

Prof. Dr. habil. Kathy Lüdge

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Scientific Career after Dissertation

- since 11/2021 **W2 Professor** at the Technische Universität Ilmenau
Institute of Physics, *Theoretical Physics, Nonlinear dynamics*
- 04/2016 – 10/2021 **W2 Professor** at the Technische Universität Berlin
Institute of Theoretical Physics, Specialist field: *Nonlinear laser dynamics*
- 10/2016 – 09/2017 **Alexander von Humboldt** Fellow, University of Auckland, New Zealand
Feodor Lynen Scholarship for Experienced Researchers
- 10/2014 – 03/2016 **Guest Professor** at the Freie Universität Berlin, Germany
Institute of Theoretical Physics
- 12/2011 – 09/2014 **Research Assistant, Privatdozentin**
Institute of Theoretical Physics, Technische Universität Berlin, Germany
- 23.11.2011 **Habilitation(venia legendi)** for *theoretical physics* at the TU Berlin
Title of the thesis: *Modeling quantum-dot based laser devices*
- 11/2003 – 11/2011 **Research Associate(C1)** within research group of Prof. Dr. E. Schöll,
Institute of Theoretical Physics, Technische Universität Berlin, Germany
- 2006, 2003 Birth of my kids, subsequently 1 year parental leave for each
- 29.10.2003 **Dr. rer. nat. (physics)**, Institute of Solid State Physics, TU Berlin
Supervisor: Prof. W. Richter, *Interface formation during epitaxial growth of Co layers on III-V semiconductor (001) surfaces*

Scientific Facts

- **Hirsch-index:** 26 (web of science); 34 (google scholar)
- **Publications:** 110 peer reviewed publications (4 Nat. Com., 6 Phys. Rev. Appl., 1 PRL)
9 book chapters, 1 edited book
- **Supervision of students:** 9 PhD students (8 past, 2 ongoing)
67 bachelor/master students (66 past, 1 ongoing)
- **Lectures:** 22 lecture courses – both on master (14) and bachelor (8) level
- **Funding record:** 2.5 million Euro

CV and Scientific Career before Dissertation

- 10/2000 – 10/2003 **Research Associate** within the group of Prof. Dr. W. Richter
Institute of Solid State Physics, TU Berlin, Germany
- 04/2001 – 02/2002 **Visiting Scientist** within the group of Prof. C. Palmstrøm
Department of Chemical Engineering and Material Science,
University of Minnesota, Minneapolis, USA
- 06/2000 – 07/2000 **Visiting Scientist** within the group of Prof. Dr.F. Bechstedt,
Institute of Solid State Theory, Friedrich-Schiller-Univ. Jena, Germany
- 11/1997 – 05/1998 **Student assistant** at Institute of Crystal Growth (IKZ), Berlin, Germany
- 10/1995 – 09/2000 **Studies** of Physics at TU Berlin, Diploma at Institute of Solid State Physics, Prof. W. Richter *Atomare Struktur phosphorhaltiger III-V Halbleiter im System In, Ga, P*,
- 08/1992 – 07/1995 **Abitur certificate**, Albert-Einstein-Gymnasium Berlin, Germany
- 17.01.1976 Born in Berlin, Germany

Research Experiences

- Analysis of delay differential equations for complex networks.
- Methods of nonlinear dynamics: Bifurcation analysis, Path continuation.
- Stochastic equations of laser networks with spontaneous emission noise.
Correlation properties, mode-switching statistics, information theoretic measures.
- Machine learning with optical networks. Reservoir computing with optical components as one realization of artificial intelligence.
- Lasers with optical feedback, localized structures in delay systems
- Microscopic modeling of nano-structured semiconductor optical devices
Quantum-dot laser, Nanowire laser, Micro-resonator laser and Mode-locked devices.

Awards and Scholarships

- 10/2016 - 9/2017 **Feodor-Lynen Research Fellowship**, Alexander von Humboldt foundation, Project: *Bifurcation analysis of coupled mode-locked lasers with fast optical pulse trains*
- 06/2012 **Karl-Scheel-Preis** der Physikalischen Gesellschaft zu Berlin (PGzB)
for excellent scientific research after the PhD
- 04/2001 **DAAD grant** for studies abroad (10 month), Department of Chemical Engineering and Material Science, University of Minnesota, USA
- 02/2001 **Erwin-Stephan-Preis**, Award for excellent and fast studies at TU Berlin
- 07/2000 Heraeus-Studienförderpreis for physics, Phys. Gesellschaft zu Berlin

Projects with Third Party Funding

- **Principal investigator** (2024-2028) within *Horizon Europe EIC 2023 Pathfinder SpikePro* project on Spiking photonic electronic IC for quick and efficient processing.
- **Project partner** (2023-2028) within Carl-Zeiss Foundation **NeuroSenseEar** *Neuromorphic acoustic sensor technology for high-performance hearing aids of tomorrow* CZS Breakthroughs: Life Science Technologies.
- **Principal investigator** (2020-2023) of DFG project LU 1729/3-1 on *Hybrid photonic computing in delay-coupled non-linear systems with memory*
- **Principal investigator** (2015-2022) within **SFB 910-Control of self-organizing nonlinear systems** for project B9 on *Stochastic and structural properties of complex laser networks for optical computing* funded by the German Research Foundation (DFG)
- **Principal investigator** (2012-2019) within **SFB 787-Semiconductor Nanophotonics** for project B2 on *Dynamics of quantum dot based multi-section laser and amplifier structures* funded by the German Research Foundation (DFG)
- **DAAD PPP Project** (2018-2019) *Narrow linewidth semiconductor lasers for coherent communication systems*, Förderprogramm Projektbezogener Personenaustausch (PPP France)

Selected Invited Talks

- 2/2023 Rank Prize Fund Symposium on *Neuromorphic Photonics*, Grasmere, UK, Title: Delay-based Photonic Reservoir Computing: Improving performance via delay architecture
- 7/2023 Workshop on *Neuromorphic photonics and applications*, Athens, Greece Titel Readout and timescale engineering in time-multiplexed reservoir computing
- 8/2022 SPIE Optics and Photonics: Emerging Topics in Artificial Intelligence (ETAI), San Diego, US, Title: Photonic reservoir computing with non-linear memory cells: Interplay between topology, delay and delayed input

Services to the Community

- **Symposium Organisation** *Complex light as a tool to understand and exploit dynamical systems for novel applications*, Dynamics Days Europe, Neapel, Italy, 09/2023.
- **Committee Member:** - SPIE Photonics West - Physics and Simulation of Optoelectronic Devices Conference (Program Committee)
- CLEO/Europe-EQEC 2023 (Technical Programm)
- Nonlinear Photonics(NP) 2024, Programm Committee.
- **MPG Workshop grant** on *Pattern Dynamics in Nonlinear Optical Cavities* in Dresden (2016) and in Auckland, Neuseeland (2017) with Prof. B. Krauskopf and Prof. N. Broderick
- **Member of IUPAP**, Commission on Laser Physics and Photonics, 2018-2022
- **Associate Editor** for - Journal *IEEE Journal of Quantum Electronics*, 2014-2020
- *European Physics Journal B* 2022-present
- **Referee** for funding agencies (Volkswagen Stiftung, DFG, EU) and several journals (Physical Review, Springer Nature, AIP, IEEE, OSA)