

Kay Kirkpatrick

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

Research Interests

Statistical mechanics, condensed matter physics, and biological computation.

Education

PhD, University of California, Berkeley, 2007, Advisor: Fraydoun Rezakhanlou

Academic Positions

University of Illinois at Urbana-Champaign, Associate Professor of Physics, 2017 -
University of Illinois at Urbana-Champaign, Associate Professor of Mathematics, 2016 -
MIT, Visiting Associate Professor of Mathematics, Fall 2017
MSRI program New Challenges in PDE, Research Professor and Organizer, Fall 2015
University of Illinois at Urbana-Champaign, Assistant Professor, 2011 - 2016
Université de Paris IX Dauphine, Visiting Professor, June 2012
New York University, Courant Instructor/NSF PIRE Fellow, 2009 - 2011
MIT, NSF Postdoctoral Fellow, 2007 - 2009

Selected Accolades

Simons Professorship at Centre de Recherches Mathématiques, Montréal, June 2021
College of LAS Study in a Second Discipline Fellowship in Neurobiology, 2020 - 2021
Discovery Partners Institute R&D Grant, \$125,000, lead PI: Madhusudan Parthasarathy
NSF HDR TRIPODS iDS2 Grant, \$1,500,000, lead PI Maxim Raginsky, 2019 - 2022
NSF CAREER Award, \$453,500, 2013 - 2020
Simons (Sabbatical) Fellowship in Mathematics, 2017 - 2018
David Blackwell Scholar in Mathematics, 2016 - 2018
NSF Division of Mathematical Sciences grant, 2011 - 2014
AAUW American Dissertation Fellowship, 2006 - 2007
NSF Graduate Research Fellowship, 2002 - 2005
Phi Kappa Phi, K. Greer Graduate Fellowship, 2002 - 2003
Schafer Prize, 2002
Goldwater Scholar, 2001

Selected Talks

BIRS Workshop, Advances in Dispersive Equations, Banff, July 2019
Colloquium, Philosophy Department, Illinois, Mar 2019
Keynote at the Seminar on Stochastic Processes (SSP), Utah, Mar 2019
Birthday conference for Thomas Liggett, Interacting Particle Systems and Statistical Mechanics, IPAM, Mar 2019
AWM Mini-Symposium talk on Math Communication, Feb 2019
Math 199 talk on Biological Computation, Feb 2019

Institute for Condensed Matter Theory seminar at University Illinois, Dec 2018
 SIAM Conference on Nonlinear Waves and Coherent Structures, Anaheim, June 2018
 AMS Annual Colloquium at University of Nebraska, Lincoln, Apr 2018
 Logic seminar at University of Illinois at Urbana-Champaign, Jan 2018
 Random matrices seminar at Harvard, Nov 2017
 Physics of Living Systems seminar at MIT, Nov 2017
 PDE and Probability seminars at MIT, Nov 2017
 Analysis seminar at McGill, Oct 2017
 Colloquium and Mathematical Physics Seminar at Purdue University, Feb - Mar 2017
 SIAM Conference on Nonlinear Waves and Coherent Structures, PA, August 2016
 Plenary talk at the Great Lakes Mathematical Physics Meeting, June 2016
 Plenary talk at Frontier Probability Days, May 2016
 Plenary talk at Texas Analysis and Mathematical Physics Symposium 2015, Nov. 2015
 Colloquium at UC Berkeley, Sept. 2015
 Colloquium at Southern Illinois University, April 2015
 Colloquium at UW-Madison, April 2015
 Plenary talk at the 5th Ohio River Analysis Meeting, Cincinnati, March 2015
 36th Midwest Probability Colloquium, Northwestern, October 2014
 BIRS Workshop, Spin Glasses and Related Topics, Banff, July 2014
 KI-Net workshop on Complex Quantum Systems, UIC, Mar. 2014

Selected Papers: faculty.math.illinois.edu/~kkirkpat/

Inafuku, D, Kirkpatrick, K., Osuagwu, O. "Shannon Capacities of Biological Machines." In preparation.

Kirkpatrick, K. "The Turing Test Relies on a Mistake about the Brain." Submitted to Biological Theory, resubmission requested.

Kirkpatrick, K., Rademacher, S., Schlein, B. "A large deviation principle in many-body quantum dynamics." Submitting to JEMS.

Kirkpatrick, K., Mirasola, A.E., Prescod-Weinstein, C. "Relaxation times for Bose-Einstein condensation in axion miniclusters." Accepted to PRD.

Hislop, P., Kirkpatrick, K., Olla, S., and Schenker, J. "Transport of a Quantum Particle in a Time-Dependent White-Noise Potential." J. Math. Phys. (2019) 60: 8 083303.

Gao, Y., Kirkpatrick, K., Marzuola, J., Mattingly, J., and Newhall, K. "Limiting Behaviors of High Dimensional Stochastic Spin Ensembles." Accepted to Comm. Math. Sci.

Kirkpatrick, K. and Nawaz., T. "Critical behavior of mean-field XY and related models," in Stochastic Analysis and Related Topics, A Festschrift in Honor of Rodrigo Bañuelos; F. Baudoin & J. Peterson (Eds.), 207-221 (2017).

Kirkpatrick, K. and Nawaz, T. "Asymptotics of mean-field $O(N)$ models." J. Stat. Phys. (2016) 165: 1114.

Kirkpatrick, K. and Zhang, Y. "Fractional Schrödinger dynamics and decoherence." Physica D Vol. 332 (2016), 41-54.

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.; 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.

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.

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 (2009), 1895 - 1916.

Blecher, D., Kirkpatrick, K., Neal, M., and Werner, W. "Ordered involutive operator spaces." *Positivity*, v.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.

Organizing

Illinois Probability seminar

34th & 39th Midwest Probability Colloquium

2016 & 2021 Conferences on New Developments in Probability

Graduate Research Opportunities for Women 2019 conference at Illinois

Fall 2015 program at MSRI on PDE, Dynamics, and Randomness in High Dimensions

Quantum Computing Advisory Committee for the Computation-based Science and Technology Research Center of The Cyprus Institute

Member, Illinois Center for Advanced Studies of the Universe and Institute of Condensed Matter Theory