

# Curriculum Vitae

## Thomas Garrett Kennedy

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### Education

- 1984    Ph.D. in Mathematics, University of Virginia  
         Advisor: David Brydges, Major field: mathematical physics.  
         Doctoral dissertation: “Mean field theory for Coulomb systems”
- 1981    M.A. in Mathematics, Indiana University
- 1977    B.S. in Mathematics, California Institute of Technology

### Employment

- 1995 - present    Professor, Mathematics Department, University of Arizona
- 2016 - 2017    Interim Head, Mathematics Department, University of Arizona
- 2009 - 2014    Assoc. Head for the Graduate Program, Mathematics Department, University of Arizona
- 2008 - 2009    Interim Head, Mathematics Department, University of Arizona
- 1998 - 1999    Acting Head, Program in Applied Mathematics, University of Arizona
- 1988 - 1995    Associate Professor, Mathematics Department, University of Arizona
- 1985 - 1988    Assistant Professor, Physics Department, Princeton University
- 1984 - 1985    Instructor, Physics Department, Princeton University

### Other Appointments

- 1996 - present    Professor (joint appointment), Physics Department
- 1988 - present    Member, Graduate Interdisciplinary Program in Applied Mathematics
- 2008 - present    Member, Graduate Interdisciplinary Program in Statistics

### Awards

- 1986-1989    NSF Mathematical Sciences Post-doctoral Research Fellowship

## Grants

- 2015-2019 NSF DMS-1500850, \$361,417, sole PI  
Conformal invariance and the renormalization group in some critical systems
- 2008-2011 NSF DMS-0758649, \$306,938, sole PI  
Critical and Near Critical systems in Statistical Mechanics
- 2005-2008 NSF DMS-0501168, \$142,337, sole PI  
Mathematical Problems from Statistical Mechanics
- 2002-2005 NSF DMS-0201566, \$132,199, sole PI  
Problems in Quantum and Classical Statistical Mechanics
- 1999-2002 NSF DMS-9970608, \$96,837, sole PI  
Crystalline Order in Classical and Quantum Mechanical Systems
- 1999-2004 NSF DMS 9977116, VIGRE grant, co-PI, 15 % effort
- 1999 NSF DMS-9988119, \$36,403, PI, 50 % effort  
International Congress on Mathematical Physics, 2000, London: Travel Funds
- 1996-1999 NSF DMS-9623509, \$95,922, sole PI  
Statistical Mechanics of Classical and Quantum Lattice Systems
- 1993-1996 NSF DMS-9303051, \$109,617, sole PI  
Itinerant Electron Systems and Quantum Mechanical Spin Systems
- 1991-1993 NSF DMS-9103621, \$43,000, sole PI  
Quantum Mechanical, Classical Lattice Spin Systems
- 1989-1991 NSF DMS-8902248, \$33,900, sole PI  
Classical and Quantum Mechanical Lattice Spin Systems

## Ph.D. Dissertation Supervision

Yan Dai, current Ph.D. student, Department of Mathematics

Jianping Jiang, Department of Mathematics, Ph.D. May 2015.

Michael Gilbert, Department of Mathematics, Ph.D. August 2013.

Benjamin Dyhr, Department of Mathematics, Ph.D., August 2009

Karl Haller, Program in Applied Mathematics, Ph.D., August 1998.

Martin Pokorny, Program in Applied Mathematics, Ph.D., August 1992.

## Published Articles

1. A lower bound on the partition function for a classical charge symmetric system. *J. Stat. Phys.* **28**, 633-638 (1982).
2. Debye-Huckel theory for charge symmetric Coulomb systems. *Commun. Math. Phys.* **92**, 269-294 (1983).
3. Mean field theory for Coulomb systems. *J. Stat. Phys.* **37**, 529-559 (1984).

4. Long range order in the anisotropic quantum ferromagnetic Heisenberg model. *Commun. Math. Phys.* **100**, 447-462 (1985).
5. (with Paul Federbush) Surface effects in Debye screening. *Commun. Math. Phys.* **102**, 361-423 (1985).
6. (with Chris King) Symmetry breaking in the lattice abelian Higgs model. *Phys. Rev. Lett.* **55**, 776-778 (1985).
7. (with Chris King) Spontaneous symmetry breakdown in the abelian Higgs model. *Commun. Math. Phys.* **104**, 327-347 (1986).
8. (with Elliott Lieb) An itinerant electron model with crystalline or magnetic long range order. *Physica* **138A**, 320-358 (1986).
9. (with David Brydges) Mayer expansions and the Hamilton-Jacobi equation. *J. Stat. Phys.* **48**, 19-49, (1987).
10. (with Ian Affleck, Elliott Lieb, Hal Tasaki) Rigorous results on valence-bond ground states in antiferromagnets. *Phys. Rev. Lett.* **59**, 799-802 (1987).
11. (with Elliott Lieb) Proof of the Peierls instability in one dimension. *Phys. Rev. Lett.* **59**, 1309-1312 (1987).
12. (with Ian Affleck, Elliott Lieb, Hal Tasaki) Valence-bond ground states in isotropic quantum antiferromagnets. *Commun. Math. Phys.* **115**, 477-528 (1988).
13. (with Elliott Lieb, Hal Tasaki) A two dimensional isotropic quantum antiferromagnet with unique disordered ground state. *J. Stat. Phys.* **53**, 383 (1988).
14. (with Elliott Lieb, B. Sriram Shastry) Existence of Néel order in some spin 1/2 Heisenberg antiferromagnets. *J. Stat. Phys.* **53**, 1019 (1988).
15. (with Elliott Lieb, B. Sriram Shastry) The XY model has long-range order for all spins and all dimensions greater than one. *Phys. Rev. Lett.* **61** 2582 (1988).
16. A fixed point equation for the high temperature phase of discrete lattice spin systems. *J. Stat. Phys.* **59**, 195-220 (1990).
17. Exact diagonalization of open spin 1 chains. *J. Phys.: Condens. Matter* **2**, 5737-5745 (1990).
18. (with Dandan Guo and Sumit Mazumdar) Spin-Peierls transitions in  $S > 1/2$  Heisenberg chains. *Phys. Rev.* **B41**, 9592 (1990).
19. Ornstein-Zernike decay in the ground state of the quantum Ising model in a transverse magnetic field. *Commun. Math. Phys.* **137**, 599-615 (1991).
20. (with Hal Tasaki) Hidden  $Z_2 \times Z_2$  symmetry breaking in Haldane gap antiferromagnets. *Phys. Rev.* **B45**, 304 (1992).
21. (with Hal Tasaki) Hidden symmetry breaking and the Haldane phase in  $S = 1$  quantum spin chains. *Commun. Math. Phys.* **147**, 431-484 (1992).
22. Solutions of the Yang-Baxter equation for isotropic quantum spin chains. *J. Phys. A: Math. Gen.* **25**, 2809 (1992).
23. Some rigorous results on majority rule renormalization group transformations near the critical point. *J. Stat. Phys.* **72**, 15-37 (1993).

24. Some rigorous results on the ground states of the Falicov-Kimball model. *Rev. Math. Phys.* **6**, 901-925 (1994). Also in *The State of Matter*, Michael Aizenman and Huzihiro Araki (eds.) World Scientific, 1994.
25. Ballistic behavior in a 1-d weakly self-avoiding walk with decaying energy penalty. *J. Stat. Phys.* **77**, 565-579 (1994).
26. Nonpositive matrix elements for Hamiltonians of spin 1 chains. *J. Phys.: Condens. Matter* **6**, 8015-8022 (1994).
27. (with Karl Haller) Absence of renormalization group pathologies near the critical temperature - two examples. *J. Stat. Phys.* **85**, 607-637 (1996).
28. Majority Rule at Low Temperatures for the Square Lattice with  $b = 2$  and for the Triangular Lattice. *J. Stat. Phys.* **86**, 1089-1107 (1997).
29. Phase separation in the neutral Falicov-Kimball model. *J. Stat. Phys.* **91**, 829-843 (1998).
30. (with Karl Haller) Periodic Ground States in the Neutral Falicov-Kimball Model in Two Dimensions. *J. Stat. Phys.* **102**, 15-34 (2001).
31. A faster implementation of the pivot algorithm for self-avoiding walks. *J. Stat. Phys.* **106**, 407-429 (2002).
32. (with Nilanjana Datta) Expansions for one quasiparticle states in spin 1/2 systems. *J. Stat. Phys.* **108**, 373-399 (2002).
33. Monte Carlo tests of SLE predictions for the 2D self-avoiding walk. *Phys. Rev. Lett.* **88**, 130601 (2002).
34. Conformal invariance and stochastic Loewner evolution predictions for the 2D self-avoiding walk - Monte Carlo tests. *J. Stat. Phys.* **114**, 51-78 (2004).
35. (with Nilanjana Data) Instability of interfaces in the antiferromagnetic XXZ chain at zero temperature, *Commun. Math. Phys.* **236**, 477 (2003).
36. Expansions for Droplet States in the Ferromagnetic XXZ Heisenberg Chain. *Markov Processes and Related Fields* **11**, 223 (2005).
37. Compact packings of the plane with two sizes of discs, *Discrete and Computational Geometry* **35**, 255-267 (2006).
38. A fast algorithm for simulating the chordal Schramm-Loewner evolution. *J. Stat. Phys.* **128**, 1125-1137 (2007).
39. The length of an SLE - Monte Carlo studies. *J. Stat. Phys.* **128**, 1263-1277 (2007).
40. Computing the Loewner driving process of random curves in the half plane. *J. Stat. Phys.* **131**, 803-819 (2008).
41. (with Michel Bauer and Denis Bernard) Conditioning SLE's and loop erased random walks. *J. Math. Phys.*, **50**, 043301 (2009).
42. Renormalization group maps for Ising models in lattice gas variables. *J. Stat. Phys.* **140**, 409-426 (2010).
43. Numerical computations for the Schramm-Loewner Evolution. *J. Stat. Phys.* **137**, 839-856 (2009).

44. (with Ben Dyhr, Michael Gilbert, Gregory F. Lawler, Shane Passon). The self-avoiding walk in a strip *J. Stat. Phys.* **144**, 1-22 (2011).
45. Transforming fixed-length self-avoiding walks into radial  $SLE_{8/3}$ . *J. Stat. Phys.* **146**, 281-293 (2012).
46. (with Gregory F. Lawler). Lattice effects in the scaling limit of the two-dimensional self-avoiding walk, *AMS Contemporary Mathematics* **601**, 195-210 (2013).
47. Simulating self-avoiding walks in bounded domains. *J. Math. Phys.* **53**, 095219 (2012).
48. (with Tony Guttmann). Self-avoiding walks in a rectangle *J. Eng. Math.* **84**, 201-208 (2014).
49. Conformal invariance of the 3D self-avoiding walk *Phys. Rev. Lett.* **111**, 165703 (2013).
50. Conformal invariance predictions for the three-dimensional self-avoiding walk, *J. Stat. Phys.* **158**, 1195-1212 (2015).
51. The Smart Kinetic Self-Avoiding Walk and Schramm-Loewner Evolution, *J. Stat. Phys.* **160**, 302-320 (2015).
52. (with Jianping Jiang). The difference between a discrete and continuous harmonic measure *J. Theoret. Probab.* **30**, 1424-1444 (2017).
53. The first order correction to the exit distribution for some random walks, *J. Stat. Phys.* **164**, 174-189 (2016).
54. A non-intersecting random walk on the Manhattan lattice and  $SLE_6$ .  
Preprint : <http://arxiv.org/abs/1803.06728>
55. Conformal invariance of the loop-erased percolation explorer  
Preprint : <http://arxiv.org/abs/1806.11561>

**Note:** The recent papers above are archived in arXiv.org. Links are on my home page.

## Invited Talks : 1998 to Present

1. *Phase separation and periodic ground states in the neutral Falicov Kimball model*, invited talk at the conference “Mathematical Results in Statistical Mechanics,” Marseille, France, July 27-31, 1998.
2. *Weakly self-avoiding walks*, invited talk at the conference “Self-interacting Random Processes,” held at Mathematisches Forschungstitut Oberwolfach in Germany from May 21-27, 2000.
3. *Weakly self-avoiding walks*, invited talk, University of Geneva, June 5, 2000.
4. *Weakly self-avoiding walks*, invited talk, Institut de Physique Théorique at the École Polytechnique Fédérale de Lausanne, Switzerland, June 5, 2000.
5. *Quasiparticles and interfaces in anisotropic quantum Heisenberg chains*, invited talk, Ecole Polytechnique Fédérale de Lausanne (Switzerland), Oct 10, 2002.
6. *Monte Carlo tests of conformal invariance and SLE predictions for the self-avoiding walk*, invited talk, Ecole Polytechnique Fédérale de Lausanne (Switzerland), Oct 25, 2002.

7. *Monte Carlo tests of conformal invariance and SLE predictions for the self-avoiding walk*, invited talk, Université de Paris - Sud (Orsay, France), Nov 7, 2002.
8. *Monte Carlo tests of conformal invariance and SLE predictions for the self-avoiding walk*, invited talk, Centre de Physique Théorique, Luminy, France, Nov 29, 2002.
9. *Monte Carlo tests of SLE predictions for the self-avoiding walk*, invited talk at the mini-conference “Autour du SLE” which was part of the special trimester “Geometry and Statistics of Random Growth” at the Henri Poincaré Institute (Paris, France), January 16, 2003.
10. *Quasi-particles and interfaces in quantum lattice systems*, invited talk at the conference “Inhomogeneous Random Systems” at the University of Cergy-Pontoise, France, Jan 28-29, 2003.
11. *Monte Carlo tests of conformal invariance and SLE predictions for self-avoiding walk*, invited talk, Physics Department, University of Geneva, Switzerland, Feb 3, 2003.
12. *Itinerant Electron Systems - An Introduction and Review of Rigorous Results*, and *Interfaces and Droplets in the Quantum XXZ Heisenberg Model*, invited talks at the conference “Classical and Quantum Phase Transitions, Crystal Formation and Bose-Einstein Condensation” at the CIRM in Luminy, France, March 17-21, 2003.
13. *Monte Carlo tests of conformal invariance and SLE predictions for the self-avoiding walk*, invited talk, Physics department, ETH, Zurich, Switzerland, May 26, 2003.
14. *Monte Carlo tests of conformal invariance and SLE predictions for the self-avoiding walk* and *An introduction to simulating the self-avoiding walk*, invited talks at the conference “Conformal Invariance and Random Spatial Processes” at the ICMS in Edinburgh, Scotland, July 9-18, 2003.
15. *Monte Carlo comparisons of the self-avoiding walk and SLE - How should SLE be parametrized?*, invited talk at the conference “Dynamics, Probability, and Conformal Invariance,” Banff International Research Station, Banff, Canada, March 12-17, 2005.
16. *Monte Carlo comparisons of the self-avoiding walk and SLE as parametrized curves*, invited talk at the conference “93rd Statistical Mechanics Conference” at Rutgers University, May 15, 2005.
17. *Monte Carlo comparisons of the self-avoiding walk and SLE as parametrized curves*, invited talk at the conference “Critical Scaling for Polymers and Percolation” at the Banff International Research Station, May 28 to June 2, 2005.
18. *The length of an SLE - Monte Carlo studies*, invited talk, Kavli Institute for Theoretical Physics, September 19, 2006.
19. *Numerical simulation of random curves*, invited series of four talks, 2008 Enrage Topical School on “Growth and Shapes,” Institut Henri Poincaré, Paris, June 2-6, 2008.
20. *Testing for SLE using the driving process*, invited talk, 13th Itzykson Conference “Puzzles of Growth,” Saclay, France, June 9-11, 2008.
21. *Monte Carlo Studies of Self-Avoiding Walks and Loops*, invited talk at the conference “Stochastic Loewner Evolution and Scaling Limits,” CRM, Montreal, Canada, August 4-8, 2008.

22. *Renormalization group maps for Ising models in lattice gas variables*, invited talk at the conference “The Renormalization Group and Statistical Mechanics,” University of British Columbia, Vancouver, Canada, July 6-12, 2009.
23. *The 2d Self-avoiding walk - bridges, strips and hitting densities*, Probability seminar, University of Chicago, February 5, 2010.
24. *Conformal invariance and covariance of the 2d self-avoiding walk*, invited talk at the AMS Western Sectional Meeting, Albuquerque, New Mexico, April 17, 2010.
25. *Renormalization group maps for Ising models in lattice gas variables*, invited talk at the conference “103rd Statistical Mechanics Conference,” Rutgers University, New Brunswick, New Jersey, May 9, 2010
26. *Efficient SLE algorithms and numerical pitfalls of the method*, APS March Meeting Invited Talk, Boston, February 28, 2012.
27. *Ten ways in which the self-avoiding walk should converge to SLE*, MSRI Research Seminar, April 24, 2012.
28. *Self-avoiding walk ensembles that should converge to SLE*, UC Davis, Math Physics Seminar, May 9, 2012.
29. *The first order correction to the exit distribution for some random walks*, Invited talk at the conference “Random Structures in High Dimensions,” Oaxaca, Mexico, June 27, 2016.