

Sui Tang

CONTACT INFORMATION

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RESEARCH INTERESTS

I am interested in employing mathematical aspects of statistical approaches in machine learning for the discovery of physical laws with provable statistical guarantees and build generalizable, interpretable predictive models in complex systems from different types of data. My research interests can be categorized to the following two areas:

- Mathematical foundation of learning theory: statistical learning theory, statistical inference for ODEs and SDEs from time-series data, high dimensional data analysis
- Applied and computational harmonic Analysis: Fourier analysis, approximation theory, sampling theory, inverse problem in mathematical/statistical signal processing

EMPLOYMENT

Department of Mathematics, University of California Santa Barbara, Isla Vista, USA
Assistant Professor, July 2020 –Present

Department of Mathematics, Johns Hopkins University, Baltimore, USA
Postdoc Fellow of Applied Mathematics, July 2019 –June 2020
Assistant Research Professor, July 2016 –June 2019

Institute for Pure and Applied Mathematics (IPAM)

- Fellow in Fall 2019 program on “Machine Learning for Physics and the Physics of Learning” (declined and attend one workshop instead)

EDUCATION

Department of Mathematics, Vanderbilt University, Nashville, USA

Ph.D., Mathematics, August 2016

- Adviser: Akram Aldroubi

M.S., Mathematics, December 2013

School of Mathematics, Sun Yat-Sen University, Guangzhou, China

B.S., Mathematics, June 2010

GRANT

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- AMS-Simons Travel Grant (\$4000) July 2017 – July 2021

HONORS AND AWARDS

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- [1] Best Overall Award in the poster competition of Second International Conference on Mathematics of Data Science November 2018
 - [2] AWM-NSF Travel Award for international conferences (\$2360) July 2017
 - [3] AMS-NSF Travel Award for Mathematical Congress of the Americas (\$1350) July 2017
 - [4] AWM travel award for Joint Mathematics Meeting (\$650) January 2016
 - [5] Excellent Student Scholarships, Sun Yat-Sen University 2007–2009

MENTORING EXPERIENCE

- Jason Miller (Graduate student at Johns Hopkins University)
 - Project: Learning theory for identifying interaction kernels in second-order heterogeneous system of agents from data
- Jiahui Cheng (Undergraduate, Summer research 2019)
 - Project: Learning linear dynamical system from partial observations of space-time samples
 - Placement: Graduate student at CSE program, Georgia Tech

PUBLICATIONS

- [1] Learning interaction kernels in stochastic systems of interacting particles from multiple trajectories (with F. Lu and M. Maggioni). ArXiv: 2007.15174. Submitted.
- [2] On the coercivity condition in the learning of interacting agents systems (with Z. Li, F. Lu, M. Maggioni, and C. Zhang). ArXiv:1912.11965. Submitted.
- [3] Learning interaction kernels in heterogeneous systems of agents from multiple trajectories (with F. Lu and M. Maggioni), Arxiv1910.04832. Submitted.
- [4] Nonparametric inference of interaction laws in systems of agents from trajectory data (with F. Lu, M. Maggioni and M. Zhong), *Proceedings of National Academy of Sciences of the USA*, 116(29), 2019.
- [5] Analysis of simulated crowd flow exit data: visualization, panic detection, exit time convergence, attribution and estimation (with A. Grim, B. Iskra, N. Ju, A. Kryshchenko, F.P. Medina, L. Ness, M. Ngamini, M. Owen, and R. Paffenroth), *Research in Data Science*, 17, 2019.
- [6] Sensor Calibration for Off-the-Grid Spectral Estimation (with Y. Eldar and W. Liao), *Applied and Computational Harmonic Analysis*, in press, 2018.
- [7] Phaseless reconstruction from space-time samples (with A. Aldroubi and I. Krishtal), *Applied and Computational Harmonic Analysis*, in press, 2018.
- [8] Undersampled windowed exponentials, spectra of Toeplitz operators and its applications (with C. Lai). *Acta Applicandae Mathematicae*, in press, 2018
- [9] Universal spatial-temporal sampling sets for discrete spatially invariant evolution systems. *IEEE Transactions on Information Theory*, 63(9), 2017.
- [10] System Identification in Dynamical Sampling. *Advance in Computational Mathematics*, 43(3), 2017.
- [11] Dynamical Sampling (with A. Aldroubi, C. Cabrelli, and U. Molter). *Applied and Computational Harmonic Analysis*, 42(3), 2017.
- [12] Phase retrieval of evolving signals from space-time samples (with A. Aldroubi and I. Krishtal). *Proceedings of SampTA*, 2017.
- [13] Multidimensional Signal Recovery in Discrete Evolution Systems via Spatiotemporal Trade-Off (with R. Aceska and A. Petrosyan). *Journal of Sampling Theory in Signal and Image Processing*, 14(2), 2015.
- [14] Filter Recovery in Infinite Spatially Invariant Evolutionary Systems Via Spatiotemporal Trade-Off. *Proceeding of SampTA*, 2015.
- [15] Dynamical sampling of two-dimensional temporally-varying signals (with R. Aceska and A. Petrosyan). *Proceeding of SampTA*, 2015.

- [16] Dynamical sampling in hybrid shift invariant spaces (with R. Aceska), *Contemporary Mathematics*, Vol 626, 2014.

PRESENTATIONS

Invited Conference Talks

- [1] Plenary Talk on “Manifold and Graph-based Learning”, Program on Data science, Approximation theory and Harmonic analysis, Fields Institute, May 2021
- [2] Minisymposium on “Machine learning on data with low-dimensional structures”, SIAM Conference on Mathematics of Data Science, Cincinnati, Ohio, May 2020
- [3] Minisymposium on “Time evolving signals, sampling, and learning, ”, approximation theory and beyond, Nashville, TN, May 2020 (postponed)
- [4] AMS special session on “Celebrating Diversity in Mathematics”, University of Virginia, Charlottesville, Virginia, March 2020 (posponed)
- [5] Applied mathematics youth forum, Peking University
- [6] Minisymposium on “Interaction between Sampling Theory and Operator Theory”, International conference on Approximation Theory XVI, Nashville, Tennessee, May 2019
- [7] Minisymposium on “Sparse Function Approximations: Theory and Applications”, Siam CSE 19, Spokane, Washington, March 2019
- [8] Special session on “Infectious Disease Data Modeling”, 4th International Conference on Big Data and Information Analytics, Houston, Texas, December 2018
- [9] AMS Fall Western Sectional Meeting, San Francisco State University, San Francisco, California, October 2018
- [10] Minisymposium on “Harmonic analysis in signal and imaging processing”, Siam Annual meeting, Portland, Oregon, July 2018
- [11] Seventh International Conference on Computational Harmonic Analysis (ICCHA7), Vanderbilt University, Nashville, Tennessee, May 2018
- [12] Workshop on applied harmonic analysis and sampling theory, University of Central Florida, Orlando, Florida, February 2018
- [13] Harmonic Analysis and Inverse Problems, Mathematical Congress of the Americas 2017, McGill University, Montreal, Canada, July 2017
- [14] Special session “Dynamical Sampling”, SampTA 2017 Conference, Tallinn University of Technology, Tallinn, Estonia, July 2017
- [15] Nonlinear signal recovery session in the Research Program of PCMI Summer school "Mathematics of Data", Midway, Utah, July 2016
- [16] Minisymposium on "Approximation theory in signal processing", 15th international conference on approximation theory, San Antonio, Texas, May 2016
- [17] SIAM Minisymposium on "Trends in the Mathematics of Signal Processing and Imaging", AMS Joint Meeting, Seattle, Washington, January 2016
- [18] Special session “Dynamical, Nonlinear and Mobile Sampling”, SampTA 2015 Conference, American University, Washington, D.C., May 2015
- [19] AMS Fall Eastern Sectional Meeting, Dalhousie University, Halifax, Canada, October 2014

Invited Seminar Talks

- [20] Colloquium, University of Hawaii,Manoa, Feb 2020
- [21] Colloquium, Purdue University, Feb 2020
- [22] Colloquium, Stevens Institute of Technology, Feb 2020
- [23] Colloquium, University of California Santa Barbara, Jan 2020
- [24] Colloquium, University of California Davis, Jan 2020
- [25] Stochastic seminar, University of Utah, Jan 2020
- [26] Colloquium, University of Utah, Jan 2020
- [27] Colloquium, École polytechnique fédérale de Lausanne, Jan 2020
- [28] Colloquium, University of Texas Dallas, Jan 2020
- [29] Colloquium, Shanghai Jiaotong University, Dec 2019
- [30] Colloquium, University of Melbourne, Dec 2019
- [31] Colloquium, University of Tennessee Knoxville, Dec 2019
- [32] Colloquium, University of Texas Arlington, Dec 2019
- [33] Colloquium, Georgetown University, Washington D.C., November 2019
- [34] MINDS Seminar, Johns Hopkins University, Baltimore, MD, October 2019
- [35] Data Science Colloquium, Colorado State University, Fort Collins, February 2019
- [36] Probability and Statistics Seminar, McMaster University, Hamilton, February 2019
- [37] Data Science Colloquium, Worcester Polytechnic Institute, Worcester, January 2019
- [38] Colloquium, University of British Columbia, Vancouver, January 2019
- [39] Scientific Computing, Applied and Industrial Mathematics Seminar, University of British Columbia, Vancouver, January 2019
- [40] Statistics Seminar, University of Houston, December 2018
- [41] Colloquium, Virginia Tech, November 2018
- [42] Norbert Wiener Center Seminar, University of Maryland, College Park, November 2018
- [43] ISyE Statistics Seminar, Georgia Institute of Technology, November 2018
- [44] Analysis Seminar, George Mason University, November 2018
- [45] Norbert Wiener Center Seminar, University of Maryland, College Park, April 2017
- [46] Colloquium, Ball State University, Muncie, IN, April 2017
- [47] Applied math seminar, Duke University, December 2015

Posters

- [48] Jubilee Poster Session at the conference celebrating John Benedetto's 80th birthday, University of Maryland, College Park, Maryland, September 2019
- [49] Second International Conference on Mathematics of Data Science, Norfolk, Virginia, November 2018
- [50] IMA workshop "Transdisciplinary Foundations of Data Science" , Minneapolis, Minnesota, September 2016
- [51] February Fourier Talk, University of Maryland, College Park, Maryland, February 2016
- [52] AWM workshop at AMS Joint meeting at Seattle, Washington, January 2016
- [53] February Fourier Talk, University of Maryland, College Park, Maryland, February 2015

Invited Research Visits

- [54] Georgia Institute of technology, Host: Professor Tuo Zhao, November 2018
- [55] Vanderbilt University, Host: Professor Akram Aldroubi, November 2016
- [56] Duke University, Host: Professor Mauro Maggioni, May 2016
- [57] Hong Kong University of Science and Technology, Host: Professor Yang Wang, July 2015
- [58] Michigan State University, Host: Professor Yang Wang, July 2014

Invited Research Programs

- [59] ICERM Women in Data Science and Mathematics Research Collaboration Workshop, Providence, RI, July 2017
- [60] PCMI Research program "Mathematics of Data", IAS/Park City Mathematics Institute, Midway, Utah, July 2016

TEACHING EXPERIENCE

Instructor:

- Calculus II, Math 109, Johns Hopkins University, Summer 2019
- Calculus II (**179 Students**), Math 109, Johns Hopkins University, Spring 2019
- Linear Algebra (**165 Students**), Math 201, Johns Hopkins University, Fall 2018
- Honors Linear Algebra, Math 212, Johns Hopkins University, Spring 2018
- Fourier Analysis, Math 443, Johns Hopkins University, Fall 2017

Teaching Assistant:

- Accelerated Single-Variable Calculus II, Vanderbilt University, Spring 2013
- Single-Variable Calculus II, Vanderbilt University, Fall 2013
- Single-Variable Calculus I, Vanderbilt University, Spring 2014
- Single-Variable Calculus I, Vanderbilt University, Fall 2014

Reviewer:

IEEE Transactions on Information Theory; IEEE Transactions on Signal Processing; Acta Applicandae Mathematicae; Applied Mathematical Modeling; Journal of Fourier Analysis and Applications; Pure and Applied Mathematics Quarterly; Circuits, Systems, and Signal Processing; Frontiers in Applied Mathematics and Statistics (**Reviewer Editor**); Sampling theory in signal and image processing; Proceeding of SampTA (Sampling Theory and Applications); Proceeding of SPARS (Signal Processing with Adaptive Sparse Structured Representations); Mathematical Reviews

Organizer:

With Fei Lu, Mauro Maggioni, Xiaofeng Ye and Ming Zhong, Data seminar at Johns Hopkins University

with Keaton Hamm, Minisymposium on "Approximation theory in signal processing", 15th international conference on approximation theory, San Antonio, TX, May 22–25, 2016.

with Weilin Li and Wenjing Liao, Minisymposium on "Harmonic analysis in signal and imaging processing", Siam Annual meeting, Portland, OR, Jul 09–13, 2017.

Membership:

American Mathematical Society

Association for Women in Mathematics

ICERM Women in Data Science Network