

Samet Oymak
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Caltech 1200 E. California Blvd.
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EDUCATION

- **California Institute of Technology** (June 2011–Present)
PhD Candidate in Electrical Engineering
Advisor: Professor Babak Hassibi
GPA: **4.13/4.00**
- **California Institute of Technology** (Sept. 2009–June 2011)
MS in Electrical Engineering
GPA: **4.13/4.00**
- **Bilkent University** (Sept. 2005–June 2009)
BS in Electrical Engineering
GPA: **3.94/4.00**
Rank: **3/150**

RESEARCH INTERESTS

Compressed sensing, Matrix completion, Machine learning, Dimensionality reduction techniques, Convex optimization, Graphical models, Clustering, Random matrix theory, MCMC methods, Random graphs

HONORS AND AWARDS

- **Ranked 1st** in Electrical Engineering Qualifying Exam, Caltech, January 2010.
- Recipient of **Caltech's Division Fellowship**, 2009-2010.
- Bilkent University **Undergraduate Fellowship**, 2005-2009.
- **Presidential Fellowship** awarded to **Top 100** students, 2005-2009, Turkey.
- **Silver Medalist** in International Mathematical Olympiad (IMO), Mexico, 2005.
- **Silver Medalist** in Balkan Mathematical Olympiad (BMO), Romania, 2005.
- **Silver Medalist** in National Mathematical Olympiad, Turkey, 2004.
- **Ranked 2nd** among 500.000 students in High School Entrance Exam, Turkey.

PROFESSIONAL EXPERIENCE

- **California Institute of Technology** (*Research Assistant*) (June 2010–Present)

My research mostly focuses on sparse signal recovery, matrix completion and convex optimization techniques. Broadly speaking, my interest is to learn a structured big data from limited observations by exploiting the underlying structure. My work involves development of new algorithms, theoretical guarantees for these, analytical performance analysis, extensive Matlab simulations and fundamental aspects of compressed sensing. I also consider application specific problems such as graph clustering, graphical models and phase retrieval. Recently, I have a particular interest on the intersection of linear inverse and structured estimation problems and I am working on a general theory that can merge various results in the literature.

- **D. E. Shaw & Co.** (*Quantitative analyst intern*) (June 2013–Sept. 2013)

Developed machine learning algorithms for the Futures group to automatize the rollover of futures contracts while maximizing certain utilities. Trained the algorithm on the in-sample data, which contained information about the traded instruments, and successfully completed the out-of-sample test. My work involved the technical aspects of the algorithm as well as various design considerations. I used Python and object oriented design extensively.

• **NEC Labs – Princeton** (*Research Intern*)

(June 2012–Sept. 2012)

I have worked on the improvement of power allocation schemes for mobile communication. In particular, I focused on computationally efficient precoder design to ensure that individual antennas satisfy certain average power constraints while optimizing achievable data rates simultaneously. My work involved algorithm development, theoretical performance analysis of these algorithms and Matlab implementations and comparisons of the new and existing algorithms.

COMPUTER SKILLS

Languages: Python, Java, C++, Matlab, L^AT_EX, Fortran, shell scripting.

Environments: Microsoft Windows, Linux, Microsoft Office.

RELEVANT COURSEWORK

Stochastic Processes and Modeling
Information Theory
Markov Chains and Applications
Communication Theory
Stochastic Signal Processing
Digital Image Processing

Learning Systems
Combinatorial Analysis
Intro to Optimization
Quantum Computation
Applied Real and Functional Analysis
Wireless Communications

PROFESSIONAL ACTIVITIES

• **Teaching Assistantship**

TA for “Communication–System Fundamentals,” Caltech, Winter 2011, 2012.
Instructor for Turkish Math Olympiad Team, Winter 2007.

• **Reviewer for**

IEEE Trans. on Signal Proc., Mathematical Programming, SampTA, SPARS

• **Research Mentorship**

Supervised two undergraduate students, Caltech, Summer 2011.

PUBLICATIONS

- **Samet Oymak**, Amin Jalali, Maryam Fazel, and Babak Hassibi, “*Estimation and Recovery of Simultaneously Structured Models*,” accepted to CDC 2013.
- **Samet Oymak**, Amin Jalali, Maryam Fazel, Yonina Eldar, and Babak Hassibi, “*Simultaneously Structured Models with Application to Sparse and Low-rank Matrices*,” submitted to IT Transactions, arXiv:1212.3753.
- Kishore Jaganathan, **Samet Oymak**, and Babak Hassibi, “*Sparse Phase Retrieval: Convex Algorithms and Limitations*,” appeared in ISIT 2013.
- **Samet Oymak** and Babak Hassibi, “*Asymptotically exact denoising in relation to compressed sensing*,” preprint available at arXiv:1305.2714.
- **Samet Oymak** and Babak Hassibi, “*On a Relation between the Minimax Risk and the Phase Transitions of Compressed Recovery*,” 50th Annual Allerton Conference on Communication, Control and Computing, UIUC, Monticello, IL.
- Kishore Jaganathan, **Samet Oymak**, and Babak Hassibi, “On Robust Phase Retrieval for Sparse Signals,” Allerton 2012, UIUC, Monticello, IL.
- **Samet Oymak**, Amin Khajehnejad and Babak Hassibi, “*Recovery Threshold for Optimal Weight ℓ_1 Minimization*,” International Symposium on Information Theory (ISIT) 2012, Cambridge, MA.
- **Samet Oymak** and Babak Hassibi, “*Recovering Jointly Sparse Signals via Joint Basis Pursuit*,” available at arXiv:1202.3531.

- Kishore Jaganathan, **Samet Oymak**, and Babak Hassibi, “*Recovery of Sparse 1-D Signals from the Magnitudes of their Fourier Transform*,” ISIT 2012.
- Kishore Jaganathan, **Samet Oymak**, and Babak Hassibi, “*Phase Retrieval for Sparse Signals Using Rank Minimization*,” International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2012.
- Cheuk Ting Li, **Samet Oymak**, and Babak Hassibi, “*Deterministic Phase Guarantees for Robust Recovery in Incoherent Dictionaries*,” ICASSP, 2012.
- Anilesh K. Krishnaswamy, **Samet Oymak**, and Babak Hassibi, “*A Simpler Approach to Weighted ℓ_1 Minimization*,” ICASSP, 2012.
- **Samet Oymak** and Babak Hassibi, “*Finding Dense Clusters via Low Rank + Sparse Decomposition*,” preprint available at [arXiv:1104.5186v1](https://arxiv.org/abs/1104.5186v1).
- **Samet Oymak**, Karthik Mohan, Maryam Fazel, and Babak Hassibi, “*A Simplified Approach to Recovery Conditions for Low Rank Matrices*,” International Symposium on Information Theory (ISIT) 2011, St. Petersburg, Russia.
- **Samet Oymak**, Amin Khajehnejad, and Babak Hassibi, “*Subspace Expanders and Matrix Rank Minimization*,” ISIT, 2011.
- **Samet Oymak** and Babak Hassibi, “*Tight Recovery Thresholds and Robustness Analysis for Nuclear Norm Minimization*,” ISIT, 2011.
- Amin Khajehnejad, **Samet Oymak**, and Babak Hassibi, “*Subspace Expanders and Fast Recovery of Low rank Matrices*,” International Conference on Sampling Theory and Applications, 2011.
- **Samet Oymak**, Amin Khajehnejad, and Babak Hassibi, “*Improved Thresholds for Rank Minimization*,” International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2011, Prague, Czech Republic.
- Mainak Chowdhury, **Samet Oymak**, Amin Khajehnejad, and Babak Hassibi, “*Robustness Analysis of A List Decoding Algorithm For Compressed Sensing*,” ICASSP, 2011.
- **Samet Oymak**, Amin Khajehnejad, and Babak Hassibi, “*Weighted Compressed Sensing and Rank Minimization*,” ICASSP, 2011.
- Xin Liu, **Samet Oymak**, Athina Petropulu, and Kapil R. Dandekar “*Collision Resolution Based on Pulse Shape Diversity*,” Signal Processing Advances in Wireless Communications (SPAWC), 2009.

PRESENTATIONS

- “On a Relation between the Minimax Risk and the Phase Transitions of Compressed Recovery,” Allerton 2012 at UIUC, Monticello, IL.
- “Recovery Threshold for Optimal Weight ℓ_1 Minimization,” ISIT 2012 at MIT, Boston, MA.
- “A Simpler Approach to Weighted ℓ_1 Minimization,” ICASSP 2012, Kyoto, Japan.
- “Subspace Expanders and Matrix Rank Minimization,” ISIT 2011, St. Petersburg.
- “A Simplified Approach to Recovery Conditions for Low Rank Matrices,” ISIT 2011.
- “Tight Recovery Thresholds and Robustness Analysis for Nuclear Norm Minimization,” ISIT 2011.
- “Subspace Expanders and Fast Recovery of Low rank Matrices,” SampTa 2011, Singapore.