

CURRICULUM VITAE

Helmut G. Katzgraber

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BIOGRAPHICAL DATA

Date and Place of Birth	July 7, 1972, Lima, Perú
Citizenship	Peruvian/Austrian

EDUCATION

Ph.D. in Physics University of California Santa Cruz (USA) Advisor: Prof. A. Peter Young	06/1998 – 09/2001
M.S. in Physics University of California Santa Cruz (USA) Advisor: Prof. A. Peter Young	10/1997 – 06/1998
Diploma in Physics ETH Zürich (Switzerland) Advisor: Prof. G. Blatter Awards: Diploma with distinction (<i>summa cum laude</i>), recipient of the Pólya Prize	10/1992 – 04/1997
Military Service Österreichisches Bundesheer (Austria) Award: Medal for outstanding service	01/1992 – 09/1992
German Bachelors Degree Colegio Alexander von Humboldt Lima (Perú) Award: best student in Sciences and Mathematics	03/1989 – 12/1991
Languages: English, German, Spanish (all fluent)	

RESEARCH & PROFESSIONAL EXPERIENCE

Assistant Professor Department of Physics, Texas A&M University, College Station, USA Theoretical Physics Institute, ETH Zürich, Switzerland (SNF)	01/2009 – 03/2007 – 03/2013
Post-Doctoral Researcher Theoretical Physics Institute, ETH Zürich, Switzerland Department of Physics, University of California, Davis, USA	10/2002 – 03/2007 10/2001 – 10/2002
Research Assistant Department of Physics, University of California, Santa Cruz, USA Theoretical Physics Institute, ETH Zürich, Switzerland	10/1997 – 10/2001 04/1997 – 09/1997
Computer System Administrator Department of Physics, University of California, Santa Cruz, USA	12/1997 – 01/2001

PUBLICATION & PRESENTATION SUMMARY

Publications	55
Conference proceedings & book chapters	13
Invited talks, seminars & colloquia	69
Conference contributions (talks & posters)	42

AWARDS

Pólya Prize

Awarded by ETH Zurich 1997

Best Diploma Thesis (masters equivalent) in mathematics and theoretical physics

SNF Förderungsprofessur

Awarded by the Swiss National Science Foundation 2007

Faculty fellowship

Note: Teaching awards are listed in the teaching section

RESEARCH INTERESTS & SKILLS

Research Interests

Disordered systems: spin, electron, quantum, vortex & structural glasses

Complex systems, optimization problems, phase transitions

Topological quantum computation, color codes, quantum dimer systems

Cold atomic gases, optical lattices

Hysteresis modeling: magnetic modeling, FORC method

Algorithm development

Tools

(Quantum) Monte Carlo methods and optimization algorithms

Analytical approaches (field theory, finite-size scaling theory)

Computer experience

Languages: C, MPI, Perl, bash, Mathematica

Platforms: Linux, Unix, Mac OS X, HPC clusters

SCIENTIFIC VISITS

KITP University of California Santa Barbara, Santa Barbara, CA, USA Program on “ <i>Electron Glasses</i> ”	08/2010
Aspen Center for Physics, Aspen, CO, USA Program on “ <i>Complexity, Disorder, and Algorithms</i> ”	05/2008 – 06/2008
KITP University of California Santa Barbara, Santa Barbara, CA, USA Program on “ <i>Topological Phases and Quantum Computation</i> ”	04/2006 – 05/2006
Institute for Rock Magnetism, Minneapolis, MN, USA Experiments on disordered systems using a VSM	05/2002

 GRANTS

Research Grants

SNF Faculty Fellowship:
 CHF 1 391k (US\$ 1 245k)
 03/2007 – 03/2011, funding period: 4 years
 Principal investigator (PI)

SNF Faculty Fellowship Grant Renewal:
 CHF 585k (US\$ 545k)
 03/2011 – 03/2013, funding period: 2 years
 Principal investigator (PI)

ETH Grant:
 CHF 1 120k (US\$ 1 003k)
 granted 11/2007, purchase of a beowulf cluster
 co-PI with M. Troyer, M. Parrinello, M. Kröger

Supercomputing Time Allocation Grants

NPACI Expedited Development Allocation	10 kCPUh	2001
AHPCC Supercomputer Allocation (Roadrunner cluster)	50 kCPUh	2001
TACC Supercomputer Startup Allocation (Ranger cluster)	115 kCPUh	2008
TACC Supercomputer Allocation (Ranger cluster)	1050 kCPUh	2009
TAMU Supercomputer Allocation (Hydra cluster)	200 kCPUh	2009
RES Supercomputer Allocation (MareNostrum cluster)	500 kCPUh	2009
TAMU Supercomputer Allocation (Hydra cluster)	200 kCPUh	2010
TACC Supercomputer Allocation (Ranger cluster)	500 kCPUh	2010
RES Supercomputer Allocation (MareNostrum cluster)	300 kCPUh	2010
TAMU Supercomputer Allocation (Brazos cluster)	180 kCPUh	2010
TAMU Supercomputer Allocation (Hydra cluster)	50 kCPUh	2010

Shareholder Supercomputing Access

TAMU Eos Cluster (96 cores)	840 kCPUh/year	since 2010
ETH Brutus Cluster (400 cores)	3500 kCPUh/year	since 2008

Large-scale Collaborations

Associate Partner, “*Quantum Information Technologies Madrid (QUITEMAD)*,”
 01/2010 – 01/2014, funding period: 4 years
 see <http://quitemad.org>
 PI: M.-A. Martin-Delgado (Universidad Complutense, Madrid, Spain)

PUBLICATIONS

Note: † Denotes 5 most important publications.
 Directly-supervised students are underlined.

Papers

- 55 Brigitte Surer, A. Glatz, **H. G. Katzgraber**, G. T. Zimanyi, B. A. Allgood and G. Blatter,
 “Reply to Comment on *Density of States and Critical Behavior of the Coulomb Glass*,”
 Phys. Rev. Lett. 105, 039702 (2010)
- 54 Ruben S. Andrist, **H. G. Katzgraber**, H. Bombin and M.-A. Martin-Delgado,
 “*Tricolored Lattice Gauge Theory with Randomness: Fault-Tolerance in Topological Color Codes*,”
 Phys. Rev. Lett., submitted (arXiv:quant-ph/1005.0777)
- 53 **H. G. Katzgraber**, H. Bombin, Ruben S. Andrist and M.-A. Martin-Delgado,
 “*Topological color codes on Union Jack lattices: a stable implementation of the whole Clifford group*,”
 Phys. Rev. A 81, 012319 (2010)
- 52 Derek Larson, **H. G. Katzgraber**, M. A. Moore and A. P. Young,
 “*Numerical studies of a one-dimensional 3-spin spin-glass model with long-range interactions*,”
 Phys. Rev. B 81, 064415 (2010)
- 51† **H. G. Katzgraber**, H. Bombin and M.-A. Martin-Delgado,
 “*Error Threshold for Color Codes and Random 3-Body Ising Models*,”
 Phys. Rev. Lett. 103, 090501 (2009)
- 50 Y. Matsuda, H. Nishimori, and **H. G. Katzgraber**,
 “*Ground-state statistics from annealing algorithms: Quantum vs classical approaches*,”
 New J. Phys. 11 (2009) 073021
- 49 M. Pelikan and **H. G. Katzgraber**,
 “*Analysis of Evolutionary Algorithms on the One-Dimensional Spin Glass with Power-Law Interactions*,”
 GECCO-2009, ACM Press, p. 843-850 (2009)
- 48† **H. G. Katzgraber**, D. Larson and A. P. Young,
 “*Study of the de Almeida-Thouless line using power-law diluted one-dimensional Ising spin glasses*,”
 Phys. Rev. Lett. 102, 177205 (2009)
- 47 **H. G. Katzgraber**, I. A. Campbell and A. K. Hartmann,
 “*Extended scaling for ferromagnetic Ising models with zero-temperature transitions*,”
 Phys. Rev. B 78, 184409 (2008)
- 46 **H. G. Katzgraber** and A. K. Hartmann,
 “*Ultrametricity and clustering of states in spin glasses: A one-dimensional view*,”
 Phys. Rev. Lett. 102, 037207 (2009)
- 45 K. Jäger, W. Lipinski, **H. G. Katzgraber**, and A. Steinfeld,
 “*Determination of thermal radiative properties of packed-bed media containing a mixture of polydisperse particles*,”
 Int. J. Therm. Sci. 48, 1510 (2009)
- 44 Brigitte Surer, **H. G. Katzgraber**, G. T. Zimanyi, B. A. Allgood and G. Blatter,
 “*Density of States and Critical Behavior of the Coulomb Glass*,”
 Phys. Rev. Lett. 102, 067205 (2009)
- 43 A. F. Albuquerque, **H. G. Katzgraber** and M. Troyer,
 “*ENCORE: An Extended Contractor Renormalization algorithm*,”
 Phys. Rev. E 79, 046712 (2009)
- 42 S. Morrison, A. Kantian, A. J. Daley, **H. G. Katzgraber**, M. Lewenstein, H. P. Büchler, P. Zoller,
 “*Physical replicas and the Bose-glass in cold atomic gases*,”
 New J. Phys. 10, 073032 (2008)
- 41 T. Jörg and **H. G. Katzgraber**,
 “*Evidence for universal scaling in the spin-glass phase*,”
 Phys. Rev. Lett. 101, 197205 (2008)

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- 40 T. Jörg and **H. G. Katzgraber**,
“Universality and universal finite-size scaling functions in four-dimensional Ising spin glasses,”
Phys. Rev. B 77, 214426 (2008)
- 39 M. Pelikan, **H. G. Katzgraber**, and S. Kobe,
“Finding Ground States of Sherrington-Kirkpatrick Spin Glasses with Hierarchical BOA and Genetic Algorithms,”
GECCO-2008, ACM Press, p. 447-454 (2008).
- 38 T. Jörg, **H. G. Katzgraber**, and F. Krzakala,
“Behavior of Ising Spin Glasses in a Magnetic Field,”
Phys. Rev. Lett. 100, 197202 (2008)
- 37 S. Boettcher, **H. G. Katzgraber**, and D. Sherrington,
“Local-field distributions in spin glasses,”
J. Phys. A: Math. Theor. 41, 324007 (2008)
- 36[†] A. F. Albuquerque, **H. G. Katzgraber**, M. Troyer, and G. Blatter,
“Engineering exotic phases for topologically-protected quantum computation by emulating quantum dimer models,”
Phys. Rev. B 78, 014503 (2008)
- 35 Charlotte Gils, **H. G. Katzgraber**, and Matthias Troyer,
“Absence of a structural glass phase in a monoatomic model liquid predicted to undergo an ideal glass transition,”
J. Stat. Mech. P09011 (2007)
- 34 **H. G. Katzgraber**, D. Hérisson, M. Östh, Per Nordblad, Atsuko Ito, and Hiroko Aruga Katori,
“Finite versus zero-temperature hysteretic behavior of spin glasses: Experiment and theory,”
Phys. Rev. B 76, 092408 (2007)
- 33 **H. G. Katzgraber**, D. Würtz, and G. Blatter,
“Typical versus average superfluid density: Understanding the vortex glass phase,”
Phys. Rev. B 75, 214511 (2007)
- 32 **H. G. Katzgraber**, L. W. Lee, and I. A. Campbell,
“Effective critical behavior of the two-dimensional Ising spin glass with bimodal interactions,”
Phys. Rev. B 75, 014412 (2007)
- 31 **H. G. Katzgraber** and F. Krzakala,
“Temperature and Disorder Chaos in Three-Dimensional Ising Spin Glasses,”
Phys. Rev. Lett. 98, 017201 (2007)
- 30 L. W. Lee, **H. G. Katzgraber**, and A. P. Young,
“Critical behavior of the three- and ten-state short-range Potts glass: A Monte Carlo study,”
Phys. Rev. B 74, 104416 (2006)
- 29 O. Gygi, **H. G. Katzgraber**, M. Troyer, S. Wessel, and G. George Batrouni,
“Simulations of ultracold bosonic atoms in optical lattices with anharmonic traps,”
Phys. Rev. A 73, 063606 (2006)
- 28 M. S. Pierce, C. R. Buechler, L. B. Sorensen, S. D. Kevan, E. A. Jagla, J. M. Deutsch, T. Mai, O. Narayan, J. E. Davies, Kai Liu, G. T. Zimanyi, **H. G. Katzgraber**, O. Hellwig, E. E. Fullerton, and J. B. Kortright,
“Disorder-induced magnetic memory: Experiments and theories,”
Phys. Rev. B 75, 144406 (2007)
- 27 M. Körner, **H. G. Katzgraber**, and Alexander K. Hartmann,
“Probing tails of energy distributions using importance-sampling in the disorder with a guiding function,”
J. Stat. Mech. P04005 (2006)
- 26 **H. G. Katzgraber**, M. Körner and A. P. Young,
“Universality in three-dimensional Ising spin glasses: A Monte Carlo study,”
Phys. Rev. B 73, 224432 (2006)
- 25 **H. G. Katzgraber**, S. Trebst, D. A. Huse, and M. Troyer,
“Feedback-optimized parallel tempering Monte Carlo,”
J. Stat. Mech. P03018 (2006)

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- 24 **H. G. Katzgraber**, L. W. Lee, and I. A. Campbell,
“*Nontrivial critical behavior of the free energy in the two-dimensional Ising spin glass with bimodal interactions,*”
(arXiv:cond-mat/0510668)
- 23[†] **H. G. Katzgraber**, A. Esposito, and M. Troyer,
“*Ramping fermions in optical lattices across a Feshbach resonance,*”
Phys. Rev. A 74, 043602 (2006)
- 22 **H. G. Katzgraber** and G. T. Zimányi,
“*Hysteretic memory effects in disordered magnets,*”
Phys. Rev. B 74, 020405(R) (2006)
- 21 **H. G. Katzgraber** and A. P. Young,
“*Probing the Almeida-Thouless line away from the mean-field model,*”
Phys. Rev. B 72, 184416 (2005), *featured in the Journal Club of Condensed Matter (Nov. 2005)*
- 20 **H. G. Katzgraber**, M. Körner, F. Liers, M. Jünger and A. K. Hartmann,
“*Universality-class dependence of energy distributions in spin glasses,*”
Phys. Rev. B 72, 094421 (2005)
- 19 **H. G. Katzgraber** and I. A. Campbell,
“*Dynamical scaling in Ising and vector spin glasses,*”
Phys. Rev. B 72, 014462 (2005)
- 18 D. Würtz and **H. G. Katzgraber**,
“*Precise finite-sample quantiles of the Jarque-Bera adjusted Lagrange multiplier test,*”
(arXiv:math.ST/0509423)
- 17 **H. G. Katzgraber** and L. W. Lee,
“*Correlation length of the two-dimensional Ising spin glass with bimodal interactions,*”
Phys. Rev. B 71, 134404 (2005)
- 16 A. P. Young and **H. G. Katzgraber**,
“*Absence of an Almeida-Thouless line in Three-Dimensional Spin Glasses,*”
Phys. Rev. Lett. 93, 207203 (2004)
- 15 I. A. Campbell, A. K. Hartmann, and **H. G. Katzgraber**,
“*Energy size effects of two-dimensional Ising spin glasses,*”
Phys. Rev. B 70, 054429 (2004)
- 14 **H. G. Katzgraber**, L. W. Lee, and A. P. Young,
“*Correlation length of the two-dimensional Ising spin glass with Gaussian interactions,*”
Phys. Rev. B 70, 014417 (2004)
- 13 **H. G. Katzgraber** and I. A. Campbell,
“*Critical properties of the three- and four-dimensional gauge glass,*”
Phys. Rev. B 69, 094413 (2004)
- 12 **H. G. Katzgraber** and A. P. Young,
“*Geometry of large-scale low-energy excitations in the one-dimensional Ising spin glass with power-law interactions,*”
Phys. Rev. B 68, 224408 (2003)
- 11 **H. G. Katzgraber** and I. A. Campbell,
“*Size-dependence of the internal energy in Ising and vector spin glasses,*”
Phys. Rev. B 68, 180402(R) (2003)
- 10 **H. G. Katzgraber**,
“*On the existence of a finite-temperature transition in the two-dimensional gauge glass,*”
Phys. Rev. B 67, 180402(R) (2003)
- 09 **H. G. Katzgraber** and A. P. Young,
“*Monte Carlo studies of the one-dimensional Ising spin glass with power-law interactions,*”
Phys. Rev. B 67, 134410 (2003)

- 08 J. J. Moreno, **H. G. Katzgraber**, and A. K. Hartmann,
 “*Finding Low-Temperature States with Parallel Tempering, Simulated Annealing and Simple Monte Carlo*,”
 Int. J. of Mod. Phys. C 14, Vol. 3, 285 (2003)
- 07 **H. G. Katzgraber** and A. P. Young,
 “*Numerical studies of the two- and three-dimensional gauge glass at low temperature*,”
 Phys. Rev. B 66, 224507 (2002)
- 06 **H. G. Katzgraber**, F. Pázmándi, C. R. Pike, Kai Liu, R. T. Scalettar, K. L. Verosub, and
 G. T. Zimányi,
 “*Reversal-field memory in the Hysteresis of Spin Glasses*,”
 Phys. Rev. Lett. 89, 257202 (2002)
- 05 **H. G. Katzgraber** and A. P. Young,
 “*Monte Carlo simulations of spin glasses at low temperatures: Effects of free boundary conditions*,”
 Phys. Rev. B 65, 214402 (2002)
- 04 **H. G. Katzgraber** and A. P. Young,
 “*Monte Carlo simulations of the four-dimensional XY spin glass at low temperatures*,”
 Phys. Rev. B 65, 214401 (2002)
- 03 **H. G. Katzgraber** and A. P. Young,
 “*Nature of the spin-glass state in the three-dimensional gauge glass*,”
 Phys. Rev. B 64, 104426 (2001)
- 02[†] **H. G. Katzgraber**, M. Palassini, and A. P. Young,
 “*Monte Carlo simulations of spin glasses at low temperatures*,”
 Phys. Rev. B 63, 184422 (2001)
- 01 **H. G. Katzgraber**, H. P. Büchler, and G. Blatter,
 “*Casimir force between vortex matter in anisotropic and layered superconductors*,”
 Phys. Rev. B 59, 11990 (1999)

Book Chapters

- 05 **H. G. Katzgraber**, “*Random Numbers in Scientific Computing: An Introduction*,” lecture held at the
 second summer school “Modern Computation Science,” Eds. A. K. Hartmann and R. Leidl, BIS-Verlag
 Oldenburg, Germany (2010). See also arXiv:comp-ph/1005.4117
- 04 **H. G. Katzgraber**, “*Introduction to Monte Carlo Methods*,” lecture held at the summer school “Mod-
 ern Computation Science,” Eds. A. K. Hartmann and R. Leidl, BIS-Verlag Oldenburg, Germany (2009).
 See also arXiv:cond-mat/0905.1629
- 03 **H. G. Katzgraber**, “*Scientific Software Engineering in a Nutshell*,” lecture held at the summer school
 “Modern Computation Science,” Eds. A. K. Hartmann and R. Leidl, BIS-Verlag Oldenburg, Germany
 (2009). See also arXiv:comp-ph/0905.1628
- 02 **H. G. Katzgraber**, Alexander K. Hartmann, and A. P. Young, “*New Insights from One-Dimensional
 Spin Glasses*,” to appear in: Computer Simulation Studies in Condensed Matter Physics XXI,
 Eds. D. P. Landau, S. P. Lewis, and H. B. Schüttler (Springer Verlag, Heidelberg, Berlin 2008),
 (arXiv:cond-mat/0803.3417)
- 01 S. Trebst, D. A. Huse, E. Gull, **H. G. Katzgraber**, U. H. E. Hansmann, and M. Troyer, “*Ensemble opti-
 mization techniques for the simulation of slowly equilibrating systems*,” in “Computer Simulation Studies
 in Condensed Matter Physics XIX” Springer Proceedings in Physics, Volume 115, Eds. D. P. Landau,
 S. P. Lewis and H.-B. Schüttler, eds (2009)

Refereed Conference Proceedings

- 08 Y. Matsuda, H. Nishimori, and **H. G. Katzgraber**, “*Quantum annealing for problems with ground-
 state degeneracy*,” in Proceedings of the International Workshop on Statistical-Mechanical Informatics
 2008, Sendai (Japan) September 14-17, 2007, J. Phys.: Conf. Ser. 143, 012003 (2009)

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- 07 **H. G. Katzgraber**, “*Spin glasses and algorithm benchmarks: A one-dimensional view*,” in Proceedings of the International Workshop on Statistical-Mechanical Informatics 2007, Kyoto (Japan) September 16-19, 2007, J. Phys.: Conf. Ser. 95, 012004 (2008)
- 06 **H. G. Katzgraber**, **M. Körner**, F. Liers, and A. K. Hartmann, “*Overcoming system-size limitations in spin glasses*,” Proceedings of the 2004 SPDSA Conference in Hayama, Japan, July 12 – 15, 2004, Progress of Theoretical Physics Supp. No. 157, 59 (2005)
- 05 **H. G. Katzgraber**, G. Friedman, and G. T. Zimányi, “*Fingerprinting hysteresis*,” Proceedings of the 2003 HMM Conference, Salamanca, Spain, May 2003, Physica B 343, 10 (2004)
- 04 **H. G. Katzgraber**, F. Pázmándi, C. R. Pike, Kai Liu, R. T. Scalettar, K. L. Verosub, and G. T. Zimányi, “*Reversal-field memory in magnetic hysteresis*,” Proceedings of the 2002 MMM Conference, Tampa, FL, Nov 11 – 15, 2002, J. Appl. Phys. 93, 6617 (2003)
- 03 **H. G. Katzgraber**, “*Numerical studies of the two- and three-dimensional gauge glass at low temperature*,” Proceedings of the 2002 MMM Conference, Tampa, FL, Nov 11 – 15, 2002, J. Appl. Phys. 93, 7661 (2003)
- 02 **H. G. Katzgraber**, “*Monte Carlo simulations of vector spin glasses at low temperatures*,” Proceedings of “Computational Modeling and Simulation of Complex Systems” Conference, Aachen, Germany, September 5 – 8, 2001, Comp. Phys. Comm. 147, 439 (2002)
- 01 H. P. Büchler, **H. G. Katzgraber**, and G. Blatter, “*Casimir force between two half spaces of vortex matter in anisotropic superconductors*,” Proceedings of the First Euro Conference on “Vortex Matter in Superconductors,” Crete, Greece, September 18 – 24, 1999, Physica C 332, Issue 1–4 (2000)

Theses

- 02 **H. G. Katzgraber**, “*Nature of the spin-glass state as seen from low-temperature Monte Carlo simulations*,” Ph.D. Thesis, University of California Santa Cruz, CA (2001)
- 01 **H. G. Katzgraber**, “*Attraction of Vortices in Anisotropic and Layered Superconductors*,” Diploma Thesis (masters equivalent), ETH Zürich, Switzerland (1997)

 TEACHING

Lectures

Graduate Seminar “Introduction to Research,” (PHYS 681, 1h/week) Texas A&M (Fall 2010)
 Undergraduate Lecture “College Physics,” (PHYS 202, 2x3h/week) Texas A&M (Fall 2010)
 Undergraduate Lecture “College Physics,” (PHYS 202, 2x3h/week) Texas A&M (Fall 2009)
 Undergraduate Lecture “College Physics,” (PHYS 202, 3h/week) Texas A&M (Spring 2009)
 Graduate Seminar (organizer) “Quantum Computing,” (3h/week) ETH Zürich (Spring 2008)
 Graduate Lecture “Optimization Algorithms in Physics,” (2h/week) ETH Zürich (Fall 2007)
 Graduate Seminar (organizer) “Phase Transitions,” (3h/week) ETH Zürich (Spring 2007)

New Courses Developed

Graduate Lecture “Optimization Algorithms in Physics” (2h/week)
 Graduate Short Course “Introduction to *Mathematica*” (2h)

Short Courses

Graduate Lecture “Introduction to Mathematica,” (2h course) ETH Zürich (2002 – 2006)
 Graduate Case Study “Spin Glasses and Optimization Problems,” (2h course) ETH Zürich (2006)

Lectures at International Schools

Modern Computational Science, Oldenburg (2009, 2010), “*Random Numbers*”
 Modern Computational Science, Oldenburg (2009, 2010), “*Introduction to Monte Carlo Methods*”
 Modern Computational Science, Oldenburg (2009, 2010), “*Software Engineering in a Nutshell*”
 Monte Carlo Simulations of Disordered Systems, Leipzig (2008), “*Exchange Monte Carlo*”
 Monte Carlo Simulations of Disordered Systems, Leipzig, (2008), “*New insights from 1D spin glasses*”

Guest Lecturer

Graduate Course “Advanced Theoretical Condensed Matter Physics,” ETH Zürich (2002, 2005)
 Graduate Course “Computational Physics,” ETH Zürich (2002, 2004, 2006)
 Graduate Course “Advanced Computational Physics,” ETH Zürich (2006)

Teaching Assistant

Coordinator, Graduate Seminar “Topology in Physics,” ETH Zürich (2006)
 Coordinator, Graduate Seminar “Methods in Condensed Matter Physics,” ETH Zürich (2004)
 Assistant, Graduate Seminar “Monte Carlo Methods in Statistical Physics,” ETH Zürich (2004)
 Coordinator, Graduate Seminar “Bose-Einstein Condensation,” ETH Zürich (2003)
 Assistant, Graduate Course “Theoretical Condensed Matter Physics,” ETH Zürich (2002)
 Assistant, Undergraduate Course “Advanced Mathematical Physics,” UC Santa Cruz (1998)
 Assistant, Undergraduate Physics Lab, UC Santa Cruz (1997)
 Assistant, Undergraduate Course “Calculus for Engineers,” ETH Zürich (1995 – 1997)

 TEACHING AWARDS

Teaching Excellence Award

Awarded by the Texas A&M System for an outstanding teaching job (USD 4000, Fall 2009)

 SUPERVISION

Post-Doctoral Scholars

Dr. Creighton Thomas, Texas A&M (since 2009)

Graduate Students

Brigitte Surer, graduate student ETH Zürich (2007 – 2009)
 Ruben Andrist, Ph.D. candidate ETH Zürich (since 2008)
 Juan Carlos Andresen, Ph.D. candidate ETH Zürich (since 2009)
 Wanyok Atisattapong, visiting graduate student (2009)
 Jianping Xiao, Texas A&M (since 2009)

Student Supervision and Advising

H. P. Büchler, undergrad. project “Casimir force between vortex matter,” ETH Zürich (1998)
 M. Körner, research project “Energy fluctuations in spin glasses,” ETH Zürich (2003)

- L. W. Lee, research project “Correlation length of the 2D $\pm J$ spin glass,” UC Santa Cruz (2004)
- A. Esposito, class research project “Parallel tempering study of spin glasses,” ETH Zürich (2004)
- F. Hassler, undergrad. research “Superconducting tetrahedral qubits,” ETH Zürich (2004)
- P. Dayal, grad. research “Quantum 2D spin glasses,” ETH Zürich (2004)
- T. Bisig, research project “Topologically protected qubits,” ETH Zürich (2004)
- A. Esposito, master thesis “Fermionic atoms in optical lattices,” ETH Zürich (2004)
- O. Gygi, master thesis “Bosonic atoms in optical lattices,” ETH Zürich (2005)
- C. Gils, grad. research “Structural glass models,” ETH Zürich (2006)
- D. Larson, grad. research “Optimizing parallel tempering in a field,” UC Santa Cruz (2006)
- L. Bonnes, undergrad. research “Optimized parallel tempering,” ETH Zürich (2006)
- B. Surer, research project “Numerical studies of the Coulomb glass,” ETH Zürich, (2006 – 2007)
- B. Surer, master thesis “Numerical studies of electron glasses,” ETH Zürich, (2007)
- D. Murer, bachelor thesis “Striped phases in superconductors,” ETH Zürich, (2007)
- R. Andrist, undergrad. research “Cluster algorithm for vector spin glasses,” ETH Zürich, (2007)
- K. Jaeger, master thesis “Numerical study of chemical solar energy storage,” ETH Zürich, (2007)
- R. Andrist, master thesis “Long-range permutation Potts glass,” ETH Zürich, (2008)
- F. Gaignat, undergrad. research “Self-organized criticality in hysteresis,” ETH Zürich, (2008)
- Y. Matsuda, grad. research “Quantum Annealing for degenerate systems,” ETH Zürich, (2008)
- R. Affolter, master thesis “Radiative properties of thermoelectric materials,” ETH Zürich (2009)
- J. Xiao, graduate research “Numerical studies of the random-field Ising model,” Texas A&M (2009)
- W. Buck, undergraduate research (PHYS 491, 485) “Quantum random numbers,” Texas A&M (2010)
- R. Mai, undergraduate writing project (PHYS 491) “Superfluidity,” Texas A&M (2010)

Thesis Committee Member

- Kelley Reaves, MS Thesis (Advisor: W. Teizer, expected 2012)
- Matthew Sears, PhD Thesis (Advisor: W. Saslow, expected 2010)

Substitute Mathematics Teacher (High School level)

- Kantonsschule (high school) Wattwil, Switzerland (1997)

 INVITED TALKS

Conferences

- 22 Conference on “Out of Equilibrium Quantum Systems,” KITP Santa Barbara, CA (August 2010), “*Understanding the stability of topologically-protected quantum computing proposals using spin glasses*”
- 21 Second summer school on Modern Computational Science, Oldenburg Germany (August 2010), “*Random Numbers in Scientific Computing: An Introduction*”
- 20 Second summer school on Modern Computational Science, Oldenburg Germany (August 2010), “*Introduction to Monte Carlo Methods*”
- 19 Second summer school on Modern Computational Science, Oldenburg Germany (August 2010), “*Software Engineering in a Nutshell*”
- 18 Seventh International Conference on Computational Physics, Beijing, China (May 2010), “*A one-dimensional approach to spin glasses*”
- 17 March Meeting of the American Physical Society, Portland, OR (March 2010), “*New insights from one-dimensional spin glasses*”
- 16 Summer school on Modern Computational Science, Oldenburg Germany (August 2009), “*Random Numbers*”
- 15 Summer school on Modern Computational Science, Oldenburg Germany (August 2009), “*Introduction to Monte Carlo Methods*”
- 14 Summer school on Modern Computational Science, Oldenburg Germany (August 2009), “*Software Engineering in a Nutshell*”
- 13 Spring School on Monte Carlo Simulations of Disordered Systems, Leipzig, Germany (April 2008), “*Exchange Monte Carlo: an efficient workhorse for optimization problems*”
- 12 Spring School on Monte Carlo Simulations of Disordered Systems, Leipzig, Germany (April 2008), “*New insights from one-dimensional spin glasses*”
- 11 Recent Developments in Computer Simulation Studies in Condensed Matter Physics, Athens, GA USA (February 2008), “*New insights from one-dimensional spin glasses*”
- 10 Nonlinear Dynamics and Statistical Mechanics of Complex Systems Workshop, Lavin, Switzerland (January 2008), “*Spin glasses: Still frustrating after all these years?*”
- 09 Texas Section Meeting of the American Physical Society, College Station, TX (October 2007), “*The Physics of Diving*” (also held in Spanish)
- 08 Meeting of the Argentinian Physical Society, Salta, Argentina (September 2007), “*Do spin glasses order in a field?*”
- 07 International Workshop on Statistical-Mechanical Informatics, Kyoto, Japan (September 2007), “*Spin glasses and algorithm benchmarks: A one-dimensional view*”
- 06 ICREA Workshop “Disorder in Cold Atoms”, Barcelona, Spain (January 2007), “*Spin glasses and cold atoms*”
- 05 CECAM Workshop “Rugged Free Energy Landscapes in Glasses, Spin Glasses and Biological Macromolecules”, Lyon, France (June 2005), “*Overcoming system-size limitations in spin glasses*”
- 04 Beowulf Day, ETH Zürich, Switzerland (January 2005), “*Large-scale spin-glass simulations on the Hreidar Beowulf cluster*”
- 03 March Meeting of the American Physical Society, Montreal, Canada (March 2004), “*Overcoming system-size limitations in spin glasses*”
- 02 Dagstuhl-Seminar (New Optimization Algorithms in Physics), Dagstuhl, Germany (September 2003), “*Spin glasses at low and zero temperatures*”
- 01 Intl. Workshop on Magnetism, Hysteresis and the FORC Method, Davis CA (April 2003), “*Fingerprinting hysteretic systems: A numerical approach*”

Colloquia

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- 08 Inaugural lecture, ETH Zurich, Zurich, Switzerland (May 2008), “*Glasses: the unknown known*”
 - 07 Theory Colloquium, Department of Physics, Oldenburg University, Germany (January 2008), “*Spin glasses: Chaotic and universal*”
 - 06 Colloquium, Department of Physics, Hong Kong Baptist University, Hong Kong (September 2007), “*Do spin glasses order in a field?*”
 - 05 Colloquium, Department of Physics, Texas A&M University, College Station TX, USA (June 2007), “*Do spin glasses order in a field?*”
 - 04 Colloquium, Department of Physics, University of Denver, Denver CO, USA (March 2007), “*Do spin glasses order in a field?*”
 - 03 Colloquium, Department of Physics, Virginia Tech, Blacksburg VA, USA (March 2006), “*Do spin glasses order in a field?*”
 - 02 Theory Colloquium, Innsbruck University, Innsbruck, Austria (October 2004), “*Spin glasses: still frustrating after all these years?*”
 - 01 Colloquium, Institute for Informatics, University of Cologne, Cologne, Germany (June 2004), “*Spin glasses: still frustrating after all these years?*”

Invited Seminars

- 39 National High Magnetic Field Laboratory, Tallahassee FL (April 2010), “*Do spin glasses order in a field?*”
- 38 City University of New York Graduate Center, New York NY (April 2010), “*Do spin glasses order in a field?*”
- 37 University of Massachusetts, Amherst MA (April 2010), “*Do spin glasses order in a field?*”
- 36 Ben-Gurion University, Israel (February 2010), “*Do spin glasses order in a field?*”
- 35 Paul Scherrer Institute (PSI), Villigen, Switzerland (August 2009), “*Do spin glasses order in a field?*”
- 34 Syracuse University, Syracuse NY (January 2009), “*Do spin glasses order in a field?*”
- 33 Universidad Complutense de Madrid, Spain (July 2008), “*New insights from one-dimensional spin glasses*”
- 32 Louisiana State University, Baton Rouge LA (April 2007), “*Do spin glasses order in a field?*”
- 31 University of Barcelona, Barcelona, Spain (January 2007), “*Equilibrium and non-equilibrium properties of spin glasses in a field*”
- 30 ETH Zürich (QSIT seminar), Zürich, Switzerland (October 2006), “*Introduction to topologically protected quantum computing*”
- 29 University of California, Santa Cruz CA (October 2006), “*Ramping fermions in optical lattices across a Feshbach resonance*”
- 28 Department of Physics, Virginia Tech, Blacksburg VA, USA (August 2006), “*Ramping fermions in optical lattices across a Feshbach resonance*”
- 27 Department of Engineering Sciences and Physics, College of Staten Island CUNY, Staten Island NY (March 2006), “*Do spin glasses order in a field?*”
- 26 University of Göttingen, Germany (January 2006), “*Equilibrium and nonequilibrium properties of spin glasses in a field*”
- 25 EPF Lausanne, Switzerland (December 2005), “*Do spin glasses have a phase transition in a field?*”
- 24 University of California, Santa Cruz CA (November 2005), “*Equilibrium and non-equilibrium properties of spin glasses in a field*”
- 23 Utrecht University, Utrecht, The Netherlands (May 2005), “*Spin glasses: still frustrating after all these years?*”
- 22 University of California, Davis CA (March 2005), “*Equilibrium and non-equilibrium properties of spin glasses in a field*”

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- 21 Microsoft Research Labs, Redmond, USA (February 2005), “*Spin glasses: still frustrating after all these years?*”
 - 20 Royal Institute of Technology (KTH), Stockholm, Sweden (September 2004), “*Recent developments in spin glasses*”
 - 19 Uppsala University, Uppsala, Sweden (September 2004), “*Equilibrium and non-equilibrium properties of spin glasses in a field*”
 - 18 ISSP, The University of Tokyo, Kashiwa, Japan (July 2004), “*Recent developments in spin glasses*”
 - 17 University of Osaka, Osaka, Japan (July 2004), “*Recent developments in spin glasses*”
 - 16 The University of Electro-Communications, Tokyo, Japan (July 2004), “*Typical versus average superfluid density: Understanding the vortex glass phase*”
 - 15 ETH Zürich, Switzerland (June 2004), “*Spin glasses: still frustrating after all these years?*”
 - 14 University of California, Davis CA (May 2004), “*Typical versus average superfluid density: Understanding the vortex glass phase*”
 - 13 University of California, Santa Cruz CA (May 2004), “*Typical versus average superfluid density: Understanding the vortex glass phase*”
 - 12 ETH Zürich, Switzerland (April 2004), “*Spin glasses: still frustrating after all these years?*”
 - 11 University of Arizona, Tucson AZ (December 2003), “*Overcoming system-size limitations in spin glasses*”
 - 10 University of Montpellier, France (July 2003), “*Probing the nature of the spin-glass state with Monte Carlo simulations*”
 - 09 University of California, Davis CA (April 2003), “*Probing the nature of the spin-glass state with Monte Carlo simulations*”
 - 08 University of Göttingen, Germany (January 2003), “*The nature of the spin-glass state*”
 - 07 University of Fribourg, Switzerland (November 2002), “*Probing the nature of the spin-glass state with Monte Carlo simulations*”
 - 06 University of California, Santa Cruz CA (May 2002), “*FORC Diagrams and Reversal-Field Memory in Magnetic Hysteresis*”
 - 05 Institute for Rock Magnetism, Minneapolis MN (May 2002), “*FORC diagrams and singularities in magnetic materials*”
 - 04 ETH Zürich, Switzerland (September 2001), “*Nature of the Spin-Glass State as seen from Low-Temperature Monte Carlo Simulation*”
 - 03 University of Basel, Switzerland (September 2001), “*Nature of the Spin-Glass State as seen from Low-Temperature Monte Carlo Simulations*”
 - 02 University of California, Santa Cruz CA (October 2000), “*Monte Carlo Simulations of Spin-Glasses at Low Temperatures*”
 - 01 University of California, Santa Cruz CA (February 1998), “*Van der Waals interaction of vortices in anisotropic and layered superconductors*”

CONFERENCE CONTRIBUTIONS

Talks

- 34 StatPhys 24, Cairns Australia (July 2010), “*Using Monte Carlo simulations, topology and statistical mechanics to build stable quantum computers*”
- 33 March Meeting of the American Physical Society, Portland, OR, (March 2010), “*Error threshold for topological color codes on Union Jack lattices*”
- 32 March Meeting of the American Physical Society, Pittsburgh, PA (March 2009), “*Study of the de Almeida-Thouless line using power-law diluted one-dimensional Ising spin glasses*”

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- 31 March Meeting of the American Physical Society, Pittsburgh, PA (March 2009), “*Error threshold in topological quantum-computing models with color codes*”
 - 30 March Meeting of the American Physical Society, New Orleans, LA (March 2008), “*On the ordering of Ising spin glasses in a field*”
 - 29 March Meeting of the American Physical Society, New Orleans, LA (March 2008), “*Monte Carlo study of the three-dimensional Coulomb glass*”
 - 28 March Meeting of the American Physical Society, Denver, CO (March 2007), “*Universality in spin glasses: A Monte Carlo study*”
 - 27 March Meeting of the American Physical Society, Denver, CO (March 2007), “*Chaos in spin glasses*”
 - 26 Swiss Physical Society Meeting, Zurich, Switzerland (February 2007), “*Chaos in spin glasses*”
 - 25 Monte Carlo data formats meeting, ETH Zürich, Switzerland (September 2006), “*Monte Carlo data formats for (spin) glass simulations*”
 - 24 Highly Frustrated Magnetism Conference 2006, Osaka, Japan (August 2006), “*Do spin glasses order in a field?*”
 - 23 March Meeting of the American Physical Society, Baltimore MD (March 2006), “*Ramping Fermions in Optical Lattices across a Feshbach resonance*”
 - 22 March Meeting of the American Physical Society, Baltimore MD (March 2006), “*Probing the Almeida-Thouless line away from the mean-field model*”
 - 21 Beowulf Day, ETH Zürich, Switzerland (January 2006), “*Do spin glasses have a phase transition in a field?*”
 - 20 2005 Swiss Workshop in Materials with Novel Electronic Properties, Les Diablerets, Switzerland (September 2005), “*Ramping Fermions in Optical Lattices across a Feshbach resonance*”
 - 19 Hysteresis and Magnetic Modeling Conference, Budapest, Hungary (May 2005), “*Memory effects in the hysteresis of the Edwards-Anderson Ising spin-glass model*”
 - 18 March Meeting of the American Physical Society, Los Angeles CA (March 2005), “*Absence of an Almeida-Thouless line in Ising spin glasses*”
 - 17 March Meeting of the American Physical Society, Los Angeles CA (March 2005), “*Correlation length of the two-dimensional Ising spin glass with bimodal interactions*”
 - 16 Conference on Computational Physics, Genoa, Italy (September 2004), “*Feedback-optimized parallel tempering Monte Carlo*”
 - 15 Conference on Statistical Physics of Disordered Systems and its Applications, Hayama, Japan (July 2004), “*Overcoming system-size limitations in spin glasses*”
 - 14 March Meeting of the American Physical Society, Montreal, Canada (March 2004), “*Typical versus average superfluid density: Understanding the vortex glass phase*”
 - 13 Beowulf Day, ETH Zürich, Switzerland (January 2004), “*Typical versus average superfluid density: Understanding the vortex glass phase*”
 - 12 Hysteresis and Magnetic Modeling Conference, Salamanca, Spain (May 2003), “*Fingerprinting Hysteresis*”
 - 11 Hysteresis and Magnetic Modeling Conference, Salamanca, Spain (May 2003), “*Fingerprinting Exchange Bias*” (together with K. Liu)
 - 10 March Meeting of the American Physical Society, Austin TX (March 2003), “*Monte Carlo studies of the 1D Ising spin glass with power-law interactions*”
 - 09 MaNEP Topical Meeting, Neuchatel, Switzerland (February 2003), “*Probing the nature of the spin-glass state with Monte Carlo simulations*”
 - 08 Beowulf Day, ETH Zürich, Switzerland (January 2003), “*Nature of the spin-glass state*”
 - 07 Conference on Magnetism and Magnetic Materials, Tampa FL (November 2002), “*Numerical studies of the two- and three-dimensional gauge glass at low temperature*”

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- 06 March Meeting of the American Physical Society, Indianapolis IN (March 2002), “*FORC diagrams and singularities in magnetic materials*”
 - 05 March Meeting of the American Physical Society, Indianapolis IN (March 2002), “*Spin-glasses at Low Temperatures: Effects of Free Boundary Conditions*”
 - 04 March Meeting of the American Physical Society, Seattle WA (March 2001), “*Monte Carlo Simulations of Spin Glasses at Low Temperatures: The 3D Gauge Glass*”
 - 03 CLC conference, Lake Tahoe CA (February 2001), “*Monte Carlo Simulations of Spin Glasses at Low Temperatures: The 3D Gauge Glass*”
 - 02 PASI Conference Chile (January 2001), “*Monte Carlo Simulations of Spin Glasses at Low Temperatures*”
 - 01 March Meeting of the American Physical Society, Los Angeles CA (March 1999), “*Casimir Force between Vortex Matter in Anisotropic and Layered Superconductors*”

Posters

- 08 International Conference on Magnetism 2006, Kyoto, Japan (August 2006), “*Probing the Almeida-Thouless line away from the mean-field model*”
- 07 Swiss Physical Society MaNEP Meeting, Lausanne, Switzerland (February 2006), “*Probing the Almeida-Thouless line away from the mean-field model*”
- 06 Conference on Statistical Physics of Disordered Systems and its Applications, Rome, Italy (September 2005), “*Probing the Almeida-Thouless line away from the mean-field model*”
- 05 MaNEP Topical Meeting (review panel), Neuchatel, Switzerland (June 2003), “*Large-scale low-energy excitations in the one-dimensional Ising spin glass with power-law interactions*”
- 04 28th MECO Conference, Saarbrücken, Germany (March 2003), “*Monte Carlo studies of the 1D Ising spin glass with power-law interactions*”
- 03 Conference on Magnetism and Magnetic Materials, Tampa FL (November 2002), “*Reversal-field memory in magnetic hysteresis*”
- 02 Conference on Computational Physics 2001, Aachen, Germany (September 2001), “*Monte Carlo Simulations of Vector Spin Glasses at Low Temperatures*”
- 01 4th International Workshop on Vortex Matter, Monte Verita, Switzerland (June 1997), “*Low Field Phase Diagram of Layered and Strongly Anisotropic Superconductors including Intervortex van der Waals Attractions*”

SERVICE

Reviewing Activities

Grant proposal reviewer: NSF (USA), FONDECYT (Chile), QIPC (Austria)
Referee: Physical Review Letters, Physical Review B, Physical Review E, JSTAT, JMMM,
JPCM, European Physics Journal B, IEEE CiSE, J. Phys. A, J. Phys. D,
New Journal of Physics, Computational Materials Science, Physica A,
Journal of Computational Physics, APS Physics, Europhysics Letters,
Quantum Information & Computation, Computer Physics Communications

Department-level Service

Member of the Texas A&M Physics IT committee (since 2010)
Chair of the Texas A&M Physics Colloquium committee (since 2009)
Chair of the ETH Zürich Theoretical Physics Colloquium committee (2007 – 2008)
Computer Coordinator of the UC Santa Cruz Physics Department (1999 – 2001)

College-level Service

Member of the UC Santa Cruz Divisional Academic Computing Advisory Committee (2000)

University-level Service

Member of the Texas A&M Supercomputing Steering Committee (since 2009)
Faculty advisor of the Texas A&M Student Anime Appreciation Club (since 2009)

Conference Organization

Co-organizer “*Meeting on Quantum Systems for Information Technology*”, Zürich, 21–24/03/2006

Outreach

Presentation at the “*Physics Festival*” (“*The Physics of Diving*”), Texas A&M University (2009, 2010)
Presentation at “*Nacht der Physik*” (“*The Physics of Diving*”), ETH Zürich (2005)
Participation and experiment design in “*Physics for Kids and Teens*”, 150 Years ETH (2005)
Project reviewer at the ETH Maturandentag (2004, 2005)
Judge for the Santa Cruz County Science Fair (1998 – 2000)

MISCELLANEA

Professional Membership

Member of the American Physical Society (since 1996)

Hobbies

Karate (1st Dan, black belt) since 04/1999
Diving (PADI Divemaster No. 981564) and underwater photography since 09/2003