FINAL PROGRAMME

EPE 2023 ECCE Europe

September 4th – 8th, 2023

Aalborg, Denmark

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The 25th European Conference on Power Electronics and Applications

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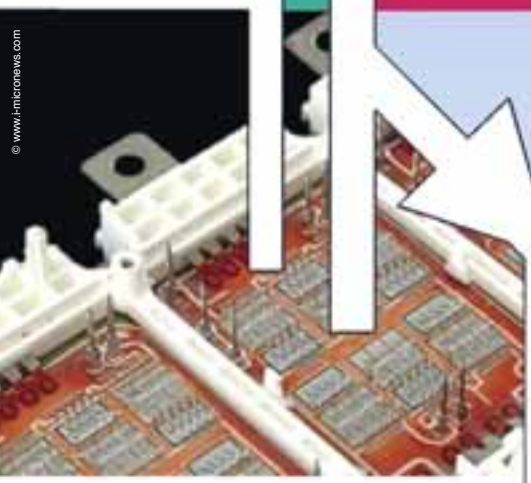

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25th European Conference

Power Electronics and Applications

4 to 8 September 2023 – Aalborg, Denmark
EPE'23 ECCE Europe

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IEA 4E - The Power Electronic Conversion Technology Annex (PECTA)

The Aalborg Convention Bureau

CONTENTS

MESSAGE FROM THE CONFERENCE CHAIR

WELCOME TO EPE'23 ECCE – EUROPE

A warm welcome to Aalborg, Denmark! The EPE-ECCE Europe conference returns to the capital city of Northern Jutland after sixteen years. Back then, in 2007, my colleague Frede Blaabjerg chaired a very successful event that remained memorable to those who took part in it.

Aalborg is the natural place to host the vibrant power electronics community, thanks to Aalborg University first, with its remarkable file of top-tier research in this field and, second, to the historical network of industries active in the field of power electronics for renewable energy sources, energy grids, industrial applications, and automotive, just to mention a few.

EPE'23 ECCE Europe offers its participants an unmatched list of experiences through its five days, from the technical-, industrial-, and social viewpoint. From the technical viewpoint, the conference starts on Monday with fourteen tutorials and ends on Friday with three tutorials and five technical visits. The three central days of the conference are thematic days, with two focus topics each day characterizing most of the activities taking place. On Tuesday, the theme will be Energy Islands, with focus topics: 1) Renewable Energy systems and Power-to-X and 2) Energy Islands. On Wednesday, the theme will be Energy Storage, with focus topics: 3) Energy-storage technologies and 4) Electric vehicles. On Thursday, the theme will be Emerging Technologies in Power Electronics, with focus topics: 5) Emerging Power Electronic Devices and Semiconductors and 6) Reliability and Artificial Intelligence in Power Electronics. Every thematic day hosts two keynote speeches, two industrial forums, up to 15 lecture sessions, and a poster session with a total of more than 150 presentations every day. Besides, several special sessions will take place during the conference on specific topics. Everyone is welcome to join those special sessions, too. From the industrial viewpoint, a huge exhibition of fifty booths distributed among four halls offers the participants a unique opportunity to stay up to date with the breaking news from this booming sector as well as to naturally connect academia to industry and industry to industry. Vendor sessions every day will ensure that every exhibitor gets the deserved visibility. From the social viewpoint, EPE'23 ECCE Europe offers a rich set of opportunities, one or more every day, making the participation experience unique also for networking: the IEEE PELS Students- and Young Professional reception on Monday, the welcome reception and the IEEE PELS Women in Engineering forum on Tuesday, the gala dinner on Wednesday, and the IEEE PELS Mentorship event on Thursday.

Among the many novelties introduced this year, we launched the Innovative Design Student Competition. Students from all over the world have been invited to participate with their prototypes and compete for the most innovative design. I believe this will be a great opportunity for the students themselves and everyone else to exchange ideas and concepts on concrete demonstrators showcased at the conference.

MESSAGE FROM THE CONFERENCE CHAIR

WELCOME TO EPE'23 ECCE – EUROPE

I hope that, despite the thrilling schedule of EPE'23 ECCE Europe, you will find the opportunity to visit Aalborg downtown and maybe spend the weekend in this nice city, that we in Denmark love to call the "Northern Paris". There are simply too many places to visit: old monasteries, medieval ruins, castles, and the old power plant, not to mention Aalborg Zoo, for families, the Modern-art museum, "Aalborg Tårnet", the Aalborg tower, where to enjoy a meal hovering at +100 meters over the city and the cozy city center where you can get lost shopping in the crowd of every Saturday morning. Do also remember to spend some time at "Limfjorden", the fjord that splits Aalborg into two parts, where you can walk in the open air and enjoy the enchanting view of the sea, the city, and the people around you.

Our sponsors made an important difference this year. Let me seize this opportunity to thank officially our two Gold Sponsors, i.e., Semikron-Danfoss and Mitsubishi, our five Silver Sponsors, i.e., BMW, Infineon, Nexperia, Vestas, and Volkswagen, and our ten contributors, i.e., Fuji, Grundfos, Hitachi Energy, KK Wind Solutions, Kohsel, ModelingTech, OPAL-RT, PECTA, Schneider Electric, and Wolfspeed, for having significantly contributed to making EPE'23 ECCE Europe happen.

I want to conclude with a warm thank you to my co-chairs Frede Blaabjerg, Stig Munk-Nielsen, and Philip Carne Kjær, and all the Organizing Committee Chairs: Amjad Anvari-Moghaddam, Peter Omand Rasmussen, and Dao Zhou (Social Event Chairs), Amir Sajjad Bahman (Exhibition Chair), Martin Kjær, Heng Wu, and Fangzhou Zhao (Publicity chairs), Pooya Davari and Daniel Stroe (Financial chairs), Morten Rahr Nielsen and Saeed Peyghami (Innovative Design Challenge chairs), Subham Sahoo (Communication Chair), Ariya Sangwongwanich (Tutorial Chair), Monika Sandelic (Local staff coordination chair), Huai Wang and Xiongfei Wang (Programme liaison Chairs), and Sjoerd Bosga (Programme Chair). Moreover, let me thank all the 45 students who volunteered for their tireless work throughout the entire conference. Certainly not least, Philippe Hamacher and Nancy Langsberg from the EPE Association, with whom I had daily contact during this past year until the conference date, deserve a special mention for having endured the huge organizational load. EPE'23 ECCE Europe would simply have not been possible without the unprecedented contribution of them all.

Enjoy EPE'23 ECCE Europe!

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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
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Topic 6: RENEWABLE ENERGY POWER SYSTEMS AND POWER-TO-X
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Prof. Hans-Günter Eckel, University of Rostock, Germany
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Prof. Ahmed Zobaa, Brunel University London, United Kingdom

Topic 8: E-MOBILITY
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Prof. Joeri Van Mierlo, Vrije Universiteit Brussel, Belgium
Prof. Regine Mallwitz, Technische Universität Braunschweig, Germany

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Prof. Wilmar Martinez, KU Leuven & Energyville, Belgium

Topic 10: DATA ANALYSIS, ARTIFICIAL INTELLIGENCE AND COMMUNICATION
Prof. Pooya Davari, Aalborg University, Denmark
Dr. Pablo Briff, GE Renewable Energy, United Kingdom

Topic 11: FOCUS TOPICS
Prof. Huai Wang, Aalborg University, Denmark
Prof. Xiongfei Wang, Aalborg University, Denmark

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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-Band Gap 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 Phenomena

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

6.d. Energy Management Systems
6.e. Energy Harvesting
6.f. Power-to-X
6.g. Other Renewable-Energy Systems

Topic 7: POWER ELECTRONICS IN TRANSMISSION AND DISTRIBUTION SYSTEMS

7.a. HVDC, FACTS, Solid State Transformers and Hybrid Circuit Breakers
7.b. Smart Grids
7.c. AC and DC Distribution and Micro Grids, including Fault Coordination and Protection
7.d. Power Quality Issues and Power Factor Correction Techniques
7.e. Charging Power Stations, Bidirectional V2G
7.f. Energy Harvesting, Energy Storage Systems and Renewable Diurnal and Seasonality Issues
7.g. Smart and Energy Efficient Buildings
7.h. Real-Time Simulation and Hardware in the Loop

Topic 8: E-MOBILITY

8.a. Electric Drive Trains for Passenger and Light Duty Vehicles
8.b. Electric Drive Trains for Heavy Duty Vehicles and Buses
8.c. Electric Drive Trains for Rail Vehicles
8.d. Electric Drive Trains for Aerospace Applications (Aircrafts, Drones)
8.e. Electric Drive Trains for Marine Applications (Offshore, Subsea and Ships)
8.f. On-Board Power Converters, WBG Technology as well as On-Board DC-Voltage Networks
8.g. Vehicle Battery Chargers: On-Board (Wired and Inductive) and Stationary (Ultra) Fast Chargers
8.h. Smart Charging and Vehicle to Grid Interaction
8.i. Batteries: Management Systems (BMS), Monitoring and Life-Time Prediction
8.j. Fuel Cells: Converters, Control, Diagnostics and System Integration

Topic 9: POWER SUPPLIES AND INDUSTRY-SPECIFIC APPLICATIONS

9.a. Wireless Power Transfer Systems
9.b. Applications for Electrolyzers and Fuel Cells
9.c. Applications in Hydrogen Storage and Transmission
9.d. Low Voltage DC Power Supplies
9.e. High Voltage DC Power Supplies
9.f. Distributed Power Supplies
9.g. Uninterruptible Power Supplies (UPS)
9.h. Lighting: Solid-State Lighting and Electronic Ballasts
9.i. Industry-Specific Applications (Cement, Steel, Paper, Textile, Mining, etc…)
9.j. 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 of Power Electronics Systems
10.e. Diagnostics of Power Electronics Systems
10.f. Digital Twin of Power Electronic Converters and Systems
10.g. Big Data and Artificial Intelligence in Energy Conversion

III – FOCUS TOPICS

Topic 11: FOCUS TOPICS

11.a. Renewable Energy Systems and Power-to-X
11.b. Energy Islands
11.c. Energy-Storage Technologies
11.d. Electric Vehicles
11.e. Emerging Power Electronic Devices and Semiconductors
11.f. Reliability and Artificial Intelligence in Power Electronics

The **EPE 2023 ECCE Europe** conference takes place in Aalborg, Denmark, from 4 to 8 September 2023, 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 25th **European Conference on Power Electronics and Applications** iq organized in cooperation with the Energy Department of Aalborg University. We are eager to host the community of power electronics in Aalborg, Denmark, for the second time. The first time was in 2007, 16 years ago.

The EPE Association welcomes researchers, academics and industrials to Aalborg, the capital of the North Jutland Region. The town's major university is Aalborg University (often abbreviated to AAU), founded in 1974, which has more than 20.000 students (as of 2018). AAU is also North Jutland's largest university and overall academic institution. Aalborg University appears on the great majority of ranking lists, and is among the top two percent of the world's 17.000 universities.

GENERAL INFORMATION ON AALBORG

The City of Aalborg

The earliest settlements date to around AD 700. Aalborg's position at the narrowest point on the Limfjord made it an important harbour during the Middle Ages, and later a large industrial centre. Architecturally, the city is known for its half-timbered mansions built by its prosperous merchants. Budolfi Church, now a cathedral, dates from the end of the 14th century and Aalborghus Castle, a royal residence, was built in 1550. Today, Aalborg is a city in transition from a working-class industrial area to a knowledge-based commu-

nity. A major exporter of grain, cement, and liquors, its thriving business interests include Siemens Wind Power, Aalborg Industries, and Aalborg Portland. These companies have become global producers of wind turbine rotors, marine boilers, and cement.

With its theatres, symphony orchestra, opera company, performance venues, and museums such as Aalborg Historical Museum and the Aalborg Museum of Modern Art, Aalborg is an important cultural hub. The Aalborg Carnival, held at the end of May, is one of the largest festivals in Scandinavia, attracting some 100,000+ people annually.

The European Commission has concluded that the citizens of Aalborg are the most satisfied people in Europe with their town.

Aalborg – Things to see

Aalborg is a vibrant city, with lots of things to do and discover. Did you know that the well-known New York Times put Aalborg in its "Top 10 of Places to Go", back in 2019? The top attractions of Aalborg are:

- The architectural Utzon Center, where you can explore and enjoy exhibitions on groundbreaking Nordic architecture and design.
- The House Of Music (Musikkens Hus), on Aalborg's waterfront. This eye-catching building is a place where music enthusiasts, players and listeners, meet.
- The Lighthouse, Aalborg's first permanent street food market, hosted in an old furniture factory. Here you can try food from around the world, while you enjoy the local atmosphere.
- The Kunsten Museum of Modern Art, designed by Alvar Aalto, a renowned Finnish architect in 1957. Well-known Danish and international artists exhibit here.
- Aalborg old town's cosy streets and buildings. Aalborg is a fascinating mix of old and new, where you can wander cobbled streets and enjoy a drink in a cosy local café.
- The Nordkraft power station, a cultural centre which houses theatres, cinemas, food joints and exhibitions, all in the lofty guts of a 1947-built power station.

- Aalborg's colourful street art: You'll definitely notice the dramatic murals when you explore the centre. There are over 50 pieces of impressive street art giving Aalborg its unique and colourful feel
- Aalborg Tower, built for an exhibition in 1933, and too expensive to tear down. It is a unique icon of the city. Ring the bell, take the elevator and enjoy the views of Aalborg. There is also a bistro on the platform.
- Lindholm Høje, Aalborg's mystical Viking burial ground. Near Aalborg Airport is this over 1500 years old historical wonder of stone circles dating from the Iron Age.

TOURIST INFO

For more information about the city of Aalborg and what the city has to offer during your stay, visit the website: https://www.enjoynordjylland.com/aalborg.

In the congress center, during the conference:

Network: AKKC
Password: freewifi

EMERGENCY CALL

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

ELECTRICITY

In Denmark the grid voltage is 230 V AC 50 Hz. Schuko (CEE 7/3) sockets are common in Denmark, but the most used by far is the Danish system, with an original Danish socket. Schuko plugs fit well into Danish sockets BUT the ground connection is interrupted this way. If you mandatorily need the ground connection, e.g., because your appliance has a metal case, then a common adaptor from Schuko (socket) to Danish (plug) for CEE 7/5 or CEE 7/3 can be easily found in Denmark.

CURRENCY

The Danish national currency is the Danish Kronor (DKK).
100 DKK is about 13,40 Euro. 100 EUR is about 745,00 DKK.

PRACTICAL INFORMATION

THE CONFERENCE VENUE

The main conference venue is the Aalborg Kongres & Kultur Center (AKKC). The main conference days are from Tuesday 5 to Thursday 7 September 2023.

Aalborg Kongres & Kultur Center
Europa Plads 4
DK-9000 Aalborg
akkc@akkc.dk
Tel. +45 9935 5555

The tutorials also take place at the Aalborg Kongres & Kultur Center (AKKC) on Monday, September 4 and Friday, September 8.

HOW TO REACH US?

Aalborg is located in northwestern Denmark, in North Jutland to be precise, at the banks of the Limfjord. The Aalborg Kongres & Kultur Center (AKKC) is located in the city center, very near to the Railway and Bus Station.

PRACTICAL INFORMATION

From Aalborg airport:
Aalborg Airport is located 6,5 km northwest of the city. There are direct flights from/to New York (seasonal), Copenhagen, Amsterdam, London, Oslo, and more!

To get from Aalborg airport to the city center (i.e. the AKKC), you can:

- Take a taxi. It should cost approximately around 300 DKK / 40 EUR and take about 12 mins.
- Take bus no. 70 or no. 200 to Prinsensgade (Aalborg), then walk 600 meters to AKKC.
- Take bus no. 12 to Budolfi Plads, then walk 800 meters to AKKC.

There are over 10 connections between Aalborg Airport and Copenhagen Kastrup Airport per day !

By Train:
Aalborg Railway Station is located in the City Center of Aalborg. It serves as a connecting hub between North Jutland and the rest of Denmark. It offers many daily connections to and from Copenhagen. (Attention: the train trip is between 4 to 5 hours. The price is approximately 482 DKK / 63,77 EUR. Train tickets should be bought at the train station, or booked online via https://www.dsb.dk/).

By Bus:
Aalborg Bus Station is also located in the City Center of Aalborg, at the John F. Kennedy Plads. It is a busstation served by among others Flixbus. There are several daily Flixbus connections to and from for example Copenhagen Kastrup Airport. Such a trip takes 5:30 to 6:30 hours and costs approximately 180 DKK/ 24,00 EUR to 300 DKK / 40,00 EUR.

By car:
The European Route E45, coming from the German-Danish border, passes through Aalborg.

CATERING

Aalborg Kongres & Kultur Center

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 AKKC.

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.

Free Wireless Internet
Network: AKKC
Password: freewifi

EPE'23 ECCE Europe APP:

Google play

Available on the App Store

The WHOVA EPE'23 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.

Fire & Evacuation Instructions

Dear guests,

There is an automatic fire alarm system installed in most parts of Aalborg Congress & Culture Centre with a voice alarm system that monitors the room you are in. In the event of a fire, this system helps to protect you and the centre in the best possible way. If you hear the voice alarm, please leave the building quietly and calmly through the nearest emergency exit. If that is not possible, you must follow the staff's instructions.

If you are in a meeting or conference room in the event of a fire, please follow the green exit signs. The staff will meet you outside the building in the evacuation zones.

All emergency exits are indicated by this sign: 

If you discover a fire and have not heard the voice alert, you must follow the description below.

Alerting;

Contact staff or activate a fire alarm button;

Rescue;

Make sure that all persons in the room are alerted and that they leave the building. Help any injured people and give life-saving first aid.

Switch-off;

Begin extinguishing the fire if it is possible and safe.
Try to limit the fire by closing doors and windows.
Inform staff of any injured people.

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 5
- WED 6
- THU 7
- None --> all the 3 days of the conference (Tue 5, Wed 6 & Thu 7)

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.

Examples of the badges:

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:

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 nice atmosphere of the Restaurant Sanya (Rendsburggade 18, 9000 Aalborg). The reception will be held on Monday, September 4, starting at 19:00.

The IEEE PELS Young Professionals Committee has generously offered funding to support the costs for drinks and snacks, but up-front registration through the registration website and a little supplementary registration fee to pay are mandatory. We are looking forward seeing you at this event.

Welcome Reception – Tuesday

On Tuesday, September 5, the welcome reception takes place at the AKKC in the exhibition areas, starting at 18:40. 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 the room 1.04 Fakultetet, starting at 18:10.

Gala Dinner – Wednesday

This year's Gala Dinner will take place in the "Musikkens Hus". You can look forward to a memorable event in a unique event location. It will start at 19:30. However, we encourage participants to be on place 15-20 minutes earlier. Only those participants with a valid registration will have access. **Don't forget your badge** when you come to the Gala Dinner.

Musikkens Hus
Musikkens Pl. 1
9000 Aalborg, Denmark

PELS Mentorship Event: Søgaard Bryghus – Thursday

We look forward to a typical evening event with food and drinks at "Søgaard Bryghus", C. W. Obels Plads 1A, in Aalborg city center. The Registration for the Mentorship Event will include the possibility to attend **IEEE PELS Mentorship Roundtables**. This event is sponsored by the IEEE Power Electronics Society Mentorship Round Tables Series.

The registration for the Mentorship Roundtables can be done while you register for the EPE'23 ECCE Europe conference or, if you're already registered, from your profile under "additional orders". A supplementary registration fee to pay is mandatory.

Calling all aspiring leaders and change-makers!

Join us for an inspiring session on "Inspiring and Shaping the world – together" hosted by IEEE-PELS Women in Engineering.

This engaging event will focus on three key topics:

- "The Role of Culture and Women's Persistence in Engineering,"
- "What It Takes to Be a Great Leader," and
- "Going Together – Diversity & Equality at Work."

Mark your calendars **for Tuesday, September 5, at 18:10**, and be ready to empower yourself and others.

Together, let's break barriers, promote diversity, and create a brighter future for all.

Time: Tuesday, 5 September 2023
(18:10 – 19:40)
Place: Room 1.04 Fakultetet

TUTORIALS
MONDAY 4 SEPTEMBER 2023 & FRIDAY 8 SEPTEMBER 2023

All tutorials will take place in the AKKC, the Aalborg Kongres & Kultur Center, Europa Plads 4, 9000 Aalborg

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 4 September 2023

Tutorial # 4: Morning (Room: 1.09 Vaerket)
SOLID STATE TRANSFORMERS: TOPOLOGIES, USE CASES, DESIGN CONSIDERATIONS, AND CHALLENGES
Ilknur COLAK, **Rafael MEDEIROS** & **Ahmed MELIGY**, Schneider Electric/Secure Power, France

Tutorial # 7: Morning (Room: 1.02 Havnen)
Fundamentals and Advancements of Modern High-frequency Magnetic Components
W.G. HURLEY, University of Galway, Ireland, **Ziwei OUYANG**, Technical University of Denmark, Denmark, **Zhan SHEN**, Southeast University, China, **Hongbo ZHAO**, Aalborg University, Denmark

Tutorial # 17: Morning (Room: 1.06 Broen)
Challenges and Perspectives of Medium Voltage SiC MOSFETs (>6kV) in Power Electronic Converters
Stig MUNK-NIELSEN, **Michael MØLLER BECH**, **Jannick KJÆR JØRGENSEN** & **Benjamin FUTTRUP KJÆRSGAARD**, Aalborg University, Denmark, Bjørn RANNESTAD, KK Wind Solutions, Denmark

Tutorial # 19: Morning (Room: 1.04 Fakultetet)
EV Charging: Power Conversion, Quality, and Digitalization
Lin MA, Autel Netherlands B.V., **Den Haag**, The Netherlands, **Zian QIN**, Delft University of Technology, The Netherlands

Tutorial # 26: Morning (Room: 1.01 Banen)
Electrified Hydrogen Systems – Challenges and Opportunities
Ahmed ABDELHAKIM & **Sjoerd BOSGA**, ABB Corporate Research, Sweden, **Thiago BATISTA SOEIRO**, University of Twente, The Netherlands, **Qianwen XU**, KTH Royal Institute of Technology, Stockholm, Sweden

Tutorial # 1: Afternoon (Room: 1.05 Møllen)
Second-Life EV Batteries for Renewable and Smart Grid Storage Applications
Chris MI, San Diego State University, United States

Tutorial # 2: Afternoon (Room: 1.09 Vaerket)

Recent Advancements on High-Power DC/DC Converters for DC Transmission and Distribution

Binbin LI & **Yingzong JIAO**, Harbin Institute of Technology, China, Shenghui CUI, Seoul National University, South Korea

Tutorial # 6: Afternoon (Room: 1.01 Banen)

Switching Loss Measurements in Power Semiconductors

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

Tutorial # 20: Afternoon (Room: 1.04 Fakultetet)

Reliability and Prognostics Towards Lifetime Improvement of Automotive Power Electronics

Sajib CHAKRABORTY & **Omar HEGAZY**, MOBI- EPOWERS Research Group, Vrije Universiteit Brussel (VUB), Brussels, Belgium, **Jan ALBRECHT** & **Alexander OTTO**, Fraunhofer Institute for Electronic Nano Systems ENAS & TU Chemnitz, Center for Microtechnology (ZfM), Chemnitz, Germany

Tutorial # 24: Afternoon (Room: 1.02 Havnen)

Planar Magnetics for On Board Chargers and others

Eckart HOENE, **Stefan HOFFMANN** & **Andreas KIENINGER**, Fraunhofer IZM, Berlin, Germany

Tutorial # 25: Afternoon (Room: 1.06 Broen)

DESIGN OF HIGH-PERFORMANCE POWER ELECTRONIC MOTOR DRIVES USING STATE-OF-THE-ART WIDE BANDGAP DEVICES

Bulent SARLIOGLU, Wisconsin Electric Machines and Power Electronics Consortium (WEMPEC), University of Wisconsin-Madison, United States

Tutorial # 8: Full Day (Room: 1.07 Fjorden)

Advanced control of industrial medium-voltage multi-phase wind power conversion systems

Ioannis TSOUMAS, ABB Medium Voltage Drives, Switzerland, **Orcun KARACA** & **Tinus DORFLING**, ABB Corporate Research, Switzerland

Tutorial # 10: Full Day (Room: 1.03 Flyveren)

Grid-Forming Converters: Principles and Practices

Xiongfei WANG, KTH Royal Institute of Technology, Stockholm, Sweden, **Heng WU**, **Fangzhou ZHAO** & **Bo FAN**, Aalborg University, Denmark, **Teng LIU**, China Southern Power Grid, Guangzhou, China

Tutorial # 14: Full Day (Room: 1.08 Tunnelen)
Intelligent BMS
Remus TEODORESCU & **Xin Sui**, Aalborg University, Denmark, **Alexander BLÖMEKE** & **Weihan LI**, RWTH Aachen University, Germany, **Changfu ZOU** & **Yang LI**, Chalmers University of Technology, Göteborg, Sweden

FRIDAY 8 September 2023

Tutorial # 3: Morning (Room: 1.08 Tunnelen)
SiC MOSFET Gate Drivers for High-Power Applications
Drazen DUJIC & **Chengmin LI**, École Polytechnique Fédérale de Lausanne, Switzerland

Tutorial # 13: Afternoon (Room: 1.08 Tunnelen)
Multi-sampling control of power electronic converters
Frede BLAABJERG & **Shan HE**, Aalborg University, Denmark and **Paolo MATTAVELLI** & **Ivan Petric**, University of Padova, Italy

Tutorial # 27: Full Day (Room: 1.09 Vaerket)
The Essence of Solid-State Transformers: Fundamentals, Design Challenges, R&D Overview, Comparative Evaluation, Outlook
Johann W. KOLAR & **Jonas HUBER**, ETH Zürich, Switzerland

The conference will highlight several Focus Topics.

These topics have been selected as follows:

Tuesday 5 September: Energy Islands
1. Renewable Energy Systems and Power-to-X
2. Energy Islands

Wednesday 6 September: Energy Storage
3. Energy-storage Technologies
4. Electric Vehicles

Thursday 7 September: Emerging Technologies in Power Electronics
5. Emerging Power Electronic Devices and Semiconductors
6. Reliability and Artificial Intelligence in Power Electronics

All Focus Topics feature a Keynote presentation, a Dedicated Lecture Session and a panel discussion called Industrial Forum. Many of the Focus Topics are enriched with tutorials and a Technical Visit.

Focus Topic 1 - Renewable Energy Systems and Power-to-X

Keynote: Power-to-X: Optimising X for a Sustainable Society
Adrian Timbus
Head of Portfolio and Market Strategy at Hitachi Energy
Tuesday 5 September - 09:30 - 10:00 - Plenary Room

Tutorial 26: Electrified Hydrogen Systems – Challenges and Opportunities
Ahmed ABDELHAKIM – Thiago BATISTA SOEIRO – Qianwen XU – Sjoerd BOSGA
Monday, 4 September, Morning (09:30 – 13:00)

Dedicated Lecture Session: LS1a - Topic 11: Focus Topic 1 - Renewable Energy Systems and Power-to-X
Tuesday 5 September - 10:30 - 11:30 - Plenary Room

0133 – Discrete-Time Cascaded-Control Design of Photovoltaic Systems for GMPPT and Power Curtailment Operations
Muhammad Saad Saleem, Gyanendra Kumar Sah, Hans-Günter Eckel
UNIVERSITY OF ROSTOCK

0230 – A Novel UPQC Configuration with Integrated Battery Energy Storage and Solar PV
Rajarshi Basu, Mahesh Kumar Mishra
Indian Institute of Technology Madras

0065 – Frequency regulation method of electrolytic hydrogen production load based on novel interfacing hybrid rectifier with self-adaptive control
Cheng Li, Xin Meng, Mingzhi He, Xiongzheng Wang， Haoran Yang
Electrical Engineering School of Sichuan University

Industrial Forum: Renewable Energy Systems and Power-to-X
Tuesday 5 September 2023: 17:00 – 18:10
Location: 1.01 Banen

Confirmed Panellists:
- Adrian Timbus (Hitachi Energy)
- Francisco Canales (ABB)
- Denys Zaikin (Advent Energy)
- Sven Schumann (Siemens Energy)
- Andreas Emmert (AEG Power Solutions)
- Charlie Sørensen (Ballard Europe)

Related Technical Visits:
- Technical Visit 2: Østerild
- Technical Visit 3: Vestas
- Technical Visit 4: Advent Energy

Focus Topic 2 – Energy Islands

Keynote: Energy Islands – the key to harvest huge amounts of wind power
Hanne storm Edlefsen
Vice President of the Energy Islands, Energinet
Tuesday 5 September - 14:40 - 15:10 - Plenary Room

Tutorial 4 : Solid State Transformers: Topologies, Use Cases, Design Considerations, and Challenges
Ilknur COLAK – Rafael MEDEIROS – Ahmed MELIGY
Monday, 4 September, Morning (09:30 – 13:00)

Tutorial 1: Second-life EV Batteries for Renewable and Smart Grid Storage Applications Chris MI
Monday, 4 September, Afternoon (14:00 – 17:30)

Tutorial 2: Recent Advancements on High-Power DC/DC Converters for DC Transmission and Distribution
Binbin LI – Yingzong JIAO – Shenghui CUI
Monday, 4 September, Afternoon (14:00 – 17:30)

Tutorial 10: Grid-Forming Converters: Principles and Practices
Xiongfei WANG – Heng WU – Fangzhou ZHAO – Bo FAN – Teng LIU
Monday, 4 September, Full Day (09:30 – 13:00 & 14:00 – 17:30)

Dedicated Lecture Session: LS2a - Topic 11: Focus Topic 2 - Energy Islands
Tuesday 5 September - 15:40 - 16:40 - Plenary Room

0260 – Impedance-Based Stability Analysis of Droop-Controlled AC Microgrids with the Generalized Nyquist Criterion
Robin Strunk and Axel Mertens
LEIBNIZ UNIVERSITY HANNOVER

0016 – Planning of Community Microgrid for Improving the Resilience of System by Using HOMER Grid
Majid Ali, Meisam Rajabnia, Juan C. Vasquez , Josep M. Guerrero, Yajuan Guan, Abdullah M. Abusorrah
Center for Research on Microgrids (CROM), Aalborg University & Center of Research Excellence in Renewable Energy and Power Systems, King Abdulaziz University

0558 – Rule-Based Bottom-Up Medium Voltage AC Microgrid Black Start through Battery Energy Storage System with
Transformer Inrush Current Management
César Augusto Santana Castelo Branco, Luiz Antônio de Souza Ribeiro, José Gomes de Matos, Hércules Araújo Oliveira, Lucas de Paula Assunção Pinheiro
Federal University of Maranhão – UFMA & Equatorial Energia S. A.

Industrial Forum: Energy Islands
Tuesday 5 September 2023: 17:00 – 18:10
Location: 1.02 Havnen

Confirmed Panellists:
- Didier Mallieu (Hitachi Energy, Switzerland)
- Changjiang Zhan (NR Electric, China)
- Kosei Shinoda (SuperGrid Institute, France)
- Fitim Kryezi (North Sea Energy Island)

Related Technical Visits:
- Technical Visit 2: Østerild
- Technical Visit 3: Vestas

Focus Topic 3 - Energy-storage Technologies

Keynote: LMNO: high-voltage spinel as Li-ion battery cathode. Status and battery properties
Søren Dahl
Topsoe
Wednesday 6 September - 08:30 - 09:00 - Plenary Room

Tutorial 1: Second-life EV Batteries for Renewable and Smart Grid Storage Applications
Chris MI
Monday, 4 September, Afternoon (14:00 – 17:30)

Dedicated Lecture Session: LS3a - Topic 11: Focus Topic 3 - Energy Storage Technologies
Wednesday 6 September - 10:00 - 11:00 - Plenary Room

0265 – Modelling of Large Volume Expansion of Silicon Batteries using an Optimum Incremental Potential Theorem
Hamzeh Beiranvand, Jan Dittmann, Jan-Ole Stern, Sandra Hansen, Rainer Adelung, Stephan Wulfinghoff
KIEL UNIVERSITY & Kiel Nano, Surface and Interface Science (KiNSIS)

0287 – Open-Circuit Voltage Characterization of Microporous Silicon Anodes for Lithium-Ion Batteries
Hamzeh Beiranvand, Sahil Shingote, Ashwin Shejwalkar, Jan-Ole Stern, Monja Gronenberg, Rainer Adelung, Stephan Wulfinghoff
KIEL UNIVERSITY, Kiel Nano, Surface and Interface Science (KiNSIS) & BITS Pilani, K.K. Birla Goa Campus

0406 – A Model Predictive Control Approach for Lithium-ion Capacitor Optimal Charging
Pankaj Saha, Mahdi Soltani, Stig Munk-Nielsen, Daniel-Ioan Stroe
Aalborg University

Industrial Forum: Energy-storage Technologies
Wednesday 6 September 2023: 17:00 – 18:10
Location: 1.01 Banen

Confirmed Panellists:
- Søren Dahl (Topsoe)
- Søren Juhl (Advent Energy)
- Jasmin Arifagic (Beyonder)
- Jonas Kehr (Hitachi Energy)

Related Technical Visit:
- Technical Visit 4: Advent Technologies

Focus Topic 4 – Electric Vehicles

Keynote: Power Electronics in Electric Vehicles: It's not only about cost
Kunal Goray
AVL-Software and Functions GmbH
Wednesday 6 September - 09:00 - 09:30 - Plenary Room

Tutorials:Tutorial 19
EV Charging: Power Conversion, Quality, and Digitalization
Lin MA – Zian QIN
Monday, 4 September, Morning (09:30 – 13:00)

Tutorial 1: Second-life EV Batteries for Renewable and Smart Grid Storage Applications
Chris MI
Monday, 4 September, Afternoon (14:00 – 17:30)

Tutorial 20: Reliability and Prognostics Towards Lifetime Improvement of Automotive Power Electronics
Sajib CHAKRABORTY – Omar HEGAZY – Jan ALBRECHT – Alexander OTTO
Monday, 4 September, Afternoon (14:00 – 17:30)

Tutorial 24: Planar Magnetics for On Board Chargers and others
Eckart HOENE – Stefan HOFFMANN – Andreas KIENINGER
Monday, 4 September, Afternoon (14:00 – 17:30)

Dedicated Lecture Session: LS4a - Topic 11: Focus Topic 4 - Electric Vehicles
Wednesday 6 September - 14:10 - 15:10 - Plenary Room

0144 – Adaptive Control of a Synchronous Reluctance Traction Drive for Electric Vehicles
Hristo Milushev, Nikolay Djagarov, Julia Djagarova, Dimitar Tsvetanov
NKOLA VAPTSAROV NAVAL ACADEMY

0542 – Ultra-Wide Voltage Gain Hybrid Modulated CLLC Converter for Electric Vehicle
Akshay Mahajan, Christof Wittwer & Yam Siwakoti
Fraunhofer Institute for Solar Energy Systems ISE & University of Technology Sydney

0480 – Driving Cycle Power Loss Analysis of SiC-MOSFET and Si-IGBT Traction Inverters for Electric Vehicles
Michael Schlüter, Marius Gentejohann and Sibylle Dieckerhoff
Technische Universität Berlin

Industrial Forum: Electric Vehicles
Tuesday 5 September 2023: 17:00 – 18:10
Location: 1.02 Havnen

Confirmed Panellists:
- Nils-Gunnar Vågstedt (Scania)
- Robert Eriksson (Volvo Cars)
- Erik Hoevenaars (Volvo Trucks)
- Christian Kluthe (Bosch)
- …

Focus Topic 5 - Emerging Power Electronic Devices and Semiconductors

Keynote: Advanced SiC Power Modules for E-Mobility
Fabio Carastro
Semikron Danfoss
Thursday 7 September - 08:30 - 09:00 - Plenary Room

Tutorial 17: Challenges and Perspectives of Medium Voltage SiC MOSFETs (>6kV) in Power Electronic Converters
Stig MUNK-NIELSEN – Michael MOLLER BECH – Jannick KJAER JORGENSEN - Benjamin FUTTRUP KJAERSGAARD – Bjorn RANNESTAD
Monday, 4 September, Morning (09:30 – 13:00)

Tutorial 3: SiC MOSFET Gate Drivers for High-Power Applications
Drazen DUJIC – Chengmin LI
Friday, 8 September, Morning (09:30 – 13:00)

Dedicated Lecture Session: LS6a - Topic 11: Focus Topic 5 - Emerging Power Electronics Devices and Semiconductors
Thursday 7 September - 10:00 - 11:00 - Plenary Room

0122 – Temperature distribution of 10 kV and 15 kV SiC-MOSFETs with large edge area
Masaki Takahashi, Zhongchao Sun, Jannick Kjær Jørgensen, Szymon Michal Beczkowski, Stig Munk-Nielsen, Asger Bjørn Jørgensen
Aalborg university

0481 – Mitigating Inter-Chip Oscillation of paralleled SiC MOSFETs
Florian Sawallich, Hans-Günter Eckel
UNIVERSITY OF ROSTOCK

0108 – Minimization of parasitic capacitance for proper function of 3 level ANPC with GaN switches
Qian Li, Günter Schröder
University of Siegen

Industrial Forum: Emerging Power Electronic Devices and Semiconductors
Thursday 7 September 2023: 16:30 – 17:40
Location: 1.01 Banen

Confirmed Panellists:
- To be announced

Related Technical Visit:
- Technical Visit 1: Grundfos

Focus Topic 6 - Reliability and Artificial Intelligence in Power Electronics

Keynote: Net-Zero-CO2 by 2050 is NOT Enough!
Johann W. Kolar
Power Electronic Systems Laboratory, ETH Zurich
Thursday 7 September - 09:00 - 09:30 - Plenary Room

Tutorial 20: Reliability and Prognostics Towards Lifetime Improvement of Automotive Power Electronics
Sajib CHAKRABORTY – Omar HEGAZY – Jan ALBRECHT – Alexander OTTO
Monday, 4 September, Afternoon (14:00 – 17:30)

Tutorial 14: Intelligent BMS
Remus TEODORESCU – Alexander BLÖMEKE – Changfu ZOU – Xin SUI – Weihan LI – Yang LI
Monday, 4 September, Full Day (09:30 – 13:00 & 14:00 – 17:30)

Dedicated Lecture Session: LS7a - Topic 11: Focus Topic 6 - Reliability and Artificial Intelligence in Power Electronics
Thursday 7 September - 15:20 - 16:20 - Plenary Room

0118 – Online Threshold Voltage Monitoring at SiC Power Devices during Power Cycling Test and Possible Consequences
Patrick Heimler, Mohamed Alaluss, Christian Schwabe, Xing Liu, Josef Lutz, Thomas Basler
CHEMNITZ UNIVERSITY OF TECHNOLOGY

0156 – Electric Vehicle Thermal Management System Modeling with Informed Neural Networks
Ekin Alp Bicer, Pascal A. Schirmer, Peter Schreivogel & Gabriele Schrag
BMW GROUP & Technical University of Munich

0311 – A model-based approach for prognostics of power semiconductor modules
Aleksi Vullia, Gerd Schlottig, Michał Orkisz, Marcin Firla, Enea Bianda
ABB Drives, Helsinki, Finland, ABB Corporate Research, Baden-Dättwil, Switzerland & ABB Corporate Technology Center, Kraków, Poland

Industrial Forum: Reliability and Artificial Intelligence in Power Electronics
Thursday 7 September 2023: 16:30 – 17:40
Location: 1.02 Havnen

Confirmed Panellists:
- Kristian Bonderup Pedersen (Vestas)
- Rasmus Steiniche (Neurospace)
- Shiori Idaka (Mitsubishi Electric Europe)
- Johan W. Kolar (ETH Zürich)

Related Technical Visit:
- Technical Visit 5: Aalborg University – Energy Department

EPE and the organising team from AAU challenged young engineers and researchers to come up with innovative design and demonstrate their crazy ideas, prototypes and power electronic applications at the EPE'23 ECCE Europe Conference.

They will be evaluated on the basis of innovativeness, relevance and cost implications as the judging criteria.

Design Scope:

1. Passive and Active Components
2. Topologies & Control
3. Gate Drivers & Modulation
4. Measurement and Condition Monitoring
5. Automation & Machines
6. AI & ML
7. Energy Storage
8. Unconventional applications (…)
9. Other power electronic applications

The proposals, prototypes and presentations are to be found in the Fundamentet, third room on the right. The winner(s) will be awarded during the EPE'23 ECCE Europe award session on Thursday, 7 September at 13:20 in the Plenary Room.

Tuesday 05 September

OPENING SESSION AND KEYNOTE SESSION

09:00 Opening Session

Location: Plenary Room

Chair(s): IANNUZZO Francesco, Aalborg University, Denmark
DOPPELBAUER Martin, Karlsruhe Institute of Technologie (KIT), Germany

Opening of the Conference and Welcome to the participants by Prof. Dr. Francesco Iannuzzo, Conference Chairman
Opening of the Conference and Welcome to the participants by Prof. Dr. Martin Doppelbauer, Vice-President of EPE Association
Message from IEEE-PELS by Prof. Dr. Brad Lehman, President of IEEE-PELS
Welcome message by Lasse Rosendahl, Department Head of the Department of Energy, Aalborg University
General information about the conference by Prof. Dr. Francesco Iannuzzo, Conference Chairman

09:30 Keynote 1 - Power-to-X: Optimizing X for a Sustainable Society

Location: Plenary Room

TIMBUS Adrian - Hitachi Energy - Switzerland

Chair(s): KJAER Philip C., Vestas Wind Systems A/S, Denmark
DE DONCKER Rik, RWTH Aachen University, Germany

Power to X is discussed recently in many commercial and technical debates about our sustainable energy future. X can take different forms, being thermal, chemical, electrical, and even magnetic energy, among others. In this keynote, we will understand needs for use of various forms of X, analyzing the financial viability and technical feasibility of different concepts. We will then put it all in the perspective of the energy transition and our ambition as a society to become carbon neutral in the next couple of decades.

10:30 LS1a - Topic 11: Focus Topic 1 - Renewable Energy Systems and Power-to-X

Location: Plenary Room

Chair(s): DAVARI Pooya, Aalborg University, Denmark
ABDELHAKIM Ahmed, EPIROC, Sweden

10:30 133 - Discrete-Time Cascaded-Control Design of Photovoltaic Systems for GMPPT and Power Curtailment Operations

SALEEM Muhammad Saad, SAH Gyanendra Kumar, ECKEL Hans-Günter - University of Rostock - Germany

10:50 230 - A Novel UPQC Configuration with Integrated Battery Energy Storage and Solar PV

BASU Rajarshi, MISHRA Mahesh Kumar - Indian Institute of Technology Madras - India

11:10 65 - Frequency regulation method of electrolytic hydrogen production load based on novel interfacing hybrid rectifier with self-adaptive control

MENG Xin, LI Cheng, ZHOU Shuhan, HE Mingzhi - Sichuan University - China

10:30 LS1b - Topic 1: Active Devices and Components (Si)

Location: 1.03 Flyveren

Chair(s): NEE Hans-Peter, KTH Royal Institute of Technology, Sweden
ZHOU Dao, Aalborg University, Denmark

10:30 50 - IGBT and Free-Wheeling Diode Behavior during the Short Circuit Type III with varied Operation Conditions

LIU Xing, LI Xupeng, LUTZ Josef, BASLER Thomas - Technische Universität Chemnitz - Germany
FUHRMANN Jan, ECKEL Hans-Günter - University of Rostock - Germany

10:50 178 - Boosting efficiency in resonant converters by the use of a new advanced power MOSFET technology

SIEMIENIEC Ralf, MAZZER Simone, BRAZ Cesar, NOEBAUER Gerhard, LAFORET David, PREE Elias, FERRARA Alessandro - Infineon Technologies Austria AG - Austria

11:10 407 - Systematic Derivation and Experimental Verification of a Compact Loss Model for Soft-switching Half-bridges

CHEN Tianxiao, MARTINS BEZERRA Pedro Andre, HE Zhengyan, LI Gengqi - Huawei Technologies Duesseldorf GmbH - Germany
HOENE Eckart - Frunhofer Institute for Reliabilty and Microintegration - Germany

10:30 LS1c - Topic 2: Solid State Transformers

Location: 1.02 Havnen

Chair(s): WHEELER Pat, University of Nottingham, United Kingdom
COLAK Ilknur, Schneider Electric, France

10:30 76 - Isolated and Bidirectional Three-phase Single-Stage Quad-Active-Bridge Series-Resonant AC-DC converter

CHAVEZ Daniel, SAL Y ROSAS Damian - Universidad Nacional de Ingenieria - Peru
NAVARRO Gustavo, LAFOZ Marcos - CIEMAT - Spain

10:50 318 - Bidirectional hybrid insolated DC transformer for Interconnection of MVDC and HVDC Systems

ZHAO Xiaodong, LI Binbin - Harbin Institute of Technology - China
ZHANG Guihong, ZHANG Xiangcheng, WANG Shibin - China
XU Dianguo - Harbin Institute of Technology - China

11:10 390 - A Multi-level Pseudo Single Active Bridge (PSAB) DC-DC Converter for Offshore DC Wind Turbines

KHANZADEH Babak, THIRINGER Torbjörn - Chalmers University of Technology - Sweden

10:30 LS1d - Topic 6: Energy Management

Location: 1.08 Tunnelen

Chair(s): ECKEL Hans-Günter, University of Rostock, Germany
JUNG Marco, Fraunhofer Institute for Energy Economics and Energy System Technology IEE, Germany

10:30 454 - Battery Inverter System for Stationary,1500 V Hybrid Battery Storage Applications

KRAGL Robert, ARMBRUSTER Cornelius, REICHERT Stefan, LIESE Stephan, MAHAJAN Akshay - Fraunhofer Institute for Solar Energy Systems ISE - Germany

10:50 396 - Performance Analysis of A New High Step-Up Boost-Buck-Boost Interleaved Converter for Bipolar LVDC Applications

ROOHOLAHI Babak - University of Rostock - Germany
SIWAKOTI Yam - University of Technology Sydney - Australia
BLAABJERG Frede - Aalborg University - Denmark
ECKEL Hans-Günter - University of Rostock - Germany

11:10 414 - Design and analysis of a voltage ride-through testing solution based on a novel medium-voltage OLTC auto-transformer

LOPEZ-ERAUSKIN Ramon, BARRENETXEA IÑARRA Manex, SAGREDO BLANCO Enrique, CANALES SEGADE Jose María - Mondragon Goi Eskola Politeknikoa S. Coop - Spain
SANTODOMINDO LLAMAS Fernando - Siemens Gamesa - Germany
DUARTE Jose - SGB-SMIT - Germany

10:30 LS1e - Topic 7: DC Distribution & Microgrids Protection (I)

Location: 1.09 Vaerket

Chair(s): CARPITA Mauro, University of Applied Sciences of Western Switzerland, Switzerland
SIEMASZKO Daniel, Hitachi Energy, Switzerland

10:30 49 - Faults current limitation in a Railway DC substation based on Superconducting technology
NKOUNGA Willy Magloire, ALMAKSOUR Khaled - L2EP - Univ. Lille - France
ALLAIS Arnaud - Nexans - France
CARON Hervé - SNCF Reseau - France
SAUDEMONT Christophe, ROBYNS Benoit - L2EP - Univ. Lille - France

10:50 69 - Ground Fault Current Control via Voltage Source Converters using Virtual Impedances in the Zero Sequence
MAHR Florian, JAEGER Johann - Friedrich-Alexander-University Erlangen-Nuremberg - Germany

11:10 56 - Efficient Control Parameter Improvements for Inverter-Based Island Grids by Means of Eigenvalue Analysis
GNAERIG Lasse, WEISS Robin, HOFFMANN Andreas, BERNET Steffen - Technische Universität Dresden - Germany

11:30 DS1a - Topic 01: Active Devices and Components (Si)
Location: Dialogue Session - Ground Floor
Chair(s): SIEMIENIEC Ralf, Infineon Technologies Austria AG, Austria

374 - Design and Implementation of a High-Power, Discrete IGBT-Based Electric Drive for Rapid Accelerations **Panel A 1.1**
ALI Waqas - Friedrich-Alexander-University Erlangen-Nuremberg - Germany
JOSHI Kedar, BISSAL Ara - Huawei Technologies Duesseldorf GmbH - Germany
MAERZ Martin - Friedrich-Alexander-University Erlangen-Nuremberg - Germany

497 - Fully Automated Wide Temperature Range Semiconductor Characterization **Panel A 1.2**
FRANK Simon Robin, HANSEL Jan, BITTERLE Jannik, SCHWENDEMANN Rüdiger, HILLER Marc - Karlsruhe Institute of Technologie (KIT) - Germany

499 - Loss Measurement of Low R_DS Devices Through Thermal Modelling - The Advantage of Not Turning it Fully On **Panel A 1.3**
SANZ-ALCAINE José Miguel, PÉREZ-CEBOLLA Franciso José, BERNAL-RUIZ Carlos - University of Zaragoza - Spain
ARRUTI Asier, AIZPURU Iosu - Mondragon Unibertsitatea - Spain
SANCHEZ Juan - Infineon Technologies Austria AG - Austria

11:30 DS1b - Topic 01: Active Devices and Components (Wide Bandgap and other New Materials)

Location: Dialogue Session - Ground Floor

Chair(s): SIEMIENIEC Ralf, Infineon Technologies Austria AG, Austria

10 - A Simple Analytical Model for The Reverse-Recovery Overvoltage and Oscillation In a SiC MOSFET Half-bridge Module **Panel A 1.4**
TO Pham Ha Trieu, ECKEL Hans-Günter - University of Rostock - Germany

46 - Fast and Accurate Data Sheet based Analytical Turn-on Switching Loss Model for a SiC MOSFET and Schottky Diode Half-Bridge **Panel A 2.1**
HU Anliang, BIELA Jürgen - ETH Zurich - Switzerland

146 - Deadtime optimization eliminating snap-off of 3.3kV SiC MOSFET bodydiodes **Panel A 2.2**
MAERZ Andreas, SCHOENEWOLF Stefan, NAGEL Andreas - Siemens Mobility GmbH - Germany
RAUH Michael, BARKAN Mark-M. - University of Bayreuth - Germany

237 - General Analytical Model for SiC MOSFETs Turn-Off Loss Considering No Miller Plateau **Panel A 2.3**
SONG Shijie, PENG Han, CHEN Xinbo - Huazhong University of Science and Technology - China
HAO Xin - Infineon Technologies Germany - Germany

238 - Double Closed-loop Self-regulating Active Gate Driver with High-bandwidth Peak Voltage Sampling Circuit **Panel A 2.4**
CHEN Xinbo, PENG Han, SONG Shijie - Huazhong University of Science and Technology - China

292 - Direct Measurement Based Behavior Modeling for Ultra-low Inductance Silicon Carbide Power Modules **Panel A 3.1**
SHAHABI Ali, ZHANG Xuning - Microchip Inc. - United States of America
LEMMON Andy - University of Alabama - United States of America
SPEER Kevin - Microchip Inc. - United States of America

316 - Fast Switching of GaN Transistors using a Boosted Gate Voltage **Panel A 3.2**
SHELTON Edward, ROGERS Dan - University of Oxford - United Kingdom
PALMER Patrick - Simon Fraser University - Canada

320 - Generic Semi-Physical SiC MOSFET Model for the Simulation of Switching Processes **Panel A 3.3**
HOFSTETTER Patrick, HOFMANN Viktor - Innomotics - Germany
BAKRAN Mark-M. - University of Bayreuth - Germany

332 - Design of a Non-destructive Device Test Platform Capable of Double-pulse Tests and Short-circuit Tests with Fast Overcurrent Protection for Wide Band-gap Devices **Panel A 3.4**
LU Zhebie, IANNUZZO Francesco - Aalborg University - Denmark

351 - Current Sharing Dynamics During IGBT ZVS Turn-On in a Hybrid Si IGBT/SiC MOSFET Switch **Panel A 4.1**
ANDRADE Marco, COUGO Bernardo - IRT Saint Exupery - France
M. F. MORAIS Lenin - Federal University of Minas Gerais - Brazil

352 - Layout Design Principle for Optimization of Transient Current Distribution among Paralleled SiC MOSFETs in Multichip Modules **Panel A 4.2**
ZHANG Man, LI Helong, YANG Zhiqing, ZHAO Shuang - Hefei University of Technology - China
WANG Xiongfei - KTH Royal Institute of Technology - Sweden
DING Lijian - Hefei University of Technology - China

415 - Application of the Double Source SwitchingTest to GaN HEMTs **Panel A 4.3**
GROSSL BADE Tamiris, ALAM Maroun, BEVILACQUA Pascal, MOREL Hervé, PLANSON Dominique - INSA de Lyon - France

421 - Experimental Evaluation of a Monolithic Gallium Nitride Devices Solution for Flyback Converter Devoted to Auxiliary Power Supply **Panel A 4.4**
MUSUMECI Salvatore, BARBA Vincenzo - Politecnico di Torino - Italy
SCRIMIZZI Filippo, CAMMARATA Federica, LONGO Giuseppe - STMicroelectronics - Italy
RIZZO Santi - University of Catania - Italy
PASTORELLI Michele - Politecnico di Torino - Italy

426 - Static and Dynamic Characterization of a 1.2 kV SiC MOSFET in Third Quadrant **Panel A 5.1**
MASSON Matthieu, COUSINEAU Marc, ROUGER Nicolas, RICHARDEAU Frédéric - LAPLACE - University of Toulouse - France

442 - Event-Triggered Gate Drive for a 1.7 kV Si-SiC Hybrid Switch with IGBT-like Short-Circuit Robustness **Panel A 5.2**
KAYSER Felix, ECKEL Hans-Günter - University of Rostock - Germany

478 - Full-SiC Single-Chip High-Side and Low-Side Dual-MOSFET for Ultimate Efficient Power Vertical Integration – Basic Concept and Technology **Panel A 5.3**
MAKHOUL Ralph - Laboratoire d'Analyse et d'Architecture des Systèmes du CNRS - France
BEYDOUN Nour - L2N (Light, Nanomaterials, Nanotechnologies) Technological University of Troyes - France

BOURENNANE Abdelhakim - Laboratoire d'Analyse et d'Architecture des Systèmes du CNRS - France
PHUNG Luong Viêt - Université de Lyon, INSA Lyon, AMPERE - France
MIHAI Lazar - L2N (Light, Nanomaterials, Nanotechnologies) Technological University of Troyes - France
RICHARDEAU Frédéric - LAPLACE - University of Toulouse - France
GODIGNON Philippe - Centro Nacional de Microelectrónica (CSIC) - Spain
PLANSON Dominique, MOREL Hervé - Université de Lyon, INSA Lyon, AMPERE - France
BOURRIER David - Laboratoire d'Analyse et d'Architecture des Systèmes du CNRS - France

484 - New Methodology for Defining Integration Limits Used for Switching Energy Computation in Power Devices **Panel A 5.4**
OLIVEIRA Joao,
COUGO Bernardo,
COCCETTI Fabio - IRT Saint Exupery - France
AZZOPARDI Stéphane - Safran Tech - France
MOREL Hervé - Université de Lyon, INSA Lyon, AMPERE - France

511 - Investigation on Single and Split Output Gate Configurations Influence on the GaN-HEMTs Switching Behaviours **Panel A 6.1**
LU Xuyang - Coventry University - United Kingdom
VIDET Arnaud, IDIR Nadir - L2EP - Univ. Lille - France
MARSIC Vlad, IGIC Petar, FARAMEHR Soroush - Coventry University - United Kingdom

11:30 DS1c - Topic 01: System Integration, Packaging & Thermal Management

Location: Dialogue Session - Ground Floor

Chair(s): SIEMIENIEC Ralf, Infineon Technologies Austria AG, Austria

373 - A new SiC power module assembly based on silver sintering bonding **Panel A 6.2**
WANG Lisheng - University of Twente - Netherlands
LEI Zhouqiao, LIANG Ruizhi - China
RIETVELD Gert, HUETING Raymond J. E. - University of Twente - Netherlands

495 - Dual Gate ClampDRIVE SiC FET Based Traction Inverter Design Demonstration **Panel A 6.3**
QU Shusun, BHALLA Anup - QORVO - United States of America

11:30 DS1d - Topic 02: Modular Multilevel Converters

Location: Dialogue Session - Ground Floor

Chair(s): SANGWONGWANICH Ariya, Aalborg University, Denmark

5 - Voltage class comparison of 3.3 kV SiC and 6.5 kV SiC Devices in the Application of HVDC Converters **Panel A 6.4**
BERGMANN Lukas - University of Bayreuth - Germany
WAHLE Marcus - Siemens Energy - Germany
BAKRAN Mark-M. - University of Bayreuth - Germany

41 - A Multilevel DC-Link Converter for VSC-HVDC Application **Panel B 1.1**
ZHAO Biao, BAI Ruihang - Tsinghua University - China
ZHANG Xueyin - Tsinghua Sichuan Energy Internet Research Institute - China
CHEN Yushuo, YU Zhanqing, SONG Qiang, ZENG Rong - Tsinghua University - China

93 - Reduced 8-Branch Modular Multilevel Matrix Converter with an Operating Point Optimised Control Strategy in a Branch Failure Event **Panel B 1.2**
HIMKER Rebecca, MERTENS Axel - Leibniz Universität Hannover - Germany

129 - Modular Multilevel DC Converter : Impact of the Control on the Design and Efficiency **Panel B 1.3**
BOUKHENFOUF Johan, GRUSON François, VERMEERSCH Pierre, DELARUE Philippe, LEMOIGNE Philippe, COLAS Frédéric, GUILLAUD Xavier - Univ. Lille, Arts et Metiers, Centrale Lille, JUNIA, ULR 2697-L2EP - France

138 - Optimized Stationary Operating Regime and Common-Mode Voltage Design for Modular Multilevel Converters in Drive Applications at High Frequency **Panel B 1.4**
GUI Qiuye, FEHR Hendrik, GENSIOR Albrecht - Technische Universität Ilmenau - Germany

269 - Impact of pole-to-pole dc voltage on energy requirement of FB YY-MMC **Panel B 2.1**
MOHTAT Sohrab, BONGIORNO Massimo, BEZA Mebtu - Chalmers University of Technology - Sweden
SVENSSON Jan - Hitachi Energy - Sweden

284 - Optimization of Control Parameters of Modular-Multilevel Converters in HVDC transmission applications **Panel B 2.2**
BRAZ SCARPA PEREIRA Ivan, TEIXEIRA PINTO Rodrigo, KONTOS Epameinondas - Siemens Energy - Germany
KOROMPILI Asimenia, MONTI Antonello - RWTH Aachen University - Germany

289 - Implementation of Active Damping Control Methodology on Modular Multilevel Converter(MMC)-Based Arbitrary Wave Shape Generator Used for High Voltage Testing **Panel B 2.3**

ZHOU Xiaochuan, GANESHPURE Dhanashree Ashok - Delft University of Technology - Netherlands
SOEIRO Thiago Batista - Twente University of Technology - Netherlands
NIASAR Mohamad Ghaffarian, WU Yang, VAESSEN Peter - Delft University of Technology - Netherlands

446 - Energy based and non-energy based control strategies for Modular Multilevel Converter with embedded storage **Panel B 2.4**

BEKKOURI Hind, BENCHAIB Abdelkrim, MOREL Florent - Supergrid Institute - France
RAULT Pierre - RTE - France
GONZALEZ Juan-Carlos, ERRIGO Florian - Supergrid Institute - France

453 - Hybrid Implementation of Cascade Control for GaN-Based Modular Multilevel Converter for Low-Voltage Grid **Panel B 3.1**

KIEHNLE Philip, KATZENBURG Niklas, STEFANSKI Lukas, HILLER Marc - Karlsruhe Institute of Technologie (KIT) - Germany

457 - Enhanced Efficiency of MV Hybrid MMC under Extended Modulation using Si/SiC devices **Panel B 3.2**

SHAHANE Rajat, NALLAMATTI Poornachandra Rao, SHUKLA Anshuman - Indian Institute of Technology Bombay - India

471 - Model Predictive Control of Modular Multilevel Converter with High Number of Submodules **Panel B 3.3**

KADHUM Hussein, ALAN Watson, M. SALEH Beeond, MARCO Rivera, PERICLE Zanchetta, PATRICK Wheeler - University of Nottingham - United Kingdom

489 - An Improved Reduced Parallel Modular Multilevel Converter with Sensorless Capacitor Voltage Balancing **Panel B 3.4**

ABARZADEH Mostafa - SMARTD Technologies Inc. - Canada
AFSHARI Masoud - Tabriz Univ. - Iran
CARON Simon - SMARTD Technologies Inc. - Canada
PEYGHAMI Saeed - Aalborg University - Denmark
AL-HADDAD Kamal - École de Technologie Supérieure - Canada

545.- Neural Network Controller Based on Direct and Indirect Model Predictive for Modular Multilevel Converters **Panel B 4.1**

YOUSEFI Niloufar, EBRAHIMI Javad, BAKHSHAI Alireza - Queen's University - Canada

11:30 DS1e - Topic 02: Solid State Transformers

Location: Dialogue Session - Ground Floor

Chair(s): SANGWONGWANICH Ariya, Aalborg University, Denmark

184 - A Novel Asymmetrical Bidirectional DAB Converter Applied to Offshore Wind Power System **Panel B 4.2**
XIAO Hanbing, MA Jianjun, ZHU Miao, CHEN Yijia - China - China

215 - Modeling and Power Transfer Characteristics of MMC-H based Solid State Transformer with Sine-Square Wave Modulation **Panel B 4.3**
DU Yihao, LIN Wenqi - Chongqing University - China
LIAN Shibo - Chongqing Yibang Technology Co., Ltd - China
ZHAO Yihui, FU Xiaojie, GUO Yujia, PAN Jianyu - Chongqing University - China

271 - Losses Analysis of MMC in Medium Frequency Medium Voltage DAB Converter for Charging Station **Panel B 4.4**
BAZYAR Sattar, JUNG Jun-Hyung, LI Rui, BEIRANVAND Hamzeh, LISERRE Marco - Kiel University - Germany

281 - Efficiency-Driven Parameter Selection for Dual Active Bridge Converters **Panel B 5.1**
MELIGY Ahmed, COELHO MEDEIROS Rafael, COLAK Ilknur - Schneider Electric - France
BACHA Seddik - G2ELAB CNRS/G-INP/UGA - France

283 - Control Strategy for DAB using SPS for Integration of Modular Batteries in EV **Panel B 5.2**
CARCAMO Alberto, VAZQUEZ Aitor, RODRIGUEZ Alberto, G. LAMAR Diego, HERNANDO Marta M., GOMEZ Alexis A. - University of Oviedo - Spain
REMON Daniel - E+ Ecoeficiencia e Ingenieria S.L. - Spain

290 - Dual Active Bridge Converter With Variable Switching Frequency Modulation to Maintain ZVS **Panel B 5.3**
LYU Dingsihao - Delft University of Technology - Netherlands
STRAATHOF Coen - EST Floattech - Netherlands
B.SOEIRO Thiago - Twente University of Technology - Netherlands
QIN Zian, BAUER Pavol - Delft University of Technology - Netherlands

319 - Analysis and Optimization of Current Stress for Single-Stage DAB DC/AC Converter in Micro-inverter Application **Panel B 5.4**
WANG Zhiyuan, LI Binbin, JIAO Yingzong, LI Ruitie, XU Dianguo - Harbin Institute of Technology - China

376 - Modelling and Stability Analysis of 100kW Modular Dual Active Bridge Converter for Robotic Arm-based Charging Systems **Panel C 1.1**
KOTB Ramy, RASOOL Haaris, CHAKRABORTY Sajib, HEGAZY Omar - Vrije Universiteit Brussel - Belgium

386 - A High Output Voltage Range DC-DC Converter with Solid-State Change-Over Switch **Panel C 1.2**
UNTERWEGER Siegmar, SCHULZ Martin - Siemens AG - Germany
BRÜCKNER Thomas - Universität der Bundeswehr München - Germany

391 - Modeling and Optimization for DAB Converter using SiC MOSFETs in Series Connection Considering Magnetizing Inductance and Voltage Ratio **Panel C 1.3**
CHEN Runtian, DENG Yibo, LI Chushan, LUO Haoze, LI Wuhua, HE Xiangning - Zhejiang University - China

434 - Output Current Control of Three-Phase Secondary-Resonant SAB DC-DC Converter for Variation of Output Voltage **Panel C 1.4**
KATO Taisei, BUDO Kohei, TAKESHITA Takaharu - Nagoya Institute of Technology - Japan

584 - Model Predictive Control for a Modular Multiport Solid-State Transformer **Panel C 2.1**
OLIVEIRA Tiago, MENDES André, CASEIRO Luís - University of Coimbra - Portugal

11:30 DS1f - Topic 02: Resonant Converters

Location: Dialogue Session - Ground Floor

Chair(s): SANGWONGWANICH Ariya, Aalborg University, Denmark

96 - Power Stacked Structure: Multi-Phase Interleaved Resonant Converter Based on Y-Connection Transformer **Panel C 2.2**
SHI Zhe - Hebei University of Technology - China
DAVARI Pooya - Aalborg University - Denmark
TANG Yu, PEI Yushuo - Hebei University of Technology - China
GUO Yingjun, SUN Hexu - Hebei University of Science and Technologu - China

147 - Design and Modeling of a 100 W 1 MHz GaN-Based Single-Switch Resonant Converter for High Power Density Inherent PFC LED Driver **Panel C 2.3**
PACE Loris, BELEY Matthieu, EL KHATTABI Mohamed, BREARD Arnaud - Université de Lyon, INSA Lyon, AMPERE - France

245 - Time-Domain Analysis of Full-Bridge Series-Resonant Converter and Boundary Conditions for DCM Operation **Panel C 2.4**
PAPADOPOULOS Theofilos, KONTOS Dimitrios, ANTONOPOULOS Antonios - National Technical University of Athens - Greece

330 - Discrete-Time Domain Modeling of a High-Power Medium-Voltage Resonant Converter **Panel C 3.1**
MAHDIZADEH SHALMAEI Amir Hossein, SOLTANI Mohsen, HAJIZADEH Amin - Aalborg University - Denmark

424 - Linear Active Disturbance Rejection Control of an LLC Converter for On-Board Chargers **Panel C 3.2**
AVCI Ebru, GREIFELT Andreas - FEAAM GmbH - Germany
BÖRNGEN Hannes, AUFDERHEIDE Eyke, KENNEL Ralph - Technische Universität München - Germany
GERLING Dieter - Universität der Bundeswehr München - Germany

466 - A Re-Configurable Series-Resonant DAB Converter **Panel C 3.3**
YAQOOB Muhammad, ALI Majid, WANG Shuqin, GROVER Torrico - Huawei Technologies Sweden AB - Sweden

493 - The Power Supply for IH Corresponding to Various Conditions **Panel C 3.4**
KUBOTA Sachio - National Institute of Technology, Toba College - Japan

569 - A Novel Scheme for the Realisation of a 3.6kW High Current Phase-Shift Full Bridge Converter with a Current Doubler and Voltage Mode Control **Panel C 4.1**
BASU Deepshikha - Private Person - India
KESHRI Ritesh Kumar - Visvesvaraya National Institute of Technology, Nagpur - India

579 - Design and Implementation of an LLC Half-Bridge Resonant Converterfor Isolated Gate-Driver Power Supply **Panel C 4.2**
CUCUCCIO Dario, MASSIMIANI Ivan, MACINA Gennaro - STMicroelectronics - Italy
CAMPAILLA Salvatore - Marelli Motorsport - Italy
SCELBA Giacomo - University of Catania - Italy

586 - Design and Implementation of A Half Bridge CLLLC Converter With Phase Shift Control for E-bike Charger **Panel C 4.3**
HASAN Md Nazmul, RINDLER Michael, PETRELLA Roberto, VOLLMAIER Franz, HACKL Herbert - Silicon Austria Labs GmbH - Austria

11:30 DS1g - Topic 02: HF Power Converters

Location: Dialogue Session - Ground Floor

Chair(s): SANGWONGWANICH Ariya, Aalborg University, Denmark

40 - Highly Efficient (99.2%), Ultra-Compact (32.3 W/cm3) Capacitively Coupled DC/DC Power Electronic Transformer for 380 V DC Power Supply Systems **Panel C 4.4**

ARITA Keigo, HAYASHI Yusuke, TAKAO Kazuto - Toshiba Corporation - Japan

101 - A Four-quadrant Buck-boost Partial Power DC/DC Converter for Battery Energy Storage System **Panel C 5.1**

TAO XingAo, WANG Feng, ZHUO Fang - Xi'an Jiaotong University - China

229 - A High Voltage Pulse Generator for Ozofractionation based PFAS Treatment in Industrial Waste **Panel C 5.2**

KULDIP Chinara, N Lakshminarasamma - Indian Institute of Technology Madras - India

503 - A New ZVT Snubber Cell for PWM-CCM Boost Converters **Panel C 5.3**

BODUR Haci - Yildiz Technical University - Turkey
YILDIRMAZ Suat - Tubitak Bilgem - Turkey

11:30 DS1h - Topic 02: Wide-Band Gap Power Electronics

Location: Dialogue Session - Ground Floor

Chair(s): SANGWONGWANICH Ariya, Aalborg University, Denmark

175 - Analysis of Efficiency Characteristics in ZVS Region of DC-DC Converter using Wide Bandgap(WBG) Switching Devices **Panel C 5.4**

KWAK Bongwoo, KIM Myungbok - Korea Institute of Industrial Technology - Korea (Republic of)

258 - Switching a eMode GaN HEMT under conditions of an inverter module for electrical vehicles (EV) **Panel C 6.1**

NEHMER Dominik - University of Bayreuth - Germany
HEPP Maximilian, WONDRAK Wolfgang - Mercedes-Benz AG - Germany
BAKRAN Mark-M. - University of Bayreuth - Germany

270 - A Five-Phase Induction Motor drive with a GaN-Based Open-end Winding Multilevel Inverter **Panel C 6.2**

FOTI Salvatore - University of Messina - Italy
RIZZOLI Gabriele, MENGONI Michele, VANCINI Luca - Alma Mater Studiorum - University of Bologna - Italy
TESTA Antonio - University of Messina - Italy

310 - Evaluation of Reconfigurable Isolated Bidirectional DC/DC k Converters for an EV Charging system with Bipolar DC-lin **Panel C 6.3**
NARESH KUMAR Kaushik - Norwegian University of Science and Technology - Norway
MISKIEWICZ Rafal, TROCHIMIUK Przemyslaw, RABKOWSKI Jacek - Warsaw University of Technology - Poland
PEFTITSIS Dimosthenis - Norwegian University of Science and Technology - Norway

492 - Investigation of Reconfigurable Battery Efficiency for an Application in an Electrical Sailplane **Panel C 6.4**
SOROKINA Nina, HÖGERL Tobias, BLIEMETSRIEDER Wolfgang - Universität der Bundeswehr München - Germany
KUDER Manuel - Bavertis GmbH - Germany
HEIN Luca, WEYH Thomas - Universität der Bundeswehr München - Germany

533 - Bidirectional Energy Transfer for Heterogeneous Modular Batteries in Electric Vehicle Applications **Panel D 1.1**
TASHAKOR Nima, POURHADI Pouyan - Technical University of Kaiserslautern - Germany
SAMIMI Mohammad Hamed - University of Tehran - Iran
BAYATI Mahdi, GOETZ Stefan - Technical University of Kaiserslautern - Germany

536 - Highly Integrated Electric Drive based-on Smart DC Batteries - Topology and Control **Panel D 1.2**
TASHAKOR Nima, AMIRREZAI Masoud, KESHAVARZI Davood, GOETZ Stefan - Technical University of Kaiserslautern - Germany

587 - Losses Evaluation in Current Source Inverter Topologies for Automotive Traction Application **Panel D 1.3**
TURRISI Gaetano, TORNELLO Luigi Danilo, SCELBA Giacomo, CACCIATO Mario, SCARCELLA Giuseppe - University of Catania - Italy

11:30 DS1i - Topic 06: Wind-Energy Systems

Location: Dialogue Session - Ground Floor

Chair(s): WU Heng, Aalborg University, Denmark

344 - Mixed Grid-Forming and Grid-Following Inverters with Secondary Control Providing Fast Voltage and Frequency Support **Panel D 1.4**
HUANG Liang - Aalborg University - Denmark
WU Chao - Shanghai Jiaotong Univeristy - China
ZHOU Dao, BLAABJERG Frede - Aalborg University - Denmark

428 - Improved performance of wind turbines using a hybrid MPPT strategy **Panel D 2.1**
OLIVEIRA Hercules - Federal University of Maranhao - Brazil
WOOD David - University of Calgary - Canada
GOMES Jose, RIBEIRO Luiz, SAAVEDRA Osvaldo, NASCIMENTO Alyston - Federal University of Maranhao - Brazil

11:30 DS1j - Topic 06: Solar-Energy Systems

Location: Dialogue Session - Ground Floor

Chair(s): WU Heng, Aalborg University, Denmark

9 - A Real-time Power Management Strategy based on Artificial Potential Field for Residential PV Systems **Panel D 2.2**
WU Xiangqiang, TANG Zhongting, KEREKES Tamas - Aalborg University - Denmark

33 - Passivity-Based Stability of LCL-Type Grid-Connected Inverter via All-Pass Filters **Panel D 2.3**
SUN Jiacheng, YAO Wenli, WANG Ting, LIU Jinxin, ZHANG Xiaobin - Northwestern Polytechnical University - China
ZHOU Dao - Aalborg University - Denmark

327 - Optimization and Analysis of a 50 KW Photovoltaic Power Plant with Examination of Partial Shading Conditions **Panel D 2.4**
SEPEHRINOUR Maryam - Brock University - Canada
KARIMI Hamed - Shahid Beheshti University - Iran
SIADATAN Alireza - York University - Canada

433 - Impacts of High-Frequency Harmonics of Input Current on a Multi-String Full-Bridge Solar Inverter **Panel D 3.1**
SOLEYMANI Behzad, EREN Suzan - Queen's University - Canada

476 - Thermal Stress Balancing for Lifetime Improvement of H6 Solar Inverter **Panel D 3.2**
CHANEKAR Abhishek - Indian Institute of Technology Bombay - India
DESHMUKH Nachiketa - Indian Institute of Technology Kanpur - India
GANGWAR Akash, ANAND Sandeep - Indian Institute of Technology Bombay - India

551 - Long Term Evaluation of a Pantile-based Maximum Power Point Tracking DC-DC Power Converter for Solar Roof Tiles **Panel D 3.3**
ZEKORN Tobias, WEIHS Léon, VOHL Kenny, HANHART Michael, ROLFF Leo, RALF Wunderlich, HEINEN Stefan - RWTH Aachen University - Germany

578 - Enhancing Primary Frequency Control in Microgrids through Self-Smoothing Photovoltaic Systems **Panel D 3.4**
RIAZ Nida, PELTONEN Lasse, REPO Sami, JÄRVENTAUSTA Pertti - Tampere University - Finland

11:30 DS1k - Topic 06: Energy Storage Systems for Renewable Energy
Location: Dialogue Session - Ground Floor
Chair(s): WU Heng, Aalborg University, Denmark

400 - A Charging Current Ripple Suppression Strategy for Three-phase Power Conversion System Based on DC-side Harmonic Current Compensation **Panel D 4.1**
CHEN Yiran, CHEN Min, CAI Haoqing, HU Changsheng - Zhejiang University - China

572 - A Study of incremental capacity analysis discrete wavelet transform-based feature extraction with stochastic analysis **Panel D 4.2**
KIM Jaeyeong, EZAHEDI Salah Eddine, KIM Jonghoon - Chungnam National University - Korea (Republic of)

11:30 DS1l - Topic 06: Energy Management Systems
Location: Dialogue Session - Ground Floor
Chair(s): WU Heng, Aalborg University, Denmark

6 - Hierarchical Power Flow Voltage Assessment of a Multi-Microgrid in Interconnected Operation Mode **Panel D 4.3**
AGUNDIS TINAJERO Gibran David, VASQUEZ Juan C., GUERRERO Josep M. - Aalborg University - Denmark

333 - Cooperative Operation of Renewable-Integrated Multi-Energy Microgrids Under Dynamic Rolling Horizon Strategy **Panel D 4.4**
LI Zhengmao, KYYRÄ Jorma - Aalto University - Finland
YAN XU - Nanyang Technological University - Singapore
ZHAO Tianyang - University of Bath - United Kingdom
WANG Yunqi - Monash University - Australia

11:30 DS1m - Topic 06: Energy Harvesting

Location: Dialogue Session - Fundamentet

Chair(s): WU Heng, Aalborg University, Denmark

59 - Investigation of Gravitational Energy Harvesters for IoT Power Supply in Freight Train Monitoring **Panel E 1.1**
LO MONACO Mirco,
RUSSO Caterina,
SOMÀ Aurelio - Politecnico di Torino - Italy

64 - Enhanced Power Management System Powered by Piezo Electric Energy Harvesters for Data Transmission Systems **Panel E 1.2**
SHOUSHA Mahmoud, SCHORER Andreas, SITTNER Martin, HAUG Martin - Würth Elektronik Eisos GmbH & Co. KG - Germany

68 - Improvement in output power and frequency band for magnetostrictive vibrational generator with resonance capacitor **Panel E 1.3**
MINAMI Masataka - Kindai University - Japan
HANAI Yuki, MOTEGI Shinichi, MICHIHIRA Masakazu - Kobe City College of Technology - Japan
UENO Toshiyuki - Kanazawa University - Japan

153 - Advanced Magnetic Energy Harvester for Charging Drones from Overhead Powerlines **Panel E 1.4**
DUONG HOANG Viet, EBEID Emad - The University of Southern Denmark - Denmark

11:30 DS1n - Topic 07: Smart Grids

Location: Dialogue Session - Fundamentet

Chair(s): PEYGHAMI Saeed, Aalborg University, Denmark

87 - Model-Free Adaptive Control Algorithm for VSG-Controlled Inverter-Interfaced Distribution Generators **Panel E 2.1**
JIANG Bingchen, GUERRERO Josep M., GOLESTAN Saeed, LI Shuting, VASQUEZ Juan C. - Aalborg University - Denmark
RAWA Muhyaddin J. M., ALGHAMDI Sultan - King Abdulaziz University - Saudi Arabia

90 - Construction of LVDC Demonstration Site for Verification of Performance and Safety Function of Component in LVDC System **Panel E 2.2**
CHOI Jung-Sik, KO Byoung-Sun, OH Seung-Yeol, CHA Dae-Seak, KIM Mina - Korea Electronics Technology Institute - Korea (Republic of)

328 - Charging Pricing Incentives-Enabled Coordinated Dispatching for Improved Overall Benefits of Electric Vehicles and Islanded Photovoltaic Charging Stations **Panel E 2.3**
YANG Wenjin, YANG Hengzhao - Shanghaitech University - China

11:30 DS1o - Topic 07: AC and DC Distribution and Micro Grids, including Fault Coordination and Protection

Location: Dialogue Session - Fundamentet

Chair(s): PEYGHAMI Saeed, Aalborg University, Denmark

22 - Adaptive Multi-Agent-Zonal Protection Scheme for AC Microgrids **Panel E 2.4**
DE LA CRUZ Jorge - Aalborg University - Denmark
GOMEZ-LUNA Eduardo - Universidad Del Valle - Colombia
CANDELO-BECERRA John E. - Universidad Nacional de Colombia, Sede Medellín - Colombia
VASQUEZ Juan C., GUERRERO Josep M. - Aalborg University - Denmark

201 - A Feasible Region Analysis and Design Method for Virtual Inertia and Damping in Virtual DC Machine Control Strategy **Panel E 3.1**
SUN Lizheng, WANG Feng, XU Ziyi, ZHUO Fang - Xi'an Jiaotong University - China

246 - Comparison of two flywheel concepts for the support of microgrids **Panel E 3.2**
FEHR Hendrik, GENSIOR Albrecht, HEIDRICH Tobias, MÖCKEL Andreas - Technische Universität Ilmenau - Germany

262 - gG and aR fuse DC arcing model for converter sizing **Panel E 3.3**
REYMOND-LARUINA Frédéric, BARNEL Nathalie, HADBI Djamel - EDF R&D - France
QUEVAL Loïc - GEEPS - France
EGROT Philippe - EDF R&D - France
PETIT Marc - GEEPS - France

264 - Comparative study of voltage regulation in distribution grid based on power electronic devices connected on the LV side of the MV/LV transformer **Panel E 3.4**
VIEIRA REINERT FRELLO Sabine, FREY David, BESANGER Yvon, HADJSAID Nouredine - G2ELAB CNRS/G-INP/UGA - France
CORDONNIER Michel, LANGLET Guillaume, BACAUD Leonard - ENEDIS - France

295 - Virtual Impedance Control for Load Sharing and Bus Voltage Quality Improvement **Panel E 4.1**
XIAO Junjie, WANG Lu, QIN Zian, BAUER Pavol - Delft University OF Technology - Netherlands

357 - Probabilistic Mapping of Stability and Reliability in Microgrids – A Bayesian Interpretation **Panel E 4.2**
SONG Yubo, SAHOO Subham - Aalborg University - Denmark
YANG Yongheng - Zhejiang University - China
BLAABJERG Frede - Aalborg University - Denmark

500 - Functional Features of Isolated AC/DC Converter Interface in Future Low-Voltage DC Microgrids **Panel E 4.3**
LAZAREVIC Vladan, ABPLANALP Markus, CANALES Francisco, SCHWEIZER Mario - ABB Corporate Research Center - Switzerland
ANTONIAZZI Antonello, GHEZZI Luca - ABB S.P.A. - Italy

505 - Modeling Inrush Currents in Medium-Voltage Grids **Panel E 4.4**
HAGEMANN Lars, HETZENECKER Katharina, KLEUTGENS Julius, DE DONCKER Rik W. - RWTH Aachen University - Germany

535 - Method for creating fast controlled transitions within multilevel converter-based DC grids **Panel E 5.1**
NGUYEN Tuan Minh, MARQUES-LOPEZ Jose-Luis, HILLERMEIER Claus - Universität der Bundeswehr München - Germany

11:30 DS1p - Topic 07: Real-Time Simulation and Hardware in the Loop

Location: Dialogue Session - Fundamentet

Chair(s): PEYGHAMI Saeed, Aalborg University, Denmark

232 - Real-time simulation and sensitivity analysis about the effect of a Solid-State Circuit Breaker with current limiter and active damping on MVDC grid inductance **Panel E 5.2**
CLERICI Alessio, RAGGINI Diego, VERONI Alessandro, CHIUMEO Riccardo - RSE SPA - Italy

254 - Flexible Load Emulation using a Rapid Control Prototyping System and Power Electronics for Automotive Power IC Reliability Investigations **Panel E 5.3**
ULBING Alexander, WARMUTH Andreas, SIEVERS Markus - KAI Kompetenzzentrum Automobil- und Industrieelektronik GmbH - Austria

437 - Faster than Real-Time Electro-Thermal-Aging Emulation of Multiple Batteries within a Modular Multilevel Converter **Panel E 5.4**
LEISTER Lars, KATZENBURG Niklas - Karlsruhe Institute of Technologie (KIT) - Germany
KUHLMANN Kai - Technische Hochschule Aschaffenburg - Germany
STEFANSKI Lukas, HILLER Marc - Karlsruhe Institute of Technologie (KIT) - Germany

565 - Real-Time Simulation of Medium-Voltage Dual-Active Bridge Converters for High-Fidelity Controller Testing **Panel E 6.1**
MENCHER Raphael - RWTH Aachen University - Germany
STEVIC Marija - OPAL-RT Germany GmbH - Germany
MATHÉ Jan - RWTH Aachen University - Germany
VENUGOPAL Ravinder - OPAL-RT Germany GmbH - Germany
W. DE DONCKER Rik - RWTH Aachen University - Germany

11:30 DS1q - Topic 07: HVDC, FACTS, Solid State Transformers and Hybrid Circuit Breakers

Location: Dialogue Session - Fundamentet

Chair(s): HUANG Liang, Aalborg University, Denmark

213 - Design of Bypass Switches for HV/MVHybrid Transformer Auxiliary Converters **Panel E 6.2**
WIEMER Adrian, BIELA Juergen - ETH Zurich - Switzerland

220 - Comprehensive Study on the Grid Fault Behavior of Grid-Forming Control for Modular Multilevel Converters **Panel E 6.3**
PAEZ DELGADO Andres Sebastian, NEUMANN Christian, ECKEL Hans-Günter - University of Rostock - Germany

417 - Protection of Multi-Terminal VSC HVDC Hybrid Transmission Line **Panel E 6.4**
SAHEBKAR FARKHANI Jalal, ÇELIK Özgür, MA KAIQI, CHEN Zhe, LETH BAK Claus - Aalborg University - Denmark

524 - Positioning and Control of Power-Flow Controllers in Meshed MVDC Grids **Panel F 1.1**
KAMMANA Sreedhar, DAHMEN Christopher, BRÜCKNER Thomas - Universität der Bundeswehr München - Germany

11:30 DS1r - Topic 07: Power Quality Issues and Power Factor Correction Techniques

Location: Dialogue Session - Fundamentet

Chair(s): HUANG Liang, Aalborg University, Denmark

11 - Constraints on the Controller Bandwidth of Grid-tied Inverters **Panel F 1.2**
DU PLESSIS Francois, BEUKES Johan - Stellenbosch University - South Africa

29 - Impedance Analysis and Resonance Mitigation for Sample-Correction-Based Boost Power Factor Correction Converters **Panel F 1.3**
ZHU Tianhua - Aalborg University - Denmark
WANG Xiongfei - KTH Royal Institute of Technology - Sweden
ZHAO Fangzhou - Aalborg University - Denmark
TORRICO Grover - Huawei Technologies Sweden AB - Sweden

148 - Reducing Harmonic Distortion in Ship Power Systems: An Evaluation of Three Shunt Active Power Filter Control Strategies **Panel F 1.4**
DJAGAROV Nikolay, TSVETANOV Dimitar, DJAGAROVA Julia, MILUSHEV Hristo - Nikola Vaptsarov Naval Academy - Bulgaria
GUERRERO Josep M. - Aalborg University - Denmark

159 - Bipolar Output Voltage Control Strategy for Three-Level Neutral-Point Clamped Converter for Low-Voltage DC Distribution System **Panel F 2.1**
KIM Mina - Korea Electronics Technology Institute - Korea (Republic of)
PARK Hwa-Pyeong - Kumoh National Institute of Technology - Korea (Republic of)
KO Byoung-Sun, CHA Dae-Seak, CHOI Jung-Sik, OH Seung-Yeol - Korea Electronics Technology Institute - Korea (Republic of)

273 - Coordinated full-bridge inverter PWM control strategy for improved energy efficiency **Panel F 2.2**
FONTAINE Jordan, TRAJIN Baptiste, VIDAL Paul-Etienne - Laboratoire Génie de Production (LGP) - France

323 - Optimal Installation and System-level Control Strategy of SAPF Based on Extended-range Compensation of Multi-bus Harmonic Sources in Distribution Networks **Panel F 2.3**
YANG Zebin, YI Hao - Xi'an Jiaotong University - China
YOU Yihong - Shenzhen Power Supply Bureau Company Limited - China
ZHUO Fang, ZHAN Cao - Xi'an Jiaotong University - China
SHI Shuaibin - Shenzhen Power Supply Bureau Company Limited - China

450 - Optimal inverter control for grid voltage unbalance mitigation **Panel F 2.4**
DE WET Werner, BEUKES Johan, DU PLESSIS Francois - Stellenbosch University - South Africa

547 - Deep-learning-based Fast System-level Harmonic Control Strategy for Multi-bus Voltages Detected APF in Distribution Systems **Panel F 3.1**
YANG Zebin,
YI Hao - Xi'an Jiaotong University - China
WU Xian - Shenzhen Power Supply Bureau Company Limited - China
ZHUO Fang, ZHU Lingyu - Xi'an Jiaotong University - China
WANG Qing - Shenzhen Power Supply Bureau Company Limited - China

11:30 DS1s - Topic 07: Charging Power Stations, Bidirectional V2G

Location: Dialogue Session - Fundamentet

Chair(s): HUANG Liang, Aalborg University, Denmark

20 - Design and experimental verification of advanced control strategies to provide ancillary services with a bidirectional Vehicle-to-Grid (V2G) inverter **Panel F 3.2**

LUH Matthias, BLANK Thomas - Karlsruhe Institute of Technologie (KIT) - Germany

11:30 DS1t - Topic 07: Energy Harvesting, Energy Storage Systems and Renewable Diurnal and Seasonality Issues

Location: Dialogue Session - Fundamentet

Chair(s): HUANG Liang, Aalborg University, Denmark

408 - The Fast Direct Power Control Strategy of Dual Active Bridge Converter for Energy Storage System in DC microgrid **Panel F 3.3**

XIAO Zhongxiu, LEI Wanjun, YIN Yilin, MU Wei - Xi'an Jiaotong University - China

11:30 DS1u - Topic 07: Smart and Energy Efficient Buildings

Location: Dialogue Session - Fundamentet

Chair(s): HUANG Liang, Aalborg University, Denmark

102 - Energy Management by Variable Distribution Voltage Based on Electricity Consumption within Consumers **Panel F 3.4**

CHISHIKI Rin - Nagaoka University of Technology - Japan
HAGA Hitoshi - Shizuoka University - Japan
ARIMATSU Kenji - Tohoku Electric Power Co., Inc. - Japan
ITO Yoichi - GS Yuasa Infrastructure Systems Co., Ltd - Japan

14:40 Keynote 2 - Energy Islands – the key to harvest huge amounts of wind power

Location: Plenary Room

EDLEFSEN Hanne Storm - ENERGINET – Denmark

Chair(s): BOROYEVICH Dushan, Virginia Tech - CPES, United States of America
WANG Xiongfei, KTH Royal Institute of Technology, Sweden

The Energy Islands will change the way we talk about harvesting wind energy. They will allow us to go much further out at sea and harvest far more power than previously known. However, the Energy Islands are a complicated matter, especially on the technological front. We have never quite done something like this in this type of scale, which means we

need innovation in order to succeed. There are many questions to be answered. I will try to give my best estimate on what type of technological challenges we need to overcome to enable the success of the Energy Islands, but also what the future Energy Islands may look like.

15:40 LS2a - Topic 11: Focus Topic 2 - Energy Islands

Location: Plenary Room

Chair(s): WANG Xiongfei, KTH Royal Institute of Technology, Sweden
KWON Jun Bum, ENERGINET, Denmark

15:40 260 - Impedance-Based Stability Analysis of Droop-Controlled AC Microgrids with the Generalized Nyquist Criterion

STRUNK Robin, MERTENS Axel - Leibniz Universität Hannover - Germany

16:00 16 - Planning of Community Microgrid for Improving the Resilience of System by using HOMER Grid

ALI Majid, Meisam Rajabnia, Juan C. Vasquez, Josep M. Guerrero, Yajuan Guan - Aalborg University - Denmark
Abdullah M. Abusorrah - King Abdulaziz University - Saudi Arabia

16:20 558 - Rule-Based Bottom-Up Medium Voltage AC Microgrid Black Start through Battery Energy Storage System with Transformer Inrush Current Management

CASTELO BRANCO César, RIBEIRO Luiz, DE MATOS José, OLIVEIRA Hércules - Federal University of Maranhao - Brazil
PINHEIRO Lucas - Equatorial Energia S.A. - Brazil

15:40 LS2b - Topic 1: Active Devices and Components (Wide Bandgap and other New Materials) ***Location: 1.03 Flyveren***

Chair(s): DIECKERHOFF Sibylle, Technical University of Berlin, Germany
SIEMIENIEC Ralf, Infineon Technologies Austria AG, Austria

15:40 42 - Improvement of Surge Current Capability of 3.3 kV SBD-Embedded SiC-MOSFET Module

OKIMOTO Shigeru, HIRONAKA Yoichi, HATORI Kenji, IIJIMA Akifumi, KAWAHARA Kotaro, SUGAWARA Katsutoshi - Mitsubishi Electric Corporation - Japan
SOLTAU Nils - Mitsubishi Electric Europe B.V. - Germany

16:00 451 - Analysis of Miller Region Sustained Oscillations during Turn-on of High-Side 10kV SiC MOSFET
KJAERSGAARD Benjamin, JØRGENSEN Asger, AUNSBORG Thore, JØRGENSEN Jannick, LIU Gao - Aalborg University - Denmark
RANNESTAD Bjørn - KK Wind Solutions - Denmark
ZHAO Hongbo, MUNK-NIELSEN Stig - Aalborg University - Denmark

16:20 509 - Investigation into Current Sharing of Parallel SiC MOSFET Modules using a Gate-Driver with Sub-Nanosecond Time-Skew Capability
NEIRA Sebastian, MATHIESON Ross, PARKER Mason, JUDGE Paul, FINNEY Stephen - University of Edinburgh - United Kingdom

15:40 LS2c - Topic 2: Modular Multilevel Converters

Location: 1.02 Havnen

Chair(s): DWORAKOWSKI Piotr, Supergrid Institute, France
TEODORESCU Remus, Aalborg University, Denmark

15:40 63 - Thermal Design of a Medium Voltage Modular Multilevel Converter Cell
FREI Yanick, DUJIC Drazen - Ecole Polytechnique Federale de Lausanne - Switzerland

16:00 134 - A 2N+1 MMPC Scheme Without Arm Current Sensors for Medium Voltage MMCs
CHAKI Rupam, DEY Anubrata - Indian Institute of Technology Roorkee - India

16:20 136 - Dynamic Mission Profile Emulation for short-term reliability test of Submodule in Modular Multilevel Converter
ENYI Li, KE Ma - Shanghai Jiaotong Univeristy - China
YALIN Zhang - Siyuanelectric Co.,Ltd - China

15:40 LS2d - Topic 6: Converters for Renewables

Location: 1.08 Tunnelen

Chair(s): BAKRAN Mark, University of Bayreuth, Germany
JUNG Marco, Fraunhofer Institute for Energy Economics and Energy System Technology IEE, Germany

15:40 126 - Stand-Alone Offshore Wind Energy and Water Electrolysis: A Study on Optimal Electrolyzer Sizing
RUNSER Thibaut, AREND Sebastian - Siemens Energy - Germany
DE DONCKER Rik W. - E.ON Energy Research Center - Germany

16:00 335 - Elimination of Back-Electromotive-Force Induced Grid Harmonics in WECS with Multiphase Permanent Magnet Synchronous Generators
TSOUMAS Ioannis - ABB Switzerland Ltd - Switzerland
HARNEFORS Lennart - ABB AB, Corporate Research - Sweden

16:20 422 - High-Power Rectifier Technologies for Hydrogen Electrolysis
CAO Zhiyu, WALLMEIER Peter - AEG Power Solutions GmbH - Germany

15:40 LS2e - Topic 7: DC Distribution & Microgrids Protection (II)

Location: 1.09 Vaerket

Chair(s): CARPITA Mauro, University of Applied Sciences of Western Switzerland, Switzerland
COLAK Ilknur, Schneider Electric, France

15:40 194 - Multi-time Scale Fault Characteristics of HVDC-Connected Offshore Wind Farm and the Coordination with Different Protection Schemes: A Review
GAO Guoqing, BLAABJERG Frede, WANG Yanbo - Aalborg University - Denmark

16:00 436 - Comparison between the ETT and LTT Technologies for Electronic OLTC Transformer Applications
SCHIELE Juergen, PRZYBILLA Jens - Infineon Technologies Bipolar GmbH&CO.KG - Germany
BARRENETXEA INARRA Manex, LOPEZ ERAUSKIN Ramon - Mondragon Unibertsitatea - Spain

16:20 401 - System Modelling and Reliability Study of the Tri-Port SST Featuring Energy Storage and Distributed Redundancy for Data Centers
SIEMASZKO Daniel, MOGOROVIC Marko - Hitachi Energy - Switzerland

15:40 PECTA-Session 1: PECTA and the WBG Landscape

Location: 1.04 Fakultetet

Chair(s): MAKOSCHITZ Markus, AIT Austrian Institute of Technology GmbH, Austria
BRÜNIGER Roland, Swiss Federal Office of Energy, Switzerland

16:25 591 - Application Readiness Map for WBG-Semiconductor-Based Applications
THOBEN Markus - University of Applied Science and Arts Dortmund - Germany
PFOST Martin - Technical University of Dortmund - Germany

17:05 598 - Reliability of WBG, results of a Pre-Scoping Study
ZHANG Kaichen, IANNUZZO Francesco - Aalborg University - Denmark
CHRISTIANSEN Christian Holm - Technological Institute - Denmark

17:00 Industrial Forum 1: Focus Topic 1 - Renewable Energy Systems and Power-to-X

Location: 1.01 Banen

Chair(s): DAVARI Pooya, Aalborg University, Denmark
ABDELHAKIM Ahmed, EPIROC, Sweden

Confirmed Panellists:
- Adrian Timbus (Hitachi Energy)
- Francisco Canales (ABB)
- Denys Zaikin (Advent Energy)
- Sven Schumann (Siemens Energy)
- Andreas Emmert (AEG Power Solutions)
- Charlie Sørensen (Ballard Europe)

17:00 Industrial Forum 2: Focus Topic 2 - Energy Islands

Location: 1.02 Havnen

Chair(s): WANG Xiongfei, KTH Royal Institute of Technology, Sweden
KWON Jun Bum, ENERGINET, Denmark

Confirmed Panellists:
- Didier Mallieu (Hitachi Energy, Switzerland)
- Changjiang Zhan (NR Electric, China)
- Kosei Shinoda (SuperGrid Institute, France)
- Fitim Kryezi (North Sea Energy Island)

PECTA's first conference contribution at EPE'23 ECCE Europe

Date: Sept 5th – 7th, 2023: PECTA afternoon sessions
Location: Room 1.04 Fakultetet

With 4 supporting countries and over 40 industry and academic experts the IEA – 4E[1] Power Electronic Conversion Technology Annex – PECTA[2] is moving forward with its ambitious work plan. PECTA aims to support policy-makers by providing evidence and information on Wide band gap (WBG) Technology, to promote the use of WBG in power electronics and thus to contribute to an increased energy efficiency in various sectors; with applications ranging from inverters for photovoltaic and wind plants, to electronic devices, uninterrupted power supplies and industry automation equipment. PECTA's workplan consists of 7 established tasks and the results of these tasks will be presented during 3 EPE conference afternoon sessions on-site at Aalborg university. The experts leading the tasks will discuss their approaches and results related to the wider adoption and use of Wide Bandgap (WBG) technologies driven by SiC and GaN.

This conference is an exciting opportunity for PECTA members and non-members to learn more on how PECTA is going forward and to contribute to its success!

Background information on PECTA´s work is given by the published report of phase 1 "**Wide Band Gap Technology: Efficiency Potential and Application Readiness Map**", as well as in the **PECTA policy brief** which highlights the major outcomes of phase 1 of work. Additionally, you find in the **PECTA Factsheet** further information on the currently active 7 tasks to be presented in more detail next September.

[1] The Energy Efficient End-Use Equipment Technology Collaboration Program of the International Energy Agency, IEA-4E: https://www.iea-4e.org/
[2] https://pecta.iea-4e.org/

PECTA Session 1 (Tuesday, 5.9.2023): 15:40 – 17:40
Location: **Room 1.04 Fakultetet**
Chair: Markus Makoschitz
Topic: PECTA and the WBG Landscape

15:40
Welcome & Get-Together
Markus Makoschitz, Session-Chair

15:50
PECTA: General Overview (35")
Roland Brueniger, PECTA Chair, Swiss Federal Office of Energy (CH)

- Introduction on the agenda of the 3 PECTA days
- What is PECTA, and how is it organized (including engagement of experts from Tasks, academia and advisory boards).
- What has been done during Phase 1 and 2
- Short review of PECTA goals and time plan

16:25
Application Readiness Map for WBG-Semiconductor-Based Applications (40")
Martin Pfost, TU Dortmund University
Markus Thoben, University of Applied Science and Arts Dortmund

17:05
Reliability for WBG, results of a Pre-Scoping Study (35")
Kaichen Zhang, Aalborg University
Christian Holm Christiansen, Danish Technological Institute
Francesco Iannuzzo, Aalborg University

17:40
End of Day 1

Industrial Forum 1: "Renewable Energy Systems and Power-to-X"

Decarbonization of major energy-consuming sectors is a top priority of the 2015 Paris Agreement and the Intergovernmental Panel on Climate Change (IPCC) climate change 2023 report. This has significantly challenged today's energy systems with the development of long-term sustainable energy production and storage. Perhaps one of the most promising strategies for addressing this challenge is the implementation of hydrogen and power-to-X solutions, in which renewables can be heavily utilized and new ways of storing and transporting this green energy can be followed.

In this context, this focus topic tends to bring together experts in the field to exchange insights on possible challenges and roadmap to pave the way to a greener future. The industrial forum will focus on the applications and best practices for system coupling/integration, topologies, innovative technologies, system degradation, efficiency, and simulation from component to system levels.

Moderators:
Pooya DAVARI, Aalborg University, Denmark
Ahmed ABDELHAKIM, Epiroc, Sweden

Panelists:
- Adrian Timbus (Hitachi Energy)
- Francisco Canales (ABB)
- Denys Zaikin (Advent Energy)
- Sven Schumann (Siemens Energy)
- Andreas Emmert (AEG Power Solutions)
- Charlie Sørensen (Ballard Europe)

When?: Tuesday, 5 September 2023 (17:00 – 18:10)

Where?: AKKC, Room 1.01 Banen

Industrial Forum 2: "Energy Islands"

Europe has set ambitious goals to address energy security challenges by exploiting offshore wind energy. By 2050, at least 260 GW of offshore wind farms will be deployed in the North Sea, accounting for 85% of the EU's current target of 300 GW. To facilitate the large-scale integration of offshore wind into future energy systems, Energy Islands are being constructed and commissioned by 2030. These islands will interconnect several GWs of new offshore wind farms with high-voltage transmission grids and use electrolyzers to convert offshore wind into renewable hydrogen.

Power electronics is a foundational technology for Energy Islands. It enables not only efficient direct-current transmission of offshore wind power but also cost-effective production of hydrogen. Hence, power-electronic-based, sector-coupled energy systems will be built on Energy Islands. This Focus Topic aims to provide a venue for exchanging latest technologies and challenges in developing Energy Islands. The Focus Topic will consist of a series of tutorials, technical sessions, and an industrial forum for inspiring discussions.

Moderators:
Xiongfei WANG, KTH Royal Institute of Technology, Sweden
Jun Bum KWON, Energinet, Denmark

Panelists:
- Didier Mallieu (Hitachi Energy, Switzerland)
- Changjiang Zhan (NR Electric, China)
- Kosei Shinoda (SuperGrid Institute, France)
- Fitim Kryezi (North Sea Energy Island)

When?: Tuesday, 5 September 2023 (17:00 – 18:10)

Where?: AKKC, Room 1.02 Havnen

Planning Vendor Sessions – Tuesday 5 September 2023
Vendor session area in vendor session area in Fundamentet

11.30-11.45 **Leapers Semiconductor**

IGBT and SiC Power Solutions for Mature and Emerging Power Electronics Applications
Alexey Cherkasov, Marketing & Sales Director

In the age of the growing electrical power demand, every industry is focusing on the efficient power conversion solutions – from power grids and railways to the emerging vehicle electrification and photovoltaics. With its core research and development center in Japan and production capacity expansion in China, Leapers Semiconductor corresponds to the continuous demand for both Si and SiC power solutions with its latest advances in power semiconductors technology.

11.50-12.05 **Current OS**

12.10-12.25 **GOmeasure**

12.50-13.05 **Typhoon HIL, Inc**

13.10-13.25 **Danfoss & Semikron Danfoss**

Efficient and Intelligence Drives of the Future
Norbert Hanigovszki

This talk will look at the historical trends of drives and how these effect what a future drive will look like and in particular, what is possible in the areas of efficiency and intelligence

13.30-13.45 **Nexperia**

High-voltage, high-power components for requirements of next generation applications
Sebastian Fahlbusch, Application Marketing Manager

This presentation will focus on the dynamics of the power electronics market, key drivers, and challenges for both the customers and the semiconductor suppliers. The implifications on the compilation of a future-proven semiconductor portfolio mix with three attractive technologies like Si, SiC & GaN, their interaction as well as packaging technology challenges are going to be part of this presentation.

13.50-14.05 **Wolfspeed**

SiC MOSFETs enables High Power Density and Scalability in MegaWatt (MW) Systems
Ian Milne, Power Field Application Engineer

With the increasing demand for megawatt (MW) power converters for energy storage systems (ESS), solar inverters, electric propulsion, wind converters, Power to X, this presentation goes into the benefits of Wolfspeed's recently introduced 3.3kV all-Silicon Carbide (SiC) power MOSFET modules. In such applications, high power density and scalability is imperative, which the new 100 mm x 140 mm LM package combined with Wolfspeed's fast-switching SiC MOSFET chips can achieve through excellent current-sharing performance, low stray inductance, and ease of paralleling the modules. A brief overview of a case study using two paralleled Wolfspeed 3.3 kV SiC modules is benchmarked against an existing Si IGBT solution to show the clear advantage of improved efficiency, higher current handling at higher switching frequencies and overall higher power densities.

14.10-14.30 **Schneider Electric**

EcoStruxure Power for Renewables
Evelina Ahlen Norberg, Project manager

This presentation will focus on presenting digital power solutions to maximize revenue and optimize operations with a focus on people & asset safety, reliability, operational efficiency and security against cyberattacks.

Push the ***Pulse***

We are looking forward to meeting the power electronics and application community and exchange with enthusiasts from all over the world. This time in Aalborg.

Let's meet at our vendor session
„Electrification Strategy of Volkswagen Group with Focus on Power-Inverters"
on September 6th at 1:50 pm

Volkswagen Vendor-Session
EPE 2023 | Aalborg
Electrification Strategy of
Volkswagen Group

Wednesday 6 September 2023 –
1:50 pm

#PushThe*Pulse*

08:30 **Keynote 3 - LMNO: high-voltage spinel as Li-ion battery cathode. Status and battery properties**

Location: Plenary Room

DAHL Søren - Topsoe – Denmark

Chair(s): STROE Daniel-Ioan, Aalborg University, Denmark
KOWAL Julia, Technical University of Berlin, Germany

The positive electrode active material for Li-ion batteries LNMO (LiNi0.5Mn1.5O4) has numerous advantages. The high working potential and high energy density pave the way to either longer operating ranges or a smaller battery package, whilst the three-dimensional spinel structure makes it possible to achieve high discharge rates and fast battery charging. The absence of the critical metal cobalt and the relatively low nickel content make this a cost-effective alternative to today's mainstream lithium-ion battery chemistries. The talk will present the properties and challenges of LNMO batteries. Furthermore, the technical status and market perspective will be given.

09:00 **Keynote 4 - Power Electronics in Electric Vehicles: It's not only about cost**

Location: Plenary Room

GORAY Kunal - AVL Software and Functions GmbH – Germany

Chair(s): RIBICKIS Leonids, Riga Technical University, Latvia
ALAKULA Mats, Lund University, Sweden

There are a number of power electronics components within an electrical vehicle performing various applications such as main traction inverter, DCDC converter, On board charger etc. Over time the automotive industry has an expectation to reduce the costs for these components, but this is a unidimensional thinking and needs to be challenged. There can be much more value generated when one starts to utilize the power electronics for providing additional functions or when one starts to integrate multiple functions into a single working unit. The transition to wide band gap semiconductors also is an enabler here that can provide highly efficient solutions across multiple applications for the electric vehicle.

09:30 Mini Workshop Medium-voltage power electronics

Location: 1.07 Fjorden

Chair(s): MUNK-NIELSEN Stig, Aalborg University, Denmark

This mini-workshop is open to ALL EPE'23 ECCE Europe-delegates who are interested in MV power electronics
Organizer: Prof. Stig Munk-Nielsen, Aalborg University

10:00 LS3a - Topic 11: Focus Topic 3 - Energy Storage Technologies

Location: Plenary Room

Chair(s): STROE Daniel-Ioan, Aalborg University, Denmark
KOWAL Julia, Technical University of Berlin, Germany

10:00 265 - Modelling of Large Volume Expansion of Silicon Batteries using an Optimum Incremental Potential Theorem

BEIRANVAND Hamzeh, DITTMANN Jan, STERN Jan-Ole, HANSEN Sandra, ADELUNG Rainer, WULFINGHOFF Stephan - Kiel University - Germany

10:20 287 - Open Circuit Voltage Characterization of Microporous Silicon Anodes for Lithium Ion Batteries

BEIRANVAND Hamzeh - Kiel University - Germany
SHINGOTE Sahil, SHEJWALKAR Ashwin - BITS Pilani - India
STERN Jan-Ole, GRONENBERG Monja, ADELUNG Rainer, WULFINGHOFF Stephan - Kiel University - Germany

10:40 406 - A Model Predictive Control Approach for Lithium-ion Capacitor Optimal Charging

SAHA Pankaj, SOLTANI Mahdi, MUNK-NIELSEN Stig, STROE Daniel-Ioan - Aalborg University - Denmark

10:00 LS3b - Topic 1: Passive Components, System Integration, Packaging & Thermal Management

Location: 1.03 Flyveren

Chair(s): BAHMAN Amir Sajjad, Aalborg University, Denmark
MARTINEZ Wilmar, KU Leuven, Belgium

10:00 195 - On the Impact of DC Magnetization on Core Losses: A Model Based on Extensive Experimental Results from the MagNet Database

ARRUTI Asier, AIZPURU Iosu, MAZUELA Mikel - Mondragon Goi Eskola Politeknikoa S. Coop - Spain

10:20 **39 - Binary-weighted Modular Multi-level Digital Active Gate Driver**
TAKAYAMA Hajime - Kyoto University - Japan
FUKUNAGA Shuhei - Osaka University - Japan
HIKIHARA Takashi - Kyoto University - Japan

10:40 **404 - Ceramic baseplate-less 10 kV SiC MOSFET power module with integrated liquid cooling**
BJØRN JØRGENSEN Asger, BECZKOWSKI Szymon, FUTTRUP KJÆRSGAARD Benjamin, STIG AUNSBORG Thore, MUNK-NIELSEN Stig, ZHAO Hongbo - Aalborg University - Denmark

10:00 **LS3c - Topic 2: Grid Connected Converters** ***Location: 1.02 Havnen***
Chair(s): BOROYEVICH Dushan, Virginia Tech - CPES, United States of America
SANGWONGWANICH Ariya, Aalborg University, Denmark

10:00 **31 - A High Power Density Three-Phase Three-Level Hybrid IGBT/SiC Interleaved Active Neutral Point Clamped Voltage Source Converter**
NAJJAR Mohammad, NIELSEN Henning Roar, RASMUSSEN Lars Bech - Schneider Electric - Denmark

10:20 **80 - Passivity Improvement of the Grid Connected VSI using Active Damping and Investigation of Inaccuracy of the Direct Discrete Plant Model**
SAH Gyanendra Kumar, SCHÜTT Michael, ECKEL Hans-Günter - University of Rostock - Germany

10:40 **242 - Limitations and Comparisons of Small Signal Modelling Techniques in Converter Dominated Medium Voltage Networks**
COFFEY Sophie, HARRISON Sam, EGEA-ALVAREZ Agusti, BROZIO Cornel - University of Strathclyde - United Kingdom

10:00 **LS3d - Topic 8: Battery Management Systems, Monitoring and Life-time Prediction** ***Location: 1.08 Tunnelen***
Chair(s): VAN MIERLO Joeri, Vrije Universiteit Brussel, Belgium
DOPPELBAUER Martin, Karlsruhe Institute of Technologie (KIT), Germany

10:00 **12 - Adaptive configuration of generalized nonlinear ECM of Li-ion batteries based on impedance measurements and DRT analysis**
SIHVO Jussi - Tampere University - Finland
KNAP Vaclav - Czech Technical University in Prague - Czech Republic
ROINILA Tomi - Tampere University - Finland
STROE Daniel-Ioan - Aalborg University - Denmark

10:20 112 - Online Measurement Method of Electrochemical Impedance of Electric Vehicle Battery Based on Three-Phase Motor Drive Inverter

LI Boyang, QU Hongyan, JIANG Dong, ZHOU Min - Huazhong University of Science and Technology - China

10:40 305 - Data-Driven Methods for Robust Battery Capacity Estimation based on Electrochemical Impedance Spectroscopy

NING Zhansheng, VENUGOPAL Prasanth, RIETVELD Gert, BATISTA SOEIRO Thiago - University of Twente - Netherlands

10:00 LS3e - Topic 7: HVDC, Distribution & Microgrids Control

Location: 1.09 Vaerket

Chair(s): COLAK Ilknur, Schneider Electric, France
WU Heng, Aalborg University, Denmark

10:00 94 - Function and performance of Multi-Terminal Hybrid UHVDC System

HUANG Weihuang, LI Guiyuan, RAO Hong, LI Yan - Electric Power Research Institute - China

10:20 347 - Comparison between DC Voltage Droop Schemes and Grid-Following & Grid-Forming Control in AC Systems in View of Interoperability of MTDC grids

SHINODA Kosei, ELSODANY Mohamed, GONZALEZ Juan-Carlos - Supergrid Institute - France
DAI Jing - Université Paris-Saclay - France
BENCHAIB Abdelkrim - Supergrid Institute - France
BACHA Seddik - G2ELAB CNRS/G-INP/UGA - France

10:40 204 - Investigation of the Stabilizing Impact of Grid-Forming Controls for LCL-connected Converters

LAMRANI Yahya - L2EP - Centrale Lille - France
COLAS Frédéric - L2EP- ENSAM - France
VAN CUTSEM Thierry - Independent Consultant - Belgium
CARDOZO Carmen, PREVOST Thibault - RTE - France
GUILLAUD Xavier - L2EP - Centrale Lille - France

11:00 DS2a - Topic 01: Passive Components

Location: Dialogue Session - Ground Floor

Chair(s): BAHMAN Amir Sajjad, Aalborg University, Denmark

4 - Fully Analytical Double 2D Model for a Capacitive Equivalent Circuit of Transformers **Panel A 1.1**
KORTHAUER Bastian, BIELA Juergen - ETH Zurich - Switzerland

17 - Design Approaches for Nonlinear Inductors with a Stepped Air-Gap **Panel A 1.2**
KAISER Jeremias, DÜRBAUM Thomas - Friedrich-Alexander-University Erlangen-Nuremberg - Germany

61 - Highly Efficient and Flexible Optimization Algorithm for Magnetic Components in Power Electronics with Comprehensive Thermal and Power Loss Analysis **Panel A 1.3**
FIESSER Sven - Technische Universität Ilmenau - Germany
SCHWALBE Ulf - Hochschule Fulda - University of Applied Sciences - Germany

89 - An improved approach for litz wire loss calculation based on segmented equivalent circuit **Panel A 1.4**
WANG Yueyin, CHEN Wu, SHEN Zhan, LAN Jianxi - Southeast University - China

114 - Modeling of litz-wire losses in high-power medium-frequency transformers **Panel A 2.1**
GRADINGER Thomas, MOGOROVIC Marko - Hitachi Energy - Switzerland

130 - Analytical Model for 3D Geometry, Radius and DC Resistance of Arbitrary Litz Wire **Panel A 2.2**
MENG Qingchao, BIELA Jürgen - ETH Zurich - Switzerland

131 - Method for reducing eddy currents losses in planar transformer windings **Panel A 2.3**
REVILLA AGUILAR Andres, BECZKOWSKI Szymon, MUNK-NIELSEN Stig, ZHAO Hongbo - Aalborg University - Denmark

145 - Long-term testing results of a high-performance 450 V Polymer Aluminium Electrolytic Capacitor **Panel A 2.4**
NEUPANE Shova, OLUWATOYIN Esther Olawale, ADASHKEVICH Vadzim, GREENBANK William, TAVARES Luciana, EBEL Thomas - The University of Southern Denmark - Denmark

183 - Improved Analytical Core Temperature Prediction Based on Estimation of the Non-Uniform Flux Distribution **Panel A 3.1**
CLAVERO Lucia - Huawei Technologies Duesseldorf GmbH - Germany
DELGADO Alberto, ALOU Pedro - Universidad Politecnica de Madrid - Spain
BAKIC Miroljub, WIJEKOON Thiwanka - Huawei Technologies Duesseldorf GmbH - Germany

197 - Eddy currents in rectangular conductors: Analytical 2D loss model in the context of magnetic component design **Panel A 3.2**
EWALD Thomas, BIELA Jürgen - ETH Zurich - Switzerland

255 - Ripple Cancellation of PWM Power Converters by Magnetically IntegratedFilter Technology **Panel A 3.3**
ZACHARIAS Peter, NOEDING Christian - University of Kassel - Germany
AGANZA Alejandro - Universidad Autónoma de San Luis Potosí - Mexico

259 - Model Approach for Simulation of the Large-Signal Performance ofInductive Components Using a N87 Core **Panel A 3.4**
ZACHARIAS Peter - University of Kassel - Germany

314 - Estimation of Leakage Inductance in High-frequency Three-Winding Transformers for Electric Vehicle On-board Chargers **Panel A 4.1**
KOUGIOULIS Ioannis, VANNINI Amedeo - University of Nottingham - United Kingdom
PAL Anirban - General Electric - India
WHEELER Pat, AHMED Md Rishad - University of Nottingham - United Kingdom

324 - A Half-turn Winding Layout in Planar Transformers **Panel A 4.2**
LIU Chao, WANG Pinhe - Danmarks Tekniske Universitet - Denmark
ZHANG Zhe - Hebei University of Technology - China
HUANG Jiasheng, ANDERSEN Michael, ZSURZSAN Gabriel - Danmarks Tekniske Universitet - Denmark
OUYANG Ziwei - Technical University of Denmark - Denmark

361 - A High Frequency Magnetic Test Bench with Fast Isothermal Measurements for Large Cores **Panel A 4.3**
AGOTE Anartz, ARRUTI Asier, AIZPURU Iosu - Mondragon Goi Eskola Politeknikoa S. Coop - Spain

387 - Optimisation of Magnetic Loss Trade-offs in High-Frequency Litz Wire Transformers **Panel A 4.4**
WOUTERS Hans, SHEN Xiaobing, PERVAIZ Hassan, MARTINEZ Wilmar - KU Leuven - Belgium

468 - Analysis of Material Mixtures for the Characteristics of a Field Coupled Current Controlled Adjustable Inductance **Panel A 5.1**
SCHIERLE Guido, MEISSNER Michael, SASS Hendrik, HOFFMANN Klaus F. - Helmut Schmidt University - Germany

474 - Experimental Demonstration of the Transformer Interwinding Capacitance Voltage Waveform in an Isolated Full-Bridge Forward Converter **Panel A 5.2**
KJELDSEN Claus, ØSTERGAARD Christian - The University of Southern Denmark - Denmark

494 - Coupled PFC inductor for 22 kW on-board charger using PCB technology **Panel A 5.3**
HOFFMANN Stefan, HOENE Eckart - Frunhofer Institute for Reliabilty and Microintegration - Germany

519 - Single-stage single-switch curved air gap power factor correction integrated flyback transformer design for lighting equipment power applications **Panel A 5.4**
MO Wai Keung, PAASCH Kasper M, EBEL Thomas - The University of Southern Denmark - Denmark

557 - Optimal Design of a Coupled Inductor for ZVS DCDC **Panel A 6.1**
KEUCK Lukas, DIERKES Martin - Hella GmbH & Co. KGAA - Germany
WEBER Mathias - Sumida Components & Modules GmbH - Germany

11:00 DS2b - Topic 01: Components and Devices for Specific Applications, including for Pulsed Power

Location: Dialogue Session - Ground Floor

Chair(s): BAHMAN Amir Sajjad, Aalborg University, Denmark

75 - Measurement Setup and Results for the Breakdown of Transformer Oil Under Rectangular Voltage Pulses in the µs-Range **Panel A 6.2**
STATHIS Spyridon, BIELA Juergen - ETH Zurich - Switzerland

303 - A Resonant Converter with a Novel PCB-made High-Frequency Toroidal Coreless Transformer **Panel A 6.3**
DANIELE Simone - Federal-Mogul Italy S.R.L. - Italy
SANTORO Danilo, DELMONTE Nicola, COVA Paolo - University of Parma - Italy

413 - Saturation characteristics analysis of Marx circuits based on avalanche transistors **Panel A 6.4**
CHEN Han, LIANG Lin, ZHANG Ziyang - Huazhong University of Science and Technology - China

11:00 DS2c - Topic 01: System Integration, Packaging & Thermal Management

Location: Dialogue Session - Ground Floor

Chair(s): BAHMAN Amir Sajjad, Aalborg University, Denmark

18 - PCB Layout Parasitics Extraction of a GaN Half-Bridge: Simulation and Experimental Validation **Panel B 1.1**

KOHLHEPP Benedikt, FABER Samuel, KÜBRICH Daniel, DÜRBAUM Thomas - Friedrich-Alexander-University Erlangen-Nuremberg - Germany

88 - Packaging of 20 kV Double-Side Cooled Silicon Carbide Diode Module With Electrical Insulation Enhanced by a Polymer-Nanoparticle Coating **Panel B 1.2**

ZHANG Zichen, NICHOLAS Carl, ARRIOLA Emmanuel - Virginia Tech - CPES - United States of America
LYNCH Justin, YUN Nick, MORGAN Adam, SUNG Woongje - State University of New York Polytechnic - United States of America
NGO Khai, LU Guo-Quan - Virginia Tech - CPES - United States of America

116 - Analysis of inhomogeneous temperature distribution in power modules for different cooling systems and the influence on lifetime consumption **Panel B 1.3**

GLEISSNER Michael, BAKRAN Mark-M. - University of Bayreuth - Germany

263 - Comparative Thermal Analysis of Cooling Methods for Dual Inverter Applications in Electric Vehicles **Panel B 1.4**

EGIN MARTIN Gamze, HOSSEINABADI Farzad, CHAKRABORTY Sajib, EL BAGHDADI Mohamed - Vrije Universiteit Brussel - Belgium
ROMANO Claudio, TRANCHERO Maurizio - Ideas & Motion - Italy
HEGAZY Omar - Vrije Universiteit Brussel - Belgium

266 - Active Thermal Control of a DC-DC Converter Using Dynamic Gate-drive for Reliability Improvement **Panel B 2.1**

HOSSEINABADI Farzad, BAY Olcay, BHOI Sachin Kumar, CHAKRABORTY Sajib, EL BAGHDADI Mohamed, HEGAZY Omar - Vrije Universiteit Brussel - Belgium

349 - Experimental verification of the AC resistance effect in Insulated Metal Substrate IMS based power converters **Panel B 2.2**

AIZPURU Iosu, LAJAS Miguel, ARRUTI Asier, AGIRREZABALA Eneko - Mondragon Unibertsitatea - Spain
SANZ MIGUEL - University of Zaragoza - Spain
PEREZ FRANCISCO - Mondragon Goi Eskola Politeknikoa S. Coop - Spain
MAZUELA MIKEL - Mondragon Unibertsitatea - Spain

355 - Junction temperature calculation on Power Modules, based on the transient Thermal Impedance for Mission Profile evaluation in the EV Traction Inverter **Panel B 2.3**
PRIVITERA Emanuela, PAPASERIO Marco, CAVALLARO Daniela Grazia - STMicroelectronics - Italy

398 - Temperature Monitoring of Multi-Chip SiC MOSFET Modules: On-Chip RTDs vs. VSD(T) **Panel B 2.4**
BAKER Nick - University of Alabama - United States of America
BECZKOWSKI Szymon, IANNUZZO Francesco - Aalborg University - Denmark
LEMMON Andy, AUSTIN John, OSTRANDER Lauren - University of Alabama - United States of America

548 - Thermal Characterization of Packaged SiC Devices for High-Temperature Applications **Panel B 3.1**
KURUKURU Varaha Satya Bharath, HASAN Md Nazmul, PETRELLA Roberto - Silicon Austria Labs GMBH - Austria

576 - A High Power Density SiC MOSFET Inverter Design and Thermal Validation for EV Traction Application **Panel B 3.2**
MIRDODDI Kaushik, K Gopikrishnan, CHAUDHURY Abhrodip, NAG Soumya Shubhra, PRAMANICK Sumit Kumar, DAS Anandarup - Indian Institute of Technology Delhi - India
MORIANZ Mike, WEIS Gerald, KOECK Thomas, STAHR Johannes, MAIER Guenther - Austria Technologie and Systemtechnik (AT&S) - Austria

11:00 DS2d - Topic 01: Reliability & Life-Time

Location: Dialogue Session - Ground Floor

Chair(s): BAHMAN Amir Sajjad, Aalborg University, Denmark

24 - Thermal cycling characterization of integrated GaN power module **Panel B 3.3**
SUN Zhongchao, TAKAHASHI Masaki, MUNK-NIELSEN Stig, JØRGENSEN Asger Bjørn - Aalborg University - Denmark

27 - Comparison of a Power Cycling Test using Repetitive Unclamped Inductive Switching for Heat Generation with the DC Power Cycling Test **Panel B 3.4**
ABUOGO James, SCHWABE Christian, LUTZ Josef, BASLER Thomas - Technische Universität Chemnitz - Germany

205 - SiC Power TrenchMOS Transistor under harsh repetitive switching conditions **Panel B 4.1**
MAREK Juraj, MINARIK Michal, MATUS Matej, KOZARIK Jozef, STUCHLIKOVA Lubica - Slovak University of Technology In Bratislava - Slovakia

277 - Functionality, Losses, and Lifetime Comparison of Hydropower Generator Excitation System Converters **Panel B 4.2**
TANG Chengjun, THIRINGER Torbjörn - Chalmers University Of Technology - Sweden

358 - Improving Power Cycle Lifetime of SiC Power Modules with Double-Bonded Wire: Experimental and Simulation Analysis **Panel B 4.3**
XIANG Enyao, LUO Haoze, YANG Huan, HE Xiangning - Zhejiang University - China
FUJISHIMA Naoto, NISHIO Haruhiko, SUMIDA Hitoshi - Fuji Electric Co., Ltd. - Japan

447 - Reliability Study on Front-end Capacitors in Boost PFC Architectures **Panel B 4.4**
MUSETTI Alex, SADEGH LAFMEJANI Hossein, SOLDATI Alessandro - University of Parma - Italy

589 - Thermal Analysis of Aluminum Electrolytic Capacitors Considering the Insulation Resistance **Panel B 5.1**
YAO Bo, WEI Xing, ZHANG Yichi - Aalborg University - Denmark
WANG Qian - Wuhan University of Technology - China
WANG Haoran - Three Gorges Intelligent Industrial Control Technology Corporation Ltd - China
WANG Huai - Aalborg University - Denmark

11:00 DS2e - Topic 02: Grid Connected Converters

Location: Dialogue Session - Ground Floor

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

30 - SVPWM-Based DC Voltage Balancing and Fault Diagnosis Method for a Cascaded H-Bridge Multilevel Converter **Panel B 5.2**
XIE Dong - Chemnitz University of Technology - Germany
LIN Chunxu - Southwest Jiaotong University - China
LIN Hongjian - City University of Hong Kong - China
BASLER Thomas - Chemnitz University of Technology - Germany

106 - System Characteristics of Grid-Forming and Grid-Following Converter Systems **Panel B 5.3**
STRUWE Julian, WREDE Holger - University of Applied Sciences Duesseldorf - Germany
VENNEGEERTS Hendrik - University of Duisburg-Essen - Germany

155 - Comprehensive comparison of efficiency in the three-phase active rectifier and TNPC with SiC MOSFET for the electric vehicle charger **Panel B 5.4**
LI Xinyue - Technische Universität München - Germany
MA Lin - AUTEL - China

224 - Comparative Evaluation of Grid Connected Current Source and Voltage Source Inverters for Wind Turbines **Panel C 1.1**
CHEN Junye, SCHÜTT Michael, ECKEL Hans-Guenter - University of Rostock - Germany

317 - Power Control and Voltage Balancing Strategies for a Five-Level T-Type Inverter **Panel C 1.2**
ACADINE Kevin - Université de Picardie Jules Verne - France
MPANDA MABWE Augustin - Unilasalle Amiens - France
EL HAJJAJI Ahmed - Université de Picardie Jules Verne - France

354 - Controller Stability and Low Frequency Interaction Analysis of Railway Train-Network Systems **Panel C 1.3**
KONG Rui, SAHOO Subham - Aalborg University - Denmark
LYU Xiaoqin - Southwest Jiaotong University - China
BLAABJERG Frede - Aalborg University - Denmark
WANG Xiaoru - Southwest Jiaotong University - China

363 - Comparison of Modular Multilevel Converter and Neutral Point Clamped Converter Topologies for MVDC applications **Panel C 1.4**
CAMPOS Adriana, PAEZ Juan, DWORAKOWSKI Piotr - Supergrid Institute - France

382 - A New Hybrid-Modular Multi-level Inverter with Fault-Tolerant Capability **Panel C 2.1**
ROOHOLAHI Babak - University of Rostock - Germany
PEYGHAMI Saeed, BAHMAN Amir Sajjad - Aalborg University - Denmark

403 - Analysis of using MMC topologies for the direct integration of renewable generationwith modular electrolyzers **Panel C 2.2**
RAUSELL NAVARRO Eduardo - University Carlos III of Madrid - Spain
NAVARRO SORIANO Gustavo, LAFOZ PASTOR Marcos - CIEMAT - Spain
ARNALTES GÓMEZ Santiago, RODRÍGUEZ AMENEDO José Luis - University Carlos III of Madrid - Spain
BLANCO AGUADO Marcos, NÁJERA ÁLVAREZ Jorge - CIEMAT - Spain

416 - An Optimized Third-Harmonic Injection Reduces DC-Link Voltage Ripple in Cascaded H-Bridge Converters up to 50% for all Power Factors **Panel C 2.3**
UNRUH Roland, BÖCKER Joachim, SCHAFMEISTER Frank - Paderborn University - Germany

427 - A Comparative Study of Three-Phase Inverter Topologies for Common Mode Voltage Reduction in Photovoltaic Applications **Panel C 2.4**
HASSAN Jamil, MINAMBRES-MARCOS Victor - Senergy Products and Services - Spain
BARRERO-GONZALEZ Fermin, ALVI Anas Abdullah - University of Extremadura - Spain

MALINOWSKI Mariusz, MARTINEZ-CABALLERO Luis - Warsaw University of Technology - Poland

429 - A Novel Single-phase Common-grounded Rectifier Without Electrolytic Capacitor **Panel C 3.1**
YUAN Yuhao, WU Weimin - Shanghai Maritime University - China
EFTYCHIOS Koutroulis - Technical University of Crete - Greece
GAO Ning - Shanghai Maritime University - China
CHUNG Henry - City University of Hong Kong - China
BLAABJERG Frede - Aalborg University - Denmark
ZHU Lixun, HUANG Min - Shanghai Maritime University - China

431 - Stability Analysis of Grid-Forming Inverter Considering Different Operating Points **Panel C 3.2**
XIAO Yi, LUO Hao, ZHU Yinxiao, YANG Yongheng - Zhejiang University - China
MOLINAS Marta - Norwegian University of Science and Technology - Norway
XU Dehong - Zhejiang University - China

440 - Experimental validation of an isolated resonant converter for auxiliary systems in a train **Panel C 3.3**
GILES Joan, RODRIGUEZ Alberto, HERNANDO Marta M., SEBASTIAN Javier - University of Oviedo - Spain
ZELAA Beñat, AGUIRRE Jon, CASTRO Ana, BERMEJO Jose Manuel, ORTEGA David - Ingeteam Power Technology S.A. - Spain

479 - A Study on Simplification of Commutation Methods for Three-Phase Direct Matrix Converters **Panel C 3.4**
XIE Jun, SUBERSKI, HENNEBERG Dustin, RÄDEL Uwe, PETZOLDT Juergen - Technical University Ilmenau - Germany

491 - Design and Implementation of the Space Vector Modulation for a Hexaphase Indirect Matrix Converter **Panel C 4.1**
SANNI Chabi Salomon D., MPANDA MABWE Augustin - Unilasalle Amiens - France
EL HAJJAJI Ahmed - Université De Picardie Jules Verne - France

504 - A Common Ground (CG) Switched Capacitor Multilevel Inverter (SCMLI) With An Additional Charge Pump Cell Fitted For Photovoltaics - Supplied Energy Systems **Panel C 4.2**
ZHANG Jiandong, LI Xueyong, YAO Jia - Nanjing University of Science and Technology - China
QIAN Qinsong - Southeast University - China
IOINOVICI Adrian - Nanjing University of Aeronautics and Astronautics - China

530 - Current Limitation for Angle Control of Grid-Side Converters **Panel C 4.3**
GIERSCHNER Magdalena, ECKEL Hans-Günter - University of Rostock - Germany

539 - Nine-level inverter based on NPC topology for high frequency operation **Panel C 4.4**
STALA Robert - AGH University of Krakow - Poland

559 - An Enhanced Current Controller for Grid-Connected Inverters based on Capacitor Current Feedback Active Damping and Capacitor Voltage Decoupling **Panel C 5.1**
SERRA Amiron, RIBEIRO Luiz, MATOS José Gomes - Federal University of Maranhao - Brazil

575 - A modified Control Strategy of Neutral-Point Clamped Converter-Fed PMSM Drives with Engergy Storage Systems **Panel C 5.2**
XIE Jun - Technische Universität Ilmenau - Germany
LI Ying - University of Nottingham - United Kingdom
DENOVAES Yalesromulo - Santa Catarina State University - Brazil
SUBERSKI Martin, HENNEBERG Dustin, PETZOLDT Juergen - Technical University Ilmenau - Germany
WATSON Alan - University of Nottingham - United Kingdom

11:00 DS2f - Topic 03: Converter Design and Optimisation

Location: Dialogue Session - Ground Floor

Chair(s): NOVAK Mateja, Aalborg University, Denmark

14 - 30 kW Three-Phase T-Type Active Front End 3D Electro-thermal Design **Panel C 5.3**
POLAT Hakan, EGIN MARTIN Gamze, GEURY Thomas, EL BAGHDADI Mohamed, HEGAZY Omar - Vrije Universiteit Brussel - Belgium

21 - Power Losses Reduction of Parallel Connected Power Electronics Devices **Panel D 1.1**
HUSSAIN Essam, LIU BIN - CRRC Times Electric UK Innovation Center (TEIC) - United Kingdom

73 - Paralleling SMD Semiconductor Switching Cells in a Flying Capacitor Converter System **Panel D 1.2**
CHRISTEN Daniel - ABB E-Mobility - Switzerland
SCHWEIZER Mario, BISHNOI Hemant - ABB Corporate Research Center - Switzerland
STOJADINOVIC Milos - ABB E-Mobility - Switzerland
PETTERSSON Sami, CANALES Francisco - ABB Corporate Research Center - Switzerland

82 - Influence of the r_ds,on temperature dependency of SiC MOSFETs on the optimal switching cell mechanical layout **Panel D 1.3**
PAPADOPOULOS Georgios, BIELA Juergen - ETH Zurich - Switzerland

113 - Reduce Order Modeling of the modular multilevel DC/DC converter (M2DC) for HVDC grid **Panel D 1.4**
SHAFIQUE Ghazala, BOUKHENFOUF Johan, GRUSON Francois - L2EP- ENSAM - France
SAMIMI Shabab - ESME - France
DELARUE Philippe - L2EP - Univ. Lille - France
LE MOIGNE Philippe - L2EP - Centrale Lille - France
COLAS Frederic - L2EP- ENSAM - France
MERLIN Michael - University of Edinburgh - United Kingdom
GUILLAUD Xavier - L2EP - Centrale Lille - France

117 - Demonstration of a Medium-Voltage DC-Chopper Enabled by 10 kV SiC MOSFETs **Panel D 2.1**
YAN Zhixing, LIU Gao, DALAL Dipen, JACOBSEN Jonas, WANG Rui, BECH Michael - Aalborg University - Denmark
RANNESTAD Bjørn - KK Wind Solutions - Denmark
ZHAO Hongbo, MUNK-NIELSEN Stig - Aalborg University - Denmark

123 - Application and control strategy of a novel three-port converter for renewable hybrid energy storage system **Panel D 2.2**
LIU Jinxin, KANG Da - Northwestern Polytechnical University - China
REN Yingnan - Science and Technology On Low-Light-Level Night Vision Laboratory - China
YAO WENLI, ZHANG Xiaobin - Northwestern Polytechnical University - China

125 - Design and Optimization of an Integrated Modular Motor Drive for LowVoltage High Power Permanent Magnet Synchronous Motor **Panel D 2.3**
SICCARDI Alexandre, JOUBERT Charles, MARTIN Christian - Université de Lyon, INSA Lyon, AMPERE - France
MAKKI Ali - Keep Motion - France

212 - Comparative Analysis of Series Connected MOSFETs with Single Switch for ZVS Turn On Converter Topology **Panel D 2.4**
SINHA Pooja, YADAV Sachin, QIN Zian, BAUER Pavol - Delft University OF Technology - Netherlands

286 - Comparison of Increasing Efficiency in DAB Converters using EPS, DPS and TPS with Evolutionary Algorithms **Panel D 3.1**
AKBOY Erdem, ESTURK Akiner - Private Person - Turkey

302 - Self-Oscillating Drive Circuit Using Cascode-Connected Normally-on Device and Normally-off Device for Self-Powered Active Bridges **Panel D 3.2**
MIWA Yoshihiro, SHOJI Hiroyuki - Hitachi, Ltd - Japan
SAKANO Junichi - Hitachi Power Semiconductor Device, Ltd - Japan

308 - Comprehensive Multi-Stage Filter Design of an Active Three-Phase Two-Level Rectifier for Aircraft Application **Panel D 3.3**

WEISS Robin, RODE Sebastian, SCHWINGAL Normann, BERNET Steffen - Technische Universität Dresden - Germany

438 - Performance Assessment of the Adjustable Hybrid Switch Converter for E-mobility Applications **Panel D 3.4**

THEKEMURIYIL Tanya - University of Applied Sciences and Arts Northwestern Switzerland - Switzerland
RAHIMO Munaf T.A. - MTAL GmbH - Switzerland
MINAMISAWA Renato Amaral, MASTELLONE Silvia - University of Applied Sciences and Arts Northwestern Switzerland - Switzerland

477 - Power Loop Inductance Optimization Strategy for Eliminating Turn-off Switching Surge for GaN-HEMT Switching Device **Panel D 4.1**

UMETANI Kazuhiro, TANOHARA Kento, ABE Koki, ISHIHARA Masataka, HIRAKI Eiji - Okayama University - Japan

510 - Design Optimization of a Three-Level Neutral-Point-Clamped Traction Inverter for Electric Vehicles based on Switching-Cell Arrays **Panel D 4.2**

RAFIEZADEH Roya, BUSQUETS-MONGE Sergio - Universitat Politècnica de Catalunya - Spain
ALEPUZ Salvador - Tecnocampus, Universitat Pompeu Fabra - Spain
Garcia-Rojas Gabriel, Fañanás Puigjaner Germán - Universitat Politècnica de Catalunya - Spain

517 - An Intelligent Hybrid Fractional Order Controller for DC–DC Buck Converters Feeding Constant Power Loads **Panel D 4.3**

SOROURI Hoda - Aalborg University - Denmark
OSHNOEI Soroush - Shahid Beheshti University - Iran
OSHNOEI Arman, TEODORESCU Remus, BLAABJERG Frede - Aalborg University - Denmark

549 - Optimization of Temperature Sensor Placement in Multi-Chip Power Modules Using Frequency Domain Analysis **Panel D 4.4**

AZHAR Usama, AGHDAEI Alireza, DE DONCKER Rik W. - RWTH Aachen University - Germany

11:00 DS2g - Topic 08: Electric Drive Trains for Passenger and Light Duty Vehicles

Location: Dialogue Session - Fundamentet

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium

343 - Effect of Dynamic Gate Control Driver on SiC MOSFET Power Module Performance in WLTC **Panel E 1.1**

FRANK Michael J., BAKRAN Mark-M. - University of Bayreuth - Germany

11:00 DS2h - Topic 08: Electric Drive Trains for Heavy Duty Vehicles and Buses

Location: Dialogue Session - Fundamentet

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium
Location: Dialogue Session - Fundamentet

86 - Analysis on the Impact of Current Ripples in Fuel Cell Electric Heavy-Duty Trucks **Panel E 1.2**

GÜRLEK Yavuz - Daimler Truck AG - Germany
BASLER Thomas - Technische Universität Chemnitz, Germany - Germany
JOOS Oliver, ACKERL Martin, LANG Charlotte, DOLD Roland - Daimler Truck AG - Germany
NEUBURGER Martin - Esslingen University - Germany

11:00 DS2i - Topic 08: Electric Drive Trains for Rail Vehicles

Location: Dialogue Session - Fundamentet

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium

166 - Common-Mode Current Suppression Study for Railway Vehicle Traction System through Scale-down Experimental System **Panel E 1.3**

HASEGAWA Takahiro, KONDO Keiichiro - Waseda University - Japan
CHIDA Tadahiko, OKUDA Kazuma, SHINOMIYA Takeshi - Hitachi, Ltd - Japan

169 - Improving the Dynamic Performance of Light-Load Regenerative Brake Control for DC Electrified Railways with Load Power Estimation by the Disturbance Observer **Panel E 1.4**

WAKAYAMA Ikumi, KONDO Keiichiro - Waseda University - Japan

11:00 **DS2j - Topic 08: Electric Drive Trains for Aerospace Applications (Aircrafts, Drones)**

Location: Dialogue Session - Fundamentet

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium

19 - Experimental Verification of Short-Circuit Detection and Thyristor-Based Circuit Shut-Off in Permanent Magnet Synchronous Generators **Panel E 2.1**

ASAI Tomoki - Ritsumeikan University - Japan
KANEDA Yukio - Japan
SHIMIZU Yuki - Ritsumeikan University - Japan
SODA Takumi, UCHIKAWA Takuya, SUGAWARA Hiroki, KOBAYASHI Toshikazu - Japan
KAWABATA Yoshitaka - Ritsumeikan University - Japan

48 - Impedance Modelling and Simulation of Variable Frequency AC Three-Stage Generator for More-Electric Aircraft **Panel E 2.2**

XU Zixiao, ZHAO Hongwei, QI Yang - Northwestern Polytechnical University - China
VASQUEZ Juan C., GUERRERO Josep M. - Aalborg University - Denmark
LI Weilin - Northwestern Polytechnical University - China

268 - Inverter design for future electrified aircraft propulsion systems under consideration of wear-out failure and random failure **Panel E 2.3**

CAO Yongtao, FAUTH Leon, KEUTER Ralf Johannes - Leibniz Universität Hannover - Germany
SANGWONGWANICH Ariya, NOVAK Mateja, BLAABJERG Frede - Aalborg University - Denmark
PONICK Bernd, MERTENS Axel - Leibniz Universität Hannover - Germany

487 - Operation Management of More-Electric Aircraft Using Two-stage Stochastic Model Predictive Control **Panel E 2.4**

WANG Xin - University of Nottingham - United Kingdom
BAZMOHAMMADI Najmeh - Aalborg University - Denmark
ATKIN JASON, BOZHKO Serhiy - University of Nottingham - United Kingdom
VASQUEZ Juan C., GUERRERO Josep M. - Aalborg University - Denmark

11:00 **DS2k - Topic 08: Electric Drive Trains for Marine Applications (Offshore, Subsea and Ships)**

Location: Dialogue Session - Fundamentet

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium

135 - Hydro-Noise Measurements for Pressurizable Underwater Power Converters **Panel E 3.1**

SCHUBERT Martin, FUHRMANN Jan, ECKEL Hans-Günter - University of Rostock - Germany

11:00 DS2l - Topic 08: On-Board Power Converters, WBG Technology as well as On-Board DC-Voltage Networks

Location: Dialogue Session - Fundamentet

Chair(s): EL BAGHDADI Mohamed, Vrije Universiteit Brussel, Belgium

26 - High efficiency low voltage isolated DC-DC converter based on GaN devices for aircraft application **Panel E 3.2**

CARCOUET Sebastien, ECRABEY Jacques - CEA - Commissariat à l'Energie Atomique (Grenoble) - France

44 - The Influence of Asymmetric Printed-Circuit-Board Layout on the Reliability of Power Electronic Circuits **Panel E 3.3**

MÜLLER Max Valentin, SCHIRMER Pascal, SCHREIVOGEL Peter - BMW Group - Germany
HELDWEIN Marcelo Lobo - Technische Universität München - Germany

121 - High Bandwith PWM-based Amplifier for Non-Linear Hybrid Filter in Electric Vehicle DC Grids **Panel E 3.4**

RAAB Sebastian, HOFMANN Martin, ACKVA Ansgar, KASTEN Henning - Technical University OF Applied Sciences Würzburg-Schweinfurt - Germany

516 - Analysis of Fault-Tolerant and Fully Redundant HV/LV DC-DC Converters for Battery Electric Vehicles **Panel E 4.1**

MARANGATTU PRINCE Aswathy, AYAD Ayman - Vitesco Technologies GmbH - Germany

562 - Model Predictive Control of a Double Input Bidirectional Boost DC-DC Converter **Panel E 4.2**

BENEVIERI Alessandro, FORMENTINI Andrea, MARCHESONI Mario, PASSALACQUA Massimiliano, VACCARO Luis - University of Genova - Italy

11:00 DS2m - Topic 08: Vehicle Battery Chargers: On-Board (Wired and Inductive) and Stationary (Ultra) Fast Chargers

Location: Dialogue Session - Fundamentet

Chair(s): SCELBA Giacomo, University of Catania, Italy

216 - Critical Short Circuit Ratio of an EV Charging System **Panel E 4.3**

WANG Lu, QIN Zian, XIAO Junjie, BAUER Pavol - Delft University of Technology - Netherlands

231 - Exploring the Potential of EV Motor Winding in LCL Filter Design for On-Board Chargers **Panel E 4.4**
FAIZ Muhammad Talib, LIU Junwei, LEUNG Ka Hei - The Hong Kong Polytechnic University (POLYU) - China
KHAN Muhammad Mansoor - Shanghai Jiaotong Univeristy - China
LOO Ka Hong - The Hong Kong Polytechnic University (POLYU) - China

279 - Applying a Fast Analytic Calculation Method in CM Domain for Touch Currentsto a Two-Stage Charging Infrastructure **Panel E 5.1**
STUTZ Christian, NIELEBOCK Sebastian - Siemens AG - Germany
MÄRZ Martin - Friedrich-Alexander-University Erlangen-Nuremberg - Germany

444 - Real-Time Capable Oversampling Model of a Fast-Switching Dual Active Bridge Converter with High PWM Resolution **Panel E 5.2**
KIFFE Axel, HOFFSTADT Thorben - DSPACE GmbH - Germany

11:00 DS2n - Topic 08: Smart Charging and Vehicle to Grid Interaction

Location: Dialogue Session - Fundamentet

Chair(s): SCELBA Giacomo, University of Catania, Italy

66 - Optimized Multi-Stage Constant Current Charging Strategy for Li-ion Batteries **Panel E 5.3**
TAHIR Muhammad Usman, SANGWONGWANICH Ariya, STROE Daniel-Ioan, BLAABJERG Frede - Aalborg University - Denmark

72 - Review of Charging and Discharging Strategies for EVs Based on DR **Panel E 5.4**
YAO Zhilei - Shanghai Maritime University - China
GAN Jiwei - Yancheng Institute of Technology - China

11:00 DS2o - Topic 08: Batteries: Management Systems (BMS), Monitoring and Life-Time Prediction

Location: Dialogue Session - Fundamentet

Chair(s): SCELBA Giacomo, University of Catania, Italy

127 - Lithium-ion Battery SOH Estimation with Varying Amount of Battery Operation Data **Panel E 6.1**
LI Xingjun, YU Dan, VILSEN SØREN Byg, STROE DANIEL-Ioan - Aalborg University - Denmark

251 - Experimental Study on DC Pulse Discharge Preheating of Lithium Ion Batteries at low temperature over a wide frequency range **Panel E 6.2**
LUO Chengwei - Wuhan University of Technology - China

552 - Analysis of potential lifetime extension through dynamic battery reconfiguration **Panel E 6.3**
SKEGRO Albert, ZOU Changfu, WIK Torsten - Chalmers University of Technology - Sweden

563 - Features extraction for battery SOH estimation from battery pulsed charging operation **Panel E 6.4**
JIN Siyu, YU Xinming, SUI Xin, GUO Wendi - Aalborg University - Denmark
Berecibar Maitane - Vrije Universiteit Brussel - Belgium
Stroe Daniel-Ioan - Aalborg University - Denmark

11:00 DS2p - Topic 09: Wireless Power Transfer Systems

Location: Dialogue Session - Fundamentet

Chair(s): VAN DEN BOSSCHE Alex, Ghent University, Belgium

15 - An Improved Peak Voltage Calculation Method for Compensation Components in S-S and LCC-S Compensated Wireless Power Transfer Systems **Panel F 1.1**
YU Guangyao, YE Pengcheng, GRAZIAN Francesca, DONG Jianning - Delft University of Technology - Netherlands
SOEIRO Thiago Batista - Twente University of Technology - Netherlands
BAUER Pavol - Delft University of Technology - Netherlands

36 - A Multi-MHz WPT System with 1 Transmitter and 6 Receivers in three levels **Panel F 1.2**
LLOP Alejandro, GONDRA Jesús María, CEBALLOS Salvador - Tecnalia - Spain

103 - Comparison of SS and SP Circuit Topologies for Wireless Power Transfer Systems Capable of Bi-directional Power Transmission **Panel F 1.3**
SUGIHARA Hiroki, OTA Morito, SIMIZU Yuki, KAWABATA Yoshitaka - Japan - Japan

207 - Effect of the Forward and Reverse Conduction Resistance of SiC MOSFET on the Harmonic Voltage of the Full-Bridge Inverters of Wireless Power Systems for Electric Vehicles and Its Suppression Method **Panel F 1.4**
YANAGI Tatsuya, NAKAHARA Ken - Rohm Co., Ltd. - Japan
SHIMIZU Osamu, FUJIMOTO Hiroshi - The University of Tokyo - Japan

208 - The Voltage Control and the Detuned Design for Handshaking of an Inductive Power Transfer System with Adjacent Units **Panel F 2.1**
CHEN Shuxin, LI Yaohua, ZENG Junming, TANG Yi - Nanyang Technological University - Singapore

209 - Design and Experimental Verification of SP-Type Resonant Wireless Power Transfer System Capable for Bidirectional Power Transmission **Panel F 2.2**
SUGIYAMA Kohei - Ritsumeikan University - Japan
OTA Morito - JapanSHIMIZU Yuki, KAWABATA Yoshitaka - Ritsumeikan University - Japan

274 - Comparative Analysis of Coil Parameters for the Optimization of Coupling Factor **Panel F 2.3**
GOMEZ Tania - Universidad Nacional de Colombia - Colombia
PERVAIZ Hassan - KU Leuven - Belgium
CORTES Camilo - Universidad Nacional de Colombia - Colombia
MARTINEZ Wilmar - KU Leuven - Belgium

11:00 DS2q - Topic 09: Applications for Electrolyzers and Fuel Cells
Location: Dialogue Session - Fundamentet
Chair(s): VAN DEN BOSSCHE Alex, Ghent University, Belgium

120 - Analytical Comparison of Bi-directional Dual Active Bridge and CLLLC-Converter for Coupling of HV-Battery to LV-Electrolyzer/Fuel Cel **Panel F 2.4**
ZAHM Joshua - Technische Universität Ilmenau - Germany
SCHERF Marko, SCHILLING Marco - ISLE GmbH - Germany
REIMANN Tobias - Technische Universität Ilmenau - Germany

11:00 DS2r - Topic 09: Low Voltage DC Power Supplies
Location: Dialogue Session - Fundamentet
Chair(s): VAN DEN BOSSCHE Alex, Ghent University, Belgium

365 - A Comprehensive Review on Partial Power Processing-based Voltage Regulator Modules for 48-V Bus-based Data Centers **Panel F 3.1**
ZHU Yinxiao, YANG Yongheng - Zhejiang University – China
BLAABJERG Frede - Aalborg University - Denmark

534 - High Step-Down DC-DC Converter And Results For 48-to-5 V And 400-to-48 V Implementation **Panel F 3.2**
STALA Robert, FOLMER Szymon - AGH University of Krakow - Poland

Mini Workshop at EPE'23 ECCE Europe
Medium-voltage power electronics: a solution to electrify the world

Organizer: Prof. Stig Munk Nielsen, Aalborg University

Date & Time: Wednesday, 6 September: 09:30 am – 12.00 am

Location: Room 1.07 Fjorden

Participation: This mini-workshop is open to ALL EPE'23 ECCE Europe-delegates who are interested in MV power electronics

Program:

09:35 – 09:55	**Opening speech and MV power electronic activities at AAU Energy** Prof. Stig Munk-Nielsen, AAU Energy, Aalborg University
09:55 – 10:25	**MV power electronic activities at CPES** Prof. Rolando Burgos, CPES, Virginia Tech
10:25 – 10:55	**MHz pulse-transformer based gate driver for MV SiC device** Prof. Hui 'Helen' Li, CAPS, Florida State University
10:55 – 11:25	**Soft-switching converters at MV-level** Prof. Teng Long, Cambridge University
11:25 – 11:55	**High Power Medium Voltage Research at EPFL** Prof. Drazen Dujic, EPFL
11:55 – 12:00	**Wrap-up** Prof. Stig Munk-Nielsen

14:10 LS4a - Topic 11: Focus Topic 4 - Electric Vehicles

Location: Plenary Room

Chair(s): ALAKULA Mats., Lund University, Sweden
HOENE Eckart, Frunhofer Institute for Reliabilty and Microintegration, Germany

14:10 144 - Adaptive Control of a Synchronous Reluctance Traction Drive for Electric Vehicles

DJAGAROV Nikolay, MILUSHEV Hristo, DJAGAROVA Julia, TSVETANOV Dimitar - Nikola Vaptsarov Naval Academy - Bulgaria
BLAABJERG Frede - Aalborg University - Denmark

14:30 542 - Ultra-Wide Voltage Gain Hybrid Modulated CLLC Converter for Electric Vehicle

MAHAJAN Akshay - Fraunhofer Institute for Solar Energy Systems ISE - Germany
SIWAKOTI Yam - University of Technology Sydney - Australia
WITTWER Christof - Fraunhofer Institute for Solar Energy Systems ISE - Germany

14:50 480 - Driving Cycle Power Loss Analysis of SiC-MOSFET and Si-IGBT Traction Inverters for Electric Vehicles

SCHLUETER Michael, GENTEJOHANN Marius, DIECKERHOFF Sibylle - Technical University of Berlin - Germany

14:10 LS4b - Topic 1: Reliability & Life-Time

Location: 1.03 Flyveren

Chair(s): WANG Huai, Aalborg University, Denmark
ECKEL Hans-Günter, University of Rostock, Germany

14:10 173 - Investigation of acceleration factors of the HV-H3TRB test on 3.3kV SiC SBDs

HATORI Kenji, EBIHARA Kohei, ISHIMOTO Kazufumi, TSUDA Ryo - Mitsubishi Electric Corporation - Japan
SOLTAU Nils, IDAKA Shiori, WIESNER Eugen - Mitsubishi Electric Europe B.V. - Germany
SCHÖNEWOLF Stefan - Siemens Mobility GmbH - Germany
HANF Michael - University of Bremen, IALB - Germany
SCHUSTER Oskar - Siemens Mobility GmbH - Germany

14:30 300 - Field-Data based Lab Testing of a Wind-Energy Power Converter System: Insights into Cabinet and IGBT-Module Microclimates

ZORN Christian - Fraunhofer Institute for Wind Energy Systems - Germany
PETERS Jan-Hendrik, HANF Michael, ADLER Johannes, HOLZKE Wilfried - University of Bremen, IALB - Germany

PELKA Karoline, BROER Christian - Fraunhofer Institute for Wind Energy Systems - Germany
FRÖHLING Sören, KOSTKA Benedikt, WENZEL Johannes, MERTENS Axel, DEHNING Kirsten, ZIMMERMANN Stefan - Leibniz Universität Hannover - Germany
FISCHER Katharina - Fraunhofer Institute for Wind Energy Systems - Germany
KAMINSKI Nando - University of Bremen, IALB - Germany

14:50 306 - Load Profile Based Reliability Assessment of IGBT Module in Full-bridge DC/DC Converter for Fast Charging of EVs
KARDAN Faezeh, AHMADI Miad, SHEKHAR Aditya, BAUER Pavol - Delft University of Technology - Netherlands

14:10 LS4c - Topic 2: Wide-Band Gap Power Electronics

Location: 1.02 Havnen

Chair(s): DWORAKOWSKI Piotr, Supergrid Institute, France
CACCIATO Mario, University of Catania, Italy

14:10 249 - 48 V Current Source Inverter with Bidirectional GaN eHEMT Switches for Low Inductance Machine Drives
ZACHER Benjamin, BAUER Andreas, FRANCK Kai, SCHUMANN Christian - Kaiserslautern University of Applied Sciences - Germany

14:30 419 - Dead Time Constraints in Gallium Nitride Devices for Inverter Applications
BARBA Vincenzo, MUSUMECI Salvatore, STELLA Fausto - Politecnico di Torino - Italy
PALMA Marco - Efficient Power Conversion - Italy

14:50 590 - An Active Snubber based Soft-Switching Totem-Pole Boost PFC
PAPPIS Douglas, WESSEL Sven, KRACHT Kai-Manuel, WICHMANN Denis, HEES Norbert - Kostal Automobil Elektrik GmbH & Co KG - Germany

14:10 LS4d - Topic 8: Battery managements systems and vehicle traction

Location: 1.08 Tunnelen

Chair(s): HEGAZY Omar, Vrije Universiteit Brussel, Belgium
BOECKER Joachim, Paderborn University, Germany

14:10 325 - Solid electrolyte interface layer growth - crack formation coupled model for Lithium-ion battery capacity fade prediction
GUO Wendi, LI Yaqi, SUN Zhongchao, VILSEN Søren Byg, STROE Daniel Ioan - Aalborg University - Denmark

14:30 **498 - Sensorless State of Temperature Estimation for Smart Battery based on Electrochemical Impedance**
ZHENG Yusheng, WEINREICH Nicolai André, KULKARNI Abhijit, CHE Yunhong, SOROURI Hoda, SUI Xin, TEODORESCU Remus - Aalborg University - Denmark

14:50 **189 - Power Electronic Solutions to Compensate the Power Pulsation in Single-Phase Grid Connected High-Power Medium Voltage Converters**
SCHÖNEWOLF Stefan - Siemens Mobility GmbH - Germany
BAKRAN Mark-Matthias - University of Bayreuth - Germany

14:10 LS4e - Topic 3: Converter Design and Optimisation (I)

Location: 1.09 Vaerket

Chair(s): SIEMASZKO Daniel, Hitachi Energy, Switzerland
KARLSSON Per, CG Drives & Automation, Sweden

14:10 **571 - Design Consideration and Demonstration of Dual-Active Bridge Converter Using 13-kV SiC-MOSFETs Packaged in TO-268**
CHO Yonghyun, HUANG Cheng, MANNEN Tomoyuki, ISOBE Takanori - University of Tsukuba - Japan

14:30 **37 - Hybrid Modulation for Balancing Thermal Dissipation in Dual Active Bridge Converters**
BOCHEN Liu - Hitachi Energy - Switzerland
DAVARI Pooya, BLAABJERG Frede - Aalborg University - Denmark

14:50 **196 - Efficiency Enhancement of a Dual Active Bridge Converter by Utilizing Complete Zero Voltage Switching**
MAHDAVIFARD Morteza, KHAJEHODDIN Ali - University of Alberta - Canada

14:10 Special Session: Recycling (Part I)

Location: 1.01 Banen

Chair(s): BLAABJERG Frede, Aalborg University, Denmark
MI Chris, San Diego State University, United States of America

Informal talks, supported by panel sessions
Organizers: Prof. Frede Blaabjerg – Aalborg University
Prof. Chris Mi – San Diego State University
Prof. Ariya Sangwongwanich – Aalborg University

15:40 LS5a - Topic 7: DC/AC Distribution & Microgrids Storage

Location: Plenary Room

Chair(s): SAHOO Subham, Aalborg University, Denmark
VAN DEN BOSSCHE Alex, Ghent University, Belgium

15:40 395 - Modeling and Validation of Grid-to-Vehicle (G2V) and Vehicle-to-Grid (V2G) Operation with Combo CCS Type 2 Connector for Medium Duty Electric Vehicle Applications

JAMAN Shahid - Vrije Universiteit Brussel - Belgium
GARCIA OSCAR Hernandez, ABDEL-MONEM Mohamed - Powerdale - Belgium
GEURY Thomas, HEGAZY Omar - Vrije Universiteit Brussel - Belgium

16:00 470 - Adaptive Droop Based Bidirectional V2G Charging Station for Grid Frequency Regulation and Improved Power Quality

MADNANI Rohan, BASU Rajarshi, MISHRA Mahesh Kumar - Indian Institute of Technology Madras - India

16:20 461 - Dynamic Converter Control Role Configuration in Grid of Grids

ARÉVALO-SOLER Josep - CITCEA-UPC - Spain
NAHALPARVARI Mehrdad - KTH Royal Institute of Technology - Sweden
PRIETO-ARAUJO Eduardo - CITCEA-UPC - Spain
NORRGA Staffan - KTH Royal Institute of Technology - Sweden
GOMIS-BELLMUNT Oriol - CITCEA-UPC - Spain

15:40 LS5b - Topic 9: Power Supplies and Industry-Specific Applications

Location: 1.03 Flyveren

Chair(s): MARTINEZ Wilmar, KU Leuven, Belgium
KYYRÄ Jorma, Aalto University, Finland

15:40 331 - Coupling Capacitance Characteristics and Design Optimization Method of CT-Type Isolated Power Supply for High-voltage SiC Devices

TANG Haibo, FU Xiaojie, HAO Yihui, DU Yihao, GUO Yujia, PAN Jianyu - Chongqing University - China

16:00 411 - Non-Coherent Power Combining for Self-Tuning Omnidirectional Wireless Power Transfer

LIU Yining, HA-VAN Nam - Aalto University - Finland
JAYATHURATHNAGE Prasad - Danfoss - Finland
KYYRÄ Jorma, TRETYAKOV Sergei - Aalto University - Finland

16:20 291 - High-power converter systems for hydrogen production
GESKE Martin, HILDEBRANDT Sebastian, JALILI Kamran, KELLER Christian - GE Energy Power Conversion GmbH - Germany

15:40 LS5c - Topic 2: Resonant Converters ***Location: 1.02 Havnen***
Chair(s): NEE Hans-Peter, KTH Royal Institute of Technology, Sweden
DWORAKOWSKI Piotr, Supergrid Institute, France

15:40 47 - DC link balancing of an Auxiliary Resonant Commutated Pole Inverter
ZOCHER Markus, GRASS Norbert, KENNEL Ralph - Technische Universität München - Germany

16:00 222 - Novel Control Strategy for a BidirectionalLCLC Converter with Resonant BoostCharging for Wide Varying Input Flow Battery
CHITPADI Nagesha, N Lakshminarasamma - Indian Institute of Technology Madras - India

16:20 501 - A Phase Detection Method using Power Handling Capability in Resonant Converters
AHMAD Faheem, BECZKOWSKI Szymon, JØRGENSEN Asger Bjørn, MUNK-NIELSEN Stig - Aalborg University - Denmark

15:40 LS5d - Topic 8: Vehicle Battery Chargers & Powertrain
Location: 1.08 Tunnelen
Chair(s): BOECKER Joachim, Paderborn University, Germany
ABDELHAKIM Ahmed, EPIROC, Sweden

15:40 312 - An EV Drivetrain Integrated Auxiliary Battery Charger using a Dual Wound Three Phase Synchronous Machine
SINGH Sukhjit, PERERA Chatumal - University of Toronto - Canada
VIANA Caniggia - Eleappower - Canada
LEHN Peter - University of Toronto - Canada

16:00 165 - Switching Loss Reduction for an Active Buffer DAB AC-DC Converter
MALANDA Sindisiwe, ARAI Kain, KOMEDA Shohei, KIFUNE Hiroyasu - Tokyo University of Marine Science and Technology - Japan
TAKUMA Shunsuke, OHNUMA Yoshiya - Nagaoka Power Electronics Co. Ltd. - Japan

16:20 567 - Analytical and Experimental Efficiency Evaluation of a Voltage Balancer Based Three-Phase Unfolding EV Powertrain
KHAN Mohammad Saleh, NAG Soumya Shubhra, DAS Anandarup - Indian Institute of Technology Delhi - India

15:40 LS5e - Topic 3: Converter Design and Optimisation (II)

Location: 1.09 Vaerket

Chair(s): SIEMASZKO Daniel, Hitachi Energy, Switzerland
KARLSSON Per, CG Drives & Automation, Sweden

15:40 79 - Storage-less PV Grid Forming Inverter with Inertial reserve for the low inertia applications

MILETIC Zoran - AIT Austrian Institute of Technology GmbH - Austria
TARRASO Andres - Universitat Politècnica de Catalunya - Spain
TREMMEL Werner, BANJAC Anja, STOECKL Johannes - AIT Austrian Institute of Technology GmbH - Austria

16:00 206 - Frequency optimisation for DC/DC converters in DC-connected offshore wind turbines

TIMMERS Victor, EGEA-ALVAREZ Agusti - University of Strathclyde - United Kingdom
GKOUNTARAS Aris - Siemens Gamesa - Germany

16:20 202 - Benefits of saturated powder core inductors in LCL filters of three-phase voltage source inverters

KAUFMANN-BÜHLER Marius, ÖZELOGLU Hayrettin, EICHSTÄDT Eric, DIECKERHOFF Sibylle - Technical University of Berlin - Germany

15:40 PECTA-Session 2: Efficiency and ecological impacts of WBG appliances

Location: 1.04 Fakultetet

Chair(s): BENNICH Peter, Swedish Energy Agency, Sweden
BRÜNIGER Roland, Swiss Federal Office of Energy, Switzerland

15:45 592 - Looking beyond energy efficiency - Environmental aspects and impacts of WBG devices and applications over their life cycle

GLASER Sebastian, FEUCHTER Philipp - Technische Universität Wien - Austria
DIAZ A. - Ecodesign - Austria

16:20 593 - Measurement of WBG-based power supplies

ZHU Hongkeng,
JAFARI Armin - Ecole Polytechnique Federale de Lausanne - Switzerland
MACHTINGER Katharina, MAKOSCHITZ Markus - AIT Austrian Institute of Technology GmbH - Austria
MATIOLI Elison - Ecole Polytechnique Federale de Lausanne - Switzerland

16:50 595 - Identifying the potential of SiC technology for PV inverters
ESKILSON Troy - AIT Austrian Institute of Technology GmbH - Austria
JEHLE Andreas, SCHMIDT Peter - ZHAW School of Engineering - Switzerland
MAKOSCHITZ Markus - AIT Austrian Institute of Technology GmbH - Austria
BAUMGARTNER Franz - ZHAW School of Engineering - Switzerland

17:10 596 - Energy saving potential of WBG-commercial power converters in different applications
SPEJO Lucas B., NONIS Erik, SCHULZ Nicola, MINAMISAWA Renato - Fachhochschule Nordwestschweiz - Switzerland

15:40 Special Session: Recycling (Part II) ***Location: 1.01 Banen***
Chair(s): BLAABJERG Frede, Aalborg University, Denmark
MI Chris, San Diego State University, United States of America

Informal talks, supported by panel sessions
Organizers: Prof. Frede Blaabjerg – Aalborg University
Prof. Chris Mi – San Diego State University
Prof. Ariya Sangwongwanich – Aalborg University

17:00 Industrial Forum 3: Focus Topic 3 - Energy Storage Technologies
Location: 1.01 Banen
Chair(s): STROE Daniel-Ioan, Aalborg University, Denmark
KOWAL Julia, Technical University of Berlin, Germany

Confirmed Panellists:
- Søren Dahl (Topsoe)
- Søren Juhl (Advent Energy)
- Jasmin Arifagic (Beyonder)
- Jonas Kehr (Hitachi Energy)

17:00 Industrial Forum 4: Focus Topic 4 - Electric Vehicles ***Location: 1.02 Havnen***
Chair(s): ALAKULA Mats, Lund University, Sweden
HOENE Eckart, Frunhofer Institute for Reliabilty and Microintegration, Germany

Confirmed Panellists:
- Nils-Gunnar Vågstedt (Scania)
- Karl Klang (Volvo Cars)
- Erik Hoevenaars (Volvo Trucks)
- Christian Kluthe (Bosch)

PECTA's conference contribution at EPE'23 ECCE Europe

PECTA Session 2 (Wednesday, 6.9.2023): 15:40 – 17:40
Location: **Room 1.04 Fakultetet**
Chair: Peter Bennich
Topic: Efficiency and ecological impacts of WBG appliances

15:40
Welcome & Get-Together
Peter Bennich, Session-Chair

15:45
Looking beyond energy efficiency – Environmental aspects and impacts of WBG devices and applications over their life cycle (35")
Sebastian Glaser, Vienna University of Technology – Research Group Ecodesign
Philipp Feuchter, Vienna University of Technology – Research Group Ecodesign
Adriana Diaz, ECODESIGN company engineering & management consultancy GmbH

16:20
Measurements of WBG-based power supplies (30")
Hongkeng Zhu, Ecole Polytechnique Fédérale de Lausanne
Markus Makoschitz, AIT Austrian Institute of Technology GmbH
Elison Matioli, Ecole Polytechnique Fédérale de Lausanne
Katharina Machtinger, AIT Austrian Institute of Technology GmbH

16:50
Identifying the potential of SiC technology for PV inverters (20")
Troy Eskilson, AIT Austrian Institute of Technology GmbH
Andreas Jehle, ZHAW School of Engineering
Peter Schmidt, ZHAW School of Engineering
Markus Makoschitz, AIT Austrian Institute of Technology GmbH
franz Baumgartner, ZHAW School of Engineering

17:10
Energy saving potential of WBG-commercial power converters in different applications (30")
Renato Minamisawa, Fachhochschule Nordwestschweiz
Nicola Schulz, Fachhochschule Nordwestschweiz
Lucas Spejo, Fachhochschule Nordwestschweiz
Erik Nonis, Fachhochschule Nordwestschweiz

17:40
End of Day 2

Recycling and reuse of electric vehicle batteries and power electronics

Organizers: Prof. Frede Blaabjerg – Aalborg University
Prof. Chris Mi – San Diego State University
Prof. Ariya Sangwongwanich – Aalborg University

Date & Time: Wednesday 6 September: Two parts: 14:10 – 15:10 & 15:40 – 16:40

Location: Room 1.01 Banen

Session Format: Informal talks supported by panel sessions

The number of electric vehicles (EVs) on the roads is growing rapidly. EV batteries today, almost exclusively lithium-ion based, can last about 10 years before they can no longer provide the required performance such as power and range. The batteries and power electronics in EVs cost heavily in both production and recycling. Handling the retired EV batteries and power electronics components is thus important both for economic and environment (e-waste).

Second-life EV components and batteries include not only the batteries that are discarded from EVs due to degraded conditions, but also in-warranty replacements, road accidents, test vehicles, and unsold components. These components, though no longer roadworthy in the vehicle, still have considerable lifetime for renewable energy and smart grid applications where the requirement for energy and power density is not as stringent in vehicles, e.g., to buffer the volatile nature of the energy output of renewable energy systems. The second-life use extends the life cycle of these components after their first life in EVs, improves the environment, reduces EV ownership cost by selling them for second-life use, and reduces the cost of BESS in renewable energy systems. The same considerations are also applied for power electronics from the retired EVs, where the potential to minimize the virgin material exploitation and reduce cost through the reuse and remanufacturing process exists.

However, there are a number of barriers to overcome in the deployment of second-life EV components, including how to properly remove them from vehicles, transport, store, test, and select second-life them for storage applications; how to quickly and accurately identify the components' health conditions of power electronic and battery before and after deployment in the new application, e.g., grid storage; how to dynamically manage them so as to minimize degradation and optimize usage; and how to meet various standards related to fire hazardous mitigation/prevention, certification, permit, and safety. These issues can be addressed through different phase of product life cycle, e.g., design, manufacturing, operation, and recycling (i.e., end-of-life). This special session will take a

thorough look at the reuse and recycle of electric vehicle components, including batteries and power electronics.

Session Outline:

Part I: Second-life battery (60 min):
- (15 mins) Talk 1 – Benefits, Safety, and Regulatory Issues, and Feasibility of Using Second-life EV Battery for Storage Applications, Prof. Chris Mi
- (15 mins) Talk 2 – Plasma based Direct Recycling of Lithium Ion Batteries, Dr. Chao Yan
- (15 mins) Talk 3 – Prof. Matt Lee
- (15 mins) Panel – Second-Life EV Battery for Renewable Energy and Smart Grid Applications, Challenges in battery reuse and recycling; environment impact of second use and approaches for recycling.

Part II: Sustainability of power electronics (60 min):
- (15 mins) Talk 1 – Tittle: TBD – will start from top level LCA and circular economy related to power electronics, Speaker: Brian Vejrum Wæhrens
- (15 mins) Talk 2 – Tittle: TBD, Speaker: Prof. Johann Kolar
- (15 mins) Talk 3 –Tittle: TBD, Speaker: Speaker from FORCE Technology
- (15 mins) Panel – Tittle: Challenges: Making power electronics sustainable while keeping high performance: What needs to be done?

Session speakers / Panellists:
- **Prof. Chris Mi** – San Diego State University (Confirmed)
- **Dr. Chao Yan**, Princeton NuEnergy, USA (Confirmed)
- **Dr. Matt Lee**, Michigan State University (Confirmed)
- **Prof. Brian Vejrum Wæhrens**, Aalborg University (Confirmed)
- **Prof. Johann Kolar**, ETH Zurich (Confirmed)
- Speaker from FORCE Technology

Industrial Forum 3: “Energy-storage technologies”

Energy storage technologies (for example lithium-ion batteries, hydrogen, supercapacitors etc…) are key enablers of the transition to a greener society. Improvements in their performance behavior and their energy and power management when integrated into various applications (for example electric vehicles, grid storage, satellites, and so on…) are further required to meet the ever-increasing requirements of the users.

Moderators: Daniel-Ioan STROE, Aalborg University, Denmark
Julia KOWAL, Technical University Berlin, Germany

Panelists:
- Søren Dahl (Topsoe)
- Søren Juhl (Advent Energy)
- Jasmin Arifagic (Beyonder)
- Jonas Kehr (Hitachi Energy)

When?: Wednesday, 6 September 2023 (17:00 – 18:10)

Where?: AKKC, Room 1.01 Banen

Industrial Forum 4: "Electric Vehicles"

Transport is one of the main pillars of modern societies and economies. It allows connecting people, cultures, cities, countries and continents. It enables producers to sell their products across the world and travellers to discover new places. Transport networks also ensure access to key public services, such as education and health, contributing to a better quality of life.

However, our current transport model is not sustainable in the long run. Transport is responsible for about a quarter of the EU’s total greenhouse gas (GHG) emissions, therefore, the decarbonization of the transport sector has an enormous potential to substantially improve climate, environment, and ultimately human health.

The proposed focus topic aims to bring together experts from academia and industry to highlight both the potential benefits and also the challenges related with transport electrification, now that the share of electrfied vehicles is expected to increase rapidly.

Moderators: Mats ALAKÜLA, Lund University & Swedish Electromobility research centre, Sweden
Fran MARQUEZ, Lund University & Swedish Electromobility research centre, Sweden
Eckart HOENE, Fraunhofer IZM, Germany

Panelists:

- Nils-Gunnar Vågstedt (Scania)
- Robert Eriksson (Volvo Cars)
- Erik Hoevenaars (Volvo Trucks)
- Christian Kluthe (Bosch)
- …

When?: Wednesday, 6 September 2023 (17:00 – 18:10)

Where?: AKKC, Room 1.02 Havnen

Planning Vendor Sessions Wednesday 6 September
Vendor session area in vendor session area in Fundamentet

11.10-11.25 **Hioki Europe**

Accurate reactor evaluation in power electronics made easy
Roy Hali, Head of Product Management

High-frequency reactors, in combination with power electronic switching elements such as IGBT, SiC and GaN FETs, are used in a variety of solutions in electric vehicles (EVs) and hybrid electric vehicles (HEVs). Examples include step-up DC/DC converters, AC/DC converters, on-board chargers, etc. In the past, elements such as IGBTs were used as switching elements, and switching frequencies were on the order of tens of kilohertz.

In recent years, in the quest of reducing the size of above-mentioned converters and improving the power density of drivetrain, SiC and GaN switching elements are being used more often. As the switching frequencies of SiC and GaN elements are greater than 100 kHz, it is necessary to validate the performance and measure losses of switching elements as well as the reactors. By directly measuring reactor loss, as well as iron loss and copper loss ratios within reactor loss, you can significantly reduce research and development time and identify areas of improvement for reaching even higher efficiency and smaller form factors. In this presentation, Hioki will present a reliable and accurate solution for rector evaluation.

11.30-11.45 **ModelingTech**

Grid-tied Inverter HIL Testing Solutions to Meet Grid Code of China
Xu Lie, Vice President

11.50-12.05 **MathWorks**

12.10-12.25 **Plexim GmbH**

Code generation for multicore microcontrollers with PLECS
Lino Capponi

12.30-12.45 **Hitachi Energy**

12.50-13.05 **Omicron Lab**

Why a VNA is mandatory for every electronics engineering lab
Florian Hämmerle

In this session we will explain the power of a low-frequency vector network analyzer and why it is a must-have to use one in your engineering lab.

A low-frequency VNA can serve as a frequency response analyzer for transfer function measurements and dynamic system analysis.
It can be used as a powerful impedance analyzer or measure s-parameters of filters and amplifiers.
Use the power of the frequency domain to place poles and zeros in the control loop to stabilize your systems quickly.
Avoid EMI surprises by analyzing your component resonances and filter structures before the compliance measurements.
Simply improve the design process by using a more systematic approach, validated by frequency domain measurements.

13.10-13.25 **EGSTON Power Electronics**

13.30-13.45 **OPAL-RT Technologies**

13.50-14.05 **Volkswagen**

Electrification Strategy of Volkswagen Group with Focus on Power-Inverters

Volkswagen's transition from an automotive manufacturer to a mobility group leads to big changes and hence a reset of our priorities – one corner stone: the consequent electrification of our powertrains. This shift in focus and competences makes working in the technical development so much more exciting and rewarding. Let us show you, what our goals are, which products we develop and how we contribute to a mobility for generations to come

NOTE

Driving decarbonization and digitalization. Together.

Semiconductors are crucial to solve the energy challenges of our time and shape the digital transformation. This is why Infineon is committed to actively driving decarbonization and digitalization.

As a global semiconductor leader in power systems and IoT, we enable game-changing solutions for green and efficient energy, clean and safe mobility, as well as smart and secure IoT.

We make life easier, safer, and greener. Together with our customers and partners. For a better tomorrow.

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08:30 Keynote 5 - Advanced SiC Power Modules for E-Mobility

Location: Plenary Room

CARASTRO Fabio - Semikron Danfoss – Germany

Chair(s): HERMANNS Kevin, PE-Systems GmbH, Germany
SUBHAM Sahoo, Aalborg University, Denmark

Next generation SiC-MOSFET power modules for electric vehicle applications are targeting increased
power density and efficiency to reduce the overall drivetrain and charger cost. High currents, fast switching transients as well as high power density packages demand: best use of semiconductor area by advanced bonding, cooling technologies and layout optimization. This presentation will give an overview of state-of-the-art of Semikron Danfoss power modules packaging, latest development in current sensing integration and some examples of high power density converter design with focus on SiC-MOSFET for E-Mobility applications.

09:00 Keynote 6 - Net-Zero-CO2 by 2050 is NOT Enough

Location: Plenary Room

KOLAR Johann - ETH Zurich – Switzerland

Chair(s): WHEELER Pat, University of Nottingham, United Kingdom
WANG Huai, Aalborg University, Denmark

The transformation of the fossil-fuel-based energy system into a new Net-Zero-CO_2 all-electric system will rely on a massive extension of the electric grid infrastructure and a massive installation of power electronic converters and energy storage systems. However, assuming a typ. 20 years lifetime, converter systems installed today will need to be replaced already by 2050, i.e., at the commonly accepted date for reaching the Net-Zero-CO_2 target. Given the scale of the future Internet of Energy, the maintenance or replacement effort at some point will potentially run into depletion of scarce raw materials and large volumes of waste and associated environmental problems. This clearly indicates that "Net-Zero-CO_2 by 2050 is NOT Enough" and underlines the urgency of a transition from a Linear Economy to a Circular Economy, which ensures that the Net-Zero-CO_2target is reached on a sustainable basis, i.e., with minimized environmental impact in all aspects. The talk will first introduce metrics for measuring the environmental impact of power electronic converters and explain the concepts of Life Cycle Analysis of systems and of a Circular Economy in contrast to the Linear Economy dominating today. Next, the utilization of degrees of freedom of the design of power electronic converters for maximizing repairability, reusability, and recyclability while minimizing the use of critical ma-

terials, toxic substances, and ultimately waste will be shown at the example of EV chargers and PV inverters employing different power semiconductor technologies and circuit topologies. Finally, a roadmap for the introduction of environmental awareness into the power electronics design process will be proposed in order to ensure that power electronics as the main enabler of a Net-Zero-CO_2 society reaches full compatibility with a Circular Economy at the earliest point in time possible.

10:00 LS6a - Topic 11: Focus Topic 5 - Emerging Power Electronics Devices and Semiconductors

Location: Plenary Room

Chair(s): HERMANNS Kevin, PE-Systems GmbH, Germany
SUBHAM Sahoo, Aalborg University, Denmark

10:00 122 - Temperature distribution of 10 kV and 15 kV SiC-MOSFETs with large edge area

TAKAHASHI Masaki, SUN Zhongchao, JØRGENSEN Jannick Kjær, BECZKOWSKI Szymon Michal, MUNK-NIELSEN Stig, JØRGENSEN Asger Bjørn - Aalborg University - Denmark

10:20 481 - Mitigating Inter-chip Oscillation of paralleled SiC MOSFETs

SAWALLICH Florian, ECKEL Hans-Günter - University of Rostock - Germany

10:40 108 - Minimization of parasitic capacitance for proper function of 3 level ANPC with GaN switches

LI Qian, SCHROEDER Guenter - University of Siegen - Germany

10:00 LS6b - Topic 3: Converter Modelling and Low-level Control, including Gate-Drives

Location: 1.03 Flyveren

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

10:00 84 - Variable switching frequency and duty cycle control strategy for the Single Active Bridge

GÓMEZ Alexis A., RODRÍGUEZ Alberto, HERNANDO Marta M., VÁZQUEZ Aitor, GILES Joan, SEBASTIÁN Javier - University of Oviedo - Spain

10:20 104 - Analytical Estimation of Parasitic Ringing Overvoltage in Fast Switching Half-Bridges

CZERWENKA Philipp, MAIER Jannik, WOLFER Tobias, SCHULLERUS Gernot, HENNIG Eckhard - Reutlingen University - Germany

10:40 228 - Modeling and Analysis of High Gain Pole Point Inductor-based Series Resonant Dual Active Bridge Converter

RAJENDRAN Nitheesh, DUBEY Ashwini Kumar, N Lakshminarasamma, KARUPPASWAMY B Arun - Indian Institute of Technology Madras - India

10:00 LS6c - Topic 4: Control of Grid Connected Converters

Location: 1.02 Havnen

Chair(s): PEYGHAMI Saeed, Aalborg University, Denmark
SIEMASZKO Daniel, Hitachi Energy, Switzerland

10:00 218 - Direct Model Predictive Control with Constrained Power Losses for Grid-Tied Converters with LCL Filters

ROSSI Mattia, KARAMANAKOS Petros - Tampere University - Finland
SANKALA Arto - Danfoss - Finland

10:20 502 - Stability Limits and Improved Robustness of Grid-Forming Converters With External Inertia-Emulation Loop

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

10:40 321 - Active Power Decoupling Control Using the Power Phasor Concept

VIANA Caniggia - Eleappower - Canada
PERERA Chatumal, MEHANATHAN Pathmanathan, LEHN Peter - University of Toronto - Canada

10:00 LS6d - Topic 5: Advanced Control Methods of Electric Drives

Location: 1.08 Tunnelen

Chair(s): LOMONOVA E.A., Eindhoven University of Technology, Netherlands
LATAIRE Philippe, Vrije Universiteit Brussel, Belgium

10:00 98 - Deadbeat predictive current control for non-salient PMAC machine drives at very low switching-to-fundamental frequency ratios

ZHOU Jiayue, SUN Xudong - Tsinghua University - China
ZHANG Meng - Beijing Institute of Control Engineering - China
XIAO Xi - Tsinghua University - China

10:20 128 - Optimized Pulse Patterns for Anisotropic Synchronous Machines with Improved Current and Torque Properties

KONTODINAS Eleftherios, KARAMANAKOS Petros - Tampere University - Finland
KRAEMER Andreas, WENDEL Sebastian - ZF Friedrichshafen AG - Germany

10:40 **518 - Applying DBFC with Integrated Optimized Pulsed Pattern to Maximize Voltage Utilization with Low Distortion in Automotive Traction Drives**
SAUR Michael, HEPP Maximilian - Mercedes-Benz AG - Germany
SILVA Martin - University of Oviedo - Spain
WONDRAK Wolfgang - Mercedes-Benz AG - Germany

10:00 LS6e - Topic 10: Data Analysis, Artificial Intelligence and Communication (I)

Location: 1.09 Vaerket

Chair(s): DAVARI Pooya, Aalborg University, Denmark
MARTINEZ Wilmar, KU Leuven, Belgium

10:00 **392 - A Data-Driven Thermal Digital Twin of a 3-Phase Inverter using Hi-Fidelity Multi-Physics Modelling**
BHOI Sachin Kumar, FRIKHA Mohamed Amine, MARTIN Gamze Egin, HOSSEINABADI Farzad, CHAKRABORTY Sajib, EL BAGHDADI Mohamed, HEGAZY Omar - Vrije Universiteit Brussel - Belgium

10:20 **297 - Machine Learning Model for High-Frequency Magnetic Loss Predictions Based on Loss Map by a Measurement Kit**
SHEN Xiaobing, MARTINEZ Wilmar - KU Leuven - Belgium

10:40 **541 - Concept Validation of Digital Twin-Based Power Losses Estimation Method for Traction Inverter Applications**
FRIKHA Mohamed Amine, BHOI Sachin Kumar, CHAKRABORTY Sajib - Vrije Universiteit Brussel - Belgium
DIVENS Niels, DILTOER Reginald - Flanders Make - Belgium
EL BAGHDADI Mohamed, HEGAZY Omar - Vrije Universiteit Brussel - Belgium

11:00 DS3a - Topic 03: Converter Modelling and Low-level Control, including Gate-Drives

Location: Dialogue Session - Ground Floor

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

95 - Dead Time Volt-Second Compensation of Converters Enabled by 10 kV SiC MOSFETs **Panel A 1.1**
RAHR NIELSEN Morten, KIRKEBY Mathias, ZHAO Hongbo, KJÆR JØRGENSEN Jannick, MØLLER BECH Michael, MUNK-NIELSEN Stig - Aalborg University - Denmark

167 - Improvement Method of Voltage sharing Performance for Series-Connected GaN devices based on an Active Surge Absorber Circuit **Panel A 1.2**
ITOGAWA Yuki - Mitsubishi Electric Corporation - Japan
HARADA Shigeki, URAKABE Takahiro, FUJITA Hideaki - Tokyo Institute of Technology - Japan

168 - An Efficient Method for Steady-State Analysis of Switching Power Converters with Non-Linear Inductors **Panel A 1.3**
PLESNIK Martin - Ericsson - Canada
RAHIMI Tohid, ASGARIMOGHADDAM Mohsen, NAKHLA Michel, WANG Xiaoyu, ACHAR Ram - Carleton University - Canada

180 - Model Predictive Direct Voltage Control for Grid-Tied Inverter Systems **Panel A 1.4**
HAGEMANN Lars, KLEUTGENS Julius, MORTIMER Benedict, DE DONCKER Rik W. - RWTH Aachen University - Germany

181 - Evaluation on Stability of DC-DC Transformer Mode Operation in Interconnected DC Grid **Panel A 2.1**
ZOU Yangxin, MA Jianjun; ZHU Miao, CHEN Yijia - China

217 - Switching losses estimation for a push-pull converter based on analytical models considering parasitic elements **Panel A 2.2**
ALBERDI Borja, MAZUELA Mikel - Mondragon Unibertsitatea - Spain
SAN SEBASTIAN Jon - Ikerlan - Spain
SÁNCHEZ Roberto - Orona - Spain

234 - Modeling and Small-Signal Linearization of Three-Phase Rotating Transformation Using Exponential Matrix: Summary, Verification, and Discussion **Panel A 2.3**
ZHANG Houkai, XIAO Guochun - Xi'an Jiaotong University - China
LIU Zhiren - Electric Power Research Institute of State Grid Hunan Electric Power Company - China

272 - Robust Direct Model Predictive Control with Reduced Computational Effort for Medium-Voltage Grid-Connected Converters with LCL Filters **Panel A 2.4**
TREGUBOV Andrei, KARAMANAKOS Petros - Tampere University - Finland
ORTOMBINA Ludovico - University of Padova - Italy

337 - Closed-loop impedance modeling and analysis of three-phase active rectifier below 150 kHz frequency range **Panel A 3.1**
TANG Zhongting - Aalborg University - Denmark
JOHANSEN Flemming - Schneider Electric - Denmark
DAVARI Pooya - Aalborg University - Denmark

378 - Influence of parasitics of components and circuit on switching losses of power SiC and GaN transistors in power converter applications **Panel A 3.2**
GÓRECKI Pawel, GÓRECKI Krzysztof, DETKA Kalina - Gdynia Maritime University - Poland
D'ALESSANDRO Vincenzo - University of Naples Federico II - Italy

379 - Investigation on the Thermal Stability of Silicon-carbide MOSFETs operating in Controlled Shoot-through mode **Panel A 3.3**
SOLDATI Alessandro, UNDRE Vishal, MENOZZI Roberto - University of Parma - Italy

423 - Resonant Gate Drive Circuit for Parallel Connected MOSFETs **Panel A 3.4**
LI Helong - Hefei University of Technology - China
MAHESHWARI Ramkrishan - The University of Southern Denmark - Denmark
YU Langlang - Hefei University of Technology - China
SURANA Prashant, EBEL Thomas - The University of Southern Denmark - Denmark

425 - Single Equivalent PV Inverter Model for PV Farms with Substantial Parameter Disparities Using WD agg Approach **Panel A 4.1**
SHABANIKIA Navid, KHAJEHODDIN S. Ali - University of Alberta - Canada

475 - A Floquet Theory-Based Time-domain Stability Analysis Method for Unbalanced Three-Phase Off-Grid Inverter **Panel A 4.2**
LI Hong, PAN Jinchan, WEI Mingbo, ZHOU Zexi - Beijing Jiaotong University - China
LI Zhong - Fernuniversität in Hagen - Germany

529 - An Active Gate Driver for Iteratively Optimizing the Switching Characteristics of SiC MOSFETs **Panel A 4.3**
KUHN Johannes, ZEKORN Tobias, VOHL Kenny, WUNDERLICH Ralf, HEINEN Stefan - RWTH Aachen University - Germany

540 - Why Midpoint Balancing of an NPC Is Still a Challenge in Medium-Voltage Applications **Panel A 4.4**
KUCKA Jakub, NEUMANN Martin - Siemens AG - Germany

583 - Efficiency Assessment of an Open-End Winding Inverter Exploiting a Mixed Si/GaN Technology **Panel A 5.1**
FOTI Salvatore - University of Messina - Italy
KHAN Haseeb - University of Pavia - Italy
TESTA Antonio - University of Messina - Italy
BAIA Gioele - University of Pavia - Italy
DE CARO Salvatore - University of Messina - Italy

11:00 DS3b - Topic 03: EMI/EMC in Power Electronics including HF Phenomena

Location: Dialogue Session - Ground Floor

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

92 - Research on EMI suppression method of switching power supply based on piezoelectric ceramic impedance resonance design **Panel A 5.2**

ZHOU Mengxia, CHENG Bin , YAN Wei, ZHAO Yang, ZHANG Jiayu - Nanjing Normal University - China

100 - The Trade-off of Switching Losses and EMIGeneration for SiC MOSFET with Common Source and Kelvin Source Configurations **Panel A 5.3**

XUE Peng, DAVARI Pooya - Aalborg University - Denmark

186 - A Low-Noise Switching Method with Variable Frequencies and Phase Shifts Which Takes into Consideration Measurement Conditions in DC-DC Converters **Panel A 5.4**

SUGAWARA Retsu - Mitsubishi Electric Corporation - Japan
WADA Keiji - Tokyo Metropolitan University - Japan

193 - In-Depth Study of the Parasitic Capacitances of a Half-bridge Circuit **Panel A 6.1**

FABER Samuel, KOHLHEPP Benedikt, DOBUSCH Julian, KAISER Jeremias, DÜRBAUM Thomas - Friedrich-Alexander-University Erlangen-Nuremberg - Germany

393 - Design and Comparison of Input Filter Configurations for SiC-MOSFET-Based Automotive DC-AC Inverters **Panel A 6.2**

ALI Mohammad, KNEBUSCH Benjamin, JUENEMANN Lennart, FRIEBE Jens, MERTENS Axel - Leibniz Universität Hannover - Germany

452 - Prediction of Electromagnetic Radiation Emission from Telecommunication Power Supply **Panel A 6.3**

WANG Weixin, HE Junping, YANG Tao, CAO Lingling - Harbin Institute of Technology, Shenzhen - China

459 - dV/dt Immunity of Half Bridges Based on 650V Enhancement Mode GaN HEMTs **Panel A 6.4**

FIORI Franco - Politecnico di Torino - Italy
NÜBLING Marcus, KLOTZ Frank - Infineon Technologies Germany - Germany

11:00 DS3c - Topic 04: Standard and Advanced Modulation Techniques

Location: Dialogue Session - Ground Floor

Chair(s): HUANG Liang, Aalborg University, Denmark

8 - Communication-less Carrier Synchronization Method for Variable Frequency PWM **Panel B 1.1**
CAO Yayue - Shandong University - China
MIAO Miao - State Grid Nanjing Power Supply Company - China
XIAO Liujie - Sineng Electric Co., Ltd. - China
XU Tao, GAO Feng, ZHAO Xingjian - Shandong University - China

52 - Improved DC-Charging for Traction Drives with Hybrid Powered Dual Two-Level Inverter **Panel B 1.2**
KUHLMANN Kai, TEIGELKOETTER Johannes, BUEDEL Johannes - Technische Hochschule Aschaffenburg - Germany

105 - Robust Optimized Pulse Patterns for Salient Permanent Magnet Synchronous Machines **Panel B 1.3**
KARACA Orcun - ABB Corporate Research Center - Switzerland
TSOUMAS Ioannis - ABB Switzerland Ltd - Switzerland

250 Continuous Sinusoidal Output Voltage Generation with a Single Phase Cascaded H-Bridge Converter **Panel B 1.4**

MERZ Tobias, MENGER Nikolas, SOMMER Fabian, SCHWENDEMANN Ruediger, HILLER Marc - Karlsruhe Institute of Technologie (KIT) - Germany

267 - A Simple Two-zone Overmodulation Implementation for Three-Phase Two-Level Inverters **Panel B 2.1**
K Gopikrishnan, PRAMANICK Sumit - Indian Institute of Technology Delhi - India

285 - Power Oscillation Damping from VSC-HVDC Connected Offshore Wind Farms using DC Link Braking Chopper **Panel B 2.2**
WANG Minxiao - Friedrich-Alexander-University Erlangen-Nuremberg - Germany
HERNANDEZ MANCHOLA Alvaro - Siemens Energy - Germany
RAAB Alexander, MEHLMANN Gert, LUTHER Matthias - Friedrich-Alexander-University Erlangen-Nuremberg - Germany

340 - Discontinuous Pulse Width Modulation for Improving Reliability of NPC Inverter operated at High Modulation Index **Panel B 2.3**
CHOI Jae-Heon, CHOI Ui-Min - Seoul National University of Science and Technology - Korea (Republic Of)

341 - Discontinuous PWM for Improving Reliability and Efficiency of Single-Phase Five-Level T-type NPC Inverter with reduced Harmonic Distortion **Panel B 2.4**
RYU Taerim, CHOI Ui-Min - Seoul National University of Science and Technology - Korea (Republic Of)

418 - Instantaneous Flux and Current Control for Three-Phase Multi-Active-Bridge DC-DC Converters **Panel B 3.1**
THÖNNESSEN André, FRONCZEK Carsten, DE DONCKER Rik W. - RWTH Aachen University - Germany

458 - Modulation methods for loss and harmonicdistortion minimization of a current source rectifier **Panel B 3.2**
SAHIN Kubilay, MARIETHOZ Sebastien - Bern University of Applied Sciences - Switzerland

11:00 DS3d - Topic 04: Standard and Advanced Current / Voltage / Synchronization Control Techniques

Location: Dialogue Session - Ground Floor

Chair(s): SANGWONGWANICH Ariya, Aalborg University, Denmark

43 - On the design of a model predictive controller for a DC-DC buck converter **Panel B 3.3**
GUERREIRO Marco, DOS SANTOS Pedro, LIU Steven - Rheinland-Pfälzische Technische Universität Kaiserslautern Landau - Germany

67 - Power Hardware-in-the-loop Validation of Grid-Forming Control and Current Limitation for Start up of Induction Motors in Microgrids **Panel B 3.4**
ERCKRATH Tobias, BENDFELD Christian, BRANDL Ron, JUNG Marco - Fraunhofer Institute for Energy Economics and Energy System Technology IEE - Germany

70 - Robust Predictive Control Strategy of 3L-NPC Wind Power ConverterAgainst Filter Inductor Variations **Panel B 4.1**
CATALÁN Pedro - Ingeteam Power Technology S.A. - Spain
WANG Yanbo - Aalborg University - Denmark
ARZA Joseba - Ingeteam R&D Europe S.L. - Spain
CHEN Zhe - Aalborg University - Denmark

74 - Passivity Design for LCL-Type Grid-Connected Inverter Based on PCC Voltage Feedforward Control **Panel B 4.2**
LI Shaojie, LIN Hua, WANG Xingwei - Huazhong University of Science and Technology - China

77 - Implementation and Operation of a Grid-Forming Fictitious Synchronous Generator Control on a 300 kVA Power Converter Test Bench **Panel B 4.3**
REDMANN Florian, MIELACH Antonio, ERNST Alexander, ORLIK Bernd - University of Bremen, IALB - Germany
RAFFEL Holger - Bremen University - Germany

85 - A comparative study of different PLL techniques for synchronization of grid-connected converters under unbalanced and distorted grid conditions **Panel B 4.4**
SALEH Bassem, GARMABAD Mahyar, WOHLFAHRT Thomas, PALOJA Imer, TURKI Faical - Compleo Charging Solutions Ag - GERMANY

91 - A Combined-Compensation Control on Harmonic Resonance for Grid-Connected Converters **Panel B 5.1**
SEKIGUCHI Kei, MAKI Koji, ISHIGURO Takahiro - Toshiba Energy Systems & Solutions Corporation - Japan

139 - Model Predictive Control Based Full Operation Modes of Dual Active Bridge Converters to Minimize Current Stress **Panel B 5.2**
KONG Dehao - Technische Universität München - Germany
PEI Zhongchen - Northeast Electric Power University - China
GAO Xiaonan - Technische Universität München - Germany
ZHU Di - Northeast Electric Power University - China
HELDWEIN Marcelo, KENNEL Ralph - Technische Universität München - Germany

151 - Model Predictive Control of Hybrid Distribution Transformer based on Back-to-Back Converter for Power Quality Management at Grid Edge **Panel B 5.3**
PEI Zhongchen - Northeast Electric Power University - China
KONG Dehao - Technische Universität München - Germany
GUO Dongbo, ZHU Di, SHAO Xinming, LIU Chuang - Northeast Electric Power University - China

226 - A Distributed predictive control for inter-cell and inter-cluster voltage balancing of a Cascaded H-Bridge Based STATCOM **Panel B 5.4**
NAVAS-FONSECA Alex - Universidad Andres Bello - Chile
BURGOS-MELLADO Claudio - Universidad de O'higgins - Chile
ARIAS-ESQUIVEL Yeiner - Instituto Tecnologico de Costa Rica - Costa Rica
VERMA Anant Kumar - Universidad de O'higgins - Chile
MORA Andres - Universidad Técnica Federico Santa María - Chile
MUNOZ-CARPINTERO Diego - Universidad de O'higgins - Chile
CARDENAS Roberto - Universidad De Chile - Chile

233 - A Voltage-Following Strategy Used in Programmable Electronic Loads with Shared DC Bus **Panel C 1.1**
CHANG Chia-Chou, HO Tzu-Hsuan, XIE Ming-Yuan, CHEN Yaow-Ming - National Taiwan University - Taiwan

235 - A Port-Hamiltonian Droop Control for Grid Forming Inverters **Panel C 1.2**
BRAVO Manuel, GARCÉS Alejandro - Universidad Tecnológica de Pereira - Colombia
RODRIGUEZ Pedro - Luxembourg Institute of Science and Technology - Luxembourg

253 - DC-Side Impedance Modeling and Stability Assessment in Grid-Forming Modular Multilevel Converters **Panel C 1.3**
NAHALPARVARI Mehrdad, ASOODAR Mohsen, NORRGA Staffan, NEE Hans-Peter - KTH Royal Institute of Technology - Sweden

362 - Bidirectional frequency control and inertia provision with grid interties and HVDC links **Panel C 1.4**
SCHWEIZER Mario - ABB Corporate Research Center - Switzerland

369 - Design and Implementation of Grid-Forming Control Strategies for Parallel Converters in an Islanded Microgrid Setup **Panel C 2.1**
BISCHOFF Christina, SCHULZ Dominik, MERSCHE Stefan, STEFANSKI Lukas, HILLER Marc - Karlsruhe Institute of Technologie (KIT) - Germany

385 - An Iterative Learning Based Compensation in Model Predictive Control for DC/DC Boost Converter **Panel C 2.2**
LI Yuan, SAHOO Subham, LIN ZHIHAO, ZHANG Yichao - Aalborg University - Denmark
DRAGICEVIC Tomislav - Technical University of Denmark - Denmark
BLAABJERG Frede - Aalborg University - Denmark

445 - A Review of Recent Requirements for Inverter-Based Resources and Grid-Forming Technologies **Panel C 2.3**
LUO Hao, XIAO Yi, ZHU Yinxiao, YANG Yongheng - Zhejiang University - China
PAPANIKOLAOU Nikolaos - Democritus University of Thrace - Greece
MOLINAS Marta - Norwegian University of Science and Technology - Norway

460 - Decoupled Control Structure of a Modular Solid State Transformer **Panel C 2.4**
MENGER Nikolas, MERZ Tobias, ZIEGLMAIER Georg, SCHWENDEMANN Rüdiger, HILLER Marc - Karlsruhe Institute of Technologie (KIT) - Germany

462 - A Robust and Effective Control Method for the Cascaded Buck-Boost Converter Using a Single Controller **Panel C 3.1**
FRITZE Eric, MIREA Bogdan-Adrian - Helmut Schmidt University - Germany
WOYWODE Oliver - Philips Medical Systems DMC GmbH - Germany
HOFFMANN Klaus F. - Helmut Schmidt University - Germany

463 - Virtual Power-Based Technique for Enhancing the Large Voltage Disturbance Stability of HV Grid-Forming Converters **Panel C 3.2**
LABA Yorgo, BRUYERE Antoine - L2EP - Centrale Lille - France
COLAS Frédéric - L2EP- ENSAM - France
GUILLAUD Xavier - L2EP - CENTRALE LILLE - France

465 - Digital Control Implementation for a Rapid Control Prototyping of a 200kW Hybrid Interleaved ANPC Active Rectifier **Panel C 3.3**
NAJJAR Mohammad, JOHANSEN Flemming, NIELSEN HENNING Roar, RASMUSSEN Lars Bech - Schneider Electric - Denmark

507 - Multi-Parameter Analysis and Measurement of Resonances in Grid-Connected Converters with LCL Filters **Panel C 3.4**
SCHULZ Dominik, LISKE Andreas, HILLER Marc - Karlsruhe Institute of Technologie (KIT) - Germany

561 - A Comparative Study of Current Control Strategies for Modular Multilevel Converters **Panel C 4.1**
SHEIKHI JOUYBARY Homa - Université de Picardie Jules Verne - France
ARAB KHABURI Davood - Iran University of Science and Technology - Iran
EL HAJJAJI Ahmed - Université de Picardie Jules Verne - France
MPANDA MABWE Augustin - Unilasalle Amiens - France

566 - V/f controlled Virtual PM Machine for Grid-connected Inverter **Panel C 4.2**
NISHIKAWA Kodai, WATANABE Hiroki, ITOH Jun-ichi - Nagaoka University of Technology - Japan

582 - A simple DC-Link Voltage Balancing Strategy for NPC Three-level Inverters **Panel C 4.3**
FOTI Salvatore, KHAN HASEEB Hassan, TESTA Antonio - University of Messina - Italy
DI TOMMASO Antonino Oscar, MICELI Rosario, NEVOLOSO Claudio - University of Palermo - Italy

11:00 DS3e - Topic 04: Estimation, Identification and Optimisation Methods

Location: Dialogue Session - Ground Floor

Chair(s): HUANG Liang, Aalborg University, Denmark

150 - Real-Time Parameter Estimations of DC-AC Converters Using a Kalman Filter Approach **Panel C 4.4**

HUANG Yuan, ARMSTRONG Matthew, ODHANO Shafiq, AHMEID Mohamed - University of Newcastle - United Kingdom

296 - Improving Steinmetz Parameters for Iron Loss Characterization with a Magnetic Measurement Kit **Panel C 5.1**

SHEN Xiaobing, WOUTERS Hans, MARTINEZ Wilmar - KU Leuven - Belgium

11:00 DS3f - Topic 04: Measurement Techniques, Sensors and State Observers

Location: Dialogue Session - Ground Floor

Chair(s): HUANG Liang, Aalborg University, Denmark

23 - Non-invasive wide-bandwidth current sensor for wide-bandgap devices **Panel C 5.2**

MOSER Stefan - Infineon Technologies Austria AG - Austria
INCURVATI Maurizio - MCI Management Center Innsbruck - Austria
SCHIESTL Martin, STÄRZ Ronald - Infineon Technologies Austria AG - Austria

190 - Sensor Faults Detection in DC Microgrids based on Unknown Input Observer **Panel C 5.3**

TAN Sen, DE LA CRUZ Jorge, VASQUEZ Q Juan, GUERRERO Josep - Aalborg University - Denmark

200 - Evaluation of a Low-Cost Wide Bandwidth Current Shunt for Characterization of Wide Bandgap Semiconductor Devices **Panel C 5.4**

ZIEGLER Philipp, HAARER Jörg, MARX Philipp, ECKSTEIN Mattea, HASPEL André, ROTH-STIELOW Jörg - University Of Stuttgart - Germany

350 - Improvement of Phase-Voltage Measurement with Voltage-to-Frequency Converters via Residual-Voltage Sensing **Panel C 6.1**

LANGE Tim - RWTH Aachen University - Germany
VON HOEGEN Anne, HARTGENBUSCH Nina, GÖTZ Georg Tobias, DE DONCKER Rik W. - ISEA - Germany

377 - A High-Bandwidth and Low-Inductive Sensor for Measuring the Commutation Current of WBG Devices **Panel C 6.2**

KLEVER Severin, DE DONCKER Rik W. - RWTH Aachen University - Germany

449 - A Review of Current Sensors in Power Electronics: Fundamentals, Measurement Techniques and Components to Measure the Fast Transients of Wide Bandgap Devices **Panel C 6.3**
LUTZEN Hauke, MÜLLER Jonas, KAMINSKI Nando - Universität Bremen - Germany

11:00 DS3g - Topic 04: Condition Monitoring and Life-Time Prediction
Location: Dialogue Session - Ground Floor
Chair(s): HUANG Liang, Aalborg University, Denmark

338 - Semiconductor Devices Condition Monitoring Using Harmonics in Inverter Control Variables **Panel C 6.4**
OU Shuyu, SANGWONGWANICH Ariya, SAHOO Subham, BLAABJERG Frede - Aalborg University - Denmark

11:00 DS3h - Topic 05: Electrical Machines and Actuators
Location: Dialogue Session - Ground Floor
Chair(s): SCELBA Giacomo, University of Catania, Italy

199 - Fast Modelling, Sizing and Mapping Techniques for Permanent Magnet and Externally Excited Axial Flux Machines **Panel D 1.1**
KIRZINGER Lukas - Vitesco Technologies GmbH - Germany
GERLING Dieter - Universität Der Bundeswehr München - Germany
BRÜLL Martin - Vitesco Technologies GmbH - Germany

203 - Methods to Reduce the Errors in the d- and q-Inductance Estimation of a SynRM by Considering the Residual Magnetism **Panel D 1.2**
KETCHEDJIAN Vasken, HASPEL André, MARX Philipp, ROTH-STIELOW Jörg - University of Stuttgart - Germany

313 - Review of Advances in Cooling Schemes for Yokeless and Segmented Armature (YASA) Axial Flux Motors **Panel D 1.3**
CAKAL Gokhan, SARLIOGLU Bulent - University of Wisconsin - Madison - United States of America

512 - Implementation of new cooling configurations in electric motors via CFD and CHT modelling **Panel D 1.4**
MINAZZATO Marco, PERSICO Giacomo - Politecnico di Milano - Italy
CASTAGNINI Alessandro, SECONDO Giulio - ABB S.P.A. - Italy

11:00 DS3i - Topic 05: Adjustable-Speed Drives and Converter-Machine Interactions

Location: Dialogue Session - Ground Floor

Chair(s): SCELBA Giacomo, University of Catania, Italy

240 - Analytical Derivation of Output Distortions Harmonics Caused by Voltage Source Inverter Non-Linearities in PMSM Drives **Panel D 2.1**
SABRIÉ Antoine, BATTISTON Alexandre, VIDAL-NAQUET Fabien - IFP Energies Nouvelles - France
GAUTHIER Jean-Yves, LIN-SHI Xuefang - Université de Lyon, INSA Lyon, AMPERE - France

252 - Development and Analysis of An IPMSM FEA-Based Model for Electric Vehicle Application **Panel D 2.2**
BITENCOUT Alexandre, FRANÇA Bruno, DIAS Daniel, BORBA Bruno - Universidade Federal Fluminense - Brazil

469 - Parallel Hybrid Converter-Based Adjustable Speed Drives Using Third Harmonic Voltage Injection Technique **Panel D 2.3**
KARAKA Nageswara Rao, RATH Ibhan Chand, SHUKLA Anshuman - Indian Institute of Technology Bombay - India

483 - Reduction of circulating bearing currents in dependence of nanocrystalline common-mode current ring cores **Panel D 2.4**
WEICKER Martin, POESS Hans-Joachim - Dovitech GmbH - Germany

526 - Loadability of Converter-fed Induction Machine **Panel D 3.1**
KÄRKKÄINEN Hannu, LINDH Pia, AARNIOVUORI Lassi, TIIHONEN Matias, NIEMELÄ Markku - LUT University - Finland

555 - Extended Linear Modulation Based Full Bridge Modular Multilevel Converter for Adjustable Speed Drives **Panel D 3.2**
KARAKA Nageswara Rao, NALLAMATTI Poornachandra Rao, SHUKLA Anshuman - Indian Institute of Technology Bombay - India

581 - Power losses Analysis in Frequency Domain of IPMSM Drive fed by Cascaded H-Bridge Multilevel Inverter **Panel D 3.3**
NEVOLOSO Claudio, DI TOMMASO Antonino Oscar, MICELI Rosario, SCAGLIONE Gioacchino - University of Palermo - Italy
FOTI Salvatore, TESTA Antonio, DE CARO Salvatore - University of Messina - Italy

11:00 DS3j - Topic 05: Design, Optimisation and Control of Electric Drives

Location: Dialogue Session - Fundamentet

Chair(s): RASMUSSEN Peter, Aalborg University, Denmark

53 - Control of a 9-Phase PMSM with Stacked Polyphase Bridge Converter including DC Source Impedance **Panel E 1.1**
BRINGEZU Thilo, BIELA Juergen - ETH Zurich - Switzerland

55 - Composition of the Countervoltage for Power-Hardware-in-the-Loop Emulators for Three-Phase Machines **Panel E 1.2**

HASPEL André, KETCHEDJIAN Vasken, MARX Philipp, ECKSTEIN Mattea, ROTH-STIELOW Jörg - University of Stuttgart - Germany

62 - Convex-Optimization-Based Linear Controllers for Speed Control of Electrical Drives with Low Feedback Accuracy **Panel E 1.3**
TANG Yiwei, SUN Xin, SUN Xudong, XIAO Xi - Tsinghua University - China
ZHANG Meng - Beijing Institute of Control Engineering - China

124 - On the Sensorless PMSM Rotor Position Estimation Enhancement: Application of ADALINE-PLL **Panel E 1.4**
MALEKIPOUR Amirhossein, CORNE Adrien, GARBUIO Lauric, GRANJON Pierre, GERBAUD Laurent - G2ELAB CNRS/G-INP/UGA - France

132 - Sensitivity Analysis of Model-Based Sensorless Control of Electrically Excited Synchronous Machines Considering Nonlinear Flux Linkages **Panel E 2.1**
PANG Yuebin, KNEZEVIC Jovan, GLOSE Daniel - BMW Group - Germany
HACKL Christoph - HM Munich University of Applied Sciences - Germany

157 - Secondary-Side Power Control Method of Power Superposition Using a Single-Phase Transformer for Power Supply of Position Sensor in Permanent Magnet Synchronous Motor **Panel E 2.2**
KIRIBUCHI Takeshi - Omron Corporation - Japan
INOUE Yukinori, MORIMOTO Shigeo - Osaka Metropolitan University - Japan

160 - Performance Evaluation of Position Sensorless Control System with Initial Speed Estimator for Overall Speed Startup **Panel E 2.3**
HAO Rongjiao, DOKI Shinji - Nagoya University - Japan
ASAHINA Kazuki, IDE Akira - Toyota Industries Corporation - Japan

172 - Using the Flux Increment over a Pulse-Width Modulation Period for Anisotropy-based Self-Sensing Control **Panel E 2.4**
HIMKER Niklas, MERTENS Axel - Leibniz Universität Hannover - Germany

176 - Capacitor Current Reduction in Dual Three-Phase PMSM Drive System by Model Predictive Control Considering Dead Time **Panel E 3.1**
SAKAUCHI Ryosuke, DOKI Shinji - Nagoya University - Japan
IMAI Koji, KONDO Kosuke, AOKI Yasuaki - Denso Corporation - Japan

182 - Parallelization of High Efficiency Sine-out Drives for Motor Drive Applications **Panel E 3.2**
CHRISTENSEN Nicklas, LAZAR Radu - Danfoss - Denmark

188 - Adaptive Control as a Hierarchical System **Panel E 3.3**
ABUBAKR Hussein, LASHAB Abderezak, GOLESTAN Saeed - Aalborg University - Denmark
M. ABUSORRAH Abdullah, J. H. RAWA Muhyaddin - King Abdulaziz University - Saudi Arabia
YAQOOB Mohammad, VASQUEZ Juan C., GUERRERO Josep M. - Aalborg University - Denmark

210 - Modeling of Novel Dual Three Phase PMSM with Pseudo-Triple Winding Structure and its Current Vector Control **Panel E 3.4**
AIBA Kohei, DOKI Shinji - Nagoya University - Japan
KATO Hidenori, ISOGAI Koji - Denso Corporation - Japan

219 - An Optimizing Method of Complex PI Controller for Permanent Magnet Synchronous Motor in Magnetic Saturation **Panel E 4.1**
LIN Chengyong, YAO Wenxi, SONG Zhihao - Zhejiang University - China

223 - Modulation method to reduce DC-bus harmonics current in two-motor drive system **Panel E 4.2**
SATO Teruya - Nagaoka University of Technology - Japan
HAGA Hitoshi - Shizuoka University - Japan

294 - Design and Comparative Analysis of Discrete-Time Current Control Algorithms for Permanent Magnet Synchronous Machines **Panel E 4.3**
SCHILLINGER Tobias, ZAICZEK Tobias, SCHUHMANN Thomas, FRANKE Matthias - University of Applied Sciences Dresden - Germany

353 - Extraction of Flux Angle using Intermodulation Saliency for Encoderless Torque Control of Induction Motors **Panel E 4.4**
RODRIGUEZ MONTERO Eduardo - Technische Universität Wien - Austria
VOGELSBERGER Markus - Alstom Transport Austria GmbH - Austria
WOLBANK Thomas - Technische Universität Wien - Austria

375 - Simulation Analysis of the 5-Leg Inverter for a Fault-Tolerant Dual-Motor Drive System **Panel E 5.1**
AL SAKKA Mustapha, GEURY Thomas, EL BAGHDADI Mohamed - Vrije Universiteit Brussel - Belgium
DHAENS Miguel, AL SAKKA Monzer - Tenneco - Belgium
HEGAZY Omar - Vrije Universiteit Brussel - Belgium

409 - Optimized Pulse Patterns for Synchronous Machines with Non-Sinusoidal Back-EMF **Panel E 5.2**
KONTODINAS Eleftherios, KARAMANAKOS Petros - Tampere University - Finland
KRAEMER Andreas, WENDEL Sebastian - ZF Friedrichshafen AG - Germany

443 - A Development of Short-Time Initial Rotor Position Estimation Technique Based on the Magnetic Saturation and Saliency **Panel E 5.3**
SATO Hiroaki, AOYAGI Shigehisa, MATSUI Hirokazu, TANIGUCHI Shun, OHARA Shunsuke - Hitachi, Ltd - Japan

473 - Identification of rotor and stator flux linkage maps of squirrel cage induction motors based on identification of rotor time constant maps **Panel E 5.4**
STOSS Johannes, KARAYEL Akif , GEIER Leonard, LISKE Andreas, HILLER Marc - Karlsruhe Institute of Technologie (KIT) - Germany

11:00 DS3k - Topic 05: Condition Monitoring and Life-Time Prediction

Location: Dialogue Session - Fundamentet

Chair(s): RASMUSSEN Peter, Aalborg University, Denmark

13 - Prediction of Voltage Stress to Ground at Synchronous Motor Terminals in Power Drive Systems **Panel F 1.1**
FRITSCH Christoph, HAHN Ingo - FAU Erlangen - Nürnberg - Germany

11:00 DS3l - Topic 10: Application of Artificial Intelligence to Power Electronics and Drive Systems

Location: Dialogue Session - Fundamentet

Chair(s): STROE Daniel-Ioan, Aalborg University, Denmark

38 - LSTM Data-Driven Model of Multi-scene Virtual Synchronous Generator **Panel F 1.2**
TIAN Jiangbin - Shanghai University of Engingeering Science - China
ZHAO Jinbin - Shanghai University of Electric Power - China
ZENG Guohui - Shanghai University of Engingeering Science - China
ZHU Xiangchen - Aalborg University - Denmark
ZHANG Zhenhua, WANG Yuzong - Shanghai University of Engingeering Science - China

490 - Immune Neuro-Fuzzy Network Based System for Collision Free Motion Control of Unmanned Electrical Vehicles **Panel F 1.3**
BEINAROVICA Anna, GOROBETZ Mikhail, RIBICKIS Leonids - Riga Technical University - Latvia

546 - Reinforcement Learning-based Control of a Buck Converter: A Comparative Study of DQN and DDPG Algorithms **Panel F 1.4**
SHAHNOOSHI Shima, RANJBARAN Parisa, EBRAHIMI Javad, BAKHSHAI Alireza, JAIN Praveen - Queen's University - Canada

553 - Exploring the Effectiveness of Different State Spaces and Reward Functions in Reinforcement Learning-based Control of a DC/DC Buck Converter **Panel F 2.1**
RANJBARAN Parisa, SHAHNOOSHI Shima, EBRAHIMI Javad, BAKHSHAI Alireza, JAIN Praveen - Queen's University - Canada

11:00 DS3m - Topic 10: Diagnostics of Power Electronics Systems
Location: Dialogue Session - Fundamentet
Chair(s): NOVAK Mateja, Aalborg University, Denmark

522 - An open-circuit fault diagnosis for interleaved boost converter with coupled inductors in fuel cell application **Panel F 2.2**
BENZINE Meryem, SALHI Issam, GAILLARD Arnaud, GAO Fei - UTBM, CNRS, Institut FEMTO-ST, Belfort - France

11:00 DS3n - Topic 10: Big Data and Artificial Intelligence in Energy Conversion
Location: Dialogue Session - Fundamentet
Chair(s): NOVAK Mateja, Aalborg University, Denmark

162 - Data-Driven Online Stability Diagnostics for Parallel Grid-Connected Converters in Weak Grid **Panel F 2.3**
QIN Caiyun - Shandong University - China
XU Hui - State Grid Liaocheng Power Supply Company - China
GAO Feng - Shandong University - China

514 - Data-Driven Component Cost Models for Power-Electronic Converters **Panel F 2.4**
FRONCZEK Carsten, FRITZ Niklas, DE DONCKER Rik W. - RWTH Aachen University - Germany

13:20 Award Session ***Location: Plenary Room***

Chair(s): BAUER Pavol, Delft University of Technology, Netherlands
DOPPELBAUER Martin, Karlsruhe Institute of Technologie (KIT), Germany

14:10 Special Session: Reliability (Part I) ***Location: 1.01 Banen***

Chair(s): ABART Christoph, AVL List GmbH, Austria
HEGAZY Omar, Vrije Universiteit Brussel, Belgium

Keynotes & Informal Talks

Organizers: Christoph Abart, AVL List GmbH
Omar Hegazy, Vrije Universiteit Brussel
Klaus Pressel, IFAG

14:20 Closing Session ***Location: Plenary Room***

Chair(s): DOPPELBAUER Martin, Karlsruhe Institute of Technologie (KIT), Germany
IANNUZZO Francesco, Aalborg University, Denmark

Greeting message by Mogens Rysholt Poulsen, Dean of the Faculty of Engineering, Aalborg University
Final words and formal closing of the conference by Prof. Dr. Martin Doppelbauer, Vice-President of EPE Association
Final words by Prof. Dr. Francesco Iannuzzo, Aalborg University, Denmark, EPE'23 ECCE Europe Conference Chairman

15:00 PECTA-Session 3: Policy issues, standards and outlook

Location: 1.04 Fakultetet

Chair(s): CHRISTIANSEN Christian Holm, Technological Institute, Denmark
BRÜNIGER Roland, Swiss Federal Office of Energy, Switzerland

15:05 597 - Policy measures to drive WBG for end use equipment

HANSEN Bjarke Spliid - Tek-Info - Denmark

15:45 594 - Switching losses in power devices: From dynamic on resistance to output capacitance hysteresis

MATIOLI Elison, ZHU Hongkeng, PERERA Nirmana, SAMIZADEH NIKOO Mohammad, JAFARI Armin - Ecole Polytechnique Federale de Lausanne - Switzerland

15:20 LS7a - Topic 11: Focus Topic 6 - Reliability and Artificial Intelligence in Power Electronics

Location: Plenary Room

Chair(s): WANG Huai, Aalborg University, Denmark
HANIGOVSZKI Norbert, Danfoss, Denmark

15:20 118 - Online Threshold Voltage Monitoring at SiC Power Devices during Power Cycling Test and Possible Consequences
HEIMLER Patrick, ALALUSS Mohamed, SCHWABE Christian, LIU Xing, LUTZ Josef, BASLER Thomas - Technische Universität Chemnitz - Germany

15:40 156 - Electric Vehicle Thermal Management System Modeling with Informed Neural Networks
BICER Ekin Alp, SCHIRMER Pascal, SCHREIVOGEL Peter - BMW Group - Germany
SCHRAG Gabriele - Technische Universität München - Germany

16:00 311 - A model-based approach for prognostics of power semiconductor modules
VULLI Aleksi - ABB Drives - Finland
SCHLOTTIG Gerd - ABB Corporate Research Center - Switzerland
ORKISZ Michal, FIRLA Marcin - ABB Corporate Research Center - Poland
BIANDA Enea - ABB Corporate Research Center - Switzerland

15:20 LS7b - Topic 3: EMI/EMC in Power Electronics, including HF Phenomena

Location: 1.03 Flyveren

Chair(s): DAVARI Pooya, Aalborg University, Denmark
SOLDATI Alessandro, University of Parma, Italy

15:20 32 - Clean Switching of SiC MOSFET Half-Bridge Module with Soft-Ferrite Dual Cores
TO Pham Ha Trieu, ECKEL Hans-Günter - University of Rostock - Germany

15:40 174 - Analysis of Passive and Active EMI Filters for On-Board Chargers in Electric Vehicles
KÖRNER Patrick, BROCKERHOFF Philip, MÜLLER Felix - Vitesco Technologies GmbH - Germany

16:00 257 - EMI Reduction in a GaN-Based Interleaved Buck Converter through Spread Spectrum Frequency Modulation
STOK Emmanuel - Eindhoven University of Technology - Netherlands
OTTEN Marald - Lightyear - Netherlands
HUISMAN Henk, KÖSESOY Yusuf - Eindhoven University of Technology - Netherlands

15:20 LS7c - Topic 4: Measurement & Control

Location: 1.02 Havnen

Chair(s): IANNUZZO Francesco, Aalborg University, Denmark
MUNK-NIELSEN Stig, Aalborg University, Denmark

15:20 412 - Improved performance of Kalman filter for junction temperature estimation with Autocovariance Least-Squares method

VELAZCO Diego, VALLE Maxime, WALLART François - Supergrid Institute - France
CLERC Guy - Université de Lyon, Université Claude Bernard Lyon 1, AMPERE - France
BOUTLEUX Emmanuel - Université de Lyon, Ecole Centrale De Lyon, AMPERE - France

15:40 482 - Series/Parallel Connection Method of DC-DC Transformer for Scalable Power Converter Systems using USPMs

IWAMOTO Takumi, YAMANOKUCHI Koki, WATANABE Hiroki, ITOH Jun-ichi - Nagaoka University Of Technology - Japan

16:00 45 - Impact of Power Factors on Reliability of NPC Inverter-Based PV Systems

CHEN Meng, SANGWONGWANICH Ariya, ZHOU Dao, BLAABJERG Frede - Aalborg University - Denmark

15:20 LS7d - Topic 5: Special Topologies and Controls of Electric Drives

Location: 1.08 Tunnelen

Chair(s) BOSGA Sjoerd, ABB AB, Corporate Research, Sweden
LATAIRE Philippe, Vrije Universiteit Brussel, Belgium

15:20 171 - An active control method after switch short-circuit fault for open-end winding motor system with isolated supply

SUN Xiangwen, LIU Zicheng, JIANG Dong, QU Ronghai - Huazhong University of Science and Technology - China
LIU Hongyang, YANG Guang - Avic Xi'an Flight Automatic Control Research Institute - China

15:40 179 - Sensorless Control Techniques for Variable Magnetomotive Force Motors Using Magnetic Flux Estimation

ISHIMIZU Manato, MAEKAWA Sari - Meiji University - Japan

16:00 329 - Vibration Reduction Method by Instantaneous Current Control in Sensorless 120-degree Conduction Drive of Compressor motor

OMI Yusuke, YASUDA Takumi, KUMAGAI Takahiro, WATANABE Hiroki, ITOH Jun-Ichi - Nagaoka University of Technology - Japan

15:20 **LS7e - Topic 10: Data Analysis, Artificial Intelligence and Communication (II)**

Location: 1.09 Vaerket

Chair(s): DOPPELBAUER Martin, Karlsruhe Institute of Technologie (KIT), Germany
ANVARI-MOGHADDAM Amjad, Aalborg University, Denmark

15:20 **198 - Comparison Study on Parametric Fault Diagnosis Using BPNN, SVM and SDAE for DC-DC Converters in Aircraft**

WANG Ting, SUN Jiacheng, YAO Wenli, ZHANG Xiaobin, LI Weilin, WANG Yufeng - Northwestern Polytechnical University - China

15:40 **298 - Health Monitoring Framework for Electric Vehicle Drive Train in Digital Twin**

KURUKURU Varaha Satya Bharath - Silicon Austria Labs GmbH - Austria
KHAN Mohammed Ali, SINGH Rupam - The University of Southern Denmark - Denmark

16:00 **585 - Ultrafast Feature Extraction for Lithium-Ion Battery Health Assessment**

SUI Xin, HE Shan, TEODORESCU Remus - Aalborg University - Denmark

15:30 **Special Session: Reliability (Part II)** ***Location: 1.01 Banen***

Chair(s): ABART Christoph, AVL List GmbH, Austria
HEGAZY Omar, Vrije Universiteit Brussel, Belgium

Keynotes & Informal Talks

Organizers: Christoph Abart, AVL List GmbH
Omar Hegazy, Vrije Universiteit Brussel
Klaus Pressel, IFAG

16:40 **Industrial Forum 5: Focus Topic 5 - Emerging Power Electronics Devices and Semiconductors**

Location: 1.01 Banen

Chair(s): HERMANNS Kevin, PE-Systems GmbH, Germany
SUBHAM Sahoo, Aalborg University, Denmark

Confirmed Panellists:

- Fabio Carastro (Semikron Danfoss)
- …

16:40 **Industrial Forum 6: Focus Topic 6 - Reliability and Artificial Intelligence in Power Electronics**

Location: 1.02 Havnen

Chair(s): WANG Huai, Aalborg University, Denmark
HANIGOVSZKI Norbert, Danfoss, Denmark

Confirmed Panellists:

- Kristian Bonderup Pedersen (Vestas)
- Rasmus Steiniche (Neurospace)
- Shiori Idaka (Mitsubishi Electric Europe)
- Johan W. Kolar (ETH Zürich)

PECTA's conference contribution at EPE'23 ECCE Europe

PECTA Session 3 (Thursday, 7.9.2023): 15:00 – 17:00
Location: **Room 1.04 Fakultetet**
Chair: Christian Holm Christiansen
Topic: PECTA: policy issues, standards and outlook

15:00
Welcome & Get-Together
Christian Holm Christiansen, Session-Chair

15:05
Policy measures to drive WBG for end use equipment (40")
Bjarke Spliid Hansen, Tek-Info v/ Bjarke Hansen

15:45
Switching losses in power devices: From dynamic on resistance to output capacitance hysteresis (40")
Elison Matioli, Ecole Polytechnique Fédérale de Lausanne
Hongkeng Zhu, Ecole Polytechnique Fédérale de Lausanne

16:25
PECTA Outlook of next term
Roland Brueniger, PECTA Chair (CH) (10")
- Next steps and strategic agenda
- PECTA's 2nd term 2024 – 2029

16:35
Round Table – Governmental contribution to accelerate WBG adoption (25")
Moderator: Roland Brueniger, PECTA Chair, Swiss Federal Office of Energy (CH)

Panel Members:
- P. Bennich (SWE, PECTA MC)
- A. Diaz (AT, PECTA Vice Chair)
- L. Lorenz (ECPE)
- B. Hansen (DK, Consultant)
- F. Iannuzzo (DK, Prof. at Aalborg University)
- C. Christiansen (DK, Teknologisk)

17:00
End of Day 3

Reliability and Lifetime prediction of WBG power electronics in automotive applications

Organizers: Christoph Abart, AVL List GmbH
Omar Hegazy, Vrije Universiteit Brussel
Klaus Pressel, IFAG

Date & Time: Thursday 7 September: 14:10 – 15:10 & 15:30 – 16:30

Location: Room 1.01 Banen

Session Format: Keynotes and Informal talks

Reliability and lifetime are key parameters for power electronics in all kinds of applications, but especially in the automotive domain. Therefore, the project HiEFFICIENT was started to investigate these parameters with different approaches likes physics of failures as well as with data driven methods. This shall enable predictive health management on component and sub-system level. Additionally, the project iREL4.0 approaches the topic one level deeper by enabling zero failure electronic components and systems manufacturing. This session will discuss the issue of power electronics reliability along the whole value chain – from chip to system.

Session Outline:

Part I:

- **Keynote 1 – Reliability and Lifetime Requirements for automotive applications**, Wolfgang Wondrak (20 mins)
- **Keynote 2 – Intelligent Reliability – Innovative Approaches to Improve Reliability in Power Electronic Devices**, Klaus Pressel (20 mins)
- **Talk 1 – A Data-Driven Thermal Digital Twin of a 3-Phase Inverter using Hi-Fidelity Multi-Physics Modelling**, Sachin Kumar Bhoi (15 mins)

Part II:

- **Talk 2 – Active Thermal Control of a DC-DC Converter Using Dynamic Gate-drive for Reliability Improvement**, Farzad Hosseinabadi (15 mins)
- **Talk 3 – Optimization of Temperature Sensor Placement in Multi-Chip Power Modules Using Frequency Domain Analysis**, A. Aghdaei (15 mins)
- **Talk 4 – SiC Power TrenchMOS Transistor under harsh repetitive switching conditions**, J. Marek (15 mins)

- **Talk 5 – Comparative Thermal Analysis of Cooling Methods for Dual Inverter Applications in Electric Vehicles**, Gamze Egin Martin (15 mins)

Session speakers / Panellists:
- Alireza Aghdaei, RWTH Aachen
- Sachin Kumar Bhoi, Vrije Universiteit Brussel
- Farzad Hosseinabadi, Vrije Universiteit Brussel
- Juraj Marek, STUBA
- Gamze Egin Martin, Vrije Universiteit Brussel
- Klaus Pressel, Infineon AG
- Wolfgang Wondrak, Mercedes Benz AG

Industrial Forum 5: "Emerging Power Electronic Devices and Semiconductors"

The strive to a more electric and an all-electric society leads to a stronger demand for higher efficiency, improved reliability and ruggedness of the utilized power electronics. Emerging SiC, GaN and the FETs made from them already unlock new designs with only the beginning of an accelerated development towards ever more efficient and better components.

New materials, heterogeneous integration or bi-directional switches are just some of the trends that will lead to ever new possibilities in power electronics.

The focus topic on emerging power electronic devices and semiconductors gives the visibility it needs and brings experts together to exchange new concepts, paving the way for the next steps toward the all-electric society.

Moderators: Kevin HERMANNS, PE-Systems GmbH, Germany
Subham SAHOO, Aalborg University, Denmark

Panellists:
- Fabio Carastro (Semikron Danfoss)
- More to be announced

When?: Thursday, 7 September 2023 (16:30 – 17:40)

Where?: AKKC, Room 1.01 Banen

Industrial Forum 6: "Reliability and Artificial Intelligence in Power Electronics"

The increasing complexity and variability of power electronics systems pose significant challenges for their reliability. At the same time, the growing interest in Artificial Intelligence (AI) techniques promises to provide new tools for design optimization, monitoring and control, and system life-cycle performance improvement. They represent how the performance requirements and methodologies in power electronics are involving. This focus topic will explore the reliability of power electronics components and systems, and the application of AI in power electronics, highlighting the state-of-the-art academic research and industry innovation, and the challenges and opportunities that this exciting area of research presents. The performance requirements and methodologies in design, control, and maintaince of power electronic components and systems are evolving. The focus topic will bring together leading academic researchers and industy experts through a keynote on Circular Economy in Power Electronics, a Tutorial on Reliability and Prognositics Towards Lifetime Improvement of Automotie Power Electronics, one lecture session and one dialogue session, and an industrial forum.

Moderators: Huai WANG, Aalborg University, Denmark
Norbert HANIGOVSKI, Danfoss, Denmark

Panelists:

- Kristian Bonderup Pedersen (Vestas)
- Rasmus Steiniche (Neurospace)
- Shiori Idaka (Mitsubishi Electric Europe)
- Johan W. Kolar (ETH Zürich)

When?: Thursday, 7 September 2023 (16:30 – 17:40)

Where?: AKKC, Room 1.02 Havnen

Planning Vendor Sessions – Thursday 7 September
Vendor session area in vendor session area in Fundamentet

11.10-11.25 **ZES Zimmer Electronic Systems GmbH**

Innovative and Precise Power Analysis Solutions to enhance Electromobility Advancement
Patrick Fuchs - Business Development Manager

The future certainly does not question cars, but having sustainable and economic transport. In the context of sustainability, energy conservation, resource preservation, and decarbonization, electromobility consistently remains a driving factor, presenting engineers both today and tomorrow with distinct challenges. This presentation illuminates these challenges and outlines how innovative and dedicated power analysis solutions and functionalities we provide support engineers to fully tap into the optimization potential of their respective products or systems. Measuring the electrical efficiency of the drive train and identifying possibilities to reduce power losses are the pivotal feedback variables, which are indispensable as inputs in the closed-loop of a testing setup to enhance system advancements. In essence, precise efficiency measurement of components and overall systems, identification and breakdown of power losses across the frequency spectrum, characterization and longevity measurements, verification of analytical simulation models, simultaneous capture of fundamental, narrowband, and wideband spectra, post-measurement analysis of raw data, and efficient integration into test bench environments are aspects we intend to introduce. Beyond the power electronics organism of electric vehicles, we also delve into measurements of peripheral systems in E-mobility, such as certification testing of charging stations and more.

11.50-12.05 **Frenetic**

12.50-13.05 **dSPACE**

Comprehensive solutions for developing and testing power electronics controls
Julian Saele

13.10-13.25 **InfraTec**

Electronic and Semiconductor Testing for Failure Detection with Thermography (active/Lock-in and passive) in HD Resolution
Dipl.-Wi-Inform. (FH) Torsten König, Project Manager Thermography Systems

The thermographic inspection of electronic materials is an established test procedure for quality assurance and process optimisation – from the development of first prototypes to serial production.

InfraTec developed a modular automated test bench for electronic and semiconductor testing – ELIT. Based on Lock-In Thermography this solution is especially designed for the use in R&D as well as for quality tests in production. With different hardware and software functions E-LIT fulfils all requirements in precision and accuracy, which are needed. With its resolution of up to (1,920 x 1,536) IR-pixels it enables the detection of smallest failures on electronic and semiconductor devices.


Danfoss
ENGINEERING
TOMORROW
iC7 Simulation
Need to speed up and de-risk your project execution?
Use FMI-compliant simulation models to improve efficiency and economy in all design and commissioning phases.
Achieve full transparency by simulating the drive at parameter level.
fmi Functional Mock-Up Interface
ON
CANCEL
support
SEARCH
iC7
Open up a new dimension

TECHNICAL VISITS

Only participants registered for these activities will be allowed on the bus / to enter the premises.

Technical visit 1 to Grundfos

Schedule:
Friday 8 September 2023, from 8:30 to 14.45

Description of the visit

Grundfos, the world's largest manufacturers of pumps will welcome a limited number of participants to it's headquarter in Bjerringbro. The visit will primary be in the Grundfos visitor center with a tour to the heavily automated UP factory where the largest amount of Grundfos's pumps, with own developed power electronics, is manufactured. The tour will also include a guided walkthrough in the visitor centers exhibition area, which gives a great insight in variety Grundfos products and technologies. Finally, Grundfos will share its Vision and experience in cooperating with universities/companies in relation to power electronics and show how this improves their products.

© Grundfos

Schedule:

08:30	Bus departure from AKKC (Parking in Front of the Scandic Aalborg City Hotel)
09:45	Welcome with refreshments
10:00	Company presentation
10:20	Guided UP factory tour
11:15	Guided tour in exhibition area
12:00	Lunch
12:45	Cooperating with universities and companies within power electronics. Visions experience and benefits.
13:15	Q&A
13:30	End of event – departure back to Aalborg

The company will offer a small lunch to the participants

Meeting Point (Friday 8 September 2023, 08:15):
The parking in front of the Scandic Aalborg City Hotel, Europa Plads 1, Aalborg.

Technical visit 2 to Østerild

Schedule:
Friday 8 September 2023, from 8:30 to 14.45

Description of the visit

In Wind, it does not get bigger than Østerild, which is the national test center for large Wind turbines. The test center has eight wind turbine sites where both Vestas and Siemens have their newest ~15 MW offshore turbines located. The guided tour starts and ends at the visitor center. The guide enthusiastically tells the story behind the Center and the Danish wind turbine adventure. After the guided tour, a lunch box will be served and visitors may enjoy touching and seeing a 63 m long wind turbine blade or walking up a 14 m (1/10) tower section, which gives a great view of the site.

Schedule:
08:30 Bus departure from AKKC (Parking in Front of the Scandic Aalborg City Hotel)
09:45 Arrival at the test center
10:00 Guided tour
12:00 Lunch & site seeing
13:00 End of event – departure back to Aalborg

The lunch is included in this visit.

© Østerild test center

TECHNICAL VISITS

Meeting Point (Friday 8 September 2023, 08:15):
The parking in front of the Scandic Aalborg City Hotel, Europa Plads 1, Aalborg.

Technical visit 3 to Vestas

Schedule:
Friday 8 September 2023, from 8.00 to 14.30 (FULLY BOOKED !)

Description of the visit

Vestas, the world's largest manufacturers of Wind turbines will welcome a limited number of participants to its Nacelle test center in Aarhus harbor. The visit will already start in the bus from Aalborg where Dr. Philip Carne Kjaer will give an introduction to Vestas and its test facilities.

After arrival at the test-center, the visitors will get safety instructions and safety equipment followed up by a two-hour tour in the test facilities. Here the visitors will experience and see a tens of MW nacelle being tested. The test bench is operated with MW power converters, which will be discussed and shown. The Event ends with Lunch and a Q&A session.

© Vestas

Schedule:

08:00 Bus from AKKC (Parking in Front of the Scandic Aalborg City Hotel)
09:30 Welcome with coffee & cake
10:00 Nacelle test-bench
11:00 Converter system
12:00 Lunch
12:30 Q&A
13:00 End of event – departure back to Aalborg

Practical information:

- Confidentiality: a Non-Disclosure Agreement (NDA) needs to be signed
- The lunch is included in this visit.

Meeting Point (Friday 8 September 2023, 07:45):
The parking in front of the Scandic Aalborg City Hotel, Europa Plads 1, Aalborg.

Technical visit 4 to Advent Technologies

Schedule:
Friday 8 September 2022, from 8:30 to 12:30

Description of the visit

Advent Technologies A/S is an innovation-driven company in the business of fuel cells and renewable energy technology. Our vision is to accelerate electrification and replace fossil fuel combustion with sustainable electrical energy through advanced materials, components and systems. In Aalborg Denmark, Advent develops and manufactures the SereneU high temperature PEM fuel cell unit, the provides clean energy for back-up, auxiliary, temporary and marine power. The fuel cell systems extends battery runtime and provides power to remote areas and applications, utilizing the energy available in

TECHNICAL VISITS

methanol fuels. The visit includes a presentation to the fuel cell technology and products and a tour to see the production facility and watch some of the systems in action. Finally Advent shares some product use cases and provides further insights into some of their current product developments.

Schedule:

08:30 Bus departure from AKKC (Parking in Front of the Scandic Aalborg City Hotel)
09:30 Welcome and refreshments at Lyngvej 3
09:45 Company and product presentation
10:30 Guided tour at the Lyngvej 8 facility
11:30 Regroup for Q&A
12:00 Departure

© Advent Technologies

Practical information:

- Restrictions: ***Participants are not allowed to take pictures***
- The lunch is not included in this visit.

Meeting Point (Friday 8 September 2023, 08:15):
The parking in front of the Scandic Aalborg City Hotel, Europa Plads 1, Aalborg.

Technical visit 5 to Aalborg University – Energy Department

Schedule:
Friday 8 September 2023, 9.00 -11.00 or 13.00 – 15.00

Description of the visit

Aalborg University (AAU) was established in 1974 and has since gained a strong reputation for its innovative approach to education by using problem-based learning (PBL). Education and research at AAU are organized in four faculties, which have a total of +20000 students and +3800 employees.

AAU Energy hosts laboratories (+5000 m2) within all parts of the energy field; our state-of-the-art laboratories range from smart energy systems labs, medium and high voltage equipment, to Power-to-X facility. The AAU Energy laboratories are in the center of many exciting projects where we collaborate with the energy sector to bring new technologies and concepts, from lab-scale to full-scale operation.

ADDRESSES:
- AAU Energy: Pontoppidanstræde (Pon.) 101 & 111, 9220 Aalborg Øst
- AAU Energy Laboratory: Pon. 105 & 107 & 109, 9220 Aalborg Øst

Schedules:
The program will start from Pon. 101, Room 1.001, and end at AAU Innovation. See the map below.

© Aalborg University

Morning Session (MS) Schedule:

09:00 – 09:30:	Introduction of the Department of Energy, AAU and the power electronics research activities (Prof. Frede Blaabjerg, Pon. 101, Room 1.001)
09:30 – 11:00:	Guided tours
After 11:00:	Coffee and networking (AAU Innovation)

Afternoon Session (AS) Schedule:

13:00 – 13:30:	Introduction of the Department of Energy, AAU and the power electronics research activities (Prof. Frede Blaabjerg, Pon. 101, Room 1.001)
13:30 – 14:00:	Guided tours
After 14:00:	Coffee and networking (AAU Innovation)

TECHNICAL VISITS

Attention: There is no lunch included in this visit.
Attention: You have to foresee in your own transportation.
(By public bus or Taxi (+/- 15 min from the city center @approx. 200 DKK)).
Location: Pontoppindanstræde 101, 9220 Aalborg East

Meeting Point (Friday 8 September 2023, 09:00 or 13:00):
Pontoppidanstræde (Pon.) 101, Room 1.001
Be present about 15 minutes before the start of the tour

GOLD

Company name: **Danfoss and Semikron Danfoss**
Booth #: **7**
Full address: Ulsnæs 1
6300 Gråsten
Denmark
Contact person: **Christian Uldal Graulund**
Phone: +45 26109797
E-Mail: christian.graulund@danfoss.com
URL: www.danfoss.com
www.semikron-danfoss.com
Product / Know-How: Danfoss Drives, member of the Danfoss Group, is a world leader in electrification and variable speed control of electric motors. Since 1968, we have contributed globally to meeting the need for energy-efficient infrastructure, connected systems, and integrated renewable energy. We employ more than 4700 experts in over 100 countries and offer the world's largest portfolio of power converters and AC drives. Our aim is to decarbonize society to meet climate goals, while driving our customers' business forward.
Semikron Danfoss is a global technology leader in power electronics. Our product offerings include semiconductor devices, power modules, stacks, and systems. With our innovative solutions for automotive, industrial, and renewable applications we help our customers to utilize energy more efficiently and sustainably and significantly reduce overall CO2 emissions. Semikron Danfoss is a family-owned business, merged by SEMIKRON and Danfoss Silicon Power in 2022. We employ more than 3,500 power electronics experts in 28 locations across the world.

Company name: **Mitsubishi Electric Europe B.V.**
Booth #: **14**
Full address: Mitsubishi-Electric-Platz 1
40882 Ratingen
German
Contact person: Mrs. Shiori Idaka
Phone: +49 21 02 486 0
E-Mail: semis.info@meg.mee.com
URL: https://www.meu-semiconductor.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.

SILVER

Company name: **BMW**
Booth #: **No booth**
URL: www.bmwgroup.com
Product / Know-How: With its four brands BMW, MINI, Rolls-Royce and BMW Motorrad, the BMW Group is the world's leading premium manufacturer of automobiles and motorcycles and also provides premium financial and mobility services.
The BMW Group production network comprises over 30 production sites worldwide; the company has a global sales network in more than 140 countries.
The success of the BMW Group has always been based on long-term thinking and responsible action.
The company set the course for the future at an early stage and consistently makes sustainability and efficient resource management central to its strategic direction, from the supply chain through production to the end of the use phase of all products.

Company name: **Infineon Technologies AG**
Booth #: **No booth**
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 / Know-How: 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. 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.
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, analog, and mixed-signal applications.

Company name: **Nexperia**
Booth #: **22**
Full address: Jonkerbosplein 52
6534 AB Nijmegen
The Netherlands
Phone: +31 24 353 7979
E-Mail: info@nexperia.com
URL: https://www.nexperia.com
Product / Know-How: Headquartered in the Netherlands, Nexperia is a global semiconductor company with a rich European history and over 15,000 employees across Europe, Asia, and the United States. As a leading expert in the development and production of essential semiconductors, Nexperia's components enable the basic functionality of virtually every electronic design in the world – from automotive and industrial to mobile and consumer applications.

Company name: **Vestas**
Booth #: **No booth**
Full address: Hedeager 42
8200 Århus N
Denmark
Contact person: Lars Helle

Phone: +4530530068
E-Mail: lah@vestas.com
URL: https://www.vestas.com
Product / Know-How: Wind turbines

Company name: **Volkswagen AG**
Booth #: **No booth**
Full address: Volkswagen Aktiengesellschaft
Brieffach 011/8107
38436 Wolfsburg
Germany
URL: https://www.volkswagen-karriere.de/en.html
Product / Know-How: We want to revolutionise the mobility of the future. To complete our mission, we need experts with a wide range of experience and expertise. Talented individuals who want to accomplish the extraordinary. And unconventional thinkers who believe in the power of big ideas. We are looking for people who are willing to travel completely new paths. People like you. So...are you in?

CONTRIBUTORS

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Germany
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E-Mail: jane.leesch@fujielectric-europe.com
URL: www.fujielectric-europe.com
Product / Know-How: Power Semiconductors

Company name: **Grundfos**
Booth #: **No booth**
Full address: Ormstrupvej 28
8850 Bjerringbro - Denmark
Contact person: Thorkild Kvisgaard
Phone: +45 87 50 14 00
E-Mail: tkvisgaard@grundfos.com
URL: www.grundfos.com
Product / Know-How: Water has always been the heart and soul of Grundfos. Therefore, we aim to be pioneering in solving the world's water and climate challenges and improving the quality of life for people.

Company name: **Hitachi Energy**
Booth #: **42**
Contact person: Signe Olsen
E-Mail: signe.olsen@hitachienergy.com
URL: www.hitachienergy.com
Product / Know-How: Hitachi Energy serves customers in the utility, industry and infrastructure sectors with innovative solutions and services across the value chain. Together with customers and partners, we pioneer technologies and enable the digital transformation required to accelerate the energy transition towards a carbon-neutral future.
We are advancing the world's energy system to become more sustainable, flexible and secure whilst balancing social, environmental and economic value. Hitachi Energy has a proven track record and unparalleled installed base in more than 140 countries. Headquartered in Switzerland, we employ around 40,000 people in 90 countries and generate business volumes of approximately $10 billion USD.

Company name: **KK Wind Solutions**
Booth #: **41**
Full address: Bøgildvej 3
7430 Ikast - Denmark
Contact person: Bjørn Rannestad
Phone: +45 5122 5336
E-Mail: bjran@kkwindsolutions.com
URL: www.kkwindsolutions.com
Product / Know-How: Building on more than 40 years of experience, KK Wind Solu-

tions is a leading systems supplier to the renewable energy industry. Our capabilities span developing state-of-the-art technologies, high-quality lean manufacturing, and flexible aftermarket services.
KK Wind Solutions is owned by A.P. Moller Holding, the parent company of the A.P. Moller Group, established in 1904 by Arnold Peter Møller.
Join us at our booth to explore the forefront of bionic design, 3D printing, and their transformative potential in power electronics.

Company name: **KOHSEL A/S**
Booth #: **21**
Full address: Sønderskovvej 1
8362 Hørning
Contact person: Morten Kohsel
E-Mail: morten@kohsel.dk
URL: https://kohsel.dk
Product / Know-How: Kohsel is a global supplier of customised inductive components for the power conversion and renewable energy segments. Our customers choose us, because we provide smarter solutions, a smooth order process and on-time deliveries. We are headquartered in Denmark and with more than 50 years of experience and 600+ employees, we deliver high quality components with built-in know-how.

Company name: **ModelingTech Energy Technology Co Ltd.**
Booth #: **43**
Full address: Room J2317,the 6th Building,
No.1288 Yecheng Road,
JiaDing District, Shanghai.
Contact person: Frank Chen
E-Mail: frank.chen@modeling-tech.com
URL: www.modeling-tech.com
Product / Know-How: ModelingTech Energy Technology Co., Ltd. is a company which focuses on the power electronics control and realtime simulation. The goal of ModelingTech is to help more power electronic researchers and engineers leverage the realtime simulation technology to tackle challenges of renewable energy and microgrid system.

Company name: **OPAL-RT**
Booth #: **17**
Full address: 196, rue Houdan
92330 Sceaux
France
Contact person: Louis Raymond
E-Mail: louis.raymond@opal-rt.com
URL: https://www.opal-rt.com/
Product / Know-How: Real-time simulation is enabling the world's visionaries to make innovative ideas a reality. OPAL-RT empowers engineers and researchers with accessible, cutting-edge, real-time simulation technology to accelerate the development of better products and more reliable energy transmission.
Since 1997, industries including automotive, aerospace, power electronics and power generation have increasingly turned to OPAL-RT, transforming the company into a world leader in real-time simulation and Hardware-in-the-Loop (HIL) testing equipment for electrical, electro-mechanical and power electronics systems.

Company name: **PECTA**
Booth #: **No booth**
Contact person: Roland Brüniger
E-Mail: roland.brueniger@brueniger.swiss
URL: www.iea-4e.org/pecta/
Product / Know-How: The Power Electronic Conversion Technology Annex PECTA is one of several Annexes within the IEA 4E Technology Collaboration Program of Energy Efficient End-Use Equipment. 4E´s PECTA assesses the efficiency benefit of utilizing the emerging Wide Band Gap (WBG) technology, keeps participating countries informed as markets for WBG technologies devices develop, and engages with research, government and industry stakeholders worldwide to lay the base for suitable policies in this area. The overall goal of PECTA includes collecting and analyzing information about new WBG based power electronic devices, coordinating internationally acceptable approaches that promote WBG-based power electronics and developing greater understanding and action amongst governments and policy makers.

Sponsors and Exhibiting companies

CONTRIBUTORS & EXHIBITORS

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Booth #: **24**
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Denmark
Contact person: Franck Pagnoux
E-Mail: franck.pagnoux@se.com
URL: www.se.com
Product / Know-How: We provide energy and automation digital solutions for efficiency and sustainability. We combine world-leading energy technologies, real-time automation, software and services into integrated solutions for Homes, Buildings, Data Centers, Infrastructure and Industries.

Company name: **Wolfspeed**
Booth #: **49**
Full address: 4600 Silicon Drive
Durham, NC 27703
USA
Contact person: Ian Milne
E-Mail: ian.milne@wolfspeed.com
URL: www.wolfspeed.com
Product / Know-How: Wolfspeed leads the market in the worldwide adoption of Silicon Carbide and GaN technologies. We provide industry-leading solutions for efficient energy consumption and a sustainable future. Wolfspeed's product families include Silicon Carbide materials, power-switching devices and RF devices targeted for various applications such as electric vehicles, fast charging, 5G, renewable energy and storage, and aerospace and defense.

EXHIBITORS

Company name: **Altoo Measurement Science ApS**
Booth #: **12**
Full address: Agern Allé 24, Bygning 3 st
2970 Hørsholm
Denmark
Contact person: Christen Simonsen
Phone: +45 45 80 12 15

E-Mail: christen.simonsen@altoo.dk
URL: www.altoo.dk
Product / Know-How: Altoo is an Northern European leader in measurement solutions and expertise, building on the foundation of Keysight Technologies measurement market leading equipment and technology.Our Mission is to provide engineers, Scientists and technicians the best fit measurement solutions to help them to measure, test and validate the performance of their electronic, wireless and photonic devices.

Company name: **Current OS Foundation**
Booth #: **20**
Contact person: Jean-François Léger
E-Mail: jean-francois.leger@se.com
URL: https://currentos.foundation
Product / Know-How: Current/OS empowers the future of Energy.
Direct Current is already all around us: PV, EV, LEDs, electronics.... Access to DC multi-sources applications offers autonomy through resilient power supply, even distribution, and the ability to utilise a property's sustainable capacity fully.
The Current/OS Foundation promotes a unified standard for DC multisource applications – By developing an ecosystem of manufacturers, we provide partners with an open Set of Rules for manufacturing or installing compatible devices that safely operate in a DC power distribution.

Company name: **Dovitech GmbH**
Booth #: **48**
Full address: Blokken 59
3460 Birkerød
Denmark
Contact person: Martin Weicker
Phone: +49 157 74481109
E-Mail: mwe@dovitech.dk
URL: https://dovitech.dk/
Product / Know-How: We are a Danish trading company specializing in the sale of electromechanical components, automation equipment, nanocrystalline cores and customized solutions. We are a team of selected employees with a high professional level, great commitment, and many years of industry experience.

Sponsors and Exhibiting companies

EXHIBITORS

Company name: **dSPACE GmbH**
Booth #: **18**
Full address: Rathenaustr. 26
33102 Paderborn
Germany
Contact person: Timotheus Geier
E-Mail: tgeier@dspace.de
URL: www.dspace.com
Product / Know-How: dSPACE is a leading provider of simulation and validation solutions worldwide for developing connected, autonomous, and electrically powered vehicles. The company's range of end-to-end solutions are used particularly by automotive manufacturers and their suppliers to test the software and hardware components in their new vehicles long before a new model is allowed on the road. Not only is dSPACE a sought-after partner in vehicle development, engineers also rely on our know-how at dSPACE when it comes to aerospace and industrial automation. Our portfolio ranges from end-to-end solutions for simulation and validation to engineering and consulting services as well as training and support. With approximately 2,400 employees worldwide, dSPACE is headquartered in Paderborn, Germany. It has three project centers in Germany and serves customers through its regional companies in the USA, the UK, France, Japan, China, Croatia, South Korea, and India.

Company name: **ECPE**
Booth #: **1**
Full address: Landgrabenstr. 94
90443 Nuremberg
Germany
Contact person: Lena Somschor
Phone: +49 (911) 820288-18
E-Mail: lena.somschor@ecpe.org
URL: www.ecpe.org
Product / Know-How: ECPE European Center for Power Electronics is an industry-driven research network in the field of Power Electronics. In the meantime, the network comprises about 100 Member Companies. Furthermore, over 100 European universities and research institutes are integrated in the network as so-called Competence Centres. The focus of ECPE activities is on pre-competitive research, education and advanced training as well as public relations for power electronics in Europe.

Company name:	**EGSTON Power Electronics**
Booth #:	**33**
Full address:	EGSTON Power Electronics Inkustraße 1-7/Stiege 2 3400 Klosterneuburg Austria
Contact person:	Elisabeth Birke
Phone:	+436645231859
E-Mail:	elisabeth.birke@egstonpower.com
URL:	https://www.egstonpower.com/
Product / Know-How:	https://www.egstonpower.com/product-overview/

Company name:	**Frenetic**
Booth #:	**47**
Contact person:	Martina Visini
Phone:	+34 684 14 10 35
E-Mail:	martina.visini@frenetic.ai
URL:	www.frenetic.ai
Product / Know-How:	Frenetic is a Spanish start-up born to change the Power Electronics industry. Frenetic provides the most powerful simulation and design software for Magnetic Components, a web-based platform that enables the users to compare millions of different possibilities for their magnetic components in just a few seconds and with the highest accuracy in the market, as well as an automatic connection with samples and mass production units delivered in just a few weeks.

Company name:	**GOmeasure ApS**
Booth #:	**4**
Full address:	Værkstedsgården 14 2620 Albertslund Denmark
Contact person:	Tommi Sørensen
Phone:	+ 45 313 314 75
E-Mail:	ts@gomeasure.dk
URL:	www.GOmeasure.dk
Product / Know-How:	GOmeasure is a proud Scandinavian test & measurement company. With leading edge products and a wide range of test solutions we are the GO-TO place for electronics testing. We help

engineers develop and produce products in education, military, communications and more. Our more than 30 partners include Tektronix, Keithley, Anritsu, Hioki, Chroma, Audio Precision, GRAS Sound & Vibration, Svantek, Ametek and many more.

Company name: **HIOKI Europe GmbH**
Booth #: **5**
Full address: HIOKI EUROPE GmbH
Helfmann-Park 2
D-65760 Eschborn
Germany
Contact person: Roy Hali, Head of Product Management
Phone: +49-(0)6196-76515-61
E-Mail: hioki@hioki.eu
URL: www.hioki.eu
Product / Know-How: High-accuracy Power Analyzers, Current Sensors, High Voltage Dividers, Impedance analyzers, LCR Meters, Battery Testers, Resistance Meters, Power Meters
HIOKI is the only test and measurement manufacturer who offers both high-end power analysers and ring-type transducers, current clamps and current sensors from its own development and production. This combination of high-accuracy measurement technology and sensor technology from one development source is the origin of HIOKI's unique power analysis solutions. The perfect coordination of both technologies enables to achieve exceptionally high measurement accuracies especially for high-power and high-frequency measurements as they are common in SiC- or GaN-based applications.

Company name: **IEEE Power Electronics Society**
Booth #: **36**
Full address: 445 Hoes Lane
Piscataway, NJ 08854
United States
Contact person: Megan Cichocki
Phone: +1 732 562 3895
E-Mail: m.cichocki@ieee.org
URL: https://www.ieee-pels.org/
Product / Know-How: The Power Electronics Society (PELS) is one of the fastest-growing technical societies of the Institute of Electrical and Electron-

ics Engineers (IEEE). For over 35 years, 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. PELS also publishes the IEEE Transactions on Power Electronics (TPEL), a top referenced journal among all IEEE publications.

PELS is dedicated to:

- Upholding the vital scientific and educational aspects of power electronics and their applications.
- Keeping its members around the globe up to date on state-of-the-art technological developments and advances in power electronics research.

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.

Company name: **imperix**
Booth #: **44**
Full address: Route des Ronquos 23
1950 Sion
Switzerland
Contact person: Simon Delalay
Phone: +41 27 552 06 60
E-Mail: simon.delalay@imperix.ch
URL: www.imperix.com
Product / Know-How: Imperix is a Swiss company developing 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, intended 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.

Company name: **InfraTec GmbH Infrarotsensorik und Messtechnik**
Booth #: **34**
Full address: Gostritzer Str. 61-63
01217 Dresden
Germany
Contact person: Torsten Koenig
E-Mail: T.Koenig@InfraTec.de
URL: www.infratec.de
Product / Know-How: InfraTec GmbH Infrarotsensorik und Messtechnik is an owner-managed company located in Dresden, Germany. The main focus is the development and manufacturing of thermographic systems and pyroelectric sensors. More than 240 employees in development, production, sales, marketing and service ensure highest product quality and customer satisfaction. A strong network of partners provides the products and services worldwide. InfraTec's Infrared Measurement Division is one of the leading suppliers of commercial thermal imaging technology for thermographic temperature measurement. The wide range of high-performance cameras like its ImageIR® series together with InfraTec's efficient and convenient thermographic software IRBIS® will make electronics testing also at a µm scale fast and precise. Additional lock-in routines allow for the detection of failures resulting only in smallest thermal differences in the µK range. The fully integrated solution E-LIT will most effectively run complex testing routines of PCB, chips or components based on specific customer demands.
The Infrared Sensor Division manufactures various customised pyroelectric infrared detectors with highest availabilities in its own cleanroom facility.
The scope of services ranges from the sale of individual systems and the equipment with OEM components to the supply of turnkey thermographic automation solutions.

Company name: **ITECH Electronic Co Ltd.**
Booth #: **11**
Full address: No.150, Yaonan Road
Nanjing
China
Contact person: Jenny Zhuang
Phone: +86 25 52415098
E-Mail: info@itechate.com
URL: www.itechate.com
Product / Know-How: AC/DC power supply, AC/DC electronic load, grid simulator, source measure unit, power test system

Company name: **IWATSU Test Instruments Europe GmbH**
Booth #: **51**
Full address: Königsteiner Str. 98
DE-65812 Bad Soden am Taunus
Germany
Contact person: Nadja Lääperi
Phone: +49 (0)6196 999 5200
E-Mail: sales@iwatsu-europe.com
URL: www.iwatsu-europe.com
Product / Know-How: IWATSU was founded 1938 in Tokyo, Japan. IWATSU offers a broad portfolio of test & measurement equipment, and solutions for telecommunications and printing systems. High power semiconductor curve tracers up to 5000V and 2000A, 10MHz B-H analyzers for soft-magnetic material characterization, stand-alone 5000V CV Measurement Systems, and a variety of probing solutions like Rogowski coil Current Probes up to 100MHz, precise AC/DC Current Probes up to 500A and high voltage probes for latest measurement challenges in power electronics applications.

Company name: **Keysight Technologies**
Booth #: **13**
Contact person: Davide Beretta
E-Mail: davide_beretta@keysight.com
URL: www.keysight.com
Product / Know-How: Keysight Technologies Inc. (NYSE: KEYS) is the world's leading electronic measurement company, transforming today's measurement experience through innovations in wireless, modular,

and software solutions. With its HP and Agilent legacy, Keysight delivers solutions in wireless communications, aerospace and defense and semiconductor markets with world-class platforms, software and consistent measurement science. The company's nearly 10,500 employees serve customers in more than 100 countries.

Company name: **Leapers Semiconductor Co Ltd.**
Booth #: **25**
Contact person: Alexey Cherkasov
E-Mail: Alexey.Cherkasov@leapers-power.com
URL: www.leapers-power.com
Product / Know-How: Leapers Semiconductor is an innovative developer and manufacturer of power semiconductors, SiC and IGBT modules for power electronics applications. The company was founded in 2019 by the top engineers coming from leading power semiconductor companies in Japan.

Leapers Semiconductor's team is comprised of experienced professionals with deep knowledge of wafer process, semiconductors design and packaging, quality control, product application, supply chain, customer support, sales, and marketing. Company's dedication to every detail provides partners with highly reliable silicon carbide (SiC) modules and IGBT modules for various applications like new energy vehicles, smart grid, solar and wind power generation, motor drives, medical equipment, traction, etc.

By using innovative advanced packaging material and processing technology, Leapers Semiconductor provides comprehensive module application solutions for miniaturization, efficiency and light weighting of electrical drive systems and inverters of new energy vehicles.

Company's R&D is based in Kumagaya, Japan, and supported by the top semiconductor engineers and industry veterans. HQ is located in Wuxi, China.

Leapers Semiconductor's SiC power modules portfolio includes various packages with 25A to 800A, 1200/1700V.

Company name: **MathWorks**
Booth #: **27**
Contact person: Niels Van Iwaarden
E-Mail: nvaniwaa@mathworks.com
URL: 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: **Metronic ApS**
Booth #: **35**
Contact person: Niels Brix
Phone: +45 43 96 30 10
E-Mail: nb@metronic.dk
URL: www.metronic.dk
Product / Know-How: Metronic ApS, is a Test & Measurement company located in Herlev close to Copenhagen.
Our business model is based on a distribution set-up, where we represent a number of leading suppliers.
Our customers are universities, industry and defence.
We want to be respected because of our technical skills and product knowledge.
Important Products/Brands:
Teledyne LeCroy: oscilloscopes, Arb. generators. Yokogawa: Power analysers, Optical spectrum analysers, sources. Optris: Infrared temperature measurement. Magna-Power: DC power supplies. PEM: Rogowski coils. Janitza: Switch board instruments, PQ analysers

Company name: **OMICRON Lab**
Booth #: **3**
Full address: OMICRON electronics GmbH
OMICRON Lab
Oberes Ried 1
6833 Klaus
AUSTRIA

Contact person: Markus Pfitscher
Phone: +43 59495 2812
E-Mail: markus.pfitscher@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: **OpSens Solutions**
Booth #: **39**
Full address: 319 rue Franquet, bureau 110
Québec QC G1P 4R4
CANADA
Contact person: Charles Leduc
E-Mail: charles.leduc@opsens.com
URL: www.opsens-solutions.com
Product / Know-How: Opsens Solutions develops, manufactures, and supplies a wide range of innovative fiber optic sensing solutions and associated signal conditioners based on proprietary technologies.
Integrated temperature measurement during the testing phase and operation phase of the modules has been identified as the solution for increasing the reliability of these devices. The EM immunity, response time and size of fiber optic sensors combined with other technological benefits provide efficient monitoring diagnostics of power electronic components under stress. Especially for applications like:

- Power cycling
- Thermal stress analysis
- High voltage environments

- Junction temperature evaluation of transistor
- Temperature mission profile of power modules
- Quality control of integrated circuit
- Thermal modeling assessment
- Active monitoring of power electronics during service

Company name: **PCIM Europe**
Booth #: **16**
Full address: Rotebühlstraße 83 – 85
70178 Stuttgart
Germany
Contact person: Anna Schulze Niehoff
E-Mail: anna.schulze-niehoff@mesago.com
URL: www.pcim.mesago.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. The exhibition covers the entire supply chain: from the component up to drive electronics, packaging and the final intelli¬gent system.

Company name: **Plexim GmbH**
Booth #: **6**
Full address: Technoparkstrasse 1
8005 Zurich - Switzerland
Contact person: Orhan Toker
Phone: +41 44 533 51 14
E-Mail: toker@plexim.com
URL: Plexim.com
Product / Know-How: Plexim, with locations in Zurich and Boston, is an innovative software 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:	**PMK Mess- und Kommunikationstechnik GmbH**
Booth #:	**50**
Full address:	Königsteiner Str. 98 DE-65812 Bad Soden am Taunus - Germany
Contact person:	Nadja Lääperi
Phone:	+49 (0)6196 999 5000
E-Mail:	sales@pmk.de
URL:	www.pmk.de
Product / Know-How:	Probing solutions for the most challenging electrical measurements for universal use with any modern oscilloscope, independent of manufacturer. Portfolio of high voltage or precision probing solutions, differential or single-ended, current probing solutions and easy to use positioning systems for probes and PCBs. The full probing solution for high-side and low-side half-bridge analysis is available. NEW: Optically-isolated probe series FireFly: Market-leading 1.5GHz bandwidth and 180dB CMRR with highest temperature stability, ideal for VGS or current shunt measurements in GaN and SiC devices NEW: High-voltage differential probe series BumbleBee: 200V to 2000V models with up to 500MHz bandwidth and low noise input, ideal for VDS measurements in power devices. NEW: High-speed Differential Probe series HSDP: 60V CM at up to 4GHz bandwidth and differential input ranges up to ±42V, ideal multi-purpose probe. NEW: MMCX-Probe series: <4pF lowest loading and repeatable ± 42Vpeak measurements up to 1GHz with direct MMCX connectivity

Company name: **Powersys**
Booth #: **28**
Full address: Les Jardins de l'Entreprise
13610 Le Puy-Sainte-Réparade
France
E-Mail: sales@powersys-solutions.com
URL: www.powersys-solutions.com
Product / Know-How: Powersys revolutionizes e-design, accelerates electrification. We are a global electrical engineering software and services provider, offering fully customized solutions to accelerate the design of Power Systems. For 20 years, we have delivered our solution to more than 2500 customers in over 80 countries, enabling our clients to solve their complex electrification challenges in EV and Grid. Our solution includes electrical engineering expertise, simulation software and power computing.

Company name: **Rohde &Schwarz Denmark A/S**
Booth #: **37**
Full address: Lyskær 3D, 1.
2730 Herlev
Denmark
URL: www.rohde-schwarz.com
Product / Know-How: Rohde & Schwarz Danmark is a leading supplier of high quality solutions in the following business fields:

- Test and Measurement
- Aerospace - Defense - Security
- Broadcast and Media
- Critical Infrastructures
- Cybersecurity
- Governmental Security

As a part of the international Rohde & Schwarz Group, Rohde & Schwarz Danmark offers its customers the best from both worlds - access to local expertise and presence, as well as the opportunity to share knowledge and ressources from our global organization.
Founded more than 80 years ago in Munich, this independent company has an extensive sales and service network and is present in more than 70 countries.

Sponsors and Exhibiting companies

EXHIBITORS

Company name:	**Typhoon HIL Inc.**
Booth #:	**10**
Full address:	Seminarstrasse 85 Wettingen, Aargau Switzerland
Contact person:	Dragan Zuber
Phone:	+38163583707
E-Mail:	zuber@typhoon-hil.com
URL:	https://www.typhoon-hil.com/
Product / Know-How:	Typhoon HIL Inc. is the market and technology leader in the rapidly-growing field of ultra-high-fidelity controller-Hardware-in-the-Loop (C-HIL) simulation for power electronics, microgrids, and distribution networks. We provide industry-proven, vertically integrated test solutions along with the highest-quality customer support. The company was founded in 2008 and since then has been creating products distinguished by the ultimate ease of use, unrivaled performance, leading-edge technology, and affordability. Designed with love, from the ground up, Typhoon HIL tools offer a unique user experience free of third-party software and hardware complexities. As a result, Typhoon HIL Control Center, with all the libraries installs with a single click, models compile in seconds, digital inputs are sampled as low as at a 3.5 ns resolution, and real-time simulation runs with a time step as low as 200 ns on the latest generation of Typhoon HIL products. We deeply believe that less is more when it comes to test equipment that our customers love. We stand behind our seamlessly integrated technology stack, from Typhoon HIL's application-specific processors and ultra-robust numerical solver all the way to the Schematic Editor, SCADA system, and TyphoonTest testing automation. The complete technology stack empowers our customers to continuously exceed their controller software quality, performance, and time-to-market goals

Company name: **Yokogawa**
Booth #: **32**
Full address: Euroweg 2
3825 HD Amersfoort
The Netherlands
Contact person: Michael Rietvelt
E-Mail: Michael.rietvelt@yokogawa.com
URL: www.tmi.yokogawa.com/eu/
Product / Know-How: Yokogawa has been developing measurement solutions for over 100 years, consistently finding new ways to give R&D teams the tools they need to gain the best insights from their measurement strategies. As well as offering a wide ranging product lineup and an extensive range of calibration and other services, the company has pioneered accurate power measurement throughout its history, and is the market leader in digital power analyzers.
Yokogawa instruments are renowned for maintaining high levels of precision and for continuing to deliver value for far longer than the typical shelf-life of such equipment. Yokogawa believes that precise and effective measurement lies at the heart of successful innovation – and has focused its own R&D on providing the tools that researchers and engineers need to address challenges great and small.

Company name: **ZES Zimmer Electronic Systems GmbH**
Booth #: **31**
Full address: Pfeiffstraße 12
61440 Oberursel
Germany
Contact person: Mr. Patrick Fuchs
Phone: +49 6171 88832 91
E-Mail: pfuchs@zes.com
URL: https://www.zes.com
Product / Know-How: Precision Power Analyzers
Power Measurement Technology
CE Compliance Test Systems
High-Voltage Dividers
Precise Current Transducers
Support and Consulting in Power Analysis
Calibration Service of LMG series Power Analyzers and Accessories

Planning Vendor Sessions

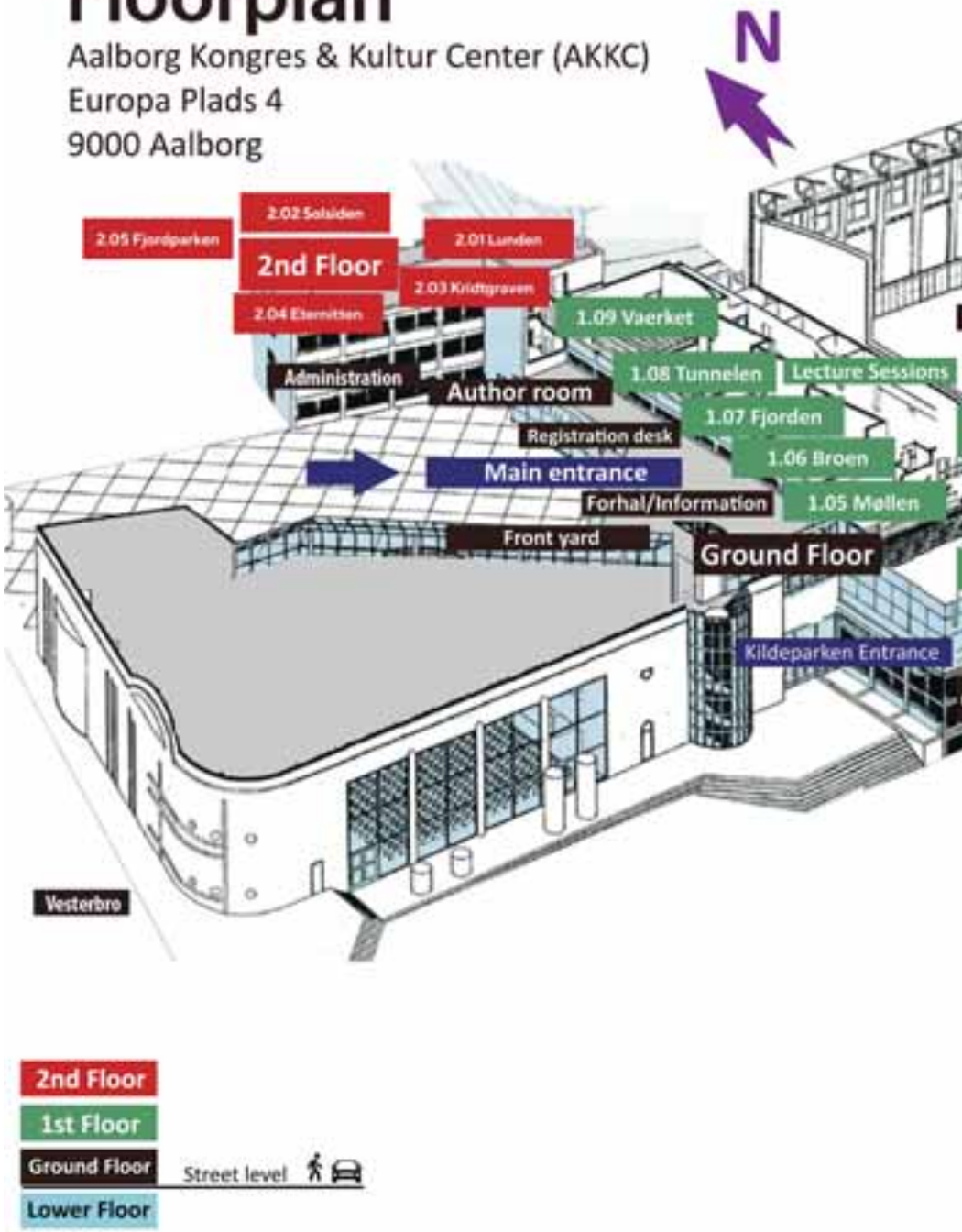
VENDOR SESSION AREA IN VENDOR SESSION AREA IN FUNDAMENTET

Timing	Tuesday 5 September
11.10 – 11.25	
11.30 – 11.45	Leapers Semiconductor
11.50 – 12.05	Current OS
12.10 – 12.25	GOmeasure
12.30 – 12.45	
12.50 – 13.05	Typhoon HIL
13.10 – 13.25	Danfoss & Semikron Danfoss
13.30 – 13.45	Nexperia
13.50 – 14.05	Wolfspeed
14.10 – 14.30	Schneider Electric
Timing	**Wednesday 6 September**
11.10 – 11.25	Hioki Europe
11.30 – 11.45	ModelingTech
11.50 – 12.05	MathWorks
12.10 – 12.25	Plexim GmbH
12.30 – 12.45	Hitachi Energy
12.50 – 13.05	Omicron Lab
13.10 – 13.25	EGSTON Power Electronics
13.30 – 13.45	OPAL-RT Technologies
13.50 – 14.05	Volkswagen
14.10 – 14.30	

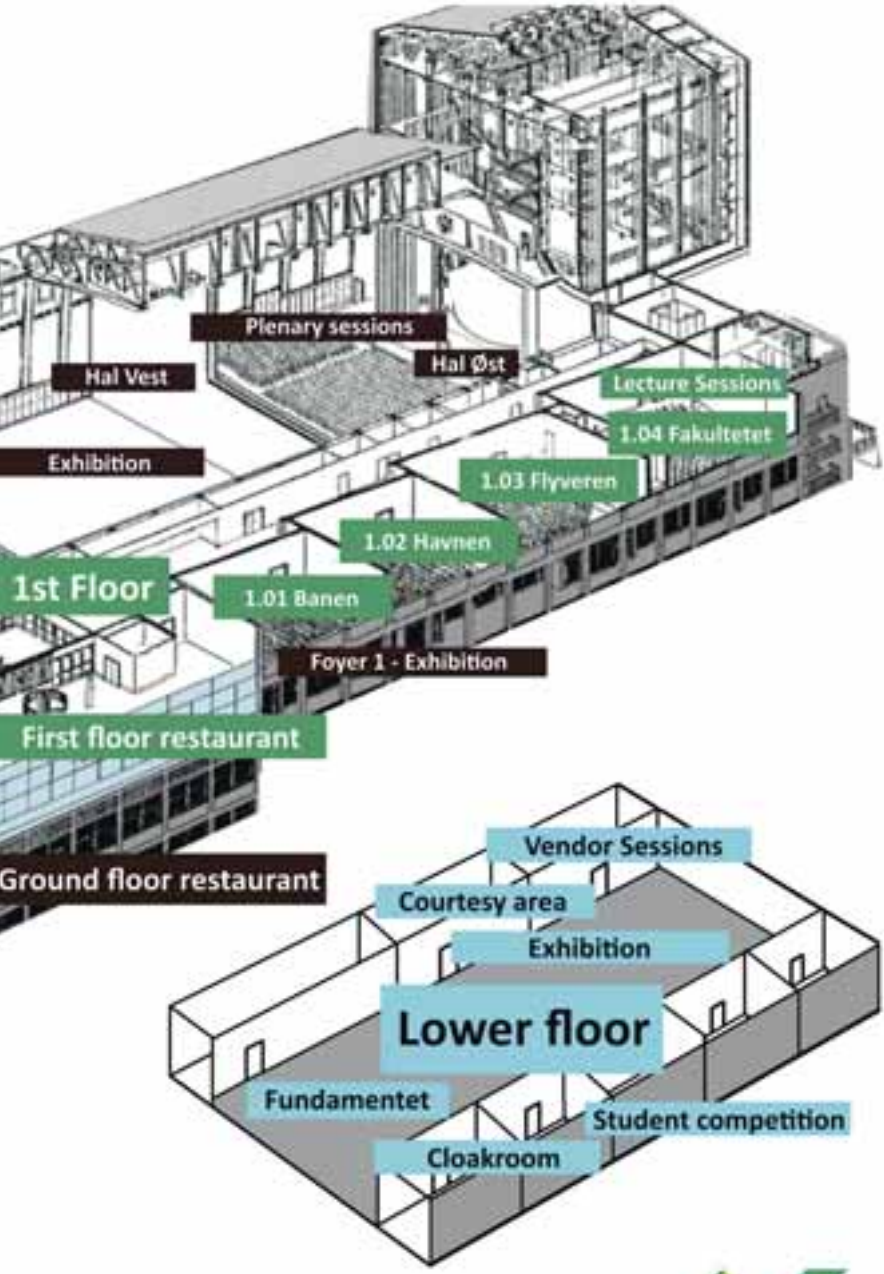
Timing	Thursday 7 September
11.10 – 11.25	ZES Zimmer Electronic Systems GmbH
11.30 – 11.45	
11.50 – 12.05	Frenetic
12.10 – 12.25	
12.30 – 12.45	
12.50 – 13.05	dSPACE
13.10 – 13.25	Infratec GmbH
13.30 – 13.45	
13.50 – 14.05	
14.10 – 14.30	

Floorplan

Aalborg Kongres & Kultur Center (AKKC)
Europa Plads 4
9000 Aalborg



2nd Floor
1st Floor
Ground Floor
Street level
Lower Floor

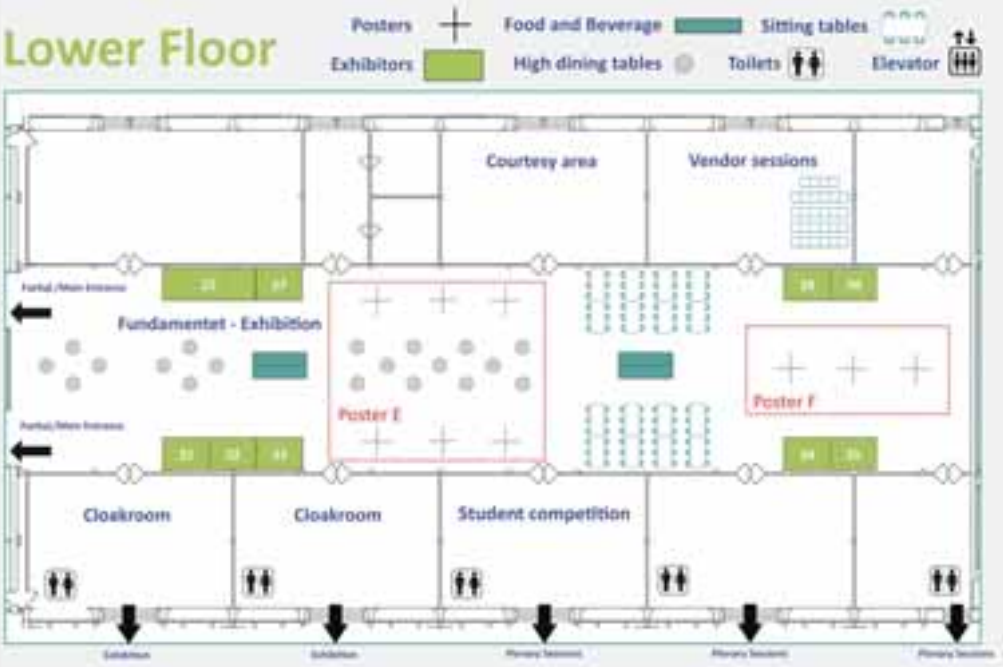


Aalborg Kongres
& Kultur Center

Ground Floor


Posters
Food and Beverage
Sitting tables
Exhibitors
High dining tables
Toilets
Elevator
oster A
tion
Poster B
49
41
6
7
10
42
43
44
Hal Øst
Plenary sessions
Lower floor
Lower floor
Lower floor
Lower floor
Poster C
Foyer 1 - Exhibition
Poster D
24
22
14
16
17
18
20
21
Kildeparken

Lower Floor

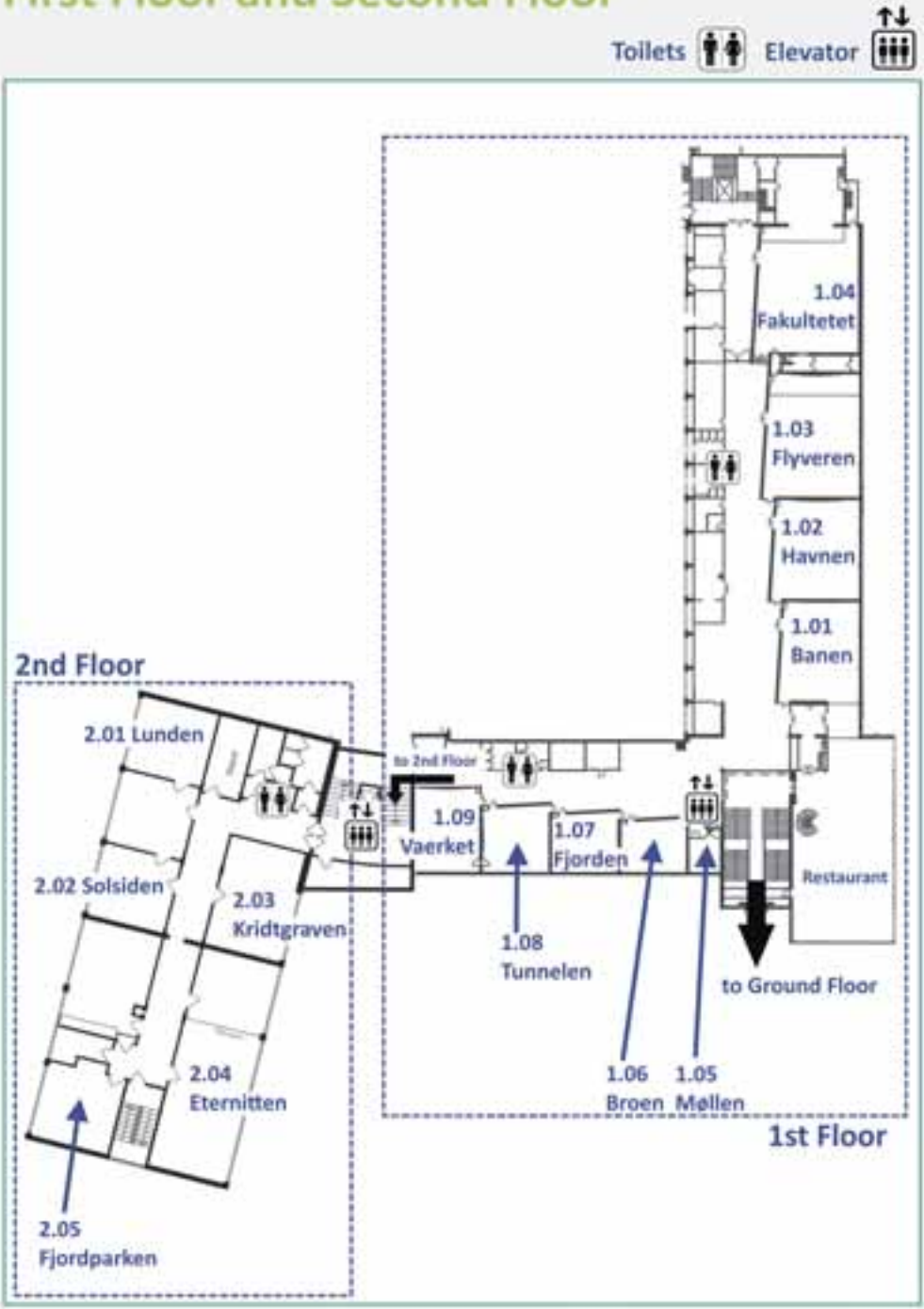


Exhibitors at EPE'23 ECCE Europe

1 ECPE - European Center for Power Electronics E.V.
2 Fuji Electric Europe GmbH
3 OMICRON electronics GmbH
4 GOmeasure ApS
5 Hioki Europe GmbH
6 Plexim GmbH
7 Danfoss and Semikron Danfoss
10 Typhoon HIL Inc.
11 ITECH Electronic Co Ltd.
12 Altoo Measurement Science ApS
13 Keysight Technologies Inc.
14 Mitsubishi Electric Europe BV
16 PCIM Europe
17 Opal-RT
18 dSPACE GmbH
20 Current/OS Foundation
21 KOHSEL A/S
22 Nexperia
24 Schneider Electric
25 Leapers Semiconductor Co Ltd.
27 MathWorks
28 Powersys
31 ZES Zimmer Electronic Systems GmbH
32 Yokogawa
33 EGSTON Power Electronics
34 InfraTec GmbH Infrarotsensorik und Messtechnik
35 Metronic ApS
36 IEEE Power Electronics Society
37 Rohde & Schwarz Denmark
39 Opsens Solutions
41 KK Wind Solutions
42 Hitachi Energy
43 ModelingTech Energy Technology Co Ltd.
44 Imperix
47 Frenetic
48 Dovitech A/S
49 Wolfspeed
50 PMK Mess- und Kommunikationstechnik GmbH
51 IWATSU

First Floor and Second Floor

Toilets Elevator



Monday 4 September 2023
Tutorial Day
Tuesday 5 September 2023
Conference Day 1
Wednesday 6 S
Tutorials
Tutorial Lunch & Tutorial Registration
Tutorials
Coffee break (30 min)
Lunch
Coffee break (30 min)
Industrial Forum
Industrial Forum
Industrial Forum
Industrial Forum
Welcome reception
EPE'23 ECCE Europe Layout
Topic 11 (Focus Topic 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)

eptember 2023	Start time of slot	Thursday 7 September 2023	Start time of slot	Friday 8 September 2023

Thursday 7 September 2023

Conference Day 3
Emerging Technologies in Power Electronics

Registration 08:00-14:00 [illegible]

Keynote 3: [illegible] Emerging Power Electronic Devices and [illegible]
Plenary Room - [illegible]

Keynote 4: [illegible] Reliability and AI in Power Electronics
Plenary Room - [illegible]

Coffee break (20 min)

Focus Topic Session [illegible] Emerging Topic Plenary | Session [illegible] 1.03 Plyssen? | Session [illegible] 1.02 Havnen? | Session [illegible] 1.06 Tunsteen? | Session [illegible] 1.08 Vestkai?

[illegible] & Exhibition Coffee break Exhibition hall

Lunch

Award Session
Plenary Room
[illegible]

[illegible] Session
Plenary Room
[illegible]

Coffee break (30 min)

Focus Topic Session [illegible] Reliability & AI Plenary | Session [illegible] 1.03 Plyssen? | Session [illegible] 1.02 Havnen? | Session [illegible] 1.06 Tunsteen? | Session [illegible] 1.08 Vestkai?

Industrial Forum (Emerging Technologies) 1.01 Bessel?

Industrial Forum (Reliability & AI) 1.02 Havnen?

[illegible] Dinner

Friday 8 September 2023

Tutorials & Technical Visits

Tutorials Registration [illegible]

Tutorials: See programme

Technical visits: See programme

Departure from [illegible] begins at [illegible]

Tutorial Lunch & Tutorial Registration

Tutorials: See programme

Plenary	Plenary Room - [illegible]
Room 1.04	Fakultetet?
Room 1.03	Plyssen?
Room 1.02	Havnen?
Room 1.01	Bessel?
Room 1.06	Tunsteen?
Room 1.08	Vestkai?
Vendor sessions	Vendor Session Area

Tutorials

Technical Visits

Evening) Events in [illegible]

Evening) Events not in [illegible]

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EPE Association and the Organizers of EPE'23 ECCE Europe would like to thank the following partners:

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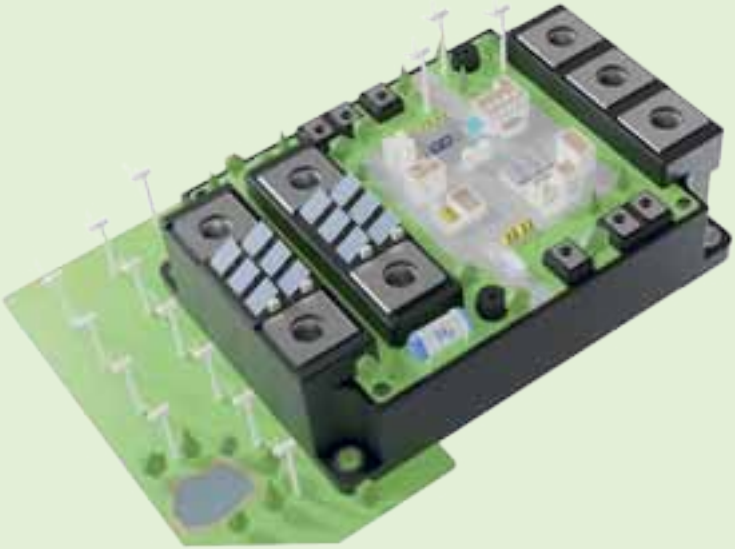

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