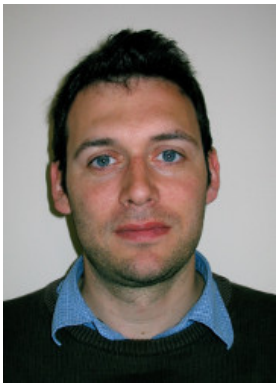
Benjamin Schlein



Academic career

1999	Diploma in Theoretical Physics, ETH Zürich, Switzerland
1999 - 2002	Graduate studies in Mathematical Physics
2002	PhD from Institute of Theoretical Physics, ETH Zürich, Switzerland
2002 - 2003	Courant Instructor, Courant Institute, New York University, NY, USA
2003 - 2004	Instructor, Stanford University, CA, USA
2004 - 2005	NSF Postdoctoral Fellow, Stanford University, CA, USA
2005 - 2006	NSF Postdoctoral Fellow, Harvard University, Cambridge, MA, USA
2006 - 2007	Assistant Professor (tenure-track), University of California, Davis, CA, USA
2007 - 2008	Research Fellow, supported by Kovalevskaja Award, LMU Munich
2007 - 2010	University Lecturer, Department of Pure Mathematics and Mathematical Statistics, Cambridge, England, UK
2010 - 2014	Hausdorff Chair (W3), University of Bonn
Since 2014	Professor, University of Zürich, Switzerland

Honours

2006	Sofja Kovalevskaja Award from the Alexander von Humboldt Foundation
2009	ERC Starting Grant
2009	Young Scientist Prize in Mathematical Physics (IUPAP)

Invited Lectures

2006	International Congress Mathematical Physics (ICMP), Rio de Janeiro, Brasil
2008	Annual meeting of DPG, Freiburg
2008	Annual meeting of DMV, Erlangen
2009	ICMP, Prague, Czech Republic
2010	Annual meeting DPG, Bonn
2010	QMath 11, Hradec Králové, Czech Republic
2011	ICIAM, Vancouver, BC, Canada
2011	Annual meeting DMV, Cologne

Research Projects and Activities

ERC Project “Mathematical Aspects of Quantum Dynamics”
2009 - 2014

Research profile

My research field is mathematical physics. I am very interested in the dynamical properties of quantum mechanical systems (quantum dynamics). In the last years, I have been working on the derivation of effective evolution equations for interacting many body systems; see [7, 2, 4, 6, **?**], as well as on the study of the behavior of the solutions of these macroscopic evolution equations.
Another subject I have been working on is the derivation of Lieb-Robinson bounds for the time evolution of anharmonic lattice systems; these bounds establish the locality of the dynamics; see [5].

I am also interested in the study of the spectral properties of random matrices; in particular, in the last years, I have been working to establish the universality of the local eigenvalue statistics for ensembles of Wigner matrices; see [3, 1, **?**].
Another class of questions I have been trying to understand is related with scattering theory for models of non-relativistic matter coupled to quantized radiation fields; see [8].

Research Area G My main interest in Research Area G is the study of random matrices, and in particular, of the spectrum of Wigner matrices, whose entries are independent random variables. In [3], we establish the validity of the semicircle law on the smallest possible scales, and we prove a Wegner type estimate. Later, in [1], the semicircle law on short scales was used to show the universality of the local eigenvalue correlation for Hermitian Wigner matrices. In [**?**], a new approach towards universality was developed and applied to Wigner matrices with arbitrary symmetry.

Research Area J An important goal of my research is the derivation of effective evolution equations from microscopic many-body quantum dynamics. In a series of paper, we obtained a rigorous derivation of the Gross-Pitaevskii equation for the dynamics of Bose-Einstein condensates; see [7, 2, 4]. In [6], we applied methods from quantum field theory to show that the nonlinear Hartree equation can be used to approximate the many-body evolution in the mean-field regime. More recently, in [**?**], I have been interested in the microscopic description of the phenomenon of stellar collapse.

Supervised theses

PhD theses currently: 1

Selected publications

[1] L'aszl'o Erdös, Jos'e Rami rez, Benjamin Schlein, Terence Tao, Van Vu, and Horng-Tzer Yau. Bulk universality for wigner hermitian matrices with subexponential decay. *Math. Res. Lett.*, 17(4):667–674, 2010.

[2] L'aszl'o Erdös, Benjamin Schlein, and Horng-Tzer Yau. Derivation of the gross-pitaevskii equation for the dynamics of bose-einstein condensate. *Ann. of Math. (2)*, 172(1):291–370, 2010.

[3] L'aszl'o Erdös, Benjamin Schlein, and Horng-Tzer Yau. Wegner estimate and level repulsion for wigner random matrices. *Int. Math. Res. Not. IMRN*, (3):436–479, 2010.

[4] L'aszl'o Erdös, Benjamin Schlein, and Horng-Tzer Yau. Rigorous derivation of the gross-pitaevskii equation with a large interaction potential. *J. Amer. Math. Soc.*, 22(4):1099–1156, 2009.

[5] Bruno Nachtergaele, Hillel Raz, Benjamin Schlein, and Robert Sims. Lieb-robinson bounds for harmonic and anharmonic lattice systems. *Comm. Math. Phys.*, 286(3):1073–1098, 2009.

[6] Igor Rodnianski and Benjamin Schlein. Quantum fluctuations and rate of convergence towards mean field dynamics. *Comm. Math. Phys.*, 291(1):31–61, 2009.

[7] L'aszl'o Erdös, Benjamin Schlein, and Horng-Tzer Yau. Derivation of the cubic non-linear schrödinger equation from quantum dynamics of many-body systems. *Invent. Math.*, 167(3):515–614, 2007.

[8] J. Fröhlich, M. Griesemer, and B. Schlein. Asymptotic completeness for compton scattering. *Comm. Math. Phys.*, 252(1-3):415–476, 2004.