

Curriculum Vitae

Personal Details

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Date of Birth: May 28, 1975
Place of Birth: Lugano, Switzerland
Citizenship: Italy and USA
Languages: Italian (mother-tongue), English (fluent), German (fluent)

Education

04/2002 : Ph.D. from Institute of Theoretical Physics, ETH-Zurich.
10/1999–03/2002 : Graduate studies in mathematical physics.
Supervisor: Prof. Jürg Fröhlich.
09/1999 : Diploma in Theoretical Physics, ETH-Zurich.
Willy Studer Prize for best diploma in the Department
of Mathematics and Physics.
10/1994–03/1999 : Undergraduate studies in theoretical physics at ETH-Zurich.

Professional History

04/2010– : Hausdorff Chair (full W3 professorship), University of Bonn,
Institute for Applied Mathematics and Hausdorff Center for Mathematics.
09/2007–03/2010 : University Lecturer at DPMMS, Cambridge University.
07/2007–08/2008 : Research fellow at LMU Munich, supported by Kovalevskaja Award.
07/2006–06/2007 : Assistant Professor (tenure-track) at UC Davis.
09/2005–07/2006 : NSF postdoctoral fellow at Harvard University.
09/2004–08/2005 : NSF postdoctoral fellow at Stanford University.
09/2003–08/2004 : Instructor at Stanford University.
09/2002–08/2003 : Courant Instructor at the Courant Institute, New York University.

Honors and Awards

- 2012: Plenary speaker at the International Congress on Mathematical Physics ICMP 2012, Aalborg.
- 2009: Young Scientist Prize in Mathematical Physics, awarded by the International Union of Pure and Applied Physics (IUPAP).
- 2009: Starting Independent Researcher Grant of the European Research Council (ERC).
- 2007: Swiss National Science Foundation SNSF-Professorship (declined to accept offer from University of Cambridge).
- 2006: Sofja Kovalevskaja Award from the Alexander von Humboldt foundation.
- 2004: Two year NSF Postdoctoral Research Fellowship in Mathematical Sciences.
- 1999: Willy Studer Prize for best Diploma at the Department of Mathematics and Physics of ETH-Zurich.

Services

- Referee for several peer reviewed journals in mathematics and physics.
- Director of Advanced School and Workshop on “Random Matrices and Growth Models” held at ICTP (Trieste) in September 2013.
- Member of editorial board of *Journal Functional Analysis* since 04/2013.
- Deputy director of SFB 1060 “Mathematics of emergent effects” since 01/2013.
- Deputy director of Institute for Applied Mathematics, Bonn, 10/2012-09/2013.
- Coorganizer of program “Mathematical challenges of materials science and condensed matter physics”, Hausdorff Institute, Bonn, May-August 2012.
- Coorganizer of workshop “Random Matrices”, Bonn, May 2012.
- Organizer of the Hausdorff Colloquium in Bonn since Winter 2011/2012.
- Coorganizer of the weakly “Oberseminar Analysis” at the University of Bonn.
- Coorganizer Oberwolfach Seminar “Feynman Diagrams in Quantum Mechanics”, 2008.
- Organizer of “Mathematical Physics and Probability Seminar”, UC Davis, 2006-2007.

Teaching Experience

- Winter 2013/2014: Analysis 3, University of Bonn.
Summer 2013 : Analysis 2, University of Bonn.
Winter 2012/2013: Analysis 1, University of Bonn.
Winter 2011/2012: Partial Differential Equations and Functional Analysis,
University of Bonn.
Summer 2011 : Selected Topics in Analysis - Atoms and Molecules
in Quantum Mechanics, University of Bonn.
Winter 2010/2011: Advanced Topics in Analysis - Stability of Matter,
University of Bonn.
Lent 2010 : Linear Analysis, Part II. University of Cambridge.
Michaelmas 2009 : Methods in Analysis, Part III. University of Cambridge.
Lent 2009 : Linear Analysis, Part II. University of Cambridge.
Michaelmas 2008 : Methods in Analysis, Part III. University of Cambridge.
Spring 2007 : Measure Theory. UC Davis.
Winter 2007 : Linear Algebra. UC Davis.
Spring 2004 : Integral Calculus of Several Variables.
Stanford University (twice).
Spring 2003 : Probability and Statistics. New York University.
Fall 2002 : Calculus 1. New York University.

Selected Talks at Conferences and Research Seminars

- 09/2013: Workshop “Dispersive pdes’: models and dynamics”, Pisa. Mini-course.
09/2013: ICAM 2013. International Conference on Applied Mathematics,
Heraclion (Greece). Plenary talk.
09/2013: QMath 12. Conference on “Mathematical results in quantum physics”,
Berlin. Invited talk.
07/2013: 29th European meeting of statisticians (EMS), Budapest. Invited speaker.
06/2013: Conference “Mathematical properties of large quantum systems”,
Institut Henri Poincaré (IHP), Paris. Invited talk.
05/2013: Workshop “Nonlinear Schrödinger equation: theory and applications”,
Heraclion (Greece). Invited talk.
03/2013: Minicourse “Spectral properties of random matrices”, CIRM (Marseille).
10/2012: Conference on “Recent developments in the mathematical analysis
of large systems”, Schrödinger Institute, Vienna.
09/2012: Workshop on “Collective quantum operations: mean field, control,
estimation”, ISI Foundation, Torino. Invited speaker.
08/2012: International congress on mathematical physics (ICMP), Aalborg (Denmark).
Plenary speaker.
07/2012: 6th European congress of mathematics (ECM), Krakow. Invited speaker.

05/2012: NTH-Mathematical Colloquium, University of Braunschweig.
 05/2012: Workshop in honor of Jürg Fröhlich. Invited talk.
 05/2012: Workshop on “Nonlinear evolution problems”, Oberwolfach.
 04/2012: Conference “Spectral days 2012”, Munich. Invited Talk.
 03/2012: School in analysis and applications. Tucson, Arizona. Main speaker.
 02/2012: Workshop on “Quantum mechanics: from foundations to quantum information science”, ZiF Bielefeld.
 02/2012: Mathematical colloquium, University of Regensburg.
 01/2012: Probability seminar, ENS Lyon.
 12/2011: Workshop on “Random matrix theory and applications in theoretical sciences”, ZiF Bielefeld.
 11/2011: Mathematical colloquium, University of Stuttgart.
 11/2011: Video seminar Berkeley/Bonn/Paris/Zurich.
 10/2011: School on “Operator algebras and mathematical physics”, Kyoto.
 Course on random matrices.
 09/2011: Annual meeting of the DMV (German Mathematical Society), Cologne.
 Invited talk in the section on mathematical physics.
 08/2011: School on mathematical statistical physics, Prague.
 Course on random matrices.
 07/2011: International congress on industrial and applied mathematics (ICIAM), Vancouver. Invited talk in the mini-symposium on mathematical physics.
 06/2011: Conference “Days on PDEs”, Biarritz (France). Invited talk.
 03/2011: Workshop on “The renormalization group”. Oberwolfach.
 12/2010: Workshop on “Random matrices”. AIM, Palo Alto.
 12/2010: Statistical mechanics seminar, Queen Mary, University of London.
 12/2010: Mathematical physics seminar, University of Tübingen.
 11/2010: Berlin-Leipzig seminar in analysis and probability.
 11/2010: Mathematical colloquium. University of Paderborn.
 11/2010: Workshop on “Bose-Einstein Condensation”. University of Marseille.
 10/2010: Workshop on “Physics and mathematics of random matrices”. Copenhagen. Main talk.
 09/2010: QMath 11. Conference on “Mathematical results in quantum physics”, Hradec Kralove (Czechia). Plenary talk.
 09/2010: Workshop on “Nonlinear waves and dispersive equations”, Oberwolfach.
 07/2010: Summer school “Current topics in mathematical physics”, Aarhus.
 Course on random matrices.
 06/2010: Workshop on “Matter and radiation”. Schrödinger Institute, Vienna.
 06/2010: Conference on random matrices. Paris 6. Invited talk.
 04/2010: Workshop in random matrices. University of Zürich. Invited talk
 03/2010: Annual meeting of DPG (German Physics Society). Main talk in the “Theoretical and mathematical physics” section.
 03/2010: Conference on “Perspectives in quantum statistics and correlations”. Heidelberg. Invited talk.

- 03/2010: Workshop on “Optical lattices and Bose gases: the mathematics and physics of clean and disordered systems”, Warwick. Invited talk.
- 02/2010: Mathematical physics seminar. University of Bristol.
- 01/2010: Colloquium. University of Warwick.
- 01/2010: London analysis seminar.
- 12/2009: 5th Brunel workshop on random matrix theory. Invited talk.
- 12/2009: Zurich theoretical physics colloquium.
- 12/2009: Mathematical physics seminar. University of Grenoble.
- 09/2009: Conference on ”Probabilistic and analytical methods in mathematical physics.” Tsaghkadzor, Armenia. Invited talk.
- 09/2009: Workshop on ”Mathematics of Complex Quantum Systems”, Oberwolfach.
- 08/2009: Workshop on ”Analysis of nonlinear wave equations and applications in engineering”, BIRS, Banff, Canada.
- 08/2009: International congress on mathematical physics (ICMP), Prague. Invited talk in the session “Non-equilibrium statistical mechanics”.
- 07/2009: Conference on “Constructive and multiscale methods in quantum theory”, Heidelberg. Invited talk.
- 06/2009: Workshop on “Open quantum systems”. ETH, Zürich. Invited talk.
- 06/2009: 25-th Nordic and 1-st British-Nordic congress of mathematics, Oslo. Invited talk in the session “Mathematical physics and spectral theory”.
- 05/2009: Mathematical physics seminar. ETH-Zurich.
- 05/2009: Mathematical physics seminar. University of Hamburg.
- 05/2009: Applied analysis seminar. University of Bonn.
- 03/2009: Colloquium. Centre for Mathematical Sciences, Cambridge.
- 02/2009: Probability seminar, DPMMS, University of Cambridge.
- 11/2008: Probability seminar, University of Bielefeld.
- 11/2008: Mathematical physics seminar, University of Nottingham.
- 10/2008: Mathematical physics seminar, University of Helsinki.
- 10/2008: Mathematical physics seminar, DAMTP, University of Cambridge.
- 10/2008: Talk in the program “Mathematics and physics of Anderson localization”, Newton Institute, Cambridge.
- 10/2008: Workshop on “Quantum many-body systems”. University of Montreal. Invited talk.
- 09/2008: Annual meeting of the DMV (German Mathematical Society), Erlangen. Invited talk in the section on random matrices.
- 08/2008: Mini-workshop “Mathematical approaches to collective phenomena in large quantum systems”, Oberwolfach.
- 07/2008: Summer school of the Clay Mathematics Institute on “Evolution equations”, ETH Zurich. Mini-course.
- 06/2008: Workshop on “Non-equilibrium systems”, Schrödinger Institute, Vienna. Invited talk.
- 04/2008: Analysis seminar. University of Zurich.
- 03/2008: Annual meeting of DPG (German Physics Society). Main talk in the mathematical physics section.

02/2008: Analysis seminar, Princeton University.
 11/2007: Meeting on “Theoretical aspects of open quantum systems”, Leuven.
 Invited talk.
 11/2007: Mathematical colloquium, Technical University Clausthal.
 10/2007: Workshop on “Interacting particle systems”, University of Milano.
 Invited talk.
 09/2007: Analysis seminar, MIT.
 08/2007: Workshop in applied analysis, University of Copenhagen. Invited talk.
 07/2007: Joint meeting of the American and Polish Mathematical Societies, Warsaw.
 Invited talk in the mathematical physics section.
 07/2007: Birthday conference of Jürg Fröhlich, ETH-Zürich. Invited talk.
 05/2007: Workshop on “Analysis and stochastic in quantum many body systems”,
 Max-Planck Institute, Leipzig. Invited talk.
 05/2007: 97th Statistical mechanics conference at Rutgers University. Invited talk.
 04/2007: PDE seminar, UC San Diego.
 02/2007: Western states mathematical physics meeting, Caltech. Invited talk.
 11/2006: Colloquium, University of Alabama at Birmingham.
 09/2006: Analysis seminar, Princeton University.
 09/2006: Workshop on “Evolution of microscopic and macroscopic fields”,
 Banff. Invited talk.
 08/2006: International congress on mathematical physics (ICMP), Rio de Janeiro.
 Invited talk in the session “Non-equilibrium statistical mechanics”.
 06/2006: Program on “Complex quantum systems”, Schrödinger Institute, Vienna.
 Invited talk.
 12/2005: Analysis seminar, Princeton University.
 12/2005: Mathematical physics seminar, Rutgers University.
 10/2005: PDE/Applied math/Analysis seminar, University of Toronto.
 07/2005: Mathematical physics seminar, ETH-Zurich.
 06/2005: Analysis seminar, University of Stuttgart.
 03/2005: Applied mathematics seminar, Stanford University.
 02/2005: Analysis seminar, Stanford University.
 02/2005: Workshop on “Open quantum systems”. Schrödinger Institute, Vienna.
 Invited talk.
 10/2004: PDE seminar, University of California at Berkeley.
 09/2004: QMath9. Conference on “Mathematical results in quantum physics”,
 Giens (France). Invited talk.
 01/2004: Mathematical physics seminar, ETH-Zurich.
 12/2003: Analysis seminar, University of Munich.
 03/2003: Conference on “Non-equilibrium statistical mechanics” at CPT, Marseille.
 Invited talk.
 11/2002: Analysis seminar, GeorgiaTech.
 02/2002: Analysis seminar, University of Mainz.
 01/2002: Analysis seminar, University of Munich.
 01/2001: Mathematical physics seminar, ETH-Zurich.

List of Publications and Preprints

- 1) J. Fröhlich, M. Griesemer, and B. Schlein. Asymptotic electromagnetic fields in models of quantum-mechanical matter interacting with the quantized radiation field. *Adv. Math.* **164** (2001), no. 2, 349–398.
- 2) J. Fröhlich, M. Griesemer, and B. Schlein. Asymptotic completeness for Rayleigh scattering. *Ann. Henri Poincaré* **3** (2002), no. 1, 107–170.
- 3) A. Elgart and B. Schlein. Adiabatic charge transport and the Kubo formula for Landau type Hamiltonians. *Comm. Pure Appl. Math.* **57** (2004), no. 5, 590–615.
- 4) J. Fröhlich, M. Griesemer, and B. Schlein. Asymptotic completeness for Compton scattering. *Comm. Math. Phys.* **252** (2004), 415–476.
- 5) A. Elgart, L. Erdős, B. Schlein, and H.-T. Yau. Nonlinear Hartree equation as the mean field limit of weakly coupled fermions. *J. Math. Pures Appl.* (9) **83** (2004), no. 10, 1241–1273.
- 6) A. Elgart, L. Erdős, B. Schlein, and H.-T. Yau. Gross-Pitaevskii equation as the mean field limit of weakly coupled bosons. *Arch. Ration. Mech. Anal.* **179** (2006), no. 2, 265–283.
- 7) B. Schlein. Derivation of the Gross-Pitaevskii hierarchy. *Mathematical Physics of Quantum Mechanics, 279–293*. Proceedings of the conference QMath 9, Gien. Lecture Notes in Phys., 690, Springer, Berlin, 2006.
- 8) L. Erdős, B. Schlein, and H.-T. Yau. Derivation of the Gross-Pitaevskii hierarchy for the dynamics of Bose-Einstein condensate. *Comm. Pure Applied Math.* **59** (2006), no. 12, 1659–1741.
- 9) A. Elgart and B. Schlein. Mean field dynamics for boson stars. *Comm. Pure Applied Math.* **60** (2007), no. 4, 500–545.
- 10) C. Albert, L. Ferrari, J. Fröhlich, and B. Schlein. Magnetism and the Weiss exchange field: a theoretical analysis of recent experiments. *J. Statist. Phys.* **125** (2006), no. 1, 77–124.
- 11) L. Erdős, B. Schlein, and H.-T. Yau. Derivation of the cubic non-linear Schrödinger equation from quantum dynamics of many-body systems. *Invent. Math.* **167** (2007), no. 3, 515–614.
- 12) J. Fröhlich, M. Griesemer, B. Schlein. Rayleigh scattering at atoms with dynamical nuclei. *Comm. Math. Phys.* **271** (2007), no. 2, 387–430.

- 13) L. Erdős, B. Schlein, and H.-T. Yau. Derivation of the Gross-Pitaevskii equation for the dynamics of Bose-Einstein condensates. *Ann. of Math. (2)* **172** (2010), no. 1, 291–370.
- 14) L. Erdős, B. Schlein, and H.-T. Yau. Rigorous derivation of the Gross-Pitaevskii equation. *Phys. Rev. Lett.* **98** (2007), no. 4, 040404.
- 15) B. Schlein. Dynamics of Bose-Einstein Condensates. *New Trends in Mathematical Physics*. Selected contributions of the XVth International Congress on Mathematical Physics, edited by V. Sidoravicius, Springer Verlag, 2009, 565–589.
- 16) L. Erdős, B. Schlein, and H.-T. Yau. Semicircle law on short scales and delocalization of eigenvectors for Wigner random matrices. *Ann. Probab.* **37** (2009), no. 3, 815–852.
- 17) I. Rodnianski and B. Schlein. Quantum fluctuation and rate of convergence towards mean field dynamics. *Comm. Math. Phys.* **291** (2009), no. 1, 31–61.
- 18) B. Nachtergaele, H. Raz, B. Schlein, and R. Sims. Lieb-Robinson bounds for harmonic and anharmonic lattice systems. *Comm. Math. Phys.* **286** (2009), no. 3, 1073–1098.
- 19) L. Erdős, B. Schlein, and H.-T. Yau. Rigorous derivation of the Gross-Pitaevskii equation with a large interaction potential. *J. Amer. Math. Soc.* **22** (2009), no. 4, 1099–1156.
- 20) L. Erdős, B. Schlein, and H.-T. Yau. Local semicircle law and complete delocalization for Wigner random matrices. *Comm. Math. Phys.* **287** (2009), no. 2, 641–655.
- 21) C. Hainzl and B. Schlein. Stellar collapse in the time dependent Hartree-Fock approximation. *Comm. Math. Phys.* **287** (2009), no. 2, 705–717.
- 22) L. Erdős and B. Schlein. Quantum dynamics with mean field interactions: a new approach. *J. Statist. Phys.* **134** (2009), no. 5, 859–870.
- 23) L. Erdős, B. Schlein, and H.-T. Yau. The ground state energy of a low density Bose gas: a second order upper bound. *Phys. Rev. A* **78** (2008), no. 5, 053627.
- 24) B. Schlein. Derivation of effective evolution equations from microscopic quantum dynamics. *Evolution Equations, CMI Summer School, ETH 2008*. Clay Mathematics Proceedings, **17**, 2013. Edited by D. Ellwood, I. Rodnianski, G. Staffilani, J. Wunsch. 511–572.

- 25) L. Erdős, A. Michelangeli, and B. Schlein. Dynamical formation of correlations in a Bose-Einstein condensate. *Comm. Math. Phys.* **289** (2009), no. 3, 1171–1210.
- 26) K. Kirkpatrick, B. Schlein, and G. Staffilani. Derivation of the two dimensional nonlinear Schrodinger equation from many body quantum dynamics. *Amer. J. Math.* **133** (2011), no.1, 91-130.
- 27) L. Erdős, B. Schlein, and H.-T. Yau. Wegner estimate and level repulsion for Wigner random matrices. *Int. Math. Res. Not. IMRN* **2010**, no. 3, 436–479.
- 28) L. Erdős, J. A. Ramirez, B. Schlein, and H.-T. Yau. Universality of sine-kernel for Wigner matrices with a small Gaussian perturbation. *Electron. J. Probab.* **15** (2010), no. 18, 526–603.
- 29) L. Erdős, S. Péché, J. A. Ramirez, B. Schlein, and H.-T. Yau. Bulk universality for Wigner matrices. *Comm. Pure Appl. Math.* **63** (2010), no. 7, 895–925.
- 30) L. Erdős, J. A. Ramirez, B. Schlein, T. Tao, V. Vu, and H.-T. Yau. Bulk universality for Wigner hermitian matrices with subexponential decay. *Math. Res. Lett.* **17** (2010), no. 4, 667–674.
- 31) L. Erdős, B. Schlein, and H.-T. Yau. Universality of random matrices and local relaxation flow. *Invent. Math.* **185** (2011), no. 1, 75-119.
- 32) B. Nachtergaele, B. Schlein, R. Sims, S. Starr, and V. Zagrebnov. On the existence of the dynamics for anharmonic quantum oscillator systems. *Rev. Math. Phys.* **22** (2010), no. 2, 207–231.
- 33) C. Hainzl, E. Lenzmann, M. Lewin, and B. Schlein. On blowup for time-dependent generalized Hartree-Fock equations. *Ann. Henri Poincaré* **11** (2010), no. 6, 1023–1052.
- 34) B. Schlein. Derivation of effective evolution equations from many body quantum dynamics. *XVIIth International Congress on Mathematical Physics*. World Sci. Publ., Hackensack, NJ, 2010, 406–416.
- 35) L. Erdős, B. Schlein, H.-T. Yau, J. Yin. The local relaxation flow approach to universality of the local statistics for random matrices. *Ann. Inst. H. Poincaré Probab. Statist.* **48** (2012), no. 1, 1–46.
- 36) J. Fröhlich, A. Pizzo, B. Schlein. Ionization of atoms by intense laser pulses. *Ann. Henri Poincaré* **11** (2010), no. 7, 1375-1407.

- 37) A. Michelangeli, B. Schlein. Dynamical description of gravitational collapse. *Comm. Math. Phys.* **311** (2012), no. 3, 645-687.
- 38) B. Schlein. Spectral properties of Wigner matrices. *Mathematical Results in Quantum Physics*. Proceedings of the QMath 11 conference. Edited by P. Exner. World Scientific, 2011, 79-94.
- 39) A. Maltsev, B. Schlein. Average density of states for hermitian Wigner matrices. *Adv. Math.* **228** (2011), 2797-2836.
- 40) B. Schlein. Effective evolution equations from many body quantum dynamics. *Proceedings of "New Perspectives in Quantum Statistics and Correlations"*. Moritz Hiller, Fernando de Melo, Peter Pickl, Thomas Wellens, Sandro Wimberger (Eds.). Universitätsverlag Winter, Heidelberg, 2012. ISBN: 978-3-8253-6001-6.
- 41) L. Chen, J.-O. Lee, B. Schlein. Rate of convergence towards Hartree dynamics. *J. Statist. Phys.* **144** (2011), no. 4, 872-903.
- 42) A. Maltsev and B. Schlein. A Wegner Estimate for Wigner Matrices. *Entropy and the Quantum II*. Arizona School of Analysis with Applications. R. Sims, D. Ueltschi Editors, American Mathematical Society, 2011, 145-160.
- 43) B. Schlein. Effective evolution equations in quantum physics. *Journées équations aux dérivées partielles* (2011), Exp. No. 11. Available in electronic form at <http://jedp.cedram.org/jedp-bin/feuilleter>.
- 44) G. Ben Arous, K. Kirkpatrick, B. Schlein. A central limit theorem in many-body quantum dynamics. *Comm. Math. Phys.*, **321** (2013), 371-417.
- 45) C. Hainzl, B. Schlein. Dynamics of Bose-Einstein condensates of fermion pairs in the low density limit of BCS theory. *J. Funct. Anal.* **265** (2013), no. 3, 399-423.
- 46) C. Cacciapuoti, A. Maltsev, B. Schlein. Local Marchenko-Pastur law at the hard edge of sample covariance matrices. *J. Math. Phys.* **54** (2013), 043302.
- 47) B. Schlein. Effective equations for quantum dynamics. Preprint arXiv:1208.0185. Contribution to Proceedings of 6-th European Congress of Mathematics, Krakow, July 2012.
- 48) N. Benedikter, G. de Oliveira, B. Schlein. Quantitative derivation of the Gross-Pitaevskii equation. Preprint arXiv:1208.0373.
- 49) B. Schlein. Quantum dynamics, coherent states and Bogoliubov transformations. Preprint arXiv:1210.1603. Contribution to Proceedings of International Conference on Mathematical Physics, Aalborg, August 2012.

- 50) N. Benedikter, M. Porta, B. Schlein. Mean-field Evolution of Fermionic Systems. Preprint arXiv:1305.2768.
- 51) M. Lewin, P. T. Nam, B. Schlein. Fluctuations around Hartree states in the mean-field regime. Preprint arXiv:1307.0665.
- 52) S. Buchholz, C. Saffirio, B. Schlein. Multivariate central limit theorem in quantum dynamics. Preprint arXiv:1309.1702.