Pan Zhang Ph.D.

Institute of Theoretical Physics, Chinese Academy of Sciences
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PERSONAL DATA

Date of Birth: November 19, 1983
Nationality: China

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PRINCIPAL RESEARCH EXPERTISE

Statistical physics of complex systems and application in computer science and information theory
Statistical inference, machine learning, graphical models
Combinatorial optimization problems, random matrix theory
Disorder systems, complex networks, neural networks
Spin glass theory, replica symmetry breaking theory, cavity method and message passing algorithms

EMPLOYMENT

Sep. 2015 -	Associate Professor, Institute of Theoretical Physics, Chinese academy of sciences
Jun. 2013–Sep. 2015	Postdoctoral research fellow, Santa Fe Institute, Santa Fe, U.S.A.
Feb. 2012–May 2013	Postdoctoral research fellow, E.S.P.C.I. Paris, France
Oct. 2009–Jan. 2012	Postdoctoral research fellow, Politecnico di Torino / Microsoft Innovation Center, Turin, Italy

EDUCATION

Oct. 2007–Jun. 2009	Joint Ph.D. program, Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing, China. Supervisor: Haijun Zhou
Sep. 2004–Jun. 2009	Ph.D. Theoretical Physics, Lanzhou University, Lanzhou, China. Supervisors: Yishi Duan and Yong Chen
Sep. 2000–Jun. 2004	B.S. Theoretical Physics, Lanzhou University, Lanzhou , China.

LANGUAGES

- Native Mandarin
- Fluent English
- Basic Italian
- Basic French

REVIEWER SERVICE

- Physical Review E
- Physical Review X
- Physical Review Letters
- European Physics Letters
- European Physics Journal B
- Journal of Statistical Physics
- Journal of Statistical Mechanics: Theory and Experiments
- Scientific Reports
- Chaos
- Physica A
- International Journal of Modern Physics B
- Communication in Theoretical Physics
- Journal of Machine Learning
- Journal of Machine Learning Research
- Neural Information Processing Systems (NIPS)
- IEEE's Transactions on Knowledge and Data Engineering

TEACHING AND MENTORING EXPERIENCE

Feb. 2007−Jul. 2007: TA for course "Electrodynamics", Lanzhou University.
Aug. 2014: Teaching course "Introduction to Graphical Models" for students of REU program in Santa Fe Institute.
Jun.2014−Aug. 2014: Mentoring a REU student at Santa Fe Institute in a research project of random matrices.
Jun.2015−Aug. 2015: Mentoring two REU students at Santa Fe Institute in a research project of networks and statistical physics.
July 2016: Advanced Summer Course of Theoretical Physics: From the Ising model to neural networks. (9 lectures)

PUBLICATIONS

Robust Spectral Detection of Global Structures in the Data by Learning a Regularization
Pan Zhang
Neural Information Processing Systems 2016

Detectability thresholds and optimal algorithms for community structure in dynamic networks
A. Ghasemian, P. Zhang, A. Clauset, C. Moore, L. Peel
Physical Review X, in press (2016)
http://arxiv.org/abs/1506.06179

Community detection in networks with unequal groups
Pan Zhang, Cristopher Moore and M.E.J. Newman
Physical Review E 93 (1), 012303 (2016)
http://arxiv.org/abs/1509.00107

Evaluating accuracy of community detection using the relative normalized mutual information
Pan Zhang
Journal of Statistical Mechanics: Theory and Experiment 11, P11006 (2015)
http://arxiv.org/abs/1501.03844

Non-backtracking operator for the Ising model and its applications in attractor neural networks
Pan Zhang
Physical Review E 91, 042120 (2015)
http://arxiv.org/abs/1409.3264

Solution space structure of random constraint satisfaction problems with growing domains
W. Xu, P. Zhang, T. Liu, F. Gong
Journal of Statistical Mechanics: Theory and Experiment, 12, P12006 (2015)
http://arxiv.org/abs/1505.06802

Decimation inference for sparse kinetic Ising model
Aurellien Decelle and Pan Zhang
Physical Review E 91, 052136 (2015)
http://arxiv.org/abs/1502.01660

Phase transitions in semisupervised clustering of sparse networks
Pan Zhang, Cristopher Moore and Lenka Zdeborová
Physical Review E 90, 052802 (2014)
http://arxiv.org/abs/1404.7789

Scalable detection of statistically significant communities and hierarchies, using message-passing for modularity
Pan Zhang and Cristopher Moore
Proceedings of National Academy of Sciences, 111, 18144 (2014)
http://www.pnas.org/content/111/51/18144

Model Selection for Degree-corrected Block Models
Xiaoran Yan , Jacob Jensen, Florent Krzakala, Cristopher Moore, Cosma Shalizi, Lenka Zdeborová, Pan Zhang and Yaojia Zhu
Journal of Statistical Mechanics: Theory and Experiments P05007 (2014)
http://arxiv.org/abs/1207.3994

Spectral redemption in clustering sparse networks
F. Krzakala, C. Moore, E. Mossel, J. Neeman, A. Sly, L. Zdeborova and P. Zhang
Proceedings of National Academy of Sciences 110, 20935 (2013)
http://www.pnas.org/content/110/52/20935.short

Non-adaptative pooling strategies for detection of rare faulty items
Pan Zhang, Florent Krzakala , Marc Mezard and Lenka Zdeborova
IEEE ICC Communications Workshops (2013).
http://arxiv.org/abs/1302.0189

The hard-core model on random graphs revisited
J. Barbier, F. Krzakala, L. Zdeborová and P. Zhang
Journal of Physics: Conference Series 473 (1), 012021 (2013)
http://arxiv.org/abs/1306.4121

Robust error correction for real-valued signals via message-passing decoding and spatial coupling
J. Barbier, F. Krzakala, L. Zdeborová and P. Zhang

IEEE Information Theory Workshop (ITW), 1-5 (2013)
http://arxiv.org/abs/1304.6599

Comparative Study of Belief Propagation for Mixture-Modeling Relational Data
Pan Zhang, Florent Krzakala, Joerg Reichardt and Lenka Zdeborova
Journal of Statistical Mechanics: Theory and Experiments P12021(2012)
http://arxiv.org/abs/1207.2328

Inference of kinetic Ising model on sparse graphs
Pan Zhang
Journal of Statistical Physics 148, 502 (2012)
http://arxiv.org/abs/1207.5405

Message passing in quantified Boolean formulas
P. Zhang, A. Ramezanpour, L. Zdeborova and R. Zecchina
Journal of Statistical Mechanics: Theory and Experiments P05025 (2012).
http://arxiv.org/abs/1202.2536

Analytical and Belief Propagation studies on random constraint satisfaction problems wit h growing domains
C. Zhao,P. Zhang, Z. Zheng, and K.Xu
Physical Review E 85, 016106 (2012).
http://journals.aps.org/pre/abstract/10.1103/PhysRevE.85.016106

Inference and learning in sparse systems with multiple states
A. Braunstein, A. Ramezanpour and R. Zecchina and P. Zhang
Physical Reivew E, 83, 056114 (2011).
http://arxiv.org/abs/1104.2775

Stability Analysis on the Finite-temperature Replica-Symmetric and First-step Replica-Symmetry-Broken Cavity Solutions of the Random Vertex Cover Problem
P. Zhang, Y. Zeng and H. Zhou
Physical Reivew E, 80, 021122 (2009).
http://arxiv.org/abs/0901.2635

Topology and Dynamics of Attractor Neural Networks: The Role of Loopiness
P. Zhang, Y. Chen
Physica A, 387, 4411 (2008)
http://arxiv.org/abs/cond-mat/0703405

Transient Dynamics of Sparsely Connected Hopfield Neural Networks with Arbitrary Degree Distributions
P. Zhang and Y. Chen
Physica A, 387, 1009 (2008).
http://arxiv.org/abs/0704.1007

Transient dynamics for sequence processing neural networks: effect of degree distributions
Y. Chen, P. Zhang, L.C. Yu, S. Zhang
Phys. Rev. E 77, 016110 (2008)
http://arxiv.org/abs/0705.3679

Statistical Neurodynamics for sequence processing neural networks with finite dilution
P. Zhang and Y. Chen

Lecture Notes in Computer Science (LNCS), 4491, 1148-1156 (2007).
http://arxiv.org/abs/cond-mat/0611313

A Network growth approach to macroevolution in ecosystems
S.M. Qin, Y. Chen and P. Zhang
New Journal of Physics 9, 220 (2007)
http://iopscience.iop.org/1367-2630/9/7/220

Frequency and phase synchronization of two coupled neurons with channel noise
L.C. Yu, Y. Chen and P. Zhang
Euro. Phys. J. B 59,249 (2007)
http://arxiv.org/abs/q-bio.NC/0611064

Optimized annealing traveling salesman problem from the nth-nearest-neighbor distribution
Y. Chen and P. Zhang
Physica A, 371, 627 (2006)
http://arxiv.org/abs/cond-mat/0603237

REFERENCES

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Lenka Zdeborová, CNRS Researcher
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