Eric W. Tramel

Curriculum Vitae

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Areas of Specialization

- Compressed Sensing
- Machine Learning
- Information Theory
- Message Passing & Belief Propagation
- Statistical Inference
- Multiview & Lightfield Imaging

Education

2007–2012 **Ph.D. in Computer Engineering**, *Mississippi State University*, Starkville, MS.

2004–2007 **B.S. in Computer Engineering**, *Mississippi State University*, Starkville, MS.

Dissertation

Title *Distance-Weighted Regularization for Compressed-Sensing Video Recovery and Supervised Hyperspectral Classification*

Committee Prof. James E. Fowler, Prof. Jenny Q. Du, Prof. Song Zhang, Prof. Robert Moorhead

Experience

Research

2013–Present **Postdoctoral Researcher**,
Laboratoire de Physique Statistique, École Normale Supérieure, Paris, France.
"Statistical Physics Applied to Reconstruction in Compressed Sensing and Complex Systems",
PI: Prof. Florent Krzakala

Summer, 2011 **Research Intern**,
Canon USA, Inc., San Jose, CA.
"Optimization Theory" & "Compressive Sampling of Lightfields",
Director: Dr. Axel Becker-Lakus

2009–2012 **Research Associate**,
Geosystems Research Institute, Mississippi State University, Starkville, MS.
"Block-based Compressed Sensing for Images and Video",
Director: Prof. James E. Fowler

Summer, 2006 **Research Assistant**,
Institute for Signal and Information Processing, Mississippi State University, Starkville, MS.
Director: Prof. Joseph Picone

Teaching

Spring, 2013 **Instructor**, *Microprocessors I Lab*, Mississippi State University.

Fall, 2012 **Instructor**, *Signals & Systems*, Mississippi State University.

Spring, 2012 **Teaching Assistant**, *Senior Design*, Mississippi State University.

Fall, 2011 **Teaching Assistant**, *Microprocessors I Lab*, Mississippi State University.

Fall, 2008 **Teaching Assistant**, *Electronic Circuits I*, Mississippi State University.

Fall, 2007 **Teaching Assistant**, *Microprocessors I Lab*, Mississippi State University.

Spring, 2007 **Grader**, *Microprocessors I*, Mississippi State University.

Talks & Presentations

October, 2015 *Invited Lecture*: "Introduction to Compressed Sensing," Biophysics: Measuring and Modelling Biology, École de Physique des Houches, Les Houches, France.

August, 2015 *Invited Talk*: "Discrete Reconstruction for Electron Tomography," 23^{rd} General Congress, Société Française de Physique (SFP), Strasbourg, France.

July, 2015 "Swept Approximate Message Passing for Sparse Estimation," International Conference on Machine Learning (ICML), Lille, France.

March, 2015 *Invited Talk*: "Belief Propagation & Approximations: Discrete Tomography," Workshop on Sparse Tomographic Reconstruction: Theoretical and Numerical Aspects, Heidelberg, Germany.

August, 2014 *Invited Plenary Talk*: "A Probabilistic Approach to Compressed Sensing: Robust Algorithms," International Travelling Workshop on Interactions between Sparse Models and Technology (iTWIST), Namur, Belgium.

April, 2012 "The Nearest Regularized Subspace Classifier," MSU GSA Research Symposium, Starkville, MS.

March, 2011 "Video Compressed Sensing with Multihypothesis," IEEE Data Compression Conference (DCC), Snowbird, UT.

Awards and Honors

2012 Graduated Doctor of Philosophy, *summa cum laude*

2010 Appointed MSU Graduate Ambassador for Electrical & Computer Engineering

2009 MSU Electrical & Computer Engineering Departmental Academic Scholarship

2007 Graduated Bachelor of Science, *magna cum laude* with Honors

2007 Phi Kappa Phi Honor Society

2006 Mississippi State University Honors Program Phase II Award

2005 Mississippi State University Honors Program Phase I Award

2004 Mississippi State University Academic Scholarship

2004 Mississippi State University Honors Scholarship

2004 Advanced Placement Scholar with Distinction

2004 Ergon/Diversified Engineering Excellence Scholarship

2004 Mississippi Eminent Scholar

2004 National Merit Finalist and Scholarship

Professional Activities

Society Memberships

- Member, IEEE
- Member, IEEE Signal Processing Society
- Member, IEEE Information Theory Society

Publication Review

- IEEE Signal Processing Letters
- IEEE Transactions on Image Processing
- SPIE Journal of Electronic Imaging
- IEEE International Conference on Acoustics, Speech, and Signal Processing
- IEEE International Conference on Image Processing
- European Signal Processing Conference
- EURASIP Journal on Image and Video Processing

Publications

Patents

[1] A. Mohan, S.-K. Tin, and E. W. Tramel, "Systems and methods for compressive light sensing using multiple spatial light modulators," U.S. Patent US9 160 900 B2, October 13, 2015.

Books

[2] J. E. Fowler, S. Mun, and E. W. Tramel, *Block-based Compressed Sensing of Images and Video*, ser. Foundations and Trends in Signal Processing. Now Publishers, Inc., 2012, vol. 4, no. 4.

[3] F. Krzakala, F. Ricci-Tersenghi, L. Zdeborovà, R. Zecchina, E. W. Tramel, and L. F. Cugliandolo, *Statistical Physics, Optimization, Inference, and Message-Passing Algorithms.* Oxford University Press, 2015.

Book Chapters

[4] E. W. Tramel, S. Kumar, A. Giurgiu, and A. Montanari, "Statistical estimation: From denoising to sparse regression and hidden cliques," in *Statistical Physics, Optimization, Inference, and Message-Passing Algorithms*, F. Krzakala, F. Ricci-Tersenghi, L. Zdeborovà, R. Zecchina, E. W. Tramel, and L. F. Cugliandolo, Eds. Oxford University Press, 2015, pp. 120–177.

Journal Articles

[5] E. W. Tramel, A. Drémeau, and F. Krzakala, "Approximate message passing with restricted Boltzmann machine priors," *Journal of Statistical Mechanics: Theory and Experiment*, 2016, to appear.

[6] C. Chen, W. Li, E. W. Tramel, M. Cui, S. Prasad, and J. E. Fowler, "Spectral-spatial preprocessing using multihypothesis prediction for noise-robust hyperspectral image classification," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. PP, no. 99, 2014.

[7] C. Chen, W. Li, E. W. Tramel, and J. E. Fowler, "Reconstruction of hyperspectral imagery from random projections using multihypothesis prediction," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 52, no. 1, pp. 365–374, 2014.

[8] J. E. Fowler, S. Mun, and E. W. Tramel, "Block-based compressed sensing of images and video," *Foundations and Trends in Signal Processing*, vol. 4, no. 4, pp. 297–416, March 2012.

[9] W. Li, E. W. Tramel, S. Prasad, and J. E. Fowler, "Nearest regularized subspace for hyperspectral classification," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 52, no. 1, pp. 477–489, 2013.

[10] M. Trocan, E. W. Tramel, J. E. Fowler, and B. Pesquet-Popescu, "Compressed-sensing recovery of multiview image and video sequences using signal prediction," *Multimedia Tools and Applications*, pp. 1–27, 2013.

Conference Papers

[11] J. Barbier, E. W. Tramel, and F. Krzakala, "Scampi: a robust approximate message-passing framework for compressive imaging," in *Proc. Int. Mtg. on High-Dimensional Data Driven Science (HD^3)*, 2016, to appear.

[12] B. Rajaei, E. W. Tramel, S. Gigan, F. Krzakala, and L. Daudet, "Intensity-only optical compressive imaging using a multiply scattering material: A double phase retrieval system," in *Proc. IEEE Int. Conf. on Acoustics, Speech and Signal Processing (ICASSP)*, 2016, to appear.

[13] M. Gabrié, E. W. Tramel, and F. Krzakala, "Training restricted Boltzmann machines via the Thouless-Andreson-Palmer free energy," in *Proc. Conf. on Neural Info. Processing Sys. (NIPS)*, Montreal, Canada, June 2015.

[14] A. Manoel, E. W. Tramel, F. Krzakala, and L. Zdeborová, "Sparse estimation with the swept approximated message-passing algorithm," in *Proc. Int. Conf. on Machine Learning (ICML)*, Lille, France, July 2015.

[15] W. Li, S. Prasad, E. W. Tramel, J. E. Fowler, and Q. Du, "Decision fusion for hyperspectral image classification based on minimum-distance classifiers in the wavelet domain," in *IEEE China Summit on Signal and Info. Processing*, Xi'an, China, July 2014, pp. 162–15.

[16] F. Krzakala, A. Manoel, E. W. Tramel, and L. Zdeborová, "Variational free energies for compressed sensing," in *Proc. IEEE Int. Symp. on Information Theory (ISIT)*, Honolulu, HI, July 2014, pp. 1499–1503.

[17] J. E. Fowler, S. Mun, and E. W. Tramel, "Multiscale block compressed sensing with smoothed projected Landweber reconstruction," in *Proc. European Signal Processing Conf. (EUSIPCO)*, Barcelona, Spain, August 2011, pp. 564–568.

[18] C. Chen, E. W. Tramel, and J. E. Fowler, "Compressed-sensing recovery of images and video using multihypothesis predictions," in *Asilomar Conf. on Signals, Systems, and Computers*, Pacific Grove, CA, November 2011.

[19] M. Trocan, T. Maugey, E. W. Tramel, J. E. Fowler, and B. Pesquet-Popescu, "Compressed sensing of multiview images using disparity compensation," in *Proc. of the IEEE Int. Conf. on Image Processing (ICIP)*, Hong Kong, Sep. 2010, pp. 3345–3348.

[20] ——, "Multistage compressed-sensing reconstruction of multiview images," in *Proc. of the IEEE Int. Workshop on Multimedia Signal Processing (MMSP)*, Saint-Malo, France, Oct. 2010, pp. 111–115.

[21] E. W. Tramel and J. E. Fowler, "Video compressed sensing with multihypothesis," in *Proc. of the IEEE Data Compression Conf. (DCC)*, Snowbird, Utah, 2011, pp. 193–202.