

**Date: Sunday, 19/June/2022**

<b>8:00am - 12:00pm</b>	<b>Short Course 1: Fundamentals of Dielectric Materials and Testing</b> Location: <b>Wiley Room</b> Session Chair: <b>Inna Kremza</b> Presented By: Dr. Nancy Frost
Wiley Room	
<b>8:00am - 12:00pm</b>	<b>Short Course 2: Dissolved Gas Analysis (DGA) for in-depth condition assessments. The scientific perspective</b> Location: <b>Milani Room</b> Session Chair: <b>Inna Kremza</b> Presented By: Mr. Lars Arvidsson General Manager VPdiagnose
Milani Room	
<b>1:00pm - 5:00pm</b>	<b>Short Course 3: Longevity and Reliability of Energy Cable Systems in the Grid</b> Location: <b>Wiley Room</b> Session Chair: <b>Inna Kremza</b> Presented By: Dr. Nigel Hampton Nigel.Hampton@ul.com UL Laboratories
Wiley Room	
<b>1:00pm - 5:00pm</b>	<b>Tutorial: Electrical Insulation Overview</b> Location: <b>Milani Room</b> Session Chair: <b>Inna Kremza</b> National Electrical Manufacturers Association – Industrial Systems The instructors are experts in their fields and collectively have over 100 years of industry experience: William Lee, Application Development Engineer – Electrical Tapes & Liquid Resins 3M Electrical Markets Division Evanne Wang, Applications Development Engineer, DuPont Mark Winkeler, Manager Application Technology, ELANTAS PDG, Inc. Solomon Chiang, Director of R&D, The Gund Company
Milani Room	
<b>3:00pm - 6:30pm</b>	<b>REGISTRATION: IPMHVC and EIC 2022 Registration Process</b> Location: <b>ROTONDA</b> Session Chair: <b>Liz Tillotson</b> Session Chair: <b>Nancy Frost</b> Authors' and attendees' registration Badge
ROTONDA	

**Date: Monday, 20/June/2022**

<b>8:30am - 9:30am</b>	<b>PLS-01: Plenary Session 1 "Recent advances in RF multipactor and breakdown"</b> Location: <b>Ballroom E&amp;F</b> IPMHVC Plenary Session Presenter: John Verboncoeur
Ballroom E&F	
<b>10:00am - 12:00pm</b>	<b>C&amp;A - S1: Cable &amp; Accessories Session 1</b> Location: <b>Meeting Room 301-A</b> Session Chair: <b>Gian Carlo Montanari</b> Cables & Accessories Oral Session 01
Meeting Room 301-A	
<b>10:00am - 12:00pm</b>	<b>RM - S1: Rotating Machines Session 1</b> Location: <b>Ballroom G</b> Session Chair: <b>Greg Stone</b> Rotating Machines Oral Session 01
Ballroom G	
<b>1:30pm - 3:00pm</b>	<b>PS-01 EIC: Poster Session 1 - EIC</b> Location: <b>Ballroom D</b> Session Chair: <b>Joseph Williams</b> Posters
Ballroom D	
<b>3:30pm - 5:30pm</b>	<b>NM - S1: New Materials Session 1</b> Location: <b>Meeting Room 301-A</b> Session Chair: <b>Maryann Lander</b>
Meeting Room 301-A	
<b>3:30pm - 5:30pm</b>	<b>PD - S1: Partial Discharge Session 1</b> Location: <b>Ballroom G</b> Session Chair: <b>Mihai Huzmezan</b>
Ballroom G	

**Date: Tuesday, 21/June/2022**

<b>8:30am - 9:30am</b>	<b>PLS-02: Plenary Session 2: 2022 IEEE DEIS Dakin Distinguished Technical Contributions Award</b> Location: <b>Ballroom E&amp;F</b> Professor Keith Nelson Selected as the winner of the 2022 IEEE DEIS Thomas Dakin Distinguished Technical Contributions Award
Ballroom E&F	
<b>10:00am - 12:00pm</b>	<b>TT - 01: Testing Technologies Session 1</b> Location: <b>Meeting Room 301-A</b> Session Chair: <b>Jim Guo</b>
Meeting Room 301-A	
<b>10:00am - 12:00pm</b>	<b>TR - 01: Transformers Session 1</b> Location: <b>Ballroom G</b> Session Chair: <b>Alan Sbravati</b>
Ballroom G	
<b>1:30pm - 3:00pm</b>	<b>PS-02: Poster Session 2 - EIC</b> Location: <b>Ballroom D</b> Session Chair: <b>Alan Sbravati</b>
Ballroom D	
<b>3:30pm - 5:30pm</b>	

Meeting Room 301-A	<b>FA - 01: Failure Analysis Session 1</b> Location: <b>Meeting Room 301-A</b> Session Chair: <b>Aleksandr Khazanov</b>
<b>3:30pm - 5:30pm</b>	<b>RM - S2: Rotating Machines Session 2</b> Location: <b>Ballroom G</b> Session Chair: <b>Reza Soltani</b> Rotating Machines Oral Session 02
Ballroom G	
<b>Date: Wednesday, 22/June/2022</b>	
<b>8:30am - 9:30am</b>	<b>PLS-03: Expert Panel: "Present and future of liquid insulation technology"</b> Location: <b>Ballroom E&amp;F</b> Session Chair: <b>Inna Kremza</b>
Ballroom E&F	
<b>10:00am - 12:00pm</b>	<b>SG_OI - 01: Switchgear and Outdoor Insulation - Session 1</b> Location: <b>Meeting Room 301-A</b> Session Chair: <b>Aleksei Nikolaev</b>
Meeting Room 301-A	
<b>10:00am - 12:00pm</b>	<b>TR - 02: Transformers Session 2</b> Location: <b>Ballroom G</b> Session Chair: <b>Diego Robalino</b>
Ballroom G	
<b>1:30pm - 3:10pm</b>	<b>TT - 02: Testing Technologies Session 2</b> Location: <b>Meeting Room 301-A</b> Session Chair: <b>Mark Winkeler</b>
Meeting Room 301-A	
<b>1:30pm - 3:10pm</b>	<b>RM - S3: Rotating Machines - S3</b> Location: <b>Ballroom G</b> Session Chair: <b>Anna Gegenava</b>
Ballroom G	

## Presentations

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### **C&A - S1: Cable & Accessories Session 1**

*Time:* Monday, 20/June/2022: 10:00am - 12:00pm · *Location:* Meeting Room 301-A  
*Session Chair:* Gian Carlo Montanari

**10:00am - 10:20am**

#### **Comparison of Different Voltage Waveforms for Partial Discharge Measurement in Medium Voltage Cables and Accessories**

**A. Naderian Jahromi<sup>1</sup>, P. Ketharam Pattabi<sup>1</sup>, S. Lo<sup>1</sup>, J. Densley<sup>1,2</sup>**  
<sup>1</sup>METSCO Energy Solutions, Canada; <sup>2</sup>Arbolec Solutions, Canada

**10:20am - 10:40am**

#### **Effect of Semiconducting Layer on Cable Insulation Damage Detection Using Surface Wave Reflectometry**

**A. S. Arman<sup>1</sup>, S. W. Glass III<sup>2</sup>, L. S. Fifield<sup>2</sup>, M. Ali<sup>1</sup>**  
<sup>1</sup>University of South Carolina, Columbia, SC, USA; <sup>2</sup>Pacific Northwest National Laboratory, Richland, WA, USA

**10:40am - 11:00am**

#### **Dielectric Fluid Based Electrical Insulation System for Electric Transport Applications**

**P. Mensah<sup>1,2</sup>, P. Cheetham<sup>1,2</sup>, C. Kim<sup>2</sup>, S. Pamidi<sup>1,2</sup>**  
<sup>1</sup>FAMU-FSU College of Engineering, Tallahassee, USA; <sup>2</sup>Center for Advanced Power Systems, Florida State University

**11:00am - 11:20am**

#### **Electrothermal aging of DC cables and insulation electrical properties: conductivity, space charge and partial discharges**

**P. Seri<sup>1</sup>, G. C. Montanari<sup>2</sup>, M. Albertini<sup>3</sup>, S. Franchi Bononi<sup>3</sup>**  
<sup>1</sup>University of Bologna, Italy; <sup>2</sup>Florida State University, USA; <sup>3</sup>Prysmian Group, Italy

**11:20am - 11:40am**

#### **Silicone Injection of Cables with Poly-isobutylene Based Water-blocked Conductor**

**J. Steele<sup>1</sup>, W. J Chatterton<sup>1</sup>, J. Smith. III<sup>2</sup>, W. Ford<sup>1</sup>, N. Laurie<sup>1</sup>**  
<sup>1</sup>Novinium, United States of America; <sup>2</sup>Smith Cable Consulting

**11:40am - 12:00pm**

#### **Understanding the risks created by dynamic loading and temperature changes in DC cables through field distribution transients**

**H. McDonald, S. Rowland**  
The University of Manchester, United Kingdom

## **RM - S1: Rotating Machines Session 1**

*Time:* Monday, 20/June/2022: 10:00am - 12:00pm · *Location:* Ballroom G  
*Session Chair:* Greg Stone

**10:00am - 10:20am**

### **Update on IEEE PES EMC Materials Subcommittee Activities**

**N. Frost**

Frosty's Zap Lab, LLC, United States of America

**10:20am - 10:40am**

### **Machine Learning for Electric Machine Prognostics with Basic Motor Data**

**H. W Penrose**

MotorDoc LLC, United States of America

**10:40am - 11:00am**

### **Comparative Study of Phase Resolved Partial Discharge Patterns obtained with Different Instruments on Individual Stator Bars and Coils**

**M. Lévesque, Y. D. Seol, C. Hudon, H. Provencher**

Hydro-Québec, Canada

**11:00am - 11:20am**

### **Megger Insulation**

**A. Toribio**

Megger, United States of America

**11:20am - 11:40am**

### **Experiences of FRA measurements on Medium Voltage Rotating Machines**

**H. Mayora<sup>1</sup>, R. Álvarez<sup>1</sup>, G. Bossio<sup>2</sup>, E. Calo<sup>1</sup>, L. Catalano<sup>1</sup>**

<sup>1</sup>IITREE-LAT, FI-UNLP; <sup>2</sup>GEA-IITEMA, UNRC - CONICET

**11:40am - 12:00pm**

### **Testing Partial Discharges in Laminated Busbar for Electrified Transportation: an Innovative Approach**

**G. C. Montanari<sup>1</sup>, Q. Yang<sup>1</sup>, D. Nath<sup>1</sup>, P. Defriece<sup>2</sup>, J. P. Schmeller<sup>2</sup>**

<sup>1</sup>Florida State University, FL, United States of America; <sup>2</sup>NSWC, Philadelphia, USA

## PS-01 EIC: Poster Session 1 - EIC

Time: Monday, 20/June/2022: 1:30pm - 3:00pm · Location: Ballroom D  
Session Chair: Joseph Williams

### Analysis of the Application of Aramid Paper in the Magnetic Pole of Hydro-generator

**J. Zhang<sup>1</sup>, Y. Wang<sup>2</sup>, Y. Sun<sup>1</sup>, R. Tropeano<sup>3</sup>, N. Frost<sup>4</sup>**

<sup>1</sup>Yantai Metastar Special Paper Co., Ltd., China; <sup>2</sup>Harbin Electric Machinery Co., Ltd., China; <sup>3</sup>Windsor-Stevens, United States of America; <sup>4</sup>Frosty's Zap Lab, LLC, United States of America

### Effect of inhomogeneities in epoxy-glass-mica composites on conductive channel formation

**P. Kadlec, O. Musil, V. Nikolić, R. Polanský**

University of West Bohemia, Czech Republic

### The effect of x-ray radiation dose on the performance of power cable insulation materials

**w. wang**

North China electric power university, China, People's Republic of

### A new fault location device for high-voltage single-core cable based on distributed distance measurement method

**H. Li, Y. He, Y. Cao, W. Sun, Z. Wang, F. Yang, Q. Yan**

State Grid Shanghai Cable Company, China, People's Republic of

### Aging data supporting network usage tariff calculation

**R. Cselko, B. Nemeth, G. Kálecz, D. Szabo**

Budapest University of Technology and Economics, Hungary

### Dielectric and thermal properties of self-healing carboxylated nitrile rubber ionically crosslinked with zinc oxide

**V. Nikolić<sup>1</sup>, P. Kadlec<sup>1</sup>, R. Polanský<sup>1</sup>, S. Utrera-Barrios<sup>2</sup>, M. Hernández Santana<sup>2</sup>**

<sup>1</sup>University of West Bohemia, Faculty of Electrical Engineering, Pilsen, Czech Republic; <sup>2</sup>Polymer Composite Group, Institute of Polymer Science and Technology (ICTP-CSIC), Madrid, Spain

### Calibration method of dielectric loss measuring instrument for power cable under 0.1Hz AC voltage

**w. wang, w. wang**

North China electric power university, China, People's Republic of

### Research on Cable Aging Diagnosis Based on Short Circuit Response

**K. Zhao, M. Sun, L. Gong, H. Wang, W. Wang**

North China Electric Power University, China, People's Republic of

### Condition Management of Low-Voltage Distribution Cables

**R. Cselko, D. Balogh, G. Kálecz, B. Nemeth, B. Hartmann**

Budapest University of Technology and Economics, Hungary

### Effect of moisture on the breakdown performance of XLPE insulation: A first-principles study

**J. Liu<sup>1</sup>, M. Hu<sup>1,2</sup>, W. Wang<sup>1</sup>**

<sup>1</sup>North China Electric Power University, China, People's Republic of; <sup>2</sup>State Grid Huaian Power Supply Company, China, People's Republic of

### Location of Cable Joint with Moisture Based on Short-circuit Response

**L. Gong, C. Du, K. Zhao, S. Zhao, W. Wang**

North China Electric Power University, China, People's Republic of

### PRE-QUALIFICATION TEST ON EHV CABLE SYSTEMS WITH WIRELESS ARCHITECTURE FOR TEMPERATURE MONITORING

**N. AL QAHTANI<sup>1</sup>, N. R. BURJUPATI<sup>2</sup>**

<sup>1</sup>GCC ELECTRICAL TESTING LABORATORY, DAMMAM, SAUDI ARABIA; <sup>2</sup>Consultant, GCCETL, Former Addl Director, Central Power research Institute, India

### **Partial Discharge Monitoring and Diagnosis Utilizing Power Line Communication in a Simulated Substation**

**A. Houdai<sup>1</sup>, R. Koresawa<sup>1</sup>, T. Wakisaka<sup>1</sup>, M. Kozako<sup>1</sup>, M. Hikita<sup>1</sup>, H. Sato<sup>2</sup>, M. Soeda<sup>2</sup>**

<sup>1</sup>Kyushu Institute of Technology, Japan; <sup>2</sup>Kyushu Electric Power Co., Inc, Japan

### **Optical Detection Technology of Partial Discharge Based on Fluorescent Glass**

**C. Li<sup>1</sup>, M. Ren<sup>1</sup>, H. Guan<sup>1</sup>, R. Chen<sup>1</sup>, L. Zhang<sup>2</sup>, J. Peng<sup>2</sup>, J. Liu<sup>2</sup>, X. Guo<sup>2</sup>**

<sup>1</sup>State Key Laboratory of Electrical Insulation and Power Equipment Xi'an Jiaotong University Xi'an, China; <sup>2</sup>China Railway Signal & Communication Metro-Transportation Control Technology Co, LTD Changsha, China

### **Fault Diagnosis of Vacuum Circuit Breaker with Permanent Magnetic Mechanism Based on Multi-physical Measurements**

**R. Chen<sup>1</sup>, M. Ren<sup>1</sup>, H. Zhang<sup>1</sup>, C. Xia<sup>1</sup>, L. Zhang<sup>2</sup>, J. Peng<sup>2</sup>, J. Liu<sup>2</sup>, X. Guo<sup>2</sup>**

<sup>1</sup>Xi'an Jiaotong University, Xi'an, China; <sup>2</sup>China Railway Signal & Communication Metro-Transportation Control Technology Co, LTD, Changsha, China

### **Estimation of UHF Current of Partial Discharges Occurring in Propulsion Coils of Superconducting Maglev Systems Using an On-Board Radio Interferometer System with a Vector-Antenna**

**M. Kawada**

Tokushima University, Japan

### **Distribution characteristics of slightly uneven electric field in oil of oil-pressboard insulation structure under DC voltage**

**K. He<sup>1</sup>, H. Zhou<sup>2</sup>, C. Gao<sup>2</sup>, B. Qi<sup>2</sup>**

<sup>1</sup>State Grid Economic and Technological Institute co., ltd; <sup>2</sup>North China Electric Power University, China, People's Republic of

### **Research on the characteristics of space electric field in the oil of large-scale oil-pressboard insulation under AC and DC voltages**

**J. Wu<sup>1</sup>, F. Su<sup>2</sup>, L. Li<sup>1</sup>, C. Gao<sup>2</sup>, B. Qi<sup>2</sup>, C. Li<sup>2</sup>**

<sup>1</sup>State Grid Economic and Technological Institute Co., Ltd; <sup>2</sup>North China Electric Power University, China, People's Republic of

### **Partial Discharge Detection of Aviation Cables under Low Pressure**

**Z. Li, Z.-b. Shen, J. JIANG, C.-h. Zhang**

Nanjing University of Aeronautics and Astronautics, China, People's Republic of

### **The location method of insulation weak point of inverter-fed motor for electric vehicles**

**S. Ma, P. Wang, H. Guo, C. Cheng, S. Akram**

College of Electrical Engineering and Information Technology Sichuan University Chengdu, China

# NM - S1: New Materials Session 1

Time: Monday, 20/June/2022: 3:30pm - 5:30pm · Location: Meeting Room 301-A  
Session Chair: Maryann Lander

**3:30pm - 3:50pm**

## **Experimental Comparative Investigation on Alternative and Commercially Available Wire Insulations Based on Partial Discharges Activity**

**H. Naderiallaf<sup>1</sup>, P. Giangrande<sup>1</sup>, M. Galea<sup>1,2</sup>**

<sup>1</sup>Power Electronics, Machine and Control Group, University of Nottingham, The United Kingdom; <sup>2</sup>Department of Industrial Electrical Power Conversion, The University of Malta

**3:50pm - 4:10pm**

## **Additive Manufactured Dielectrics for Aerospace Electrical Insulation Applications**

**C. M. Severns<sup>1</sup>, S. Dinculescu<sup>1</sup>, T. Lebey<sup>2</sup>**

<sup>1</sup>Universite de Toulouse III, Universite Paul Sabatier, Laboratoire Plasma et Conversion d'Energie, Fance; <sup>2</sup>Safran Technology, Toulouse, France

**4:10pm - 4:30pm**

## **Process of Material Development for Unique Electrical Applications**

**C. Klein<sup>1</sup>, M. Wantuch<sup>1</sup>, N. Frost<sup>2</sup>**

<sup>1</sup>Astro Chemical, United States of America; <sup>2</sup>Frosty's Zap Lab, LLC, United States of America

**4:30pm - 4:50pm**

## **Fabrication and Characterization of Electrical Insulation System Components Using SLA and FDM Based Additive Manufacturing**

**E. Manzo<sup>1,2</sup>, N. Downey<sup>1,2</sup>, P. Cheetham<sup>1,2</sup>, C. H. Kim<sup>2</sup>, S. Pamidi<sup>1,2</sup>**

<sup>1</sup>FAMU-FSU College of Engineering; <sup>2</sup>Florida State University's Center for Advanced Power Systems

**4:50pm - 5:10pm**

## **Dielectric Failure of Hydrofluoroolefine HFO1234ze in the Presence of Water Impurity**

**X. Hu, X. Yu, H. Hou, B. Wang**

Wuhan University, China, People's Republic of

**5:10pm - 5:30pm**

## **Field-Grading Effect of a Polymer-Nanoparticle Composite on Medium-Voltage Power Module Substrates**

**Z. Zhang<sup>1,2</sup>, Q. Yuchi<sup>3</sup>, F. Boshkovski<sup>2,3</sup>, K. D. T. Ngo<sup>1,2</sup>, G.-Q. Lu<sup>1,2,3</sup>**

<sup>1</sup>Bradley Department of Electrical and Computer Engineering, Virginia Tech, Blacksburg, VA; <sup>2</sup>Center for Power Electronics Systems (CPES), Virginia Tech, Blacksburg, VA; <sup>3</sup>Department of Materials Science and Engineering, Virginia Tech, Blacksburg, VA

## PD - S1: Partial Discharge Session 1

Time: Monday, 20/June/2022: 3:30pm - 5:30pm · Location: Ballroom G  
Session Chair: Mihai Huzmezan

3:30pm - 3:50pm

### A Review of the History of the Development of Partial Discharge Testing

G. Stone<sup>1</sup>, A. Cavallini<sup>2</sup>, G. Behrmann<sup>3</sup>

<sup>1</sup>Stone Dielectrics, Canada; <sup>2</sup>Univeristy of Balogna; <sup>3</sup>Consultant

3:50pm - 4:10pm

### Effect of Particle Geometry on Electric Field Distribution, Partial Discharge, and Dielectric Strength of Iron-Polymer Composites

R. E. Calabrese<sup>1</sup>, E. Bury<sup>2</sup>, A. Koh<sup>2</sup>, C. Park<sup>1</sup>

<sup>1</sup>Mississippi State University, United States of America; <sup>2</sup>University of Alabama, United States of America

4:10pm - 4:30pm

### PD Detection and Monitoring of High Voltage Cabling in an Aerospace Environment Using a UHF Radio Sensing System

H. Jahangiri<sup>1</sup>, M. Kawada<sup>2</sup>

<sup>1</sup>aerospaceHV, United Kingdom; <sup>2</sup>Tokushima University, Japan

4:30pm - 4:50pm

### Omicron Infomercial

M. Sze

Omicron, United States of America

4:50pm - 5:10pm

### Investigation about the effect of the voltage profile on RPDIV and time to failure for insulation materials subjected to impulsive stress conditions

A. Caprara, G. Ciotti

Techimp - Altanova group Srl, Italy

5:10pm - 5:30pm

### Comparison of Partial Discharge activity in Synthetic Ester and Synthetic Ester- based fullerene nanofluid under AC 50 Hz

H. KHELIFA<sup>1</sup>, S. ANAND<sup>2</sup>, E. VAGNON<sup>1</sup>, A. BEROUAL<sup>1</sup>

<sup>1</sup>Univ Lyon, Ecole Centrale de Lyon, INSA Lyon, Université Lyon 1, CNRS, Ampère, UMR5005; <sup>2</sup>Power Electronics & Converters/ Ampère CNRS SuperGrid Institute/ INSA Lyon, Villeurbanne, France



## TT - 01: Testing Technologies Session 1

Time: Tuesday, 21/June/2022: 10:00am - 12:00pm · Location: Meeting Room 301-A

Session Chair: Jim Guo

10:00am - 10:20am

### **Nondestructive 100 percent electrical strength test method for thermally conductive insulating foils**

**L. Reissenweber<sup>1</sup>, M. Scheler<sup>1</sup>, S. Hetzel<sup>1</sup>, T. Fischer<sup>1</sup>, M. Rossner<sup>1</sup>, A. Stadler<sup>1</sup>, W. Pohl<sup>2</sup>, T. Doering<sup>2</sup>**

<sup>1</sup>Coburg University of Applied Sciences and Arts, Germany; <sup>2</sup>HALA Contec GmbH & Co. KG, Germany

10:20am - 10:40am

### **Transformer Core-Vibration Analysis: Coupling Paths**

**A. Wuerde<sup>1</sup>, J. N. Kahlen<sup>2</sup>, N. Langenberg<sup>1</sup>, A. Moser<sup>1</sup>**

<sup>1</sup>IAEW at RWTH Aachen University, Germany; <sup>2</sup>Fraunhofer Institute for Applied Information Technology FIT, Sankt Augustin, Germany

10:40am - 11:00am

### **Multiple Chopped Wave Test: Experience and Possible Future Test Improvement**

**T. Zupan<sup>1</sup>, I. Novko<sup>1</sup>, I. Ziger<sup>2</sup>**

<sup>1</sup>Končar – Electrical Engineering Institute Ltd., Croatia; <sup>2</sup>Končar – Instrument Transformers Inc., Croatia

11:00am - 11:20am

### **Multilayer Electret Based Electric Field Neutralization under Pulse Width Modulated High Voltage Waveforms**

**F. Haque, O. Faruque, C. Park**

Mississippi State University, United States of America

11:20am - 11:40am

### **Effect of test parameters and statistical life data analysis of sinusoidal voltage endurance test on round magnet wires and insulating papers**

**R. G. Andrzejewski, E. Spezia, W. d. L. Pires**

WEG Equipamentos Elétricos S.A., Brazil

## TR - 01: Transformers Session 1

*Time:* Tuesday, 21/June/2022: 10:00am - 12:00pm · *Location:* Ballroom G  
*Session Chair:* Alan Sbravati

**10:00am - 10:20am**

### **Impacts on DER: Transformer and Cable Reliability**

**A. Ross<sup>1</sup>, B. Lanz<sup>2</sup>**

<sup>1</sup>EPRA - Electric Power Reliability Alliance, United States of America; <sup>2</sup>IMCorp

**10:20am - 10:40am**

### **Vegetable fluids: the reason of the new trend**

**F. SCATIGGIO, G. CAMPI**

A&A FRATELLI PARODI

**10:40am - 11:00am**

### **Parameters Identification of the Electrical Debye Model for Power Transformers Multilayer Insulation Systems**

**G. Hernandez<sup>1</sup>, A. Ramirez<sup>1</sup>, D. Robalino<sup>2</sup>**

<sup>1</sup>VTC West, Mexico; <sup>2</sup>Megger

**11:00am - 11:20am**

### **On-line Partial Discharge Monitoring of Substation Power Transformers**

**M. Huzmezan**

Power Diagnostix Systems GmbH, Germany

**11:20am - 11:40am**

### **PD-localization in spatial distributed HV-windings**

**C. Staubach<sup>1</sup>, C. Engelen<sup>2</sup>, F. Oetti<sup>2</sup>**

<sup>1</sup>University of Applied Science Hannover, Germany; <sup>2</sup>OMICRON electronics GmbH

**11:40am - 12:00pm**

### **Thermal behavior evaluation of a new solid insulating paper in natural ester and mineral insulating oils**

**H. WILHELM<sup>1</sup>, P. FERNANDES<sup>1</sup>, L. DILL<sup>1</sup>, K. MOSCON<sup>1</sup>, M. A. MARIN<sup>2</sup>, T. MARCHESAN<sup>3</sup>, V. BENDER<sup>3</sup>, G. MORAES<sup>2</sup>**

<sup>1</sup>VEGOOR, Brazil; <sup>2</sup>COPEL, Brazil; <sup>3</sup>UFSM, Brazil

## PS-02: Poster Session 2 - EIC

Time: Tuesday, 21/June/2022: 1:30pm - 3:00pm · Location: Ballroom D  
Session Chair: Alan Sbravati

### Interference of Stray Gases in the Diagnosis of Low-temperature Faults in Soybean-Based Natural Esters

M. Meira<sup>1</sup>, R. Álvarez<sup>2</sup>, C. Verucchi<sup>1</sup>, L. Catalano<sup>2</sup>

<sup>1</sup>INTELYMEC (UNCPBA) and CIFICEN (UNCPBA-CICPBA-CONICET), Olavarría, Argentine Republic; <sup>2</sup>IITREE-LAT-FI-UNLP, La Plata, Argentine Republic

### Investigation on the arrangement strategy of UHF detection antennas in power transformers

J. Du, J. Bi, S. Yuan, Y. Xu, J. Jiang

China Electric Power Research Institute

### Analysis of a Gas Formation Fault in Converter Transformer Bushing

Q. Xie, R. Liu, Y. Feng, L. Chen, Z. Zhang

State Grid Sichuan Electric Power Research Institute, China, People's Republic of

### Effect of Thermal Bubbles on Partial Discharge and Breakdown Characteristics of Oil-Immersed Pressboard

R. Zhang, Q. Zhang, J. Zhou, Z. Zhang, Y. Sun, S. Wang

State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an Jiaotong University

### Prediction Method for Online Monitoring Data of Dissolved Gas in Transformer Oil

J. Li, Y. Cheng

North China Electric Power University, China, People's Republic of

### Partial discharge detection of cast resin transformers using high-frequency signal propagation characteristic analysis and application to diagnostic technology

R. Koresawa<sup>1</sup>, M. Kozako<sup>1</sup>, M. Hikita<sup>1</sup>, Y. Aoki<sup>2</sup>, K. Iida<sup>2</sup>, T. Umemura<sup>2</sup>, T. Nakamae<sup>3</sup>, T. Maeda<sup>3</sup>, T. Ozaki<sup>3</sup>, Y. Nakamura<sup>4</sup>

<sup>1</sup>Kyushu Institute of Technology, Japan; <sup>2</sup>Mie University; <sup>3</sup>Toshiba Industrial Products and Systems Co, Ltd; <sup>4</sup>Toshiba Infrastructure Systems & Solutions Corporation

### Research and optimization measures on anti-short circuit electrodynamic force of amorphous alloy three-dimensional coil transformer

H. Zhan, Y. Luo, Y. Duan

North China Electric Power University, China, People's Republic of

### Characteristic gas dissolution properties in ester insulating oil

Y. Xing, Q. Ma, Q. Li, M. Dong

State Key Laboratory of Electrical Insulation and Power Equipment, School of Electrical Engineering, Xi'an Jiaotong University, Xi'an, China

### Multi-spectral characteristics in partial discharge process of oil-paper insulated needle-plate electrode

Y. Liu, Y. Xing, Y. Hu, M. Dong, M. Ren, Y. Xi

Xi'an Jiaotong University, China, People's Republic of

### Analysis on the Causes of Unqualified AC Withstand Voltage Measurement on the Valve Side of a Converter Transformer

Q. Xie, L. Chen, Z. Zhang, R. Liu, Y. Feng

State Grid Sichuan Electric Power Research Institute, China, People's Republic of

### Study on gas production difference of ester insulating oil under discharge fault

Y. Xing, C. Li, Q. Ma, M. Dong

State Key Laboratory of Electrical Insulation and Power Equipment, School of Electrical Engineering, Xi'an Jiaotong University, Xi'an, China

### Complex Thermal Expansion of an Epoxy-Fiberglass Laminate

**J. Grace<sup>1</sup>, A. T. Wilder<sup>2</sup>**

<sup>1</sup>Colorado School of Mines, USA; <sup>2</sup>The University of Texas at Austin, USA

**Comparison between improved Mask R-CNN and SOLOv2 in automatic detection of electro-thermal defects in substations**

**Y. Yang, F. Gao, L. Li, N. Yang, P. Jia, S. Han**  
China Electric Power Research Institute, China

**Experimental verification of the space charge measurement method based on optoelectronics principles**

**H. Gao<sup>1</sup>, Q. Li<sup>1</sup>, H. Ren<sup>1</sup>, Y. Shi<sup>1</sup>, S. Cheng<sup>1</sup>, T. Qi<sup>1</sup>, Z. Wang<sup>2</sup>**

<sup>1</sup>State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources, North China Electric Power University, Beijing 102206, China; <sup>2</sup>College of Engineering, Mathematics and Physical Sciences, University of Exeter, Exeter, EX44QJ, UK

**Study of permittivity change in the cervical cell membrane 3D realistic model due to application of nanosecond electric field using SRD based pulse generator**

**M. KUMAR, A. Mishra**  
IITA, India

**AC Breakdown Voltage of Mineral Oil, Synthetic and Natural Esters – Based Fe<sub>3</sub>O<sub>4</sub> Nanofluids**

**U. Khaled, A. Beroual**  
University of Lyon, Ecole Centrale de Lyon, AMPERE Lab CNRS UMR 5005

**Effect of Winding Insulation Thickness on Partial Discharge Degradation and Life Characteristics of Enamel Twisted Pair**

**S. Kodama<sup>1</sup>, Y. Zenda<sup>1</sup>, M. Kozako<sup>1</sup>, M. Hikita<sup>1</sup>, N. Hayashizaka<sup>2</sup>, H. Kikuchi<sup>3</sup>**

<sup>1</sup>Kyushu Institute of Technology; <sup>2</sup>Sumitomo Seika Chemicals Co, Ltd.; <sup>3</sup>Hide Technology LLC.

**Partial Discharge Inception Characteristics of Bubbles with Different Sizes in Oil-paper Insulation**

**J. Zhou, Q. Zhang, R. Zhang, Z. Wu, T. Wen, C. Guo**  
Xi'an Jiaotong University, China, People's Republic of

**Acoustic-Electrical Combined Localization for Partial Discharge Based on Chaotic Elite Harris Hawks Optimization Algorithm**

**Y. Xi, R. Chen, Y. Liu, K. Wang, C. Zhang, M. Dong**  
Xi'an Jiaotong University, China, People's Republic of

**Detection of insulation defects on generator bars and coils using an instrumented impact test**

**F. Lafleur, H. Provencher, M. Lévesque, S. Pelletier**  
Institut de Recherche d'Hydro-Québec, Canada

## FA - 01: Failure Analysis Session 1

Time: Tuesday, 21/June/2022: 3:30pm - 5:30pm · Location: Meeting Room 301-A  
Session Chair: Aleksandr Khazanov

3:30pm - 3:50pm

### Copper: An Element of Interest

L. Arvidsson

VPdiagnose AB, Sweden

3:50pm - 4:10pm

### Condition Assessments of 50 Year Old Low Voltage Power Cables

T. A. Toll, P. R. Ward, C. R. Ferree, P. N. Ellis, C. D. Sexton

Analysis and Measurement Services Corporation, United States of America

4:10pm - 4:30pm

### Online Partial Discharge Monitoring and Failure Analysis Case Study of a 275 kV Oil Filled Cable Termination

B. J. Ward<sup>1</sup>, T. Whyte<sup>2</sup>

<sup>1</sup>Powerlink Queensland, Australia; <sup>2</sup>EA Technology Australia

4:30pm - 4:50pm

### Influence of Transformer Axial-Clamping Loss on the Vibration of Transformers

A. Wuerde<sup>1</sup>, J. N. Kahlen<sup>2</sup>, N. Langenberg<sup>1</sup>, A. Moser<sup>1</sup>

<sup>1</sup>IAEW at RWTH Aachen University, Germany; <sup>2</sup>Fraunhofer Institute for Applied Information Technology FIT, Sankt Augustin, Germany

4:50pm - 5:10pm

### Machine Stator Windings On-site Assessment Challenges and Recommendations for Reliability and Condition Monitoring

A. Trivedi<sup>1</sup>, S. U. Haq<sup>2</sup>, M. T. Moorthy<sup>2</sup>, D. Desrochers<sup>1</sup>

<sup>1</sup>Delom/Wajax; <sup>2</sup>GE Power Conversion

5:10pm - 5:30pm

### An Assessment of high failure rate of pole-mounted transformers using Probabilistic Risk Evaluation of Lightning Arresters

N. Koalana, P. N. Bokoro

University of Johannesburg, South Africa

## RM - S2: Rotating Machines Session 2

Time: Tuesday, 21/June/2022: 3:30pm - 5:30pm · Location: Ballroom G  
Session Chair: Reza Soltani

3:30pm - 3:50pm

### Effect of performing DC tests before dielectric frequency response on a MV stator

E. Calo, R. Álvarez, H. Mayora, L. Catalano, P. Morcelle

IITREE - LAT, Argentine Republic

3:50pm - 4:10pm

### How does PDIV change during isothermal ageing of magnet wire

M. Szczepanski<sup>1,2</sup>, L. Fetouhi<sup>1,2</sup>, M. Sabatou<sup>1</sup>, S. Dreuilhe<sup>1</sup>, S. Pin<sup>1</sup>, C. Van de Steen<sup>1</sup>, G. Belijar<sup>1</sup>

<sup>1</sup>IRT Saint Exupéry; <sup>2</sup>Nidec Leroy-Somer

4:10pm - 4:30pm

### Stress grading performance of form wound motor coil under initial heat cycle load

Y. Kimura<sup>2</sup>, Y. Yao<sup>1</sup>, M. Sato<sup>1</sup>, A. Kumada<sup>1</sup>, K. Hidaka<sup>1,2</sup>, T. Okamoto<sup>3</sup>, T. Sakurai<sup>3</sup>, Y. Yamanaka<sup>4</sup>, T. Umemoto<sup>4</sup>

<sup>1</sup>The University of Tokyo, Japan; <sup>2</sup>Tokyo Denki University, Japan; <sup>3</sup>Toshiba Mitsubishi Electric Industrial Systems Corporation, Japan; <sup>4</sup>Advanced Technology R&D Center, Mitsubishi Electric Corporation, Japan

4:30pm - 4:50pm

### Machine Learning and Uncertainty Quantification for Motor Predictive Maintenance

G. Jones<sup>1</sup>, N. Frost Ph.D.<sup>2</sup>

<sup>1</sup>SmartUQ, United States; <sup>2</sup>Frosty's Zap Lab LLC, United States

4:50pm - 5:10pm

### PD detection in inverter-fed machines using fiber-optic acoustic emission sensors. A preliminary investigation.

A. Cavallini<sup>1</sup>, A. Zadeh<sup>2</sup>, N. Lebedev<sup>2</sup>, E. Concuttoni<sup>3</sup>, S. Luna<sup>3</sup>, F. Rosignoli<sup>3</sup>, A. Rumi<sup>1</sup>

<sup>1</sup>University of Bologna, Bologna, Italy; <sup>2</sup>Optics11, Amsterdam, the Netherlands; <sup>3</sup>Loccioni Spa, Angeli di Rosora, Italy

5:10pm - 5:30pm

### Correction Factor for Insulation Resistance of Salient Poles

J. Pedneault-Desroches, S. Bernier

Hydro-Québec, Canada

# SG\_OI - 01: Switchgear and Outdoor Insulation - Session 1

*Time:* Wednesday, 22/June/2022: 10:00am - 12:00pm · *Location:* Meeting Room 301-A

*Session Chair:* Aleksei Nikolaev

**10:00am - 10:20am**

## **A comparison of different PD detection techniques for complete assemblies of air-insulated switchgear**

**M. Lachance<sup>1</sup>, F. Rosa<sup>2</sup>**

<sup>1</sup>OMICRON electronics Canada Corp; <sup>2</sup>Technologies Dual-ADE inc.

**10:20am - 10:40am**

## **Magnetic Signature of Vacuum Interrupters during Load Switching**

**N. Guo, K. Whitmore, M. Cohen, T. Shekari, R. Beyah, L. Graber**

GEORGIA INSTITUTE OF TECHNOLOGY, United States of America

**10:40am - 11:00am**

## **Separation of Partial Discharge Faults in Metal-clad Switchgear Based on Pulse Shape Analysis**

**G. A. Hussain<sup>1</sup>, W. Hassan<sup>2</sup>, F. Mahmood<sup>2</sup>, J. A. Kay<sup>3</sup>**

<sup>1</sup>American University of Kuwait (AUK), Kuwait; <sup>2</sup>University of Engineering & Technology, Lahore, Pakistan; <sup>3</sup>Rockwell Automation, Canada

**11:00am - 11:20am**

## **Simulation of HFCT PD Detection in MV Bus Bar Chamber**

**M. Miljanovic<sup>1</sup>, M. Kearns<sup>2</sup>, B. G Stewart<sup>1</sup>**

<sup>1</sup>University of Strathclyde, United Kingdom; <sup>2</sup>EDF Energy, Nuclear Generation, United Kingdom

**11:20am - 11:40am**

## **Statistical Analysis of Varistor Capacitance under Slow-Front Overvoltages**

**L. Muremi, P. Bokoro, W. Doorsamy**

University of Johannesburg, South Africa

## TR - 02: Transformers Session 2

Time: Wednesday, 22/June/2022: 10:00am - 12:00pm · Location: Ballroom G  
Session Chair: Diego Robalino

10:00am - 10:20am

### Determination of Relative Thermal Performance of Power Transformers Using Data Driven Thermal Models

**A. Doolgindachbaporn<sup>1</sup>, G. Callender<sup>2</sup>, P. Lewin<sup>2</sup>, E. Simonson<sup>3</sup>, G. Wilson<sup>4</sup>**

<sup>1</sup>King Mongkut's University of Technology Thonburi; <sup>2</sup>University of Southampton; <sup>3</sup>Southampton Dielectric Consultants; <sup>4</sup>National Grid Electricity Transmission

10:20am - 10:40am

### Practical Considerations for the Usage of Ester Fluids in Distribution Transformers

**R. Breazeal<sup>2</sup>, A. Sbravati<sup>1</sup>, D. Robalino<sup>3</sup>**

<sup>1</sup>Cargill, United States of America; <sup>2</sup>Southern California Edison; <sup>3</sup>Megger Corporation

10:40am - 11:00am

### Indian Experience with Commissioning of World's First 400kV Natural Ester Based Shunt Reactor

**D. N. Jha, P. Ghosh, R. K. Jain, P. R. S. Yadav, A. K. Gupta**

Power Grid Corporation Of India Limited, India

11:00am - 11:20am

### Evaluation of DFIG Wind Turbine Generator and Transformer Conditions with Electrical Signature Analysis

**H. W Penrose**

MotorDoc LLC, United States of America

11:20am - 11:40am

### Comparative analysis of transformer solid insulation drying methods

**O. Mazur, J. Mora, A. Dannik, D. Wilson**

Globecore GmbH, Germany

11:40am - 12:00pm

### Comparative method for assessing cellulose-based paper degradation rate immersed in different fluids

**A. Sbravati, K. Rapp, K. Wirtz**

Cargill, United States of America



## TT - 02: Testing Technologies Session 2

Time: Wednesday, 22/June/2022: 1:30pm - 3:10pm · Location: Meeting Room 301-A  
Session Chair: Mark Winkeler

1:30pm - 1:50pm

### Thermal Conductivity of Filler and Un-filler Potting Materials

T. T. Nguyen

Elantas inc., United States of America

1:50pm - 2:10pm

### AC and DC Electrical Strength of Thermally Conductive Insulating Foils under Various Conditions

M. Scheler<sup>1</sup>, L. Reissenweber<sup>1</sup>, S. Hetzel<sup>1</sup>, T. Fischer<sup>1</sup>, M. Rossner<sup>1</sup>, A. Stadler<sup>1</sup>, W. Pohl<sup>2</sup>, T. Doering<sup>2</sup>

<sup>1</sup>Coburg University of Applied Sciences and Arts, Germany; <sup>2</sup>HALA Contec GmbH & Co. KG, Germany

2:10pm - 2:30pm

### Surface Wave Based Non-conductor-contact Reflectometry Method for Insulation and Jacket Damage Detection in Multi-Conductor Cables

A. S. Arman<sup>1</sup>, S. W. Glass III<sup>2</sup>, L. S. Fifield<sup>2</sup>, M. Ali<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, SC, USA; <sup>2</sup>Pacific Northwest National Laboratory, Richland, WA, USA

2:30pm - 2:50pm

### Green chemistries for use as electrical insulation

B. Chambers<sup>1</sup>, N. Frost<sup>2</sup>

<sup>1</sup>Star Technology, United States of America; <sup>2</sup>Frosty's Zap Lab, LLC, United States of America

2:50pm - 3:10pm

### Tracking and Erosion Performance of Alumina Trihydrate/ Aluminium Nitride filled Micro and Nano Silicone Rubber Composites

B. S. A V, M. J. Thomas, D. Kaushik

Indian Institute of Science, Bangalore, India.

## RM - S3: Rotating Machines - S3

Time: Wednesday, 22/June/2022: 1:30pm - 3:10pm · Location: Ballroom G  
Session Chair: Anna Gegenava

1:30pm - 1:50pm

### Reflections on the On-Line Partial Discharge Monitoring and Analysis for Condition Assessment of large Generators and Motors

M. Huzmezan

Power Diagnostix Systems GmbH, Germany

1:50pm - 2:10pm

### Lifetime estimation of type I random-wound electrical machines under active thermal cycling

S. Pin<sup>1</sup>, S. Dreuilhe<sup>1</sup>, L. Fetouhi<sup>1,2</sup>, M. Szczepanski<sup>1,2</sup>, S. Stemmer<sup>1</sup>, G. Belijar<sup>1</sup>

<sup>1</sup>IRT Saint Exupéry, France; <sup>2</sup>NIDEC Leroy-Somer

2:10pm - 2:30pm

### Investigating the effect of space charge accumulation on partial discharges activity for unaged and thermally aged Glass fibre insulated wire

H. Naderiallaf<sup>1</sup>, P. Giangrande<sup>1</sup>, M. Galea<sup>1,2</sup>

<sup>1</sup>Power Electronics, Machine and Control Group, University of Nottingham, The United Kingdom; <sup>2</sup>Department of Industrial Electrical Power Conversion, The University of Malta

2:30pm - 2:50pm

### Aging study in electromechanical chain: design of experiment definition using step stress tests

S. Pin<sup>1</sup>, M. Sabatou<sup>1</sup>, M. Szczepanski<sup>2</sup>, S. Dreuilhe<sup>1</sup>, L. Fetouhi<sup>2</sup>, G. Belijar<sup>1</sup>

<sup>1</sup>IRT Saint Exupéry, France; <sup>2</sup>Leroy Somer, France

2:50pm - 3:10pm

### Can Corona Resistant wires ensure reliability in aerospace machine insulation?

A. Rumi, J. G. Marinelli, A. Cavallini, P. Seri

University of Bologna, Italy