

Kay Kirkpatrick

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University of Illinois at Urbana-Champaign, 1409 W. Green Street, Urbana, IL 61801

Research Interests

Statistical mechanics, PDEs, condensed matter physics, and computational biology.

Education

Massachusetts Institute of Technology Visiting doctoral student, 2005 - 2007
University of California, Berkeley Ph.D. in Mathematics, 2007
 Thesis Title: “Rigorously deriving the Landau equation in the weak coupling limit”
 Advisor: Fraydoun Rezakhanlou
Montana State University, Bozeman B.S. in Mathematics, 2002

Academic Positions

University of Illinois at Urbana-Champaign, Assistant Professor, August 2011 - present
Université de Paris IX Dauphine, Visiting Professor, June 2012
New York University, Courant Instructor/PIRE Fellow, 2009 - 2011
Massachusetts Institute of Technology, NSF Postdoctoral Fellow, 2007 - 2009

Fellowships and Awards

2016-2017 Helen Corley Petit Scholar
2016 Tenney Peck Teaching Award
UIUC List of Teachers Ranked as Excellent, Spring 2015
UIUC List of Teachers Ranked as Excellent, Spring 2014
NSF CAREER Award DMS-1254791, May 2013 – present
ICERM Research Fellow in Fall 2012 program: Computational Challenges in Probability
NSF REU supplement DMS-1242731, July 2012 – present
NSF Division of Mathematical Sciences grant, DMS-1106770, 2011 – present
Courant/NSF PIRE Fellowship at Université de Paris IX, 2010 – 2011
NSF Mathematical Sciences postdoc fellowship, DMS-0703618, 2007 – 2009
AAUW American Dissertation Fellowship, 2006 – 2007
National Science Foundation Graduate Research Fellowship, 2002 – 2005
Phi Kappa Phi, Kathleen Greey Graduate Fellowship, 2002 – 2003
Alice T. Schafer Prize (awarded to top undergraduate woman in math nationwide), 2002
Barry Goldwater Math and Science Scholarship, 2001 – 2002

Recent Academic Talks

Colloquium at Bradley University, Feb. 2016
Plenary talk at the Texas Analysis and Mathematical Physics Symposium (TexAMP 2015),
Nov. 2015
Colloquium at UC Berkeley, Sept. 2015
Workshop for Women in Analysis and PDE at IMA, May 2015

- Conference in Stochastic Analysis and Related Topics in honor of Rodrigo Banuelos at Purdue, May 2015
- Colloquium at UW-Madison, April 2015
- Colloquium at Southern Illinois University, April 2015
- Plenary talk at the 5th Ohio River Analysis Meeting, University of Cincinnati, March 2015
- 36th Midwest Probability Colloquium at Northwestern, October 2014
- BIRS Workshop on Spin Glasses and Related Topics, Banff, July 2014
- KI-Net workshop on Mathematical and Numerical Methods for Complex Quantum Systems, UIC, Mar. 2014
- University of Minnesota Probability seminar, Oct. 2013
- UIUC Probability seminar, Sept. 2013
- UIUC IMSE (Initiative for Mathematical Sciences and Engineering) Summer School on Multi-Agent Networked Systems, Aug. 2013
- 71st Midwest PDE seminar, May 2013
- University of Colorado at Boulder Probability seminar, Apr. 2013
- Purdue University Probability seminar, Apr. 2013
- UIUC Computational Science and Engineering seminar, Mar. 2013
- Stanford Analysis/PDE seminar, Jan. 2013
- ICERM Conference on Monte Carlo Methods in Physics and Biology, Nov. 2012
- Duke University Workshop for Women in Probability plenary talk, Oct. 2012
- IMSE Kickoff Symposium: Critical Challenges at the Interface of Mathematics and Engineering, Sept. 2012
- Banff workshop, Evolution equations of physics, fluids, and geometry, Sept. 2012
- Oxford University/Man Institute Probability seminar, June 2012

Publications

- Kirkpatrick, K. and Nawaz, T. “Asymptotics of mean-field $O(N)$ models.” Submitted.
- Kirkpatrick, K. and Zhang, Y. “Fractional Schrödinger dynamics and decoherence.” Accepted to *Physica D* pending minor revisions.
- Brannan, M. and Kirkpatrick, K. Quantum groups and generalized circular elements. *Pacific J. Math.*, Vol. 282 (2016), No. 1, 35–61.
- Kirkpatrick, K. and Meckes, E. “Asymptotics of the mean-field Heisenberg model.” *J. Stat. Phys.*, 152:1, 2013, 54-92.
- Kirkpatrick, B. and Kirkpatrick, K. “Optimal State-Space Reduction for Pedigree Hidden Markov Models.” Submitted.
- Ben Arous, G., Kirkpatrick, K., and Schlein, B. “A Central Limit Theorem in many-body quantum dynamics.” *Comm. Math. Phys.*, 321:2, 2013, 371-417.
- Kirkpatrick, K. “Solitons and Gibbs measures for nonlinear Schrödinger equations.” Invited article accepted for the special “Solitary waves” issue of *Math. Modelling of Natural Phenomena*, v.7, 2012, 95.
- Kirkpatrick, K.; Lenzmann, E.; and Staffilani, G. “On the continuum limit for discrete NLS with long-range lattice interactions.” *Comm. Math. Phys.*, 317:3, 2013, 563-591.
- Chatterjee, S. and Kirkpatrick, K. “Probabilistic methods for discrete nonlinear Schrödinger

equations.” *Comm. in Pure and Appl. Math.*, 65:5, 2012, 727-757.

Kirkpatrick, K., Staffilani, G., and Schlein, B. “Derivation of the two dimensional nonlinear Schrödinger equation from many body quantum dynamics.” *Amer. J. of Math.*, 133:1, 2011, 91-130.

Kirkpatrick, K. “Rigorous derivation of the Landau equation in the weak coupling limit.” *Comm. in Pure and Appl. Analysis*, 8:6, November 2009, 1895 - 1916.

Blecher, D., Kirkpatrick, K., Neal, M., and Werner, W. “Ordered involutive operator spaces.” *Positivity*, vol. 11, 2007, 497-509.

Teppo, A. R., Esty, W. W., and Kirkpatrick, K. “The Assessment of Mathematical Logic: Abstract Patterns and Familiar Contexts.” *Psychology in Mathematics Education, Proceedings of the 25th Annual Meeting*, July 2003, 283-290.

Kirkpatrick, K. “The Shilov Boundary and M -structure of Operator Spaces.” in the University of Houston mathematics preprint journal, August 2001.

Bortz, D., Guy, B., Hood, J., Kirkpatrick, K., Nyugen, V., Shimanovich, V. “Modeling HIV infection dynamics using delay differential equations,” in Pierre A. Gremaud, Zhilin Li, Ralph C. Smith, and Hien T. Tran, eds., *CRSC Technical Report, CRSC-TR00-24*, October 2000.

Student and Postdoctoral Research Supervision

Danni Sun, Zhencheng Wang, and Shuxin Yu, research article: “Kinship accuracy: Comparing algorithms for large pedigrees.” Accepted with revisions to *Stanford Undergraduate Research Journal*.

Jack Weinstein: “Metastable states in the 2D XY model, and a two-step phase transition to superconductivity in a chain of XY models.” Honorable mention for the nationwide Computing Research Association Outstanding Undergraduate Researcher Award.

Michelle Delcourt, Yibo Guo, Yuxi He, Kaiyue Hou, Thomas Mahoney, Yang Song, Zi Wang, Zhiren He, Jiachuan Chen, Chenhao Zhang: projects with the Illinois Geometry Lab.

Dawna Bagherian: “Stein’s method for free quantum particles.”

Tayyab Nawaz, PhD student (math with CSE option): Stein’s method and critical behavior for the mean-field XY model.

Leslie Ann Ross, PhD student (physics): Process-level Stein’s method for the mean-field Heisenberg model.

Michael Brannan, postdoc: Quantum groups and free Araki-Woods Factors. Jing Wang, postdoc.

Collaborators

G rard Ben Arous, Courant; Jose Blanchet, Columbia; Michael Brannan, Texas A&M; Sourav Chatterjee, Courant; Peter Hislop, U Kentucky; B. Kirkpatrick, U Miami; Enno Lenzmann, Copenhagen; Elizabeth Meckes, Case Western; Stefano Olla, Paris IX Dauphine; Fraydoun Rezakhanlou, UC Berkeley; Benjamin Schlein, Bonn; Vedran Sohinger, U Penn; Gigliola Staffilani, MIT; Yanzhi Zhang, Missouri S&T, Daniel Spector, National Chiao Tung University, Taiwan.

Service

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Organizer of the Conference on New Developments in Probability at Northwestern University, May 6-8, 2016

Organizer of semester-long jumbo program at MSRI on New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems, Fall 2015

Organizer of the UIUC probability seminar

Organizer of the Fall 2012 Midwest Probability Colloquium

Other Activities

AWM Student Chapter advisor, 2016 – present

Supporter of UIUC Sonia Kovalevsky Math Days for girls, 2013 – present

Organizer of the Urbana-Champaign Probability Seminar, 2011 – present

Member of the Institute for Condensed Matter Theory (ICMT) at UIUC, 2011 – present

Co-organizer of the 34th Midwest Probability Colloquium, 2012

Girls Angle mentor, Bulletin editor, member of advisory board, Fall 2008 – present

Guest lecturer at the Stanford University Math Camp, 2007

Expanding Your Horizons group leader, panel member, and program presenter, 2001 – 2002