EPNC 2024

XVIII Symposium on Electromagnetic Phenomena in Nonlinear Circuits

Conference Program

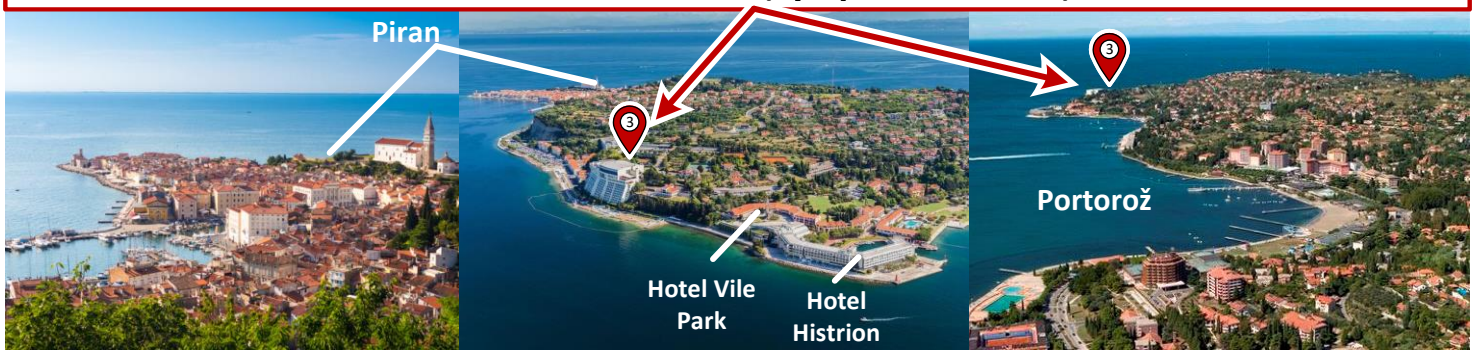
Portorož, Slovenia | June 18th to June 21st, 2024

University of Maribor
Faculty of Electrical Engineering and Computer Science

Politechnika Poznańska
Poznan University of Technology

Location

Grand Hotel Bernardin (Symposium Venue)

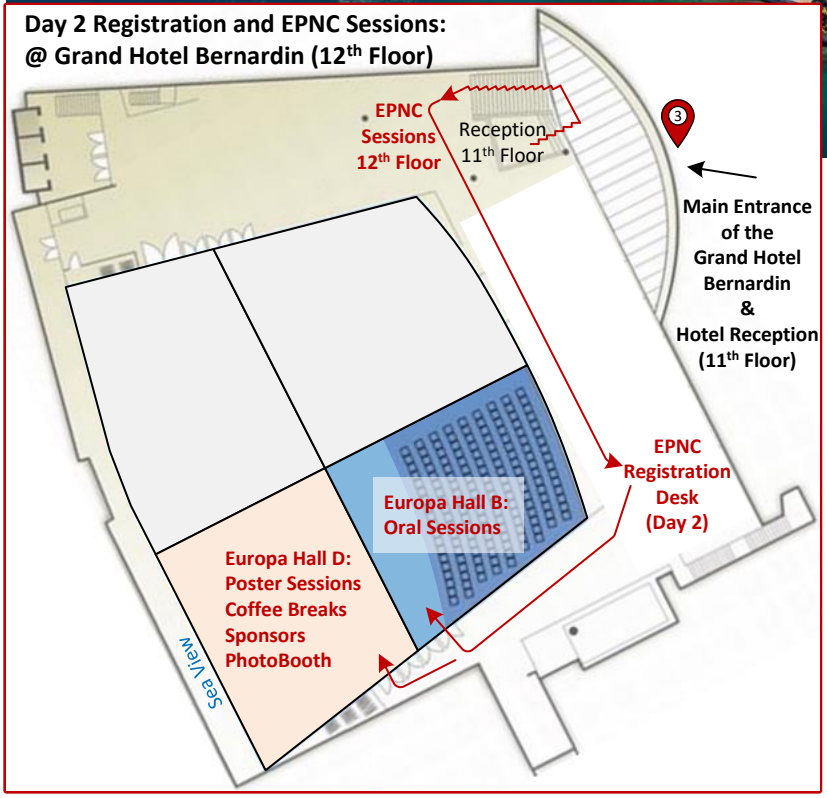


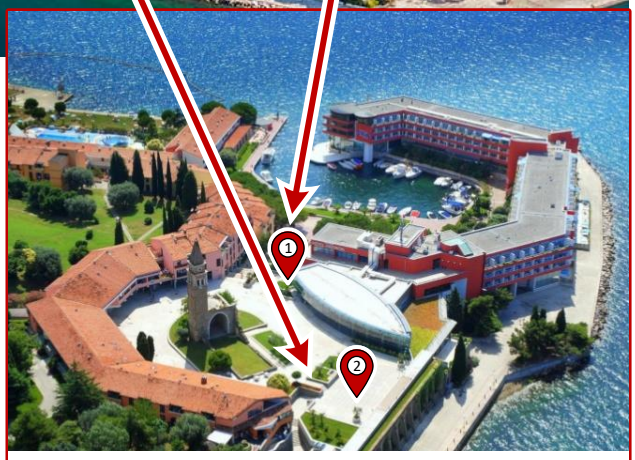
Main Entrance of the Grand Hotel Bernardin (11th Floor) ③

Welcome Reception @ Hotel Histrion View Point ②

Day 1 Registration @ Main Entrance Hotel Histrion ①

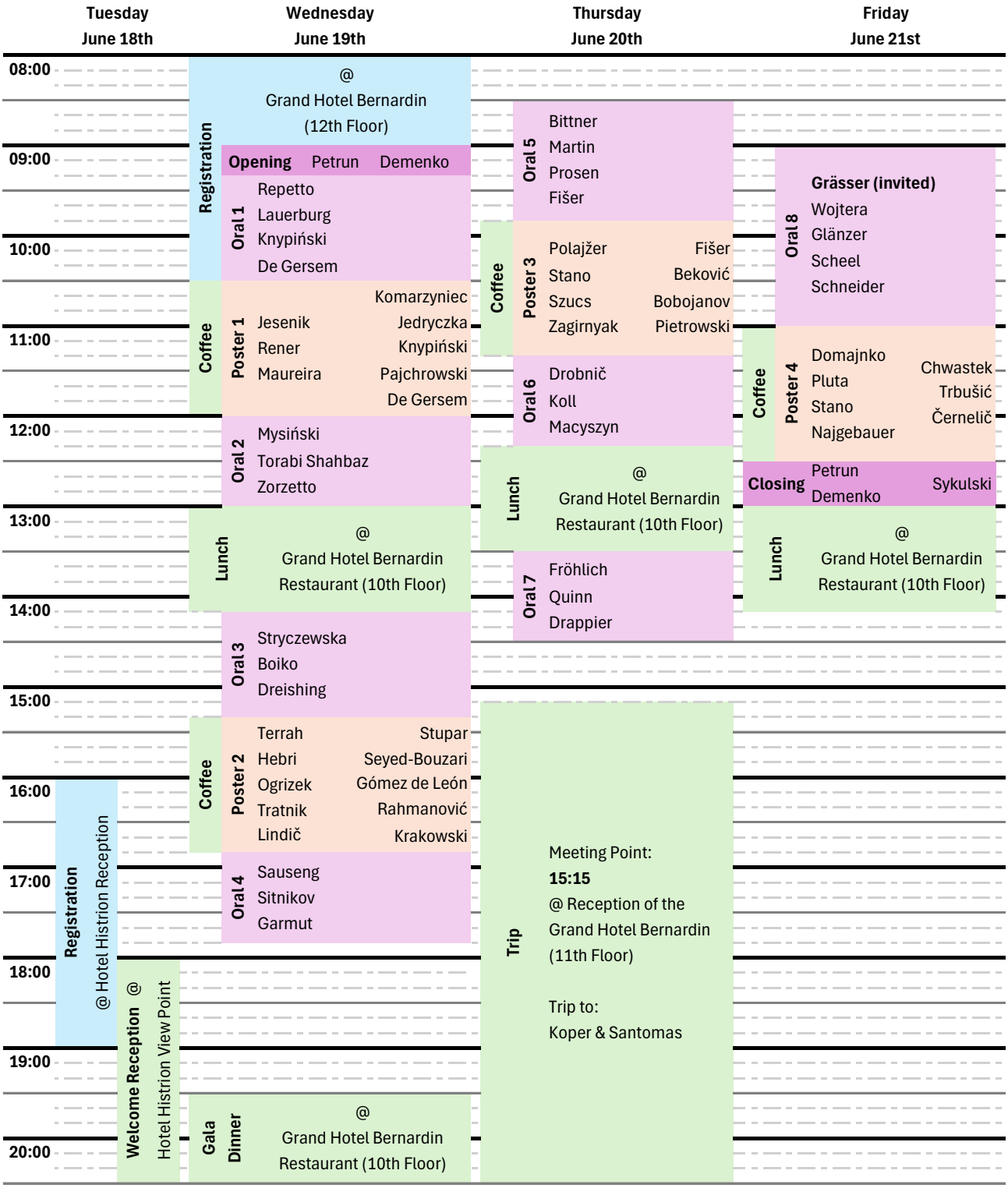
Day 2 Registration and EPNC Sessions: @ Grand Hotel Bernardin (12th Floor)





Day 1 Registration and Welcome Reception

Conference Schedule



DAY 1 - Afternoon Schedule — **Tuesday, June 18th**

16:00	**Registration** (@ Main Entrance of the Hotel Histrion)
18:00	**Welcome Reception** (@ Hotel Histrion View Point)
20:00	

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DAY 2 - Morning Schedule — Wednesday, June 19th

08:00 **Registration** (@ Grand Hotel Bernardin, 12th Floor)

09:00 **Welcome Session**

Martin Petrun — **University of Maribor FERI**
Andrzej Demenko — **Poznan University of Technology**

09:10 **Nonlinear Coupled Electromagnetic Phenomena I**

Registration / Oral Session 1

09:10 **O11** — **Maurizio Repetto** — **Politecnico di Torino**
Data-Driven Simulation of Traction Electrical Machines: a Modelling Strategy for Multi-Physics Dataset Generation

09:30 — **Maximilian Lauerburg** — **RWTH Aachen University** — **O12**
Methodology to Determine the Maximum Rotational Speed for the Arrangement of Buried Permanent Magnets in High-Speed Rotors of Electrical Machines

09:50 **O13** — **Łukasz Knypiński** — **Poznan University of Technology**
The Optimization of Permanent Magnet Synchronous Motor Using Chimp Algorithm

10:10 — **Herbert De Gersem** — **TU Darmstadt** — **O14**
Dimensioning Field-Grading Materials in Cable Joints by Adjoint Transient Finite-Element Sensitivity Analysis

10:30 **Nonlinear Coupled Electromagnetic Phenomena II**

Cofee break / Poster Session 1

P11 — **Cezary Jedryczka** — **Poznan University of Technology**
Design and Analysis of the Low-Cost Induction Gear for Vertical Axis Wind Turbines

P12 — **Grzegorz Komarzyniec** — **Lublin University of Technology**
Influence of Transformer Design in AC/DC/AC Converter Output Circuits on Plasma Reactor Characteristics

P13 — **Herbert De Gersem** — **TU Darmstadt**
Bias-Corrected Eddy-Current Simulation Using a Recurrent Neural Net/Finite-Element Hybrid Model

P14 — **Angel Maureira** — **Universidad Andrés Bello**
Model-Free Control of a DC-DC Boost Converter Based on the Inductor Current Averaging

P15 — **Marko Jesenik** — **University of Maribor FERI**
Determination of a DC Motor's and Drive's Parameters Using Speed and Current Responses at the Motor's Start and Stop

P16 — **Łukasz Knypiński** — **Poznan University of Technology**
ADRC Load Side Speed Controller Parameters Adjustment Based on a Neural Model Applied for a Nonlinear Two-Mass Drive System

P17 — **Tomasz Pajchrowski** — **Poznan University of Technology**
Precise Determination of the Angular Distribution of the Winding Inductance of a Switched Reluctance Motor

P18 — **Krištof Rener** — **TAE Power Europe**
Quantitative Impact of Current Harmonics on Electromagnetic Losses in Automotive PMSMs

12:00 **Nonlinear Coupled Electromagnetic Phenomena III**

Oral Session 2

12:00 **O21 Student** — **Michał Mysiński** — **Poznan University of Technology**
Comparative Analysis of Spatial-Time Harmonics of Radial Forces in the Multi-Phase Synchronous Reluctance Machines of Three-, Six-, and Nine-Phase Winding

12:20 — **Mohammad Torabi Shahbaz** — **Johannes Kepler University Linz** — **O22 Student**
Characterization of Non-Highly Compressed Iron Powders in Ring Form for Electromagnetic Device Application

12:40 **O23 Student** — **Mateo Zorzetto** — **University of Padova**
Topology Optimization of Non-Linear Ferrite Core for Induction Heating in Injection Molding

DAY 2 - Afternoon Schedule **Wednesday, June 19th**

13:00		**Lunch** (@ Restaurant Grand Hotel Bernardin, 10th Floor)		
14:10	Oral Session 3	**Nonlinear Devices and Systems I**		
14:10		**Henryka Danuta Stryczewska** — Review of Power Systems of Non-Thermal Plasma Reactors and Their Applications	**Lublin University of Technology**	**O31**
14:40		**O32** — **Oleksandr Boiko** — Nanofluids Containing Electromagnetic Nanoparticles: The Review of Electrical Properties and Applications	**Lublin University of Technology**	
15:00		**Florian Dreishing** — Saturation Model for Plastic-Iron Composites with Low Iron Concentration	**Helmut Schmidt University Hamburg**	**O33**
15:20	Cofee break / Poster Session 2	**Nonlinear Devices and Systems II**		
		P21 Student — **Mohammed Terrah** — Wireless Power Transfer for UAV Applications : A Parametric Approach for Coupler Design	**GeePs: Group of Electrical Engineering – Paris**	
		Mohamed Amine Hebri — Non-Grain Oriented Silicon Steel Under Bending Stress and Annealing Effect	**Artois University**	**P22 Student**
		P23 Student — **Pavel Ogrizek** — Performance Analysis of an IPMSM When Applying Heavy Rare-Earth-Free NdFeB PMs	**University of Maribor FERI**	
		Ermin Rahmanović — Modelling of Nonlinear Magnetic Properties of Current Transformers with Piecewise Bézier Curves	**University of Maribor FERI**	**P24 Student**
		P25 Student — **Tomasz Krakowski** — Analysis of a High Power Density Axial Flux Permanent Magnet Synchronous Machine with Active Cooling	**Poznan University of Technology**	
		Jelena Stupar — Comparison of Simple Modeling Approaches of the Nonlinear Magnetic Properties of a Single-Phase Transformer	**University of Maribor FERI**	**P26 Student**
		P27 Student — **Seyed Ali Seyed-Bouzari** — Overview of DFIG-Based Wind Turbine Systems in Europe	**Graz University of Technology**	
		Eva Tratnik — Case Study Analysis of the Solar Power Plant Investment After Annual Net Metering Restructuring	**University of Maribor FERI**	**P28 Student**
		P29 Student — **Maja Lindič** — Modelling of Initial Magnetic Curves of Non-Oriented Laminated Steels Using Artificial Neural Networks	**Bosch Rexroth**	
		Fermín Gómez de León — A Novel Railgun Simulation Model Based on a Quasistatic Study	**Huawei Technologies Duesseldorf GmbH**	**P210 Student**
16:50	Oral Session 4	**Nonlinear Devices and Systems III**		
16:50		**O41 Student** — **Alexander Sauseng** — Network-Based Transformer Models - A Transient Analysis	**Graz University of Technology**	
17:10		**Maksim Sitnikov** — Analysis of Synchronous Reluctance Machine with 3D-Printed Axially Laminated Rotor Featuring Axially Alternated Layers	**Aalto University**	**O42 Student**
17:30		**O43 Student** — **Mitja Garmut** — Neural Network Based Optimization of an IPMSM Within a BLDC Drive	**University of Maribor FERI**	
19:30		**Gala Dinner** (@ Restaurant Grand Hotel Bernardin, 10th Floor)		

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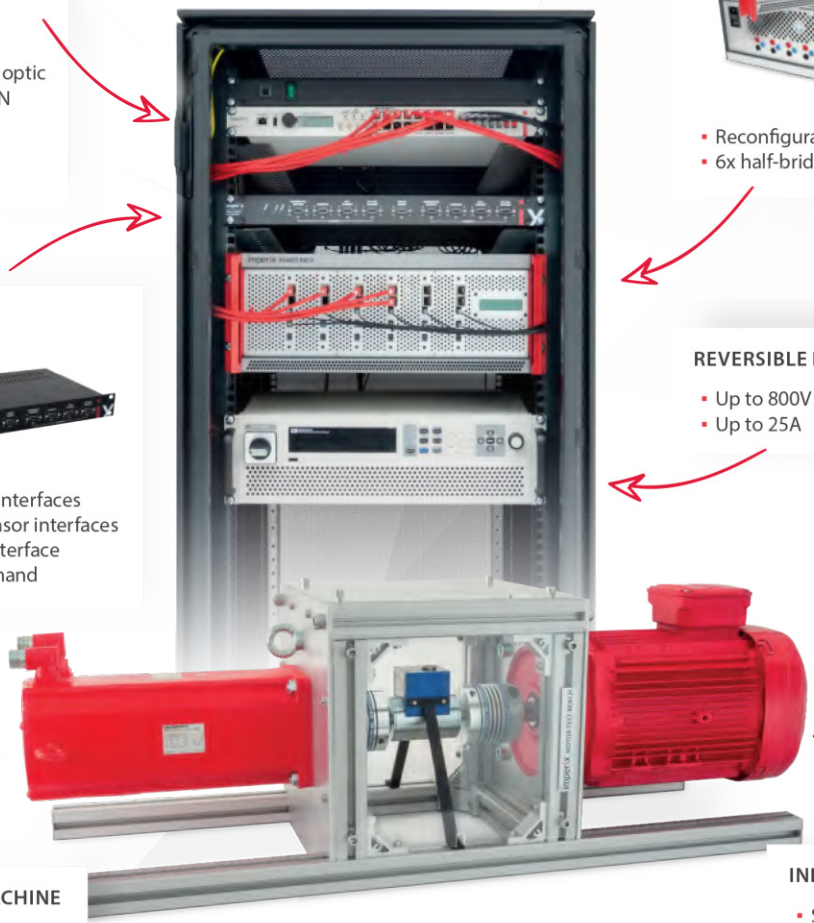

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- Squirrel cage motor
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DAY 3 - Morning Schedule — Thursday, June 20th

08:30 — Oral Session 5 — **Electromagnetics for Energy I**

08:30 — **O51** — **Florian Bittner** — **AUDI AG**
TECH-TALK: PPE - The new e-drives from Audi

08:50 — **Floran Martin** — **Aalto University** — **O52**
Modelling the Anisotropic Properties of Grain-Oriented Materials

09:10 — **O53** — **Nataša Prosen** — **University of Maribor FERI**
The Implementation of Pulse-Density Modulated Wireless Power System Using a Sliding Mode Controller

09:30 — **Rastko Fišer** — **University of Ljubljana FE** — **O54**
Uncontrolled Generation in Nine-Phase Machine Drive

09:50 — Cofee break

Poster Session 3 — **Electromagnetics for Energy II**

P31 — **Boštjan Polajžer** — **University of Maribor FERI**
Current-Transformer Saturation Reconstruction Using a Normalized Least Mean Squares Adaptive Method

Ernest Stano — **Lodz University of Technology** — **P32**
Analysis of Secondary Currents Self-Distortion of Current Transformers

P33 — **Aron Szucs** — **ABB Large Motors and Generators**
Towards Design Rule Extraction from Large Computational Datasets by Causal Correlation Analysis

Mykhailo Zagirnyak — **Kremenchuk Mykhailo Ostrohradskyi National University** — **P34**
Improved Control of Dynamic Loads within Hydraulic Systems by Considering Nonlinear Properties of Pipeline Fittings

P35 — **Rastko Fišer** — **University of Ljubljana FE**
Computation of Iron Losses Using FEM Model of Permanent Magnet Synchronous Motor

Miloš Beković — **University of Maribor FERI** — **P36**
Maximising Diesel Generator Fuel Efficiency with LTO Battery Integration

P37 — **Makhsud Bobojanov** — **Tashkent State Technical University**
Dynamic Model of Induction Motor with a Three-Phase Combined Winding

Wojciech Pietrowski — **Poznan University of Technology** — **P38**
Analysis of the Correlation Between Vibrations and the Number of Shorted Turns in the Stator Winding of a Squirrel-Cage Induction Motor

11:20 — Oral Session 6 — **Nonlinear Devices and Systems IV**

11:20 — **O61** — **Klemen Drobnič** — **University of Ljubljana FE**
Unbalanced Magnetic Pull in Dual Three-Phase Machine

11:40 — **Martin Koll** — **Johannes Kepler University Linz** — **O62**
Impact of Material Property Variations and Sensor Positioning on the Coating Thickness Determination of Steel Sheets

12:00 — **O63** — **Lukasz Macyszyn** — **Poznan University of Technology**
Model of Magnetic Precession Gear Dynamics Based on 3D Finite Element Analysis and Prototype Investigation

DAY 3 - Afternoon Schedule					Thursday, June 20th
12:20		**Lunch** (@ Restaurant Grand Hotel Bernardin, 10th Floor)			
13:30	Oral Session 7	**Nonlinear Devices and Systems V**			
13:30			**Alexander Fröhlich**	**Graz University of Technology**	**O71 Student**
			No Load Behavior Prediction of Large Five-Legged Transformers Using Topological Transient Models		
13:50		**O72 Student**	**Raymond Quinn**	**Tampere University**	
			Design and Modelling of Toroidal Inductors with Different Geometries for a Single-Phase Inverter Application		
14:10			**Joël Drappier**	**University of Lille**	**O73 Student**
			Impact of Nonlinear Anisotropic Magnetic Behavior Models on Iron Loss Modeling in Transformers		
15:15 20:30		**Trip** (Meeting Point: Reception @ Grand Hotel Bernardin, 11th Floor)			

DAY 4 - Morning Schedule — Friday, June 21st

09:00 — Oral Session 8 — **Bioelectromagnetics**

09:00	O81	**Matthias Grässer** — **Fraunhofer Research Institution IMTE** INVITED TALK: Magnetic Particle Imaging Opportunities and challenges on the way to the clinic	
09:40		**Katarzyna Wojtera** — **Lodz University of Technology** Optimization of the Ferromagnetic Nanoparticles Fabrication for Medical Applications	O82
10:00	O83 Student	**Lukas Glänzer** — **RWTH Aachen University AME** Towards Accurate Size Predictions of Magnetic Nanoparticles Using Support Vector Regression	
10:20		**Jan-Philipp Scheel** — **Fraunhofer Research Institution IMTE** Current Control System for Coupled Coil Arrays in MPI	O84 Student
10:40	O85 Student	**Karl Schneider** — **RWTH Aachen University AME** Long-Term Multimodal Loading of Fiber-Based Magnetic Scaffolds for Hyperthermia Applications	

11:00 — Cofee break / Poster Session 4 — **Nonlinear Devices and Systems VI**

		Jure Domajnko — **University of Maribor FERI** A Comparison of Different Modulation Techniques for Multi-Coil Inductive Power Transfer	P41
	P42	**Krzysztof Chwastek** — **Częstochowa University of Technology** A Comparison of Two Approaches to Account the Anisotropy of Non-Oriented Electrical Steel	
		Ernest Stano — **Lodz University of Technology** Polymer Composites for Electromagnetic and Electrostatic Shielding	P43
	P44	**Mariusz Najgebauer** — **Częstochowa University of Technology** The Estimation of Magnetic Losses in Composite Cores Excited by Harmonic Magnetic Flux Density Waveforms	
		Jernej Černelič — **University of Maribor FERI** Comparison of Different Offline MTPA Trajectory Estimation Methods	P45
	P46	**Mislav Trbušić** — **University of Maribor FERI** Design Aspects of the Shell-Type Shunt Reactors	

12:30 — **Closing Session**

Jan Sykulski — **University of Southampton**
presenting Best Paper Award
presenting Best Poster Award

Andrzej Demenko — **Poznan University of Technology**
presenting next edition of EPNC

Martin Petrun — **University of Maribor FERI**
Hvala in nasvidenje!

13:00 — **Lunch** (@ Restaurant Grand Hotel Bernardin, 10th Floor)

Symposium Organization

University of Maribor
Faculty of Electrical Engineering and Computer Science

Conference is organized under the auspices of the following institutions:

- Committee on Electrical Engineering, Polish Academy of Sciences
- Committee on Electrical Engineering, PAS – Poznan Branch

International Organizing Committee

Martin Petrun	Conference Chair and Technical Program Chair
Wojciech Pietrowski	Technical Program Chair
Katja Petrun	Local Event Manager

International Steering Committee

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