

## Organisational Information

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

Registration Deadline:

- 13 February 2020

Participation Fee:

- € 660,- \* for industry
- € 490,- \* for universities/institutes
- € 165,- \* for students/PhD students (limited spaces; copy of students ID required; dinner € 50,-\* extra)

\* plus VAT

- The regular participation fee includes dinner, lunches, coffee/soft drinks and a flash drive with presentations. The reduced (PhD) students fee includes all the above except for dinner (can be booked for an extra fee of € 50,-\*)
- A printed version of the workshop handout is available on request (€ 50,-\*).
- Upon receipt of registration confirmation via email you are signed-up for the event. The invoice will be sent via letter post.
- 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 and in case of no-show 50 % of the fee is non-refundable (replacement is possible).

## Organisational Information

**Organiser** ECPE e.V.  
90443 Nuremberg, Germany  
[www.ecpe.org](http://www.ecpe.org)

**Technical Contact** Dr. Chris Gould

**Technical Chair** Dr. Andreja Rojko, Mitsubishi Electric R&D Centre Europe (MERCE)

Dr. Samuel Araujo, Robert Bosch

Dr. Thomas Plum, Robert Bosch

Dr. Stefan Weber, TDK Electronics

**Organisation** Lena Somschor, ECPE e.V.  
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**Venue** Grenoble INP - G2E Lab  
Amphi Ampère G-1A002  
21 avenue des Martyrs  
CS 90624  
38031 Grenoble Cedex 1  
France  
[www.grenoble-inp.fr/en](http://www.grenoble-inp.fr/en)



Source: G2E Lab, Grenoble



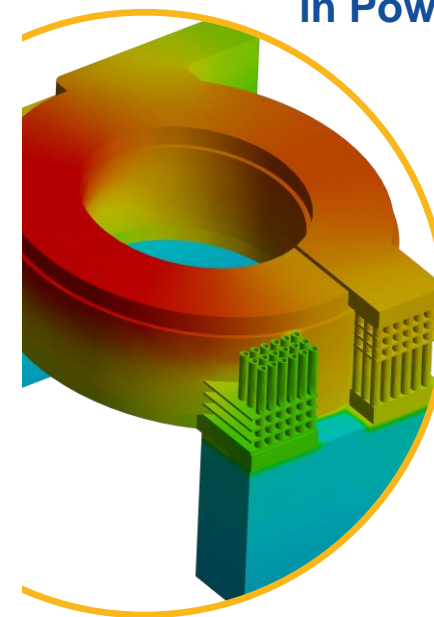
European Center for  
Power Electronics e.V.

## Programme

### ECPE Workshop

### Magnetic Components in Power Electronics

19 - 20 February 2020  
Grenoble  
France



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## ECPE Workshop

### Magnetic Components in Power Electronics

19 - 20 February 2020  
Grenoble, France

The miniaturisation of power electronics converters has been mainly driven by successive increases on the switching frequency, with wide bandgap devices enabling even higher frequencies with minimal losses.

In the meantime though, further size reduction cannot be achieved, with magnetic components clearly arising as the main bottleneck. Challenges can be identified at all levels, starting from the selection of core materials and their suitability to extreme operating conditions, up to the winding techniques that determine the parasitic losses and coupling effects. Other aspects, such as cooling technique and simulation methods, also stand in the path towards higher power density and better design trade-offs. Finally, completely new device concepts focusing on, for example, functional integration need to be developed.

This workshop aims to address these challenges by bringing together experts from industry and research, in order to present and discuss the wide range of topics at both component and application levels. The speakers will provide an update on the newest advances and, through discussions, jointly identify opportunities for further developments.

The workshop is aimed at experts who would like to get insight into the latest developments in this field, but also at the beginners and experienced practitioners who want to get an overview of this challenging field.

#### The workshop is chaired by:

Dr. Andreja Rojko  
Mitsubishi Electric R&D Centre Europe (MERCE), France

Dr. Samuel Araujo, Dr. Thomas Plum  
Robert Bosch, Germany

Dr. Stefan Weber  
TDK Electronics, Germany

All presentations and discussions will be in English.

## Programme

### Wednesday, 19 February 2020

09:30 Registration & Welcome Coffee

10:00 **Welcome, Opening**  
Chris Gould, ECPE e.V. (D)  
Yves Lembeye, G2Elab - University Grenoble Alpes (F)

#### Introduction & Overview of Challenges for Future Magnetic Miniaturisation and High-frequency Operation

10:15 **High Frequency Magnetics Designs for Future Power Electronics**  
Stefan Weber, TDK Electronics (D)

10:50 **Magnetics - Bottleneck of Converter Miniaturisation?**  
Thomas Plum, Samuel Araujo, Robert Bosch (D)

11:20 **Challenges, Opportunities and Trends for Magnetic Design**  
Marek S. Rylko, SMA Magnetics (PL)

#### Optimisation & Design of Magnetic Circuits and Devices

12:00 **Magnetic Design for PFC Rectifiers with High Switching Frequency**  
Carsten Henkenius, Delta Energy Systems (D)

12:30 Lunch

13:30 **Loss-Optimal Design of High-Frequency Inductors**  
Panteleimon Papamanolis, ETH Zurich (CH)

14:00 **Thermal considerations of the impedance, losses and EMI performance of power inductors**  
Richard Blakey, Würth Elektronik (D)

14:30 **Common Mode Noise Reduction for High Frequency PFC with Integrated PCB Winding Inductor**  
Qiang Li, CPES - Virginia Tech (USA)

15:00 **Current Sharing between Parallel Windings in High Ratio Planar Transformers: from Modelling to Rules to Improve the Balancing**  
Yves Lembeye, G2Elab - University Grenoble Alpes (F)

15:30 Coffee Break

#### Modelling & Simulation of Magnetic Components & Systems

16:00 **Modelling Magnetic Components for Design Optimisation versus Electrical Circuit Simulations**  
Drazen Dujic, EPFL (CH)

16:30 **A Frequency Dependent Nonlinear Magnetic Material Model based on the Jiles Atherton Model**  
Jörn Schliewe, TDK Electronics (D)

17:00 **Numerical Calculation and SPICE Modelling of High Frequency Litz Wire Losses**  
Stefan Ehrlich, Fraunhofer IISB (D)

17:30 End of 1<sup>st</sup> Day

19:30 Dinner at "Upper Place",  
rue Beccaria, 38000 Grenoble, France

## Programme

### Thursday, 20 February 2020

08:30 Start of 2<sup>nd</sup> Day

#### Integration of Magnetic Components

08:30 **Compact Inductors Based on Coupled Tape-Wound Cores**  
Christian Dick, Cologne Univ. of Applied Sciences (D)

09:00 **Coupled Inductors in Modern Power Electronics Applications**  
Alexander Stadler, Coburg University of Applied Sciences (D)

09:30 **Integrated Planar Magnetic Components for High Frequency Resonant Converters**  
Qiang Li, CPES - Virginia Tech (USA)

10:00 Coffee Break

#### Development of Magnetic Materials

10:30 **Advanced Nanocrystalline Solutions for Power Electronics**  
Gabriela Saage, Vacuumschmelze (D)

11:00 **Ferrite Core as a Key Component to Breach Frontier of the EMI Filter Performance**  
Marcin Kacki, SMA Magnetics (PL)

11:30 **The Nanocrystalline Cores for the Power Electronics**  
Thierry Waeckerle, Gony Bashar, Aperam Alloys Imphy (F)

12:00 **Improved Magnetic Materials for High Frequency Applications and their Limits**  
Michael Baumann, Sumida (D)

12:30 Lunch

#### Applications & Special Topics

13:30 **Introduction of the CFFC-Compensating Fringing Field Concept and its Application in PCB Winding Inductors**  
Jannik Schäfer, ETH Zurich (CH)

14:00 **Controllable Inductive Components: Possible Designs and Applications**  
Peter Zacharias, University of Kassel (D)

#### Panel Discussion

14:30 **Outlook for Future Developments in Magnetics**  
Moderation: Samuel Araujo, Robert Bosch (D)

15:30 Final Discussion

16:00 **Optional Programme:**  
Lab Tour at G2E lab (1 h duration)

16:00 End of Workshop