghley

11:00-12:30 Sessions

11:00-12:30 Session 6A: Power System Operation and Planning
CHAIR: Bora Karayaka
LOCATION: Stuyvesant
51 *Ken Crawford* and *Mesut Baran*
Capacitor Bank Failure Detection in Distribution Systems Using State Estimation

61 *Bishal Lamichhane*, *Christine Chen* and *Roohallah Khatami*
    Distributed Continuous-time Optimal Power Flow

34 *Wesley G. Schwartz*, *Jose E. Tabarez* and *Arthur K. Barnes*
    Input Impedance Characterization of a Power Factor Corrected Rectifier for Harmonic Power Flow Studies

181 *Saugat Ghimire*, *Vaithianathan Venkatasubramanian* and *Gilles Torresan*
    Analysis of Optimization Algorithms for Multiple Parameter Estimation in Model Validation Problems

164 *Ahmad Abuelrub*, *Ahmad Emran* and *Malik Jawarneh*
    A Comparison Between EV Fixed and Mobile Charging in Jordan

67 *Gavin Trevorrow* and *Ning Zhou*
    Regression model forecasting for time-skew problems in power system state estimation

11:00-12:30 Session 6B: Emerging Topics in Modern Power Systems
CHAIR: Adam Birchfield
LOCATION: Amherst

43 *Nizar Tayem*, *Samuel Gonzalez*, *Ahmed Hussain* and *Redha Radaydeh*
    Frequency and Harmonics estimation for Electric Power System using Subspace Method

35 *Alexander Sanchez-Ocampo*, *Mario R Arrieta-Paternina*, *Juan M Ramirez*, *Alejandro Zamora-Mendez* and *Juan Ramon Rodriguez*
    Synchronous machines' inertia estimation through PMU data-driven

93 *Narges Ehsani*, *Fatemeh Ahmadi-Gorjayi*, *Zong-Jhen Ye*, *Alex McEachern* and *Hamed Mohsenian-Rad*
    Sub-cycle Event Detection and Characterization in Continuous Streaming of Synchro-waveforms: An Experiment Based on GridSweep Measurements

186 *Komal Naz*, *Fasiha Zainab*, *Yehong Peng* and *Yong Fu*
    Intelligent Residential Demand Response: Achieving Resilient Voltage Management with Consumer Preference

123 *Santhosh Madasthu*, *Abdullah Al Mamun*, *Akintonde Abbas*, *Emily Abbate*, *Badrul Chowdhury* and *Robert Cox*
    Ensemble Deep Learning Model for Power System Outage Prediction for Resilience Enhancement

90 *Yanda Jiang*, *Zohreh Pravini*, *James Mccalley*, *Nicolas Lhuillier*, *Olivier Despouys*, *Armando Figueroa-Acevedo* and *James Okullo*
Network Reduction for Power System Planning: Zone Identification

11:00-12:30 Session 6C: Analysis of Distribution Systems and Distributed Energy Resources
CHAIR: Randy Collins
LOCATION: Burghley

135 *Adithya Melagoda*, *Arun-Kaarthick Manoharan*, *Mohd Rahman*, *Visvakumar Aravinthan* and *Al Tamimi*
Optimal Restoration of a Power Distribution System During Extreme Events Considering Load Criticality

160 *Dan Moldovan*, *Madhura Sondharangalla*, *Kunal Shah*, *Devarajan Srinivasan* and *Rajapandian Ayyanar*
An Edge Intelligent Device for Advanced Monitoring and Control of DER Inverters in a High Penetration Distribution System

4 *Jinxian Zhang*, *Junbo Zhao*, *Fei Ding*, *Jing Yang* and *Junhui Zhao*
A Graph Convolutional Network for Active Distribution System Anomaly Detection Considering Measurement Spatial-temporal Correlations

126 *Jinshun Su*, *Ruotan Zhang*, *Payman Dehghanian* and *Mohammad Heidari Kapourchali*
Pre-Disaster Allocation of Mobile Renewable-Powered Resilience-Delivery Sources in Power Distribution Network

192 *Srikanth Yelem*, *Preetham Goli* and *Mohammed Alhashem*
OpenDSS and Typhoon HIL Co-Simulation for Real-Time Evaluation of a Distribution Network

11:00-12:30 Session 6D: Renewable and Clean Energy Systems and Energy Storage
CHAIR: Saurav Basnet
LOCATION: Vanderbilt II

188 *Naveen Kumar Kodanda Pani*, *Abhijith Ravi*, *Linquan Bai* and *Feng Qiu*
Enhancing Microgrid Resilience through Wave Energy Integration

11:00-12:30 Session 6E: Power System Protection
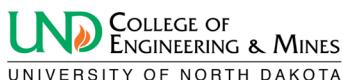CHAIR: Sarah Kurtz
LOCATION: Vanderbilt I

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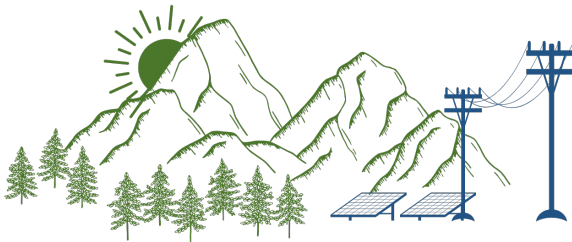Andy Ritenour - aritenour@wcu.edu

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North American Power Symposium

October 15-17, 2023 | Asheville, NC

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