

## Organisational Information

Sign up at: [www.ecpe.org/events](http://www.ecpe.org/events)

Registration Deadline:

**20 June 2024**

Participation Fee:

- € 720,- \* for industry
  - € 525,- \* for universities/institutes
  - € 180,- \* for students/PhD student  
(limited spaces; copy of students ID required)
- \* plus VAT

- The on site participation fee includes dinner, lunches, coffee/soft drinks and digital proceedings. The reduced (PhD) students fee includes all except for dinner (can be booked for an extra fee of € 50,-\*)
- The online participation includes remote access via the meeting software Webex and digital proceedings.
- Digital proceedings will be provided by download link latest one day before start of the event. A printed handout is available on request.
- Upon receipt of registration confirmation via email you are signed-up for the event. The invoice will be sent via email.
- Three participants from each ECPE member company free of charge. Allocation in sequence of registration.
- 10% discount on university/institute fee for participants from ECPE competence centres.
- Further information (hotel list and maps) will be provided after registration and can be found on the ECPE web page.
- Cancellation policy: Full amount will be refunded in case of cancellation upon to 2 weeks prior to the event. After this date 50 % of the fee is non-refundable (replacement is possible).

18/06/24

## Organisational Information

**Organiser** ECPE e.V.  
Ostendstrasse 181  
90482 Nuremberg, Germany  
[www.ecpe.org](http://www.ecpe.org)

**Technical Chair** Prof. Francesco Iannuzzo,  
Aalborg University, Denmark  
Dr. Stefan Molloy,  
Infineon Technologies Austria  
Dr. Wolfgang Wondrak, Germany

**Technical Contact** Dr. Chris Gould, ECPE e.V.  
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**Organisation** Ingrid Bollens, ECPE e.V.  
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**Venue** NH Hotel Villa de Bilbao  
Gran Vía 87  
48011 Bilbao, Spain



Source: NH Hotel Villa de Bilbao  
Source graph front page: ECPE e.V.



European Center for  
Power Electronics e.V.

## Hybrid Event

### ECPE Workshop

### Condition & Health Monitoring in Power Electronics

27 - 28 June 2024  
Bilbao, Spain / hybrid



in cooperation with



# ECPE Hybrid Workshop

## Condition & Health Monitoring in Power Electronics

27 - 28 June 2024  
Bilbao, Spain / hybrid

Condition and Health Monitoring (CHM) is an effective means of improving the availability of power electronic components, converters and systems, whilst also controlling the life-time cost considering maintenance and repair. Many solutions have been developed, but their adoption in industrial applications still requires significant development. Advanced CHM techniques that open new possibilities for industrialisation will be presented and discussed. Their potential, limitations and implementation will be outlined and critically reviewed with the goal to benefit both industrial applications and research.

A significant part of the workshop is dedicated to CHM for semiconductor power devices and modules, including topics such as prognostics-based qualification for power electronics. Prognostic Health Management (PHM) necessitates technologies to predict the future failure rate of the products by employing deterministic remaining useful lifetime methods. This will also lead to significant sustainability improvements with cost and environmental benefits spanning the entire product lifecycle.

In-situ methods for estimation of junction temperature and use of Temperature Sensitive Electrical Parameters (TSEPS) will be reviewed. The CHM of other key materials and components, such as capacitors and substrate technologies will also be addressed.

This planned two-day Hybrid Workshop intends to incorporate all of the above issues using industrially motivated research and speakers from the automotive, industrial and renewable drives sectors, in order to provide a system level description of techniques and best practices.

### The workshop is chaired by:

Prof. Francesco Iannuzzo, Aalborg University, Denmark  
Dr. Stefan Mollov, Infineon Technologies Austria

Dr. Wolfgang Wondrak, Germany

All presentations and discussions will be in English.

## Programme

### Thursday, 27 June 2024

- 09:00 Registration & Welcome Coffee / Webex started
- 09:30 Welcome, Opening and Introduction into the Topic  
Technical Chairs, Chris Gould, ECPE

#### Introduction

- 10:00 **Keynote: Opportunities for Power Electronics and Perspectives for CHM**  
Stefan Mollov, Infineon Technologies Austria (AT)

#### CHM/PHM of Power Devices and Modules

- 10:30 **In-situ Junction Temperature Measurement and Condition Monitoring – State of the art and new approaches**  
Marco Denk, University of Applied Science Coburg (DE)
- 11:00 **A Case for Multi-Chip Temperature Data**  
Nick Baker, The University of Alabama (US)

#### 11:30 Break

- 12:00 **Challenges related to WBG Power Devices at High Frequencies**  
Bernado Cogo, IRT Saint Exupéry (FR)

- 12:30 **Data-driven Health Monitoring of Power Modules Using Generated Data for Traction Inverters**  
Elena Blazhevskaya, Virtual Vehicle Research GmbH (AT)

#### 13:00 Lunch Break

- 14:00 **Thick-film Thermocouples for Close-to-chip Temperature Measurements in Power Modules**  
Henry Barth, Fraunhofer IKTS (DE)

- 14:30 **Degradation Detection of Power Electronic Modules using Phase Shift Spectroscopy**  
Tianlong Albert, RWTH Aachen University (DE)

#### CHM/PHM on System Level

- 15:00 **Sensorless Condition Monitoring by AI-based Analysis of Controller Value**  
Marc Hiller, Karlsruhe Institute for Technology (DE)

#### 15:30 Break

- 16:00 **Condition Monitoring for Electronics in Renewable Energy Applications**  
Daniel Clemens, SMA (DE)

- 16:30 **Towards Self-healing Converters – Capitalising on CHM Techniques**  
Stefan Mollov, Infineon Technologies Austria (AT)

#### 17:00 End of 1<sup>st</sup> Day

- 20:30 Dinner: Restaurant „Bocado“  
Gardoki Kardenalaren Kalea, 6, Abando;  
48008 Bilbo, Spain

## Programme

### Friday, 28 June 2024

- 08:30 Webex started

#### CHM/PHM on System Level (Continued)

- 09:00 **Physics-Based Condition Monitoring: Training Surrogate Models with Thermo-Mechanical Finite Element Simulations for Degradation Analysis**  
Tobias Daniel Horn, Fraunhofer ENAS (DE)

- 09:30 **Thermal Precision for Enhanced Semiconductor Health**  
Varaha Satya Bharath Kurukuru, Silicon Austria Labs (AT)

#### CHM for eMobility

- 10:00 **Condition & Health Monitoring for Power Electronics Railway Systems: Needs, Opportunities and Challenges**  
Emmanuel Batista, Michel Piton, Alstom Group (FR)

- 10:30 **Condition Monitoring of Automotive Power Modules**  
Evgeny Kusmenko, Infineon Technologies (DE)

#### 11:00 Break

- 11:30 **From Auto-Grade to EV-Grade: New Concepts and Qualification Methods for Extended Mission Profiles**  
Denis Dutey, STMicroelectronics (FR)

- 12:00 **Foundations for e-Powertrains Robustification**  
Bruno Condamine, Valeo (DE)

#### Reliable Useful Lifetime Modelling

- 12:30 **CHM-Enhanced Reliable Useful Lifetime Modelling to Support Circular Economy Strategies like Re-use**  
Johannes Jaeschke, Fraunhofer IZM (DE)

#### 13:00 Lunch Break

- 14:00 **From Condition Monitoring to Predictive Maintenance: The Role of Prognostics, Particle Filter and Statistical Reliability Models**  
Kai Hencken, ABB (CH)

- 14:30 **Remaining Useful Life Prediction in Condition & Health Monitoring: Case Studies and Challenges**  
Shuai Zhao, Aalborg University (DK)

- 15:00 **Open Discussion: Opportunities, Limits and Obstacles Related to CHM**  
All

#### 16:00 End of Workshop