



Curriculum Vitae

- February 1966
Abitur at Freie Waldorfschule Kassel
- July 1972
Diploma in Physics at the Freie Universität Berlin on the influence of acoustic fields on radiation distributions of excited nuclei under the supervision of H. Gabriel.
- March 1977
Promotion to Dr. rer. nat. at the Freie Universität Berlin. Dissertation on nuclear quadrupole relaxation in liquid metals under the supervision of H. Gabriel.
- April 1977
to
October 1977
Research period at the H. H. Wills Physics Laboratory of the University Bristol, England. Collaboration with R. Evans on thermodynamic properties of liquid metals and alloys.
- November 1977
to
April 1980
Research Assistant in the Dept. of Physics of the University Marburg. Collaboration with B. Movaghar and P. Thomas on hopping transport in disordered semiconductors. Collaboration with F. Hensel and W. Freyland on the thermodynamic properties of liquid metals.
- Since
April 1980
Research Assistant in the Dept. of Physics of the Technical University Munich with E. Lüscher and W. Petry. Research on transport and thermodynamic properties of disordered metals and semiconductors. Collaboration with W. Götze on the mode-coupling description of the glass transition.
- January 1985
to
December 1985
Research period at the Institute Max von Laue/Paul Langevin (ILL) Grenoble. Collaboration with Ph. Nozières on many-body theory.
- July 1989
Habilitation ("second Doctorate", Teaching ability). Dissertation on hopping transport in disordered semiconductors at the Dept. of Physics of the Technical University Munich.
- Since
January 1990
Lecturer at the Technical University Munich.
- April 1991
to
May 1992
Lecturer at the University of Augsburg. Research on quantum interferences in hopping transport. Collaboration with P. Hänggi on the path-integral description of complex dynamics in solids.
- January 1993
to
December 1996
Research work on Fractals and critical phenomena. Collaboration with Klaus Mainzer on the philosophical interpretation of quantum and chaos physics.

January 1997 to March 1999	Research work with W. Götze and W. Petry on a Mode-coupling description of the lattice dynamics of strongly anharmonic crystals.
April 1999 to May 1999	Research visit at the Universität Köln. cooperation with Prof. J. Hajdu on the quantum theory of mesoscopic semiconductor structures and quantum chaos.
June 2001	Research visit at the Hebrew University, Jerusalem, Israel. Cooperation with Prof. Z. Ovadyahu and Dr. O. Bleibaum on Hopping Transport and tunneling in Semiconductors.
Oct./Nov. 1999, Nov. 2000 to March 2001 and Feb. 2002	Research visits at the University of Oregon, Eugene, OR, USA. cooperation with Prof. D. Belitz on the field theoretical description of vibrations in disordered solids.
September 2003; September 2004; Aug/Sept. 2005; Aug 2006	Research visits at the Advanced Photon Source, Argonne National Lab. cooperation with Dr. Harald Sinn on liquid dynamics and the metal-nonmetal transition. Work on the vibrational dynamics of disordered solids.
Juni 2006	Nomination as an extraordinary Professor
Nov. 2008 to March 2009	temporarily chair of theoretical physics in place of Prof. K. Binder, Univ. Mainz
Since April 2009	senior scientist and extraordinary professor at University Mainz Mainz
June 2011	Retirement
Fall 2013	Guest Professor at KAUST, Saudi Arabia. Scientific collaboration with Prof. A. Fratalocchi and Prof. G. Schuster on wave propagation in composite materials. Graduate Course on Field-theoretical description of disordered materials.
Oct 2014 - March 2015	Guest Scientist at the University of Innsbruck, Austria, Scientific collaboration with Prof. T. Franosch on soft-matter modelling.
June - July 2016	Guest Scientist at the University of Perugia, Italy, Scientific collaboration with Prof. A. Orecchini on visco-elastic properties of water
2006 until now	Extended collaborations and research visits at the university "La Sapienza", Rome and IIT Rome. Cooperation with Prof. G. Ruocco, Prof. T. Scopigno, and Dr. M. Leonetti on the theory of waves in disordered systems.
2015 until now	Collaboration with Prof. F. Hensel and Dr. W. C. Pilgrim, University of Marburg, Germany on the equation of states of expanded metals
2018 until now	Collaboration with Prof. A. Zeitler at the University of Cambridge, UK on anomalous-Kerr-effect data in glasses, granted by the British Counsel
2018 until now	Collaboration with Prof. Anne Tanguy, INSA Lyon, France, on the use of finite-element simulations for the description of disordered solids and soft matter
2018 until now	Collaboration with Prof. Jie Zhang, Jiao Tong Technical University Shanghai, on the interpretation of the vibrational properties of two-dimensional macroscopic granular materials
2019 until now	Collaboration with Prof. L. Wondraczek, University of Jena, Germany on the interpretation of Raman and specific heat data in glasses

Walter Schirmacher: Recent Publications (2010-2021)

- *Theory of Liquids and Other Disordered Media: A Short Introduction*
W. Schirmacher, Lecture Notes in Physics 887, Springer-Verlag, Heidelberg, 2014
(Monography)
- *Transverse and quantum localization of light: a review on theory and experiments*
Taira Giordani, Walter Schirmacher, Giancarlo Ruocco, and Marco Leonetti, *Frontiers in Physics*, to appear, 2021
- *Absence of a boson peak in anharmonic phonon models with Akhiezer-type damping*
A. Shvaika, M. Shpot, W. Schirmacher, T. Bryk and G. Ruocco arXiv 2104.13076
- *Disorder-induced vibrational anomalies fom crystalline to amorphous solids*
Ling Zhang, Yinqiao Wang, Yangrui Chen, Jin Shang, Aile Sun, Xulai Sun, Shuchang Yu, Jie Zheng, Yujie Wang, Walter Schirmacher, and Jie Zhang, arXiv 2104.13142
- *Level statistics and Anderson delocalization in two-dimensional granular materials*
Ling Zhang, Yinqiao Wang, Jie Zheng, Aile Sun, Xulai Sun, Yujie Wang, Walter Schirmacher, and Jie Zhang, *Phys. Rev. B* **103**, 104201 (2021)
- *An equation of states for expanded liquid metals*
W. Schirmacher, W.-C. Pilgrim and F. Hensel, *J. Phys. Condens. Matter* **33**, 024001 (2020)
- *Continuum constitutive laws to describe acoustic attenuation in glasses*
H. Luo, A. Gravouil, V. M. Giordano, W. Schirmacher, and A. Tanguy, *Phys. Rev. E* **102**, 033003 (2020)
- *Heterogeneous elasticity: The tale of the boson peak*
W. Schirmacher and G. Ruocco, 2020, in: *Low-Temperature Thermal and Vibrational Properties of Disordered Solids* (A Half-Century of universal "anomalies" of glasses), Ed. M. A. Ramos, to appear
- *Self-consistent Euclidean-random-matrix theory*
W. Schirmacher, V. Folli, C. Ganter and G. Ruocco, *J. Phys. A: Math. Theor.* **52**, 464002 (2019)
- *Disentangling boson peaks and van Hove singularities in a model glass*
Y. Wang, L. Hong, Y. Wang, W. Schirmacher, J. Zhang *Phys. Rev. B* **98**, 174207 (2018)
- *What is the right theory for Anderson localization of light?*
W. Schirmacher, B. Abaie, A. Mafi, G. Ruocco, M. Leonetti, *Phys. Rev. Lett.* **120**, 067401 (2017)
- *Moment-preserving theory of vibrational dynamics of topologically disordered systems*
V. Folli, G. Ruocco, W. Schirmacher, *Frontiers in Physics* **5**, 29 (2017)
- *Analytical description of the transverse Anderson localization of light*
W. Schirmacher, M. Leonetti, and G. Ruocco, *J. Optics* **19**, 045602 (2017)
- *Disorder-induced single-mode transmission*
G. Ruocco, B. Abaie, W. Schirmacher, A. Mafi, and M. Leonetti *Nature Communications* **8**, 14571 (2017)
- *Theory of heterogeneous viscoelasticity*
W. Schirmacher, G. Ruocco, and V. Mazzone, *Philos. Magazine* **96**, 620 (2016)
- *Anomalous magnetotransport in disordered structures: classical edge-state percolation*
W. Schirmacher, B. Fuchs, F. Hfling, and Th. Franzosch, *Phys. Rev. Lett.* **115**, 240602 (2015)
- *Heterogeneous viscoelasticity: a combined theory of dynamic and elastic heterogeneity*
W. Schirmacher, G. Ruocco and V. Mazzone, *Phys. Rev. Letters*, **115**, 015901 (2015)
- *Theory of vibrational anomalies in glasses*
W. Schirmacher, G. Ruocco, and T. Scopigno, *J. Noncryst. Sol.* **407**, 133 (2014)

- *High-frequency vibrational density of states of a disordered solid*
C. Tomaras and W. Schirmacher, J. Phys. Condens. Matter, **25**, 495402 (2013)
- *Coherent-Potential approximation for diffusion and wave propagation in topologically disordered systems*
S. Köhler, G. Ruocco and W. Schirmacher, Phys. Rev. B **88**, 064203 (2013)
- *Acoustic dynamics of network-forming glasses at mesoscopic wavelength*
C. Ferrante, E. Pontecorvo, G. Cerullo, A. Chiasera, G. Ruocco, W. Schirmacher and T. Scopigno Nature Communications, **4**, 1793 (2013)
- *The boson peak*
W. Schirmacher, Phys. stat. sol. (b), **250**, 937 (2013)
- *Heterogeneous shear elasticity of glasses: the origin of the boson peak*
A. Marruzzo, W. Schirmacher, A. Fratolocchi and G. Ruocco Nature Scientific Reports **3**, 1407 (2013)
- *Vibrational anomalies and marginal stability of glasses*
A. Marruzzo, S. Köhler, A. Fratolocchi, G. Ruocco and W. Schirmacher, Eur. Phys. J. Special Topics **216**, 83 (2013)
- *Localization-delocalization transition for disordered cubic harmonic lattices*
Sebastian Pinski, Walter Schirmacher, Terry Whall and Rudolf A. Römer, J. Phys. Condensed Matter **24**, 405401 (2012)
- *Anderson universality in a model of disordered phonons*
S. Pinski, W. Schirmacher and R. A. Römer Europhys. Lett. **97**, 16007 (2012)
- *Modified mode-coupling theory for the collective dynamics of simple liquids*
B. Schmid, W. Schirmacher, J. Phys. Condensed Matter **23**, 254211 (2011)
- *Inelastic neutron and low-frequency Raman scattering in Niobium-Phosphate glasses: The role of spatially fluctuating elastic and elasto-optic constants*
A. Schulte, W. Schirmacher, B. Schmid and T. Unruh, J. Phys. Condensed Matter **23**, 254212 (2011)
- *Theory of collective excitations in simple liquids*
W. Schirmacher, B. Schmid and H. Sinn, Europ. Physical Journal - Special Topics **196**, 3 (2011)
- *Rayleigh and Brillouin scattering in a lysozyme-water mixture: An unusual behavior around 343 K*
C. Pruner, H. W. Schrer, K. Plätzer, L. Bieler, H. Brandstetter, W. Schirmacher, A. Schulte, and Emmerich Wilhelm, J. molecular liquids **158**, 7 (2011)
- *Euclidean random matrix theory: low-frequency non-analyticities and Rayleigh scattering* C. Ganter and W. Schirmacher, Philos. Mag. **91**, 1894 (2011)
- *Rayleigh scattering, long-time tails and the harmonic spectrum of topologically disordered systems*
C. Ganter and W. Schirmacher, Phys. Rev. B **82**, 094205 (2010)
- *Replica field theory for anharmonic sound attenuation in glasses*
C. Tomaras, B. Schmid, W. Schirmacher, Journal of Non-Crystalline Solids **357**, 542 (2011)
- *Some comments on fluctuating-elasticity and local oscillator models for anomalous vibrational excitations in glasses*
Walter Schirmacher, Journal of Non-Crystalline Solids **357**, 518 (2011)
- *Inelastic neutron and low-frequency Raman scattering in a niobium-phosphate glass for Raman gain applications*
T. Unruh, A. Schulte, Y. Guo, W. Schirmacher, B. Schmid, Journal of Non-Crystalline Solids **357**, 506 (2011)
- *Elastic torsion effects in magnetic nanoparticle diblock-copolymer structures*
L. Schulz, W. Schirmacher, A. Omran, V. R. Shah, P. Böni, W. Petry, P. Müller-Buschbaum, J. Phys. Condens. Matter **22**, 346008 (2010)

- *Sound attenuation and anharmonic damping in solids with correlated disorder*
W. Schirmacher, C. Tomaras, B. Schmid, G. Baldi, G. Viliani, G. Ruocco, T. Scopigno, *Condensed Matter Physics* **13**, 23605 (2010)
 - *Anharmonic elasticity theory for sound attenuation in disordered solids with fluctuating elastic constants*
C. Tomaras, B. Schmid and W. Schirmacher, *Phys. Rev. B* **81**, 104206 (2010)
- Total number of publications by May 2021: 131

Further education of high-school teachers

1990-2012 Organization and supervision of further-education courses for physics and other science teachers at high schools at Gymnasium Zwiesel (Bay. Wald) and Bavarian Academy Dillingen.

List of Courses taught

- Undergraduate (prior to Bachelor)
 - Experimental Physics I. and II. with demonstrations
Introductory lecture on physics for physics beginners, including the supervision of small-group tutorials
 - Mathematical Supplement for Experimental Physics I. and II.
Gap-bridging for physics beginners in elementary mathematics
 - Mathematical Methods of Physics
Higher mathematics (calculus, theory of functions, field theory), supplementary to theoretical mechanics and electrodynamics.
 - Quantum Mechanics
Elementary and advanced course on quantum theory including supervision of small-group tutorials
 - Computational Physics
Step-wise introduction, leading from scientific programming towards modern simulational techniques, including supervision of small-group tutorials.
 - Proseminar Dynamical Systems and Chaos
Supervision of undergrade students to give high-level talks on selected items in the field of dynamical systems and chaos
- Graduate (post-Bachelor and post-Master)
 - Condensed-matter theory

Standard graduate course on the quantum and statistical theory of solids, including supervision of small-group tutorials.

- Theory of metallic magnetism

Quantum and field theory of magnetism, including supervision of small-group tutorials

- Theory of disordered solids

Advanced-level theory of the description of the properties of quenched-disordered materials, including supervision of small-group tutorials

- Green's and correlation functions in solid-state theory

Introduction to the mathematical tools in solid-state theory, including supervision of small-group tutorials

- Theory of liquids and polymers

Physics and physical chemistry of liquids, fractals and polymers

- Field-theoretical methods in condensed-matter physics

The use of Feynman-path integrals in quantum physics, disordered classical materials and polymers

- Quantum effects and chaos in mesoscopic semiconductor structures

Introduction to the quantum theory of miniaturized semiconductor structures.