

# Chuang Wang

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## Research interest

Theoretical aspects of high-dimensional machine learning and signal processing; probabilistic graphical models, physics-inspired optimization algorithms; imaging and imaging processing.

## Career

**Research Associate in Electrical Engineering** (02/2018 – present)

**Postdoc Fellow in Electrical Engineering** (02/2015 – 01/2018)

Harvard University

Advisor: Prof. Yue M. Lu

Research Direction: High dimensional statistical inference algorithms in machine learning and signal processing

## Education

**Ph.D. in Statistical Physics** (09/2010 – 01/2015)

University of Chinese Academy of Science, Beijing, China

Institute of Theoretical Physics, Chinese Academy of Science

Advisor: Prof. Hai-Jun Zhou

Research Direction: Physics-inspired algorithms for probabilistic graphical model, spin glasses

**B.S. in Physics**, graduated with the highest honor (09/2006 – 07/2010)

Northeast Normal University, Changchun, Jilin, China

## Work Experience

### Referee for

IEEE Transactions on Signal Processing, IEEE Transactions on Image Processing, Signal Processing, and Physics Review E, Scientific Report, Geoscience and Remote Sensing Letters

### Teaching Fellow at Harvard

ES254: Information Processing and Statistical Physics, graduate level (Fall 2015)

- Designed the course materials with Prof. Yue Lu from scratch (No similar course had been taught at Harvard)
- Led the sessions, office hours

ES150: Introduction to Probability with Engineering Applications, undergraduate level (Spring 2017)

- Designed the course materials, led the sessions and office hours

### JOIN Network studio

Technical group leader (10/2006 – 07/2010)

- Led a group of about 20 students to build 5 websites for our college and other organizations, e.g. [www.dszyw.net](http://www.dszyw.net), which posts about 300,000 job positions a year serving for 28 colleges in northeast of China.

## Awards

- Best student paper award, IEEE Global Conference on Signal and Information Processing (top 3), 2014
- National scholarship for graduate students, Ministry of Education of China (<1%), 2012
- Outstanding graduates, Northeast Normal University (10 in about 4000), 2010
- National scholarship for undergraduates, Ministry of Education of China (<1%), 2007

## Publications

- [1] **Chuang Wang**, Hong Hu, Yue M. Lu, A Solvable High-Dimensional Model of GAN, arXiv:1805.08349 (submitted)
- [2] **Chuang Wang**, Yonina C. Eldar, Yue M. Lu, Subspace Estimation from Incomplete Observations: A High-Dimensional Analysis, *Journal of Selected Topic in Signal Processing*, 2018 (Accepted with minor revision)
- [3] **Chuang Wang**, Jonathan Mattingly, Yue M. Lu, Scaling Limit: Exact and Tractable Analysis of Online Learning Algorithms with Applications to Regularized Regression and PCA, 2017, arXiv:1712.04332 (preprint)
- [4] **Chuang Wang**, Yue M. Lu, The scaling limit of high-dimensional online independent component analysis, *Advances in Neural Information Processing Systems (NIPS)*, 2017 (spotlight talk)
- [5] **Chuang Wang**, Yonina C. Eldar and Yue M. Lu, Subspace estimation from incomplete observations: a precise high-dimensional analysis, *Signal Processing with Adaptive Sparse Structured Representations (SPARS)*, Lisbon, Portugal, 2017
- [6] **Chuang Wang**, Yue M. Lu, Online learning for sparse PCA in high dimensions: exact dynamics and phase transitions, 2016 IEEE Information Theory Workshop (ITW), 186-190, 2016
- [7] G. D. Ferraro, **Chuang Wang**, Haijun Zhou, E. Aurell, On one-step replica symmetry breaking in the Edwards-Anderson spin glass model, *Journal of Statistical Mechanics: Theory and Experiment* 2016 (7), 073305
- [8] **Chuang Wang**, A. Agaskar and Yue M. Lu, "Randomized Kaczmarz algorithm for inconsistent linear systems: an exact MSE analysis," *International Conference on Sampling Theory and Applications (SampTA)*, Washington, DC, 2015, pp. 498-502.
- [9] A. Agaskar, **Chuang Wang**, Yue M. Lu, Randomized Kaczmarz algorithms: Exact MSE analysis and optimal sampling probabilities, *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, 2014
- [10] **Chuang Wang**, Shaomeng Qin, Haijun Zhou, Topologically invariant tensor renormalization group method for the Edwards-Anderson spin glasses model, *Physical Review B* 90 (17), 174201, 2014
- [11] **Chuang Wang**, Haijun Zhou, Simplifying generalized belief propagation on redundant region graphs, *Journal of Physics: Conference Series*, 473, 012004 (2013)
- [12] Haijun Zhou, **Chuang Wang**, Region graph partition function expansion and approximate free energy landscapes: Theory and some numerical results, *Journal of Statistical Physics* 148, 513-547 (2012)
- [13] Haijun Zhou, **Chuang Wang**, Zedong Bi, Jinqing Xiao, Partition function expansion on region graphs and message-passing equations, *Journal of Statistical Mechanics: Theory and Experiment* 2011 (12), L12001
- [14] Haijun Zhou, **Chuang Wang**, Ground-state configuration space heterogeneity of random finite-connectivity spin glasses and random constraint satisfaction problems, *Journal of Statistical Mechanics: Theory and Experiment*, P10010 (2010)

### Book chapter:

M. Mézard, G. D. Ferraro, **Chuang Wang**, D. Martí, *Cavity Method: Message Passing from a Physics Perspective*, "Statistical Physics, Optimization, Inference and Message-passing Algorithms", Oxford University Press, 2015

## Workshop /Activities

- 31<sup>st</sup> Annual Conference on Neural Information Processing Systems (NIPS), Long Beach, CA, USA, 2017
- *Signal Processing with Adaptive Sparse Structured Representations (SPARS)*, Lisbon, Portugal, 2017
- 50<sup>th</sup> Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, 2016
- 25<sup>th</sup> International Conference on Statistical Physics (STATPHYS25), Seoul, South Korea, 2014
- Autumn School of Statistical physics, Optimization, Inference and Message-Passing algorithms, Ecole de Physique des Houches, Les Houches, France, 2013
- 4<sup>th</sup> International Summer School on Modern Computational Science Optimization, Oldenburg, Germany, 2012
- Bridging statistical physics and optimization, inference and learning, Ecole de Physique des Houches, Les Houches, France, 2012