Résumé: Short Curriculum Vitae | Prof. Dr. Martina Hentschel | Technische Universität Chemnitz
URL for web site: https://www.tu-ilmenau.de/theophys2/mitarbeiter

EDUCATION

2001	PhD (Dr. rer. nat.) "Mesoscopic wave phenomena in electronic and optical ring structures" Max Planck Institute for the Physics of Complex Systems, and Faculty of Mathematics and Science, Technische Universität Dresden, Germany Supervisor Prof. Dr. Klaus Richter
1997	Master (Diploma in Physics) "Diphoton production in heavy ion collisions" Faculty of Mathematics and Science, Technische Universität Dresden, Germany
1994	Imperial College International Diploma, Imperial College London, UK

CURRENT POSITION

2020 –	Professor for Theoretical Physics of complex dynamical Systems Faculty of Natural Sciences, Technische Universität Chemnitz, Germany

PREVIOUS POSITIONS

2012 – 2020	Professor for Theoretical Physics, Technische Universität Ilmenau, Germany
2006 – 2012	Emmy Noether Group Leader, Max Planck Institute for the Physics of Complex Systems, Dresden, Germany
2004 – 2006	Scientific Assistant, Faculty of Physics, Universität Regensburg, Germany
2005	Visiting Research Fellow (Oct. – Dec. 2005), ATR Laboratories, Kyoto, Japan
2002 – 2004	Humboldt Research Fellow, Department of Physics, Duke University, Durham, U.S.A.
2001 – 2002	Research Fellow, Max Planck Institute for the Physics of Complex Systems, Dresden, Germany

FELLOWSHIPS

2006 – 2016	Emmy-Noether Fellowship of the German Research Foundation (DFG) Max Planck Institute for the Physics of Complex Systems, Germany
2008 – 2010	Fellowship in the Fast Track Program of the Robert Bosch Foundation, Germany
2002 – 2004	Feodor-Lynen-Fellowship of the Alexander von Humboldt Foundation Department of Physics, Duke University, U.S.A.
1993, 2000	Scholarships of the German Academic Exchange Service (DAAD) University of Illinois at Urbana-Champaign, U.S.A. (July – Aug. 1993) and Department of Applied Physics, Yale University, New Haven, U.S.A. (Feb. – April 2000)
1991 – 1997	Scholarship Studienstiftung des deutschen Volkes (German Academic Scholarship Foundation), Study of Physics, Technische Universität Dresden, Germany and Imperial College London, UK

PRIZES

2011	Hertha Sponer Prize of the German Physical Society *for her outstanding theoretical work on mesoscopic electronic and optical system, in particular optical microcavities*

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

2020 –	1 PhD Student Faculty of Natural Sciences, Technische Universität Chemnitz, Germany
2012 – 2020	2 Postdocs/ 3 PhD/ 12 Master Students Faculty of Mathematics and Science, Technische Universität Ilmenau, Germany
2006 – 2012	6 Postdocs/ 3 PhD/ 1 Master Student Max Planck Institute for the Physics of Complex Systems, Dresden, and Technische Universität Dresden, Germany

TEACHING ACTIVITIES

2020 – Courses in Theoretical Physics, Nonlinear Dynamics, and Mesoscopic Physics, Faculty of Natural Sciences, Technische Universität Chemnitz, Germany

2012 – 2020 Courses in Theoretical Physics, Technische Universität Ilmenau, Germany

2006 – 2011 Courses in Mesoscopic Physics and Nanoscience, Technische Universität Dresden, Germany

ORGANISATION OF SCIENTIFIC MEETINGS

2018 – Initiator and Organizer of Netzwerk Physikdozentinnen of the DPG

2017 Scientific Organizer, 5th International Workshop on Optical Microcavities and their Applications (5th WOMA and 653th WE Heraeus Seminar), 80 participants, Bad Honnef, Germany

2017 Chief Scientific Organizer and Local Manager, Deutsche Physikerinnentagung (German Women in Physics Meeting), 150 participants, TU Ilmenau, Germany

2015 Scientific Co-Organizer, 4th International Workshop on Optical Microcavities and their Applications (4th WOMA), 120 participants, Sapporo, Japan

2012 Scientific Organizer, International Workshop, Wave Chaos from the Micro- to the Macroscale, 70 participants, Dresden, Germany

2010 Scientific Organizer, International Workshop, Optical Microcavities: Quantum Chaos in Open Systems Meets Optical Resonators, 60 participants, Dresden, Germany

2008 Scientific Organizer, International Workshop and Seminar, New Frontiers of Quantum Chaos in Mesoscopic Systems, 90 participants, Dresden, Germany

INSTITUTIONAL RESPONSIBILITIES

2015 – 2017 Chief Responsibility for acquisition of new High Performance Compute (HPC) Cluster for Technische Universität Ilmenau (purchased 3/2017, 580 000 Euro)

2014 – Deputy Director of the Physics Institute, Technische Universität Ilmenau, Germany

2013 – 2014 Head of search committee “Professorship for Technical Physics”, Technische Universität Ilmenau, Germany

COMMISSIONS OF TRUST

2016 – Board Member “Fast Track Program”, Robert Bosch Foundation Stuttgart, Germany

2017 – Selection Committee Member Hertha Sponer Prize, German Physical Society, Germany

MEMBERSHIPS OF SCIENTIFIC SOCIETIES

1996 – Member, German Physical Society, Germany

2010 – Member of Academia Net

2015 – Founder of the Academia Net Club Saxony and Thuringia

2017 – Member, Gesellschaft für Angewandte Optik (German Branch of European Optical Society)

MAIN RESEARCH COLLABORATIONS

2002 – Klaus Richter, Graphene billiards, University of Regensburg, Germany

2002 – Henning Schomerus, PT-symmetry in optical microcavities, University of Lancaster, U.K.

2007 – Jan Wiersig, Directional emitting microcavities, OvG University Magdeburg, Germany

2013 – Oliver Schmidt, Exp., Spin-orbit-interaction in nano-cones, IFW Dresden, Germany

2015 – Yun-Feng Xiao, Exp., Asymmetric microcavities, Peking University, China

2016 – Lan Yang, Exp., Taming light for innovative photonics, Wash. Univ., St. Louis, U.S.A.

2016 – Stefan Sinzinger, Exp., Micro-nano-integration in optics, TU Ilmenau, Germany

2017 – Stephan Reitzenstein, Exp., Micropillar laser arrays, TU Berlin, Germany

2017 – Diego Frustaglia, Spin- and geometry-dependent transport, Univ. of Sevilla, Spain

2018 – Johan Dubbeldam, Quantum networks, Delft University, The Netherlands

CAREER BREAKS

1st child, born 3/2009, 2nd child, born 9/2010, 3rd child, born 12/2012

Résumé: Early achievements track-record | Prof. Dr. Martina Hentschel | Technische Universität Ilmenau

Publication Record Summary

I am co-author of 65 **articles** in refereed journals, 2 review articles (one on Scholarpedia), 5 book chapters and 9 refereed proceedings since 1996. I am first author in 25 of these publications (out of which 4 are the single author) and senior author of 28 papers. 58 papers are without my PhD supervisor. Furthermore, 2 papers are submitted or will soon be. According to Web of Science (as of December 21, 2017), 62 articles have been cited 1576 times in 898 articles (1371 citations in 853 articles without self citations), corresponding to an average of 75 citations per year and an h-index of 21.

My field of research is the **complex dynamics and interactions** in both electronic **mesoscopic systems** such as quantum dots or graphene, and optical mesoscopic systems such as microresonators. Here, light is not confined between two mirrors, but rather by total internal reflection of light travelling along the system boundary in so-called whispering-gallery modes. My **major scientific achievements** are the following (grouped by topic):

- **Electronic mesoscopic systems and graphene**

1. D. Frustaglia, **M. Hentschel,** and K. Richter, Quantum transport in non-uniform magnetic fields: Aharonov-Bohm ring as a spin switch, **Phys. Rev. Lett. 87**, 256602(1-4) (2001). *We showed that spin currents can be controlled by a tiny magnetic field (flux) across the system which proofed to be useful for spintronic applications. (119 citations)*

2. **M. Hentschel** and F. Guinea, Orthogonality catastrophe and Kondo effect in graphene, **Phys. Rev. B 76**, 115407(1-7) (2007). *Many-body effects are at the heart of condensed matter physics. We studied two important (orthogonality catastrophe and the Kondo effect) for mesoscopic systems, here in particular for graphene, and showed their absence at the Dirac point. (96 citations)*

- **Optical mesoscopic systems – Fundamentals**

3. **M. Hentschel** and K. Richter, Quantum chaos in optical systems: The annular billiard, **Phys. Rev. E 66**, 056207(1-13) (2002). *Optical systems are intrinsically open as light may escape by refraction or by evanescent leakage. We explain the consequences for quantum chaos and ray-wave correspondence. (84 citations)*

4. **M. Hentschel,** H. Schomerus, and R. Schubert, Husimi functions at dielectric interfaces: Inside-outside duality for optical systems and beyond, **Europhys. Lett. 62**, 636-642 (2003). *The openness of optical systems requires a generalisation of Husimi functions such that incoming, reflected and transmitted rays are properly represented by their wave (Husimi) counterparts.(73 citations)*

5. H. Schomerus and **M. Hentschel**, Correcting ray optics at curved dielectric microresonator interfaces: Phase-space unification of Fresnel filltering and the Goos-Hänchen shift, **Phys. Rev.Lett. 96**, 243903(1-4) (2006).
Ray optics breaks down for small wavelengths, with additional corrections arising when the interface boundaries are curved. These are essential for an amended ray description of microcavities. (62 citations)

6. P. Stockschläder and **M. Hentschel,** Consequences of a wave-correction extended ray dynamics for integrable and chaotic optical microcavities**, J. Opt. 19**, 125603(1-13) (2017). *This paper summarizes ray-wave correspondence and corrections to it in the context of quantum chaos in optical microcavities, including detailed formulae for the Fresnel filtering and Goos-Hänchen correction.*

7. J. Wiersig, S. W. Kim, and **M. Hentschel,** Asymmetric scattering and non-orthogonal mode patterns in passive optical micro-spirals, **Phys. Rev. A 78**, 053809(1-8) (2008). *This paper marks the beginning of research on non-Hermitian physics in otpical microcavities that meanwhile has taken the community to PT-symmetry and its breaking as well as to the peculiar resonance mode properties at exceptional points and their use in sensing applications. (69 citations)*

- **Optical mesoscopic systems – Applications**

8. J. Wiersig and **M. Hentschel,** Combining unidirectional light output and ultralow loss in deformed microdisks, **Phys. Rev. Lett. 100**, 033901(1-4) (2008). *Achieving the unidirectional light output that*

characterizes all lasers from microdisk resonators has long been the holy grail in the field. In this 2008 PRL we predicted that a certain deformation (called Limaçon) will yield directional emission. This was confirmed by four different groups in experiments within one year. The reason is that light coupling out follows the so-called unstable manifold ruling the dynamics in nonlinear (chaotic) systems even, and in particular, when they are open. (177 citations)

9. J. Kreismann, S. Sinzinger, and **M. Hentschel,** Three-dimensional Limaçon: Properties and applications, **Phys. Rev. A 95**, 011801(R)(1-6) (2017). *Modelling optical microcavities as two-dimensional billiards is applicable only when their height is small compared to the wavelength. This paper marks the beginning of a systematic study of three-dimensional microresonators in which we find qualitatively new behavior. It is important for applications, in particular we find far-field output tilted away from cross-sectional (two-dimensional) resonator plane.*

- **Optical mesoscopic systems – Topology**

10. L. B. Ma, S. L. Li, V. M. Fomin, **M. Hentschel,** J. B. Götte, Y. Yin, M. R. Jorgensen, and O. G. Schmidt, Spin-orbit coupling of light in asymmetric microcavities, **Nature Comm. 7**,10983(1-6);10983s1(1-9) (2016).

The coupling of the two polarisation directions of light in three dimensions induces an intricate interplay between orbital and polarisation (spin) degrees of freedom. This polarisation dynamics depends, e.g., via an anisotropic refractive index, furthermore on the material properties. (10 citations)

PRIZES AND AWARDS

I was **awarded the Hertha-Sponer Prize 2011 of the German Physical** Society for my research on mesoscopic systems. A major part of my research since 2006 has been carried out with my **Emmy Noether group funded within the excellence programme** of the German Research Foundation (**DFG**). My initial work on many-body mesoscopics was funded by a prestigious **Feodor-Lynen Fellowship of the Humboldt Foundation** that I used for a two years stay at Duke University.

I am dedicated to teaching and the encouragement of young scientists. I was honoured to be recognised as a great mentor by the OSA Foundation in 2017. I act as a much appreciated mentor especially for the female physics students at the Technische Universität Ilmenau. Most of these have joined the local organisation committee of the **2017 German Conference of Women in Physics Meeting in Ilmenau** under my scientific, organisational, and financial responsibility. It was a great success with about 150 participants and a rich programme. Most importantly, I was able to initiate, in close cooperation with the patron of the meeting, the German Physical Society (DPG), changes indispensable to enhance networking among female physicists. Together with Prof. Ulrike Woggon, we organised the first **Women in Physics Lunch** on the DPG spring meeting in Regensburg 2019, and continue to do so.

CONFERENCES

I have been the **organizer of 7 international scientific conferences** with more than 60 participants each (see CV for details), the largest being the 2017 German Conference of Women in Physics at TU Ilmenau.
I have been serving continuously on the scientific advisory board of the WOMA (International Workshop on optical microcavities) conference series since 2011. I have been an **invited speaker at 28 international conferences**, the two most recent being in 2018 (Duke University 5/2018 and MPIPKS Dresden 8/2018).

REVIEWING

I serve as reviewer for the following journals: *Physical Review Letters, Physical Review A and E, European Physical Letters, European Physical Journal, Optics Letters, Optics Express, Journal of Optics, Applied Physics B, Photonics Technology Letters.*

CURRENT GROUP

My group consists steadily of about 5-8 people. A regular flow of excellent students joins my group as student researchers and for their Bachelor, Master, and PhD theses. I am now planning my research program for the coming 5-10 years based on my rich experience in the investigation of mesoscopic systems. The focus on engineering at TU Chemnitz and previously at TU Ilmenau inspires new ideas how to turn fundamental phenomena into innovative applications, e.g. by merging the fields of mesoscopic physics with new, and even non-classical, light sources.