

# EPE '22

September 5-9, 2022  
Hannover, Germany

## ECCE EUROPE

## FINAL PROGRAMME



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**24<sup>th</sup> European Conference**

# **Power Electronics and Applications**

**5 to 9 September 2022 - Hannover, Germany**

**EPE 2022 ECCE Europe**

Sponsored by:

European Power Electronics and Drives Association  
&  
IEEE Power Electronics Society

Hosted by:

Leibniz University Hannover - Hannover, Germany

In cooperation with:

**ECPE** : The European Center for Power Electronics

**IEEE-IAS** : The Industry Applications Society of the Institute  
of Electrical Engineers of Japan

**KIPE** : The Korean Institute of Power Electronics

**VDE-ETG** : Verband der Elektrotechnik Elektronik Informationstechnik e. V.  
Energietechnische Gesellschaft

**VUB-MOBI** : Vrije Universiteit Brussel - Mobility, Logistics & Automotive  
Technology Research Centre

# CONTENTS

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5	Welcome to Hannover - Message from the conference Chairman
8	Organisation of EPE 2022 ECCE Europe – Committees
11	Organisation of EPE 2022 ECCE Europe – List of topics
14	General information
18	Practical information
26	Tutorials
28	Highlighted Focus Topics
<b>38</b>	<b>Technical programme of Tuesday 6 September 2022</b>
38	Opening and Keynote session
39	Lecture sessions
41	Dialogue sessions
57	Keynote session and Lecture sessions
60	Industrial Forums
<b>64</b>	<b>Technical programme of Wednesday 7 September 2022</b>
64	Keynote session
65	Lecture sessions
67	Dialogue sessions
84	Lecture sessions
90	IEEE TC 12
93	Industrial Forums
<b>96</b>	<b>Technical programme of Thursday 8 September 2022</b>
96	Keynote session
97	Lecture sessions
99	Dialogue sessions
115	Award and Closing session
115	Lecture sessions
119	ETUT-Project
120	Industrial Forums
122	IFEC'23
<b>124</b>	<b>Technical visits on Friday 6 September 2022</b>
<b>130</b>	<b>Sponsors and exhibiting companies</b>
<b>150</b>	<b>Planning Vendor Session</b>
<b>152</b>	<b>ECPE Event</b>
<b>153</b>	<b>EPE 2022 'GaNius'</b>



## MESSAGE FROM THE CONFERENCE CHAIR

### WELCOME TO EPE'22 ECCE – EUROPE

Welcome to Hannover! In many respects, EPE'22 ECCE Europe is a special conference among EPE meetings. After two years of virtual events, it is the first to be held in person again. Everyone involved in the preparations is, therefore, especially pleased to host you here in Hannover.

EPE'22 ECCE Europe is also using a new layout for the first time, which sees the Dialogue Sessions highlighted and framed by the Lecture Sessions. This will make the programme more varied and encourage even more intensive discussions and talks.

Another new feature is a choice of 6 Focus Topics, which are designed with keynotes, invited lectures, panel discussions, appropriate tutorials and technical tours – these provide a guiding thread running through the conference. To this end, we have selected three topics which, as technology drivers, are particular sources of advancement in power electronics and its applications: these are the new power semiconductors, the wide-bandgap power semiconductor environment and the batteries, all of which are developing very rapidly. Three further Focus Topics concern application fields that are strongly influencing the development of power electronics from the market side, due to their innovative energy and strong growth. These application-related topics are all of special importance to the local region. Firstly, the electrification of vehicles. One of the world's largest automotive groups, which is clearly oriented towards electromobility, has its headquarters here. Secondly, the electrification of aircraft as a means towards sustainable, energy-efficient aviation. A large research cluster, connecting the region's universities and funded by the German Research Foundation (DFG), is performing intensive research in this field. Speaking more broadly, Northern Germany is a region of intense activity in the aviation industry. Thirdly, the topic of hydrogen. As a storage medium which can replace conventional fossil fuels, it will become very important in the near future. The northern German states have established a North German Hydrogen Strategy, which is being implemented through many interesting projects. Without power electronics, all of this would be unthinkable. Three years ago, when the Focus Topics were chosen, we could only guess at the great importance of these topics. The dynamic and disruptive nature of these topics has been intensified yet further by recent events. Thus, this conference is highly topical – and will hopefully prove highly engaging for you.

The importance of power electronics in Northern Germany can also be discerned from the many local companies which manufacture and implement power electronics. This is also reflected by the large number of sponsors we have been able to attract – another special feature of this conference. The exhibition, which takes place in the same hall as the Dialogue Sessions, will thus be a particular attraction.

For the participants, meeting and exchanging ideas with their peers is often the most important thing which occurs at a conference. The focus of the social events is specially placed on getting together and networking. There are plenty to choose from, from the

## MESSAGE FROM THE CONFERENCE CHAIR

### WELCOME TO EPE'22 ECCE – EUROPE

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IEEE Young Professionals Reception and the traditional Welcome Reception to the Gala Dinner and the new finale offered by the Brauhaus event. The programme is rounded off by the IEEE Women in Engineering event and the IEEE PELS Mentoring event.

You may still have time to look around Hannover and the surrounding area. We have compiled a few tips below. My personal favourites are the many green spaces in the city – starting with the Royal Gardens of Herrenhausen – and the great wealth of history, which is particularly prominent in the surrounding area, including Goslar, Hildesheim, Celle, Braunschweig and Hameln.

I wish you a successful and interesting conference with many special memories!



Axel Mertens  
Conference General Chairman

Samar Aidrus, Development Engineer at dSPACE



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## ORGANISATION OF EPE'22 ECCE EUROPE - COMMITTEES

### CONFERENCE ORGANISING COMMITTEE

#### Conference Chairperson

Axel Mertens, Leibniz University Hannover, Germany

#### Conference Co-Chairperson

Bernd Ponick, Leibniz University Hannover, Germany

#### Conference Co-Chairperson

Jens Friebe, Leibniz University Hannover, Germany

#### Local Scientific Committee

Martin DOPPELBAUER	Karlsruhe Institute of Technology, Germany
Amir EBRAHIMI	Leibniz University Hannover, Germany
Hans-Günter ECKEL	University of Rostock, Germany
Klaus HOFFMANN	Helmut Schmidt University, Hamburg, Germany
Nando KAMINSKI	University of Bremen, Germany
Andreas LINDEMANN	Otto von Guericke University Magdeburg, Germany
Marco LISERRE	University of Kiel, Germany
Regine MALLWITZ	Technische Universität Braunschweig, Germany
Bernhard WICHT	Leibniz University Hannover, Germany

#### Local Organizing Committee

Robert MEYER	Leibniz University Hannover, Germany
Jörn STEINBRINK	Leibniz University Hannover, Germany
Rebecca DIERKS	Leibniz University Hannover, Germany
Amir EBRAHIMI	Leibniz University Hannover, Germany
Thomas HARDER	ECPE, Germany
Andreas RIDDER	Leibniz University Hannover, Germany
Johannes WENZEL	Leibniz University Hannover, Germany
Silke KENZLER	Kenzler Conference Management
Viktor WILlich	Leibniz University Hannover, Germany

#### Programme Chairman

Sjoerd Bosga, ABB Corporate Research & KTH, Sweden

#### EPE Association

Philippe Hamacher & Nancy Langsberg, Conference Managers

#### EPE / IEEE-PELS Coordination Committee

The overall management of the Congress is conducted by the Coordination Committee to ensure consistency in strategy, scope and content of the Conferences from year to

# ORGANISATION OF EPE'22 ECCE EUROPE - COMMITTEES

## CONFERENCE ORGANISING COMMITTEE

year. The committee issues a Call for future locations of the Conferences, and forwards its recommendations to the EPE-Executive Council as well as to IEEE-PELS Administrative Committee for final approval.

### Members:

#### *EPE representative members:*

Abdelkrim Benchaib  
Mario Cacciato (Chairman)  
Martin Doppelbauer  
Philippe Lataire  
Elena Lomonova  
Jean-Luc Thomas

#### *PELS representative members:*

Rik De Doncker  
Ralph Kennel  
Mario Pacas (Co-Chairman)  
John Shen  
Jian Sun  
Patrick Wheeler

### Topic Chairpersons and co-chairpersons

## I POWER ELECTRONICS DEVICES AND CONVERTERS

### **Topic 1: DEVICES, COMPONENTS, PACKAGING AND SYSTEM INTEGRATION**

Prof. Hans-Peter Nee, The Royal Institute of Technology, Sweden  
Prof. Sybille Dieckerhoff, Technische Universität Berlin, Germany

### **Topic 2: POWER CONVERTERS TOPOLOGIES**

Prof. Drzen Dujic, EPFL, Switzerland  
Prof. Marc Hiller, Karlsruher Institut für Technologie (KIT), Germany

### **Topic 3: CONVERTER MODELLING, DESIGN AND LOW-LEVEL CONTROL**

Dr. Daniel Siemaszko, Hitachi Energy, Switzerland  
Prof. Salvatore Musumeci, Politecnico Di Torino, Italy

### **Topic 4: MEASUREMENT, SUPERVISION AND CONTROL FOR POWER CONVERTERS**

Prof. Eric Monmasson, Université de Cergy-Pontoise, France  
Prof. Pericle Zanchetta, University of Nottingham, United Kingdom

## II POWER ELECTRONICS APPLICATIONS

### **Topic 5: ELECTRICAL MACHINES AND DRIVE SYSTEMS**

Dr. ir. Sjoerd Bosga, ABB AB & KTH, Sweden  
Prof. Mario Cacciato, Università degli Studi di Catania, Italy

## ORGANISATION OF EPE'22 ECCE EUROPE - COMMITTEES

### CONFERENCE ORGANISING COMMITTEE

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**Topic 6: RENEWABLE ENERGY POWER SYSTEMS AND POWER-TO-X**

Prof. Mark Bakran, Universität Bayreuth, Germany

Prof. Hans-Günter Eckel, University of Rostock, Germany

**Topic 7: GRIDS, SMART GRIDS, AC & DC**

Prof. Mauro Carpita, University of Applied Sciences of Western Switzerland

Prof. Seddik Bacha, University of Grenoble - G2ELAB, France

**Topic 8: E-MOBILITY**

Prof. Joachim Böcker, University of Paderborn, Germany

Prof. Joeri Van Mierlo, Vrije Universiteit Brussel, Belgium

**Topic 9: POWER SUPPLIES AND INDUSTRY SPECIFIC APPLICATIONS**

Prof. Jorma Kyyrä, Aalto University, Finland

Prof. Korneel Wijnands, Technical University of Eindhoven, The Netherlands

Prof. Wilmar Martinez, KU Leuven & Energyville, Belgium

**Topic 10: DATA ANALYSIS, ARTIFICIAL INTELLIGENCE AND COMMUNICATION**

Dr. Pooya Davari, Aalborg University, Denmark

Dr. Pablo Briff, GE Renewable Energy, United Kingdom

**EPE Association Secretariat**

Philippe Hamacher - Nancy Langsberg - Carol Appelmans

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**Local Secretariat**

Kenzler Conference Management

Karla-Schmidt-Strasse 14

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GERMANY

Phone: +49 (0)511 65581860

### **I - POWER ELECTRONICS COMPONENTS AND CONVERTERS**

#### **Topic 1: DEVICES, COMPONENTS, PACKAGING AND SYSTEM INTEGRATION**

- 1.a. Passive Components
- 1.b. Active Devices and Components (Si)
- 1.c. Active Devices and Components (Wide Bandgap and other New Materials)
- 1.d. Components and Devices for Specific Applications, including for Pulsed Power
- 1.e. System Integration, Packaging & Thermal Management
- 1.f. Reliability & Life-Time

#### **Topic 2: POWER CONVERTERS TOPOLOGIES**

- 2.a. Modular Multilevel Converters
- 2.b. Solid State Transformers
- 2.c. Grid Connected Converters
- 2.d. Resonant Converters
- 2.e. HF Power Converters
- 2.f. Wide Band Gap Power Electronics

#### **Topic 3: CONVERTER MODELLING, DESIGN AND LOW-LEVEL CONTROL**

- 3.a. Converter Design and Optimisation
- 3.b. Converter Modelling and Low-level Control, including Gate-Drives
- 3.c. EMI/EMC in Power Electronics including HF Phenomen

#### **Topic 4: MEASUREMENT, SUPERVISION AND CONTROL FOR POWER CONVERTERS**

- 4.a. Standard and Advanced Modulation Techniques
- 4.b. Standard and Advanced Current / Voltage / Synchronisation Control Techniques
- 4.c. Estimation, Identification and Optimisation Methods
- 4.d. Measurement Techniques, Sensors and State Observers
- 4.e. Condition Monitoring and Life-Time Prediction

### **II - POWER ELECTRONICS APPLICATIONS**

#### **Topic 5: ELECTRICAL MACHINES AND DRIVE SYSTEMS**

- 5.a. Electrical Machines and Actuators
- 5.b. Adjustable-Speed Drives and Converter-Machine Interactions
- 5.c. Design, Optimisation and Control of Electric Drives
- 5.d. Condition Monitoring and Life-Time Prediction

#### **Topic 6: RENEWABLE ENERGY POWER SYSTEMS AND POWER-TO-X**

- 6.a. Wind-Energy Systems
- 6.b. Solar-Energy Systems
- 6.c. Energy Storage Systems for Renewable Energy including Power-to-Gas



# ORGANISATION OF EPE'22 ECCE EUROPE

## TOPICS

### TOPICS

- 6.d. Energy Management Systems
- 6.e. Energy Harvesting
- 6.f. Other Renewable-Energy Systems

#### **Topic 7: GRIDS, SMART GRIDS, AC & DC**

- 7.a. Power Electronics in Transmission and Distribution Systems
- 7.b. HVDC & FACTS
- 7.c. Micro Grids
- 7.d. Smart Grids
- 7.e. Mobile Power Stations
- 7.f. Power Quality Issues and Power Factor Correction Techniques
- 7.g. DC Grids including Fault Coordination and Protection
- 7.h. Hybrid Circuit Breakers
- 7.i. Real-Time Simulation and Hardware in the Loop

#### **Topic 8: E-MOBILITY**

- 8.a. Electric Drive Trains for On- and Off-Road Vehicles
- 8.b. Electric Drive Trains for Rail Vehicles
- 8.c. Electric Drive Trains for Aerospace and Space Applications
- 8.d. Electric Drive Trains for Marine Applications (Offshore, Subsea and Ships)
- 8.e. On-Board Power Converters
- 8.f. Batteries: Management Systems (BMS), Monitoring and Life-Time Prediction
- 8.g. Vehicle Battery Chargers: Contact and Contactless
- 8.h. Fuel Cells: Converters, Control, Diagnostics and System Integration
- 8.i. Smart Charging and Vehicle to Grid Interaction

#### **Topic 9: POWER SUPPLIES AND INDUSTRY-SPECIFIC APPLICATIONS**

- 9.a. Low Voltage DC Power Supplies
- 9.b. High Voltage DC Power Supplies
- 9.c. Distributed Power Supplies
- 9.d. Uninterruptible Power Supplies (UPS)
- 9.e. Lighting: Solid-State Lighting and Electronic Ballasts
- 9.f. Contactless (Wireless) Power Supply
- 9.g. Industry-Specific Applications (Cement, Steel, Paper, Textile, Mining, etc...)
- 9.h. Applications in Physics Research and Related Areas

#### **Topic 10: DATA ANALYSIS, ARTIFICIAL INTELLIGENCE AND COMMUNICATION**

- 10.a. Data Analysis applied to Power Electronics and Drive Systems
- 10.b. Application of Artificial Intelligence to Power Electronics and Drive Systems
- 10.c. Communication for Power Electronics and Drive Systems
- 10.d. Wireless Control
- 10.e. Diagnostics

## NOTE

[illegible]

## GENERAL INFORMATION



The **EPE 2022 ECCE Europe** conference will take place in Hannover, Germany, from 5 to 9 September 2022, where participants will gain detailed insights into the state of the art of power electronics and its applications, and enjoy the exchange with other enthusiasts from all over the world who are interested in this highly relevant and constantly growing area.

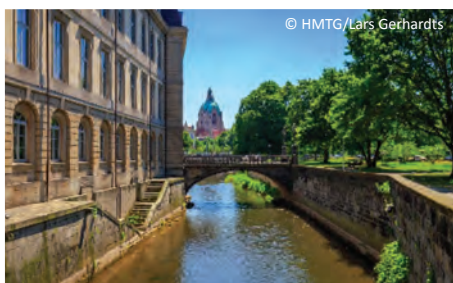
The **24<sup>th</sup> European Conference on Power Electronics and Applications** will be organized in cooperation with Leibniz University Hannover. Following Aachen (1989), Dresden (2005) and Karlsruhe (2016), we are looking forward to host the community of power electronics in Germany for the fourth time.

The EPE Association welcomes researchers, academics and industrials to Hannover, the capital of the state of Lower Saxony and one of the greenest cities in Germany, in autumn 2022. The state of Lower Saxony is home of important companies and is at the forefront of the transition to E-Mobility and of the *Energiewende* as a whole. The trade fairs at Hannover have made the city famous in engineering disciplines worldwide. Hannover can be reached easily by high-speed trains, by air and by car.



## GENERAL INFORMATION ON HANNOVER

### The City of Hannover



Hannover, capital city of the Federal State of Lower Saxony, is an important, centrally situated industrial and trade fair location in the heart of Europe. The city is situated on the river Leine, where the North German Plain gradually gives way to the mountainous region of Lower Saxony. Its convenient location on the intersection between traditionally busy traffic corridors

from north to south and east to west played a major part in Hannover's development from a medieval village to a modern metropolis.

Thanks to its central location in the heart of Europe, Hannover Region is ideally integrated in the major European transport connections. This is where the A7 motorway (Munich - Hamburg) and the A2 motorway (Ruhr Area - Berlin) intersect. The Deutsche Bahn ICE network also ensures fast rail links to and from all major conurbations. Hannover Airport offers direct flights to more than 100 destinations.

The Hannover Region offers an **excellent quality of life** and appeals to people of all age groups. In addition to extensive green spaces, it also boasts excellent shopping amenities within easy reach, a bustling club and nightlife scene as well as a wide selection of recreational areas in and around the city. Hannover is surrounded by a beautiful countryside which is ideal for diverse leisure-time pursuits ranging from water sports to hiking and nature study.



© HMTG/Martin Kirchner

### Hannover – Things to see

On animal safari around the world with exotic landscapes, there are over 2000 animals and amazing shows at the **Hannover Adventure Zoo**. Germany's most spectacular zoo attracts about 1.5 million visitors a year. It is the only place north of the Sahara that makes you believe you are in Africa: with hippopotamuses, zebras and rhinoceroses almost close enough to touch; a Zambezi-style boat trip; and a lookout point that brings you face to face with elegant giraffes. The Indian Jungle Palace is home to one of the largest herds of elephants in Europe: Meet them in the Palace Pool and at showtime.



© HMTG/Lars Gerhardt

**Herrenhausen Gardens** are Hannover's most famous attraction and have been a striking example of grand horticultural style for more than 300 years. The centrepiece, the "Great Garden", is the most important baroque garden in Europe and is a magnet for tourists from all over the world. The Baroque garden in Herrenhausen was created by Electress Sophie

phie (1630-1714) and is one of the few baroque parks which has retained its basic

## GENERAL INFORMATION

structure until today. Music, dance and theatre at Herrenhausen – this tradition thrives today with drama in the hedge theatre, concerts, festivals, world-class cabaret performing arts and international fireworks competitions to animate the Great Garden in Herrenhausen all year round. For a first impression of the royal gardens click here for the virtual tour.

Hannover has something unique to offer: The 4.2 km long **"Red Thread"** is painted on the pavement and passes through the city centre along the 36 most important places of interest of the city. The barrier-free Red Thread has been showing tourists around Hannover since 1970.



Spectacular projects, precious collections and pioneering exhibits all confirm Hannover Region's reputation as a centre of art. There are excellent **museums** in Hannover devoted to archaeology, natural history and ethnology, including vivid portrayals of technical history and everyday life in centuries gone by.

### Hannover – The Green City and its surroundings areas



Hannover is one of the greenest cities in Europe and you can find proof for this in numerous places in and around Hannover. There are several huge parks and recreational areas such as the **Eilenriede**, one of the largest urban forests in Europe. The **Julius-Trip-Ring** is a famous bike tour of 24 km, which will lead you all around the city, giving you the chance to find out how green and diverse Hannover is. There are several

bike sharing opportunities where you can find yourself a suitable ride for an evening getaway.

Hannover is famous for its diverse street culture. Especially in summer, there is a lot of life in the streets. Each district of the city feels like a town for itself and whether you are looking for nice restaurants, individual shopping opportunities or cafés and bars, be sure that Hannover has all of it on offer. There are many well-known options to choose from in each part of the city.

Visiting the Sprengel Museum in the South part of the town, strolling along the Lister

Meile to explore the local shopping opportunities or enjoying a coffee in colourful Linden, Hannovers districts invite you to find your own way to enjoy the city and make you feel welcome wherever you are going.

If you want to discover the surrounding areas of Hannover, you will find diverse and beautiful nature. From green grasslands to the beautiful lake area of the Steinhuder Meer, there is a lot to see.

If you are interested in discovering the surrounding cities of Hannover, take a trip to Celle, Hameln, Hildesheim, or Goslar and stroll along the half-timbered houses and their charming old towns. Visit the site of the world-famous medieval legend of the Pied Piper of Hamelin. You will also find lots of historic places: The old cathedrals of Hildesheim, the Old Town of Goslar and the historic Rammelsberg mine nearby are listed on UNESCO World Heritage List.

### TOURIST INFO

For more information about the city of Hannover and what the city has on offer during your stay visit the website:  
<https://www.hannover.de/en>.

The Hannover Tourist Information is located in the city center close to the central station:  
Ernst-August-Platz 8 - 30159 Hannover  
Tel: +49 511 12345111



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### In the congress center, during the conference:

Network: HCC-WiFi  
Password: No password necessary

## PRACTICAL INFORMATION

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### EMERGENCY CALL

In case of emergency you should use the telephone number 112 to call an ambulance or the fire fighters. You can call the police with the telephone number 110. All emergency calls are free from any device.

### ELECTRICITY

In Germany the power plugs and sockets are of type F (also known as "Schuko"). The standard voltage is 230 V and the standard frequency is 50 Hz.

### CURRENCY

The German national currency is the Euro.

## PRACTICAL INFORMATION

### THE CONFERENCE VENUES

The main conference venue is the Hannover Congress Centrum (HCC) from Tuesday 6 to Thursday 8 September 2022.

Theodor-Heuss-Platz 1-3  
30175 Hannover – Germany  
Tel.: +49 511 8113 0  
<https://www.hcc.de/>

The tutorials take place at the Leibniz University Hannover on Monday, September 5 and Friday, September 9.

Gottfried Wilhelm Leibniz Universität Hannover  
Welfengarten 1  
30167 Hannover - Germany  
Tel.: +49 511 762 - 0  
<https://www.uni-hannover.de/en/>

### HOW TO REACH US?

Public transport tickets can be bought at ticket machines or in the app "GVH – Fahrkarten".

- By taxi



- Hallo Taxi Tel.: +49 511 3811
- Arnemann GmbH Tel.: +49 511 4584545
- Groß Taxen GmbH Tel.: +49 511 664964
- Taxi-App “Free Now”
- App “Moia Ridesharing”
- App “Uber”

### ***From Hannover airport***

- First, take the commuter train S5 to Hannover Hbf (main station, 12 minutes)
- Single tickets (2 zones AB, cost 3.90 €) are valid for 2 hours
- Continue as described below

### ***Hannover Congress Centrum (HCC)***

- By bus from Hannover Hbf (main station)
  - Bus 128 or 134 direction Hannover Peiner Straße, from Hauptbahnhof / Ernst-August-Platz to bus stop Hannover Congress Centrum (9 minutes)
  - Single tickets for the city area (zone A, cost 3.10 €) are valid for 2 hours
- By subway from Hannover Hbf (main station) via Kröpcke (U)
  - Go to the subway station Kröpcke (U) by walking (5 minutes) or by subway (1 minute)
    - Line 1 direction Sarstedt
    - Line 2 direction Rethen
    - Line 3 direction Wettbergen
    - Line 7 direction Wettbergen
    - Line 8 direction Messe/Nord
  - From Kröpcke (U) take subway line 11 direction Hannover Zoo to stop Congress Centrum (8 minutes)
  - Single tickets for the city area (zone A, cost 3.10 €) are valid for 2 hours
- By car
  - The car park at HCC has a maximum rate of 3.50 € / day
  - The parking area of the congress hotel offers 2 charging points for electric vehicles

### ***Leibniz University Hannover***

- By subway from Hannover Hbf (main station) via Kröpcke (U)
  - Go to the subway station Kröpcke (U) by walking (5 minutes) or by subway (1 minute)
    - Line 1 direction Sarstedt
    - Line 2 direction Rethen
    - Line 3 direction Wettbergen

## PRACTICAL INFORMATION

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- Line 7 direction Wettbergen
  - Line 8 direction Messe/Nord
- From Kröpcke (U) take the subway to stop Leibniz Universität (4 minutes)
  - Line 4 direction Garbsen
  - Line 5 direction Hannover Stöcken
- Single tickets for the city area (zone A, cost 3.10 €) are valid for 2 hours
- By car
  - A free parking area can be found next to the main building of the university at Welfengarten 1
  - It includes two charging points for electric vehicles
  - More car parks can be found in the city center

### CATERING

#### ***Hannover Congress Centrum***

Coffee breaks are planned between all sessions and lunch will be served from 12:00 to 13:30 on Tuesday, Wednesday and Thursday at the HCC.

#### ***Leibniz University Hannover***

For the tutorials on Monday and Friday, lunch had to be ordered additionally during registration.

### FIRST AID

Please inform the staff at the registration desk in case of emergency.

### COVID-19

FFP2-masks are mandatory in Germany when making use of public transport. We recommend you to wear a FFP2-mask, on voluntary basis, when you have the feeling that it is necessary.

### Free Wireless Internet

**Network:** HCC-WiFi  
**Password:** No password necessary

**EPE'22 ECCE Europe APP:**

The WHOVA EPE'22 ECCE Europe-application provides you with a lot of information about the conference and exhibition. This app will allow you to:

- View the event agenda and plan your schedule
- Consult and download PDFs: Full papers and Posters.
- Organize virtual meetings with your participating colleagues to interact remotely.
- Create/Chat in various discussion topics in the community forums.
- Receive updates such as last minute announcements from the organizers.

## SOCIAL EVENTS

### PELS Young Professionals Reception – Monday

The PELS Young Professionals Reception is an excellent occasion for an informal and enjoyable way to get to know each other and to network in the beautiful atmosphere of the main building of the Leibniz University Hannover. The reception will be held on Monday, September 5, starting at 18:00.

The IEEE PELS Young Professionals Committee has generously offered funding to support the costs for drinks and snacks. We are looking forward seeing you at this event.

### Welcome Reception – Tuesday

On Tuesday, September 6, the welcome reception takes place at the HCC in the main exhibition hall, the Eilenriedehalle, starting at 18:10. This is a great opportunity to meet all the participants of the conference.

The diverse future leadership event (hosted by Women In Engineering), takes place in parallel, in the Vendor Session Area, starting at 19:30.

### Gala Dinner – Wednesday

This year's Gala Dinner will take place in the historic "Kuppelsaal" (dome hall) of the HCC. You can look forward to a memorable event in a unique event location. It will start at 19:30. Only those participants with a valid registration will have access. Don't forget your badge when you come to the Gala Dinner.

© Kevin Muenkel



### Brauhaus-Event – Thursday

We look forward to a typical "Hanoverian" evening event with food and drinks at the brewery restaurant Meiers Lebenslust, Osterstraße 64, 30159 Hannover. The event starts at 19:00. A small contribution towards expenses is necessary for participation, but definitely worth it! There will be a buffet with various dishes and drinks included.



© Claudia Becker & Wesuell-Dieter Sieg

Late registration is still possible at the conference. However, the event is limited to 180 EPE'22 ECCE Europe-participants. The Brauhaus Event is co-sponsored by the German IEEE IAS/IES/PELS Societies Joint Chapter.

All conference delegates are required to wear badges, which they will receive when they register. These badges will indicate the type of registration each delegate has.

On the top left corner of each badge, the following symbol indicates the **type of conference access**:

- L = Lunches included
- R = Welcome Reception included
- G = Gala Dinner included

On the top right corner, the following symbols indicate the **day(s) of access**:

- TUE 6
- WED 7
- THU 8
- None --> all the 3 days of the conference (Tue 6, Wed 7 & Thu 8)

Specific points to be aware of:

- **Badges** with a specific date on the top right corner give access to the conference and/or exhibition at the specified date(s) only
- **Visitor badges** give access to the exhibition only on the day specified on the top right corner of the badge. People wearing these badges are not allowed to attend the conference's sessions.
- **Guest badges** give access to the lunches (if L is indicated) and/or to the welcome reception (if R is indicated) on the specified date(s). When lunch time is over, people wearing these badge must leave the conference hall and are not allowed to attend the conference's sessions.

Normal participant's badge:



Specific day badge:



Organiser's badge:



## BADGES

Guest badge:



Badge Tutorial Monday:



Badge Tutorial Friday:



Badge All Tutorials on Monday:



Badge All Tutorials on Friday:



Badge for Press-delegates:



Visitor's badge:



Exhibitor's badge:



Technical Visit:





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*„Effect of Phase Error in Power Measurement“*  
Vendor session area – September 7 (Wed), 12 pm





## TUTORIALS

MONDAY 5 SEPTEMBER 2022 & FRIDAY 9 SEPTEMBER 2022

All tutorials will take place at the Leibniz University of Hannover, Welfengarten 1, 30167 Hannover.

Morning sessions start at 09:30, the registration opens at 08:30

Afternoon session start at 14:00, the registration for afternoon tutorials opens at 13:00

### MONDAY 5 September 2022

#### Tutorial #1: Afternoon (Room F 128)

##### **Switching Loss Measurements in Power Semiconductors**

**Sebastian SPRUNCK** (Fraunhofer Institute for Energy Economics and Energy System Technology IEE, Germany), **Marco JUNG** (Bonn-Rhein-Sieg University of Applied Sciences & Fraunhofer IEE, Germany), **Christian LOTTIS** (Bonn-Rhein-Sieg University of Applied Sciences, Germany)

#### Tutorial #2: Morning (Room F 128)

##### **Reliability of Modern Power Electronics Based Power Systems (PEPS)**

**Frede BLAABJERG** (Department of Energy Technology, Aalborg University, Denmark), **Dao ZHOU** (Department of Energy Technology, Aalborg University, Denmark), **Saeed PEYGHAMI** (Department of Energy Technology, Aalborg University, Denmark), **Jose RUEDA TORRES** (Electrical Sustainable Energy Department, Delft University of Technology, The Netherlands)

#### Tutorial #3: Full Day (Room F 102)

##### **Bulk DC-DC Conversion for MVDC Applications**

**Drazen DUJIC** (EPFL – Ecole Polytechnique Fédérale de Lausanne, Switzerland), **Jakub KUCKA** (Siemens AG, Germany), **Nikolina DJEKANOVIC** (EPFL – Ecole Polytechnique Fédérale de Lausanne, Switzerland), **Gabriele ULISSI** (EPFL – Ecole Polytechnique Fédérale de Lausanne, Switzerland), **Renan BARCELOS** (EPFL – Ecole Polytechnique Fédérale de Lausanne, Switzerland)

#### Tutorial #4: Morning (Room B 302)

##### **Passives in Power Electronics: Magnetic Components**

**William Gerard HURLEY** (National University of Ireland, Galway, IRELAND), **Ziwei OUYANG** (Technical University of Denmark)

#### Tutorial #5: Morning (Room F 142)

##### **Introduction to Si IGBTs and Fast Diodes: Design Principles, Performance Requirements and Development Trends**

**Munaf T. A. RAHIMO** (MTAL GmbH, Switzerland)

**Tutorial #7: Afternoon (Room B 302)**

**Wide Band-Gap Semiconductor Devices: State-of-the-Art and their Application Basics**  
**Nando KAMINSKI** (University of Bremen, Germany), **Eckart HOENE** (Fraunhofer IZM, Germany)

**Tutorial #16: Afternoon (Room F 142)**

**Modular Multi-Level Converter enabling Reliability-Oriented Control and Protection in Multi-Terminal dc Systems**

**Marco LISERRE** (Christian-Albrechts-Universität zu Kiel, Germany), **Marius LANGWASSER** (Christian-Albrechts-Universität zu Kiel, Germany), **Rongwu ZHU** (Harbin Institute of Technology, Shenzhen, China), **Hossein IMAN-EINI** (School of Electrical and Computer Engineering, University of Tehran, Iran)

**Tutorial #21: Morning (Room F 107)**

**Integrated Motor Drives Using SiC and GaN Wide Bandgap Devices**

**Bulent SARILOGLU** (University of Wisconsin-Madison, USA)

**Tutorial #22: Full Day (Room B 305)**

**Understanding Lithium-Ion Batteries as a partner of Power Electronics**

**Dirk-Uwe SAUER** (RWTH Aachen University, Germany), **Alexander BLÖMEKE** (RWTH Aachen University, Germany)

**FRIDAY 9 September 2022:****Tutorial #8: Morning (Room F 142)**

**Machine Learning Techniques for Reliable Battery State of Health Estimation**

**Daniel-Ioan STROE** (Aalborg University, Denmark), **Søren B. VILSEN** (Aalborg University, Denmark), **Xin SUI** (Aalborg University, Denmark)

**Tutorial #11: Full Day (Room F 128)**

**Testing, Design, and Monitoring of Power Electronic Components for Reliability**

**Francesco IANNUZZO** (Center of Reliable Power Electronics (CORPE), Aalborg University, Denmark), **Amir Sajjad BAHMAN** (Center of Reliable Power Electronics (CORPE), Aalborg University, Denmark)

**Tutorial #15: Full Day (Room B 302)**

**High-Performance Model Predictive Control of Power Electronic Systems**

**Tobias GEYER** (ABB System Drives, Switzerland), **Petros KARAMANAKOS** (University of Tampere, Finland)

## HIGHLIGHTED FOCUS TOPICS

The conference will highlight several Focus Topics. Three of them cover the latest technology trends that will be driving future innovation in power electronics, while the three other topics cover important application trends that will have a tremendous impact on future markets and requirements for power electronic systems. These topics have been selected as follows:

### Technology Focus Topics

- Focus Topic 1 : New Power Electronic Devices
- Focus Topic 2 : Integration and Adverse Effects of WBG Devices
- Focus Topic 3 : Batteries in Power Electronics

### Application Focus Topics

- Focus Topic 4 : Electrification of Aircraft
- Focus Topic 5 : Electrification of On- and Off-Road Vehicles
- Focus Topic 6 : Electricity and Hydrogen based Energy Systems

All Focus Topics feature a Keynote presentation, an Invited Lecture Session and a panel discussion called Industrial Forum. For the Technology Focus Topics, we arranged a number of Tutorials. Many of the Focus Topics are enriched with a Technical Tour.

### Technology Focus Topics



#### **New Power Electronic Devices**

Innovations in power electronic devices, not only in WBG but also in Silicon and High-Power semiconductors, will help to further increase the efficiency, power density and robustness of power electronics systems.

#### **Keynote Speaker:**

**Dr. Gerald DEBOY**  
Infineon

### **Shaping the Transition from Si-based Power Devices to SiC MOSFETs and GaN HEMTs**

Tuesday, 6 September 2022: 09:30 – 10:00  
*Plenary Room (Niedersachsenhalle)*

### Invited Lectures:

LS1a – Plenary Room (Niedersachsenhalle), Tuesday, 6 September 2022, 10:20 – 11:20

#### **Hybrid Silicon-SiC Inverter – Combining the Best of Both Worlds**

**Hans-Günter ECKEL**

University of Rostock

#### **Robustness of SiC Trench MOSFETs**

**Christian FELGEMACHER**

ROHM Semiconductor GmbH

#### **3D Predictive Fatigue Modeling of Power Modules**

**Ben SAMPLES**

Wolfspeed

### Industrial Forum:

Industrial Forum 1 (Roter Saal), Tuesday, 6 September 2022, 17:00 – 18:10

#### **Squeezing out more – fine-tuning of devices and processes**

**Moderator: Nando KAMINSKI**

### Related Tutorials:

#### **TUTORIAL N° 05**

**Monday Morning (09:30 – 13:00)**

**Introduction to Si IGBTs and Fast Diodes: Design Principles, Performance Requirements and Development Trends**

**Munaf T. A. RAHIMO** (MTAL GmbH)

#### **TUTORIAL N° 07**

**Monday Afternoon (14:00 – 17:30)**

**Wide Band-Gap Semiconductor Devices: State-of-the-Art and their Application Basics**

**Eckart HOENE** (Fraunhofer IZM)

**Nando KAMINSKI** (University of Bremen)

#### **TUTORIAL N° 11**

**Friday Full Day (09:30 – 17:30)**

**Testing and Monitoring of Power Electronic Components for Reliability Introduction to Si IGBTs and Fast Diodes: Design Principles, Performance Requirements and Development Trends**

**Francesco IANNUZZO** (Aalborg University)

**Amir Sajjad BAHMAN** (Aalborg University)

## HIGHLIGHTED FOCUS TOPICS



### **Integration and Adverse Effects of WBG Devices**

While WBG devices allow faster switching and higher efficiency, they also come with increased requirements on the surrounding components. This includes passive components, especially magnetics, as well as embedding the switches into the commutation cell. Monolithic integration can be a key to handle the resulting challenges.

### **Keynote Speaker:**

**Dan KINZER**

NAVITAS SEMICONDUCTOR

### **Advancing GaN Power ICs: Efficiency, Reliability & Autonomy**

Wednesday, 7 September 2022: 08:30 – 09:00

*Plenary Room (Niedersachsenhalle)*

### **Invited Lectures:**

LS4a – Plenary Room (Niedersachsenhalle), Wednesday, 7 September 2022, 14:20 – 15:20

#### **Heterogeneous Integration of Power Conversion using Power Supply on Chip and Power Supply in Package**

**Cian Ó MATHÚNA & Seamus O'DRISCOLL**

Tyndall

#### **Driving Innovations for Power Electronics with Integratable and Sustainable Magnetics**

**Matt WILKOWSKI**

EnaChip

#### **Impact of package technology on the switching behavior of high-voltage GaN FETs**

**Sebastian KLÖTZER**

Nexperia

### **Industrial Forum:**

Industrial Forum 3 (Roter Saal), Wednesday 7 September 2022, 17:00 – 18:10

#### **There is more to GaN than just the lateral HEMT single switch**

**Moderator: Nando KAMINSKI**

### Related Tutorials:

#### **TUTORIAL N° 01**

**Monday Afternoon (14:00 – 17:30)**

#### **Switching Loss Measurements in Power Semiconductors**

**Sebastian SPRUNCK** (Fraunhofer Institute)

**Marco JUNG** (Bonn–Rhein–Sieg University of Applied Sciences)

**Christian LOTTIS** (Bonn–Rhein–Sieg University of Applied Sciences)

#### **TUTORIAL N° 04**

**Monday Morning (09:30 – 13:00)**

#### **Passives in Power Electronics: Magnetic Components**

**Ger HURLEY** (National University of Ireland)

**Ziwei OUYANG** (Technical University of Denmark)

### Related Technical Visit:

#### **Technical Visit N° 01**

**Friday 9 September 2022 (07:30 – 14:30)**

**BLOCK Transformatoren GmbH**

Verden, Germany



#### **Batteries in Power Electronics**

The availability of high-capacity batteries has made E-mobility a reality. Further improvements in battery technology will provide even higher ranges and will enable even more mobile applications of power electronics, including electric aviation. On the other hand, their characteristics, especially when combined with power electronics, need more attention.

### Keynote Speaker:

**Prof. Yi CUI, Ph.D.**

Stanford University

## **Reinventing Batteries Through Nanotechnology**

Tuesday, 6 September 2022: 14:40 – 15:10

*Plenary Room (Niedersachsenhalle)*

### Invited Lectures:

LS2a – Plenary Room (Niedersachsenhalle), Tuesday, 6 September 2022, 15:40 – 16:40

## HIGHLIGHTED FOCUS TOPICS

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### **Impact of power electronics on battery operation**

**Dirk Uwe SAUER**

RWTH Aachen University

### **Impact of high frequency current pulses on battery ageing**

**Julia KOWAL**

TU Berlin

### **Trends in Power Electronics and Batteries for Electrified Vehicle Infrastructure**

**Torsten LEIFERT**

Volkswagen Group Charging (Elli) Hardware Platform

### **Industrial Forum:**

Industrial Forum 2 (Blauer Saal), Tuesday 6 September 2022, 17:00 – 18:10

### **Batteries in Power Electronics**

**Moderator: Marco LISERRE**

### **Related Tutorials:**

#### ***TUTORIAL N° 08***

***Friday Morning (09:30 – 13:00)***

#### **Machine Learning Techniques for Reliable Battery State of Health Estimation**

**Daniel-Ioan STROE** (Aalborg University)

**Søren B. VILSEN** (Aalborg University)

**Xin SUI** (Aalborg University)

#### ***TUTORIAL N° 22***

***Monday Full Day (09:30 – 17:30)***

#### **Understanding Lithium-Ion Batteries as a partner of Power Electronics**

**Dirk-Uwe SAUER** (RWTH Aachen University)

**Alexander BLÖMEKE** (RWTH Aachen University)

### **Related Technical Visit:**

#### ***Technical Visit N° 02***

***Friday (07:30 – 14:30)***

#### **Volkswagen Battery System Factory**

Braunschweig, Germany



### Application Focus Topics :



#### **Electrification of Aircraft**

Among the most fascinating application trends is the electrification of air transportation. This Focus Topic will highlight the role of electric drives in the future of zero-emission aircraft.

### Keynote Speaker:

**Tanja NEULAND**  
AIRBUS OPERATIONS GmbH

### **Make it Fly – The Future of Sustainable Aviation**

Thursday, 8 September 2022: 08:30 – 09:00  
*Plenary Room (Niedersachsenhalle)*

### Invited Lectures:

LS6a – Plenary Room (Niedersachsenhalle), Thursday, 8 September 2022, 10:00 – 11:00

#### **Aircraft Electrification – System-Level Potentials for Aviation Decarbonization**

**Kathrin EBNER**  
Bauhaus Luftfahrt

#### **About Power Electronics Challenges in Aviation**

**Marco BOHLLAENDER**  
Rolls-Royce Deutschland Ltd & Co KG

#### **Development of electric motors for aircraft applications**

**Simon WOLFSTÄDTER**  
Oswald Elektromotoren GMBH

### Industrial Forum:

Industrial Forum 5 (Roter Saal), Thursday 8 September 2022, 16:30 – 17:40

**Electrification of Aircraft**  
**Moderators: Regine MALLWITZ**

## HIGHLIGHTED FOCUS TOPICS

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### Related Tutorial:

#### **TUTORIAL N° 21**

**Monday Morning (09:30 – 13:00)**

**Integrated Motor Drives Using SiC and GaN Wide Bandgap Devices**

**Bulent SARILOGLU** (University of Wisconsin-Madison)

### Related Technical Visit:

#### **Technical Visit N° 03**

**Friday 9 September 2022 (08:30 – 14:30)**

**Deutsches Zentrum für Luft- und Raumfahrt (DLR) Research Airport**

Braunschweig, Germany



#### **Electrification of On- and Off-Road Vehicles**

While the electrification of passenger cars has come a long way, the trends and perspectives of future developments will be discussed. Even higher challenges have to be met in the electrification of utility vehicles.

### Keynote Speaker:

**Alexander KRICK**

Volkswagen AG – Group Components

### **Electrification Strategy of Volkswagen Group**

**Wednesday, 7 September 2022: 09:00 – 09:30**

Plenary Room (Niedersachsenhalle)

### Invited Lectures:

LS3a – Plenary Room (Niedersachsenhalle), Wednesday, 7 September 2022, 10:00 – 11:00

#### **Modulation Strategy Impact of BEV Inverters on the Voltage Ripple and the High-Voltage Traction System Stability**

**Cornelius RETTNER**

Group Components, Volkswagen AG

#### **Zero Emission Trucks & Bodies**

**Martin GLASER**

Daimler Truck

### **Powertrain trends in electric trucks**

**Luciana C. AFONSO**

Infineon Technologies AG

#### **Industrial Forum:**

Industrial Forum 4 – Blauer Saal, Wednesday 7 September 2022, 17:00 – 18:10

### **Faster charging and new technologies – the Power Architecture of future electric cars and trucks**

**Moderator: Martin DOPPELBAUER**

#### **Related Technical Visit:**

**Technical Visit N° 04**

**Friday 9 September 2022 (09:00 – 14:00)**

**Komatsu Hannover, Germany**



### **Electricity and Hydrogen based Energy Systems**

In a carbon-free future, not only regenerative energies but also Hydrogen will play a key role. Trends of applications, as well as electrolysis power supply will be highlighted.

#### **Keynote Speaker:**

**Dr. Stefan LINDER**

Alpiq AG

### **The Instrumental but Extremely Challenging Role of Hydrogen Towards a Decarbonized Society**

**Thursday, 8 September 2022: 09:00 – 09:30**

Plenary Room (Niedersachsenhalle)

#### **Invited Lectures:**

LS7a – Plenary Room (Niedersachsenhalle), Thursday, 8 September 2022, 15:10 – 16:10

### **Integrating Offshore Wind & Hydrogen – An Operator's View**

**Dr. Florian Gremme**

RWE Technology International GmbH

## HIGHLIGHTED FOCUS TOPICS

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**Status quo and future prospects of power electronic solutions for electrolysis plants**

Sven SCHUMANN

Siemens Energy

**Modular power supply system for large scale water electrolyzers**

Klaus RIGBERS

SMA Solar Technology AG

### Industrial Forum:

Industrial Forum 6 (Blauer Saal), Thursday 8 September 2022, 16:30 – 17:40

**Hydrogen based energy systems**

Moderator: Stefan LINDER

### Related Technical Visit:

**Technical Visit N° 05**

**Friday 9 September 2022 (07:30 – 14:30)**

**H2-Campus Salzgitter** Salzgitter, Germany

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C A R I A D

## Tuesday 06 September

### OPENING SESSION AND KEYNOTE SESSION

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#### **09:00    Opening Session**

***Location: Niedersachsenhalle***

Chair(s): MERTENS Axel, Leibniz Universität Hannover, Germany  
THOMAS Jean-Luc, Conservatoire National des Arts et Metiers, France

Opening of the Conference and Welcome to the participants  
by Prof. Dr. Axel Mertens, Conference Chairman

Opening of the Conference and Welcome to the participants  
by Prof. Dr. Jean-Luc Thomas, President of EPE Association

Message from IEEE-PELS by Prof. Dr. Liuchen Chang, President of IEEE-PELS

General information about the conference by Prof. Dr. Axel Mertens, Conference Chairman

#### **09:30    Keynote 1: Shaping the transition from Si-based power devices to SiC MOSFETs and GaN HEMTs by DEBOY Gerald - Infineon Technologies Austria AG - Austria**

***Location: Niedersachsenhalle***

Chair(s): KAMINSKI Nando, Universität Bremen, Germany  
RABKOWSKI Jacek, Warsaw University of Technology, Poland



With an expected growth of SiC-device and module volumes to around 6 bn US\$ and GaN HEMTs to 2 bn US\$ in the next 5 years the transition from Si-based power devices to their corresponding Wide-bandgap technologies is now fully on its way. The advantages being created by wide bandgap devices on system level will outweigh their higher costs on device level.

These benefits are as diverse as the applications where wide bandgap power devices will be considered in the first place. SiC MOSFETs have started in the field of Photovoltaics by improving efficiency and size/weight of the PV inverter and are now penetrating the main inverter offering a range extension of up to 8%. GaN HEMTs first made an impact on chargers for mobile phones and laptops by enabling form factors up to now unachievable.

The presentation will start with an overview of key performance indicators of wide bandgap technologies in comparison to their silicon counterparts and their perspective along further generations. In a 2nd section we will discuss topologies and modulation schemes being required to reach the full system benefits of wide bandgap power devices. An outlook on future trends and applications will close the talk.

**10:20    LS1a - Topic 12: Invited Lectures - New Power Electronics Devices**

***Location: Niedersachsenhalle***

Chair(s): KAMINSKI Nando, Universität Bremen, Germany  
RABKOWSKI Jacek, Warsaw University of Technology, Poland

**10:20    577 - Hybrid Silicon-SiC Inverter – Combining the Best of Both Worlds**

*ECKEL Hans-Günter, KAYSER Felix, TO Pham Ha Trieu - University of Rostock - Germany*

**10:40    578 - Robustness of SiC Trench MOSFETs**

*FELGEMACHER Christian - Rohm Semiconductor GmbH - Germany*

**11:00    579 - 3D Predictive Fatigue Modeling of Power Modules**

*SAMPLES Ben, PASSMORE Brandon - Wolfspeed - United States of America*

**10:20    LS1b - Topic 1: Passive Components**

***Location: Roter Saal***

Chair(s): MARTINEZ Wilmar, KU Leuven, Belgium  
RABKOWSKI Jacek, Warsaw University of Technology, Poland

**10:20    168 - Investigation of core-loss mechanisms in large-scale ferrite cores for high-frequency applications**

*BAUMANN Michael, DREXLER Christoph, LORENZ Erwin, PFEIFFER Jonas, SCHMIDHUBER Michael, SCHUEL TZKE Jens - Sumida Components & Modules GmbH - Germany*

**10:40    339 - Design and Potential of EMI CM Chokes with Integrated DM Inductance**

*ALI Mohammad, BUSHRA Rehnuma, FRIEBE Jens, MERTENS Axel - Leibniz Universität Hannover - Germany*

**11:00    350 - A high-performance EMI filter based on laminated ferrite ring cores**

*KACKI Marcin - SMA Magnetics – Poland, HAYES John - University College Cork – Ireland, RYLKO Marek - SMA Magnetics – Poland, SULLIVAN Charles - Dartmouth College - United States of America*

**10:20    LS1c - Topic 2: Wide-Band Gap Power Converters (I)**

***Location: Blauer Saal***

Chair(s): DUJIC Drazen, Ecole Polytechnique Federale de Lausanne, Switzerland  
PEFTITSIS Dimosthenis, Norwegian University of Science and Technology, Norway

**10:20    89 - Current Distribution Control in Parallel Connected Power Converters with Continuous Output Voltage**

*ULMER Sabrina, BRUNNER Andreas, CZERWENKA Philipp, SCHULLERUS Gernot, SOENMEZ Ertugrul - Reutlingen University - Germany*



## Tuesday 06 September

### LECTURE SESSIONS

**10:40 38 - Function Blocks of a Highly-Integrated All-in-GaN Power IC for DC-DC Conversion**  
*BASLER Michael, MOENCH Stefan, QUAY Rüdiger, REINER Richard, WALTEREIT Patrick - Fraunhofer Institute for Applied Solid State Physics IAF - Germany*

**11:00 326 - Design of a GaN-Based Reconfigurable Resonant Converter for High Frequency On-Board Charger of Battery Electric Vehicles**  
*TRAN Manh Tuan, EL BAGHDADI Mohamed, HEGAZY Omar, LATAIRE Philippe, RASOOL HARRIS, TRAN Dai Duong - Vrije Universiteit Brussel - Belgium*

#### **10:20 LS1d - Topic 3: Converter Design and Optimisation (I)**

**Location: Bonatz Saal**

Chair(s): SIEMASZKO Daniel, Hitachi Energy, Switzerland  
WHEELER Pat, University of Nottingham, United Kingdom

**10:20 221 - A Seamless Modulation Strategy for Step-up/down Partial Power Processing Converter (SUD-P3C)**  
*LIU Chao, ANDERSEN Michael, HUANG Jiangsheng, OUYANG Ziwei - Danmarks Tekniske Universitet - Denmark, ZHANG Zhe - Hebei University of Technology - China, ZSURZSAN Gabriel - Danmarks Tekniske Universitet - Denmark*

**10:40 268 - DC Bias Currents in Full-Bridge DC-DC Converters in Context of WBG Semiconductors and High Switching Frequencies**  
*BADENHOP Niklas, FRAEGER Lukas, KAMPEN Dennis, LANGFERMANN Sascha, OWZARECK Michael - BLOCK Transformatoren-Elektronik GmbH - Germany*

**11:00 332 - dV/dt-Based Filter Design for Motor Inverters with Continuous Output Voltage**  
*ULMER Sabrina, BUGARSKI Stevan, SCHULLERUS Gernot, SOENMEZ Ertugrul - Reutlingen University - Germany*

#### **10:20 LS1e - Topic 5: Adjustable-Speed Drives and Converter-Machine Interactions**

**Location: Konferenzraum 27**

Chair(s): CACCIATO Mario, University of Catania, Italy  
KENNEL Ralph, Technische Universität München, Germany

**10:20 40 - Impact of Insulation and Cooling on Performance due to Reliability-Oriented Design of Electrical Machines**  
*HANISCH Lucas, FRANZKI Jonas, HENKE Markus - Technische Universität Braunschweig - Germany*

**10:40     330 - Influence of static rotor imbalance on the roller bearing damage due to inverter-induced bearing currents**

*WEICKER Martin, BINDER Andreas, SAFDARZADEH Omid - Technische Universität Darmstadt - Germany*

**11:00     457 - A Case Study of Pole-Phase Changing Induction Machine Performance**

*BITSI Konstantina - KTH Royal Institute of Technology – Sweden, BOSGA Sjoerd - ABB AB, Corporate Research - Sweden*

**11:20     DS1a - Topic 01: Passive Components**

**Location: Eilenriedehalle**

Chair(s): LUTZ Josef, Technische Universität Chemnitz, Germany

**33 - Frequency scaling of high-power medium-voltage medium-frequency transformers**

**Panel A 1.1**

*GRADINGER Thomas, BURKART Ralph, MOGOROVIC Marko - Hitachi Energy - Switzerland*

**54 - A Novel Concept to Optimize Core Loss in Planar Magnetic Based on an Unbalanced-Flux-Approach**

**Panel A 1.2**

*BARG Sobhi, BERTILSSON Kent - Mid Sweden University – Sweden, GROVER Torrico - Huawei Technologies Sweden AB - Sweden*

**59 - Modeling the arrangement of drill holes for orthogonal biasing in controllable inductors for power electronic converters**

**Panel A 1.3**

*PFEIFFER Jonas, DREXLER Christoph - Sumida Components & Modules GmbH – Germany, KUESTER Pierre - University of Kassel – Germany, SCHMIDHUBER Michael - Sumida Components & Modules GmbH – Germany, ZACHARIAS Peter - University of Kassel - Germany*

**62 - Inductance Estimation for Square-Shaped Multilayer Planar Windings**

**Panel A 1.4**

*PAPADOPOULOS Theofilos, ANTONOPOULOS Antonios - National Technical University of Athens - Greece*

**76 - Loss characterization methodology for soft magnetic nano-crystalline tape materials in coupled inductors**

**Panel A 2.1**

*BOHNE David, DECK Patrick, DICK Christian, WAGNER Valentin - Cologne University of Applied Sciences - Germany*

**77 - Substitution of Nanocrystalline Toroid by Laminated Ferrite Toroid in the Application of a Common-Mode Choke**

**Panel A 2.2**

*REISSENWEBER Lukas, STADLER Alexander, WOHLRATH Fritz - Coburg University of Applied Sciences and Arts - Germany*

## Tuesday 06 September

### DIALOGUE SESSIONS

**140 - New Analytical Model for Calculating HF-Losses in Litz Wire Regions Located Outside the E/U-Core Window of Transformers** **Panel A 2.3**

*MENG Qingchao, BIELA Jürgen - ETH Zurich - Switzerland*

**154 - Impact of aluminum casing on high-frequency transformer leakage inductance and AC resistance** **Panel A 2.4**

*BAKRI Reda, BRUYÈRE Antoine, CIMETIÈRE Xavier - L2EP - Centrale Lille – France, DA-CUNHA-ALVES Wendell - Valeo Siemens Eautomotive France SAS – France, GILLON Frédéric, MARGUERON Xavier - L2EP - Centrale Lille – France, VATAMANU Lucian - Valeo Siemens Eautomotive France SAS - France*

**189 - Measurement Method for Simple Determination of Sinusoidal Large Signal Losses in Inductive Components** **Panel A 3.1**

*ZACHARIAS Peter, AGANZA TORRES Alejandro - University of Kassel - Germany*

**201 - DC Bias Impact on Magnetic Core Losses at High Frequency** **Panel A 3.2**

*SANUSI Bima, OUYANG Ziwei - Danmarks Tekniske Universitet - Denmark*

**242 - A Low-Leakage, Low-Loss Magnetic Transformer Structure for High-Frequency Applications** **Panel A 3.3**

*NGUYEN Allen, HANSON Alex, PHANSE Ajinkya, SOLOMENTSEV Michael - The University of Texas at Austin - United States of America*

**345 - An Open-Source FEM Magnetic Toolbox for Calculating Electric and Thermal Behavior of Power Electronic Magnetic Components** **Panel A 3.4**

*FÖRSTER Nikolas, BÖCKER Joachim, HÖLSCHER Jonas, PIEPENBROCK Till, REHLAENDER Philipp, SCHAFMEISTER Frank, WALLSCHEID Oliver - Paderborn University - Germany*

**361 - Characterisation of a Ferrite-Polymer based Magnetic Material** **Panel A 4.1**

*LE LESLE Johan, LEFEVRE Guillaume, MORAND Julien, PERRIN Rémi, PICHON Pierre-Yves, REGNAT Guillaume - Mitsubishi Electric R&D Centre Europe - France*

**375 - Generalized Core and Winding Area Ratio - Trends for Inductors and Transformers in Power Electronics with High Switching Frequencies** **Panel A 4.2**

*LIN Siqi, FAUTH Leon, FRIEBE Jens - Leibniz Universität Hannover – Germany, MARTINEZ Wilmar - KU Leuven - Belgium*

**440 - PCB Layer Optimization of Planar Medium Frequency Transformer for On-Board EV Chargers** **Panel A 4.3**

*GROON Fabian, BEIRANVAND Hamzeh, GÖRKEM Can, LISERRE Marco, THIAGO Pereira - Kiel University - Germany*

**443 - The Variation of Core Loss in High-Frequency Transformers Under Different Load Conditions** **Panel A 4.4**

*RASEKH Navid, WANG Jun, YUAN Xibo - University of Bristol - United Kingdom*

**444 - A complete PFC inductor design for lighting equipment applications** **Panel A 5.1**

*MO Wai Keung, EBEL Thomas, PAASCH Kasper M - The University of Southern Denmark - Denmark*

**450 - Analysis and Discussion of a Concept for an Adjustable Inductance Based on an Impact of an Orthogonal Magnetic Field** **Panel A 5.2**

*SCHIERLE Guido, HOFFMANN Klaus F., MEISSNER Michael - Helmut Schmidt University - Germany*

**466 - A General Method to Measure Parasitic Capacitance of Transformer Using Guarding Technique** **Panel A 5.3**

*LUAN Shaokang - Aalborg University – Denmark, HORTANS Magnus - Danfoss Drives A/S – Denmark, NIELSEN Stig - Aalborg University – Denmark, SCHUPP Jan, WAKELIN Bruce - Danfoss Drives A/S – Denmark, ZHAO Hongbo - Aalborg University - Denmark*

**488 - Analysis of Test Methods for Measurement of Leakage and Magnetising Inductances in Integrated Transformers** **Panel A 5.4**

*ARAB ANSARI Sajad, DAVIDSON Jonathan, FOSTER Martin, STONE David - University of Sheffield - United Kingdom*

**511 - Analytical, FEM and Experimental Study of the Influence of the Airgap Size in Different Types of Ferrite Cores** **Panel A 6.1**

*ARRUTI Asier, AIZPURU Iosu, ANZOLA Jon, MAZUELA Mikel - Mondragon Unibertsitatea – Spain, PEREZ-CEBOLLA Francisco Jose - University of Zaragoza - Spain*

**11:20 DS1b - Topic 01: Active Devices and Components (Si)**

**Location: Eilenriedehalle**

Chair(s): LUTZ Josef, Technische Universität Chemnitz, Germany

**245 - Boosting Pilot-Diode Reverse-Conducting IGBTs Turn-ON and Reverse-Recovery Losses with a Simple Gate-Control Technique** **Panel A 6.2**

*LEXOW Daniel, ECKEL Hans-Günter - University of Rostock - Germany*

**251 - Influence of IGBT and Diode Parameters on the Current Sharing and Switching-Waveform Characteristics of Parallel-Connected Power Modules** **Panel A 6.3**

*ANDO Yu, HATORI Kenji, SAKAI Junya - Mitsubishi Electric Corporation - Japan, SOLTAU Nils, WIESNER Eugen - Mitsubishi Electric Europe B.V. - Germany*

## Tuesday 06 September

### DIALOGUE SESSIONS

**11:20 DS1c - Topic 01 : Components and Devices for Specific Applications, including for Pulsed Power**

**Location: Eilenriedehalle**

Chair(s): LUTZ Josef, Technische Universität Chemnitz, Germany

**84 - A Pulse generator based on Transmission line Transformer for Insulation Aging Test** Panel A 6.4

*YU Xiao, NGUYEN Khanh-Hung, ZACHARIAS Peter - University of Kassel - Germany*

**101 - Influence of Power Semiconductor Device Variations on Pulse Shape of Nanosecond Pulses in a Solid-State Linear Transformer Driver** Panel A 7.1

*RISCH Raffael, BIELA Jürgen, HU Anliang - ETH Zurich - Switzerland*

**188 - Comparison of Two and Three-Level AC-DC Rectifier Semiconductor Losses with SiC MOSFETs Considering Reverse Conduction** Panel A 7.2

*YU Guangyao, BATISTA SOEIRO Thiago, BAUER Pavol, DONG Jianning - Delft University of Technology - Netherlands*

**200 - Design Procedure for Transformer-based Solid-State Pulse Modulators with Damping Network** Panel A 7.3

*STATHIS Spyridon, BIELA Jürgen - ETH Zurich – Switzerland*

**316 - Reducing the Impact of Skin Effect Induced Measurement Errors in M-Shunts by Deliberate Field Coupling** Panel A 7.4

*LUTZEN Hauke - Universität Bremen - Germany, HUESGEN Till - University of Applied Science Kempten - Germany, KAMINSKI Nando, MUELLER Jonas - Universität Bremen - Germany, POLEZHAEV Vladimir - University of Applied Science Kempten - Germany*

**530 - Comparison of Pulse Current Capability of Different Switches for Modular Multilevel Converter-based Arbitrary Wave shape Generator used for Dielectric Testing of High Voltage Grid Assets** Panel B 1.1

*GANESHPURE Dhanashree Ashok, BAUER Pavol, NIASAR Mohamad Ghaffarian, SOEIRO Thiago Batista, SOUNDARARAJAN Ajeeth Phrassanna, VAESSEN Peter - Delft University of Technology - Netherlands*

**11:20 DS1d - Topic 01: Reliability & Life-Time**

*Location: Eilenriedehalle*

Chair(s): LUTZ Josef, Technische Universität Chemnitz, Germany

**134 - Study of Current Ripple Generators for Accelerated Ageing of Capacitors** **Panel B 1.2**

*KEILMANN Robert, MALLWITZ Regine, SCHEFER Hendrik - Technische Universität Braunschweig - Germany*

**137 - Investigation of Creepage Distances on Printed Circuit Boards for Avionic Applications** **Panel B 1.3**

*SCHEFER Hendrik, KOPP Tobias, KURRAT Michael, MALLWITZ Regine, XU Zhongqing - Technische Universität Braunschweig - Germany*

**145 - Online Junction Temperature Measurement of SiC-MOSFETs via Gate Impedance Using the Gate-Signal Injection Method** **Panel B 1.4**

*HIRNING David, BAUER Luca, HAARER Jörg, ROTH-STIELOW Jörg, RUTHARDT Johannes, ZIEGLER Philipp - University of Stuttgart - Germany*

**146 - Powercycling Test Bench with Realistic Loss Distribution and Temperature Ripples** **Panel B 2.1**

*PLÖTZ Till-Mathis, ECKEL Hans-Günter, FUHRMANN Jan - University of Rostock - Germany*

**159 - Design of a High-Dynamic Test Bench for Accelerated Dielectric Lifetime Testing with adjustable Voltage Slopes and Temperatures** **Panel B 2.2**

*SCHEFER Hendrik, DIETRICH Tim-Hendrik, HANISCH Lucas, HENKE Markus, MALLWITZ Regine - Technische Universität Braunschweig - Germany*

**210 - Comparison of Power Cycling Results of discrete GaN Cascodes for Automotive Power Electronics with high Temperature Swings** **Panel B 2.3**

*LIPPOLD Florian, HAUENSCHILD Philipp, MALLWITZ Regine - Technische Universität Braunschweig - Germany*

**241 - Impact of Bond Wire Configuration on the Power Cycling Capability of Discrete SiC-MOSFET Devices** **Panel B 2.4**

*HEIMLER Patrick, BASLER Thomas, LUTZ Josef, THÖNELT Nick - Technische Universität Chemnitz - Germany*

**263 - Comparative Lifetime Estimations for IGBT Modules in Wind Turbine Converters** **Panel B 3.1**

*NEUMANN Christian, ECKEL Hans-Günter - University of Rostock - Germany*

## Tuesday 06 September

### DIALOGUE SESSIONS

#### **265 - Magnetic Core Evaluation Kit for the Comparison of Core Losses** **Panel B 3.2**

MARTINEZ Wilmar - KU Leuven - Belgium, FRIEBE Jens, LIN Siqi - Leibniz Universität Hannover - Germany, SHEN Xiaobing - KU Leuven - Belgium

#### **284 - System Level Simulation of Moisture Propagation and Effects in Wind Power Converters** **Panel B 3.3**

WENZEL Johannes Christian, MERTENS Axel - Leibniz Universität Hannover - Germany

#### **294 - Response of IGBT chip characteristics due to critical mechanical stress** **Panel B 3.4**

YAMAUCHI Kohei - Fuji Electric Co., Ltd. - Japan, DE DONCKER Rik W. - RWTH Aachen University - Germany

#### **327 - Transient Liquid Phase Bond Reliability Evaluation of Die-attach for Power Module Packaging** **Panel C 1.1**

BILLA Laxma Reddy, GRANT Thomas, LI Xiang, MORSHED Muhammad, NEAL Harley, WANG Yangang - Dynex Semiconductor Ltd - United Kingdom

#### **448 - Extension and Implementation of a Model-based Lifetime Monitoring System with Parallel Calculation of Multiple Power Semiconductors** **Panel C 1.2**

MENZEL Steffen, GROKE Holger, HANF Michael, HOLZKE Wilfried, KAMINSKI Nando, ORLIK Bernd - University of Bremen, IalB - Germany

#### **552 - Dynamic Load Emulation for Automotive Power IC Robustness Validation** **Panel C 1.3**

ULBING Alexander - Kompetenzzentrum Automobil- und Industrie-Elektronik GmbH - Austria, KOSTYNSKI Daniel - KAI Kompetenzzentrum Automobil- und Industrie-Elektronik GmbH - Austria, SIEVERS Markus - Kompetenzzentrum Automobil- und Industrie-Elektronik GmbH - Austria

### **11:20 DS1e - Topic 02: Resonant Converters**

**Location: Eilenriedehalle**

Chair(s): HOFFMANN Klaus, Helmut Schmidt University, Germany

#### **25 - Analysis and design of a resonant DC/DC transformer in modular operation** **Panel C 2.1**

LÓPEZ ANTUÑA Abraham, ARIAS PÉREZ DE AZPEITIA Manuel - University of Oviedo - Spain, FERNÁNDEZ GONZÁLEZ Arturo - European Space Agency - Netherlands, FERNÁNDEZ MIAJA Pablo - University of Oviedo - Spain

#### **66 - A PFC boost converter with reduced switching losses operating at a fixed switching frequency** **Panel C 2.2**

ULRICH Burkhard - Reutlingen University - Germany



**97 - Impact of Higher Current Harmonics on Component Current Stress and Conduction Losses of Half-Bridge-Series-Resonant-Converters in Discontinuous Conduction Mode for High-Power Applications** **Panel C 2.3**

*HAAKE Daniel, GORODNICHEV Anton - Fraunhofer Institute for Energy Economics And Energy System Technology IEE - Germany, JUNG Marco - Bonn-Rhein-Sieg University of Applied Sciences - Germany, SCHNABEL Fabian - Fraunhofer Institute for Energy Economics And Energy System Technology IEE - Germany*

**336 - Minimizing voltage stress in Auxiliary Resonant Commutated Pole Inverters Using saturable Inductors** **Panel C 2.4**

*ZOCHER Markus, GRASS Norbert - Technische Hochschule Nuernberg - Germany, KENNEL Ralph - Technische Universität München - Germany*

**476 - Active output LLC converter topology** **Panel C 3.1**

*BÖRNGEN Hannes, JAGANNATH Sriram, KENNEL Ralph, LIEGMANN Eyke - Technische Universität München - Germany*

**517 - A Series Resonant Balancing Converter for Bipolar DC Grids on Ships** **Panel C 3.2**

*YADAV Sachin, BAUER Pavol, QIN Zian - Delft University of Technology - Netherlands*

**11:20 DS1f - Topic 02: HF Power Converters**

**Location: Eilenriedehalle**

Chair(s): HOFFMANN Klaus, Helmut Schmidt University, Germany

**52 - A Three-Phase Isolated Secondary-Resonant Single-Active-Bridge DC-DC Converter with a Delta-Star Connected Transformer** **Panel C 3.3**

*NISHIO Atsushi, BUDO Kohei, MAI VAN Tuan, TAKESHITA Takaharu - Nagoya Institute of Technology - Japan*

**106 - Mitigation of Dead-Time Effects on Transient DC Bias Elimination in Dual Active Bridge Link Current** **Panel C 3.4**

*MOHANTA Mk Kharabela - Indian Institute of Technology Bhubaneswar - India, CASTELLAZZI Alberto - Kyoto University - Japan, DE Dipankar, SAHU Silpashree - Indian Institute of Technology Bhubaneswar - India*

**123 - Class-E Push-Pull Resonance Converter with Load Variation Robustness for Industrial Induction Heating** **Panel H 1.1**

*MEINERT Janus, AUNSBORG Thore - Aalborg University - Denmark, DUUN Sune - Topsil Globalwafers A/S - Denmark, JOERGENSEN Asger, KJAERGAARD Benjamin, MUNK-NIELSEN Stig - Aalborg University - Denmark*

## Tuesday 06 September

### DIALOGUE SESSIONS

#### **249 - Static analysis and control strategies of the Single Active Bridge Converter** **Panel H 1.2**

GÓMEZ Alexis A. - University of Oviedo - Spain, AYARZAGUENA Iban, BERMEJO Jose Manuel - Ingeteam Power Technology S.A. - Spain, HERNANDO Marta M., LAMAR Diego G. - University of Oviedo - Spain, LARRAZABAL Igor, ORTEGA David - Ingeteam Power Technology S.A. - Spain, RODRIGUEZ Alberto, SEBASTIAN Javier - University of Oviedo - Spain, VAZQUEZ Francisco - Ingeteam R&D Europe S.L. - Spain

#### **331 - Novel current balancing method for HF interleaved converters with reduced control effort** **Panel H 1.3**

BECKEMEIER Christian, FRIEBE Jens - Leibniz Universität Hannover - Germany

#### **378 - Transformer Design Optimization and Comparison for a DC-DC Converter used in PV Micro-Inverters** **Panel H 1.4**

MANTHEY Tobias, FRIEBE Jens, KHADER Meriem - Leibniz Universität Hannover - Germany

#### **383 - Design of Planar Coupled Inductor Applied to Zero-Current Switching Clamped Current Converter** **Panel H 2.1**

BEZERRA Vinicius Freire, FRIEBE Jens, MANTHEY Tobias - Leibniz Universität Hannover - Germany, VITORINO Montiê Alves - Federal University of Campina Grande - Brazil

#### **394 - Phase-Shift Modulation for Flying-Capacitor DC-DC Converters** **Panel H 2.2**

REHLAENDER Philipp, BÖCKER Joachim, SCHAFMEISTER Frank - Paderborn University - Germany

#### **470 - Dynamic average small signal model of the SAB converter** **Panel H 2.3**

GÓMEZ Alexis A. - University of Oviedo - Spain, AYARZAGUENA Iban, BERMEJO Jose Manuel - Ingeteam Power Technology S.A. - Spain, HERNANDO Marta M., LAMAR Diego G. - University of Oviedo - Spain, LARRAZABAL Igor, ORTEGA David - Ingeteam Power Technology S.A. - Spain, RODRIGUEZ Alberto, SEBASTIAN Javier - University of Oviedo - Spain, VAZQUEZ Francisco - Ingeteam R&D Europe S.L. - Spain

#### **481 - Bus voltage regulation using sequential switching ZVZCS converters for spacecraft power systems** **Panel H 2.4**

GARRIGOS Ausias, BLANES Jose Manuel, CASADO Pablo, MARROQUI David, ORTS Carlos, TORRES Cristian - University Miguel Hernandez of Elche - Spain

#### **540 - Optimal frequency for Dynamic Wireless Power Transfer** **Panel H 3.1**

LIANG Mincui, EL KHAMLI KHILIL, PASQUIER Christophe - Universite Clermont Auvergne, Clermont Auvergne INP, CNRS, Institute Pascal - France

**11:20 DS1g - Topic 03: Converter Design and Optimisation**

*Location: Eilenriedehalle*

Chair(s): SIEMASZKO Daniel, Hitachi Energy, Switzerland

**15 - Oscillation Damping in a 500kW Hybrid Si/SiC Three-Level ANPC Inverter with Decoupling Capacitor** Panel F 1.1

*TO Pham Ha Trieu, ECKEL Hans-Günter - University of Rostock - Germany*

**21 - Instability in active balancing control of dc bus voltages in VSC convertersinterconnected via multi-winding transformers** Panel F 1.2

*BASIC Duro, SAMI Siala - General Electric Power Conversion - France*

**86 - Design Comparison of Common Mode and Differential Mode Inductors for 3-Phase Interleaved Converters** Panel F 1.3

*ROBINSON Jonathan, HÄNSEL Stefan, MONDAL Gopal, NEUMEISTER Matthias - Siemens AG - Germany*

**107 - Generalized Automated Tool for Analysis and Design of Multiphase Coupled Inductor Buck Converters** Panel F 1.4

*ALI Rana Asad, HAUG Martin, SHOUSHA Mahmoud - Würth Elektronik EISOS - Germany*

**151 - Simple and Low-Computational Losses Modeling for Efficiency Enhancement of Differential Inverters with High Accuracy at Different Modulation Schemes** Panel F 2.1

*SHAWKY Ahmed, AHMED Emad Mohamed - Aswan University - Egypt, ALI Mokhtar - San Sebastian University - Chile, KOURO Samir - Universidad Tecnica Federico Santa Maria - Chile, RODRIGUEZ José - San Sebastian University - Chile*

**158 - A Comparative Analysis of Power Converter Topologies for Integration of Modular Batteries in Electric Vehicles** Panel F 2.2

*CARCAMO Alberto, G. LAMAR Diego, HERNANDO Marta M. - University of Oviedo - Spain, REMON Daniel - E+ Ingenieria - Spain, RODRIGUEZ Alberto, VAZQUEZ Aitor - University of Oviedo - Spain*

**173 - Design of Triple-Active Bridge Converter with Inherently Decoupled Power Flows** Panel F 2.3

*DONG-UK Kim - Hanyang University - Korea (Republic of), BYENG JOO Byen, BYUNG HWANG Jeong - Hyosung Corporation - Korea (Republic of), SUNG MIN Kim - Hanyang University - Korea (Republic of)*

## Tuesday 06 September

### DIALOGUE SESSIONS

**199 - Standardised switching cell building block for converter design optimisation with detailed electro-thermal model** **Panel F 2.4**

*PAPADOPOULOS Georgios, BIELA Jürgen - ETH Zurich - Switzerland*

**212 - Current distortion study for hybrid multi-level grid inverter with active neutral-point-clamped 4-Leg topology** **Panel F 3.1**

*STEFFEN Jonas - Fraunhofer Institute for Energy Economics and Energy System Technology IEE - Germany, JUNG Marco - Bonn-Rhein-Sieg University of Applied Sciences - Germany, KLEE Matthias, SCHNABEL Fabian, SEIBEL Axel - Fraunhofer Institute for Energy Economics and Energy System Technology IEE - Germany*

**230 - Influence of DC supply voltage unbalances on the performance of ARCP Inverters** **Panel F 3.2**

*TABRIZI Gholamreza - Fraunhofer Institute for Energy Economics and Energy System Technology IEE - Germany, JUNG Marco - Bonn-Rhein-Sieg University of Applied Sciences - Germany, SPRUNCK Sebastian - Fraunhofer Institute for Energy Economics and Energy System Technology IEE - Germany*

**281 - Medium Voltage Diode Rectifier Design for High Step-Up DC-DC Converter** **Panel F 3.3**

*LE METAYER Pierre - Supergrid Institute - France, BUTTAY Cyril - Centre National de la Recherche Scientifique (CNRS) - France, DUJIC Drazen - Ecole Polytechnique Federale De Lausanne - Switzerland, DWORAKOWSKI Piotr - Supergrid Institute - France*

**317 - Grid Forming Control for HVDC Systems: Opportunities and Challenges** **Panel F 3.4**

*ABDALRAHMAN Adil, HAFNER Ying-Jiang, NAMI Ashkan, NAYAK Khirod Kumar, SAHU Malaya Kumar - Hitachi Energy - Sweden*

**367 - Artificial-Intelligence based DC-DC Converter Efficiency Modelling and Parameters Optimization** **Panel F 4.1**

*TIAN Fanghao, BERNAL COBALEDA Diego, MARTINEZ Wilmar - KU Leuven - Belgium*

**388 - Optimization and Scaling of a Compact High-Power IGCT Capacitor Charger Based on Simulation and Measurements with a 300kW/3.3kV Demonstrator** **Panel F 4.2**

*HAAG Felix, ALBRECHT Fabian - Helmut Schmidt University - Germany, BROMMER Volker - French-German Research Institute of Saint-Louis - France, HOFFMANN Klaus F. - Helmut Schmidt University - Germany, LIEBFRIED Oliver - French-German Research Institute of Saint-Louis - France*

**389 - Multilayer busbars for medium voltage ANPC converter dedicated to battery energy storage systems** **Panel F 4.3**

*BIMMEL Luc, BEYE Mamadou Lamine, BIER Anthony, MARTIN Jérémy - CEA - Commissariat a l'Energie Atomique (Grenoble) - France*

**405 - A technical overview of single-stage three-port dc-dc-ac converters** **Panel F 4.4**

*NEIRA Sebastian, BLATSI Zoe, MERLIN Michael - University of Edinburgh - United Kingdom, PEREDA Javier - Pontificia Universidad Catolica de Chile - Chile*

**421 - Brain Emotional Learning-Based Weighting Factor Design for FS-MPC in Power Converters** **Panel G 1.1**

*ORFI YEGANEH Mohammad Sadegh - Danmarks Tekniske Universitet - Denmark, BLAABJERG Frede - Aalborg University - Denmark, DRAGICEVIC Tomislav, MIJATOVIC Nenad - Danmarks Tekniske Universitet - Denmark, OSHNOEI Arman, PEYGHAMI Saeed - Aalborg University - Denmark*

**424 - Analysis and Implementation of different non-isolated Partial-Power Processing Architectures based on the Cuk Converter** **Panel G 1.2**

*ARTAL-SEVIL Jesús Sergio - University of Zaragoza - Spain, ANZOLA Jon - Mondragon Unibertsitatea - Spain, BALLESTIN-BERNAD Victor, BERNAL-AGUSTIN José Luis - University of Zaragoza - Spain*

**435 - Investigation of an Interleaved Current-Fed Single Active Bridge DC-DC Converter for PV Applications** **Panel G 1.3**

*DE ARAÚJO GOMES Lucas Vinicius - Federal University of Campina Grande - Brazil, FRIEBE Jens, MANTHEY Tobias - Leibniz Universität Hannover - Germany, VITORINO Montiê Alves - Federal University of Campina Grande - Brazil*

**451 - A Field Programmable and Dynamic Configurable Power Electronic Converter Concept** **Panel G 1.4**

*HOFF Bjarte - UIT The Arctic University of Norway - Norway*

**531 - Accurate Modeling of IGBT-Based Converters in PLECS** **Panel G 2.1**

*VON HOEGEN Anne, DE DONCKER Rik - RWTH Aachen University - Germany, KOJIMA Tet-suya - Mitsubishi Electric Corporation - Japan, TILLMANN Philipp - RWTH Aachen University - Germany*

**567 - Comparison of High-Power 2-Level and 3-Level Converters in Terms of Power Density, Costs and Performance** **Panel G 2.2**

*SCHLEGEL Ludwig, HOFMANN Wilfried - Technische Universität Dresden - Germany*

## Tuesday 06 September

### DIALOGUE SESSIONS

#### 595 - Properties of a Lithium-Ion Battery as a Partner of Power Electronics

Panel G 2.3

*BLÖMEKE Alexander, JÖST Dominik, LI Weihang, LILITH QUADE Katharina, RINGBECK Florian, SAUER Dirk Uwe - RWTH Aachen University - Germany*

#### 11:20 DS1h - Topic 05: Electrical Machines and Actuators

*Location: Eilenriedehalle*

Chair(s): KENNEL Ralph, Technische Universität München, Germany

#### 142 - Influence of an Electrical Machine on the Dimension and Packaging of Multi-Machine Systems

Panel D 1.1

*STÖCKL Thomas - Renk Group - Germany, HERZOG Hans-Georg - Technische Universität München - Germany*

#### 198 - Combining Schwarz-Christoffel Mappings and Biot-Savart Law to Calculate the High Frequency Current Distribution Inside a Single Slot

Panel D 1.2

*FRICKE Torben, PONICK Bernd - Leibniz Universität Hannover - Germany, SCHWARZ Babette - Voith Hydro Holding GmbH & Co. KG - Germany*

#### 278 - Linear Flux-Switching Machine Design - A Multi-objective Optimization

Panel D 1.3

*MARKS Hendrik, BALASUBRAMANIAN Sridhar, HENKE Markus, SCHILLINGMANN Henning - Technische Universität Braunschweig - Germany*

#### 423 - Subtle Design and Performance Comparison of WF-FSM and DC-VRM for Large-Scale Direct-Drive Wind Power Generation

Panel D 1.4

*AKURU Udochukwu - Tshwane University of Technology - South Africa, KAMPER Marteen - Stellenbosch University - South Africa, ZHU Zi-Qiang - University of Sheffield - United Kingdom*

#### 428 - Integrated motor drive: A multidisciplinary approach

Panel D 2.1

*LEMAIRE-SEMAIL Betty - L2EP - Univ. Lille - France, HARMAND Souad - Université Polytechnique Hauts de France - France, IDIR Nadir - L2EP - Univ. Lille - France, SEMAIL Eric - L2EP / Arts Et Metiers - France*

#### 526 - Thermal behavior impact on the electric motor shape multi-objective optimization

Panel D 2.2

*MEDDOUR Aissam Riad, BABIN Anthony - ESTACA - France, BURKE Richard - University of Bath - United Kingdom, DEGAA Laid, RIZOUG Nassim - ESTACA - France, VAGG Christopher - University of Bath - United Kingdom*

**560 - Modeling and Measuring the Bearing Capacitance of Radially Loaded Bearings** **Panel D 2.3**

*QUABECK Stefan, DE DONCKER Rik W., RODRIGUEZ PINTO Daniel - RWTH Aachen University - Germany*

**566 - In-slot Cooling of Electrical Machines Using Traditional Techniques and Additive Manufacturing** **Panel D 2.4**

*HEMBEL Ahmed, CAKAL Gokhan, SARLIOGLU Bulent - University of Wisconsin - Madison - United States of America*

**11:20 DS1i - Topic 05: Adjustable-Speed Drives and Converter-Machine Interactions**

**Location: Eilenriedehalle**

Chair(s): KENNEL Ralph, Technische Universität München, Germany

**238 - Comparison of Magnetic Noise Compensation Techniques for Dual Three-Phase Electrically Excited Synchronous Machines** **Panel D 3.1**

*HENKENJOHANN Jonas - Leibniz Universität Hannover - Germany, ANDRESEN Jan - KEB Automation KG - Germany, MERTENS Axel - Leibniz Universität Hannover - Germany*

**497 - Double inverter concept for high-speed drives without motor filters** **Panel D 3.2**

*BEINEKE Stephan, BACHMANN Matthias, KASTEN Henning - Keba Industrial Automation Germany - Germany*

**11:20 DS1j - Topic 05: Design, Optimisation and Control of Electric Drives**

**Location: Eilenriedehalle**

Chair(s): KENNEL Ralph, Technische Universität München, Germany

**18 - Influences of conductor positions and fast rising impulse voltages on the line-end coil based on a three-phase high-frequency model** **Panel D 3.3**

*HELMHOLDT-ZHU Ting - Leibniz Universität Hannover - Germany, GRABS Volker - Lenze SE - Germany*

**26 - Predictive Braking Algorithm for Soft Starter Driven Induction Motors** **Panel D 3.4**

*NANNEN Hauke - Ostbayerische Technische Hochschule Amberg-Weiden - Germany, GRIEPENTROG Gerd - Technische Universität Darmstadt - Germany, ZATOCIL Heiko - Ostbayerische Technische Hochschule Amberg-Weiden - Germany*



## Tuesday 06 September

### DIALOGUE SESSIONS

#### **41 - Long Switching Horizon Model Predictive Controller for High-Speed Integrated Modular Motor Drives** **Panel D 4.1**

*SCHIESTL Martin, INCURVATI Maurizio, SCHMID Markus, STÄRZ Ronald - MCI Management Center Innsbruck - Austria*

#### **56 - Drive Level Parameter Identification of an Induction Motor** **Panel D 4.2**

*BÜNTE Andreas, HALD Alex, KIRSCH Andreas - University of Applied Sciences Bielefeld - Germany*

#### **68 - Parameter sensitivity of a MRAS-based sensorless control for AFPMSM considering speed accuracy and dynamic response at multiple parameter variations** **Panel D 4.3**

*BRÜNS Michael, MÜLLER Tankred, RUDOLPH Christian - University of Applied Sciences Hamburg - Germany*

#### **78 - Direct Active Stabilization of the DC-Link in Voltage-Source Converters** **Panel D 4.4**

*KOTEICH Mohamad - Schneider Electric - France, BERTIN Matthieu - ELSYS Design - France*

#### **102 - Optimal design of integrated motor drives - Comparison of topologies (2L/3L/modular), PWM variants, and switch technologies (Si/SiC/GaN)** **Panel E 1.1**

*BRINGEZU Thilo, BIELA Jürgen - ETH Zurich - Switzerland*

#### **113 - High-Bandwidth Power Hardware-in-the-Loop for Motor and Battery Emulation at High Voltage Levels** **Panel E 1.2**

*FISCHER Manuel, EPPING Daniel, HERBOLD Johannes, KEMPER Philipp, PUSCHMANN Frank - dSPACE GmbH - Germany*

#### **222 - Performances Analysis of Non-Model-Based Speed Estimation Algorithms for Motor Drives** **Panel E 1.3**

*TORNELLO Luigi Danilo - University of Catania - Italy, DE DONATO Giulio - Sapienza University of Rome - Italy, SCARCELLA Giuseppe, SCELBA Giacomo, TURRISI Gaetano - University of Catania - Italy*

#### **232 - Low Phase Shift Filter for Current Sensing based on the Difference between AC Machine Models with and without Iron Losses** **Panel E 1.4**

*HIMKER Niklas, KRÜMPPELMANN Marcel, MERTENS Axel - Leibniz Universität Hannover - Germany*

#### **256 - Saliency Extraction and Torque Sharing Estimation of Dual Motor Drive using Special Current Sensor Configuration** **Panel E 2.1**

*RODRIGUEZ MONTERO Eduardo - Technische Universität Wien - Austria, VOGELSBERGER Markus - Alstom Transport Austria GmbH - Austria, WOLBANK Thomas - Technische Universität Wien - Austria*



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|---|--------------------|
| <b>311 - Active control of gear mesh vibration using a permanent-magnet synchronous motor and simultaneous equation method</b>  | <b>Panel E 2.2</b> |
| <i>REITMEIER Dominik, MERTENS Axel - Leibniz Universität Hannover - Germany</i>   |                    |
| <b>385 - Novel Extended Robust Disturbance Observer for Improved Cogging Force Compensation in Permanent Magnet Linear Motors</b>   | <b>Panel E 2.3</b> |
| <i>LUCKERT Franz - Wittenstein Cyber Motor GmbH - Germany, MERTENS Axel - Leibniz Universität Hannover - Germany</i>  |                    |
| <b>412 - Synchronization Angle determination in DVCSFO of DFIM naval propulsion</b>   | <b>Panel E 2.4</b> |
| <i>DRIMIZI Youssef, MAUSSION Pascal, PIETRZAK-DAVID Maria - LAPLACE - University of Toulouse - France</i>   |                    |
| <b>416 - Inverter-machine parametric co-design for energy efficient electric drives</b>   | <b>Panel E 3.1</b> |
| <i>KWAK Jaedon, CASTELLAZZI Alberto - Kyoto University of Advanced Science - Japan</i>  |                    |
| <b>420 - Impact on the torque and on the copper losses under fault-tolerant Control of 5-phase PMSG</b>   | <b>Panel E 3.2</b> |
| <i>DIENG Abdoulaye - UCAD/ESP - Senegal</i>   |                    |
| <b>437 - Self-Sensing Design and Control for an Induction Machine with an Additional Short-Circuited Rotor Coil</b>   | <b>Panel E 3.3</b> |
| <i>LUECKE Stefan, MERTENS Axel - Leibniz Universität Hannover - Germany</i>   |                    |
| <b>464 - Model Predictive Position Control of Electrical Drives on an Industrial PC</b>   | <b>Panel E 3.4</b> |
| <i>KARAU Fabian, LEUER Michael - University of Applied Sciences Bielefeld - Germany</i>   |                    |
| <b>472 - Algorithm for optimal selection of drive motor transmission combination</b>  | <b>Panel E 4.1</b> |
| <i>JACQUES Dries, DERAMMELAERE Stijn - University of Antwerp - Belgium, HOUWEN Simon - Ghent University - Belgium, RAMOS GARCES Santiago, VAN OOSTERWYCK Nick - University of Antwerp - Belgium, VANWALLEGHEM Bart - Ghent University - Belgium</i> |                    |
| <b>509 - Novel Quasi-Direct Rotor Position Estimator for Permanent Magnet Synchronous Machines based on the Back-Electromotive Force using Current Oversampling</b>   | <b>Panel E 4.2</b> |
| <i>LINDEMANN Georg, MERTENS Axel, WILLICH Viktor - Leibniz Universität Hannover - Germany</i>   |                    |

## Tuesday 06 September

### DIALOGUE SESSIONS

#### **11:20 DS1k - Topic 05: Condition Monitoring and Life-Time Prediction**

**Location: Eilenriedehalle**

Chair(s): KENNEL Ralph, Technische Universität München, Germany

#### **165 - Application of a HV bipolar square-wave voltage generator for qualification and assessment of energy equipment** **Panel E 4.3**

*FISCHER-BAEUMER Rico - University of Applied Science Hannover - Germany, DOMES Konrad - Saxogy Power Electronics - Germany, GÖHRMANN Kai, SAHAN Benjamin, STAUBACH Christian - University of Applied Science Hannover - Germany*

#### **11:20 DS1l - Topic 10: Application of Artificial Intelligence to Power Electronics and Drive Systems**

**Location: Eilenriedehalle**

Chair(s): MALLWITZ Regine, Technische Universität Braunschweig, Germany

#### **23 - Online Islanding Detection scheme for Grid Connected Distributed Generation Systems** **Panel G 3.1**

*KHAN Mohammed Ali - Brno University of Technology - Czech Republic, KURUKRURU V S Bharath - Jamia Millia Islamia - India, SINGH Rupam - Khagenfurt University - Austria*

#### **270 - Inductor Design Optimization Using FEA Supervised Machine Learning** **Panel G 3.2**

*CAJANDER David - Université Laval - LEEPCI - Canada, AGUGLIA Davide - CERN - European Organization For Nuclear Research - Switzerland, VIAROUGE Isabelle - Electrotechnologies Selem INC - Canada, VIAROUGE Philippe - Université Laval - LEEPCI - Canada*

#### **453 - SNNFT: Sequential Neural Network-Fuzzy Thermal Early Warning System for Lithium-ion Batteries** **Panel G 3.3**

*DONG Chaoyu - Nanyang Technological University – Singapore, CAO Jingming, JIA Hongjie, LI Marui, MU Yunfei, XIAO Qian - Tianjin University - China*

#### **548 - Deep-Learning fault detection and classification on a UAV propulsion system** **Panel G 3.4**

*BRULIN Pierre-Yves, KHENFRI Fouad, RIZOUG Nassim - ESTACA - France*

**14:40     Keynote 2: Reinventing Batteries Through Nanotechnology by CUI Yi - Stanford University - United States of America**

**Location: Niedersachsenhalle**

Chair(s): LISERRE Marco, Christian-Albrechts-Universität zu Kiel, Germany  
SAUER Dirk Uwe, RWTH Aachen University, Germany



The fast growth of portable power sources for transportation and grid-scale stationary storage presents great opportunities for new battery chemistries. How to increase energy density, reduce cost, speed up charging, extend life, enhance safety and reuse/recycle are critical challenges. Here I will present how we utilize nanoscience to reinvent batteries and address many of challenges by understanding the materials and interfaces through new tools and providing new materials guiding principles. The topics to be discussed include: 1) A breakthrough tool of cryogenic electron microscopy, leading to atomic scale resolution of fragile battery materials and interfaces. 2) Materials design to enable high capacity materials: Si and Li metal anodes and S cathodes. 3) Interfacial design with polymer and inorganic coating to enhance cycling efficiency of battery electrodes. 4) New electrolyte design. 5) New battery chemistry for grid scale storage.

**15:40     LS2a - Topic 12: Invited Lectures - Batteries in Power Electronics**

**Location: Niedersachsenhalle**

Chair(s): LISERRE Marco, Christian-Albrechts-Universität zu Kiel, Germany  
MERTENS Axel, Leibniz Universität Hannover, Germany

**15:40     583 - Impact of power electronics on battery operation**

SAUER Dirk Uwe - RWTH Aachen University - Germany

**16:00     585 - Impact of high frequency current pulses on battery ageing**

KOWAL Julia - Technical University of Berlin - Germany

**16:20     584 - Trends in Power Electronics and Batteries for Electrified Vehicle Infrastructure**

LEIFERT Torsten - Volkswagen AG - Germany

**15:40     LS2b - Topic 1: Silicon Power Devices**

**Location: Roter Saal**

Chair(s): DIECKERHOFF Sibylle, Technical University of Berlin, Germany  
LUTZ Josef, Technische Universität Chemnitz, Germany

## Tuesday 06 September

### LECTURE SESSIONS

#### **15:40 118 - Investigation for Condensation Test Condition of HVIGBT Modules**

*HATORI Kenji - Mitsubishi Electric Corporation - Japan, IDAKA Shiori - Mitsubishi Electric Europe B.V. - Germany, NAKAMURA Keiichi, NOBORU Wakana - Mitsubishi Electric Corporation - Japan, SOLTAU Nils, WIESNER Eugen - Mitsubishi Electric Europe B.V. - Germany*

#### **16:00 202 - Investigation of the Short Circuit Type II Safe Operating Area of IGBTs**

*MYSORE Madhu Lakshman, ALALUSS Mohamed - Technische Universität Chemnitz - Germany, BABURSKE Roman - Infineon Technologies Germany - Germany, BASLER Thomas, MAITRA Abhishek - Technische Universität Chemnitz - Germany, NIEDERNOSTHEIDE Franz-Josef, SCHULZE Hans-Joachim - Infineon Technologies Germany - Germany*

#### **16:20 204 - A new power MOSFET technology achieves a further milestone in efficiency**

*SIEMIENIEC Ralf, BRAZ Cesar, HOFER Heimo, HUTZLER Michael, LAFORET David, NAEVE Tomasz, NEUMANN Ingmar, PREE Elias - Infineon Technologies Austria AG - Austria*

#### **15:40 LS2c - Topic 2: Resonant Converters**

**Location: Blauer Saal**

Chair(s): DUJIC Drazen, Ecole Polytechnique Federale de Lausanne, Switzerland  
HOFFMANN Klaus, Helmut Schmidt University, Germany

#### **15:40 254 - A Multi-Mode Control Based Asymmetrical Dual-Active-Bridge Series-Resonant DC-DC Converter (DABSRC)**

*YAQOOB Muhammad, TORRICO Grover, WANG Shuqin - Huawei Technologies Sweden AB - Sweden*

#### **16:00 269 - Parameter tuning method for classF2 converters for high-frequency wireless power transfer applications**

*LIU Yining, JAYATHURATHNAGE Prasad, KYRÄ Jorma - Aalto University - Finland*

#### **16:20 295 - Mega-hertz High-power WPT system with Parallel-connected inverters using current balance circuit**

*YAMAGUCHI Masamichi, ITOH Jun-Ichi, KUSAKA Keisuke - Nagaoka University of Technology - Japan*

#### **15:40 LS2d - Topic 5: Design, Optimisation and Control of Electric Drives**

**Location: Bonatz Saal**

Chair(s): BOSGA Sjoerd, ABB AB, Corporate Research, Sweden  
CORDIER Julien, Technische Universität München, Germany

**15:40 460 - Control and Integration of a multiphase Brushless Wound Synchronous Motor Drive**

*PERRIN Rémi, BUENO MARIANI Guilherme - Mitsubishi Electric R&D Centre Europe - France*

**16:00 467 - Inductance Analysis of Electric Machines by Classical and Numerical Methods**

*MILLER Tim - University of Glasgow - United Kingdom, GERMISHUIZEN Johannes - Siemens Mobility GmbH - Germany*

**16:20 303 - Performance Evaluation of Sinusoidal-Flux Reluctance Machine for Improving Power Density with Reduced Torque and Input-Current Ripples**

*NAGAYASU Kiwa, HIRAKI Eiji, IIDA Masaki, ISHIHARA Masataka, UMETANI Kazuhiro - Okayama University - Japan*

**15:40 LS2e - Topic 10: Data Analysis and Cybersecurity Techniques**

*Location: Konferenzraum 27*

Chair(s): BRIFF Pablo, GE Grid Solutions, United Kingdom

RIBICKIS Leonids, Riga Technical University, Latvia

**15:40 133 - Data-driven decentralized volt/var control for smart PV inverters in distribution systems**

*LU Yizhou, NORDSTRÖM Lars, XU Qianwen - KTH Royal Institute of Technology - Sweden*

**16:00 195 - Detection of Incipient Inter-Turn Short-Circuit Faults by Artificial Intelligence Classifiers**

*ÖRGÜT Osman - Aselsan Inc. - Turkey, GÜNES Ece Olcay - Istanbul Technical University - Turkey, SAHIN Ilker - Aselsan Inc. - Turkey*

**16:20 293 - Impact of Cyber Attacks on Cost Oriented Power Routing Schemes in Microgrids**

*GUPTA Kirti - Indian Institute of Technology Delhi - India, BLAABJERG Frede - Aalborg University - Denmark, PANIGRAHI Bijaya Ketan - Indian Institute of Technology Delhi - India, SAHOO Subham - Aalborg University - Denmark*

**17:00 Industrial Forum 1: New Power Electronic Devices**

*Location: Roter Saal*

Chair(s): KAMINSKI Nando, Universität Bremen, Germany

**17:00 Industrial Forum 2: Batteries in Power Electronics**

*Location: Blauer Saal*

Chair(s): LISERRE Marco, Christian-Albrechts-Universität zu Kiel, Germany

**Tuesday 06 September**

## **INDUSTRIAL FORUM**

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### **Industrial Forum 1: "Squeezing out more – fine-tuning of devices and processes"**

About ten years ago, the first SiC MOSFETs became commercially available and in the meantime, SiC devices have conquered a considerable market share. On the one hand, the economy of scale brings down prices and SiC devices become viable for more and more applications, also demanding more diverse devices, packages and topologies. On the other hand, it is now the time of optimising the devices, achieving higher performance and reliability as well as higher power density. The panel will discuss current trends and prospects and what to expect from future SiC devices.

**Moderator:** Prof. Dr. Nando KAMINSKI

**Panellists:**

- Peter FRIEDRICHS (Infineon)
- Niels SOLTAU (Mitsubishi Electric)
- Aly MASHALY (Rohm)
- Pietro SCALIA (onsemi)
- Petio NATZKIN (Wolfspeed)
- Manuel GÄRTNER (STMicroelectronics)
- Mark ROELOFFZEN (Nexperia)

**When?:** Tuesday, 6 September 2022 (17:00 – 18:10)

**Where?:** Hannover Congress Centrum (HCC), Roter Saal

### **Industrial Forum 2: "Batteries in Power Electronics"**

In the future volatile energy system batteries will play a central role. Batteries will be also the natural connection point between green transportation sector and electric grid based on sustainable energies. In the Panel experts of different fields from materials for batteries to battery management systems will discuss about battery technologies and their impact on power electronic design. The possibility of power converters to characterize the battery and influence its charging speed and its lifetime will be critically discussed. With an interactive discussion with the audience the panel speakers will confront with the question: are batteries the new frontier for power electronics after electrical machines and electric grid ?

The Discussion will be moderated by Prof. Marco Liserre, Director of the Laboratory for Reliable Battery-Assisted Energy Conversion (BAEW), KINSIS, Kiel University

**Moderator:** Prof. Dr. Marco LISERRE

**Panellists:**

- Prof. Dirk Uwe SAUER (RWTH Aachen University)
- Dr. Julia KOWAL (TU Berlin)
- Prof. Yi CUI (Stanford University)
- Dr. Torsten LEIFERT (Volkswagen AG)

**When?:** Tuesday, 6 September 2022 (17:00 – 18:10)

**Where?:** Hannover Congress Centrum (HCC), Blauer Saal

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# Push the *Pulse*

We are looking forward to meeting the power electronics and application community and exchange with enthusiasts from all over the world. Volkswagen is going EPE – and we're bringing energy management and pulse width modulated inverters made by Volkswagen with us! Sounds intriguing? Come meet us at booth 63 watch the Keynote and take a chance at our raffle. #PushThePulse





# Visit us at **booth 63!**

**On 7 September 2022, 9:00-9:30 am, we will  
give a keynote about Electrification Strategy  
of #VolkswagenGroup.**

For more information on the conference  
program, please visit the EPE's website  
<http://www.epe2022.com>



**Find more information and  
jobs on the VW Career Website**

**08:30    Keynote 3: Advancing GaN Power ICs: Efficiency, Reliability & Autonomy  
by KINZER Dan - Navitas Semiconductor - United States of America**

***Location: Niedersachsenhalle***

Chair(s): WICHT Bernhard, Leibniz Universität Hannover, Germany  
FRIEBE Jens, Leibniz Universität Hannover, Germany



Gallium Nitride (GaN) is a next-generation 'wide-bandgap' semiconductor, replacing legacy silicon chips in power electronic systems. To maximize the full potential of GaN's superior performance traits, Navitas monolithically integrates power, drive, and control to enable up to 3 times faster charging and 3 times more power in half the size and weight for mobile fast chargers, consumer electronics, solar, data centers and electric vehicles.

Integration is key with GaN power devices due to their extremely high switching speeds and sensitive gate characteristics. The next generation of GaN power ICs enable even higher efficiency, autonomy, and reliability with precision sensing of system current, voltage and temperature with real-time control and protection. Implementing integrated loss-less current sensing, external monitoring components such as large, lossy sense resistors are eliminated, reducing system power loss, complexity and system cost.

Offering GaN's superior performance and switching speed alongside the highest level of protection and sensing, GaN power ICs can be confidently used in higher power applications with stringent regulations for efficiency and reliability, such as solar inverters, motor drives, server power, EV Onboard Chargers (OBC) and DC-DC systems.

**09:00    Keynote 4: Electrification Strategy of Volkswagen Group by KRICK  
Alexander - Volkswagen AG - Germany**

***Location: Niedersachsenhalle***

Chair(s): PONICK Bernd, Leibniz Universität Hannover, Germany  
DOPPELBAUER Martin, Karlsruhe Institute of Technologie (KIT), Germany



Volkswagen AG is focusing on the world of mobility in 2030. By 2030, the global market for electric vehicles will have caught up with that of combustion engines, including in terms of sales volume.

With a view to tapping into the revenue streams offered by the new world of mobility, we are in the process of developing industry-leading platforms. The platform approach will be the key to success in the technological world of tomorrow.

These platforms form the backbone of the strategy and provide high-quality, industry leading technology at unprecedented scale and competitive cost.

The Scalable System Platform (SSP) will allow us to reduce complexity. It covers the entire product portfolio, from entry models to high-end vehicles.

The Group Components Technical Development division for E-Drive and Transmission, based at Kassel, Wolfsburg and Ingolstadt locations, is taking a leading role in the development of electric drivetrains for the SSP. One area of focus is the Group-wide responsibility to develop all future inverters. Therefore we are designing a modular system for future drivetrains on the SSP platform. Our aim is to design electric drivetrains that are the best-in-class. Inverter and software are the key components in this regard.

**10:00    LS3a - Topic 12: Invited Lectures - Electrification of Vehicles**

**Location: Niedersachsenhalle**

Chair(s): DOPPELBAUER Martin, Karlsruhe Institute of Technologie (KIT), Germany  
PONICK Bernd, Leibniz Universität Hannover, Germany

**10:00    590 - Modulation Strategy Impact of BEV Inverters on the Voltage Ripple and the High-Voltage Traction System Stability**

*RETTNER Cornelius - Volkswagen AG - Germany*

**10:20    591 - Zero Emission Trucks & Bodies**

*GLASER Martin - Daimler Truck AG - Germany*

**10:40    589 - Powertrain trends in electric trucks**

*AFONSO Luciana Caminha - Infineon Technologies Germany - Germany*

**10:00    LS3b - Topic 1: Wide Bandgap Power Devices**

**Location: Roter Saal**

Chair(s): SIEMIENIEC Ralf, Infineon Technologies Austria AG, Austria  
KAMINSKI Nando, Universität Bremen, Germany

**10:00    163 - Short Circuit Performance and Current Limiting Mode of a Monolithically Integrated SiC Circuit Breaker for DC Applications up to 800 V**

*BOETTCHER Norman, ERLBACHER Tobias - Fraunhofer Institute for Integrated Systems and Device Technology IISB - Germany, NISHIZAWA Shin-Ichi, SAITO Wataru - Kyushu University - Japan, TAKAMORI Taro, WADA Keiji - Tokyo Metropolitan University - Japan*

**10:20    477 - Short Circuit Type II and III Behavior of 1.2 kV Power SiC-MOSFETs**

*LIU Xing, BASLER Thomas, LI Xupeng - Technische Universität Chemnitz - Germany*

**10:40    372 - Analysis of current sharing in the parallel connection of GaN transistors**

*STALLEICKEN Frederik, DIECKERHOFF Sibylle - Technical University of Berlin - Germany, HANDT Karsten, NIELEBOCK Sebastian - Siemens AG - Germany*

## WEDNESDAY 07 SEPTEMBER

### LECTURE SESSIONS

#### **10:00    LS3c - Topic 2: Wide-Band Gap Power Converters (II)**

*Location: Blauer Saal*

Chair(s): BLAABJERG Frede, Aalborg University, Denmark  
FRIEBE Jens, Leibniz Universität Hannover, Germany

#### **10:00    442 - Adaptive Resonant-Valley Switching for a GaN HEMT Direct AC-AC Auxiliary Resonant Commutated Pole Converter**

*STEYN Kyle, BEUKES Johan - Stellenbosch University - South Africa*

#### **10:20    519 - Experimental Demonstration of a 2.2kW Active-Clamp Converter for High-Current Wide-Voltage-Transfer Ratio Applications**

*REHLAENDER Philipp, BÖCKER Joachim, KORTHAUER Bastian, SCHAFMEISTER Frank - Paderborn University - Germany*

#### **10:40    541 - A Wide-Input-Voltage-Range 50W Series-Capacitor Buck Converter with Ancillary Voltage Bus for Fast Transient Response in 48V PoL Applications**

*KHAN Nameer - University of Toronto - Canada, BERGVELD Henk Jan, EL SHERIF Alaa, PIGOTT John - NXP Semiconductors N.V. - United States of America, PIQUÉ Gerard Villar - NXP Semiconductors N.V. - Netherlands, TRESCASES Olivier, XU James - University of Toronto - Canada*

#### **10:00    LS3d - Topic 3: Converter Modelling and Low-level Control, including Gate-Drives**

*Location: Bonatz Saal*

Chair(s): MUSUMECI Salvatore, Politecnico di Torino, Italy  
EBRAHIMI Amir, Leibniz Universität Hannover, Germany

#### **10:00    141 - Fast And Accurate Soft-Switching And Hard-Switching Losses Estimation For Power Converter, Application To The Dual Active Bridge Converter (DAB)**

*BOIGE François, GUERRERO Bruno, LACLAVERIE Julien, VIDEAU Nicolas, ZIANI Adel - Gamma Technologies - United States of America*

#### **10:20    240 - Desaturated turn-off of low-saturation IGBTs with clamping method to reduce turn-off energy losses**

*ACHARYA NAYAMPALLI Vishwas, ECKEL Hans-Günter - University of Rostock - Germany*

#### **10:40    246 - Modeling of an Interleaved DC-DC Boost Converter for a Direct Model Predictive Control Strategy**

*EFFENBERGER Thomas, BÖRNGEN Hannes - Technische Universität München - Germany, HOERNER Michael - Technische Hochschule Nuernberg - Germany, KARAMANAKOS Petros - Tampere University - Finland, KENNEL Ralph, LIEGMANN Eyke - Technische Universität München - Germany*

## WEDNESDAY 07 SEPTEMBER

### LECTURE SESSIONS + DIALOGUE SESSIONS

#### **10:00 LS3e - Topic 7: Control of Grid and Microgrids Connected Inverters**

**Location: Konferenzraum 27**

Chair(s): CARPITA Mauro, University of Applied Sciences of Western Switzerland, Switzerland

DWORAKOWSKI Piotr, Supergrid Institute, France

#### **10:00 167 - Universal Real-Time Model for Active Rectifiers in Versatile Totem-Pole PFC Configurations**

KIFFE Axel, HOFFSTADT Thorben - dSPACE GmbH - Germany

#### **10:20 170 - An Overview of Grid-Connection Requirements for Converters and Their Impact on Grid-Forming Control**

IMGART Paul, BEZA Mebtu, BONGIORNO Massimo - Chalmers University of Technology - Sweden, SVENSSON Jan - Hitachi Energy - Sweden

#### **10:40 55 - Model Reduction using Singular Perturbation Methods for a Microgrid Application**

GNÄRIG Lasse - Technische Universität Dresden - Germany, BURUTXAGA LAZA Saioa - RWE Battery Solutions - Germany, CARRASCO Miguel - EMIS Deutschland - Germany, GENSIOR Albrecht - Technische Universität Ilmenau - Germany, REINCKE-COLLON Carsten - AG-GREKO Deutschland - Germany

#### **11:00 DS2a - Topic 01: Active Devices and Components (Wide Bandgap and other New Materials)**

**Location: Eilenriedehalle**

Chair(s): ALLARD Bruno, Université de Lyon, INSA Lyon, AMPERE, France

#### **14 - Turn-on Losses Optimization for Medium Power SiC MOSFET Half-bridge Module** **Panel C 1.1**

TO Pham Ha Trieu, ECKEL Hans-Günter, KAYSER Felix - University of Rostock - Germany

#### **19 - Simulation Tool for Optimization of Digital Active Gate Drive Sequence Using Genetic Algorithm** **Panel C 1.2**

TAKAYAMA Hajime - Kyoto University - Japan, FUKUNAGA Shuhei - Osaka University - Japan, HIKIHARA Takashi - Kyoto University - Japan

#### **49 - Benefits of switching from Si to SiC modules with further converter optimization** **Panel C 1.3**

ARRIZABALAGA Antxon, AIZPURU Iosu, AZTIRIA Jon, MAZUELA Mikel, URKIZU June - Mondragon Unibertsitatea - Spain

## WEDNESDAY 07 SEPTEMBER

### DIALOGUE SESSIONS

**181 - A Calorimetric and Electrical Method for Measuring Loss Energies of Half-Bridges** **Panel C 1.4**

HAARER Jörg, ECKSTEIN Mattea, HIRNING David, MARX Philipp, ROTH-STIELOW Jörg, ZIEGLER Philipp - University of Stuttgart - Germany

**192 - A Novel Technique for the Suppression of the Displacement Current through Power Module Base-plate Capacitance** **Panel C 2.1**

SAEIDI Mahmoud, NAZERI Ahmad Ali, ZACHARIAS Peter, ZILIC Rufad - University of Kassel - Germany

**193 - Analysis and Implementation of Effective Placement of EMC Capacitors for WBG Modules** **Panel C 2.2**

SAEIDI Mahmoud, JENHANI Firas, NAZERI Ahmad Ali, ZACHARIAS Peter - University of Kassel - Germany

**209 - Threshold voltage shifting and Junction temperature sensing in GaN HEMTs** **Panel C 2.3**

ALATISE Olayiwola, DEB Arkadeep, ETOZ Burhan - University of Warwick - United Kingdom, JAHDHI Saeed - University of Bristol - United Kingdom, ORTIZ GONZALEZ Jose - University of Warwick - United Kingdom

**352 - Investigation of the Static Performance and Avalanche Reliability of High Voltage 4H-SiC Merged-PiN-Schottky Diodes** **Panel C 2.4**

SHEN Chengjun, ALATISE Olayiwola, BASHAR Erfan - University of Warwick - United Kingdom, JAHDHI Saeed, MELLOR Phil - University of Bristol - United Kingdom, ORTIZ GONZALEZ Jose - University of Warwick - United Kingdom, YANG Juefei - University of Bristol - United Kingdom

**371 - Study on the gate loop design and its impact on switching characteristics of GaN Transistors** **Panel C 3.1**

GENG Xiaomeng, DIECKERHOFF Sibylle - Technical University of Berlin - Germany, HILT Oliver - Ferdinand-Braun-Institut Leibniz-Institut für Höchstfrequenztechnik - Germany, KURING Carsten - Technical University of Berlin - Germany, WOLF Mihaela, WÜRFL Joachim - Ferdinand-Braun-Institut Leibniz-Institut für Höchstfrequenztechnik - Germany

**373 - Verification of GaN-HEMT Spice Models Using an S-parameters Approach** **Panel C 3.2**

GUTIERREZ GALEANO Alonso, GAVELLE Mathieu, MARCAULT Emmanuel, SAID Nasri - CEA - Commissariat à l'Energie Atomique (Grenoble) - France

**377 - Active substrate termination of discrete and monolithic bidirectional GaN HEMTs in a T-type inverter** **Panel C 3.3**

*KURING Carsten, DIECKERHOFF Sibylle, GENG Xiaomeng - Technical University of Berlin - Germany, HILT Oliver - Ferdinand-Braun-Institut Leibniz-Institut für Höchstfrequenztechnik - Germany, LANGE Yannic - Technical University of Berlin - Germany, WOLF Mihaela, WÜRFEL Hans-Joachim - Ferdinand-Braun-Institut Leibniz-Institut für Höchstfrequenztechnik - Germany*

**379 - Automated gate impedance network design for SiC MOSFETs using SPICESolver interfaced with MATLAB environment** **Panel C 3.4**

*KUBULUS Pawel, BECZKOWSKI Szymon, JØRGENSEN Asger, MUNK-NIELSEN Stig - Aalborg University - Denmark*

**483 - Gate Input Capacitance Characterization for Power MOSFETs Using Turn-on and Turn-off Switching Waveforms** **Panel H 1.1**

*NISHITANI Yota, INOUE Michiko - Nara Institute of Science And Technology - Japan, SATO Takashi - Kyoto University - Japan, SHINTANI Michihiro - Kyoto Institute of Technology - Japan*

**544 - Influence of Current Collapse due to Vds Bias Effect on GaN-HEMTs Id-Vds Characteristics in Saturation Region** **Panel H 1.2**

*LU Xuyang - L2EP - Univ. Lille - France, FARAMEHR Soroush - Coventry University - United Kingdom, IDIR Nadir - L2EP - Univ. Lille - France, IGIC Petar, LI Ke - Coventry University - United Kingdom, VIDET Arnaud - L2EP - Univ. Lille - France*

**565 - Measurement of Coss-V characteristic of the 1.7kV/900A SiC power module and estimation of the channel current** **Panel H 1.3**

*RABKOWSKI Jacek - Warsaw University of Technology - Poland, GONZALEZ Fernando - Ikerlan - Spain, LARRANAGA Ursue - CAF Power & Automation - Spain, VILLAR Irma - Ikerlan - Spain, ZDANOWSKI Mariusz - Warsaw University of Technology - Poland*

**11:00 DS2b - Topic 01: System Integration, Packaging & Thermal Management**

**Location: Eilenriedehalle**

Chair(s): ALLARD Bruno, Université de Lyon, INSA Lyon, AMPERE, France

**46 - Study on Commutation Loop Inductance and Current Distribution to DC-link Capacitors in a GaN Half-bridge** **Panel H 1.4**

*KOHLHEPP Benedikt, DUERBAUM Thomas, FABER Samuel, KAISER Jeremias - Friedrich-Alexander-University Erlangen-Nuremberg - Germany*



## WEDNESDAY 07 SEPTEMBER

### DIALOGUE SESSIONS

**95 - Characterization of Si-IGBT Crosstalk with a Concentration on Power Circuit Parasitic Elements and the Device Operation Point** **Panel H 2.1**

AZAM RAJABIAN Amir - K.N. Toosi University of Technology - Iran, MEHRAN Kamyar - Queen Mary University of London - United Kingdom, MOHSENZADE Sadegh - K.N. Toosi University of Technology - Iran, NAGHIBI Javad - Queen Mary University of London - United Kingdom

**144 - Design of a serial impingement cooling heatsink for a 30 kW PV string inverter** **Panel H 2.2**

PIQUET BOISSON Guillaume, BRUYERE Paul, PEREZ Gaetan - CEA - Commissariat à l'Energie Atomique (Grenoble) - France

**244 - Temperature Distribution of an IGBT Chip during Repetitive Switching Events under Consideration of Front-Side Ageing** **Panel H 2.3**

BAEUMLER Christian, BASLER Thomas, GOLLER Maximilian, LIU Xing, ZHANG Bo - Technische Universität Chemnitz - Germany

**272 - Advanced Low-Voltage System-in-Package Half-Bridge MOSFET with Added Protection Features** **Panel H 2.4**

MUSUMECCI Salvatore, BARBA Vincenzo - Politecnico di Torino - Italy, MISTRETTA Carmelo, SCRIMIZZI Filippo - STMicroelectronics - Italy

**309 - Hybrid circuit board structure for power electronics** **Panel H 3.1**

BRAUN Gerrit, MOLDENHAUER Deniz-Heinz - SMA Solar Technology AG - Germany

**386 - Improvement of a self-powered gate driver power supply** **Panel H 3.2**

RAYA Mariana, AVIÑÓ Oriol - Centro Nacional de Microelectrónica (Csic) - Spain, BUSQUETS Sergio - Universitat Politècnica de Catalunya - Spain, JORDÀ Xavier, PERPIÑÀ Xavier, VELLVEHI Miquel - Centro Nacional de Microelectrónica (Csic) - Spain

**403 - Insulation Design and Analysis of a Medium Voltage Planar PCB-based Power Bus Considering Interconnects and Ancillary Circuit Integration** **Panel H 3.3**

STEWART Joshua, BOROYEVICH Dushan - Center for Power Electronics Systems (CPES) - Virginia Tech - United States of America, BURGOS Rolando - Virginia Tech - CPES - United States of America



**11:00 DS2c - Topic 02: Solid State Transformers**

*Location: Eilenriedehalle*

Chair(s): DWORAKOWSKI Piotr, Supergrid Institute, France

**67 - Predictive Control of Power Electronics Autotransformer for Mitigating Three-Phase Grid Current Unbalance in Railway Supply Systems** **Panel A 1.1**  
*MIR Tabish, HAJIAN Masood, HARDAN Faysal, KAMEL Tamer, TRICOLI Pietro - University of Birmingham - United Kingdom*

**203 - Single Transformer, MMC based MV Power Electronic Traction Transformer** **Panel A 1.2**  
*FUCHS Simon, BECK Simon, BIELA Jürgen - ETH Zurich - Switzerland*

**333 - Evaluation of Core Losses in Transformers for Three-phase Multi-level DAB Converters** **Panel A 1.3**  
*KHANZADEH Babak, SERDYUK Yuriy, THIRINGER Torbjörn - Chalmers University of Technology - Sweden*

**396 - Configurable ISOP-IPOP DC-DC Converter for Universal Solid-State Transformer** **Panel A 1.4**  
*APTE Pramod - Leibniz Universität Hannover - Germany, FRÄGER Lukas - Block Transformatoren-Elektronik GmbH - Germany, FRIEBE Jens - Leibniz Universität Hannover - Germany*

**413 - Power control of LCR-DAB converter with phase shift in fixed switching frequency** **Panel A 2.1**  
*BAEK Seung-Hyuk - Korea Electrotechnology Research Institute - Korea (Republic of), KIM Sungmin - Hanyang University - Korea (Republic of), LEE Jaehong, LEE Seung-Hwan - University of Seoul - Korea (Republic of)*

**430 - A Multi-port Smart Transformer for Green Airport Electrification** **Panel A 2.2**  
*BUTICCHI Giampaolo - University of Nottingham Ningbo China - China, DE CARNE Giovanni - Karlsruhe Institute of Technologie (KIT) - Germany, GAO Xiang - University of Kiel - Germany, KO Youngjong - Pukyong National University - Korea (Republic of), LISERRE Marco, PEREIRA Thiago, WANG Kangan - University of Kiel - Germany, ZOU Zhixiang - Southeast University Nanjing - China*

**441 - Fault Current Capability Assessment of Low-Voltage side Inverters in Smart-Transformers** **Panel A 2.3**  
*PEREIRA Thiago, CAMURCA Luis, LISERRE Marco, SANTOS Francisco - Christian-Albrechts-Universität zu Kiel - Germany*

## WEDNESDAY 07 SEPTEMBER

### DIALOGUE SESSIONS

**549 - A Compact Solid State Transformer for Replacing Conventional Medium Power Transformer Weight-Critical Applications** **Panel A 2.4**  
*FAUTH Leon, FRIEBE Jens, WILLER Felix - Leibniz Universität Hannover - Germany*

#### **11:00 DS2d - Topic 02: Wide Band Gap Power Electronics**

**Location: Eilenriedehalle**

Chair(s): DWORAKOWSKI Piotr, Supergrid Institute, France

**129 - Partial Discharges of Insulated Wires under Impulses from Wide Bandgap Power Electronics** **Panel A 3.1**  
*HELMHOLDT-ZHU Ting - Leibniz Universität Hannover - Germany, GRAU Vivien - RWTH Aachen University - Germany, OBERNOLTE Urs - Lenze SE - Germany*

**139 - A 20 kW, 3-level flying capacitor 1500 V inverter with characterized GaN devices for grid-tie applications** **Panel A 3.2**  
*NGUYEN Van Sang, BIER Anthony, CATELLANI Stephane, DELETTE Gerard, ES-SEGHER Hajar, SOUPREMANIEN Ulrich - CEA - Commissariat à l'Energie Atomique (Grenoble) - France*

**208 - Performance Evaluation of SiC-based Isolated Bidirectional DC/DC Converters for Electric Vehicle Charging** **Panel A 3.3**  
*NARESH KUMAR Kaushik - Norwegian University of Science and Technology - Norway, MISKIEWICZ Rafal - Warsaw University of Technology - Poland, PEFTITSIS Dimosthenis - Norwegian University of Science and Technology - Norway, RABKOWSKI Jacek, TROCHIM-IUK Przemyslaw - Warsaw University of Technology - Poland*

**233 - Design and analysis of a voltage clamping active delay control method for series connected SiC MOSFETs** **Panel A 3.4**  
*WANG Rui, BJØRN JØRGENSEN Asger, MUNK-NIELSEN Stig, ZHAO Hongbo - Aalborg University - Denmark*

**283 - Fast Switching Planar Inductance Current Source ZETA Converter with Integrated Common Mode Filter** **Panel A 4.1**  
*ZACHER Benjamin, SCHUMANN Christian - Kaiserslautern University of Applied Sciences - Germany*

**301 - Frequency and modulation index related effects in continuous and discontinuous modulated Y-Inverter for motor-drive applications** **Panel A 4.2**  
*JABER Hamzeh J., CASTELLAZZI Alberto - Kyoto University of Advanced Science - Japan*

**325 - Experimental study of interleaved Y-Inverter performance** **Panel A 4.3**  
*ENDO Yusuke - Kobe City College of Technology - Japan, CASTELLAZZI Alberto, JABER Hamzeh J. - Kyoto University of Advanced Science - Japan, MINAMI Masataka - Kobe City College of Technology - Japan*

**340 - Implementation options of a fully SiC Buck-CSI for advanced motor drive application** **Panel A 4.4**  
*LEE Yonghwa, CASTELLAZZI Albero - Kyoto University of Advanced Science - Japan*

**364 - Non-parasitic induced transient overvoltage in ANPC topology due to critical switching sequences** **Panel A 5.1**  
*GEISS Michael, KRAGL Robert, THOMA Jürgen, VOLZER Benjamin - Fraunhofer Institute for Solar Energy Systems ISE - Germany*

**374 - Power Loss Modelling of GaN HEMT-based 3L-ANPC Three-Phase Inverter for different PWM Techniques** **Panel A 5.2**  
*CACCIATO Mario - University of Catania - Italy, AIELLO Giuseppe, GENNARO Francesco - STMicroelectronics - Italy, MITA Salvatore - University Of Catania - Italy, PATTI Dario - STMicroelectronics - Italy, SCALBA Giacomo, SUJEETH Arjun - University Of Catania - Italy*

**425 - GaN HEMT and SiC Diode Commutation Cell based Dual-Buck Single-Phase Inverter with Premagnetized Inductors and Negative Gate Driver Turn-off Voltage** **Panel A 5.3**  
*BRINKER Tobias, FRIEBE Jens, GRÄBER Hendrik - Leibniz Universität Hannover - Germany*

**512 - Design Method of a High Frequency GaN-based Half-Bridge with Bottom-Side Cooled Transistors Using Multi-PCB Assembly** **Panel A 5.4**  
*PACE Loris - Universite de Lyon, INSA Lyon, AMPERE – France, CHEVALIER Florian, DUQUESNE Thierry, IDIR Nadir - L2EP - Univ. Lille - France*

**11:00** **DS2e - Topic 03: Converter Modelling and Low-level Control, including Gate-Drives**

**Location: Eilenriedehalle**

Chair(s): BOROYEVICH Dushan, Virginia Tech - CPES, United States of America

**34 - Output Power Characteristics of Isolated Secondary-Resonant SAB DC-DC Converter for Output Voltage Variation** **Panel A 6.1**  
*YAMASHITA Shota, BUDO Kohei, CAO Tuan, TAKESHITA Takaharu - NAGOYA INSTITUTE OF TECHNOLOGY - JAPAN*

## WEDNESDAY 07 SEPTEMBER

### DIALOGUE SESSIONS

**81 - Hardware-in-the-loop control of a modular induction motor drive in power electronics education** **Panel A 6.2**

*KAERST Jens Peter - HAWK, UNIVERSITY OF APPLIED SCIENCES AND ARTS, GÖTTINGEN - GERMANY*

**122 - Impedance-based analysis of HVDC converter control for robust stability in AC power systems** **Panel A 6.3**

*SCHÖN André, ALVAREZ VALENZUELA Rodrigo Alonso, LORENZ Andreas - Siemens Energy - Germany*

**153 - Method to analyze the influence of switching behavior in hard switching halfbridge topologies for traction application** **Panel A 6.4**

*NEHMER Dominik, BAKRAN Mark-M., BERGMANN Lukas, GLEISSNER Michael - University of Bayreuth - Germany*

**178 - Systematic analysis of oscillations in DC-links of fast switching power electronics** **Panel A 7.1**

*FRICKE Tobias, MALLWITZ Regine - Technische Universität Braunschweig - Germany*

**219 - DC-Bus Control Considerations of Asymmetrical Multilevel Inverters with Embedded Buck-Boost Converter** **Panel A 7.2**

*MOUSELINOS Theodoros, TATAKIS Emmanuel - University of Patras - Greece*

**259 - Control of an Active Gate Driver for an Electric Vehicle Traction Inverter Using Artificial Neural Networks** **Panel A 7.3**

*WIESEMANN Julius, DUMTZLAFF Jacob, MERTENS Axel - Leibniz Universität Hannover - Germany*

**290 - Modelling and Control of 50kW SiC DAB Converter for Off-Board Chargers of Battery Electric Buses** **Panel A 7.4**

*RASOOL Haaris, BAGHDADI Mohamed, CHAKRABORTY Sajib, GEURY Thomas, HEGAZY Omar, TRAN Tuan, VAN MIERLO Joeri - Vrije Universiteit Brussel - Belgium*

**356 - Real-Time MRAC-Based Voltage Control Scheme for Multilevel Inverters Interfacing PV Applications** **Panel B 1.1**

*ORFI YEGANEH Mohammad Sadegh - Danmarks Tekniske Universitet - Denmark, BLAAB-JERG Frede, DAVARI Pooya - Aalborg University - Denmark, DRAGICEVIC Tomislav, MIJATOVIC Nenad - Danmarks Tekniske Universitet - Denmark, RAHMANI Mehdi - Imam Khomeini International University - Iran*

- 393 - A Simulation Model for SiC MOSFET Switching Transients Controlled by an Adaptive Gate Driver with the Capability of Reducing Switching Losses and EMI across the Full Operating Range** **Panel B 1.2**

*LI Zheming, BAKRAN Mark-Matthias - University of Bayreuth - Germany, DOMES Daniel - Infineon Technologies Germany - Germany, MAIER Robert - ZF Friedrichshafen AG - Germany, NIEDERNOSTHEIDE Franz-Josef - Infineon Technologies Germany - Germany*

- 397 - Using System-on-Chip Boards for the Deployment of Controller for Verification and Prototyping** **Panel B 1.3**

*JAMAL Adeel, GRIEPENTROG Gerd - Technische Universität Darmstadt - Germany*

- 404 - Modular multilevel converter control with using a general space vector PWM method in medium voltage hydro power application** **Panel B 1.4**

*TANG Chengjun, THIRINGER Torbjörn - Chalmers University of Technology - Sweden*

- 411 - Investigation About Operation and Performance of Gate Drivers for Power Electronics Converters for Cryogenic Temperatures** **Panel B 2.1**

*UL HASSAN Mustafeez, LUO Fang, SOLOVYOV Vyacheslav, WU Yuxuan - Stony Brook University - United States of America*

- 516 - Dynamic Control of the Switching Behavior of SiC MOSFETs in Converter Operation** **Panel B 2.2**

*HENN Jochen, DE DONCKER Rik W., SCHMITZ Laurids - RWTH Aachen University - Germany*

**11:00 DS2f - Topic 03: EMI/EMC in Power Electronics including HF Phenomena**

**Location: Eilenriedehalle**

Chair(s): BOROYEVICH Dushan, Virginia Tech - CPES, United States of America

- 111 - Modeling method for conducted noise flowing in power lines of DC / DC converter** **Panel B 2.3**

*HATTORI Takato, KITAGAWA Wataru, TAKESHITA Takaharu - Nagoya Institute of Technology - Japan*

- 114 - Analysis and Discussion of Different Three-Phase dv/dt Filter Topologies and the Influences of Their Filter Parameters on Losses and EMC** **Panel B 2.4**

*FRITZE Eric, DICKMANN Stefan, HOFFMANN Klaus F., MEISSNER Michael, RATHJEN Kai - Helmut Schmidt University - Germany, WOYWODE Oliver - Philips Medical Systems DMC GmbH - Germany*

## WEDNESDAY 07 SEPTEMBER

### DIALOGUE SESSIONS

#### **126 - Design and experimental validation of a Voltage Sensing-Current Cancellation Common Mode Linear Actif Filter** **Panel B 3.1**

*MOHAMED NASSURDINE Bacar, CARCOUET Sébastien - CEA - Commissariat à l'Energie Atomique (Grenoble) – France, LABROUSSE Denis, LEVY Pierre-Etienne - University Of Paris Saclay – France, MAYNARD Xavier - CEA - Commissariat à l'Energie Atomique (Grenoble) – France, SCHANEN Jean-Luc - G2ELAB CNRS/G-INP/UGA - France*

#### **434 - Design Interactions of AC- and DC-Side Filters for Traction Drives with SiC Inverters** **Panel B 3.2**

*MOVAGHARNEJAD Hedieh, KNEBUSCH Benjamin, MERTENS Axel, PONICK Bernd - Leibniz Universität Hannover - Germany*

#### **465 - Bidirectional Active EMC Filter for Industrial Power Converters** **Panel B 3.3**

*WUNSCH Bernhard - ABB Corporate Research Center - Switzerland, FORSSTRÖM Ville - ABB OY - Finland, SKIBIN Stanislav - ABB Corporate Research Center - Switzerland*

#### **504 - Investigations on the Active Reduction of Common Mode Noise with Opposing Noise Sources** **Panel B 3.4**

*MARX Philipp, HIRNING David, ROTH-STIELOW Jörg, SEYBOLD Felix, ZIEGLER Philipp - University Of Stuttgart - Germany*

### **11:00 DS2g - Topic 04: Standard and Advanced Modulation Techniques**

**Location: Eilenriedehalle**

Chair(s): ZHOU Dao, Aalborg University, Denmark

#### **17 - Three-Phase ZVS Inverter with Variable and Fixed Frequency Operation based on GaN Semiconductors** **Panel E 1.1**

*KOHLHEPP Benedikt, DUERBAUM Thomas, LUTSCH Michael - Friedrich-Alexander-University Erlangen-Nuremberg - Germany*

#### **90 - Optimized Pulse Pattern with Half-wave Symmetry for 5-Level Converter** **Panel E 1.2**

*WEIRES Jonas, DOS SANTOS Pedro, LIU Steven - Technical University of Kaiserslautern - Germany*

#### **105 - Influence of Carrier-Based PWM Techniques on the Common-Mode Voltage and Common-Mode Current of Six-Phase Full-Bridge Inverter** **Panel E 1.3**

*ARROZY Juris, CECCARELLI Lorenzo, DUARTE Jorge L., HUISMAN Henk, ILHAN CAARLS Esin - Eindhoven University of Technology - Netherlands*

**228 - Efficiency Improvement of Single-Stage AC-DC LLC Converter Using a Line Cycle Synchronous Rectifier (SR) Driving Strategy** Panel E 1.4  
*FOROUZESH Mojtaba, LIU Yan-Fei, SEN Paresh C. - Queen's University - Canada*

**264 - Single-phase, Five-level Inverter with SPWM-Based Neutral Point Voltage Balancing Scheme** Panel E 2.1  
*KONDRATENKO Dmytro, LEWICKI Arkadiusz, ODEH Charles - Gdansk University of Technology - Poland*

**285 - PWM-Based Optimization-Less Active Voltage-Balancing Control of 7-Level Active Neutral-Point-Clamped Flying-Capacitor Inverters** Panel E 2.2  
*DARGAHI Wahid - University of Washington - United States of America*

**289 - Comparative evaluation of the 5-phase Vienna and the 5-phase PWM rectifiers under DC voltage control** Panel E 2.3  
*DIENG Abdoulaye - UCAD/ESP - Senegal*

**341 - Optimized Control Scheme to Achieve ZVS for the Complete Pre-Charging Phase of Supercapacitors with a 500 kHz SiC- and GaN-Based Dual Active Bridge** Panel E 2.4  
*LENZEN Patrick, PFOST Martin - Technische Universität Dortmund - Germany*

**11:00 DS2h - Topic 04: Standard and Advanced Current / Voltage / Synchronization Control Techniques**

*Location: Eilenriedehalle*

Chair(s): ZHOU Dao, Aalborg University, Denmark

**13 - Stability Assessment and Optimization of MMC Energy Balancing for Drive Applications at Standstill Using an Averaging Approach** Panel E 3.1  
*GUI Qiuye, FEHR Hendrik, GENSJÖR Albrecht - Technische Universität Ilmenau - Germany*

**45 - A Direct Model Predictive Control Strategy of Back-to-Back Modular Multilevel Converters Using Arm Energy Estimation** Panel E 3.2  
*HAKKILA Akseli - Tampere University - Finland, ANTONOPOULOS Antonios - National Technical University of Athens - Greece, KARAMANAKOS Petros - Tampere University - Finland*

**98 - Control of a Zero-Voltage Switching Isolated Series-Resonant Power Circuit for Direct 3-phase AC to DC Conversion** Panel E 3.3  
*KOSESOY Yusuf, BONTEN Remco, HUISMAN Henk, SCHELLEKENS Jan - Eindhoven University of Technology - Netherlands*



## WEDNESDAY 07 SEPTEMBER

### DIALOGUE SESSIONS

#### **207 - Constrained Long-Horizon Direct Model Predictive Control for Grid-Connected Converters with LCL Filters** **Panel E 3.4**

*ROSSI Mattia - Tampere University - Finland, CASTELLI-DEZZA Francesco - Politecnico di Milano - Italy, KARAMANAKOS Petros - Tampere University - Finland*

#### **276 - Model Predictive Control-enabled Fault Ride Through Operation Strategy for High Power Wind Turbine** **Panel E 4.1**

*CATALÁN Pedro - Ingeteam Power Technology S.A. - Spain, ARZA Joseba - Ingeteam R&D Europe S.L. - Spain, CHEN Zhe, WANG Yanbo - Aalborg University - Denmark*

#### **277 - A Theoretical Comparison of Different Virtual Synchronous Generator Implementations on Inverters** **Panel E 4.2**

*KÖRNER Patrick, MEIER Hans, NIEMETZ Michael, REINDL Andrea - University of Applied Sciences Regensburg - Germany*

#### **380 - An Improved Multi-loop Resonant and plug-in Repetitive Control Schemes for Three-Phase Stand-Alone PWM Inverter Supplying Non-Linear Loads** **Panel E 4.3**

*NAZERI Ahmad Ali, ZACHARIAS Peter - University of Kassel - Germany*

#### **381 - High Switching Frequency Operation of a Single-Phase Five-Level Hybrid Active Neutral Point Clamped Inverter with a Model Predictive Control Approach** **Panel E 4.4**

*NAJJAR Mohammad - Schneider Electric - Denmark, HEYDARI Rasool, NYMAND Morten - The University of Southern Denmark - Denmark, SHAHPARASTI Mahdi - University of Vaasa - Finland*

#### **419 - A fast control for a three-switch multi-input DC-DC converter** **Panel D 1.1**

*COSSO Simone, FORMENTINI Andrea, MARCHESONI Mario, PASSALACQUA Massimiliano, VACCARO Luis - University of Genova - Italy*

#### **422 - A Strategy for Smooth Microgrid Transitions without Phase Misalignment and Voltage mismatch** **Panel D 1.2**

*SILVA ROCHA Gabriel, ARAUJO OLIVEIRA Hercules, GOMES DE MATOS Jose, RIBEIRO Luiz, SANTANA CASTELO BRANCO Cesar Augusto, WOLFF DOS SANTOS SERRA Amiron - Federal University of Maranhao - Brazil*

#### **494 - Systematic Adaptive Robust State Feedback Control for Active Front-End Rectifiers** **Panel D 1.3**

*ZHETESSOV Aidar, VENKATARAMANAN Giri - University of Wisconsin - Madison - United States of America*



**495 - An Optimized Compensation Strategy of Direct Matrix Converter-Fed PMSM Drives with Field Weakening under Unbalanced Supply Conditions** Panel D 1.4

*XIE Jun, HENNEBERG Dustin, KUSEBAUCH Manuel-Peter, PETZOLDT Jürgen, RAEDEL Uwe, SUBERSKI Martin - Technische Universität Ilmenau - Germany*

**523 - Ageing Mitigation and Loss Control in Reconfigurable Batteries in Series-Level Setups** Panel D 2.1

*KACETL Tomas, GOETZ Stefan, KACETL Jan, TASHAKOR Nima - Technical University of Kaiserslautern - Germany*

**557 - DAB frequency decoupling control with current minimization** Panel D 2.2

*UICICH Simon, ALLARD Bruno, GAUTHIER Jean-Yves, LIN-SHI Xuefang - INSA de Lyon – France, PLAT Arnaud - Airbus - France*

**558 - Design and Performance Analysis of a Modified Proportional Multi-Resonant (PMR) Controller for Three-Phase Voltage Source Inverters** Panel D 2.3

*NAZERI Ahmad Ali, SAEIDI Mahmoud, ZACHARIAS Peter - University of Kassel - Germany*

**561 - Comprehensive Control of Matrix Converters in On-Board Electric Drive Applications** Panel D 2.4

*GALINA Mirzaeva, GOODWIN Graham, LIU Yuan, SERON Maria - University of Newcastle, Australia - Australia*

**569 - SOC governed algorithm for a EV Cascaded H-Bridge connected to a DC charger** Panel D 3.1

*TRESCA Giulia - University of Pavia - Italy, FORMENTINI Andrea - University of Genova - Italy, GEMMA Filippo, LEUZZI Riccardo - University of Pavia - Italy, LUSARDI Federico - Power Electronics Engineer - Italy, ZANCHETTA Pericle - University of Pavia - Italy*

### **11:00 DS2i - Topic 06: Solar-Energy Systems**

**Location: Eilenriedehalle**

Chair(s): FRIEBE Jens, Leibniz Universität Hannover, Germany

**30 - Boost/Buck-boost Based Grid Connected Solar PV Micro-inverter with Reduced Number of Switches and Having Power Decoupling Capability** Panel G 1.1

*PAUL Arup Ratan, BHATTACHARYA Arghyadip, CHATTERJEE Kishore - Indian Institute of Technology Bombay - India*

## WEDNESDAY 07 SEPTEMBER

### DIALOGUE SESSIONS

#### **213 - Dynamic Maximum Power Point Tracking Method including Detection of Varying Partial Shading Conditions for Photovoltaic Systems** **Panel G 1.2**

*ROUPHAEL Rosalie, GAUBERT Jean-Paul, MAAMRI Nezha - University of Poitiers - France*

#### **400 - Cost Comparison for Different PV-Battery System Architectures Including Power Converter Reliability** **Panel G 1.3**

*DECKERS Martijn, DRIESEN Johan, EMMERS Glenn, POORMOHAMMADI Fereshteh - KU Leuven - Belgium, VAN CAPPELLEN Leander - Hasselt University - Belgium*

#### **478 - Analog MPPT Comparison for Interplanetary Small Satellites Missions** **Panel G 1.4**

*TORRES VERGARA Cristian, BLANES MARTÍNEZ José Manuel, CASADO PEREZ Pablo, GAR-RIGÓS SIRVENT Ausias, MARROQUÍ SEMPERE David, ORTS TORRES Carlos - University Miguel Hernandez of Elche - Spain*

#### **489 - A Topology-Morphing Series Resonant Converter for Photovoltaic Module Applications** **Panel G 2.1**

*SERGEANTANIS Grigorios, DE LILLO Liliana, EMPRINGHAM Lee, JOHNSON Mark - University of Nottingham - United Kingdom*

#### **11:00 DS2j - Topic 06: Energy Storage Systems for Renewable Energy including Power-to-Gas**

**Location: Eilenriedehalle**

Chair(s): FRIEBE Jens, Leibniz Universität Hannover, Germany

#### **9 - An Electrically Driven Gas Compressor for Hydrogen Refueling Stations with Active Power Smoothing** **Panel G 2.2**

*RUFER Alfred - Ecole Polytechnique Federale de Lausanne - Switzerland*

#### **267 - Sizing of Hybrid Energy Storage System for Residential PV Applications** **Panel G 2.3**

*WU Xiangqiang, KEREKES Tamas, TANG Zhongting - Aalborg University - Denmark*

#### **485 - AC Battery: Modular Layout with Cell-level Degradation Control** **Panel G 2.4**

*BURGOS Claudio - Universidad de O'Higgins - Chile, DRAGICEVIC Tomislav - Technical University of Denmark - Denmark, LLANOS Jacqueline - Universidad de Las Fuerzas Armadas Espe - Ecuador, MUÑOZ-CARPINTERO Diego - Universidad de O'Higgins - Chile, ORCHARD Marcos - Universidad de Chile - Chile, REYES Lorenzo - Universidad Austral de Chile - Chile*

**11:00 DS2k - Topic 06: Energy Harvesting**

*Location: Eilenriedehalle*

Chair(s): FRIEBE Jens, Leibniz Universität Hannover, Germany

**43 - Standalone Power Management System for Flexible Piezo Electric Nano Generators (PENG) Based on the Co-Polymer P(VDF:TrFE)** **Panel G 3.1**

WÖLK Alexander - Würth Elektronik EISOS - Germany, ALVAREZ Asier - Joanneum Research Forschungsgesellschaft mbH, Materials - Austria, BROOKS Michael, FÖLKEL Lorandt - Würth Elektronik EISOS - Germany, GROTEN Jonas - Joanneum Research Forschungsgesellschaft mbH, Materials - Austria, HAUG Martin - Würth Elektronik EISOS - Germany, PETRITZ Andreas, SCHÄFFNER Philipp - Joanneum Research Forschungsgesellschaft mbH, Materials - Austria, SHEKHAWAT Shashank, SHOUSA Mahmoud - Würth Elektronik EISOS - Germany, STADLOBER Barbara, TSCHOPP Andreas - Joanneum Research Forschungsgesellschaft mbH, Materials - Austria

**11:00 DS2l - Topic 06: Other Renewable-Energy Systems**

*Location: Eilenriedehalle*

Chair(s): FRIEBE Jens, Leibniz Universität Hannover, Germany

**29 - Ambient Electromagnetic Energy Harvesting Circuit Manufactured with Stereolithography Resin** **Panel G 3.2**

NGUYEN Xuan Viet Linh, ALLARD Bruno - Université de Lyon, INSA Lyon, AMPERE - France, BENECH Philippe - University of Grenoble - G2ELAB - - France, CABRERA Michel - Université de Lyon, INSA Lyon, AMPERE - France, DUCHAMP Jean-Marc - University of Grenoble - G2ELAB - - France, GERGES Tony, LOMBARD Philippe, VERDIER Jacques - Université de Lyon, INSA Lyon, AMPERE - France

**11:00 DS2m - Topic 08: Electric Drive Trains for On- and Off-Road Vehicles**

*Location: Eilenriedehalle*

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium

**108 - Experimental study of a directly oil-cooled electrical machine for a full-electric vehicle by using low viscosity oil** **Panel F 1.1**

XU Huihui, DE DONCKER Rik W., GÖTZ Georg Tobias - RWTH Aachen University - Germany, ZHANG Shimin - Totalenergies - France

**319 - A Highly Integrated and Modular High Speed Electric Drive for Lightweight Electric Mountain Bikes** **Panel F 1.2**

HOFER Matthias, NIKOWITZ Mario, SCHROEDL Manfred - Technische Universität Wien - Austria

## WEDNESDAY 07 SEPTEMBER

### DIALOGUE SESSIONS

**439 - Calculating the tractive power and power conversion efficiency of battery electric vehicles using a global navigation satellite system and a road elevation database** **Panel F 1.3**

*DOMAE Shinichi, CASTELLAZZI Alberto - Kyoto University of Advanced Science - Japan, DONG Tenghui - Kyoto University - Japan, JABER Hamzeh J. - Kyoto University of Advanced Science - Japan, MOCHIYAMA Shiu, NAKAMURA Taketsune - Kyoto University - Japan, TAKAHASHI Ryo - Kyoto University of Advanced Science - Japan*

**563 - An artificial intelligence pipeline for critical equipment thermalconditioning system design** **Panel F 1.4**

*ORBBAY Raik, BERNICHON Thomas, LÖFGREN Jonas, MARCAIDE Inko, THIRINGER Torbjörn, TZANAKIS Athanasios - Volvo Car Corporation - Sweden*

### **11:00 DS2n - Topic 08: Electric Drive Trains for Rail Vehicles**

**Location: Eilenriedehalle**

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium

**456 - Adaptive Pontryagin's Minimum Principle-Inspired Supervised-Learning-based Energy Management for Hybrid Trains Powered by Fuel Cells and Batteries** **Panel F 2.1**

*PENG Hujun, CHEN Zhu, DENG Kai, HAMEYER Kay, JESCHKE Sebina, LI Feifei - RWTH Aachen University - Germany*

### **11:00 DS2o - Topic 08: Batteries: Management Systems (BMS), Monitoring and Life-Time Prediction**

**Location: Eilenriedehalle**

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium

**36 - Battery cyclor to generate open li-ion cell aging data and models** **Panel F 2.2**

*LUH Matthias, BLANK Thomas - Karlsruhe Institute of Technology (KIT) - Germany*

**117 - State of Charge Prediction of Lithium-Ion Batteries Based on Artificial Neural Networks and Reduced Data** **Panel F 2.3**

*POHLMANN Sebastian, GIERATHS Antje, KARNEHM Dominic, KUDER Manuel, MASHAYEKH Ali, WEYH Thomas - Universität der Bundeswehr München - Germany*

**304 - Power Hardware-In-the-Loop test of low-voltage battery for a plug-in hybrid electric vehicle** **Panel F 2.4**

*BOUSCAYROL Alain, GERMAN Ronan, LEMAIRE-SEMAIL Betty - Université Lille 1 - L2EP - France, LIEVRE Aurelien - Valeo - France, TOURNEZ Florian - Université Lille 1 - L2EP - France*

**11:00 DS2p - Topic 08: Vehicle Battery Chargers: Contact and Contactless**

Location: Eilenriedehalle

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium

**74 - Analytic calculation of touch and leakage currents of non-isolated EV chargers using a fast common mode calculation method and non-ideal passive component models** **Panel F 3.1**

*STUTZ Christian - Siemens AG - Germany, MÄRZ Martin - Friedrich-Alexander-University Erlangen-Nuremberg - Germany, NIELEBOCK Sebastian - Siemens AG - Germany*

**226 - A Reconfigurable Single-Stage Three-Phase Electric Vehicle DC Fast Charger Compatible with Both 400V and 800V Automotive Battery Packs** **Panel F 3.2**

*FOROUZESH Mojtaba, LIU Yan-Fei, SEN Paresh C. - Queen's University - Canada*

**349 - A Novel Dual CC–CV Output Wireless EV Charger With Minimal Dependency on Both Coil Coupling and Load Variation** **Panel F 3.3**

*BARMAN Subhranil, CHATTERJEE Kishore - Indian Institute of Technology Bombay - India*

**469 - Dynamic Wireless Power Transfer DWPT Time Domain model: xyz position and speed coupling effect** **Panel F 3.4**

*AIZPURU Iosu, AGIRREZABALA Eneko, ARRUTI Asier - Mondragon Unibertsitatea - Spain, BERNAL Carlos - University of Zaragoza - Spain, IRAOLA Unai, MAZUELA Mikel - Mondragon Unibertsitatea - Spain, OYARBIDE Estanis - University of Zaragoza - Spain*

**500 - Onboard ESU Sizing and Dynamic IPT Charging Scenarios for a Tramway Application** **Panel F 4.1**

*BILBAO MURUAGA Endika - Ikerlan - Spain, LEGAY Florian, PRENLELOUP Pierre - SAFT Batteries – France, REYNAUD Jean-François - CAF Power & Automation - Spain, VILLAR Irma - Ikerlan - Spain*

**559 - Proposition and Comparison of Several Solutions for High Induced Voltage across Inactive Transmitting coils in a Series-Series Compensation DIPT System** **Panel F 4.2**

*KABBARA Wassim, BENSETTI Mohamed - GEEPS - France, CAILLIEREZ Antoine, LOUDOT Serge - Renault - France, PHULPIN Tanguy, SADARNAC Daniel - GEEPS - France*

## WEDNESDAY 07 SEPTEMBER

### DIALOGUE SESSIONS & LECTURE SESSIONS

#### **11:00**    **DS2q - Topic 08: Fuel Cells: Converters, Control, Diagnostics and System Integration**

**Location: Eilenriedehalle**

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium

**109 - Development of A Family of High Voltage Gain Step-Up Multi-Port DC-DC Converters for Fuel Cell-based Hybrid Vehicular Power Systems**      **Panel F 4.3**  
*ZOLFI Pouya, EL-REFAIE Ayman, VAHID Sina - Marquette University - United States of America*

**287 - Model Predictive Power Sharing Algorithm for Fuel Cell Integration in a Dual Inverter Electric Vehicle Drivetrain**      **Panel F 4.4**  
*PATHMANATHAN Mehanathan, LEHN Peter W., SINGH Sukhjot, VIANA Caniggia - University of Toronto - Canada*

#### **11:00**    **DS2r - Topic 08: Smart Charging and Vehicle to Grid Interaction** **Location: Eilenriedehalle**

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium

**449 - Smart Charging Strategy for Electric Vehicles Using an Optimized FuzzyLogic System**      **Panel G 3.3**  
*GHOLAMI Mehrdad, BACHA Seddik, HABLY Ahmad, HAJAR Khaled, LABONNE Antoine, MEHRASA Majid, RAZI Reza - GIPSA-LAB CNRS/G-INP/UGA - France*

**499 - Optimization of electric vehicle charge scheduling with consideration of battery degradation**      **Panel G 3.4**  
*JOVANOVIC Raka, BAYHAN Sertac - Hamad Bin Khalifa University - Qatar, BAYRAM Islam - University of Strathclyde - United Kingdom*

#### **14:20**    **LS4a - Topic 12: Invited Lectures - Integration and Adverse Effects of WBG Integration**

**Location: Niedersachsenhalle**

Chair(s): FRIEBE Jens, Leibniz Universität Hannover, Germany  
WICHT Bernhard, Leibniz Universität Hannover, Germany

**14:20**    **580 - Heterogeneous Integration of Power Conversion using Power Supply on Chip and Power Supply in Package**  
*O MATHUNA Cian - Tyndall – Ireland, O'DRISCOLL Seamus - Microelectronics Circuits Centre Ireland - Ireland*

**14:40 581 - Driving Innovations for Power Electronics with Integratable and Sustainable Magnetics**

*WILKOWSKI Matt - ENACHIP - United States of America*

**15:00 582 - Impact of package technology on the switching behavior of high-voltage GaN FETs**

*KLÖTZER Sebastian - Nexperia - Germany*

**14:20 LS4b - Topic 3: EMI/EMC in Power Electronics including HF Phenomena**

***Location: Roter Saal***

Chair(s): MUSUMECI Salvatore, Politecnico di Torino, Italy  
BLAABJERG Frede, Aalborg University, Denmark

**14:20 431 - Improvement of the EMI Filter Attenuation Using Shielding**

*ALI Mohammad, BUSHRA Rehnema, FRIEBE Jens; MERTENS Axel - Leibniz Universität Hannover - Germany*

**14:40 179 - EMI Mitigation Induced by An IGBT Driver Based on A Controlled Gate Current Profile**

*MARTINEZ Daniel Sting - University of Technology of Compiègne - France, MONMASSON Eric - University of Cergy-Pontoise - France, PATIN Nicolas - University of Technology of Compiègne - France*

**15:00 407 - Common-Mode EMI Noise Modeling of Three-Level T-Type Inverter for Adjustable Speed Drive System**

*KARAKASLI Vefa, ALLIOUA Abdelmoumin, GRIEPENTROG Gerd - Technische Universität Darmstadt - Germany*

**14:20 LS4c - Topic 8: E-Mobility: Protective Measures and Power Control**

***Location: Blauer Saal***

Chair(s): BOECKER Joachim, Paderborn University, Germany  
VAN MIERLO Joeri, Vrije Universiteit Brussel, Belgium

**14:20 121 - Surge current protection for railway traction applications**

*GLEISSNER Michael, BAKRAN Mark-M. - University of Bayreuth - Germany*

**14:40 223 - A Method to Design Power Control System of Wayside Energy Storage System for Energy Saving in DC-electrified Railway**

*SATO Kota - Waseda University - Japan, CHIDA Makoto - West Japan Railway - Japan, KOBAYASHI Hiroyasu - Chiba University - Japan, KONDO Keiichiro - Waseda University - Japan*



## WEDNESDAY 07 SEPTEMBER

### LECTURE SESSIONS

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**15:00     162 - Novel Method for Active Short Circuit (ASC) Tests of Power Module in Automotive Traction Application**

*APPEL Tobias, BIELER Arne Christian - Danfoss Silicon Power GmbH - Germany*

**14:20     LS4d - Topic 6: Power Electronics for Renewables**

***Location: Bonatz Saal***

Chair(s): ECKEL Hans-Günter, University of Rostock, Germany  
WHEELER Pat, University of Nottingham, United Kingdom

**14:20     433 - Energy Storage Systems for Airborne Wind Generators**

*BAGABER Bakr, MERTENS Axel - Leibniz Universität Hannover - Germany*

**14:40     273 - Evaluation of common-mode leakage current of Aalborg-type transformerless PV inverters**

*ORFANOUDAKIS Georgios - Hellenic Mediterranean University (HMU) - Greece, FOTEINOPOULOS Georgios, KOUTROULIS Eftychios - Technical University of Crete (TUC) - Greece, WU Weimin - Shanghai Maritime University - China*

**15:00     48 - Cooperative Control of Online Spectroscopy Impedance Monitoring Method and Maximum Power Point Tracking Method for Photovoltaic Panels**

*WANG Xin, AILLERIE Michel, DE BERNARDINIS Alexandre - LMOPS-Université de Lorraine & Centralesupélec - France, HISSEL Daniel, PÉRA Marie-Cécile - CNRS&FEMTO-ST&Université Bourgogne - France, SAWICKI Jean-Paul, ZHENG Zhixue - LMOPS- Université de Lorraine & Centralesupélec - France*

**14:20     LS4e - Topic 10: Neural Network / Machine Learning**

***Location: Konferenzraum 27***

Chair(s): BRIFF Pablo, GE Grid Solutions, United Kingdom  
SEMAIL Betty, Université Lille 1 - L2EP, France

**14:20     307 - Deep Neural Network for Magnetic Core Loss Estimation using the MagNet Experimental Database**

*SHEN Xiaobing, MARTINEZ Wilmar; WOUTERS Hans - KU Leuven - Belgium*

**14:40     384 - Characterization of Online Junction Temperature of the SiC power MOSFET by Combination of Four TSEPs using Neural Network**

*SHARMA Kanuj, KALLFASS Ingmar, KAMM Simon, MUÑOZ BARÓN Kevin - University of Stuttgart - Germany*



**15:00 505 - Knowledge Based Grey Box Modeling of Inaccessible Circuits for System EMC-Simulation in Time Domain**

*ROCHE Jan-Philipp - KEB Automation KG - Germany, FRIEBE Jens - Leibniz Universität Hannover - Germany, NIGGEMANN Oliver - Helmut Schmidt University - Germany*

**15:40 LS5a - Topic 1: Integration**

**Location: Niedersachsenhalle**

Chair(s): ALLARD Bruno, Université de Lyon, INSA Lyon, AMPERE, France  
NEE Hans-Peter, KTH Royal Institute of Technology, Sweden

**15:40 131 - Efficiently Paralleling GaN-Transistors for High Current and High Frequency Applications Using a Butterfly Layout**

*WATTENBERG Martin, GARCIA LORENZ Oscar, SANCHEZ Juan - Infineon Technologies Austria AG - Austria*

**16:00 539 - Characterization of GaN-on-AlN/SiC transistors towards monolithic integrability**

*WIECZOREK Nick - Technical University of Berlin - Germany, BRUNNER Frank - Ferdinand-Braun-Institut Leibniz-Institut für Höchstfrequenztechnik - Germany, DIECKERHOFF Sibylle, GENG Xiaomeng - Technical University of Berlin - Germany, HILT Oliver - Ferdinand-Braun-Institut Leibniz-Institut für Höchstfrequenztechnik - Germany, KURING Carsten - Technical University of Berlin - Germany, WOLF Mihaela, WÜRFL Hans-Joachim - Ferdinand-Braun-Institut Leibniz-Institut für Höchstfrequenztechnik - Germany*

**16:20 147 - Design, implementation and characterization of an integrated current sensing in GaN HEMT device by using the current-mirroring technique**

*NGUYEN Van Sang, CATELLANI Stephane, ESCOFFIER Rene, FAYOLLE-LECOCQ Murielle, MARTIN Jérémy - CEA - Commissariat à l'Energie Atomique (Grenoble) - France*

**15:40 LS5b - Topic 2: Converter Design and Optimisation**

**Location: Roter Saal**

Chair(s): BOROYEVICH Dushan, Virginia Tech - CPES, United States of America  
POURESMAEL Edris, Aalto University, Finland

**15:40 135 - ntra-arm Balancing Control of Cascaded Multi-Port Converter for Whole Power Unbalance Conditions**

*YASUDA Takumi, ITOH Jun-Ichi - Nagaoka University of Technology - Japan*

**16:00 160 - Novel modulation method for common-mode noise reduction in Solid-State Transformer based on ISOP configuration**

*KIKUCHI Naoto, ITOH Jun-Ichi, KUSAKA Keisuke, WANATABE Hiroki - Nagaoka University of Technology - Japan*

## WEDNESDAY 07 SEPTEMBER

### LECTURE SESSIONS

#### **16:20     61 - A Sectorized FCS-MPC Transformerless SST For Power Transmission Application**

*ENCARNAÇÃO Lucas Frizera, BACHETI Gabriel Gaburro - Federal University of Espírito Santo - Brazil, BUENO Emilio José - University of Alcalá - Spain, CAMARGO Renner Sartório - Federal University of Espírito Santo - Brazil, LISERRE Marco - Christian-Albrechts-Universität zu Kiel - Germany*

#### **15:40     LS5c - Topic 8: E-Mobility: Charging Systems and Battery Issues (I)**

*Location: Blauer Saal*

Chair(s): VAN MIERLO Joeri, Vrije Universiteit Brussel, Belgium  
BOUSCAYROL Alain, Université Lille 1 - L2EP, France

#### **15:40     125 - Review of Power Converter Topologies for Electrochemical Impedance Spectroscopy of Lithium-Ion Batteries**

*BEIRANVAND Hamzeh - Kiel University - Germany, CONSTANTINO BROGIOLI Dorian - Bremen University - Germany, HAHN Frederik - Kiel University - Germany, LA MANTIA Fabio - Bremen University - Germany, LISERRE Marco, MAXIMILLIAN PLACZEK Julius - Kiel University - Germany, ZAMPARDI Giorgia - Bremen University - Germany*

#### **16:00     297 - Ferrite optimization for a three-phase wireless power transfer system for electric vehicles**

*NIE Shuang, LEHN Peter, PATHMANATHAN Mehanathan - University of Toronto - Canada*

#### **16:20     250 - Multi-port Inductive Power Transfer System Considering Charging Auxiliary Battery in EVs**

*ZHANG Zhuoqi, HOSHI Nobukazu, OKADA Ryohei, OTA Ryosuke - Tokyo University of Science - Japan*

#### **15:40     LS5d - Topic 4: Control of Power Converters**

*Location: Bonatz Saal*

Chair(s): ZANCHETTA Pericle, University of Nottingham, United Kingdom  
FORMENTINI Andrea, University of Genova, Italy

#### **15:40     39 - Comparison of redundancy requirements for Modular Multilevel Converter considering manufacturer reliability inputs and mission profile**

*VELAZCO Diego - Supergrid Institute - France; BOUTLEUX Emmanuel, CLERC Guy - Université de Lyon, INSA Lyon, AMPERE - France, WALLART François - Supergrid Institute - France*

#### **16:00     296 - Investigation and Mitigation of Common-mode Voltage in Four-level NPC Converters Modulated by Redundant Level Modulation**

*WANG Jun, XIE Lihong, XU Wei, YUAN Xibo - University of Bristol - United Kingdom*

- 16:20**     **324 - Experimental Comparison of FPGA-Implemented Model Predictive Voltage Control to Cascaded Proportional Resonant Control for a Three-Phase Four-Wire Three-Level Grid-Forming Inverter of 250 kVA**

*LANGE Jarren, BÖCKER Joachim, SCHMIES Dominik, STILLE Karl Stephan, WALLSCHEID Oliver - Paderborn University - Germany*

**15:40**     **LS5e - Topic 7: Benchmarking & Testing**

*Location: Konferenzraum 27*

Chair(s): BAUER Pavol, Delft University of Technology, Netherlands  
JUNG Marco, Fraunhofer Institute for Energy Economics and Energy System Technology IEE, Germany

- 15:40**     **186 - Design and Development of a Short-Circuit Test Bench for Low-Voltage Direct Current Protection Devices**

*RAVYTS Simon, CAPPELLE Jan, STUL Koen, VANDENBUSSCHE Thomas - KU Leuven - Belgium*

- 16:00**     **169 - Generation of benchmark microgrids and an application to the ESUSCON project**

*DÖRNER Oscar, MENDOZA-ARAYA Patricio - Universidad de Chile - Chile*

- 16:20**     **312 - Research Laboratory for Testing Grid Connected Devices under Grid Voltage / Grid Impedance Variations and Microgrid Conditions**

*BOSCH Swen, STAIGER Jochen, STEINHART Heinrich - University of Applied Sciences Aalen - Germany*

**15:40**     **PELS TC12: Energy Access and Power Electronics**

*Location: Vendor Session Area*

Chair(s): POPOVIC Jelena, University of Twente, Netherlands

**17:00**     **Industrial Forum 3: Integration and Adverse effects of WBG Devices**

*Location: Roter Saal*

Chair(s): KAMINSKI Nando, Universität Bremen, Germany

**17:00**     **Industrial Forum 4: Electrification of On- and Off-Road Vehicles**

*Location: Blauer Saal*

Chair(s): DOPPELBAUER Martin, Karlsruhe Institute of Technologie (KIT), Germany

## Energy Access and Power Electronics – Technology Needs and Market Opportunities

### Session Organizers:

IEEE PELS Technical Committee – 12: Energy Access and Off-Grid Systems (Jelena Popović, Sanjib Kumar Panda, Issa Batarseh, Deepak Divan) and ECPE European Center for Power Electronics (Peter Rechberger).

### Motivation and objective:

Ensuring universal, affordable, and sustainable energy access is one of the biggest societal challenges of our time, and a target of the global Sustainable Development Goal 7. As of 2021, over 750 million people worldwide live without having access to electricity, and another two billion have unreliable access. The centralized electricity grid is not always the optimal choice for energy access contexts, due to environmental impact, cost, mismatch to user needs and challenges around financial feasibility. Decentralized approaches, such as solar home systems and mini- and micro-grids have emerged in response to the shortcomings of centralized grid extension, sparked private sector innovation and are increasingly being integrated in national electrification plans. However, affordability, scalability, business models, interoperability of solutions, quality, technology obsolescence and life-cycle sustainability remain as major challenges.

Power electronics technology is one of the key enabling technologies for affordable, sustainable, efficient and reliable energy access solutions. The objective of this special session is to showcase the engagement in energy access of IEEE Power Electronics Society and ECPE (and its Bavarian Power Electronics Cluster) to the broader power electronics community.

### Session Set-up:

The Session consists of two parts:

- 1. Presentations of IEEE PELS and ECPE on their activities in Energy Access, covering technology innovation and market opportunities, stakeholder mapping and lessons learned.***

The **IEEE Power Electronics Society (PELS)** engaged with Energy Access through organizing a global challenge – Empower a Billion Lives (EBL-I) in 2018/2019, and by including Energy Access as a new and core topic in its long-range planning. Since then, the engagement of PELS in Energy Access has grown and is carried out through the following initiatives:

- Empower a Billion Lives a recurring competition to foster interdisciplinary innovation in the global community to develop, demonstrate and de-risk energy access solutions that are designed to scale, are regionally relevant, holistic, economically viable and have positive social impact. The second round of competition (EBL-II) was launched in 2021 and will run until 2023.
- Global Energy Access Forum is a multi-stakeholder platform involving industry, academia, NGOs, governmental agencies, international organizations, financial institutions with the objective to facilitate multi-stakeholder collaboration and dialogue to create alignment in goals, strategy and metrics, to achieve universal access to sustainable energy for all by 2030.
- Technical Committee – 12: Energy Access and Off-Grid Systems was formed by IEEE PELS to provide global technical leadership in energy access. Activities are being planned to organize technical events (conferences, workshops, tutorials), special issues of PELS journals, providing inputs to standards etc.

The **ECPE European Center for Power Electronics** with its Bavarian Power Electronics Cluster is an industry driven research network to promote education, innovation, science, research and technology transfer in the area of power electronics. The Cluster has initiated many projects focusing on the efficient and safe integration of renewable energy into the grid. The Cluster is a consortium member of European Sustainable Energy Cluster Partnership for Africa (ESECA), whose main objective is to intensify business network collaboration among European companies from the renewable energy and smart grids sectors to develop a joint internationalisation strategy towards Sub-Saharan African markets.

## 2. Panel discussion

A panel discussion will include 4 panelists including the speakers from the previous session. The panel will include a mix of experts from various types of organizations (industry, academia, governments/NGOs). The discussion will centre around technology innovation, market developments and collaboration opportunities.

### Session Agenda:

#### Part 1: IEEE PELS and ECPE presentations

- Peter Rechberger, ECPE and ESECA Project
- Jelena Popovic, IEEE PELS TC-12 and Empower a Billion Lives

#### Part 2: Panel discussion

Positioning statements panellists

## WEDNESDAY 07 SEPTEMBER

### IEEE TC 12

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- Fabian Jochem (confirmed)
- Dushan Boroyevich (to be confirmed)

Panel discussion

Q&A from the audience

#### **Justification for Industry Participation:**

Energy Access is a young, burgeoning sector with growing opportunities for the power electronics industry. The Energy Access challenge and opportunity has spurred enormous private sector innovation, in off-grid solar, microgrids, fintech, IoT etc. Market insights and multistakeholder findings from two organizing initiatives will provide new insights in opportunities for the power electronics industry and facilitate access to new markets in Africa.

**When?:** Wednesday, 7 September 2022 (15:40 – 16:40)

**Where?:** Hannover Congress Centrum (HCC), Vendor Session Area, Eilenriedehalle

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**Industrial Forum 3: “There is more to GaN than just the lateral HEMT single switch”**

The lateral HEMT single switch has become synonymous for GaN power devices and has achieved remarkable maturity within an astonishingly short period of time. However, there are several other development directions, which might attract more attention in the future. One is the integration of the gate unit and even logic into a GaN device. Another is integration of a full topology like a six pack in one chip. A third is making vertical devices, possibly a trench MISFET. And of course, people look into cascodes and other control schemes. Which of these directions will become big and which will rather serve their respective niches, while the lateral HEMT single switch shows progress and remains the “top dog”? The panel will discuss current trends and prospects and what to expect from future GaN devices.

**Moderator:** Prof. Dr. Nando KAMINSKI

**Panellists:**

- Gerald DEBOY (Infineon)
- Dan KINZER (Navitas)
- Dilder CHOWDHURY (Nexperia)
- Daniel SHERMAN (VisIC)
- Cam PHAN (GaN Systems)
- Jan ŠONSKÝ (Innoscence)

**When?:** Wednesday, 7 September 2022 (17:00 – 18:10)

**Where?:** Hannover Congress Centrum (HCC), Roter Saal

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## WEDNESDAY 07 SEPTEMBER

### INDUSTRIAL FORUM

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#### **Industrial Forum 4: “Faster charging and new technologies - the Power Architecture of future electric cars and trucks”**

The electrification of passenger cars is progressing rapidly. The next step will be light and then heavy commercial vehicles with ever higher power and battery capacities. This poses completely new challenges for power electronics. System voltages will move from 400 to 800 and even higher, maximum charging currents from 500 A to 1000 A, and perhaps even exceeding 3000 A in the long term. This will have implications on the entire electrical system and may even require changes in the architecture. In this panel discussion, we talk with renown experts from automotive companies about future developments and challenges.

**Moderator:** Prof. Dr. Martin DOPPELBAUER

**Panellists:**

- Dr. Christian WACHTENDORF  
Leiter Entwicklung Leistungselektronische Systeme, Volkswagen AG, Wolfsburg
- Martin GLASER  
Project Lead Manager, Daimler Truck AG
- Jörg HERMANN  
General Manager R&D Construction KOMATSU
- More to be announced!

**When?:** Wednesday, 7 September 2022 (17:00 – 18:10)

**Where?:** Hannover Congress Centrum (HCC), Blauer Saal

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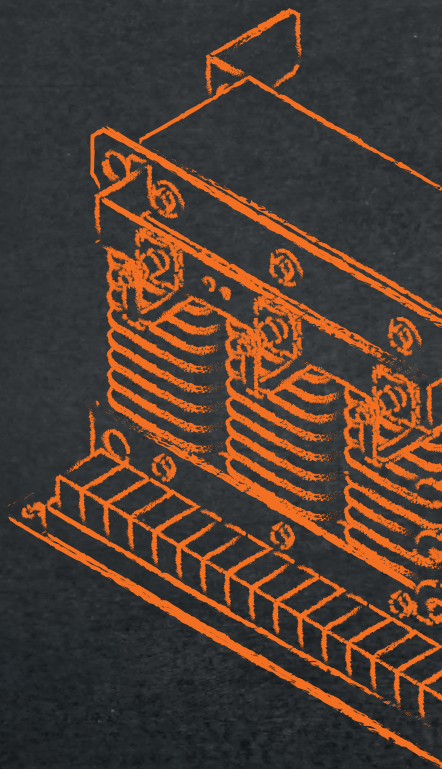


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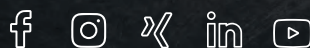
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### **08:30    Keynote 5: Make it Fly - The Future of Sustainable Aviation by NEULAND Tanja - Airbus Operations GmbH - Germany**

***Location: Niedersachsenhalle***

Chair(s): MALLWITZ Regine, Technische Universität Braunschweig, Germany  
MOEHLENKAMP Georg, Brandenburgische Technische Universität Cottbus-Senftenberg, GERMANY



Even if the impact of aviation on global warming is “only 3.5%”, in absolute terms we are speaking about gigatons of CO<sub>2</sub>, which must be massively reduced by 2050: net zero CO<sub>2</sub> by 2050 is the goal. To support this, Airbus wants to be a pioneer of decarbonized aviation and already in 2018, Airbus decided to take disruptive steps and continued to do so during the Corona crisis. We evaluate hydrogen powered propulsion technologies in regards to electronics & electric motors, fuel cells, liquid hydrogen storage and gas turbines. The fuel cell uses hydrogen to convert it into electrical energy. The electrical power of the fuel cell is used via power electronics to drive electric motors, which are connected to the propeller shaft via gears. Hydrogen direct combustion is the second form of drive for the propeller shaft. For this, the hydrogen (ideally in liquid form) is compressed and then sprayed into the combustion chamber. The heat generated by the ignition is used in a thermodynamic process to drive the shaft via turbine blades (similar to a classic jet engine). But on the way to this goal there are still some challenges to overcome → technically, logistically and also politically.

### **09:00    Keynote 6: The Instrumental but Extremely Challenging Role of Hydrogen Towards a Decarbonized Society by LINDER Stefan - ALPIQ AG - Switzerland**

***Location: Niedersachsenhalle***

Chair(s): ECKEL Hans-Günter, University of Rostock, Germany  
MERTENS Axel, Leibniz Universität Hannover, Germany



The energy transition, which in fact should be correctly named climate transition, holds unprecedented challenges that are widely underestimated. The presentation will start with a cruising altitude view that explains why all current efforts are much too slow and not orchestrated well enough to successfully meet the 2-degree target. It is shown that a successful decarbonization must be based on a few cornerstones that must be addressed swiftly, relentlessly, and in a globally coordinated manner. Hydrogen belongs to these pillars. It will be explained why hydrogen is so important, but also why there is no chance that hydrogen can develop quickly enough, unless there is both a national and a global consensus and coordinated action to overcome the barriers. The question

also arises as to what role power electronics will play in the development of a hydrogen infrastructure. The presentation will show that power electronics will not be the glamorous main cast, but that it will be an indispensable and ubiquitous team member, playing its role mostly out of the limelight.

### **10:00    LS6a - Topic 12: Invited Lectures - Electrification of Aircraft**

***Location: Niedersachsenhalle***

Chair(s): MOEHLKAMP Georg, Brandenburgische Technische Universität Cottbus-Senftenberg, Germany  
MALLWITZ Regine, Technische Universität Braunschweig, Germany

#### **10:00    586 - Aircraft Electrification – System-Level Potentials for Aviation Decarbonization**

*EBNER Kathrin - Bauhaus Luftfahrt - Germany*

#### **10:20    587 - About Power Electronics Challenges in Aviation**

*BOHLLAENDER Marco - Rolls-Royce Deutschland Ltd & Co KG - Germany*

#### **10:40    588 - Development of electric motors for aircraft applications**

*WOLFSTÄDTER Simon - Oswald Elektromotoren GmbH - Germany*

### **10:00    LS6b - Topic 2: Modular Multilevel Converters**

***Location: Roter Saal***

Chair(s): HILLER Marc, Karlsruhe Institute of Technologie (KIT), Germany  
BOROYEVICH Dushan, Virginia Tech - CPES, United States of America

#### **10:00    120 - Square wave operation to reduce pulsating power in isolated MMC-based ultrafast chargers**

*PEREIRA MARCA Ygor, G.L. ROES Maurice, L. DUARTE Jorge, WIJNANDS Korneel - Eindhoven University of Technology - Netherlands*

#### **10:20    214 - Novel Operation Mode of the Modular Multilevel Matrix Converter based on a Dimensioning Algorithm**

*DIERKS Rebecca, MERTENS Axel - Leibniz Universität Hannover - Germany*

#### **10:40    359 - Experimental study of the reduction and removal of turn-on snubber for IGCT based MMC submodule using fast silicon diodes**

*BOUTRY Arthur, ASLLANI Besar - Supergrid Institute - France, BUTTAY Cyril - Universite de Lyon, INSA Lyon, AMPERE - France, DONG Dong - Virginia Tech - CPES - United States of America, LEFEBVRE Bruno - Supergrid Institute - France, VAGNON Eric - Universite de Lyon, INSA Lyon, AMPERE - France*

# THURSDAY 08 SEPTEMBER

## LECTURE SESSIONS

### **10:00**    **LS6c - Topic 7: AC and DC Grids Applications of Power Converters**

*Location: Blauer Saal*

Chair(s): DWORAKOWSKI Piotr, Supergrid Institute, France  
POURESMAEIL Edris, Aalto University, Finland

### **10:00**    **64 - A Novel Combined Control of Ground Current and DC-pole-to-Ground Voltage in Symmetrical Monopole Modular Multilevel Converters for HVDC Applications**

BRIFF Pablo, KUMAR Amit - GE Grid Solutions - United Kingdom

### **10:20**    **454 - Fine-grained Dynamics Representation and Stability Analysis for MMC-based Hybrid AC/DC Power Systems**

DONG Chaoyu - Nanyang Technological University - Singapore, CAO Jingming, JIA Hongjie, LI Marui, XIAO Qian, YU Xiaodan - Tianjin University - China

### **10:40**    **348 - Design Concepts for Medium Voltage DC Networks supplying the Future Circular Collider (FCC)**

COLMENERO MORATALLA Manuel, BLANQUEZ DELGADO Francisco Rafael - CERN - European Organization for Nuclear Research - Switzerland, BLASCO-GIMENEZ Ramon - Polytechnic University Of Valencia - Spain

### **10:00**    **LS6d - Topic 6: Power Electronics for Wind Power**

*Location: Bonatz Saal*

Chair(s): BAKRAN Mark, University of Bayreuth, Germany  
PEYGHAMI Saeed, Aalborg University, Denmark

### **10:00**    **253 - Field-measurement based hygrothermal modelling of the converter-cabinet climate in wind turbines**

FISCHER Katharina - Fraunhofer Institute for Wind Energy Systems - Germany, GOEHLER Katherina - Leibniz University Hannover & Fraunhofer Iwes - Germany

### **10:20**    **358 - Control Principles for Black Start and Island Operation of Offshore Wind Farms integrating Grid-Forming Converters**

PAGNANI Daniela - Ørsted - Denmark, BAK Claus, BLAABJERG Frede - Aalborg University - Denmark, HJERRILD Jesper, KOCEWIAK Lukasz - Ørsted - Denmark

### **10:40**    **447 - A Novel Grid-demanded Power Point Tracking (GPPT) Control Method for Wind Turbines to Preserve Grid Stability with High Wind Energy Penetration**

MATTHIES David, ERNST Alexander, HOLZKE Wilfried, ORLIK Bernd, REIMANN René, SAUERLAND Henning - Bremen University - Germany



# THURSDAY 08 SEPTEMBER

## LECTURE SESSIONS & DIALOGUE SESSIONS

### **10:00    LS6e - Topic 9: Power Supplies & Industry-Specific Applications**

**Location: Konferenzraum 27**

Chair(s): KYRÄ Jorma, Aalto University, Finland  
MARTINEZ Wilmar, KU Leuven, Belgium

### **10:00    8 - Self-Oscillating Capacitive Power Transfer with Multiple Receiver Capability and Coupling Path Adaption**

*SELIGER Norbert - Technical University of Applied Sciences Rosenheim - Germany*

### **10:20    35 - Hardware and Control Design of a High Precision Modular Power Converter based on GaN Technology for Particle Accelerator Magnets**

*MARGREITER Thomas, DE CESARIS Ivan - Medauston - Austria, INCURVATI Maurizio - MCI Management Center Innsbruck - Austria, PELLETIER Sebastien - Medauston - Austria, SCHIESTL Martin, STÄRZ Ronald - MCI Management Center Innsbruck - Austria*

### **10:40    257 - Soft-switching Converter for Inductive Power Transfer System with Double-sided LCC Resonant Network**

*OKADA Ryohei, HOSHI Nobukazu, OTA Ryosuke - Tokyo University of Science - Japan*

### **11:00    DS3a - Topic 02: Modular Multilevel Converters**

**Location: Eilenriedehalle**

Chair(s): POURESMAEIL Edris, Aalto University, Finland

### **16 - Multi Busbar Sub-module Modular Multilevel STATCOM with Partially Rated Energy Storage Configured in Sub-stacks** **Panel D 1.1**

*HAO Chuantong, FINNEY Stephen, JUDGE Paul - University of Edinburgh - United Kingdom, MA Wenhao - Zhejiang Electric Power Research Institute - China, MERLIN Michael - University of Edinburgh - United Kingdom*

### **20 - Analysis of balancing algorithms for Quasi-Two/Three-Level Single Phase Operation of a Flying Capacitor Converter** **Panel D 1.2**

*MERSCHÉ Stefan Christoph, BAYER Markus, HILLER Marc, RICKERT Kai - Karlsruhe Institute of Technologie (KIT) - Germany*

### **32 - A detailed View on the Trapezoidal Operation for MMC Type Braking Chopper in Medium Voltage Application** **Panel D 1.3**

*HOFSTETTER Patrick, HOFMANN Viktor, KARW(ATZKI Dennis - Siemens AG - Germany*

### **58 - Design and Modulation Optimization of an MMC Based Braking Chopper** **Panel D 1.4**

*HOFMANN Viktor, HOFSTETTER Patrick - Siemens AG - Germany*

## THURSDAY 08 SEPTEMBER

### DIALOGUE SESSIONS

#### **87 - Steady-State Analysis and Comparison of SSFB, SDFB and DSFB MMC-based STATCOM** **Panel D 2.1**

*BELHAOUANE Mohamed Moez - L2EP - Centrale Lille - France, DENNETIERE Sebastien - RTE Réseau de Transport d'Electricité - France, GRUSON Francois - L2EP / Arts Et Metiers - France, GUILLAUD Xavier - L2EP - Centrale Lille - France, RAULT Pierre - RTE Réseau de Transport d'Electricité - France, VERMEERSCH Pierre - L2EP - Centrale Lille - France*

#### **148 - GaN-Based Modular Multilevel Converter for Low-Voltage Grid Enables High Efficiency** **Panel D 2.2**

*KIEHNLE Philip, HILLER Marc, HIMMELMANN Patrick - Karlsruhe Institute of Technology (KIT) - Germany*

#### **156 - Voltage Estimation for Diode-Clamped MMCs Based on a Simplified Neural Network** **Panel D 2.3**

*TASHAKOR Nima, BANANA Shady, GOETZ Stefan, KESHAVERZI Davood - Technical University of Kaiserslautern - Germany*

#### **172 - Modular Battery-Integrated Power Electronics - Modelling, Advantages, and Challenges** **Panel D 2.4**

*TASHAKOR Nima, GOETZ Stefan - Technical University of Kaiserslautern - Germany, KACETL Jan, KACETL Tomas - Dr. Ing. H.C. F. Porsche AG - Germany*

#### **205 - Experimental Evaluation of Battery Impedance and Submodule Loss Distribution for Battery Integrated Modular Multilevel Converters** **Panel D 3.1**

*BALACHANDRAN Arvind, ERIKSSON Lars, JONSSON Tomas - Linköping University - Sweden, LARSSON Anders - Scania AB - Sweden*

#### **255 - Extended Balancing and Dimensioning of Capacitors in MMC Double Submodules** **Panel D 3.2**

*SHARAF ADDIN Ali, BRÜCKNER Thomas, DAHMEN Christopher - Universität der Bundeswehr München - Germany*

#### **258 - Ultra Low Loss - MMC Submodules favorable for SiC-FET enabling High Functional Safety** **Panel D 3.3**

*DAHMEN Christopher, MARQUARDT Rainer - Universität der Bundeswehr München - Germany*

#### **262 - Overview and Evaluation of Energy Balancing Techniques for MMCs with Various Input and Output Frequencies** **Panel D 3.4**

*SAH Gyanendra Kumar, ECKEL Hans-Günter, SCHÜTT Michael - University of Rostock - Germany*

**266 - Multi-Objective Optimization of Modular Multilevel Converter Systems** **Panel D 4.1**

*PATZELT Nikolaus, SCHLEGEL Christian, VASILADIOTIS Michail - Hitachi Energy - Switzerland*

**279 - Single-Arm MMC-based Converter for Transformerless Rail Interties** **Panel D 4.2**

*BECK Simon, BIELA Jürgen, FUCHS Simon - ETH Zurich - Switzerland*

**306 - Full-Bridge Modular Multilevel Converters for the Four-Quadrant Supply of High Power Magnets in Particle Accelerators** **Panel D 4.3**

*COLMENERO MORATALLA Manuel, BLANQUEZ DELGADO Francisco Rafael - CERN - European Organization for Nuclear Research - Switzerland, BLASCO-GIMENEZ Ramon - Polytechnic University of Valencia - Spain, VIDAL ALBALATE Ricardo - Jaume I University - Spain*

**338 - Multilevel battery converter with cascaded H-bridges on cell level –battery management system or a renewed attempt for Power Electronic Building Blocks?** **Panel D 4.4**

*ROTHENBURGER Max, BRABETZ Ludwig, HILLMER Hartmut, HORN Markus - University of Kassel - Germany, MUYLLAERT Koenraad, SCHULZE Gerold - P&E Power&Energy GmbH - Germany, YU Xiao, ZACHARIAS Peter - University of Kassel - Germany*

**355 - On chain-link based multi-port converters able to connect HVDC and MVDC to AC transmission network** **Panel E 1.1**

*FALCHI Daniele - CITCEA-UPC - Spain, DESPOUYS Olivier - RTE Réseau de Transport d'Électricité - France, GOMIS-BELLMUNT Oriol, PRIETO-ARAUJO Eduardo - CITCEA-UPC - Spain*

**365 - Open-Delta SBC: a New Converter Topology with Low Number of Sub-Modules for MV applications** **Panel E 1.2**

*LANZAROTTO Damiano, MOREL Florent, STECKLER Pierre-Baptiste, VERSHININ Konstantin - Supergrid Institute - France*

**398 - Utilizing the Reactive Current Control Capability of an MMC-Fed AC/DCCConverter for Volt-Second Balancing in Medium Frequency Transformers** **Panel E 1.3**

*POURESMAEIL Kaveh, BAARS Nico, DUARTE Jorge, PAPAFOOTIU Georgios, ROES Maurice, WIJNANDS Korneel - Eindhoven University of Technology - Netherlands*

**490 - A novel parameter for the evaluation of protective circuits for IGBT explosion protection in submodules of MMC** **Panel E 1.4**

*JUNGHANS Christoph, ECKEL Hans-Günter - University of Rostock - Germany*

## THURSDAY 08 SEPTEMBER

### DIALOGUE SESSIONS

**493 - Sub-Modules Switching Algorithms for Dual Active Bridge Modular Multilevel Converters to Optimize Capacitor Voltage Deviation versus Power Efficiency** **Panel E 2.1**

*XIA Peizhou, FINNEY Stephen, HAO Chuantong, MERLIN Michael - University of Edinburgh - United Kingdom*

**525 - Zero-Sequence Voltage Reduces DC-Link Capacitor Demand in Cascaded H-Bridge Converters for Large-Scale Electrolyzers by 40%** **Panel E 2.2**

*UNRUH Roland, BÖCKER Joachim, SCHAFMEISTER Frank - Paderborn University - Germany*

#### **11:00 DS3b - Topic 02: Grid Connected Converters**

**Location: Eilenriedehalle**

Chair(s): POURESMAEIL Edris, Aalto University, Finland

**44 - Analysis and Estimation of Neutral-Point Voltage Balancing Ability of an Optimized Balancing Algorithm for Grid Connected Active-NPC converter** **Panel E 2.3**

*BANDA Joseph Kiran - Norwegian University of Science and Technology - Norway, I Hridya, JHA Kapil, KUMAR TIWARI Arvind, RAMIREZ Fernando - General Electric - United States of America*

**100 - Design of a Robust Voltage Control for Inverters with LC Filter based on the Internal Model Control** **Panel E 2.4**

*STALLMANN Frederik - Leibniz Universität Hannover - Germany, FRÄGER Lukas - Block Transformatoren-Elektronik GmbH - Germany, MERTENS Axel - Leibniz Universität Hannover - Germany*

**155 - Neural Networks-Generalized Predictive Control for MIMO Grid-Connected Z-Source Inverter Model** **Panel E 3.1**

*MARTINEZ-GARCIA Herminio, SALEHI Navid, VELASCO-QUESADA Guillermo - Universitat Politècnica de Catalunya - Spain*

**185 - Measurement results of Multilevel Hysteresis Control for paralleled Two-Level Converters** **Panel E 3.2**

*GIERSCHNER Magdalena, ECKEL Hans-Günter, HEIN Yves - University of Rostock - Germany, HEYEN Christian - Enercon - Germany*

**187 - A Novel Modified-TOGI based PLL for the Three-Phase Unbalanced and Distorted Grid Conditions** **Panel E 3.3**

*NGUYEN Khanh-Hung, NAZERI Ahmad Ali, YU Xiao, ZACHARIAS Peter - University of Kassel - Germany*



**328 - Experimental Evaluation on Observer-Based Delay-Compensating Active Damping for LC-Filters** **Panel E 3.4**

*SCHUETT Michael, ECKEL Hans-Günter - University of Rostock - Germany*

**369 - Analysis of the Loss Distribution of a 6 kW two Stage Power Supply for 600 V DC Applications** **Panel E 4.1**

*FRÄGER Lukas, BADENHOP Niklas - Block Transformatoren-Elektronik GmbH - Germany, FRIEBE Jens - Leibniz University Hannover & Fraunhofer IWES - Germany, KAMPEN Dennis, LANGFERMANN Sascha, OWZARECK Michael - Block Transformatoren-Elektronik GmbH - Germany*

**414 - A Simplified Braking Method for Direct Matrix Converter-Fed PMSM Drives with Consideration of Avoiding Regenerative Energy** **Panel E 4.2**

*XIE Jun, ELLINGER Thomas, HENNEBERG Dustin, PETZOLDT Juergen, RAEDEL Uwe, SUBERSKI Martin - Technische Universität Ilmenau - Germany*

**542 - Four-Level Boost Inverter Based on ANPC Topology with Switched-Capacitor Branch** **Panel E 4.3**

*STALA Robert - AGH University of Science and Technology in Krakow - Poland, BHATNAGAR Pallavee - IES College of Technology, Bhopal - India, GUPTA Krishna Kumar, JAIN Sanjay K. - Thapar Institute of Engineering and Technology, Patiala - India, JENA Kasinath - School of Electrical Engineering, KIIT Deemed to be University, Bhubaneswar - India, MONDZIK Andrzej, PENCZEK Adam, PIROG Stanislaw, SKALA Aleksander, WARADZYN Zbigniew - AGH University of Science and Technology in Krakow - Poland*

**11:00 DS3c - Topic 04: Estimation, Identification and Optimisation Methods**

**Location: Eilenriedehalle**

Chair(s): DIERKS Rebecca, Leibniz Universität Hannover, Germany

**5 - Dynamic Power Analysis of Inverter-Fed Drives based on the Switching Period of the Power Electronics** **Panel F 1.1**

*STOCK Alexander - Hottinger Brüel & Kjaer GmbH - Germany*

**50 - On the reduction of output capacitance in two-level three phase PFC boost rectifier for pulsating loads** **Panel F 1.2**

*CUESTA CANO Tania, CASTRO ÁLVAREZ Ignacio - Collins Aerospace Ireland, Ltd. - Ireland, GONZALEZ LAMAR Diego, PEDROSO Douglas - Collins Aerospace Ireland, Ltd. - Ireland, RODRIGUEZ ALOSNO Alberto - University of Oviedo - Spain*

**520 - A Simplified Model for the Ageing Potential Under Highly Rippled Load** **Panel F 1.3**

*KACETL Tomas, GOETZ Stefan, KACETL Jan, TASHAKOR Nima - Technical University of Kaiserslautern - Germany*

## THURSDAY 08 SEPTEMBER

### DIALOGUE SESSIONS

#### **532 - Novel Analytical Method for Estimating the Junction-to-Top Thermal Resistance of Power MOSFETs** **Panel F 1.4**

*SANZ-ALCAINE José Miguel - University of Zaragoza - Spain, AIZPURU Iosu, ARRUTI Asier - Mondragon Unibertsitatea - Spain, BERNAL-RUIZ Carlos, PEREZ-CEBOLLA Francisco Jose - University of Zaragoza - Spain*

#### **536 - Utilizing the Electroluminescence of SiC MOSFETs as Degradation Sensitive Optical Parameter** **Panel F 2.1**

*RUPPERT Lukas A., DE DONCKER Rik W., LAUMEN Michael - RWTH Aachen University - Germany*

### **11:00 DS3d - Topic 04: Measurement Techniques, Sensors and State Observers**

**Location: Eilenriedehalle**

Chair(s): DIERKS Rebecca, Leibniz Universität Hannover, Germany

#### **177 - Influences of Parasitic Capacitances in Wide Bandwidth Rogowski Coils for Commutation Current Measurement** **Panel F 2.2**

*ZIEGLER Philipp, FESTERLING Tobias, HAARER Jörg, HIRNING David, MARX Philipp, ROTH-STIELOW Jörg - University of Stuttgart - Germany*

#### **184 - Condition Monitoring Approach of a SiC Power Semiconductor using Turn-Off Delay with an Integration in a SiC Driver** **Panel F 2.3**

*GOLEV Victor, BOCKHOLT Jan, RASSMANN Rando, SCHÜMANN Ulf - University of Applied Sciences Kiel - Germany*

#### **235 - Design For Enhanced Noise Immunity of PCB Coils used for Sensing Current through Power Devices** **Panel F 2.4**

*RAFIQ Aamir, PRAMANICK Sumit - Indian Institute of Technology Delhi - India*

#### **236 - Measurement Principle for Measuring High Frequency Bearing Currents in Electric Machines and Drive Systems** **Panel F 3.1**

*KNEBUSCH Benjamin, HOELTJE Pauline, JUENEMANN Lennart, MERTENS Axel, PONICK Bernd - Leibniz Universität Hannover - Germany*

#### **475 - Evaluation of Drain-Source Voltage in Switch Transient Time Intervals as Gate Oxide Degradation Precursor of SiC Power MOSFETs** **Panel F 3.2**

*NAGHIBI Javad - Queen Mary University of London - United Kingdom, FOSTER Martin - University of Sheffield - United Kingdom, MEHRAN Kamyar - Queen Mary University of London - United Kingdom, MOHSENZADE Sadegh - K.N. Toosi University of Technology - Iran*

**510 - Design Considerations for Fast On-State Voltage Measurement Circuits** **Panel F 3.3**  
*WEISER Mathias, KALLFASS Ingmar, RUESS Manuel - University of Stuttgart - Germany*

**524 - Characterization of Conventional and Advanced Current Measurement Techniques Suitable for WBG Semiconductor Devices** **Panel F 3.4**  
*KLEVER Severin, DE DONCKER Rik W., THÖNNESSEN André - RWTH Aachen University - Germany*

**11:00 DS3e - Topic 04: Condition Monitoring and Life-Time Prediction**

**Location: Eilenriedehalle**

Chair(s): DIERKS Rebecca, Leibniz Universität Hannover, Germany

**234 - Practical Implementation of a Concept for In-Situ Detection of Humidity-Related Degradation of IGBT Modules** **Panel F 4.1**  
*KOSTKA Benedikt, MERTENS Axel - Leibniz Universität Hannover - Germany*

**335 - A quasi-offline condition monitoring method of DC-link capacitor banks in accelerator power converters** **Panel F 4.2**  
*BAUMANN Timm Felix - Norwegian University of Science and Technology - Norway, GARCIA Raul, PAPASTERGIOU Konstantinos - CERN - European Organization for Nuclear Research - Switzerland, PEFTITSIS Dimosthenis - Norwegian University of Science and Technology - Norway*

**409 - A Condition Monitoring Scheme for Semiconductor Devices in Modular Multilevel Converters With Cascaded H-Bridge Submodules** **Panel F 4.3**  
*ASOODAR Mohsen - KTH Royal Institute of Technology - Sweden, DANIELSSON Christer - Hitachi Energy - Sweden, NAHALPARVARI Mehrdad, NEE Hans-Peter - KTH Royal Institute of Technology - Sweden*

**432 - Implementation of onsite Junction Temperature Estimation for a SiC MOSFET Module for Condition Monitoring** **Panel F 4.4**  
*HOSSEINABADI Farzad, CHAKRABORTY Sajib, EL BAGHDADI Mohamed, HASAN Md Mahamudul, HEGAZY Omar, JAMAN Shahid, KUMAR BHOI Sachin - Vrije Universiteit Brussel - Belgium*

**11:00 DS3f - Topic 06: Wind-Energy Systems**

**Location: Eilenriedehalle**

Chair(s): COLAK Ilknur, Schneider Electric, France

## THURSDAY 08 SEPTEMBER

### DIALOGUE SESSIONS

#### **31 - Operation and Selection of Multilevel Power Converters for Doubly Fed Induction Generator-based Wind Turbines** **Panel C 1.1**

*JHA Kapil - General Electric - United States of America, BANDA Joseph Kiran - Norwegian University of Science and Technology - Norway, I Hridya, TIWARI Arvind - General Electric - United States of America*

#### **305 - Stability Analysis of DFIG System connected with High-Frequency Capacitive Grid based on Closed-Loop Current Control and Direct Power Control** **Panel C 1.2**

*HU Bin - Zhejiang University - China, BLAABJERG Frede - Aalborg University - Denmark, NIAN Heng - Zhejiang University - China, SAHOO Subham - Aalborg University - Denmark, XU Zixiao - Northwestern Polytechnical University - China, ZHANG Yaqian - Southeast University - China*

#### **446 - Model-based Converter Control for the Emulation of a Wind Turbine Drive Train** **Panel C 1.3**

*ERNST Alexander, HOLZKE Wilfried, KAMINSKI Nando, KOCZY Dawid, ORLIK Bernd - University of Bremen, IALB - Germany*

#### **528 - Efficiency and Lifetime Analysis of Several Airborne Wind Energy Electrical Drive Concepts** **Panel C 1.4**

*BAGABER Bakr, HEIDE Daniel, MERTENS Axel, PONICK Bernd - Leibniz Universität Hannover - Germany*

### **11:00 DS3g - Topic 06: Energy Management Systems**

**Location: Eilenriedehalle**

Chair(s): COLAK Ilknur, Schneider Electric, France

#### **7 - Stability Analysis in an inverter-dominant microgrid facing Inrush current of an induction machine** **Panel C 2.1**

*FAZLI Nastaran, ECKEL Hans-Günter, GIERSCHNER Sidney, HAMMES David - University of Rostock - Germany*

#### **149 - Energy Management of Smart Homes with Electric Vehicles using Deep Reinforcement Learning** **Panel C 2.2**

*WEISS Xavier, NORDSTRÖM Lars, XU Qianwen - KTH Royal Institute of Technology - Sweden*

#### **521 - System Modeling and Design of a Hybrid Renewable Energy System for a Cable Network Head-End Station in Rural Area** **Panel C 2.3**

*SCHILLINGER Tobias, ECKART Martin, SCHUHMANN Thomas - University of Applied Sciences Dresden - Germany*

**543 - Comparative Evaluation of Partially-Rated Energy Storage Integration Topologies for High Voltage Modular Multilevel Converters** Panel C 2.4  
*BLATSI Zoe, FINNEY Stephen, MERLIN Michael, NEIRA Sebastian - University of Edinburgh - United Kingdom*

**11:00 DS3h - Topic 07: Power Electronics in Transmission and Distribution Systems**

**Location: Eilenriedehalle**

Chair(s): CARPITA Mauro, University of Applied Sciences of Western Switzerland, Switzerland

**57 - Impedance Stability of Single-Phase LCL Grid-Connected Voltage Source Inverters with Wideband Gap Devices Under Different Control Approaches** Panel A 1.1  
*ALI Ramy, O'DONNELL Terence - University College Dublin - Ireland*

**69 - Synchronization Stability of a Grid Forming Converter Under the Effect of Current Limit in Voltage Dips with VI Based Current Limiting Method: Analysis and Solution** Panel A 1.2  
*KHAN Siam Hasan, ACEÑA Javier Cañas, ARZA Joseba, IZURZA Pedro, LAZKANO Markel Zubiaga, SANCHEZ-RUIZ Alain - Ingeteam R&D Europe S.L. - Spain*

**104 - Distribution transformer voltage control using a single-phase matrix converter** Panel A 1.3  
*WANG Rui, HUISMAN Henk, WIJNANDS Korneel - Eindhoven University of Technology - Netherlands*

**271 - Enabling large-scaled MMC EMT-RMS co-simulation by data exchange in the loop (DXiL)** Panel A 1.4  
*XIAO Xiong, CHOUDHURY Soham, COUMONT Martin, HANSON Jutta - Technische Universität Darmstadt - Germany*

**362 - Model predictive-based control technique for fault ride-through capability of VSG-based grid-forming converter** Panel A 2.1  
*POURESMAEIL Edris - Aalto University - Finland, ADABI Jafar - Babol Noshirvani University of Technology (BNUT) - Iran; KHAN Basit Ali, POURESMAEIL Mobina, SEPEHR Amir - Aalto University - Finland*

**363 - Grounding Points in HV/MV Hybrid Transformer Auxiliary Converters** Panel A 2.2  
*WIEMER Adrian, BIELA Jürgen - ETH Zurich - Switzerland*

## THURSDAY 08 SEPTEMBER

### DIALOGUE SESSIONS

**366 - Characterising the effect of an inverter on the regulation of the AC voltage using a frequency response identification technique** **Panel A 2.3**  
*ALDARMON Mohamed - Imperial College London - United Kingdom*

**459 - A Pre- and Discharge Unit for Capacitive DC-Links Based on a Dual-Switch Bidirectional Flyback Converter** **Panel A 2.4**  
*HOFFMANN Madlen, MÄRZ Martin - Friedrich-Alexander-University Erlangen-Nuremberg - Germany*

**527 - Modelling Approaches of Power Systems Considering Grid-Connected Converters and Renewable Generation Dynamics** **Panel A 3.1**  
*GIRONA-BADIA Jaume, GOMIS-BELLMUNT Oriol - Universitat Politècnica de Catalunya - Spain, KUSCHE Stephan - HTW Berlin - University of Applied Sciences - Germany, LACERDA Vinicius - Universitat Politècnica de Catalunya - Spain, POSCHKE Florian - HTW Berlin - University of Applied Sciences - Germany, PRIETO-ARAUJO Eduardo - Universitat Politècnica de Catalunya - Spain, SCHULTE Horst - HTW Berlin - University of Applied Sciences - Germany*

**11:00 DS3i - Topic 07: HVDC & FACTS** **Location: Eilenriedehalle**  
Chair(s): *CARPITA Mauro, University of Applied Sciences of Western Switzerland, Switzerland*

**161 - Modular STATCOM for compensation of reactive power and voltage asymmetry in medium-voltage distribution power grids** **Panel A 3.2**  
*ŠTENGL Josef, KOMRSKA Tomáš, PEROUTKA Zdenek, TALLA Jakub - University of West Bohemia - Czech Republic*

**197 - Modeling the impact of grid-forming E-STATCOMs on inter-area system oscillations** **Panel A 3.3**  
*BOLZONI Alberto - Hitachi Energy - Switzerland, HASLER Jean-Philippe, JOHANSSON Nicklas - Hitachi Energy - Sweden*

**323 - Steady State Simulations of a Hybrid HVAC/HVDC Network Using OS Based ARM Devices** **Panel A 3.4**  
*DAMIAN Ioan, EREMIA Mircea - University Politehnica of Bucharest - Romania*

**461 - A Way Forward to Achieve Interoperability in Multi-Vendor HVDC System** **Panel A 4.1**  
*ABDALRAHMAN Adil - Hitachi Energy - Sweden, HAEDERLI Christoph - Hitachi Energy - Switzerland, HAFNER Ying-Jiang - Hitachi Energy - Sweden, MAIBACH Philippe - Hitachi Energy - Switzerland*

**533 - DC Side Impedance for Handling Interoperability of Multi-vendor Multi-Terminal HVDC Systems** **Panel A 4.2**

*NAMI Ashkan, ABDALRAHMAN Adil, HAFNER Ying-Jiang, NAYAK Khirod Kumar, SAHU Malaya Kumar - Hitachi Energy - Sweden*

**564 - Aspects of stability issues of HVAC/HVDC coupled grids** **Panel A 4.3**

*BAKHOS Gianni - Supergrid Institute - France, BACHA Seddik - Université Grenoble Alpes - G2ELAB, Supergrid Institute - France, BENCHAIB Abdelkrim, GONZALEZ TORRES Juan-Carlos, SHINODA Kosei - Supergrid Institute - France, VANFRETTI Luigi - Rensselaer Polytechnic Institute - United States of America*

**11:00 DS3j - Topic 07: Micro Grids**

**Location: Eilenriedehalle**

Chair(s): CARPITA Mauro, University of Applied Sciences of Western Switzerland, Switzerland

**130 - Analysis of a Droop-Based Power Controller for Three-Phase Microgrids** **Panel A 4.4**

*LAURI Andrea, ABEDINI Hossein, BIADENE Davide, CALDOGNETTO Tommaso, MATTAVELLI Paolo - University of Padova - Italy*

**166 - A Decentralized and Communication-free Control Algorithm of DC Microgrids for the Electrification of Rural Africa** **Panel A 5.1**

*RICHARD Lucas, ALVAREZ-HERAULT Marie-Cecile, FREY David, RAISON Bertrand - G2ELAB CNRS/G-INP/UGA - France*

**176 - An application of electrostatic machines to a microgrid** **Panel A 5.2**

*RAMOS HUERTA Gabriel, MENDOZA-ARAYA Patricio - Universidad de Chile - Chile*

**194 - Power Hardware-in-the-Loop Verification of a Cold Load Pickup Scenario for a Bottom-up Black Start of an Inverter-dominated Microgrid** **Panel A 5.3**

*MIRZADEH Mina - Leibniz Universität Hannover - Germany, Erckrath Tobias - Fraunhofer Institute for Energy Economics and Energy System Technology IEE - Germany, MERTENS Axel, STRUNK Robin - Leibniz Universität Hannover - Germany*

**231 - Grid-Forming Control for Enhanced Microgrid Interconnection** **Panel A 5.4**

*ERCKRATH Tobias, BENDFELD Christian, JUNG Marco, SEIBEL Axel, UNRUH Peter - Fraunhofer Institute for Energy Economics and Energy System Technology IEE - Germany*

**445 - Automatic Generation Control-based Charging/Discharging Strategy for EV fleets to Enhance the Stability of a Vehicle-To-Weak Grid System** **Panel A 6.1**

*MEHRASA Majid, BACHA Seddik, GHOLAMI Mehrdad, HABLY Ahmad, HAJAR Khaled, LABONNE Antoine, RAZI Reza - G2ELAB CNRS/G-INP/UGA - France*



## THURSDAY 08 SEPTEMBER

### DIALOGUE SESSIONS

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**482 - A standardized and modular power electronics platform for academic research on advanced grid-connected converter control and microgrids** **Panel A 6.2**

*FRANK Simon, HILLER Marc, SCHULZ Dominik, SCHWENDEMANN Rüdiger, STEFANSKI Lukas - Karlsruhe Institute of Technology (KIT) - Germany*

**562 - Power System Simulation Tool for Quick Benchmarking of Innovative MVDC Grids in E-Mobility Applications** **Panel A 6.3**

*SIEMASZKO Daniel, NOISETTE Philippe - Hitachi Energy - Switzerland*

#### **11:00 DS3k - Topic 07: Mobile Power Stations**

***Location: Eilenriedehalle***

Chair(s): CARPITA Mauro, University of Applied Sciences of Western Switzerland, Switzerland

**479 - Feasibility assessment of variable-speed generator set concepts with focus on rating of power electronic equipment** **Panel A 6.4**

*FEHR Hendrik - Technische Universität Ilmenau - Germany, ATZLER Frank - Technische Universität Dresden - Germany, GENSIOR Albrecht, MÖCKEL Andreas - Technische Universität Ilmenau - Germany, REINCKE-COLLON Carsten - Aggreko Deutschland GmbH - Germany, ROSS Tilo - Technische Universität Dresden - Germany*

#### **11:00 DS3l - Topic 07: Power Quality Issues and Power Factor Correction Techniques**

***Location: Eilenriedehalle***

Chair(s): CARPITA Mauro, University of Applied Sciences of Western Switzerland, Switzerland

**157 - A Non-cooperative Game-theoretic Distributed Control Approach for Power Quality Compensators** **Panel A 7.1**

*BURGOS Claudio, BUCAREY Victor - Universidad de O'Higgins - Chile, MORALES-PAREDES Helmo - São Paulo State University (UNESP) - Brazil, MUÑOZ-CARPINTERO Diego - Universidad de O'Higgins - Chile*

#### **11:00 DS3m - Topic 07: DC Grids including Fault Coordination and Protection**

***Location: Eilenriedehalle***

Chair(s): CARPITA Mauro, University of Applied Sciences of Western Switzerland, Switzerland



**342 - DC-MMC with reduced number of sub-modules providing fault blocking capability in HVDC Grids** **Panel A 7.2**

*PAEZ Juan - Supergrid Institute - France, BACHA Seddik - University of Grenoble - G2ELAB - France, DWORAKOWSKI Piotr, MOREL Florent - Supergrid Institute - France*

**410 - Particular Requirements on Drive Inverters for Safe and Robust Operation on an Open Industrial DC Grid** **Panel A 7.3**

*PULS Simon - Lenze SE - Germany, BORCHERDING Holger - Technische Hochschule Ostwestfalen-Lippe - Germany, EHLICH Martin - Lenze SE - Germany, KOCH Jan-Niklas - Technische Hochschule Ostwestfalen-Lippe - Germany*

**458 - New Topology of Superconducting Fault Current Limiter with Bypass Resistor** **Panel A 7.4**

*BRONSHTEIN Svetlana, BAIMEI Dmitry - Shamoon College of Engineering - Israel, BAIMEI Nina - Sapir Academic College - Israel, BARBIE Eli - Shamoon College of Engineering - Israel, KUPERMAN Alon - Ben Gurion University - Israel*

**11:00 DS3n - Topic 07: Hybrid Circuit Breakers**

**Location: Eilenriedehalle**

Chair(s): CARPITA Mauro, University of Applied Sciences of Western Switzerland, Switzerland

**110 - Bidirectional DC Circuit Breaker with Improved Performance during Commissioning and Reclosing** **Panel B 2.1**

*POGULAGUNTLA Aditya - Indian Institute of Technology Dharwad - India, ANDRII Chub - Tallinn University of Technology - Estonia, BANAVATH Satish Naik, ITTE Venkata raghavana - Indian Institute of Technology Dharwad - India, KRISHNAMOORTHY Harish Sarma - University of Houston - United States of America, THAMBALLA Sreekanth - University of Minnesota Twin Cities - United States of America*

**11:00 DS3o - Topic 07: Real-Time Simulation and Hardware in the Loop**

**Location: Eilenriedehalle**

Chair(s): CARPITA Mauro, University of Applied Sciences of Western Switzerland, Switzerland

**11 - Unsymmetrical fault behavior of PLL based grid-connected converters** **Panel B 1.1**

*HACKL Philipp, SCHUERHUBER Robert, ZHANG Ziqian - Graz University of Technology - Austria*

## THURSDAY 08 SEPTEMBER

### DIALOGUE SESSIONS

**180 - An Accurate and Fast Model of Three-Level Three-Phase Dual-Active Bridge Converters in Real-Time Simulation** **Panel B 1.2**

*JIA Ming, DE DONCKER Rik W., JOEBGES Philipp - RWTH Aachen University - Germany*

**427 - Determination of optimal associated discrete circuit switch model parameters for real-time simulation of dual-active bridge converters** **Panel B 1.3**

*STEVIC Marija, VENUGOPAL Ravinder - Opal-RT Germany GmbH - Germany*

**452 - DAB converter discrete ADRC control into real-time CHIL simulation of a MVDC/LVDC power grid** **Panel B 1.4**

*VERONI Alessandro, CHIUMEO Riccardo, CLERICI Alessio, RAGGINI Diego - RSE SPA - Italy*

### **11:00 DS3p - Topic 08: Electric Drive Trains for Aerospace and Space Applications**

**Location: Eilenriedehalle**

Chair(s): EBRAHIMI Amir, Leibniz Universität Hannover, Germany

**215 - On the Cosmic Ray Influence on the Electronics Design of a High Altitude Electric Aircraft** **Panel G 1.1**

*MOREY Philippe, CARPITA Mauro - University of Applied Sciences of Western Switzerland - Switzerland*

**252 - Innovative driving scheme for electrical generators in More Electric Aircrafts employing Series Active Filtering** **Panel G 1.2**

*APOSTOLIDOU Nena, PAPANIKOLAOU Nick - Democritus University of Thrace - Greece*

**261 - Cascaded H-Bridge Converter Designs for Future Short-Range All-Electric Aircraft Propulsion** **Panel G 1.3**

*HAGEDORN Maximilian, LORENZ Malte, MERTENS Axel - Leibniz Universität Hannover - Germany*

**275 - Potentials to Improve the Post-Fault Performance of a Fault-Tolerant Inverter System in Electrified Aircraft Propulsion System** **Panel G 1.4**

*CAO Yongtao, FAUTH Leon, FRIEBE Jens, MERTENS Axel - Leibniz Universität Hannover - Germany*

**429 - Hardware in the Loop Test of an Electric Aircraft Powertrain** **Panel G 2.1**

*MÖNNINGHOFF Sebastian, HAMEYER Kay, SCHOLJEGERDES Moritz - RWTH Aachen University - Germany*

**529 - Design and Performance Analysis of Single-phase Axial Flux Permanent Magnet Motor for Coaxial Cascade** **Panel G 2.2**  
*WANG Chu, GENG Weiwei, HOU Jining, HU Xiaowei, LI Qiang, WANG Xiaoya - Nanjing University of Science and Technology - China*

**576 - Short Circuit Behavior of Dual Three-phase Permanent Magnet Synchronous Motors with Different Mutual Inductance in Electric Propulsion Application** **Panel G 2.3**  
*YANG Yinghui, MÖHLENKAMP Georg - Brandenburgische Technische Universität Cottbus-Senftenberg - Germany*

**11:00 DS3q - Topic 08: On-Board Power Converters**

*Location: Eilenriedehalle*

Chair(s): EBRAHIMI Amir, Leibniz Universität Hannover, Germany

**63 - Cost and efficiency considerations in On-board Chargers** **Panel H 1.1**  
*JANKOVIC Marija, CHARKAOUI Abdelmouneim, FELGEMACHER Christian, LENZ Kevin, MASHALY Aly - Rohm Semiconductor GmbH - Germany*

**75 - Triple-Phase-Shift Controlled Dual Active Bridge Converter with Variable Input Voltage in Auxiliary Railway Supply** **Panel H 1.2**  
*SCOHIER Martin, DEBLECKER Olivier, VALDERRAMA SAKUYAMA Carlos Alberto - University of Mons - Belgium*

**239 - PCB Technology Comparison Enabling a 900V SiC MOSFET Half Bridge Design For Automotive Traction Inverters** **Panel H 1.3**  
*SPIELER Matthias - Center For Power Electronics Systems (CPES) - Virginia Tech - United States of America, ALVI Muhammad H - General Motors Research & Development - United States of America, BURGOS Rolando, CHANG Che-Wei, DONG Dong - Center for Power Electronics Systems (CPES) - Virginia Tech - United States of America, EL-REFAIE Ayman - Marquette University - United States of America*

**274 - Multi-Frequency Traction-to-Auxiliary Integrated EV Drivetrain: Eliminating the Need for an Auxiliary Power Module** **Panel H 1.4**  
*VIANA Caniggia, LEHN Peter, PATHMANATHAN Mehanathan - University of Toronto - Canada*

**321 - Performance Enhancement of Power Conditioning Systems in More Electric Aircrafts** **Panel H 2.1**  
*RIGOGIANNIS Nick, PAPANIKOLAOU Nick - Democritus University of Thrace - Greece, YANG Yongheng - Zhejiang University - China*

## THURSDAY 08 SEPTEMBER

### DIALOGUE SESSIONS

**346 - Comparison of Dual-Active-Bridge-based Topologies for single-phase single-stage EV On-board Chargers** **Panel H 2.2**

*GAONA Daniel, DE OLIVEIRA Eduardo Façanha - Huawei Technologies Duesseldorf GmbH - Germany, PAULS Denis - Friedrich-Alexander-University Erlangen-Nuremberg - Germany*

**395 - An EV Integrated isolated DC charger using a six-phase synchronous machine** **Panel H 2.3**

*SINGH Sukhjit, PATHMANATHAN Mehanathan, WALDEMAR LEHN Peter - University of Toronto - Canada*

**417 - Bidirectional Cuk Converter in Partial-Power Architecture with Current Mode Control for Battery Energy Storage System in Electric Vehicles** **Panel H 2.4**

*ARTAL-SEVIL Jesús Sergio - University of Zaragoza - Spain, AIZPURU Iosu, ANZOLA Jon - Mondragon Unibertsitatea - Spain, BALLESTIN-BERNAD Victor - University of Zaragoza - Spain*

**498 - A Universal Single Stage Current-fed Bidirectional Converter with both AC and DC Input Power Source Compatibility** **Panel H 3.1**

*KUMAR Manish, PANIGRAHI Bijaya Ketan, PRAMANICK Sumit - Indian Institute of Technology Delhi - India*

**518 - A V2G-enabled Seven-level Buck PFC Rectifier for EV Charging Application** **Panel H 3.2**

*JAIN Anekant, AGARWAL Ritika, GUPTA Krishna Kumar, JAIN Sanjay K. - Thapar Institute of Engineering and Technology, Patiala- India*

**11:00 DS3r - Topic 09: Uninterruptible Power Supplies (UPS)**

**Location: Eilenriedehalle**

Chair(s): WIJNANDS Korneel, Eindhoven University of Technology, Netherlands

**522 - Comparison of System-Level Availability in Industrial Grids** **Panel B 3.1**

*EMMERS Glenn, DRIESEN Johan - KU Leuven - Belgium*

**11:00 DS3s - Topic 09: Contactless (Wireless) Power Supply**

**Location: Eilenriedehalle**

Chair(s): WIJNANDS Korneel, Eindhoven University of Technology, Netherlands

**82 - Design and efficiency analysis of an LCL Capacitive Power Transfer system with Load-Independent ZPA** **Panel B 3.2**

*MUSOLINO Francesco, ABDULLAH Ahmed, CROVETTI Paolo, FERREYRA Fabio - Politecnico di Torino - Italy, PAVONE Mario - STMicroelectronics - Italy*

**337 - Adaptive Dead-Time Control in a Resonant Wireless Power Transfer System** **Panel B 3.3**  
*KRIGAR Tim, PFOST Martin - Technische Universität Dortmund - Germany*

**13:20 Award Session**

***Location: Niedersachsenhalle***

Chair(s): KATIC Vladimir, University of Novi Sad, Serbia  
THOMAS Jean-Luc, Conservatoire National des Arts et Métiers, France

**14:20 Closing Session**

Location: Niedersachsenhalle

Chair(s): MERTENS Axel, Leibniz Universität Hannover, Germany  
THOMAS Jean-Luc, Conservatoire National des Arts et Métiers, France

Final words and formal closing of the conference by Prof. Dr. Jean-Luc Thomas, President of EPE Association

Final words by Prof. Dr. Axel Mertens, Leibniz University of Hannover, Germany, EPE '22 ECCE Europe Conference Chairman

Transfer of the EPE ECCE flag and official launch of EPE '23 ECCE Europe in Aalborg by Prof. Dr. Axel Mertens, Leibniz University of Hannover, Germany, EPE '22 ECCE Europe Conference Chairman and Prof. Dr. Francesco Iannuzzo, Aalborg University, EPE '23 ECCE Europe Conference Chairman

Short presentations of sister events ECCE NA 2022 and ECCE Asia 2023

**15:10 ETUT-Project**

***Location: Vendor Session Area***

Chair(s): BRICEÑO Pablo, University of Nottingham, United Kingdom

**15:10 LS7a - Topic 12: Invited Lectures - Electricity and Hydrogen Based Energy Systems**

***Location: Niedersachsenhalle***

Chair(s): ECKEL Hans-Günter, University of Rostock, Germany  
MERTENS Axel, Leibniz Universität Hannover, Germany

**15:10 592 - Integrating Offshore Wind & Hydrogen – An Operator's View**  
*GREMME Florian - RWE - Germany*

## THURSDAY 08 SEPTEMBER

### LECTURE SESSIONS

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**15:30**     **593 - Status quo and future prospects of power electronic solutions for electrolysis plants**

*SCHUMANN Sven - Siemens Energy - Germany*

**15:50**     **594 - Modular power supply system for large scale water electrolyzers**

*JUCHEM Ralf, RIGBERS Klaus - SMA Solar Technology AG - Germany*

#### **15:10     LS7b - Topic 2: Grid Connected Converters**

***Location: Roter Saal***

Chair(s): HILLER Marc, Karlsruhe Institute of Technology (KIT), Germany  
FORMENTINI Andrea, University of Genova, Italy

**15:10**     **24 - Difference in the design process of LCL filters for grid connected VSI when using SiC/GaN instead of Si semiconductors**

*KAMPEN Dennis, BADENHOP Niklas, FRÄGER Lukas - Block Transformatoren-Elektronik GmbH - Germany, MAMBETOW Artur - Technische Hochschule Ostwestfalen-Lippe - Germany*

**15:30**     **152 - Estimation of Battery Parameters in Cascaded Half-Bridge Converters with Reduced Voltage Sensors**

*TASHAKOR Nima - Technical University of Kaiserslautern - Germany, AL-HADDAD Kamal, ARABSALMANABADI Bitar - École de Technologie Supérieure - Canada, GOETZ Stefan, HOSSEINI Seyedeh Elham - Technical University of Kaiserslautern - Germany*

**15:50**     **206 - Constant DC power infeed grid forming with improved ability to ride-through unbalanced low-voltage faults**

*HASSAN Tayssir, DIECKERHOFF Sibylle, EGGERS Malte, TASKE Peter, YANG Huoming - Technical University Of Berlin - Germany*

#### **15:10     LS7c - Topic 3: Converter Design and Optimisation (II)**

***Location: Blauer Saal***

Chair(s): SIEMASZKO Daniel, Hitachi Energy, Switzerland  
EBRAHIMI Amir, Leibniz Universität Hannover, Germany

**15:10**     **418 - Design Space Exploration for a Capacitive 36V, 4A, 4:1 DCDC Converter with GaN Switches Using a Performance-Cost-Matrix Including Uncommon Topologies**

*GEHL Adrian, DISSELKAMP Simon, KEMPCHE Malte, OLBRICH Markus, WICHT Bernhard - Leibniz Universität Hannover - Germany*

**15:30 174 - Application of a multi-winding magnetic component characterization method to optimize cross-regulation performances in DCM flyback converters**  
*MOTTE-MICHELLON Denis, COGITORE Bruno - EXXELIA - France, LEMBEYE Yves, RAMDANE Brahim - G2ELAB CNRS/G-INP/UGA - France*

**15:50 119 - Three phase PV inverter LCOE optimization considering technological choice**  
*TADBIRI NOOSHABADI Morteza - G2ELAB CNRS/G-INP/UGA - France, FARHANGI Shahrokh, IMANEINI Hossein - University of Tehran - Iran, SCHANEN Jean-Luc - G2ELAB CNRS/G-INP/UGA - France*

**15:10 LS7d - Topic 4: Health Monitoring of Power Converters**

*Location: Bonatz Saal*

Chair(s): ZANCHETTA Pericle, University of Nottingham, United Kingdom  
 VAN DEN BOSSCHE Alex, Ghent University, Belgium

**15:10 51 - Cognitive Insights into Metaheuristic Digital Twin based Health Monitoring of DC-DC Converters**  
*MIRZA Abdul Basit, CHOKSI Kushan - Stony Brook University - United States of America, KRISHNA MOORTHY Radha - Oak Ridge National Lab (ORNL) - United States of America, LUO Fang, SALEHI VALA Sama - Stony Brook University - United States of America, SUDHAN CHINTHAVALI Madhu - Oak Ridge National Lab (ORNL) - United States of America*

**15:30 436 - Real-Time Thermal Characterization of Power Semiconductors using a PSO-based Digital Twin Approach**  
*KUPRAT Johannes, LISERRE Marco - Kiel University - Germany, PASCAL Yoann - Fraunhofer Institute for Silicon Technology - IZEHoe - Germany*

**15:50 237 - Climatically Induced Insulation Degradation in Power Semiconductor Modules of Wind Turbines**  
*LICHTENSTEIN Timo, FISCHER Katharina, FRÖHLING Sören, TEGTMEIER Bernd - Fraunhofer Institute for Wind Energy Systems - Germany*

**15:10 LS7e - Topic 8: E-Mobility: Charging Systems and Battery Issues (II)**

*Location: Konferenzraum 27*

Chair(s): BOECKER Joachim, Paderborn University, Germany  
 HEGAZY Omar, Vrije Universiteit Brussel, Belgium

**15:10 515 - A 30 kW Dynamic Wireless Inductive Charging System for EVs**  
*MEIRA GOMES Zariff - Vedecom - France, DAMM Gilney - Universite Gustave Eiffel - France, KADEM Karim, MOUSSA Hassan - Vedecom - France, PINHEIRO José Renes - Federal University of Bahia - Brazil*

## THURSDAY 08 SEPTEMBER

### LECTURE SESSIONS

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**15:30     550 - Comparative Study of Single-phase and Three-phase DAB for EV Charging Application**

*BLASUTTIGH Nicola - Università Degli Studi di Trieste - Italy, BEIRANVAND Hamzeh,, LIS-ERRE Marco, PEREIRA Thiago - Christian-Albrechts-Universität zu Kiel - Germany*

**15:50     568 - Autonomous Characterization of Lithium-Ion Battery Model Parameters utilizing a Mathematical Optimization Methodology**

*ASTUDILLO HERAS Galo Daniel, BEIRANVAND Hamzeh, HANSEN Sandra, KRÜGER Helge, LISERRE Marco - Kiel University - Germany, WERLICH Christian, WÜRSIG Andreas - Fraunhofer Institute for Silicon Technology - IZEHoe - Germany*

**16:30     IEEE IFEC'23 Q&A**

***Location: Vendor Session Area***

Chair(s): FRIEBE Jens, Leibniz Universität Hannover, Germany

**16:30     Industrial Forum 5: Electrification of Aircraft**

***Location: Roter Saal***

Chair(s): MALLWITZ Regine, Technische Universität Braunschweig, Germany  
MOEHLENKAMP Georg, Brandenburgische Technische Universität Cottbus-Senftenberg, GERMANY

**16:30     Industrial Forum 6: Electricity and Hydrogen Based Energy Systems**

***Location: Blauer Saal***

Chair(s): LINDER Stefan, Alpiq AG, Switzerland



## European Training network in collaboration with Ukraine for electrical Transport



The EU-funded ETUT (European Training network in collaboration with Ukraine for electrical Transport) is a Marie Skłodowska Curie Action which received funding from the European Union's EU Framework Programme for Research and Innovation Horizon 2020 under Grant Agreement No 955646. This project aims to train more electrical engineers so they can be absorbed in the European labour market. The project will model, design, estimate, quantify and monitor economic measures for a reliable, safe, effective, and greener electrical transport system. The ETUT doctoral training objectives are in line with the needs as stated by the EU, such as Developing a structural doctoral programme in Power Electronics (PE) and Electromagnetic Compatibility (EMC) by 3 leading research groups, in close collaboration with industry at 3 renowned universities: the University of Nottingham in the UK, the University of Twente in the Netherlands, and Ukrainian State University of Science and Technologies in Ukraine. The project's scientific objectives can be achieved through advanced models and simulation methods allowing for uncertainty for connected devices and systems, novel modulation techniques for decreased and meticulous interference, and full experimental evaluation and characterization in time- and frequency-domain of transport installations.

For more information, please see the ETUT-website: <https://www.etut-itn.org/>

**When?:** Thursday, 8 September 2022 (15:10 – 16:10)

**Where?:** Hannover Congress Centrum (HCC), Vendor Session Area, Eilenriede-halle

#### **Industrial Forum 5: "Electrification of Aircraft"**

The energy transition has arrived in aviation. For some years now, there has been an increasing electrification of aircraft. The aim here is to save emissions and fuel. From the point of view of power electronics, this means an increasing demand for electrical energy converters at ever higher on-board voltage levels. Before electrification of the propulsion system, it must be clarified which sustainable fuel is technically most sensible to use. At present, hydrogen is seen as the most sensible solution. In this panel discussion, we talk with experts from different areas of aviation about possible solutions and their challenges.

**Moderator:** Prof. Dr. Regine MALLWITZ

**Panellists:**

- Kathrin EBNER  
Lead Energy & Fuels, Coordinator (Hybrid-)Electric & Hydrogen Aviation, Bauhaus Luftfahrt e. V., Taufkirchen, Germany
- Tanja NEULAND  
Hydrogen Techno IPT Leader – Propulsion of Tomorrow, Airbus Operations GmbH, Hamburg, Germany
- Prof. Pat WHEELER  
Head of Power Electronics, Machines and Control Research Group and Professor of Power Electronic Systems, Faculty of Engineering, University of Nottingham, UK
- Prof. Markus HENKE, TU Braunschweig.  
Representative of the SE<sup>2</sup>A – Sustainable and Energy-Efficient Aviation – Cluster of Excellence Brunswick-Hanover
- Prof. Bulent SARLIOGLU. University Wisconsin-Madison  
Representative of the North-American Aviation Industry

**When?:** Thursday, 8 September 2022 (16:30 – 17:40)

**Where?:** Hannover Congress Centrum (HCC), Roter Saal

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**Industrial Forum 6: " Hydrogen Based Energy Systems "**

A keyword search in IEA's 2021 report "Net Zero by 2050" reveals the following number of matches: hydrogen: 441, solar: 148, wind: 130, nuclear: 83, and battery: 74. This example illustrates the importance hydrogen is given – not only by IEA – to slow down global warming. According to IEA's net zero scenario, the annual hydrogen consumption will reach some 500 million tons in 2050, its production absorbing approximately 20% of the world's electricity supply. However, these large numbers trigger important questions, such as: Are there no "all-electric", i.e., more efficient alternatives? Where will hydrogen be produced in the future? How much more expensive will hydrogen be compared to fossil energy and electricity? Will it be affordable? There are no firm answers to all of these questions, and even hydrogen advocates constantly struggle with contradictions, doubts, and dilemmas. This panel with experts along the hydrogen value chain will try to shed some light on the most burning questions.

**Moderator:** Dr. Stefan LINDER, Alpiq AG

**Panellists:**

- Tristan KRETSCHMER (Plug Power)
- Adrian HERBERGER (Airbus)
- Dr. Sven SCHUMANN (Siemens Energy Global)
- Prof. Dr. Richard HANKE-RAUSCHENBACH (Leibniz University Hannover)
- Dr. Florian GREMME (RWE)

**When?:** Thursday, 8 September 2022 (16:30 – 17:40)

**Where?:** Hannover Congress Centrum (HCC), Blauer Saal

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## THURSDAY 08 SEPTEMBER

### IFEC'23

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#### IEEE International Future Energy Challenge - IFEC 2023

##### **Single-Phase Solid-State Transformer**

IFEC is an international student competition for innovation, conservation, and effective use of electrical energy, which is open to college and university student teams from recognized engineering programs in any location. It is organized by the IEEE PELS, IEEE IAS, IEEE PES and the Power Sources Manufacturers Association (PSMA).

The goal of IFEC 2023 is to develop a high-efficient and autonomous single-phase solid-state transformer.

Detailed specifications and requirements are listed on the Challenge Homepage:

<http://energychallenge.weebly.com/ifec-2023.html>

IEEE IFEC'23 will be organized by a Team from the University Hannover. We will take the chance and give a short update on the challenge and also add a Q&A-Session (hybrid) at the EPE'22 ECCE Europe.

**When?:** Thursday, 8 September 2022 (16:30 – 17:40)

**Where?:** Hannover Congress Centrum (HCC), Vendor Session Area, Eilenriede-halle



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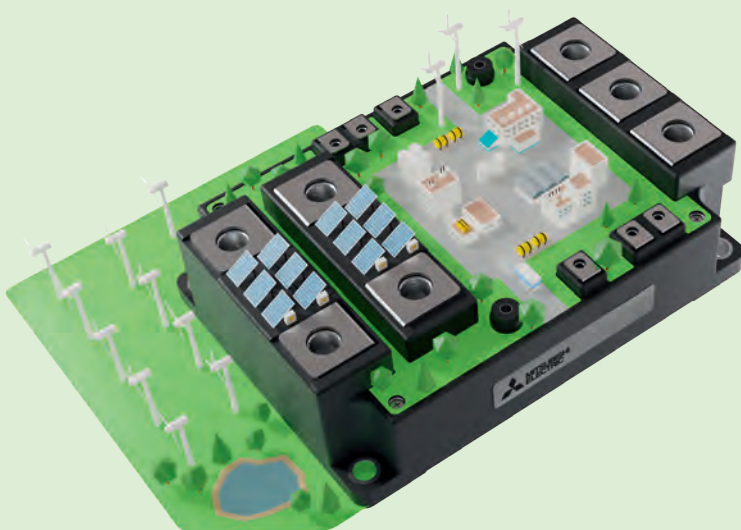
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## TECHNICAL VISITS

Only participants registered for these activities will be allowed on the bus / to enter the premises.

### Technical visit 1 to BLOCK Transformatoren GmbH - Verden

#### Schedule

Friday 9 September 2022, from 7.30 to 14.30

#### Description of the visit

Inductive components and EMC in power electronics: Excursion to BLOCK Transformatoren-Elektronik GmbH.

Take part in an exciting excursion to a manufacturer of inductive wound goods, EMC filters and switched-mode power supplies. See an extremely high vertical range of manufacture and a professional EMC and environmental simulation laboratory.

#### *Schedule:*

- 09:30 Welcome
- 09:45 Company presentation
- 10:15 Company tour
- 12:30 Questions and answers
- 12:45 End of the event, departure back to Hannover

The company will offer a small lunch to the participants



© BLOCK Transformatoren GmbH

**Meeting Point (Friday 9 September 2022, 07:30):** Bus parking next to the HCC, Schillstrasse



### Technical visit 2 to Volkswagen Battery System Factory - Braunschweig

**Schedule :** Friday 9 September 2022, from 7.30 to 14.30 (**FULLY BOOKED !**)

#### Description of the visit

The Volkswagen plant in Braunschweig is a member of Volkswagen Group Components, an independent business unit in the Group Technology division under the umbrella of Volkswagen AG that is responsible for developing and manufacturing strategic components for the Group's vehicle-producing brands. The Braunschweig plant produces the battery systems for a wide range of battery-driven electric and hybrid vehicles. Braunschweig has also been producing the batteries for the new MEB vehicles of the Group since 2019. As a result of its work, the location plays a key role in electric mobility for the Volkswagen brand. During a technical visit, you will have an opportunity to tour Hall 32 A of the Braunschweig plant. Batteries for the all-electric models made by the Volkswagen Group are produced exclusively here. The first plant designed to mass-produce batteries for the ID. family was erected on a site totalling about 49,000 square metres here in 2019. The hall is subdivided into four main areas: the aluminium warehouse, housing production, battery assembly and the assembly warehouse. Thanks to its state-of-the-art production facilities, an operation that has achieved an exceptionally high level of precision, the Braunschweig location is one of the largest battery-system producers in Europe. The know-how that has been amassed here is tapped and employed throughout the Volkswagen Group.



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The lunch is not included in this visit.

**Meeting Point (Friday 9 September 2022, 07:30):** Bus parking next to the HCC, Schillstrasse





## TECHNICAL VISITS

### Technical visit 3 to Deutsches Zentrum für Luft- und Raumfahrt (DLR) Research Airport - Braunschweig

#### Schedule

Friday 9 September 2022, from 8.30 to 14.30 (**FULLY BOOKED !**)

#### Description of the visit

DLR is the Federal Republic of Germany's research centre for aeronautics and space. We conduct research and development activities in the fields of aeronautics, space, energy, transport, security and digitalisation. The German Space Agency at DLR plans and implements the national space programme on behalf of the federal government. Two DLR project management agencies oversee funding programmes and support knowledge transfer.

Climate, mobility and technology are changing globally. DLR uses the expertise of its 55 research institutes and facilities to develop solutions to these challenges. Our 10,000 employees share a mission – to explore Earth and space and develop technologies for a sustainable future. In doing so, DLR contributes to strengthening Germany's position as a prime location for research and industry.



© DLR

The lunch is not included in this visit.

**Meeting Point (Friday 9 September 2022, 07:30):** Bus parking next to the HCC, Schillstrasse





### Technical visit 4 to Komatsu

**Schedule :** Friday 9 September 2022, from 9.00 to 14.00 (**FULLY BOOKED !**)

#### **Description of the visit**

Komatsu, one of the world's largest manufacturers of construction and mining machinery, headquartered in Tokyo, Japan, looks back on a 100-year tradition and produces modern construction machinery at its Hanover site. In collaboration with the EPE'22 ECCE Europe-conference and with the "IEEE Joint IES/IAS/PELS German Chapter Meeting" on the 9th of September 2022, Komatsu Germany GmbH will welcome a limited number of participants on the traditional, former Hanomag factory site. An insight into its production halls as well as its development activities in the newly built HiTeC (Hannover Innovation Technical Center) will be given. A visit to the test and demo site, which is also located on the factory premises, provides an insight into the testing activities to ensure the durability in operation of the wheeled excavators and compact wheel loaders developed in Hannover.

Komatsu invites the participants to a lunch together on the factory campus



*View of the assembly line at Komatsu HiTeC Germany GmbH in Hannover, Germany*

© Komatsu



*Building of Komatsu Germany GmbH in Hannover, Germany*

**Meeting Point (Friday 9 September 2022, 09:30):** Hanomagstr. 15, 30449, Hannover (Bus 500, Bus Stop: "Hannover Deisterplatz/Bornumer Straße")



## TECHNICAL VISITS

### Technical visit 5 to H2-Campus Salzgitter

**Schedule :** Friday 9 September 2022, from 7.30 to 14.30

#### Description of the visit

##### **Hydrogen to decarbonize industry!**

##### ***From the production of green hydrogen to industrial use – Hydrogen Campus Salzgitter***

At the Wasserstoff Campus Salzgitter, a broad alliance from industry – Salzgitter AG, MAN Energy Solutions, Robert Bosch Elektronik, Alstom Transport Deutschland and WEVG Salzgitter – in collaboration with local government partners such as the office for regional development and the city of Salzgitter as well as the Allianz für die Region and the Fraunhofer Institute for Surface Engineering and Thin Films IST, is researching and demonstrating the economically viable supply and use of hydrogen research and demonstrate the economically viable supply and use of hydrogen. This tour focuses on the transformation of factory systems towards green production. We discuss hydrogen technologies along the entire value chain from production to use, with special focus on economic and ecological aspects.

A comprehensive exhibition at the campus sums up these results from the basics of hydrogen to the production of green hydrogen, its storage and as well as usage for a production facility for electronics. In this context the transformation of a Bosch production plant towards CO<sub>2</sub>-neutrality, energy-autarchy and energy-flexibility will be presented on-site.

The lunch is not included in this visit.

**Meeting Point (Friday 9 September 2022, 07:30):** Bus parking next to the HCC, Schillstrasse



© H2-Campus Salzgitter



### Technical visit 6 to Institute for Drive Systems and Power Electronics (IAL) at the Leibniz University of Hannover

#### Schedule

Friday 9 September 2022, from 7.30 to 14.30

#### Description of the visit

The laboratories of IAL are open for your visit – however we do have some restrictions because of construction works.

We will show you the Low Power Laboratory at the Leibniz University of Hannover main building as well as the Generator-Converter Laboratory for MVA-Applications. Here we do our research on wind and hydro power generation. The test bench is equipped with two 690V machines of 1.2 and 2 MW, respectively, each with their individual converters, as well as an inverter-based network simulation with 4.4 MVA, which allows free adjustment of the network frequency, asymmetry or harmonics in the network voltage.

The lunch is not included in this visit.



© IAL Leibniz University Hannover



© IAL Leibniz University Hannover

**Meeting Point (Friday 9 September 2022, 09:30 | 10:30 | 13:00 | 14:00):** IAL, Welfengarten 1, 30167 Hannover



## Sponsors and Exhibiting companies

### SPONSORS

#### PLATINUM

**Company name:** Infineon Technologies AG

**Booth #:** 62

**Full address:** Infineon Technologies AG  
Am Campeon 1-15  
85579 Neubiberg (near Munich)  
Germany

**Contact person:** Iris Musiol

**Phone:** +49-89-234-89280

**E-Mail:** iris.musiol@infineon.com

**URL:** www.infineon.com

**Product/** Here at Infineon, we combine entrepreneurial success with responsible action to make life easier, safer and greener. Barely visible, semiconductors have become an indispensable part of everyday life. Ranked one of the global top 10 semiconductor companies, we play a key role in shaping a better future – with microelectronics that link the real and the digital world. Our semiconductors enable efficient energy management, smart mobility, as well as secure, seamless communications in an increasingly connected world.

**Know-How:** Infineon designs, develops, manufactures and markets a broad range of semiconductors and system solutions. The focus of its activities is on automotive and industrial electronics, communication and information technologies, IoT, sensor technology and security. The product range comprises standard components, software, customer-specific solutions for devices and systems, as well as specific components for digital, analogue, and mixed-signal applications.

#### Product range:

- Automotive: 32-bit automotive microcontrollers for powertrain, safety and driver assistance systems; 3D ToF sensors; discrete power semiconductors; IGBT modules; magnetic and pressure sensors; memories (NOR Flash, SRAM, nvSRAM, F-RAM); power ICs; radar sensor ICs (77 GHz); SiC diodes, SiC MOSFETs and SiC modules; transceivers (CAN, CAN FD, LIN, Ethernet, FlexRay™); voltage regulators
- Industrial Power Control: bare die business; discrete IGBTs; driver ICs; IGBT modules (low-power, medium-power, high-power); IGBT module solutions including IGBT stacks; intelligent IGBT modules with integrated control unit, driver and switch; SiC diodes, SiC MOSFETs, SiC modules

- Power & Sensor Systems: 3D ToF sensors; chips for gas sensors; chips for MEMS microphones; chips for pressure sensors; control ICs for power switches; customized chips (ASICs); discrete low-voltage, mid-voltage and high-voltage power MOSFETs (Si-based); GaN power switches; GPS low-noise amplifier; low-voltage and high-voltage driver ICs; radar sensor ICs (24 GHz, 60 GHz); RF antenna switches; RF power transistors; SiC diodes, SiC MOSFETs; TVS (transient voltage suppressor) diode; USB controller
- Connected Secure Systems: connectivity solutions (Wi-Fi, Bluetooth, BLE); embedded security controllers; microcontroller for consumer electronics and industrial applications; security controllers (contact-based, contactless, dual-interface)

## GOLD

**Company name:** Volkswagen AG

**Booth #:** 63

**Full address:** Volkswagen Aktiengesellschaft  
Brieffach 011/8107  
38436 Wolfsburg  
Germany

**Contact person:** Sabrina Schulte

**Phone:** +49 151-74635872

**E-Mail:** [sabrina.schulte@volkswagen.de](mailto:sabrina.schulte@volkswagen.de)

**URL:** <https://www.volkswagen-karriere.de/en/spezial/push-the-pulse.html>

**Product /** Volkswagen AG is investing around six billion euros in electromobility in the next five years. The "Development of e-drives and transmissions" department of Volkswagen Group Components is taking on a pioneering position and has assumed responsibility for the development of all future pulse-controlled inverters. We develop the mobile future by consistently converting our innovations into economical products and continuously developing the existing ones.

**Know-How:** Meet us live and get to know us at booth 63. Besides the keynote from Alexander Krick, you will get the chance to join in discussions with department representatives, meet our recruiters and discover our latest exhibits. For more information, please visit our website.

We are looking forward to meet you!

## Sponsors and Exhibiting companies

### SPONSORS

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#### SILVER

**Company name:** BLOCK Transformatoren-Elektronik GmbH

**Booth #:** 34

**Full address:** Max-Planck-Straße 36-46  
27336 Verden  
Germany

**Contact person:** Dr. Dennis Kampen

**Phone:** +49 42316780

**Fax :** +49 4231678177

**E-Mail:** dennis.kampen@block.eu

**URL:** www.block.eu

**PRODUCT /  
KNOW-HOW:** BLOCK — A FAMILY COMPANY WITH A BRIGHT FUTURE, A RELIABLE  
BRAND

When it comes to perfect voltage solution for systems and plants, BLOCK has been a strong global partner of industry and commerce for decades . Since the launch of the blue PCB transformers, the entire electronics industry has come to appreciate our brand's reliability and supply security. In more than 80 years of company history, the company expanded into one of the world's leading manufacturers of transformers, power supplies, reactors and EMI filters. And to keep it that way, BLOCK consistently focuses on controllable, fast and reliable production within the company to maintain the highest quality standards. That is both the case at our headquarters and production site in Verden as well as in the production facilities in USA and China. Together with the increasingly important development center with more than 80 engineers and technicians, BLOCK not only offers the extensive standard portfolio in stock, but also fast customization or new development of your products. Thus, after only three weeks BLOCK custom-made products can be certified and leave the production sites in Verden. BLOCK unites research, development and production under one roof. From winding products to filters to power supplies and software development, our know-how can be found at every stage of the development and manufacturing process.

<b>Company name:</b>	<b>CARIAD SE</b>
<b>Booth #:</b>	<b>64</b>
<b>Full address:</b>	CARIAD SE Berliner Ring 2, Brieffach 1080/2 38440 Wolfsburg Germany
<b>Contact person:</b>	Dr.-Ing. Marc Feßler
<b>Phone:</b>	+49-0172-3690810
<b>E-Mail:</b>	marc.fessler@cariad.technology
<b>URL:</b>	<a href="https://cariad.technology/">https://cariad.technology/</a>
<b>Product / Know-How:</b>	CARIAD is an independent automotive software company in the Volkswagen Group, consolidating and further expanding the Group's software competencies to transform automotive mobility. It's developing the leading tech stack for the automotive industry with mission to make the automotive experience safer, more sustainable and more comfortable. Around 5,000 engineers and developers are now working on building a uniform software platform for all brands of Volkswagen Group, which includes a unified and scalable architecture, an operating system and automotive cloud. Further, CARIAD is working on outstanding digital automotive features like ADAS systems, a standardized infotainment platform, software functions for linking powertrains, chassis and charging technology, new ecosystems and digital business models in and around the vehicle. CARIAD operates in software competence centers throughout Germany, and works closely with the Volkswagen Group's international development teams in the US and China.

<b>Company name:</b>	<b>dSPACE GmbH</b>
<b>Booth #:</b>	<b>59</b>
<b>Full address:</b>	Rathenastr. 26 33102 Paderborn Germany
<b>Contact person:</b>	Benjamin Ridder
<b>Phone:</b>	+49 5251 1638-0
<b>Fax:</b>	+49 5251 16198-0
<b>E-Mail:</b>	<a href="mailto:info@dspace.de">info@dspace.de</a>
<b>URL:</b>	<a href="http://www.dspace.com">www.dspace.com</a>
<b>Product / Know-How:</b>	dSPACE is a leading provider of simulation and validation solutions worldwide for developing connected, autonomous, and electrically powered vehicles. With a comprehensive portfolio and cutting-edge technology for rapid control prototyping (RCP), hardware-in-the-loop



## Sponsors and Exhibiting companies

### SPONSORS

(HIL) and Power HIL testing, dSPACE is in high demand as a development partner in the automotive industry, aerospace, industrial automation, and for modern power grids. In the areas of power electronics and electric drives, dSPACE provides state-of-the-art FPGA technology as well as preconfigured simulation models, including the dSPACE Automotive Simulation Models (ASM) based on Simulink®, and FPGA modeling toolkits based on Xilinx® System Generator (XSG). Generic approaches using topology-based implementations are also available (dSPACE Electrical Power Systems Simulation Package), as well as electronic load modules for testing power electronics systems at full power. For more information visit [www.dspace.com](http://www.dspace.com)

**Company name:** Mitsubishi Electric Europe B.V.  
**Booth #:** 31  
**Full address:** Mitsubishi-Electric-Platz 1  
 40882 Ratingen  
 Germany  
**Contact person:** Mrs. Shiori Idaka  
**Phone:** + 49 21 02 486 0  
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**E-Mail:** [semis.info@meg.mee.com](mailto:semis.info@meg.mee.com)  
**URL:** [www.mitsubishichips.eu](http://www.mitsubishichips.eu)  
**Product / Know-How:** Mitsubishi Electric is a leading manufacturer of power semiconductors. Our power modules are crucial components in the generation, transmission and saving of electric energy. We offer a wide range of products, which covers a broad spectrum of application fields, including power transmission and distribution, railway, renewable energy, motor control, automotive, uninterruptible power supplies, medical technology, elevators, welding engineering, home appliances and pumps.

**Company name:** Nexperia  
**Booth #:** 45-46  
**Full address:** Jonkerbosplein 52  
 6534 AB Nijmegen  
 The Netherlands  
**Phone:** +31 24 353 7979  
**E-Mail:** [info@nexperia.com](mailto:info@nexperia.com)  
**URL:** <https://www.nexperia.com>  
**Product / Know-How:** Nexperia is a global semiconductors innovator, creating and improving the essential components that are used to complete every modern



electronic design. From smartphones to laptops, electric vehicles to consumer electronics and beyond, our work helps the world work better. As a leading semiconductors company, Nexperia has a solid foundation for a future of tremendous growth and constant innovation. Ours is a continuing journey of discovery, shared by more than 14,000 talented individuals who form the unique TeamNexperia.

**Company name:** SMA Solar Technology AG

**Booth #:** 30

**Full address:** Sonnenallee 1  
34266 Niestetal  
Germany

**Contact person:** *Hon. Prof. Dr.-Ing. Mike Meinhardt*

**Phone:** +49 151 54345 713

**E-Mail:** mike.meinhardt@sma.de

**URL:** www.sma.de

**Product /** PV and Battery converter, Energy Management, Power-to-Gas, EV  
**Know-How:** Charging

As a leading global specialist in photovoltaic system technology, SMA Solar Technology AG is setting the standards today for the decentralized and renewable energy supply of tomorrow. SMA's portfolio contains a wide range of efficient PV inverters, holistic system solutions for PV systems of all power classes, intelligent energy management systems and battery-storage solutions as well as complete solutions for PV diesel hybrid and power-to-gas applications. Digital energy services as well as extensive services up to and including operation and maintenance services for PV power plants round off SMA's range. SMA inverters with a total output of more than 100 gigawatts have been installed in more than 190 countries worldwide. SMA's multi-award-winning technology is protected by more than 1,700 patents and utility models. Moreover, SMA has become one of the leading employers of engineers for 40 years. In this growing and fast developing market of the energy transition SMA is constantly expanding its R&D Team of about 400 engineers and therefore looking for qualified applicants in the power electronics, control techniques, grid integration and energy management.

## Sponsors and Exhibiting companies

### CONTRIBUTORS

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#### CONTRIBUTORS

**Company name:** KEB Automation KG

**Booth #:** 42

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**URL:** www.keb.de

**Product / Know-How:** As a supplier of drive and automation technology, KEB Automation stands for custom-fit system solutions. E-mobility, plastics machinery, wood processing, process technology, intralogistics or wind energy are some of the application fields in which KEB products and solutions are in demand. Whether hardware solutions in combination with software functionalities for Control & Automation, Drive Controllers, powerful Motors and Gears, high-quality Brakes and Clutches or IIoT applications: KEB offers complete solutions, customised to individual needs.

Founded in 1972 and headquartered in Barntrup (Germany), the company employs more than 1,500 people and is owner-run in the second generation.

**Company name:** Lenze SE

**Booth #:** 49

**Full address:** Hans-Lenze-Straße 1  
31855 Aerzen  
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**URL:** www.lenze.com

**Product / Know-How:** As a global specialist in machine automation, Lenze supports its customers in all phases of the engineering process. Our integrated and scalable hardware and software portfolio covers control, field level and electromechanics and ensures standardized data communication up to the cloud. Tools and digital services enable data analysis up to new digital business models.

## Sponsors and Exhibiting companies

### CONTRIBUTORS

Our intelligent automation solutions address the key future issues of sustainability and digitalization. They are perfect for machine builders who need to bring highly flexible, networked and energy-efficient machines with digital services to market quickly.

**Company name:** Opal-RT Germany GmbH  
**Booth #:** 51  
**Full address:** Bucher Str. 100  
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**E-Mail:** timo.roesch@opal-rt.com  
**URL:** www.opal-rt.com  
**Product / Know-How:** OPAL-RT is a market leader in Hardware-in-the-Loop simulation of power electronics and electrical systems and has a vast variety of solutions for innovative controller testing. The solutions cover Rapid Control Prototyping systems, HIL and Power HIL applications. For converter, inverter or motor controller testing our systems assure highest performance with sub-microsecond time-steps combined with a very simple workflow for FPGA-based HIL. We would be glad to support you to save time and costs in your controller development and testing. So just stop by at our booth nr. 51

**Company name:** ROHM Semiconductor  
**Booth #:** 35  
**Full address:** Karl-Arnold Strasse 15  
47877 Willich  
Germany  
**Contact person:** Dominique Shen  
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**E-Mail:** dominique.shen@de.rohmeurope.com  
**URL:** www.rohm.com/eu  
**Product / Know-How:** ROHM Semiconductor is a global company of 452.1 billion Yen (3.3 billion Euros) per March 31st, 2022 with over 23,000 employees. The company with Headquarters in Kyoto, Japan, develops and manufactures a very large product range from SiC Diodes and MOSFETs, Analog ICs such as Gate Drivers and Power Management ICs to Power Transistors and Diodes to Passive Components. As technology driver, ROHM Semiconductor has pioneered in the de-

## Sponsors and Exhibiting companies

### CONTRIBUTORS & EXHIBITORS

velopment of Silicon Carbide (SiC). The company produces SiC components in-house in a vertically integrated manufacturing system and thus delivers high quality products and achieves a constant market supply.

**Company name:** **Wolfspeed GmbH**  
**Booth #:** **33**  
**Full address:** Wolfspeed GmbH  
 Einsteinstrasse 12  
 85716 Unterschleissheim  
 Germany  
**Contact person:** Gracen Pittard  
**Phone:** +49 89-548-0740  
**E-Mail:** info@wolfspeed.com  
**URL:** https://www.wolfspeed.com  
**Product /** Wolfspeed is the worldwide leader of Silicon Carbide (SiC) MOSFETs,  
**Know-How:** Schottky Diodes, and Power Modules.

### EXHIBITORS

**Company name:** **Baker Hughes**  
**Booth #:** **16**  
**Full address:** Baker-Hughes-Strasse 1  
 29221 Celle  
 Germany  
**Contact person:** Rashidreza Karimi  
**Phone:** +495141203492  
**E-Mail:** rashidreza.karimi@bakerhughes.com  
**URL:** https://www.bakerhughes.com/  
**Product /** Steerable Drilling Tools – Down-Hole Measurement Equipment –  
**Know-How:** High-Temperature Electronics for Down-Hole Applications – Drilling Automation

**Company name:** **BASiC Semiconductor Co. Ltd.**  
**Booth #:** **36**  
**Full address:** Shenzhen BASiC Semiconductor Co. Ltd.  
 National Engineering Lab Building, Gaoxin South 7th Road  
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**Contact person:** Min Luo

## Sponsors and Exhibiting companies

### EXHIBITORS

**Phone:** +41 78 806 4881  
**E-Mail:** luomin@basicsemi.com  
**URL:** www.basicsemi.com/en/  
**Product / Know-How:** Shenzhen BASiC Semiconductor LTD., the leading enterprise of Wide-band Gap semiconductor industry in China, is dedicated to the R&D and industrialization of SiC power devices. It has set up R&D centers in Shenzhen, Beijing, Nanjing, Wuxi and Nagoya Japan. BASiC master the state-of-the-art core technology of SiC. The R&D fields cover the whole industrial chain of SiC power devices, such as epitaxial preparation, chip design, packaging and driver circuit application etc. Successively launched series of products such as full-current and full voltage range SiC schottky diode, 1200V SiC MOSFET which has passed the reliability test of industrial level and automotive Full-SiC power modules etc. The products are widely used in renewable energy, electric vehicle, railway tractions, smart grids, industrial drives and other fields. BASiC, one of the initiators of National Innovation Center for Advanced Radio Frequency Devices, has been approved as CAST cross-sector partnership between industry and academia integrated technology innovation service system of Wide-band Gap semiconductor synergetic innovation center, and jointly established the material and devices R&D center of Wide-band Gap Semiconductors with Research Institute of Tsinghua University in Shenzhen. BASiC was also awarded with the honor of China IC outstanding technology innovation product, and won the first prize in China innovation and entrepreneurship competition.

**Company name:** chesco Center for Hybrid Electric Systems Cottbus  
**Booth #:** 40  
**Full address:** BTU Cottbus Senftenberg, LS Flug- Triebwerksdesign  
 Siemens-Halske-Ring 14  
 03046 Cottbus  
 Germany  
**Contact person:** Anne Stabler  
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**E-Mail:** anne.stabler@b-tu.de  
**URL:** https://www.b-tu.de/chesco  
**Product / Know-How:** chesco is a research center for hybrid-electric and electric propulsions for the mobility sector  
 With chesco a unique center for research into hybrid-electric and electric drives is to be established at BTU Cottbus-Senftenberg. Core

## Sponsors and Exhibiting companies

### EXHIBITORS

research fields are hybrid-electric and electric systems for aviation, rail, road and off-road. chesco intends to find solutions for climate-friendly and climate-neutral mobility applications. Therefore, chesco will be built as a manufacturing center for innovative production technologies, including the complete digitalization of all development, production, operation and maintenance processes as well as a test center with state-of-the-art facilities for testing the developed novel systems and prototypes.

#### EXHIBITING COMPANIES

**Company name:** EA Elektro-Automatik GmbH & Co KG

**Booth #:** 3

**Full address:** Helmholtzstr. 31-37  
41747 Viersen  
Germany

**Contact person:** Eugen Kitke

**Phone:** +49 (0)541-97743644

**E-Mail:** ea1974@elektroautomatik.com

**URL:** www.elektroautomatik.com

**Product / Know-How:** The EA Elektro-Automatik Group (EA) is Europe's leading supplier of power electronics for R & D and industrial applications. At the German headquarter in Viersen, North Rhine Westphalia, more than 250 qualified associates research, develop and produce high-tech equipment for laboratory power supplies, high power mains adaptors and electronic loads, with and without mains feedback. Specific to power electronics, made by EA, is the wide application spectrum. The units are used across many branches, from batteries, through fuel cell technology, to wind and solar power, from electrochemicals and process technology to telecommunication.

**Company name:** ECPE - European Center for Power Electronics E.V.

**Booth #:** 1

**Full address:** Landgrabenstr. 94  
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**Contact person:** Lena Somschor

**Phone:** +49 (911) 820288-18

**Fax:** +49 (911) 810288-28

**E-Mail:** lena.somschor@ecpe.org

**URL:** www.ecpe.org

**Product /** ECPE European Center for Power Electronics e.V., founded in 2003 is

## Sponsors and Exhibiting companies

### EXHIBITORS

**Know-How:** the leading industry-driven Research Network in the field of Power Electronics in Europe with more than 200 member organizations, comprising Member companies and Competence Centres. As a European technology and innovation platform, ECPE is driving precompetitive joint research and set up research & technology roadmaps for a strategic research agenda with future research directions according to the demands of European power electronics industry. The ECPE expert workshops and advanced training programme cover a wide range of current topics addressed especially to engineers from industry.

**Company name:** EGSTON Power Electronics

**Booth #:** 52

**Full address:** Grafenbergerstr. 37  
3730 Eggenburg  
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**Contact person:** Elisabeth Birke

**Phone:** +43 664 523 18 59

**E-Mail:** info@egstonpower.com

**URL:** www.egstonpower.com

**Product /** We are a young, forward thinking Austrian company with deep roots  
**Know-How:** & a strong history in innovating power electronics. We are the world leader in real time emulation and test systems, combining several years of knowledge and experience with a creative out of the box mindset.

We emulate with real power. Grids, batteries, motors, generators & machines to name a few. Research? Testing & certification? Repairs? Prototype development? The opportunities are many. Imagination is the limit.

Our programmable amplifiers and P-HIL setups can operate in several AC / DC & HIL-based modes all in one unit! Current-control, voltage-control and mixed-mode capability with up to 15kHz bandwidth. From 100kVA to megawatt level. Made and produced in Austria.

**Company name:** Fraunhofer Institute for Wind Energy Systems

**Booth #:** 9

**Full address:** Am Seedeich 45  
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**Contact person:** Melissa Liebermann



## Sponsors and Exhibiting companies

### EXHIBITORS

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**Phone:** +49 471 14290-536  
**E-Mail:** melissa.liebermann@iwes.fraunhofer.de  
**URL:** www.iwes.fraunhofer.de  
**Product / Know-How:** Fraunhofer IWES secures investments in technological developments through validation, shortens innovation cycles, accelerates certification procedures, and increases planning accuracy by means of innovative measurement methods in the wind energy and hydrogen technology sectors. At present, there are more than 300 scientists and employees as well as around 150 students employed at the nine sites: Bochum, Bremen, Bremerhaven, Emden/Leer, Görlitz, Hamburg, Hanover, Leuna and Oldenburg.

**Company name:** HBK – Hottinger Brüel & Kjær  
**Booth #:** 15  
**Full address:** Im Tiefen See 45  
64293 Darmstadt  
Germany  
**Contact person:** Holger Müller  
**Phone:** +49 6151 8038702  
**E-Mail:** holger.mueller@hbkworld.com  
**URL:** <https://www.hbm.com/en/8750/electric-power-testing/>  
**Product / Know-How:** HBK (Hottinger, Brüel & Kjær) provides scalable electrification test and validation solutions that empower engineers to accurately measure electric/mechanical power in motors and inverters and characterize motor controls. This allows them to cut time-to-market and drive innovation. HBK offers technology for sensing, data acquisition, data analytics and simulation to cover all aspects of product design, development and deployment. Key applications include electric power train performance calibration, durability testing, and electromechanical analysis.

**Company name:** HIOKI EUROPE GmbH  
**Booth #:** 4  
**Full address:** Helfmann-Park 2  
65760 Eschborn  
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**Contact person:** Oliver Witte  
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**E-Mail:** hioki@hioki.eu  
**URL:** www.hioki.eu

## Sponsors and Exhibiting companies

### EXHIBITORS

<b>Product / Know-How:</b>	<p>HIOKI – Japanese Precision since 1935</p> <p>Founded in Japan in 1935 HIOKI has since become the market leader for current sensors. The company develops leading-edge technology with maximum precision for power analysis and battery testing solutions. Today, HIOKI has around 1,000 employees worldwide and offers more than 200 main products.</p> <p>HIOKI is the only test and measurement manufacturer who offers both high-end power analysers and also ring-type transducers and current clamps and current sensors from its own development and production. This combination of measurement technology and sensor technology from one development source represents HIOKI's particular strength: The perfect coordination of both technologies enables to achieve exceptionally high measurement accuracies.</p> <p><b>Portfolio :</b> HIOKI's portfolio further includes Impedance Analysers, LCR meters, Data Loggers / Recorders, Battery Testers, High voltage Test Equipment, Precision Resistance Meters, Insulation Testers, Power Quality Analyzers, Digital Multimeters and more.</p> <p><b>European subsidiary :</b> In 2017 HIOKI has set foot in Europe. HIOKI EUROPE GmbH guarantees prompt deliveries, immediate technical support and a high level of service quality. Together with highly trained and experienced partners, customers all over Europe have access to premium technology with premium service.</p>
<b>Company name:</b>	<b>imperix SA</b>
<b>Booth #:</b>	<b>50</b>
<b>Full address:</b>	imperix Ltd. Route des Ronquoz 23 1950 Sion Switzerland
<b>Contact person:</b>	Simon Delalay
<b>Phone:</b>	+41 27 552 06 60
<b>Fax :</b>	+41 27 552 06 69
<b>E-Mail:</b>	info@imperix.ch
<b>URL:</b>	<a href="https://imperix.com">https://imperix.com</a>
<b>Product / Know-How:</b>	Imperix develops high-end control equipment and prototyping hardware for power electronics, drives, smart grids, and related topics. Its products are designed to enable cutting-edge innovation in corporate and academic environments. They are especially valued for their ability to accelerate the implementation of laboratory-scale power converters and facilitate the derivation of high-quality experimental results. The company also offers various levels of integration services, in-

## Sponsors and Exhibiting companies

### EXHIBITORS

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tended to assist its customers in their prototyping activities. As such, its offering ranges from the delivery of plug-and-play hardware and software, to that of fully customized systems involving specialized control software algorithms.

Imperix Ltd. is established in Sion, Switzerland. Its name is derived from the Latin verb imperare, which stands for controlling – or ruling – and refers to the company's core business: the control of power electronic systems. It is a spin-off of the Swiss Federal Institute of Technology, Lausanne (EPFL).

### EXHIBITING COMPANIES

**Company name:** Mathworks  
**Booth #:** 38  
**Full address:** 3 Apple Hill Drive  
Natick, MA 01760  
USA

**Contact person:** Chris Andreotes  
**Phone:** +1 508-647-2291  
**E-Mail:** candreot@mathworks.com  
**URL:** <https://www.mathworks.com/>

**Product / Know-How:** The MATLAB and Simulink product families are fundamental applied math and computational tools adopted by more than 6,500 universities and colleges. MathWorks products help prepare students for careers in industry, where the tools are widely used for data analysis, mathematical modeling, and algorithm development in collaborative research and new product development.

**Company name:** MUECAP Bauelemente GmbH  
**Booth #:** 43  
**Full address:** Lochhamer Schlag 11a  
82166 Graefelfing  
Germany

**Contact person:** Andreas Krauss  
**Phone:** +49 (0)89 / 89 80 81-0  
**E-Mail:** [info@muecap.de](mailto:info@muecap.de)  
**URL:** [www.muecap.de](http://www.muecap.de)  
**Product / Know-How:** Passive Components for Power Electronics

**Company name:** OMICRON Lab  
**Booth #:** 12  
**Full address:** OMICRON electronics GmbH - OMICRON Lab  
 Oberes Ried 1  
 6833 Klaus  
 Austria  
**Contact person:** Tobias Schuster  
**Phone:** +43 59495  
**E-Mail:** info@omicron-lab.com  
**URL:** www.omicron-lab.com  
**Product / Know-How:** OMICRON Lab is a division of OMICRON electronics GmbH specialized in providing Smart Measurement Solutions® to professionals such as scientists, engineers and teachers engaged in the field of electronics. It simplifies measurement tasks and provides its customers with more time to focus on their real business.  
 OMICRON Lab was established in 2006 and is meanwhile serving customers in more than 60 countries. Offices in America, Europe, East Asia and an international network of distributors enable a fast and extraordinary customer support.  
 OMICRON Lab products stand for high quality offered at the best price/value ratio on the market. The products' reliability and ease of use guarantee trouble-free operation. Close customer relationship and more than 30 years in-house experience enable the development of innovative products close to the field.

**Company name:** PCIM Europe  
**Booth #:** 61  
**Full address:** Rotebuehlstraße 83 – 85  
 70178 Stuttgart  
 Germany  
**Contact person:** Anna Schulze Niehoff  
**Phone:** +49 711 61946-43  
**Fax:** +49 711 61946-11  
**E-Mail:** anna.schulze-niehoff@mesago.com  
**URL:** pcim-europe.com  
**Product / Know-How:** PCIM Europe is the international leading exhibition and conference for power electronics and its fields of application. Industry experts amongst others from industrial and automotive electronics, focus on this specialist field. In this way, the event mirrors the entire value chain – from components, drives control and packaging to the final intelligent system.

## Sponsors and Exhibiting companies

### EXHIBITORS

<b>Company name:</b>	<b>PELS</b>
<b>Booth #:</b>	<b>11</b>
<b>Full address:</b>	445 Hoes Lane, Piscataway, NJ USA 08854
<b>Contact person:</b>	Becky Boresen
<b>Phone:</b>	+1 732 562 6368
<b>E-Mail:</b>	b.boresen@ieee.org
<b>URL:</b>	<a href="https://www.ieee-pels.org">https://www.ieee-pels.org</a>
<b>Product /</b>	The Power Electronics Society (PELS) is one of the fastest-growing technical societies of the Institute of Electrical and Electronics Engineers (IEEE). For over 35 years, the PELS has facilitated and guided the development and innovation in power electronics technology. This technology encompasses the effective use of electronic components, the application of circuit theory and design techniques, and the development of analytical tools for efficient conversion, control, and condition of electric power. Some of our members include distinguished award winners, practitioners, and preeminent researchers. The PELS also publishes the IEEE Transactions on Power Electronics (TPEL), a top referenced journal among all IEEE publications. The PELS is dedicated to:
<b>Know-How:</b>	
	<ul style="list-style-type: none"> <li>• Upholding the vital scientific and educational aspects of power electronics and their applications.</li> <li>• Keeping its members around the globe up to date on state-of-the-art technological developments and advances in power electronics research.</li> </ul>
	In striving to build knowledge and awareness of the latest technologies and other advances in power electronics, the PELS's goal is to keep its members current and competitive in the workplace and provide them with the tools necessary to help them grow both personally and professionally. We invite you to join us and benefit from a world of invaluable information and support.

<b>Company name:</b>	<b>Plexim GmbH</b>
<b>Booth #:</b>	<b>60</b>
<b>Full address:</b>	Technoparkstrasse 1 8005 Zürich Switzerland
<b>Contact person:</b>	Orhan Toker
<b>Phone:</b>	+41 44 533 51 14
<b>E-Mail:</b>	<a href="mailto:sales@plexim.com">sales@plexim.com</a>
<b>URL:</b>	<a href="http://plexim.com">plexim.com</a>
<b>Product /</b>	Plexim, with locations in Zurich and Boston, is an innovative software

**Know-How:** company active in the field of technical simulation. For 20 years we have successfully developed and marketed PLECS – the leading simulation software for power electronic systems and electrical drives. In addition, we offer automatic code generation and real-time systems as pioneering technologies for the development and test of controls. Our customers are industrial corporations of all sizes, research labs and technical universities. They develop systems for electrical energy conversion and thus drive the transition towards electromobility and renewable energy sources. Plexim's simulation tools are heavily employed in the development of electric cars, rolling stock, wind turbines, solar inverters and power supplies.

Plexim is a dynamic, owner-managed company with short decision-making processes and a flat hierarchy. We focus our activities on sustainable product quality and long-term customer benefits rather than on short-term financial figures. As a climate-neutral company, we strive to minimize business travel and offset the unavoidable remainder of our emissions.

We are constantly looking for new colleagues in order to accelerate the continuous development of our simulation tools, provide high quality technical and commercial support to our customers and resellers, and educate about our products.

**Company name:** Teledyne LeCroy

**Booth #:** 32

**Full address:** Im Breitspiel 11c  
69126 Heidelberg  
Germany

**Contact person:** Alison Gierss

**Phone:** +49-151-10226810

**E-Mail:** alison.gierss@teledyne.com

**URL:** www.teledynelecroy.com

**Product /** Teledyne LeCroy is a leading provider of oscilloscopes, protocol analyzers and related test and measurement solutions that enable companies across a wide range of industries to design and test electronic devices of all types. Since our founding in 1964, we have focused on creating products that improve productivity by helping engineers resolve design issues faster and more effectively.

**Know-How:** For more than 20 years ADMESS has been your official Teledyne LeCroy distributor, providing competent and reliable support for electronic measuring instruments and systems.

Our main focus is on oscilloscopes and accessories, arbitrary and function generators, audio and video measurement technology, Rogowski coils and measurement accessories.

## Sponsors and Exhibiting companies

### EXHIBITORS

**Company name:** The Institution of Engineering and Technology (IET)  
**Booth #:** 5  
**Full address:** The Institution of Engineering and Technology  
 Futures Place - Kings Way  
 Stevenage  
 Hertfordshire, SG1 2UA  
 United Kingdom  
**Contact person:** Lewis Findley  
**Phone:** +44 7511160486  
**E-Mail:** Lewisfindley@theiet.org  
**URL:** www.theiet.org  
**Product / Know-How:** We are the IET and we inspire, inform and influence the global engineering community to engineer a better world. As a diverse home across engineering and technology, we share knowledge that helps make better sense of the world in order to solve the challenges that matter. It's why we are uniquely placed to champion engineering.

**Company name:** Typhoon HIL, Inc  
**Booth #:** 39  
**Full address:** Bajci Zilinskog BB  
 Novi Sad  
 Serbia  
**Contact person:** Dragan Zuber  
**Phone:** +38163583707  
**E-Mail:** zuber@typhoon-hil.com  
**URL:** www.typhoon-hil.com  
**Product / Know-How:** Real Time Hardware in the Loop Test Solutions

**Company name:** Yokogawa Europe B.V.  
**Booth #:** 6  
**Full address:** Yokogawa Europe B.V.  
 Euroweg 2  
 3825 HD Amersfoort  
 The Netherlands  
**Contact person:** Benetti, Lucia  
**Phone:** +31-6500-56-163  
**E-Mail:** Lucia.Benetti@nl.yokogawa.com  
**URL:** https://tmi.yokogawa.com/eu  
**Product / Know-How:** DL950 DL950 ScopeCorder  
 DLM5000 Series Mixed Signal Oscilloscope  
 WT5000 Precision Power Analyze,



## Sponsors and Exhibiting companies

### EXHIBITORS

<b>Company name:</b>	<b>ZES ZIMMER Electronic Systems GmbH</b>
<b>Booth #:</b>	<b>2</b>
<b>Full address:</b>	Pfeiffstraße 12 61440 Oberursel Germany
<b>Contact person:</b>	Patrick Fuchs
<b>Phone:</b>	+49 6171 88832-91
<b>Fax:</b>	+49 6171 88832-27
<b>E-Mail:</b>	pfuchs@zes.com
<b>URL:</b>	www.zes.com
<b>Product / Know-How:</b>	<p>ZES ZIMMER Electronic Systems GmbH is the sole high-tech company world-wide exclusively dedicated to high-precision power analysis. Thanks to their accuracy and reliability, the power analyzers of ZES ZIMMER's LMG series have conquered a leading position in the market. Through the unique combination of high-precision instruments with tailor-made software developed in-house, we are able to offer integrated EMC test solutions that convince customers both by their feature set as well as ease-of-use. Our participation in international standardization committees helps to ensure we remain at the forefront of technology.</p> <p>It is our commitment to enable our customers to get fast, precise and reliable results in order to solve their measurement tasks in an efficient manner – our time-proven technology and our decade-long experience in power analysis provide all it takes.</p>

# Planning Vendor Sessions

## EXHIBITION HALL

### VENDOR SESSIONS

Timing	Tuesday 6 September
11.40 – 11.55	BLOCK Transformatoren Elektronik GmbH
12.00 – 12.15	SMA Solar Technology AG
12.20 – 12.35	Yokogawa Europe B.V.
13.00 – 13.15	Volkswagen AG
13.20 – 13.35	dSPACE
13.40 – 13.55	Lenze SE
14.00 – 14.15	CARIAD SE
Timing	Wednesday 7 September
11.20 – 11.35	ZES Zimmer
11.40 – 11.55	Plexim GmbH
12.00 – 12.15	HIOKI
12.20 – 12.35	ROHM Semiconductor
12.40 – 12.55	Fraunhofer IWES
13.00 – 13.15	Nexperia
13.20 – 13.35	Opal-RT
13.40 – 13.55	Typhoon HIL
Timing	Thursday 8 September
12.20 – 12.35	Chesco Center for Hybrid Electric Systems Cottbus
12.40 – 12.55	Baker-Hughes

## NOTE

[illegible]

## ECPE EVENT

### ECPE WORKSHOP

#### ECPE Workshop: High Power Electronics for a Successful Energy Transition towards 100% Renewable Energy

**Date:** 08/09/2022 – 09/09/2022

**Location:** Hannover, Germany



With the international commitment to a gradual coal phase-out, the transition towards a sustainable energy supply based on Renewable Energies will gain momentum. This workshop addresses the High-Power Electronics challenges in the MegaWatt and multi-MW range related to this transition including the introduction of hydrogen-based fuel-cells or turbines in combination with large-scale electro-lyzers.

Development of hybrid power plants utilising combinations of renewable energy in-feed and energy storage by means of battery, hydrogen and thermal storage will gain importance in the local Medium Voltage range and DC distribution networks.

Weak grids in cities where uptake in EVs is highest will rely on localised battery energy storage for dynamic and fast charging of electric vehicles. Adaptation of this energy store for use in Firm Frequency Response applications benefits the grid during the day, whilst also enabling reactive power control at night.

#### **Technical Chair:**

Dr. Sönke Rogalla, Dirk Kranzer, Fraunhofer ISE  
Dr. Peter Steimer, Hitachi Energy  
Prof. Leo Lorenz, Dr. Chris Gould, ECPE

#### **ECPE Contact:**

Lena Somschor  
+49 911 81 02 88 – 18  
lena.somschor@ecpe.org

**When?:** Thursday, 8 September 2022 & Friday, 9 September 2022

**Where?:** Hannover Congress Center, Theodor-Heuss-Platz 1-3, 30175 Hannover, Germany

**EPE 2022 "GaNius" Status Meeting**

The DFG Priority Program SPP 2312 GaNius, launched in October 2021, targets the emerging field of Group III nitride-based power electronics.

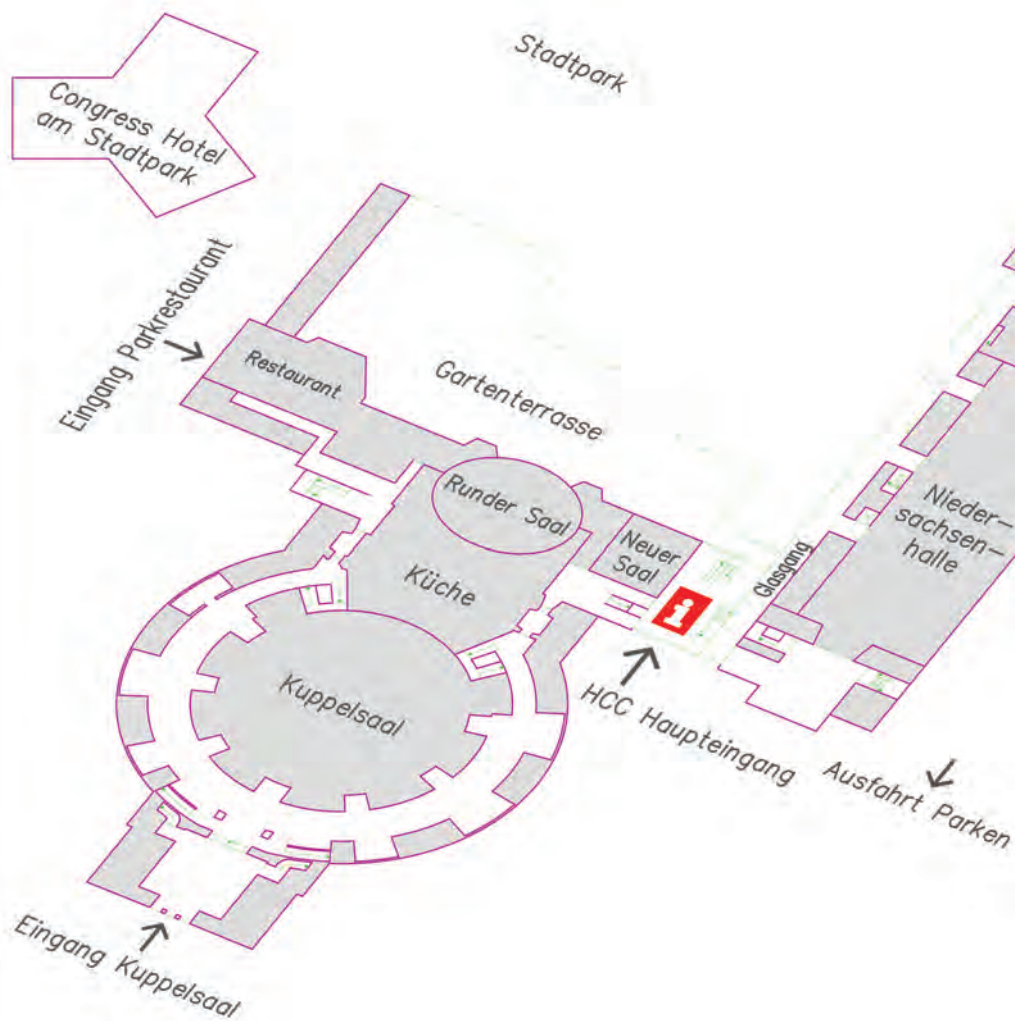
The core objective is to promote interdisciplinary and collaborative research by 11 research projects and 20 working groups on novel devices, circuits and components for highly efficient power electronic systems.

The EPE2022 "GaNius" status meeting will include three sessions on "Materials, Technology and Devices", "Device Models and Control" and "Bidirectional Devices and Topologies" to present the work progress of each research project. The presentations and discussions are open to "GaNius" members and EPE participants from the power electronics community.

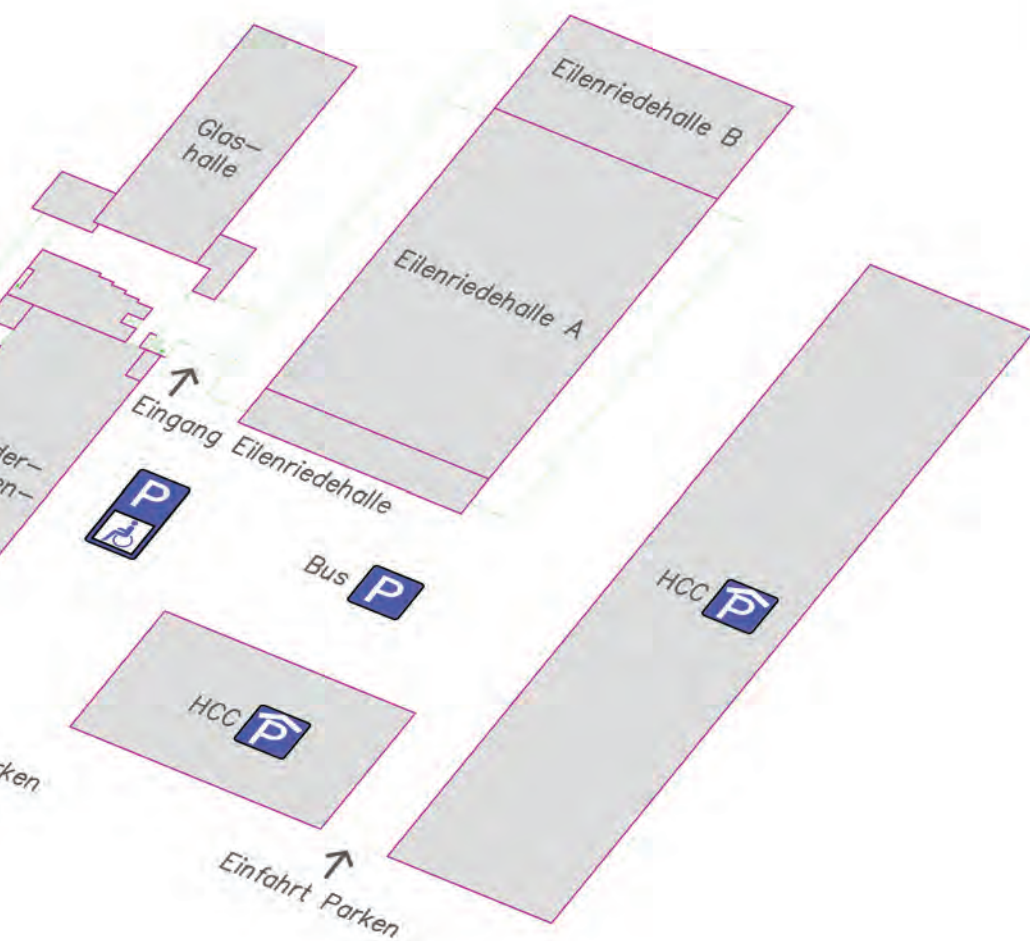
**When?:** Friday, 9 September 2022

**Where?:** Leibniz University Hannover, Welfengarten 1, 30167 Hannover

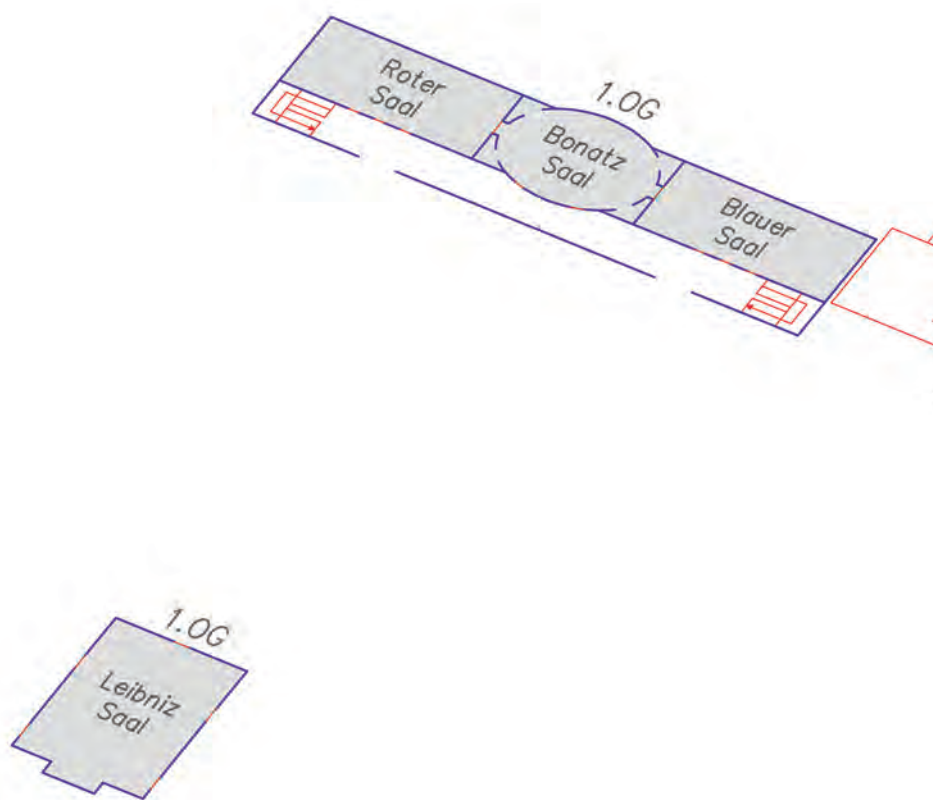
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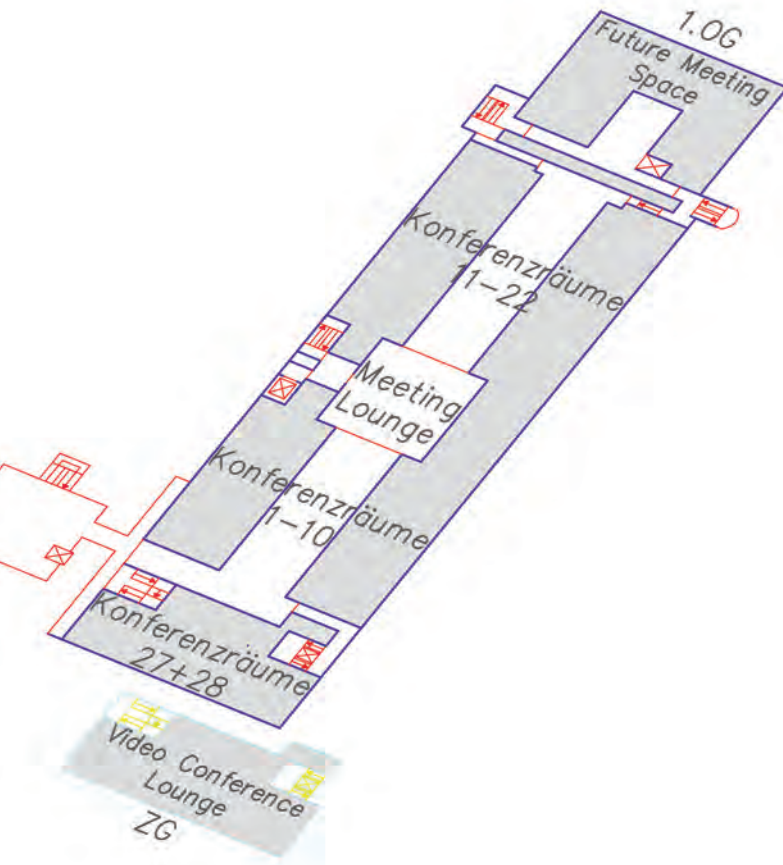
# Hannover Congress Centrum Orientation plan ground floor





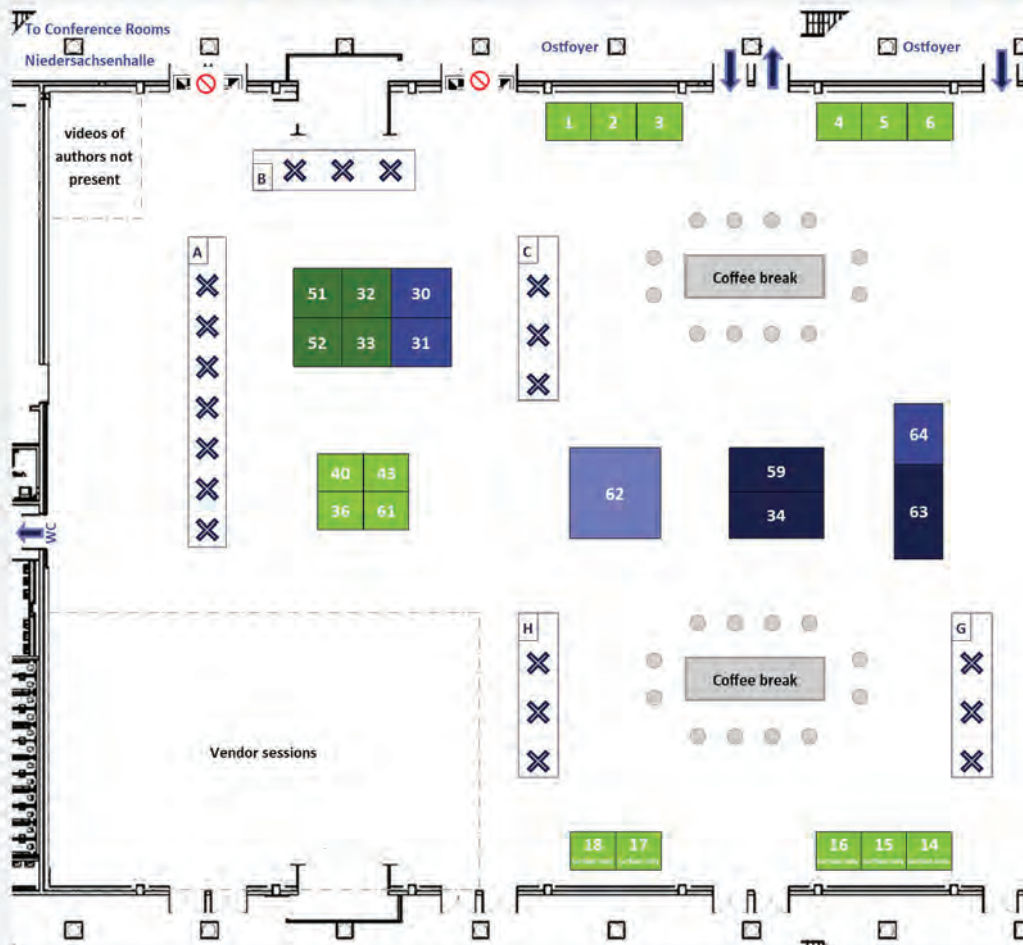


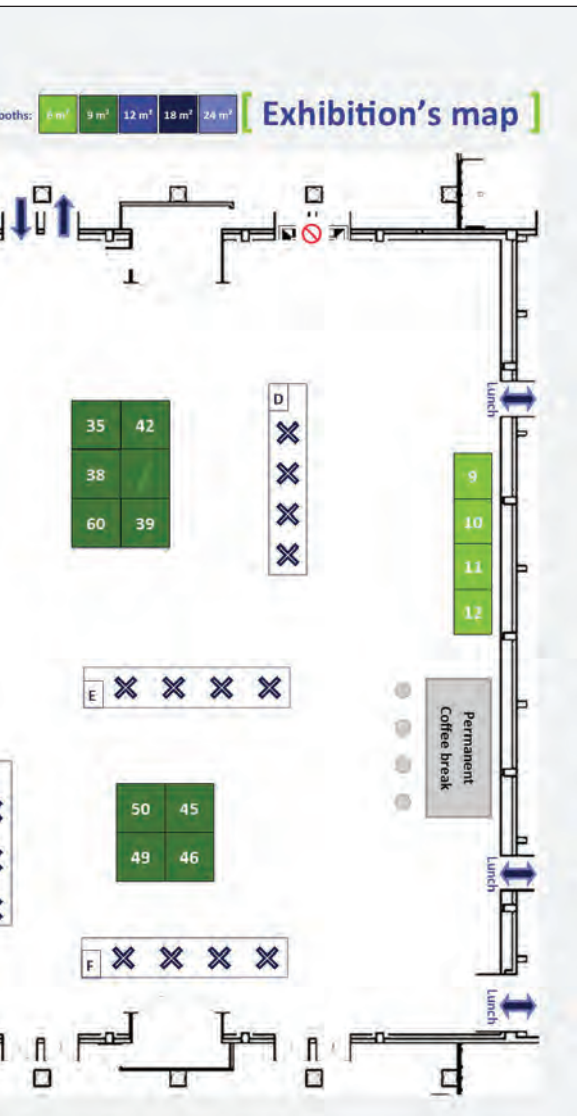
# Hannover Congress Centrum Orientation plan first floor



# [ Hannover Congress Centrum ] Eilenriedehalle

Posters: X High dining table: ☉ Booths: [ ]





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	Start time of slot	Thursday 8 September 2022						Start time of slot	Friday 9 September 2022											
		Registration: 08:00-14:30h (@HCC)																		
	8h30	Keynote 5 (FT: Electrification of Aircraft) Plenary Room						8h30	Tutorials Registration (@ LUH)											
	8h40							8h40												
	8h50							8h50												
	9h00	Keynote 6 (FT: Hydrogen Based Energy Systems) Plenary Room						9h00												
	9h10							9h10												
	9h20							9h20												
	9h30	Coffee break (30 min)						9h30												
	9h40							9h40												
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	10h00	Invited Session LS6a El. of Aircraft Plenary	Session LS6b Topic 2 Roter Saal	Session LS6c Topic 7 Blauer Saal	Session LS6d Topic 6 Bonatz Saal	Session LS6e Topic 9 Konf. Raum 27		10h00	Tutorials See programme											
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	11h00	DS3 & Exhibition Coffee break Exhibition Hall						11h00												
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	14h00	Award Session Plenary Room	Lunch					14h00	Tutorial Lunch											
	14h10							14h10												
	14h20							14h20												
	14h30	Closing Session Plenary Room						14h30	Tutorials See Programme											
	14h40	Coffee break (20 min)						14h40												
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	15h10	Invited Session LS7a Hydrogen Plenary	Session LS7b Topic 2 Roter Saal	Session LS7c Topic 3 Blauer Saal	Session LS7d Topic 4 Bonatz Saal	Session LS7e Topic 8 Konf. Raum 27	ETUT Project (Vendor Session Area)	15h10												
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	16h10	Industrial Forum (Electrification of Aircraft) Roter Saal				IEEE IFEC/23 Q&A (Vendor Session Area)		16h10												
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	17h10	Industrial Forum (Hydrogen Based Energy Systems) Blauer Saal						17h10												
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# VERSION July 2022

HCC = Hannover Congress Center

LUH = Leibniz University Hannover

- Invited Lecture Session
- Topic 1 (Devices, Components,...)
- Topic 2 (Converter Topologies)
- Topic 3 (Converter Design)
- Topic 4 (Measurement, Supervision)
- Topic 5 (Electrical Machines)
- Topic 6 (Renewables, Power-to-X)
- Topic 7 (Grids)
- Topic 8 (E-Mobility)
- Topic 9 (Supplies & Applications)
- Topic 10 (Data Analysis, AI, ...)
- Industry session
- Workshops

Room 1 / Plenary	Niedersachsen Halle
Room 2	Roter Saal
Room 3	Blauer Saal
Room 4	Bonatz Saal
Room 5	Konferenzraum 27
vendor sessions	Ellenriederhalle

(evening) events not in HCC







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# EPE 2023 ECCE Europe

September 4<sup>th</sup> – 8<sup>th</sup>, 2023  
Aalborg, Denmark

The 25<sup>th</sup> European  
Conference on Power  
Electronics and  
Applications



[www.epe2023.com](http://www.epe2023.com)  
**CALL FOR PAPERS**

## Important dates

**March 2<sup>nd</sup>, 2023**  
Full-paper submission deadline

**April 26<sup>th</sup>, 2023**  
Acceptance notification

**June 1<sup>st</sup>, 2023**  
Final paper submission

