

Curriculum Vitae

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November 1, 2009

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Citizenship:

United States

Date of birth:

July 29, 1980

Postions Held :

Universität Bonn - Mathematics Institute: Hausdorff Center Visiting Postdoctoral Fellow 2008-2009.

Columbia University - Applied Mathematics Department: NSF Postdoctoral Fellow 2007-2008, 2009-2011.

Education :

University of California, Berkeley: Ph.D. granted May 2007, under the supervision of Professor Daniel Tataru.

Thesis Title: *A stable class of perturbations for a minimal mass soliton of a saturated NLS equation in three dimensions.*

University of Oklahoma: 2002, Mathematics. B.A. Summa cum laude. Minor in Physics.

Senior thesis: *On the number of small atoms in numerical semigroups*, directed by Professor Andy Miller.

Publications and Preprints:

17. "Nonconcentration in partially rectangular billiards," (with Luc Hillairet) in preparation (2009).
16. "Spectral analysis of matrix Hamiltonian operators," (with Gideon Simpson) in preparation (2009).
15. "Dispersive estimates for the linearized KdV equation and applications," (with Herbert Koch) in preparation (2009).
14. "Existence and stability of solitons for the nonlinear Schrödinger equation on hyperbolic space," (with Hans Christianson) to appear in *Nonlinearity* (2009).

13. "A system of ODE's for a perturbation of a minimal mass soliton," (with Sarah Raynor and Gideon Simpson) submitted (2009).
12. "Long time dynamics near the symmetry breaking bifurcation for nonlinear Schrödinger/Gross-Pitaevskii equations," (with Michael I. Weinstein) in preparation (2009).
11. "Dipersive estimates using scattering theory for matrix Hamiltonian operators resulting from linearization about minimal mass soliton solutions of saturated nonlinear Schrödinger equations," submitted (2009).
10. "A class of stable perturbations for a minimal mass soliton in three dimensional saturated nonlinear Schrödinger equations," submitted (2009).
9. "Counting numerical sets with no small atoms," (with Andy Miller) to appear in *Journal of Combinatorial Theory A* (2009).
8. "An eigenfunction concentration result for polygonal billiards," (with Andrew Hassell and Luc Hillairet) *Comm. Partial Differential Equations*, **34**, Issue 5 (2009), 475-485.
7. "Strichartz estimates on Schwarzschild black hole backgrounds," (with Jason Metcalfe, Daniel Tataru, and Mihai Tohaneanu) to appear in *Communications in Mathematical Physics* (2009).
6. "A class of stable perturbations for a minimal mass soliton in three dimensions," (thesis written under the direction of Daniel Tataru) accepted May 2007.
5. "Strichartz estimates and local smoothing estimates for asymptotically flat Schrödinger equations," (with Jason Metcalfe and Daniel Tataru) *Journal of Functional Analysis*, **255**, No. 6 (2008), 1497-1553.
4. "Wave packet parametrices for evolutions governed by PDO's with rough symbols," (with Jason Metcalfe and Daniel Tataru) *Proceedings of the American Mathematical Society*, **136**, No. 2 (2008), 597-604.
3. "Soliton splitting by external delta potentials," (with Justin Holmer and Maciej Zworski) *Journal of Nonlinear Science*, **17**, Number 4 (2007), 349-367.
2. "Fast soliton scattering by delta impurities," (with Justin Holmer and Maciej Zworski) *Communications in Mathematical Physics*, **274**, Number 1 (2007), 187-216..
1. "Eigenfunctions for partially rectangular billiards," *Comm. Partial Differential Equations* **31** (2006), 775-790.

Research Interests:

Partial Differential Equations, Microlocal Analysis, Harmonic Analysis, Schrödinger Equations, Soliton Theory, Billiards, Numerical Simulations.

Academic Honors, Fellowships, and Grants:

Visiting Member of the Institut Henri Poincaré: Attended the Trimester on Analysis Program from June 13-27, 2009.

Mathématiques en Pays de la Loire: Visiting Researcher to the University of Nantes, December 1-5, 2008.

Hausdorff Center Postdoctoral Fellowship: Academic year 2008-2009 to work with Professor Herbert Koch at the Universität Bonn.

General Member of MSRI: Summer 2007 workshop on Nonlinear Partial Differential Equations.

NSF Mathematical Sciences Postdoctoral Research Fellowship: Awarded February 2007. Award granted to work with Professor Michael Weinstein of Columbia University.

Associate Member of MSRI: Fall 2005.

Letzeiser Gold Award Winner - Outstanding Graduate: 2002

Phi Beta Kappa: 2002

Research Experiences for Undergraduates (REU) in Physics: 2002, supervised by Professor Timothy Stanton (Woods Hole Oceanographic Institute).

Research Experiences for Undergraduates (REU) in Physics: 2001, supervised by Professor Kieran Mullen (U. of Oklahoma).

Undergraduate Mathematics Scholarships at the University of Oklahoma: 1999-2002

NASA-Epscor Research Fellowship: 1999, supervised by Professor Semion Gutman (U. of Oklahoma).

Talks:

Expository:

“Introduction to Microlocal Analysis,” University of Oklahoma Math Club Lecture Series.
“Soliton existence for nonlinear Schrödinger equations,” UC-Berkeley student PDE/Analysis seminar.
“Strichartz estimates for dispersive equations,” UC-Berkeley student PDE/Analysis seminar.
“The Calderon-Zygmund decomposition and pseudodifferential operators,” UC-Berkeley student PDE/Analysis seminar.

Original Research:

“A stable class of perturbations of a minimal mass soliton for saturated NLS equations in \mathbb{R}^3 ”:
University of California, Berkeley PDE Seminar- October 30, 2006,
Northwestern University PDE Seminar- November 2, 2006,
University of Toronto PDE Seminar- February 12, 2007,
Australian National University PDE Seminar- July 16, 2007,
MSRI Session on Nonlinear PDE- August 9, 2007,
University of Oklahoma Mathematics Colloquium- August 29, 2007,
Massachusetts Institute of Technology PDE Seminar- November 14, 2007,
University of Rochester PDE Seminar- February 1, 2008,
Johns Hopkins University PDE Seminar- February 11, 2008.

“Wave packet parametrices for evolutions governed by PDO’s with rough symbols”:
University of Bonn PDE Seminar- September 7, 2007,
MFO Oberwolfach Workshop on Nonlinear Dispersive Equations- September 14, 2007,
AMS Session - University of New Mexico - October 14, 2007.

“Fast soliton scattering by delta function potentials”:
Columbia University Brown Bag Lunch Lecture Series - October, 2007,
New Jersey Institute of Technology PDE Seminar - February 6, 2008,
Columbia University - APAM Research Conferences - March 14, 2008,
University of Duisburg-Essen PDE Seminar- February 17, 2009.

“Strichartz estimates and local smoothing estimates for asymptotically flat Schrödinger equations”:
Columbia University Geometry and Analysis Seminar - January 24, 2008.

“An eigenfunction concentration result for polygonal billiards”:
University of Bonn SFB Seminar - November 4, 2008,
University of Nice PDE Seminar- May 21, 2009,
Columbia University Applied Math Colloquium - September 15, 2009,
University of Texas Mathematical Physics Seminar - October 15, 2009.

“Long time dynamics near the symmetry breaking bifurcation for nonlinear Schrödinger/Gross-Pitaevskii equations”:
Basque Center for Applied Mathematics - February 4, 2009,
University of Bonn - Workshop on Nonlinear Phenomena - March 5, 2009.

“The quartic KdV equation: Stability and scattering in $\dot{H}^{-\frac{1}{6}}$ near the soliton”:
Institut Henri Poincaré Trimester on Analysis Workshop - June 24, 2009,
Columbia University Geometry and Analysis Seminar - September 17, 2009,

AMS Session - Baylor University - October 18, 2009.

Teaching Experience:

Calculus TA, Spring 2003 (under N. Reshetikhin).
Calculus TA*, Spring 2004 (under N. Reshetikhin).
Calculus TA*, Fall 2004 (under G. Dales).
Calculus TA*, Spring 2005 (under N. Reshetikhin).
Graduate Functional Analysis TA, Fall 2006 (under M. Ratner).
Calculus TA, Spring 2007 (under M. Aganagic).
Graduate Numerical Analysis of PDE, Fall 2009.
Graduate Asymptotic Analysis, Spring 2010.

*Taught for the Professional Development Program.

Conferences Organized:

Hausdorff Center Workshop on Nonlinear Structures Arising in Dispersive Differential Equations (with Herbert Koch): April 2009 in Bonn, Germany.

AMS Special Session on Nonlinear Dispersive Equations (with Sebastian Herr): May 2009 in San Francisco, CA, USA.

Conferences Attended:

NSF-CBMS conference on nonlinear dispersive and wave equations with Professor Terry Tao: Summer 2005 in Las Cruces, NM.

IACM conference on nonlinear dispersive wave phenoma: Summer 2005 in Anogia, Crete, Greece.

MSRI session on nonlinear dispersive equations: Fall 2005 at MSRI in Berkeley, CA.

BIRS conference on Schrödinger evolution equations: Spring 2006 in Banff, Alberta, Canada.

Workshop on nonlinear dispersive equations: Fall 2006 in Baltimore, MD.

MSRI workshop on nonlinear partial differential equations: Summer 2007 in Berkeley, CA.

Workshop on nonlinear dispersive equations: September 2007 at MFO in Oberwolfach, Germany.

AMS Special Session on Harmonic Analysis applied to Partial Differential Equations: October 2007 in Albuquerque, NM.

IHP trimester on Nonlinear waves and dispersion: June 2009 in Paris, France.

BIRS conference on Analysis of nonlinear wave equations and applications in engineering: August 2009 in Banff, Alberta, Canada.

AMS Special Session on Harmonic Analysis and Partial Differential Equations: October 2009 in Waco, TX.

Memberships and Services:

Journal Referee: Communications in Partial Differential Equations, Journal of Computational Physics, Mathematische Annalen, SIAM Journal of Mathematical Analysis, Physical Letters A.

Student PDE/Analysis Seminar Co-Organizer: UC Berkeley, 2004.

UCLEADS Undergraduate Student Mentor: 2004.