

Soledad Villar

Assistant Professor

Applied Mathematics and Statistics
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Education

- 2017 **PhD in Mathematics**, *University of Texas at Austin*, United States
Supervisor: Rachel Ward
Dissertation: Relax, descend and certify: optimization techniques for typically tractable data problems
- 2012 **Master of Science in Mathematics**, *Universidad de la República*, Uruguay
Supervisor: Gonzalo Tornaría
Dissertation: Gross formula on heights and special values of L -series.
- 2010 **Bachelor in Mathematics**, *Universidad de la República*, Uruguay
Supervisor: Gonzalo Tornaría
Project: Pell curves cryptography and generalizations.
- 2010 **Bachelor in Software Engineering**, *Universidad Católica del Uruguay*, Uruguay

Academic positions

- 2020-now **Assistant Professor**, *Department of Applied Mathematics and Statistics. Mathematical Institute for Data Science*, Johns Hopkins University, Baltimore, USA
- 2017-2020 **Moore-Sloan Research Fellow**, *Center for Data Science and Courant Institute of Mathematical Sciences*, New York University, New York City, USA
Mentor: Joan Bruna
- 2017-2020 **Collaboration Scientist**, *Algorithms and Geometry Simons Collaboration*, Simons Foundation, New York City, USA
Mentor: Afonso Bandeira
- Fall 2017 **Research Fellow**, *Bridging Continuous and Discrete Optimization*, Simons Institute, University of California, Berkeley, USA
Mentor: Benjamin Recht

Industry positions

- 2023-now **Part-time visiting researcher**, *Flatiron Institute*, Simons Foundation, New York City, USA
- Summer 2023 **Visiting researcher**, *Apple Research*, Paris, France

Grants and awards

Federal grants

- 2024-2029 **NSF CAREER**, \$593,632 grant for 5-year project. *Symmetries and classical physics in machine learning for science and engineering*
(PI)
- 2022-2025 **NSF Collaborative Research: CIF: Medium.**, \$1.2M grant for 3-year project (\$900,000 to JHU). *Understanding Robustness via Parsimonious Structures*
(PI, co-PIs: Rene Vidal (UPenn), Jeremias Sulam (JHU), Soheil Feizi (UMD))
- 2022-2024 **ONR**, \$394,995 grant for 3-year project. *Geometric methods for optimal matching and feature identification in data sets*
(PI)

- 2020-2025 **NSF-Simons Research Collaborations on the Mathematical and Scientific Foundations of Deep Learning**, 5-year \$10M grant for large collaborative project (16 PIs at Johns Hopkins, Duke, Stanford, Berkeley and UPenn). *Collaborative Research: Transferable, Hierarchical, Expressive, Optimal, Robust, Interpretable NETWORKS (THEORINET)*
(co-PI)
- 2019-2021 **NSF-DMS Computational Mathematics**, \$58k grant for project *Optimization techniques for geometrizing real-world data*
(PI)
- 2018-2020 **European Office of Aerospace Research and Development (EOARD)**, \$50k grant for project *Error quantification and complexity limits in deep learning*
Co-PI with Augustin Cosse (then Postdoc at Ecole Normale Supérieure, France)
- Other funding**
- 2023 **Apple research gift**, \$30,000 gift
- 2022 **Amazon AI2AI Faculty Research Award**, \$80,000 grant for 1-year project. *Green AI: Powerful and Lightweight Machine Learning via Exploiting Symmetries*
- 2021 **JHU Covid Bridge grant**, \$50,000 grant for one year
- Other awards**
- 2024 **Data Science and AI Institute Junior Faculty Award**, Johns Hopkins University
- 2019 **Rising star in Computational and Data Sciences**, University of Texas, Austin, USA
- 2017 **Speaker at UT Commencement Ceremony**, presented remarks representing the graduating class of PhD students at University of Texas at Austin
- 2014 **Frank Gerth III Graduate Excellence Award**, Department of Mathematics, University of Texas at Austin
- 2012-2013 **Fulbright Fellow**

Publications

† Equal contribution. * Student coauthor

Journal publications

- [J12] W. Gregory*, N. Sarwar*, G.A. Kevrekidis*, **S. Villar**[†], B. Dumitrascu[†], *MarkerMap: nonlinear marker selection for single-cell studies*, **npj Systems Biology and Applications** 10 (1):17, 2024
- [J11] **S. Villar**[†], D.W. Hogg[†], W. Yao*, G.A. Kevrekidis*, B. Schölkopf, *Towards fully covariant machine learning*, **Transactions on Machine Learning Research (TMLR)** 2023
- [J10] B. Blum-Smith, **S. Villar**, *Machine learning and invariant theory*, **Notices of the AMS**, 2023
- [J9] **S. Villar**, W. Yao*, D. W. Hogg, B. Blum-Smith, B. Dumitrascu, *Dimensionless machine learning: Imposing exact units equivariance*, **Journal of Machine Learning Research (JMLR)** 24 (109), 1-32, 2023.
- [J8] N. Huang*, D. W. Hogg, **S. Villar**, *Dimensionality reduction, regularization, and generalization in overparameterized regressions*, **SIAM Journal on Mathematics of Data Science (SIMODS)** 4 (1), 126-152, 2022
- [J7] B. Dumitrascu[†], **S. Villar**[†], D. G. Mixon, B. E. Engelhardt, *Optimal marker gene selection for cell type discrimination in single cell analyses*, **Nature Communications** 12 (1): 1-8. 2021
- [J6] D. W. Hogg, **S. Villar**, *Fitting very flexible models: Linear regression with large numbers of parameters*, **Publications of the Astronomical Society of the Pacific**, 133:093001 (18pp), 2021
- [J5] C. Frederick, **S. Villar**, Z. H. Michalopoulou, *Seabed classification using physics-based modeling and machine learning*, **The Journal of the Acoustical Society of America** 148, 859, 2020

- [J4] C. McWhirter*, D. G. Mixon, **S. Villar**,
SqueezeFit: label-aware dimensionality reduction, **IEEE Transactions on Information Theory** 66 (6), 3878-3892, 2019
- [J3] R. Kueng, D. G. Mixon, **S. Villar**,
Fair redistricting is hard, **Theoretical Computer Science** 791, 28-35, 2019
- [J2] D. G. Mixon, **S. Villar**, R. Ward,
Clustering subgaussian mixtures by semidefinite programming, **Information and Inference: A Journal of the IMA**, 6(4):389–415, 2017
- [J1] T. Iguchi, D. G. Mixon, J. Peterson, **S. Villar**,
Probably certifiably correct k-means clustering, **Mathematical Programming**, 165(2):605–642, 2017
[Computer science and machine learning conferences](#)
- [C7] S. Gupta*, J. Robinson*, D. Lim*, **S. Villar**, S. Jegelka,
Structuring Representation Geometry with Rotationally Equivariant Contrastive Learning, **The International Conference on Learning Representations (ICLR)**, 2024
- [C6] N. Huang*, R. Levie, **S. Villar**,
Approximately equivariant graph networks, **Advances in Neural Information Processing Systems (NeurIPS) 2023**
- [C5] J Böker*, R Levie, N Huang*, **S Villar**, C Morris,
Fine-grained Expressivity of Graph Neural Networks, **Advances in Neural Information Processing Systems (NeurIPS) 2023**
- [C4] **S. Villar**, D. W. Hogg, K. Storey-Fisher*, W. Yao*, B. Blum-Smith,
Scalars are universal: Equivariant machine learning, structured like classical physics, **Advances in Neural Information Processing Systems (NeurIPS) 34**, 28848-28863, 2021
- [C3] Z. Chen*, L. Chen*, **S. Villar**, J. Bruna,
Can graph neural networks count substructures?, **Advances in Neural Information Processing Systems (NeurIPS)**, 10383–10395, vol 33. 2020
- [C2] Z. Chen*, **S. Villar**, L. Chen*, J. Bruna,
On the equivalence between graph isomorphism testing and function approximation with GNNs, **Advances in Neural Information Processing Systems (NeurIPS)**, 15894-15902, 2019
- [C1] P. Awasthi, A. S. Bandeira, M. Charikar, R. Krishnaswamy, **S. Villar**, R. Ward,
Relax, no need to round: Integrality of clustering formulations, **In Proceedings of the 2015 Conference on Innovations in Theoretical Computer Science**, pages 191–200. ACM, 2015
[Conference proceedings and workshops \(peer-reviewed\)](#)
- [W10] L. Ruiz, N. Huang*, **S. Villar**,
Graph Neural Networks for Community Detection on Sparse Graphs, **IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)**, 2024
- [W9] N. Huang*, **S. Villar**, C.E. Priebe, D. Zheng, C. Huang, L. Yang, V. Braverman,
From local to global: Spectral-inspired graph neural networks., **NeurIPS 2022 Workshop: New Frontiers in Graph Learning**. 2022
- [W8] N. Chen*, **S. Villar**,
SE(3)-equivariant self-attention via invariant features., **NeurIPS workshop Machine learning for the Physical Sciences**, 2022
- [W7] W. Yao*, K. Storey-Fisher*, W. Hogg, **S. Villar** ,
A simple equivariant machine learning method for dynamics based on scalars, **NeurIPS workshop Machine learning for the Physical Sciences**, 2021
- [W6] N. Huang*, **S. Villar**,
A short tutorial on the Weisfeiler-Lehman test and its variants, **IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)**, 2021, pp. 8533-8537
- [W5] E. Onaran*, **S. Villar**,
Efficient belief propagation for graph matching, **IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)** 9060-9064, 2020

- [W4] W. Yao*, A. S. Bandeira, **S. Villar**,
Experimental performance of graph neural networks on random instances of max-cut, **International Society for Optics and Photonics (SPIE)**, Wavelets and Sparsity XVIII, vol. 11138, p. 111380S. 2019
- [W3] A. Nowak*[†], **S. Villar**[†], A. S. Bandeira, J. Bruna,
Revised note on learning algorithms for quadratic assignment with graph neural networks, **IEEE Data Science Workshop, DSW 2018**, Lausanne, Switzerland, : 229-233, 2018
- [W2] E. Onaran, **S. Villar**,
Projected power iteration for network alignment, **International Society for Optics and Photonics (SPIE)**, Wavelets and Sparsity XVII, volume 10394, pages 103941C. 2017
- [W1] T. Carson, D. Mixon, **S. Villar** and R. Ward,
Manifold optimization for k-means clustering, **International Conference on Sampling Theory and Applications (SampTA)**, pages 73–77. IEEE, 2017
- [Book chapters \(peer-reviewed\)](#)
- [B1] D. G Mixon, T. Needham, C. Shonkwiler, **S. Villar**,
Three proofs of the Benedetto-Fickus theorem, **Sampling, Approximation, and Signal Analysis: Harmonic Analysis in the Spirit of J. Rowland Higgins**, Springer International Publishing, pages 371-391, 2024
- [Other \(peer-reviewed\)](#)
- [O1] D. Campos, M. Rivera, M. A. Salazar, J. A. Samper, J. Simental, **S. Villar**,
Cibercoloquio latinoamericano de matemáticas, **Notices of the American Mathematical Society**, 68(5):793-797, 2021

Student mentees and group members

- 2022-now **Ben-Blum Smith**, *Postdoctoral Fellow*
- 2023-now **Josué Tonelli-Cueto**, *Postdoctoral Fellow*
- 2023-now **Kaiying Xie**, *Postdoctoral Fellow*
- 2020-now **Teresa Huang**, *Fourth year PhD student*, (co-advised with Carey Priebe)
- 2022-now **George Kevrekidis**, *Third year PhD student*, (co-advised with Mauro Maggioni)
- 2022-now **Wilson Gregory**, *Third year PhD student*
- 2023-now **Daniel López-Castaño**, *Third year PhD student*, (co-advised with Mateo Diaz)
- 2023-now **Yuxin Ma**, *First year PhD student*
- 2022-2023 **Evan Mata**, *Former master student*, (Currently at NSA)

Professional service

Educational activities, conferences and seminar organization

- Fall 2024 **Distinguished women in math and engineering**, *Activity co-organized with the student chapter of the Asociation of Women in Math at Johns Hopkins, funded by NSF CAREER.*
- Aug 2023 **SLMath (former MSRI at Berkeley)**, *Algorithms, Fairness, and Equity workshop*, Co-organizer, <https://www.slmath.org/workshops/1051>
- Carl-Zeiss-Stiftung Summer School**, *Scientific machine learning summer school in Heidelberg, Germany*, Co-organizer, <https://astroai-lab.de/conferences/czs-school-2023/>
- Jun 2023 **FoCM, Paris, France**, *Workshop Foundations of Data Science and Machine Learning*, Co-organizer, <https://focm2023.org/workshops/workshop-2/item/125-workshop-2-4>
- Mar 2023 **Khipu, Montevideo, Uruguay**, *Latin American Meeting In Artificial Intelligence*, Co-organizer, <https://khipu.ai/>
- 2023 **LOG**, *Learning on graphs conference*, Program chair, <https://https://logconference.org/>
- 2022 **AMS Mathematics Research Communities (MRC)**, *Program: Data Science at the crossroads of analysis, geometry, and topology*, Co-organizer
- 2022 **Whiting Internships in Science & Engineering (WISE) Program**, *Hosted a student from a Baltimore Public School to work on a computational redistricting problem (using MCMC techniques to assess whether the 2022 Maryland Congressional map is gerrymandered)*

Dec 2021 **Out of distribution generalization Workshop at NeurIPS 2021**, *Co-organizer*

May 2021 **Geometrical and Topological Representation Learning Workshop at ICLR 2021**, *Co-organizer*, <https://gt-rl.github.io/>

Mar 2021 **AMS Spring Southeastern Sectional Meeting**, *Co-organizer of session: Graphs in Data Science*

2021-2022 **One world MINDS seminar**, *Co-organizer*, <https://sites.google.com/view/minds-seminar/>

2021-now **Mathematics and Democracy Institute at Wellesley College**, *Affiliated scholar*, <https://mathematics-democracy-institute.org/>

2020-now **DeepMath Conference**, *Co-organizer*, <https://deepmath-conference.com/>

2020-now **Cibercoloquio Latinoamericano de Matemáticas**, *Co-organizer of a weekly virtual math colloquium in Spanish directed to the global Spanish-speaking mathematical community*, <http://www.cibercoloquio.com/>

2020 **Mathematical and Scientific Machine Learning (MSML)**, *Program chair*, <https://msml21.github.io/>

Mar 2020 **Centre International de Rencontres Mathématiques**, *Co-organizer of program: Optimization for Machine Learning*, Luminy, France

Jan 2019 **Joint Math Meetings**, *Co-organizer of session: Low Complexity Models in Data Analysis and Machine Learning*, Baltimore, USA

[JHU service](#)

2024 **Panelist at Johns Hopkins Women in Data Science and AI**

2023-now **Diversity, Equity, and Inclusion Committee for the Data Science and AI Institute**

2023-2024 **Data Science and AI Institute Director search committee**

2023-2024 **AMS open-rank faculty search committee member and diversity advocate**

2023 **Association of Women in Mathematics**, *Faculty sponsor of the student chapter*

2023 **Panelist at WSE event for Underrepresented Students**

2022-now **AI2AI Amazon-JHU initiative**, *Advisory board member*

2022 **MINDS director search committee member**

2022 **AMS PhD student admission committee**

May 2022 **Lead a workshop on getting NSF funding directed to AMS postdocs**

2022 **AMS faculty search committee member**

2021-now **Mentor of 25 students between AMS undergraduates, MSE and data science**

2021-2022 **MINDS/CIS Seminar organizer**

2021-2022 **AMS Department Seminar organizer**

2021 **MINDS faculty search committee member and diversity advocate**

Jan 2021 **TRIPODS Winter School & Workshop on Graph Learning and Deep Learning**, *Co-organizer*

Oct 2020 **MINDS IDES Symposium**, *Co-organizer*

Sep 2020 **JHU Fulbright panel member**

[Reviewer](#)

- ARO grant proposals.
- DOE grant proposals.
- NSF CISE panels (2022, 2024).
- NSF DMS panels (2020, 2021 and 2022).
- SIAM Journal on Mathematics of Data Science (SIMODS).
- SIAM Journal on Optimization (SIOPT).
- SIAM Journal on Applied Algebra and Geometry (SIAGA).
- SIAM Journal on Scientific Computing (SISC).
- IEEE Transactions on Information Theory.
- IEEE Transactions on Signal Processing.
- Statistics and Public Policy Journal.
- Computational Learning Theory Conference (COLT).
- Information Theory Workshop (ITW).

- ACM Symposium on the Theory of Computing (STOC).
- Conference on Neural Information Processing Systems (NeurIPS).
- International Conference on Machine Learning (ICML).
- Journal on Machine Learning research (JLMR).

Teaching

Instructor

- 2020-now **Johns Hopkins University**
- Introduction to data science
 - Optimal transport
 - Real analysis
 - Equivariant machine learning
 - Topics on trustworthy machine learning
 - Non-linear optimization II
 - Introduction to convexity
- 2019 **NYU Center for Data Science**
- Inference and representation
- 2012 **Universidad de la República, Engineering School, Uruguay**
- Calculus I
- 2011 **Universidad de la Católica del Uruguay, Electrical Engineering, Uruguay**
- Linear Algebra and Discrete Mathematics

Teaching assistant

- 2012-2017 **University of Texas at Austin, Department of Mathematics**
- Differential equations and linear algebra.
 - From numbers to chaos.
 - Introduction to mathematics.
 - Calculus of complex variables.
 - Integral calculus.
 - Differential calculus.
 - Differential equations and linear algebra.
- 2008-2012 **Universidad de la República, Department of Mathematics, Uruguay**
- Mathematics for life sciences.
 - Linear algebra for Mathematics majors.
 - Introduction to programming in Haskell.
 - Introduction to programming in Python.
 - General topology.

Selected talks and presentations

- Apr 2024 **Machine Learning seminar speaker at the Flatiron Institute, NYC, USA**
- Mar 2024 **MIT IAIFI colloquium speaker, MIT, Boston, USA**
Speaker at Foundations of Neurosymbolic Computing School, Santiago, Chile
- Feb 2024 **Plenary speaker at XXIV Simposio Internacional de Métodos Matemáticos Aplicados a las Ciencias, Liberia, Costa Rica**
- Dec 2023 **Plenary speaker at Escuela de Verano en Inteligencia Computacional, Santiago, Chile**
- Nov 2023 **Colloquium at University of Pennsylvania, Philadelphia, USA**
Plenary speaker at CCA workshop Debating the Potential of Machine Learning in Astronomical Surveys, Flatiron Institute, NYC, USA
Math and Data seminar speaker, New York University, NYC, USA
- Oct 2023 **Colloquium at Princeton Applied Mathematics, Princeton, USA**

- Talk at FFT conference at University of Maryland, College Park, USA
 Google/Yale workshop on foundational models, New Haven, USA
 Mathematical Information Science Workshop organized by Huawei Technologies France, Paris, France
- Sep 2023 **SEA-CROGS MMICCs center on next generation machine learning architectures**, PNNL, virtual talk
- Aug 2023 **Speaker at Minisymposium on Geometric methods in machine learning and data analysis**, ICIAM 2023, Tokyo, Japan
Statistical Physics & Machine Learning back together again, Cargese, France
- Jul 2023 **Youth in high dimensions**, *The Abdus Salam International Centre for Theoretical Physics*, Trieste, Italy
Plenary speaker at SampTA, Yale, New Haven, USA
Plenary speaker at CLAPEM, Sao Paulo, Brazil
- Jun 2023 **Invited talk at Max Planck Institute for Intelligent Systems**, Tübingen, Germany
- May 2023 **Chalmers AI4Science seminar series**, virtual talk, Sweden
- Apr 2023 **Scientific Machine Learning (SciML) workshop at the Oden Institute**, Austin, USA
- Feb 2023 **Data-driven physical simulation webinar at Lawrence Livermore National Laboratory**, virtual talk, Livermore, USA
Harvard Probabilitas Seminar Series, Cambridge, USA
- Jan 2023 **Plenary speaker at LACIAM**, Rio de Janeiro, Brazil
- Dec 2022 **Keynote talk at Learning on Graphs Conference**, virtual talk
Keynote talk at LatinX in AI workshop at NeurIPS, virtual talk
IMA Seminar at University of Minnesota, MN, USA
NYU Center for Data Science Math and Data Seminar, NY, USA
- Nov 2022 **Seminar at Imperial College**, virtual talk, London, UK
MATH + X Symposium on Matter under Extreme Conditions in Solar System Giant Planets and Exoplanets, Inverse Problems and Deep Learning, Las Catalinas, Costa Rica
Colóquio de Matemática Aplicada (IM - UFRJ), virtual talk, Rio de Janeiro, Brazil
- Oct 2022 **Mathematical Advances for Multi-Dimensional Microscopy**, virtual talk, IPAM, UCLA, USA
MGGG Redistricting seminar at Tufts, virtual talk, Tufts, USA
- Sep 2022 **Mathematical and Scientific Foundations of Deep Learning Annual Meeting**, virtual talk, Simons Foundation, NY, USA
Dagstuhl Workshop: Machine Learning for Science: Bridging Data-Driven and Mechanistic Modeling, Warden, Germany
Center for Mathematics and Artificial Intelligence Colloquium at George Mason University, Fairfax, VA, USA
- Jul 2022 **Keynote talk at ICML Workshop: Topology, Algebra, and Geometry in Machine Learning**, Baltimore, USA
Keynote talk at ICML Workshop: Machine Learning for Astrophysics, Baltimore, USA
BIRS workshop, Deep Exploration of non-Euclidean Data with Geometric and Topological Representation Learning, Kelowna, Canada
LatinX in the Mathematical Sciences, IPAM workshop, University of California Los Angeles, USA
- June 2022 **Institut de recherche en mathématique et physique seminar**, UCLouvain, Belgium
Friedrich-Alexander-Universität Erlangen-Nürnberg, virtual research talk
Lecturer at Summer School in Machine Learning Theory, Princeton University, USA
Prospects and Challenges of Machine Learning for the Physical Sciences Conference, Flatiron Institute, New York, USA
- May 2022 **Data Science, Approximation Theory, and Harmonic Analysis workshop**, Fields Institute, Toronto, Canada

- Apr 2022 **Fast Faraway Talks (University of Maryland, College Park)**, virtual research seminar
CRM Applied Math Seminar, Montreal, Canada
Mathematics in Imaging, Data and Optimization at Rensselaer Polytechnic Institute, virtual research seminar
Panel moderator at ICLR Workshop on Geometric and Topological Representation Learning, virtual panelist
- Mar 2022 **University of Chicago IMSI Workshop: The Mathematics of Soft Matter**, virtual research talk
AMS Spring Sectional at Tufts, virtual research talk
Data-oriented Mathematical & Statistical Sciences Seminar at Arizona State University, virtual research talk
Codex Seminar, virtual research talk
Statistics Seminar at George Mason University, Fairfax, VA, USA
AI + Math Colloquia at Institute of Natural Sciences, Shanghai Jiao Tong University, virtual research seminar
- Dec 2021 **Simons Institute Optimization Under Symmetry Workshop**, virtual research talk
Oberwolfach workshop: Applied Harmonic Analysis and Data Science, virtual research talk
Lisbon webinar Mathematics, Physics and Machine Learning, virtual research talk
Mathematical Foundations of Machine Learning at the 2021 Canadian Mathematical Society Winter Meeting, virtual research talk
- Oct 2021 **Princeton Day of Statistics**, Princeton, USA
BIRS-CMO Workshop: Geometry & Learning from Data, virtual research talk
The Ohio State Mathematics Colloquium, Columbus, USA
- Sep 2021 **University of Florida data science seminar**, virtual research talk
University of Houston Data-Enabled Science Seminar, virtual research talk
- Jun 2021 **Fields Institute workshop: Low-Rank Models and Applications**, virtual research talk
ICTP workshop: Youth in high dimensions, virtual research talk
- May 2021 **ICLR 2021 LatinX in AI workshop**, Invited keynote speaker
- Mar 2021 **University of Maryland College Park Statistics Seminar**, virtual seminar
- Feb 2021 **UCLA Statistics Seminar**, virtual seminar
- Jan 2021 **UCLA Applied Mathematics Seminar**, virtual seminar
- Dec 2020 **NeurIPS Women in Machine learning mentoring session**, participant in virtual panel
CERN String data workshop, virtual research talk
ASA Acoustics Virtually Everywhere, virtual research talk
- Nov 2020 **RWTH Aachen University**, virtual seminar
Duke Probability Seminar, virtual seminar
INFORMS 2020 annual meeting, virtual research talk
- Oct 2020 **C3.ai DTI Workshop on The Analytical Foundations of Deep Learning**, virtual research talk
- Aug 2020 **One World ML**, virtual research talk
- Apr 2020 **ICERM Workshop on Computational Statistics and Data-Driven Models**, virtual research talk
- Jan 2020 **Joint Math Meetings**, Denver, USA
- Dec 2019 **Machine Learning Tools for Research in Astronomy**, Ringberg, Germany
- Nov 2019 **Using Physical Insights for Machine Learning**, University of California, Los Angeles, USA
- Oct 2019 **Computational Harmonic Analysis and Data Science**, Oaxaca, Mexico
- Aug 2019 **Microsoft Research AI Institute workshop Geometry of Deep Learning**, Redmond, USA
- May 2019 **Oberwolfach workshop Statistical and computational aspects of learning with complex structure**, Oberwolfach, Germany
TU Berlin Theoretical Computer Science seminar, Berlin, Germany
- Apr 2019 **Rising stars in Computational and Data Sciences**, University of Texas, Austin, USA

- Mar 2019 **Halicioğlu Data Science Institute Seminar**, University of California, San Diego, USA
Data Institute SF Annual Conference, University of San Francisco, San Francisco, USA
Mathematical Institute for Data Science Seminar, Johns Hopkins University, Baltimore, USA
- Jan 2019 **NJIT Applied Mathematics and Statistics Seminar**, New Jersey Institute of Technology, Newark, USA
Joint Math Meetings, *Session organizer: Low Complexity Models in Data Analysis and Machine Learning*, Baltimore, USA
Math + X Symposium on inverse problems and deep learning in space exploration, Rice University, Houston, USA
- Nov 2018 **Sublinear Algorithms and Nearest-Neighbor Search**, Simons Institute for the Theory of Computing, Berkeley, USA
- Oct 2018 **Young Researchers Workshop: Kinetic descriptions in theory and applications**, University of Maryland, College Park, USA
Quantitative Redistricting, Duke University, Durham, USA
- Sep 2018 **NJIT Mechanical Engineering Colloquium**, New Jersey Institute of Technology, Newark, USA
- Aug 2018 **Statistical physics and machine learning back together**, Cargese, France
- Apr 2018 **SILO Seminar**, University of Wisconsin, Madison, USA
Norbert Wiener Center Seminar, University of Maryland, College Park, USA
DIMACS Theory Seminar, Rutgers University, New Brunswick, USA
Télécom ParisTech, Paris, France
INRIA, Paris, France
- Mar 2018 **Oberwolfach workshop Applied Harmonic Analysis and Data Processing**, Oberwolfach, Germany
NYU Mathematics Colloquium, New York University, USA
- Feb 2018 **Center for Data Science lunch seminar**, New York University, USA
- Jan 2018 **Microsoft Research**, Redmond, Washington, USA
- Dec 2017 **Uruguayan Colloquium of Mathematics**, Universidad de la República, Uruguay
Young Researchers Workshop: new trends in Computational and Applied Mathematics, Peking University, Beijing, China
Minisymposium on Spectral Graph Theory and Optimization, University of California, Berkeley, USA
- Nov 2017 **Mathematical Data Science Seminar**, Department of Mathematics, University of Tennessee, Knoxville, USA
- Sep 2017 **Topology, Geometry and Data Seminar**, Department of Mathematics, Ohio State University, Columbus, Ohio, USA
Machine Learning Lunch Seminar, Electrical and Computer Engineering Department, Ohio State University, Columbus, Ohio, USA
IMA Data Science Seminar, Institute of Mathematics and its Applications, University of Minnesota Twin Cities, Minneapolis, USA
- Ago 2017 **SPIE Wavelets and Sparsity**, San Diego, USA
- Jul 2017 **Foundation of Computational Mathematics**, Barcelona, Spain
Approximation Theory and Function Spaces Workshop, Centre de Recerca Matemàtica, Barcelona, Spain
- Oct 2016 **Applied Harmonic Analysis, Massive Data Sets, Machine Learning, and Signal Processing**, Oaxaca, Mexico
- Sep 2016 **Information Theory Workshop**, Cambridge University, UK
- May 2016 **SIAM Imaging**, Albuquerque, New Mexico, USA
- Apr 2016 **MIT Applied Mathematics Seminar**, MIT, Cambridge, USA
- Mar 2015 **AMS Sectional Meeting**, Michigan State University, East Lansing, USA
- Sep 2014 **IDeAS seminar**, Princeton University, Princeton, USA