

# Dr. sc. techn. Christian Schuster

Full Professor and Head of the  
Institut für Theoretische Elektrotechnik at  
Hamburg University of Technology (TUHH)



Christian Schuster received the Diploma degree in physics from the University of Konstanz, Germany, in 1996, and the Ph. D. degree in electrical engineering from the Swiss Federal Institute of Technology (ETH), Zurich, Switzerland, in 2000. Since 2006 he is full professor and head of the Institute of Electromagnetic Theory at the Hamburg University of Technology (TUHH), Germany. Prior to that he was with the IBM T. J. Watson Research Center, Yorktown Heights, NY, where he was involved in high-speed optoelectronic package and backplane interconnect modeling and signal integrity design for new server generations. His current interests include signal and power integrity of digital systems, multiport measurement and calibration techniques, and development of electromagnetic simulation methods for communication electronics.

Dr. Schuster received IEEE Transactions on EMC Paper Awards in 2002 and 2015, IEEE Transactions on CPMT Paper Awards in 2012 and 2016, DesignCon Paper Awards in 2006, 2010, 2017, and 2018, three IBM Research Division Awards between 2003 and 2005, and IBM Faculty Awards in 2009 and 2010. He is a member of the German Physical Society (DPG), a Senior Member of the IEEE, and a member of several technical program committees of international conferences on signal and power integrity, and electromagnetic compatibility. Within the IEEE he was serving as a Distinguished Lecturer for the EMC Society in the period 2012-2013, as a member of the Board of Directors of the EMC Society in 2015 and in the period 2020-2022, and as the Chair of the German IEEE EMC Chapter in the period 2016-2019. Currently he is an Associate Editor for the IEEE Transactions on EMC. At TUHH he was serving as Dean of the School of Electrical Engineering, Computer Science and Mathematics in the period 2017-18. Since April 2020 he is an Adjunct Associate Professor at the School of Electrical and Computer Engineering of the Georgia Institute of Technology.

# Curriculum Vitae

## Employment History:

10/06	to	today	Full professor of Electrical Engineering at <b>Hamburg University of Technology (TUHH)</b> , Germany, and head of the Institute of Electromagnetic Theory (full-time). Directing applied research in the areas of computational electromagnetics and electrical design of high speed digital systems. Managing positions held at TUHH: Director of the Electrical Engineering program, Vice-Dean and Dean of the School of Electrical Engineering, Computer Science, and Mathematics, Speaker of Deans at TUHH.
7/01	to	9/06	Research staff member at the <b>IBM T.J. Watson Research Center</b> , Yorktown Heights, NY, USA, in the in the High-Speed Electrical and Optical Packaging Group of the Communication Technologies Department (full-time). Research in the areas of high speed optical transceiver packaging, broadband backplane interconnects, high frequency measurement techniques, electromagnetic field and link modeling.
3/00	to	4/01	Software engineer at <b>Integrated Systems Engineering (ISE) AG</b> , Zurich, Switzerland (now Synopsis), a company in the field of semiconductor device and process simulation (full-time). Development, application, and support of a commercial electromagnetic field solver. 5/01 to 6/01 active as a part-time consultant for ISE.
8/96	to	1/00	Research and teaching assistant at the Integrated Systems Laboratory, Department of Information Technology and Electrical Engineering, <b>Swiss Federal Institute of Technology (ETH)</b> , Zurich, Switzerland (full-time). Ph.D. thesis on electromagnetic field simulation and application to signal integrity and electromagnetic interference problems.
7/95	to	6/96	Internship at <b>Dornier GmbH</b> (DaimlerChrysler Group), Friedrichshafen, Germany (full-time). Research on charge storage mechanisms at the phase boundary between metal oxides and electrolytes ("super-caps").

## Education and Research Scholarships:

3/19	to	6/19	Visiting Scholar with the Institute for Electronics and Nanotechnology at the <b>Georgia Institute of Technology</b> , Atlanta, GA, USA. Conducting research in collaboration with Prof. Madhavan Swaminathan and the Center for Co-Design of Chip, Package, and System (C3PS) as well as the Center for Advanced Electronics through Machine Learning (CAEML).
8/96	to	1/00	Ph. D. thesis at the <b>Swiss Federal Institute of Technology (ETH)</b> , Zurich, Switzerland (Integrated Systems Institute, Department of Information Technology and Electrical Engineering). Degree: "Doktor der Technischen Wissenschaften" (Ph.D. of Technical Sciences). Topic: "Simulation, Analysis, and Parameter Extraction of Electronic Components and Circuits Using the Finite Difference Time Domain Method".
10/90	to	7/96	Studying physics at the <b>University of Konstanz</b> , Germany. Degree: "Diplom-Physiker" (equiv. to a Master Degree in Physics).

## Areas of Expertise:

- Signal integrity (SI) and power integrity (PI) of high-speed digital systems.
- Electromagnetic compatibility (EMC) and electromagnetic interference (EMI).
- High frequency (HF) measurement methods.
- Packaging technologies for digital, and millimeter-wave devices, components, and systems.
- Electromagnetic fields and waves and their equivalent circuit modeling.
- Computational electromagnetics (CEM) and electronic design automation (EDA).
- Bioelectromagnetics (BEM), i.e. physical effects and modeling of electromagnetic fields within the human body.

## Professional Activities at Hamburg University of Technology (TUHH):

- From 1/20 till 9/23 speaker and organizer of the research initiative “Machine Learning in Engineering (MLE)” with over 100 participating researchers from TUHH and other public institutions of the Hamburg metropolitan area ([www.mle.hamburg](http://www.mle.hamburg)).
- From 4/18 to 1/19 Speaker of Deans at TUHH representing all seven schools in academic and administrative affairs.
- From 2/17 to 1/19 Dean of the School of Electrical Engineering, Computer Science and Mathematics. Overseeing the education of 1200+ students at undergraduate and graduate level in four bachelor and five master programs, two of which being international.
- From 2/09 to 6/10 and from 2/15 till 1/17 Vice Dean of the School of Electrical Engineering, Computer Science and Mathematics.
- From 2/07 to 1/09 and from 7/10 till 12/15 coordinator for the bachelor and master programs in Electrical Engineering. Overseeing the introduction of the Bologna process’ framework for higher-education qualifications.
- Teaching courses at Bachelor’s and Master’s level since 10/06 in:
  - electromagnetic field theory
  - foundations of electrical engineering
  - electrical design and characterization of packages and interconnects
  - bioelectromagnetics
  - waveguides and antennas
  - signal and power integrity
  - electromagnetic compatibility
- Supervision of students at all levels (Bachelor, Master, Ph.D.).
- Current Ph.D. students:
  - Lennart Bohl – since 10/23
  - Til Hillebrecht – since 11/22
  - Youcef Hassab – since 11/22
  - Jose Enrique Hernandez Bonilla – since 9/22
  - Hamideh Esmaeili – since 11/21
  - Christian Morten Schierholz – since 11/19

- Former Ph.D. students:
  - Michael Wulff – graduation expected 04/24
  - Torben Wendt – graduation 02/23
  - Ömer Faruk Yildiz – graduation 06/22
  - Katharina Scharff – graduation 6/21
  - Torsten Reuschel – graduation 10/18
  - David Dahl – graduation 12/17
  - Jan Birger Preibisch – graduation 6/17
  - Alexander Vogt – graduation 4/16
  - Andreas Hardock – graduation 11/15
  - Sebastian Müller – graduation 10/14
  - Arne Schröder – graduation 4/14
  - Miroslav Kotzev – graduation 2/13
  - Xioamin Duan – graduation 4/12
  - Renato Rimolo-Donadio – graduation 12/10
  
- Host for Alexander-von-Humboldt Research Fellowships:
  - Prof. Dr. Qi Wu, Beihang University, China – period 3/14 till 2/16
  - Prof. Dr. Lei Wang, Heriot-Watt University, UK – period 2/18 till 1/20

### Further Professional Activities:

- Associate Editor of the IEEE Transaction on Electromagnetic Compatibility since January 2019.
- Member-at-Large of the Board of Directors of the IEEE EMC Society from January till December 2015 and from January 2020 till December 2022.
- Member of the Steering Committee of the IEEE Transactions on Signal and Power Integrity from January 2021 till April 2022.
- Chair of the German Chapter of the IEEE Society on Electromagnetic Compatibility from April 2016 till December 2019. Vice-Chair in the period 2013-2015. Introduction of EMC boot camps and student contests with participation from industry as well as fostering of a network of EMC professionals.
- Program Co-Chair of the IEEE Workshops on Signal and Power Integrity 2015 in Berlin, Germany, and 2020, 2021, and 2022 in Siegen, Germany.
- Guest Editor of the IEEE Transaction on Electromagnetic Compatibility for a special section on “Advances in Modeling, Measurement and Design of Discontinuities and Their EMC and SI/PI Effects on Wired Communication Links”, February 2018.
- Member of the Steering Committee of the IEEE Journal on Multiscale and Multiphysics Computational Techniques from June 2015 till December 2019.
- Technical program committee member (intermittent) of:
  - the DesignCon Conference (DesignCon)
  - the IEEE Workshop on Signal and Power Integrity (SPI)
  - the IEEE Asia-Pacific International Symposium on EMC (APEMC),
  - the IEEE Electrical Design of Advanced Packaging and Systems Symposium (EDAPS)
  - the IEEE International Symposium on Electromagnetic Compatibility (EMCS)
  - the EMC Europe Symposium and Exhibition (EMC Europe)
  - the IEEE International Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization (NEMO).

- Reviewer for international journals and conferences (intermittent):
  - the Electrical Components and Technology (ECTC) Conference
  - the German Microwave Conference (GEMIC)
  - the IEEE International Symposium on Electromagnetic Compatibility (EMCS)
  - the IEEE Microwave and Wireless Technology Letters
  - the IEEE Transactions on Advanced Packaging
  - the IEEE Transactions on Electromagnetic Compatibility
  - the IEEE Transactions on Components, Packaging, and Manufacturing Technology.
- Chair of conference sessions, workshops, and programs at:
  - the IEEE Workshop on Signal and Power Integrity (SPI)
  - the European Conference on Electromagnetic Compatibility (EMC Europe)
  - the European Microwave Week (EuMW)
  - the IEEE International Symposium on Electromagnetic Compatibility (EMCS).
- Reviewer for the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG).
- Senior Member of the IEEE and member of the German Physical Society (DPG).

### Honors, Awards:

- IEEE Electrical Performance of Electronic Packaging and Systems Best Poster Award in 2023.
- IEEE UK-China Emerging Technologies (UCET) Best Paper Award in the Propagation Track in 2020.
- IEEE Electromagnetic Compatibility Society Award for Sustained Service to the Society in 2019.
- 2016 IEEE Transactions on Components, Packaging and Manufacturing Technology Best Paper Award (category “Electrical Performance of Integrated Systems”).
- 2015 Richard Schulz Transactions Prize Paper Award (by the IEEE EMC Society).
- 2012 IEEE Transactions on Components, Packaging and Manufacturing Technology Best Paper Award (category “Electrical Performance of Integrated Systems”).
- 2002 Best IEEE Transactions on Electromagnetic Compatibility Paper Award.
- Elected to be Distinguished Lecturer on behalf of the IEEE EMC Society in the period 2012-2013.
- IEEE Electromagnetic Compatibility Society Certificates of Appreciation for:
  - outstanding contributions to the development of IEEE Standard 1597.2-2010 in 2010
  - outstanding service as an EMC Distinguished Lecturer for the term 2012-2013 in 2014
  - outstanding service 2015 as a member of the IEEE EMC Society Board of Directors in 2016
  - outstanding activities as the Chair of the German IEEE EMC Chapter in 2021.
- Elevated to IEEE Senior Member Grade in 2005.
- DesignCon Paper Awards:
  - “Developing a ‘Physical’ Model for Vias” in 2006
  - “Fast Physics-Based Via and Trace Models for Signal and Power Integrity Co-Analysis” (category “Power and RF Design”) in 2010
  - “Exploring Efficient Variability-Aware Analysis Method for High-Speed Digital Link Design Using PCE” (category “Serial Link Design”) in 2017
  - “Efficient Sensitivity-Aware Assessment of High-Speed Links Using PCE and Implications for COM”

(category “Serial-Link Design”)in 2018

- IBM Research Division Awards:
  - “10 Gbps Ethernet Transceiver Development” in 2003
  - “Characterization of Board Dielectric for Systems Group” in 2005
  - “Next Generation 10 Gb/s Serial Link Operating over Legacy and Advanced Packaging Technology” in 2005.
- IBM Invention Achievement Award (First Plateau) in 2006.
- IBM Faculty Awards:
  - “Multi-Port Calibration, Measurement, and Modeling of Differential Data Buses and other High-Speed Digital Interconnects” in 2009
  - “Combined Analysis and Optimization of Signal and Power Integrity for High-Speed Server Systems” in 2010.
- Invited presenter at several occasions, e.g.:
  - the European Conference on Circuit Theory and Design in 1999,
  - the IEEE Symposium on EMC in 2002,
  - the EuroDesignCon Conference in 2005,
  - the Asia-Pacific EMC Week in 2010,
  - the IEEE Electrical Design of Advanced Packaging and Systems Symposium in 2010,
  - the IEEE Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC) in 2017.
  - the IEEE Latin American Symposium on Circuits and Systems (LASCAS) in 2020.
- Eight U.S. patents issued (nos. 7303113, 7335976, 7375290, 7412172, 7509053, 7854368, 8089006, 8203206).

### Supervised Student’s Awards:

- Early-Career Best Paper Award Winner of the DesignCon Conference in 2023 (student: Morten Schierholz).
- Best Bachelor Thesis of the Year Award of the IEEE German Chapter on EMC in 2022 (student: Malte Thode).
- Best Ph.D. Thesis of the Year Award of the IEEE German Chapter on EMC in 2019 (student: Torsten Reuschel).
- Best Student Paper Award of the 2018 IEEE Workshop on Signal and Power Integrity (student: Katharina Scharff).
- Best Master Thesis of the Year Award of the IEEE German Chapter on EMC in 2017 (student: Ömer Yildiz).
- Best MasterThesis of the Year Award of the IEEE German Chapter on EMC in 2016 (student: Alexander Vogt).
- Third Prize in the Student Paper Contest of the 2015 IEEE Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization (student: Jan Birger Preibisch).
- Best Bachelor Thesis of the Year Award of the IEEE German Chapter on EMC in 2014 (student: Jan Birger Preibisch).

- Best Student Paper Award of the 2014 IEEE Workshop on Signal and Power Integrity (student: David Dahl).
- Best Student Paper Award at the Asia-Pacific EMC Conference in 2013 (student: Alexander Vogt).
- First Runner Up Student Paper Award of the IEEE EMC Symposium in 2012 (student: Alexander Vogt).
- Best Paper Award of the EMV Düsseldorf trade show and congress in 2012 (student: Arne Schröder).
- Best Ph.D. Thesis of the Year Award of the IEEE German Chapter on EMC in 2011 (student: Renato Rimolo-Donadio).
- TUHH Diplomp reis in 2010 (student: Sebastian Müller).
- IBM Ph.D. Fellowship Award in 2010 (student: Xioamin Duan).
- Best Student Symposium Paper Award at the International IEEE EMC Symposium in 2009 (student: Xioamin Duan).
- Best Bachelor Thesis of the Year Award of the IEEE German Chapter of the EMC Society in 2008 (student: Sebastian Müller).
- Best Interactive Presentation Award at the Design, Automation, and Test in Europe (DATE) conference in 2008 (student: Renato Rimolo-Donadio).

### External Fund Raising:

- **≈ € 340.000** from the European Union (7<sup>th</sup> Framework Programme) within the project “High Intensity Radiated Field Synthetic Environment” (funding period: 2008-2012).
- **≈ € 240.000** from the German Research Foundation (DFG) for the project “Via-Arrays in Mehrlagen-substraten für den Einsatz in schnellen, energie- und ressourcensparenden digitalen Systemen“ (funding period: 2010-2013).
- **≈ € 240.000** from the German Research Foundation (DFG) for the project “Entwurf von passiven Hochfrequenz-Komponenten in Mehrlagensubstraten mit Hilfe von funktionalen Vias“ (funding period: 2011-2014).
- **≈ € 220.000** from the German Research Foundation (DFG) for the project “Elektrische Modellbildung und Entwurf von Through Silicon Vias für integrierte Systeme“ in collaboration with Technical University of Berlin (funding period: 2012-2015).
- **≈ € 70.000** from the German Research Foundation (DFG) for a follow-up project to “Via-Arrays in Mehrlagensubstraten für den Einsatz in schnellen, energie- und ressourcensparenden digitalen Systemen“ (funding period: 2014-2015).
- **≈ € 240.000** from the German Research Foundation (DFG) for the project to “Stochastic Contour Integral Methodology for the Computation of Two-Dimensional Electromagnetic Wave Propagation“ (funding period: 2015-2018).

- **≈ € 250.000** from the German Research Foundation (DFG) for the project “Hybrid Simulation of Electromagnetic Field Interaction with Metallic Structures Showing Massive Nonlinear Loading” (funding period: 2017-2020).
- **≈ € 11.000** from the German Research Foundation (DFG) for the development of international collaborations with the Georgia Institute of Technology in the field of artificial neural networks for printed circuit board design (funding period: 2019).
- **≈ € 196.000** from the State of Hamburg (Landesforschungsförderung) within the project HELIOS - Hamburg Electronics Lab for Integrated Optoelectrical Systems (funding period: 2018-2020).
- Support as one of four PIs of a project headed by Prof. Trieu of TUHH. Total funds **≈ € 3.540.00** from the German Federal Ministry of Education and Research within the project "Forschungslabore Mikroelektronik Deutschland (ForLab)" (funding period: 2019-2021).
- **≈ € 271.000** from the German Research Foundation (DFG) for the project “Properties of Orbital Angular Momentum (OAM) Waves with Respect to Wireless Communication in Complex Environments and to Electromagnetic Interference” (funding period: 2020-2023).
- **≈ € 153.000** from German Federal Ministry for Economic Affairs and Climate Action (BMWK) for the subcontract “Unterstützung der PCB- und Chip-Usecases“ within the collaborative project “Unterstützung der Entwicklung von effizienten und sicheren Elektroniksystemen für zukünftige KFZ-Anwendungen mit automatisierten Fahrfunktionen mittels einer modular strukturierten KI-Plattform (progressivKI)“ (funding period 2023-2024).
- **≈ € 600.000** from different industrial partners for various projects concerned with computational electromagnetics as well as applied signal integrity, power integrity, and electromagnetic compatibility (funding periods: 2010-2025).

Sum of all funding directly received **≈ € 2.831.000** (funding periods: 2008-2025).



# Publications

## Peer-Reviewed Conference Contributions:

1. T. Hillebrecht, J. Alfert, T. Reuschel, **C. Schuster**, "Automated Generation of Physics-Based Via Models with Full-Wave Simulation for an SI/PI Database", IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS), Milpitas, CA, USA, October 15-18, 2023.  
**EPEPS BEST POSTER AWARD**
2. M. Wulff, L. Wang, A. Kölpin, **C. Schuster**, "Influence of the Communication Environment on Orbital Angular Momentum (OAM) Mode Orthogonality", European Microwave Week (EuMW), Berlin, Germany, September 17-22, 2023.
3. H. Esmaeili, C. Yang, **C. Schuster**, "Physics Inspired Artificial Neural Network Adaptation for SAR Prediction in Bio-EM Problems", IEEE International Microwave Biomedical Conference (IMBioC), Leuven, Belgium, September 11-13, 2023.
4. H. Esmaeili, C. Yang, **C. Schuster**, "SAR Prediction in Human Head Tissues with Varying Material Parameters Using an Artificial Neural Network", Annual Meeting of the BioEM Society (BioEM), Oxford, UK, June 18-23, 2023.
5. J. Hernandez-Bonilla, G. Alavi, C. Yang, **C. Schuster**, "Measurement of Temperature and Humidity Dependence of Automotive-Grade Interconnects", IEEE Workshop on Signal and Power Integrity (SPI), Aveiro, Portugal, May 7-10, 2023.
6. L. Bohl, K. Scharff, X. Duan, **C. Schuster**, "Bayesian Optimization of First-Order Continuous-Time Linear Equalization in High-Speed Links Including Crosstalk", IEEE Workshop on Signal and Power Integrity (SPI), Aveiro, Portugal, May 7-10, 2023.
7. F. Garbuglia, D. Spina, T. Reuschel, **C. Schuster**, D. Deschrijver, T. Dhaene, "Modeling S-parameters of Interconnects using Periodic Gaussian Process Kernels", IEEE Workshop on Signal and Power Integrity (SPI), Aveiro, Portugal, Germany, May 7-10, 2023.
8. M. Schierholz, I. Erdin, J. Balachandran, **C. Schuster**, "Data-Efficient Supervised Machine Learning Technique for Practical PCB Noise Decoupling, DesignCon Conference, Santa Clara, CA, USA, January 31 - February 2, 2023.  
**DESIGNCON 2023 EARLY-CAREER BEST PAPER AWARD**
9. H. Esmaeili, C. Yang, **C. Schuster**, "Flexible Numerical Evaluation of Human Head Exposure to a Transmitter Coil For Wireless Power Transfer at 13.56 MHz", International Symposium on EMC Europe (EMC Europe), Gothenburg, Sweden, September 5-8, 2022.
10. M. Wulff, L. Wang, C. Yang, **C. Schuster**, "Inter Mode Interference in Circular Antenna Arrays for Orbital Angular Momentum (OAM) Based Communication", IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), Denver, CO, USA, July 10-15, 2022.
11. T. Wendt, C. Yang, J. Hernandez-Bonilla, J. Schütt, **C. Schuster**, "Signal Integrity Assessment of External ESD Protection for Gbit/s Data Rates on Ceramic Test Fixture", IEEE Workshop on Signal and Power Integrity (SPI), hybrid event, Siegen, Germany, May 22-25, 2022.
12. M. Schierholz, I. Erdin, J. Balachandran, C. Yang, **C. Schuster**, "Parametric S-Parameters for PCB based Power Delivery Network Design Using Machine Learning", IEEE Workshop on Signal and Power Integrity (SPI), hybrid event, Siegen, Germany, May 22-25, 2022.
13. M. De Stefano, S. Grivet-Talocia, T. Wendt, C. Yang, **C. Schuster**, "Low-Frequency Modal Extrapolation and Regularization for Full-Bandwidth Macromodeling of Electromagnetic Structures", IEEE Workshop on Signal and Power Integrity (SPI), hybrid event, Siegen, Germany, May 22-25, 2022.
14. M. Wulff, L. Wang, C. Yang, **C. Schuster**, "Effect of the Orientation of the Array Elements of Uniform Circular Antenna Arrays on Orbital Angular Momentum (OAM) Modes", IEEE German Microwave Conference (GeMiC), Ulm, Germany, May 16-18, 2022.

15. M. Schierholz, Y. Hassab, C. Yang, **C. Schuster**, "Evaluation of Support Vector Machines for PCB based Power Delivery Network Classification", IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS), virtual event, October 17-20, 2021.
16. T. Wendt, C. Yang, M. De Stefano, S. Grivet-Talocia, **C. Schuster**, "Distributed Nonlinear Shielding in Power Delivery Networks on Printed Circuit Boards", IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS), virtual event, October 17-20, 2021.
17. C. Yang, M. Schierholz, E. Trunczik, L. Helmich, H.-D. Brüns, **C. Schuster**, "Efficient and Flexible Huygens' Source Replacement of mm-scale Human Brain Implants", Joint IEEE International Symposium on Electromagnetic Compatibility, Signal and Power Integrity (EMCS+SIPI) and Symposium on EMC Europe (EMC Europe), virtual event, Glasgow, Scotland, July 26 - August 20, 2021.
18. Ö. Yildiz, N. Pathe, M. Bochar, C. Yang, **C. Schuster**, "Analysis of Differential Crosstalk and Transmission for Via Arrays in Low Temperature Cofired Ceramics", IEEE Workshop on Signal and Power Integrity (SPI), virtual event, Siegen, Germany, May 10-12, 2021.
19. A. Sanchez-Masis, A. Carmona-Cruz, M. Schierholz, X. Duan, K. Roy, C. Yang, R. Rimolo-Donadio, **C. Schuster**, "ANN Hyperparameter Optimization by Genetic Algorithms for Via Interconnect Classification", IEEE Workshop on Signal and Power Integrity (SPI), virtual event, Siegen, Germany, May 10-12, 2021.
20. L. Wang, M. Wulff, C. Yang, **C. Schuster**, "Numerical Analysis of Two MIMO Channels Carrying Orbital Angular Momentum (OAM)", EuCAP European Conference on Antennas and Propagation (EuCAP), virtual event, Düsseldorf, Germany, March 22-26, 2021.
21. Ö. Yildiz, O. Thomsen, M. Bochar, C. Yang, **C. Schuster**, "Vertically Integrated Microwave Filters Using Functional Via Structures in LTCC", European Microwave Conference (EuMC), virtual event, Utrecht, The Netherlands, January 10-15, 2021.
22. K. Scharff, C. M. Schierholz, C. Yang, **C. Schuster**, "ANN Performance for the Prediction of High-Speed Digital Interconnects over Multiple PCBs", IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS), virtual event, October 4-7, 2020.
23. K. Scharff, H. Torun, C. Yang, M. Swaminathan, **C. Schuster**, "Bayesian Optimization for Signal Transmission Including Crosstalk in a Via Array", International Symposium on EMC Europe (EMC Europe), virtual event, Rome, Italy, September 23-25, 2020.
24. L. Wang, M. Wulff, C. Yang, W. Park, **C. Schuster**, "Numerical Investigation of OAM Based Indoor Communication in a Corridor with Electrical Conducting Walls", IEEE International Conference on UK-China Emerging Technologies (UCET), virtual event, Glasgow, United Kingdom, August 20-21, 2020.

#### UCET BEST PAPER AWARD (PROPAGATION TRACK)

25. M. Schierholz, C. Yang, K. Roy, M. Swaminathan, **C. Schuster**, "Comparison of Collaborative versus Extended Artificial Neural Networks for PDN Design", IEEE Workshop on Signal and Power Integrity (SPI), virtual event, Cologne, Germany, May 17-20, 2020.
26. M. Wulff, L. Wang, C. Yang, H.-D. Brüns, **C. Schuster**, "Using Orbital Angular Momentum (OAM) Modes on Multi-Conductor Cables for Crosstalk Mitigation", IEEE Workshop on Signal and Power Integrity (SPI), virtual event, Cologne, Germany, May 17-20, 2020.
27. Ö. Yildiz, **C. Schuster**, "Design of Wideband Functional Via Structures for LTCC Multilayer Substrates up to 110 GHz", IEEE Electrical Design of Advanced Package & Systems Symposium (EDAPS), Kaohsiung, Taiwan, December 16-18, 2019.
28. M. Schierholz, K. Scharff, **C. Schuster**, "Evaluation of Neural Networks to Predict Target Impedance Violations of Power Delivery Networks", IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS), Montreal, Canada, October 6-9, 2019.
29. T. Wendt, C. Yang, **C. Schuster**, S. Grivet-Talocia, "Numerical Complexity Study of Solving Hybrid Multiport Field-Circuit Problems for Diode Grids", accepted for presentation at the IEEE International Conference on Electromagnetics in Advanced Applications (ICEAA), Grenada, Spain, September 9-13, 2019.
30. L. Wang, C. Yang, H.-D. Brüns, **C. Schuster**, "Effect of the Interference from Conducting Plates on OAM Based Wireless Communication", accepted for presentation at the IEEE International Conference on Electromagnetics in Advanced Applications (ICEAA), Grenada, Spain, September 9-13, 2019.

31. Z. Wen, Q. Wu, Ö. Yildiz, **C. Schuster**, "Design of Experiments for Analyzing the Efficiency of a Multi-Coil Wireless Power Transfer System Using Polynomial Chaos Expansion", IEEE Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC), Sapporo, Japan, June 3-7, 2019.
  32. K. Scharff, H.-D. Brüns, **C. Schuster**, "Performance Metrics for Crosstalk on Printed Circuit Boards in Frequency Domain", IEEE Workshop on Signal and Power Integrity (SPI), Chambéry, France, June 18-21, 2019.
  33. A. Carmona-Cruz, K. Scharff, J. Cedeno-Chavez, H.-D. Brüns, R. Rimolo-Donadio, **C. Schuster**, "Via Transition Optimization Using a Domain Decomposition Approach", IEEE Workshop on Signal and Power Integrity (SPI), Chambéry, France, June 18-21, 2019.
  34. J. Cedeno-Chaves, K. Scharff, A. Carmona-Cruz, H.-D. Brüns, R. Rimolo-Donadio, **C. Schuster**, "Mode Conversion Due To Residual Via Stubs in Differential Signaling", IEEE Workshop on Signal and Power Integrity (SPI), Chambéry, France, June 18-21, 2019.
  35. T. Hillebrecht, D. Dahl, **C. Schuster**, "Prediction of Frequency Dependent Shielding Behavior for Ground Via Fences in Printed Circuit Boards", IEEE Workshop on Signal and Power Integrity (SPI), Chambéry, France, June 18-21, 2019.
  36. Ö. Yildiz, D. Dahl, **C. Schuster**, "Quantifying the Impact of RF Probing Variability on TRL Calibration for LTCC Substrates", IEEE Electronic Components and Technology Conference (ECTC), Las Vegas, USA, May 28 - 31, 2019.
  37. L. Wang, W. Park, H.-D. Brüns, D. Kam, C. Schuster, "Numerical Investigation of the Impact of Array Orientations on Orbital Angular Momentum (OAM) Based Communication Using a Mixed-Mode Matrix", German Microwave Conference (GeMiC), Stuttgart, Germany, March 25-27, 2019.
  38. E. Frick, D. Dahl, C. Seifert, M. Lindner, **C. Schuster**, "An Intrusive PCE Extension of the Contour Integral Method and its Application in Electrical Engineering", Annual Meeting of the Gesellschaft für Angewandte Mathematik und Mechanik (GAMM), February 18-22, Vienna, Austria, 2019.
  39. L. Carrera-Retana, R. Rimolo-Donadio, **C. Schuster**, "Efficient Construction of Interconnect Passive Macromodels Through Segmented Analysis", IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS), San Jose, CA, USA, October 14-17, 2018.
  40. E. Frick, D. Dahl, C. Seifert, M. Lindner, **C. Schuster**, "Novel Method for Error Estimation in Applications of Polynomial Chaos Expansion to Stochastic Modeling of Multi-Resonant Systems", IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS), San Jose, CA, USA, October 14-17, 2018.
  41. L. Wang, **C. Schuster**, "Investigation of Radiated EMI from Printed Circuit Board Edges up to 100 GHz by using an Effective Two-Dimensional Approach", International Symposium on EMC Europe (EMC Europe), Amsterdam, Netherlands, August 27-30, 2018.
  42. K. Scharff, D. Dahl, H.-D. Brüns, **C. Schuster**, "Physical Scaling Effects of Differential Crosstalk in Via Arrays up to Frequencies of 100 GHz", IEEE Workshop on Signal and Power Integrity (SPI), Brest, France, May 22-25, 2018.
- SPI BEST STUDENT PAPER AWARD
43. T. Wendt, T. Reuschel, **C. Schuster**, "Direct Prediction of Linear Equalization Coefficients Using Raised Cosine Pulse Shaping in Frequency Domain", IEEE Workshop on Signal and Power Integrity (SPI), Brest, France, May 22-25, 2018.
  44. W. Park, D. Kam, H.-D. Brüns, **C. Schuster**, "Numerical Investigation of Orbital Angular Momentum Density of Antenna Arrays Based on the Method of Moments", Joint IEEE Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC) and IEEE International Symposium on Electromagnetic Compatibility (EMCS), Singapore, May 14-17, 2018.
  45. D. Dahl, Ö. Yildiz, E. Frick, C. Seifert, M. Lindner, **C. Schuster**, "Feasibility of Uncertainty Quantification for Power Distribution Network Modeling Using PCE and a Contour Integral Method", Joint IEEE Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC) and IEEE International Symposium on Electromagnetic Compatibility (EMCS), Singapore, May 14-17, 2018.
  46. P. Liang, Q. Wu, H.-D. Brüns, **C. Schuster**, "Efficient Modeling of Multi-Coil Wireless Power Transfer Systems using Combination of Full-Wave Simulation and Equivalent Circuit Modeling", Joint IEEE Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC) and

IEEE International Symposium on Electromagnetic Compatibility (EMCS), Singapore, May 14-17, 2018.

47. T. Reuschel, Ö. Yildiz, J. Balachandran, C. Filip, N. Bhagwath, B. Sen, **C. Schuster**, "Efficient Sensitivity-Aware Assessment of High-Speed Links Using PCE and Implications for COM", DesignCon Conference, Santa Clara, CA, USA, January 30 - February 1, 2018.

DESIGNCON PAPER AWARD

48. L. Carrera-Retana, R. Rimolo-Donadio, **C. Schuster**, "Evaluation of Concatenation Techniques for State-Space Interconnect Macromodels", IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS), San Jose, CA, USA, October 15-18, 2017.

EPEPS BEST POSTER PRESENTATION AWARD

49. Ö. Yildiz, J. Preibisch, Jan Niehof, **C. Schuster**, "Sensitivity Analysis and Empirical Optimization of Cross-Domain Coupling on RFICs using Polynomial Chaos Expansion", IEEE Symposium on Electromagnetic Compatibility, Signal and Power Integrity (EMC+SIPI), Washington, DC, USA, August 7-11, 2017.
50. E. Frick, J. Preibisch, C. Seifert, M. Lindner, **C. Schuster**, "Variability Analysis of Via Crosstalk Using Polynomial Chaos Expansion", IEEE International Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization for RF, Microwave and Terahertz Applications (NEMO), Sevilla, Spain, May 17-19, 2017.
51. T. Reuschel, J. Preibisch, **C. Schuster**, "Efficient Design of Continuous Time Linear Equalization for Loss Dominated Digital Links", IEEE Workshop on Signal and Power Integrity (SPI), Baveno, Italy, May 7-10, 2017.
52. D. Dahl, I. Ndip, K.-D. Lang, **C. Schuster**, "Effect of 3D Stack-Up Integration on Through Silicon Via Characteristics", IEEE Workshop on Signal and Power Integrity (SPI), Baveno, Italy, May 7-10, 2017.
53. K. Scharff, T. Reuschel, X. Duan, H.-D. Brüns, **C. Schuster**, "Exploration of Differential Via Stub Effect Mitigation by Using PAM4 and PAM8 Line Coding", IEEE Workshop on Signal and Power Integrity (SPI), Baveno, Italy, May 7-10, 2017.
54. J. Speichert, T. Kiehl, R. God, H.-D. Brüns, **C. Schuster**, "Simulation-Based Validation of Near Field Communication Effects on Aircraft Wiring", International Workshop on Aircraft System Technologies (AST), Hamburg, Germany, February 21–22, 2017.
55. Y. Zhao, R. Grünheid, G. Bauch, T. Reuschel, **C. Schuster**, "Redundant and Non-Redundant Spectrum Shaping Schemes for Reflection-Limited Chip-to-Chip Communication", International ITG Conference on Systems, Communication and Coding (SCC), Hamburg, Germany, February 6-9, 2017.
56. J. Preibisch, J. Balachandran, T. Reuschel, K. Scharff, B. Sen, C. Schuster, "Exploring Efficient Variability-Aware Analysis Method for High-Speed Digital Link Design Using PCE", DesignCon Conference, Santa Clara, CA, USA, January 31 - February 2, 2017.

DESIGNCON PAPER AWARD

57. L. Carrera-Retana, R. Rimolo-Donadio, **C. Schuster**, "Evaluation of Vector Fitting for Compact Interconnect Model Representation", IEEE Convention of Central America and Panama Region (CONCAPAN), San Jose, Costa Rica, November 9-11, 2016.
58. J. Preibisch, **C. Schuster**, "Extension of the Contour Integral Method for the Modeling of TE Scattering in Two-Dimensional Photonic Structures Using the Duality Principle", International Congress on Advanced Electromagnetic Materials in Microwaves and Optics (Metamaterials), Crete, Greece, September 17-22, 2016.
59. X. Duan, M. Böttcher, D. Dahl, **C. Schuster**, C. Tschoban, I. Ndip, K.-D. Lang, "High Frequency Characterization of Silicon Substrate and Through Silicon Vias", IEEE Electronic Components and Technology Conference (ECTC), Las Vegas, USA, May 31 - June 3, 2016.
60. Q. Wu, H.-D. Brüns, **C. Schuster**, "Evaluation of isolation between blade antennas in pre-design phase using a synthesized model", IEEE Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC), Shenzhen, China, May 17-21, 2016.
61. C. Yang, P. Liu, H.-D. Brüns, **C. Schuster**, "Design Aspects for HIRF Protection of a Rectangular Metallic Cavity Using Energy Selective Diode Grids", IEEE Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC), Shenzhen, China, May 17-21, 2016.

62. J. Preibisch, T. Reuschel, K. Scharff, **C. Schuster**, "Impact of Continuous Time Linear Equalizer Variability on Eye Opening of High-Speed Links", IEEE Workshop on Signal and Power Integrity (SPI), Turin, Italy, May 8-11, 2016.
63. D. Dahl, T. Reuschel, X. Duan, I. Ndip, K.-D. Lang, **C. Schuster**, "On the Upper Bound of Total Uncorrelated Crosstalk in Large Through Silicon Via Arrays", IEEE Workshop on Signal and Power Integrity (SPI), Turin, Italy, May 8-11, 2016.
64. A. Vogt, H.-D. Brüns, **C. Schuster**, "Auswirkung absorbierender Materialien auf die Verkopplung von Komponenten innerhalb eines PC-Gehäuses", Internationale Fachmesse und Kongress für Elektromagnetische Verträglichkeit, Düsseldorf, Germany, February 23-25, 2016.
65. Y. Kwark, T. Reuschel, R. Rimolo-Donadio, D. Kaller, T.-M. Winkel, H. Harrer, **C. Schuster**, "Systematic Analysis of Electrical Link Bottlenecks and Strategies for Their Equalization", DesignCon Conference, Santa Clara, CA, USA, January 19 - 21, 2016.
66. X. Duan, M. Böttcher, S. Dobritz, D. Dahl, **C. Schuster**, I. Ndip, K.-D. Lang, "Comparison of Passivation Materials for High frequency 3D Packaging Application up to 110 GHz", European Microelectronics and Packaging Conference and Exhibition (EMPC), Friedrichshafen, Germany, September 14-16, 2015.
67. Q. Wu, A. Vogt, J. B. Preibisch, A. Hardock, H.-D. Brüns, **C. Schuster**, "Modeling of Mutual Coupling between Coaxial Probes in Flat Metallic Casings Using the Contour Integral Method", IEEE International Conference on Electromagnetics in Advanced Applications (ICEAA), Torino, Italy, September 7-11, 2015.
68. C. Yang, H.-D. Brüns, P.G. Liu, **C. Schuster**, "Validation of a Flexible Causality Treatment for Transient Analysis of Nonlinearly Loaded Structures ", IEEE Symposium on Electromagnetic Compatibility, Dresden, August 16-22, 2015.
69. Q. Wu, A. Vogt, H.-D. Brüns, F. Gronwald, **C. Schuster**, "Numerical and Experimental Evaluation of Electromagnetic Coupling between Radiating Antenna Structures inside a Computer Casing", IEEE Symposium on Electromagnetic Compatibility, Dresden, August 16-22, 2015.
70. J. Preibisch, P. Triverio, **C. Schuster**, "Efficient Stochastic Transmission Line Modeling Using Polynomial Chaos Expansion with Multiple Variables", IEEE International Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization (NEMO), Ottawa, Canada, August 11-14, 2015.

#### THIRD PRIZE NEMO BEST STUDENT PAPER AWARD

71. X. Duan, D. Dahl, **C. Schuster**, I. Ndip, K.-D. Lang, "Efficient Analysis of Wave Propagation for Through-Silicon-Via Pairs Using Multipole Expansion Method", IEEE Workshop on Signal and Power Integrity (SPI), Berlin, Germany, May 10-13, 2015.
72. J. Preibisch, P. Triverio, **C. Schuster**, "Sensitivity Analysis of Via Impedance Using Polynomial Chaos Expansion", IEEE Workshop on Signal and Power Integrity (SPI), Berlin, Germany, May 10-13, 2015.
73. A. Hardock, D. Dahl, H.-D. Brüns, **C. Schuster**, "Efficient Calculation of External Fringing Capacitances for Physics-Based PCB Modeling", IEEE Workshop on Signal and Power Integrity (SPI), Berlin, Germany, May 10-13, 2015.
74. A. Hardock, **C. Schuster**, "Using Coupled Vias for Band-Pass Filters in Multilayered Printed-Circuit Boards", German Microwave Conference (GeMic), Nürnberg, Germany, March 16-18, 2015.
75. D. Dahl, S. Müller, **C. Schuster**, "Effect of Layered Media on the Parallel Plate Impedance of Printed Circuit Boards", IEEE Electrical Design of Advanced Package & Systems Symposium (EDAPS), Bangalore, India, December 14-16, 2014.
76. Y. Kwark, R. Rimolo-Donadio, C. Baks, S. Müller, **C. Schuster**, "Proximity Effects Between Striplines and Vias", International Conference on Signal and Power Integrity (SIPI) embedded within the International Symposium on Electromagnetic Compatibility, Raleigh, NC, USA, August 3-8 2014.
77. X. Duan, A. Hardock, I. Ndip, C. Schuster, K.-D. Lang, "Optimization of Microstrip-to-Via Transition for High-Speed Differential Signaling on Printed Circuit Boards by Suppression of the Parasitic Modes in Shared Antipads", International Conference on Signal and Power Integrity (SIPI) embedded within the International Symposium on Electromagnetic Compatibility, Raleigh, NC, USA, August 3-8 2014.

78. T. Reuschel, S. Müller, H.-D. Brüns, **C. Schuster**, "Investigation of Long Range Differential Crosstalk on Printed Circuit Boards", IEEE Workshop on Signal and Power Integrity (SPI), Ghent, Belgium, May 11-14, 2014.
79. D. Dahl, A. Beyreuther, X. Duan, I. Ndip, K.-D. Lang, **C. Schuster**, "Analysis of Wave Propagation along Coaxial Through Silicon Vias Using a Matrix Method", IEEE Workshop on Signal and Power Integrity (SPI), Ghent, Belgium, May 11-14, 2014.

**SPI BEST STUDENT PAPER AWARD**

80. S. Müller, H.-D. Brüns, **C. Schuster**, "Einfluss der Routing-Lage in Via-Arrays auf die Signalqualität bei hohen Datenraten", Internationale Fachmesse und Kongress für Elektromagnetische Verträglichkeit, Düsseldorf, Germany, March 11-13, 2014.
81. A. Vogt, H.-D. Brüns, **C. Schuster**, "Einfluss von absorbierenden Materialien auf die elektromagnetische Strahlung von Leiterplatten", Internationale Fachmesse und Kongress für Elektromagnetische Verträglichkeit, Düsseldorf, Germany, March 11-13, 2014.
82. D. Dahl, X. Duan, A. Beyreuther, I. Ndip, K.-D. Lang, **C. Schuster**, "Applying a Physics-Based Via Model to the Simulation of Through Silicon Vias", IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS), San Jose, CA, USA, October 27-30, 2013.
83. J. Preibisch, X. Duan, **C. Schuster**, "Extensions to the Contour Integral Method for Efficient Modeling of TM Scattering in Two-Dimensional Photonic Crystals", International Congress on Advanced Electromagnetic Materials in Microwaves and Optics (Metamaterials), Bordeaux, France, September 16-21, 2013.
84. A. Vogt, H.-D. Brüns, H. Fielitz, **C. Schuster**, "Modeling Absorbing Materials in Cavities with Apertures Using the Thin Sheet Approximation", IEEE Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC), Melbourne, Australia, May 20-23, 2013.

**APEMC BEST STUDENT PAPER AWARD**

85. D. Dahl, X. Duan, A. Beyreuther, I. Ndip, K.-D. Lang, **C. Schuster**, "Application of the Transverse Resonance Method for Efficient Extraction of the Dispersion Relation of Arbitrary Layers in Silicon Interposers", IEEE Workshop on Signal and Power Integrity (SPI), Paris, France, May 12-15, 2013.
86. S. Müller, A. Hardock, R. Rimolo-Donadio, H.-D. Brüns, **C. Schuster**, "Analytical Extraction of Via Near-Field Coupling Using a Multiple Scattering Approach", IEEE Workshop on Signal and Power Integrity (SPI), Paris, France, May 12-15, 2013.
87. R. Rimolo-Donadio, X. Duan, Y. Kwark, X. Gu, C. Baks, S. Müller, T.-M. Winkel, T. Strach, L. Shan, H. Harrer, **C. Schuster**, "Signal and Power Integrity (SPI) Co-Analysis for High-Speed Communication Channels", DesignCon Conference, Santa Clara, CA, USA, January 28 - 31, 2013.
88. T.-M. Winkel, H. Harrer, T. Strach, R. Rimolo-Donadio, Y. Kwark, X. Duan, **C. Schuster**, "Framework for Co-Simulation of Signal and Power Integrity in Server Systems", IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS), Tempe, AZ, USA, October 21-24, 2012.
89. A. Hardock, S. Müller, X. Duan, H.-D. Brüns, **C. Schuster**, "Minimizing Displacement Return Currents in Multilayer Via Structures", IEEE Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS), Tempe, AZ, USA, October 21-24, 2012.
90. X. Duan, A. Vogt, H.-D. Brüns, **C. Schuster**, "Progress Toward a Combined CIM/MoM Approach for EMI Analysis of Electronic Systems", International Symposium on Electromagnetic Compatibility Europe (EMC Europe), Rome, Italy, September 17-21, 2012.
91. S. Müller, X. Duan, **C. Schuster**, "Energy-Aware Analysis of Electrically Long High-Speed I/O Links", International Conference on Energy-Aware High Performance Computing (ENA-HPC), Hamburg, September 12, 2012 (paper published in Computer Science – Research and Development by Springer, August 2012, and an erratum ibidem, November 2012).
92. A. Vogt, H.-D. Brüns, S. Connor, B. Archambeault, **C. Schuster**, "Applicability of the Thin Sheet Approximation to the Analysis of EM Emission from Coated PCBs", IEEE Symposium on Electromagnetic Compatibility, Pittsburgh, PA, USA, August 5-10, 2012.

**FIRST RUNNER UP EMC SYMPOSIUM BEST STUDENT PAPER AWARD**

93. A. Hardock, R. Rimolo-Donadio, H.-D. Brüns, **C. Schuster**, "Double Stub Matching in Multilayered Printed Circuit Board Using Vias", IEEE Electronic Components and Technology Conference (ECTC), San Diego, USA, May 29 - June 1, 2012.
94. S. Müller, R. Rimolo-Donadio, X. Duan, H.-D. Brüns, **C. Schuster**, "Analytical Calculation of Conduction and Displacement Current Contributions in PCB Return Current Paths", IEEE Asia-Pacific EMC Symposium (APEMC), Singapore, May 21-24, 2012.
95. D. Timmermann, R. Rimolo-Donadio, Y. Kwark, T.-M. Winkel, C. Siviero, H. Harrer, **C. Schuster**, "Methods for Calculation of Eye Diagrams for Digital Links with Multiple Aggressors Having Unknown Time Offsets", IEEE Workshop on Signal and Power Integrity (SPI), Sorrento, Italy, May 13-16, 2012.
96. A. Schröder, H.-D. Brüns, **C. Schuster**, "Efficient Compression of Far Field Matrices in Multipole Algorithms Based on Spherical Harmonics and Radiating Modes", Advanced Electromagnetics Symposium (AES), Paris, France, April 16-19, 2012 (extended version published in Advanced Electromagnetics, vol. 1, no. 2, pp. 5-11, 2012).
97. S. Müller, R. Rimolo-Donadio, H.-D. Brüns, **C. Schuster**, "Anwendung quasianalytischer Via-Modelle zur schnellen Simulation dichter Via-Arrays", Internationale Fachmesse und Kongress für Elektromagnetische Verträglichkeit, Düsseldorf, Germany, March 7-9, 2012.
98. A. Schröder, H.-D. Brüns, **C. Schuster**, "Beschleunigung schneller Löser in der Momentenmethode bei Einkopplungsproblemen mit Mehrfachanregung", Internationale Fachmesse und Kongress für Elektromagnetische Verträglichkeit, Düsseldorf, Germany, March 7-9, 2012.

#### EMV DÜSSELDORF BEST PAPER AWARD

99. X. Gu, Y. Kwark, D. Liu, Y. Zhang, J. Fan, R. Rimolo-Donadio, S. Müller, **C. Schuster**, F. de Paulis, "Backplane Channel Design Optimization: Recasting a 3Gb/s Link to Operate at 25Gb/s and Above", DesignCon Conference, Santa Clara, CA, USA, January 30 - February 2, 2012.
100. X. Duan, R. Rimolo-Donadio, S. Müller, K. Han, X. Gu, Y. Kwark, H.-D. Brüns, **C. Schuster**, "Impact of Multiple Scattering on Passivity of Equivalent-Circuit Via Models", IEEE Electrical Design of Advanced Package & Systems Symposium (EDAPS), Hangzhou, China, December 12-14, 2011.
101. A. Schröder, G. Rasek, S. Loos, H.-D. Brüns, **C. Schuster**, "Numerical and Experimental Investigations on a Metallic Fuselage Model with Apertures", International Symposium on EMC Europe (EMC Europe), York, United Kingdom, September 26-30, 2011.
102. A. Schröder, H.-D. Brüns, G. South, **C. Schuster**, "Investigation of Field Coupling into a Carbon Fiber Aircraft Model with the Method of Moments", International Conference on Electromagnetics in Advanced Applications (ICEAA), Torino, Italy, September 12-16, 2011.
103. Y. Kwark, M. Kotzev, C. Baks, X. Gu, **C. Schuster**, "Novel Multiport Probing Fixture for High Frequency Measurements in Dense Via Arrays", International Microwave Symposium (IMS), Baltimore, USA, June 5-10, 2011.
104. X. Duan, R. Rimolo-Donadio, H.-D. Brüns, **C. Schuster**, "A Hybrid CIM/MoM Approach for Power Plane Analysis Including Radiation Loss", IEEE Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC), Jeju Island, Korea, May 16-19, 2011.
105. M. Kotzev, Y. Kwark, C. Baks, X. Gu, **C. Schuster**, "Electrical Performance of a Multiport Interposer for Measurements of Dense Via Arrays", IEEE Workshop on Signal Propagation on Interconnects (SPI), Naples, Italy, May 8-11, 2011.
106. R. Rimolo-Donadio, T.-M. Winkel, C. Siviero, D. Kaller, H. Harrer, H.-D. Brüns, **C. Schuster**, "Fast Parametric Pre-Layout Analysis of Signal Integrity for Backplane Interconnects", IEEE Workshop on Signal Propagation on Interconnects (SPI), Naples, Italy, May 8-11, 2011.
107. M. Kotzev, **C. Schuster**, "Custom-Made Calibration Standards for Measurements of Multilayer Substrates", German Microwave Conference (GeMic), Darmstadt, Germany, March 14-16, 2011.
108. X. Gu, Y. Kwark, Y.-J. Zhang, J. Fan, A. Ruehli, M. Kotzev, S. Müller, R. Rimolo-Donadio, **C. Schuster**, B. Archambeault, "Validation and Application of Physics-based Via Models to Dense Via Arrays", DesignCon Conference, Santa Clara, CA, USA, January 31 - February 3, 2011.
109. S. Müller, X. Duan, R. Rimolo-Donadio, H.-D. Brüns, **C. Schuster**, "Non-Uniform Currents on Vias and Their Effects in a Parallel-Plate Environment", IEEE Electrical Design of Advanced Package & Systems Symposium (EDAPS), Singapore, December 7-9, 2010.

110. M. Kotzev, H.-D. Brüns, **C. Schuster**, "Effect of Via Stubs on the TRL Calibration Technique for Measurement of Embedded Multilayer Structures", European Microwave Conference (EuMC), Paris, France, September 28 – October 1, 2010.
111. A. Schröder, H.-D. Brüns, **C. Schuster**, "Exploiting Planes of Magnetic Symmetry in the Fast Multipole Method", International Symposium on Electromagnetic Compatibility Europe (EMC Europe), Wroclaw, Poland, September 13-17, 2010.
112. M. Kotzev, R. Frech, H. Harrer, D. Kaller, A. Huber, T.-M. Winkel, H.-D. Brüns, **C. Schuster**, "Crosstalk Analysis in High Density Connector Via Pin Fields for Digital Backplane Applications Using a 12-Port Vector Network Analyzer", IEEE Electronics System Integration Technology Conferences (ESTC), Berlin, Germany, September 13-16, 2010.
113. M. Kotzev, R. Rimolo-Donadio, H.-D. Brüns, **C. Schuster**, "Multiport Measurement and Deembedding Techniques for Crosstalk Study in Via Arrays", IEEE Workshop on Signal Propagation on Interconnects (SPI), Hildesheim, Germany, May 9-12, 2010.
114. S. Müller, R. Rimolo-Donadio, M. Kotzev, H.-D. Brüns, **C. Schuster**, "Effect of Mixed-Reference Planes on Single-Ended and Differential Links in Multilayer Substrates", IEEE Workshop on Signal Propagation on Interconnects (SPI), Hildesheim, Germany, May 9-12, 2010.
115. S. Müller, R. Rimolo-Donadio, H.-D. Brüns, **C. Schuster**, „Schnelle Simulation verlustbehafteter Verbindungsstrukturen auf Leiterplatten auf der Grundlage quasianalytischer Via-Modelle und der Leitungstheorie“, Internationale Fachmesse und Kongress für elektromagnetische Verträglichkeit (EMV Düsseldorf), Düsseldorf, Germany, March 9-11, 2010.
116. A. Schröder, M. Astner, H.-D. Brüns, **C. Schuster**, "Ausnutzung magnetischer Symmetrie bei der numerischen Analyse von Feldproblemen mit der schnellen Multipolmethode“, Internationale Fachmesse und Kongress für elektromagnetische Verträglichkeit (EMV Düsseldorf), Düsseldorf, Germany, March 9-11, 2010.
117. X. Gu, R. Rimolo-Donadio, Z. Yu, F. de Paulis, Y. H. Kwark, M. Cocchini, M. B. Ritter, B. Archambeault, A. Ruehli, J. Fan, **C. Schuster**, "Fast-Physics-Based Via and Trace Models for Signal and Power Integrity Co-Analysis“, DesignCon Conference, Santa Clara, CA, USA, February 1-4, 2010.

#### DESIGNCON PAPER AWARD

118. X. Duan, R. Rimolo-Donadio, H.-D. Brüns, B. Archambeault, **C. Schuster**, "Contour Integral Method for Rapid Computation of Power/Ground Plane Impedance (Special Session on Power Integrity Techniques)", DesignCon Conference, Santa Clara, CA, USA, February 1-4, 2010.
119. R. Rimolo-Donadio, X. Duan, H.-D. Brüns, **C. Schuster**, "Comprehensive Multilayer Substrate Models for Co-Simulation of Power and Signal Integrity", International Microelectronics and Packaging Symposium (IMAPS), San Jose, CA, USA, November 1-5, 2009.
120. X. Duan, B. Archambeault, H.-D. Brüns, **C. Schuster**, "EM Emission of Differential Signals Across Connected Printed Circuit Boards in the GHz Range", IEEE Symposium on Electromagnetic Compatibility, Austin, TX, USA, August 17-21, 2009.

#### EMC SYMPOSIUM BEST STUDENT PAPER AWARD

121. R. Rimolo-Donadio, X. Duan, H.-D. Brüns, **C. Schuster**, "Differential to Common Mode Conversion Due to Asymmetric Ground Via Configurations", IEEE Workshop on Signal Propagation on Interconnects (SPI), Strasbourg, France, May 12-15, 2009.
122. M. Kotzev, R. Rimolo-Donadio, **C. Schuster**, "Extraction of Broadband Error Boxes for Microprobes and Recessed Probe Launches for Measurement of Printed Circuit Board Structures", IEEE Workshop on Signal Propagation on Interconnects (SPI), Strasbourg, France, May 12-15, 2009.
123. M. Kotzev, X. Gu, Y. H. Kwark, M. B. Ritter, R. Rimolo-Donadio, **C. Schuster**, "Bandwidth Study of Recessed Probe Launch Variations for Broadband Measurement of Embedded PCB Structures", German Microwave Conference (GeMiC), Munich, Germany, March 16-18, 2009.
124. X. Gu, F. de Paulis, R. Rimolo-Donadio, K. Shringarpure, Y. Zhang, B. Archambeault, S. Connor, Y. H. Kwark, M. B. Ritter, J. Fan, **C. Schuster**, "Fully Analytical Methodology for Fast End-to-End Link Analysis on Complex Printed Circuit Boards including Signal and Power Integrity Effects", DesignCon Conference, Santa Clara, CA, USA, February 2-5, 2009.



125. R. Rimolo-Donadio, H.-D. Brüns, **C. Schuster**, "Including Stripline Connections into Network Parameter Based Via Models for Fast Simulation of Interconnects", EMC Zurich Conference, Zurich, Switzerland, January 12-16, 2009.
126. S. Wu, X. Chang, **C. Schuster**, X. Gu, J. Fan, "Eliminating Via-Plane Coupling Using Ground Vias for High-Speed Signal Transitions", IEEE Topical Meeting on Electrical Performance of Electronic Packaging (EPEP), San Jose, CA, USA, October 27-29, 2008.
127. M. Ritter, P. Pepeljugoski, X. Gu, Y. Kwark, D. Kam, R. Rimolo-Donadio, B. Wu, C. Baks, R. John, L. Shan, **C. Schuster**, "The Viability of 25 Gb/s On-board Signalling", IEEE Electronic Components and Technology Conference (ECTC), Lake Buena Vista, FL, USA, May 27-30, 2008.
128. R. Rimolo-Donadio, A. Stepan, H. Brüns, J. Drewniak, **C. Schuster**, "Simulation of Via Interconnects Using Physics-Based Models and Microwave Network Parameters", IEEE Workshop on Signal Propagation on Interconnects (SPI), Avignon, France, May 12-15, 2008.
129. R. Rimolo-Donadio, **C. Schuster**, Y. Kwark, X. Gu, M. Ritter, "Analysis and Optimization of the Recessed Probe Launch for High Frequency Measurements of PCB Interconnects", IEEE Design, Automation and Test in Europe Conference and Exhibition (DATE), Munich, Germany, March 10-14, 2008.

#### BEST INTERACTIVE PRESENTATION AWARD

130. **C. Schuster**, G. Selli, Y. Kwark, M. Ritter, J. Drewniak, "Progress in Representation and Validation of Physics-Based Vias Models", IEEE Workshop on Signal Propagation on Interconnects (SPI), Genova, Italy, May 13-16, 2007.
131. G. Selli, **C. Schuster**, Y. Kwark, M. Ritter, J. Drewniak, "Developing a Physical Model for Vias – Part II: Coupled and Ground Return Vias", DesignCon Conference, Santa Clara, CA, USA, January 29 - February 1, 2007.
132. **C. Schuster**, Y. Kwark, M. Ritter, G. Selli, J. Drewniak, "Accuracy and Application of Physics Based Circuit Models for Vias", International Microelectronics and Packaging Symposium (IMAPS), San Diego, CA, USA, October 8-12, 2006.
133. G. Selli, **C. Schuster**, Y. Kwark, J. Drewniak, "Model-to-Hardware Correlation of Physics-Based Via Models With the Parallel Plate Impedance Included", IEEE Symposium on Electromagnetic Compatibility (EMCS), Portland, OR, USA, August 14-18, 2006.
134. B. Archambeault, S. Connor, D. de Araujo, A. Ruehli, **C. Schuster**, "Fullwave Simulation and Validation of a Complex Packaging Structure", IEEE Electronic Components and Technology Conference (ECTC), San Diego, CA, USA, May 30-June 2, 2006.
135. **C. Schuster**, A. Deutsch, E. Klink, R. Krabbenhoft, "Attenuation Measurement Technique for Printed Circuit Board Traces in a Production Environment", IEEE Workshop on Signal Propagation on Interconnects (SPI), Berlin, Germany, May 9-12, 2006.
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#### Invited or Non-Peer-Reviewed Papers and Presentations:

1. **C. Schuster**, "Methods of Machine Learning: Tools or Toys in EMC Engineering?", EMC Professional Talk, IEEE German EMC Chapter, virtual event, March 22, 2022.
2. C. Feiler, F. Lurz, R. Meißner, S. Schulte, **C. Schuster**, G. Vonbun-Feldbauer, "Machine Learning in Engineering and Materials Science: On Your Marks, Get Set, ... Go!?", Conference on AI in Engineering, [www.ai-engineering.technology](http://www.ai-engineering.technology), virtual event, December 1, 2021.

## KEYNOTE SPEECH

3. M. Schierholz, **C. Schuster**, "Einsatz und Chancen von Methoden des Maschinellen Lernens in der Elektromagnetischen Verträglichkeit", MLE-Days 2021 Workshop, www.mle-days.hamburg, virtual event, July 1-2, 2021.
4. **C. Schuster**, "Artificial Neural Networks for EMC Engineering", Tech Expert Talk for the Bangalore Chapter of the IEEE Electronics Packaging Society (EPS), online, June 12, 2020.
5. F. Gronwald, J. Hansen, C. Karch, **C. Schuster**, M. Tröscher, "Auf die Verträglichkeit kommt es an: Von der Kunst, elektromagnetische Felder und Wellen zu kontrollieren", Physik-Journal, Juni 2020.
6. **C. Schuster**, "Artificial Neural Networks for EMC Engineering", IEEE Latin American Symposium on Circuits and Systems (LASCAS), San José, Costa Rica, February 25-28, 2020.

## KEYNOTE SPEECH

7. K. Scharff, **C. Schuster**, "SI-PI-EMI: Three Problems for Every Electronic Design ", Electronic Design and Test Day 2020, Rohde & Schwarz, Munich, Germany, February 20, 2020.

## KEYNOTE SPEECH

8. **C. Schuster**, "Methods of Machine Learning in EMC", EMC Boot Camp of the IEEE German EMC Chapter, Darmstadt, Germany, November 6, 2019.
9. **C. Schuster**, "Update on Signal and Power Integrity Research in Electromagnetic Compatibility", C3PS Distinguished Speaker Seminar at Georgia Institute of Technology, Atlanta, GA, USA, March 26, 2019.
10. **C. Schuster**, "Signal and Power Integrity for High Speed Serial Links", Bosch Corporate Research Colloquium on EMC, Renningen, Germany, November 27, 2018.
11. Ö. Yildiz, H.-D. Brüns, **C. Schuster**, "The Method of Moments in EMC Modeling & Simulation", Joint IEEE Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC) and IEEE International Symposium on Electromagnetic Compatibility (EMCS), contribution to the tutorial "Introduction to EMI Modeling Techniques", Singapore, May 14-17, 2018.
12. C. Yang, H.-D. Brüns, **C. Schuster**, "Using the Method of Moments for Computation of Nonlinear Shielding", Joint IEEE Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC) and IEEE International Symposium on Electromagnetic Compatibility (EMCS), contribution to the workshop "Computational Electromagnetics (CEM) for EMC Applications", Singapore, May 14-17, 2018.
13. Ö. Yildiz, H.-D. Brüns, **C. Schuster**, "Integral Equation Methods (MoM) in Numerical Modeling ", IEEE Symposium on Electromagnetic Compatibility, Signal and Power Integrity (EMC+SIP), Workshop on EMC DESIGN - Modeling Fundamentals, Washington, DC, USA, August 7-11, 2017.
14. **C. Schuster**, "Signal and Power Integrity – Research in EMC", Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC), Seoul, South Korea, June 20-23, 2017.

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15. J. Preibisch, X. Duan, **C. Schuster**, "Corrections to 'An Efficient Analysis of Power/Ground Planes With Inhomogeneous Substrates Using the Contour Integral Method'", IEEE Transactions on Electromagnetic Compatibility, vol. 59, no. 3, page 1000, June 2017.
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