

# JEREMIAS SULAM

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## EDUCATION

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<b>Ph.D., Computer Science</b> Technion – Israel Institute of Technology Thesis: From Local to Global Sparse Modeling, Advisor: Michael Elad	March 2018
<b>Biomedical Engineering</b> (summa cum laude) Universidad Nacional de Entre Ríos, Argentina	March 2013

## WORK EXPERIENCE

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<b>Assistant Professor and William R. Brody Faculty Scholar</b> <b>Johns Hopkins University</b> Biomedical Engineering Department (primary), Computer Science Department (secondary, since 2020) Applied Math and Statistics (secondary, since 2022) <b>Institutes Affiliations:</b> Mathematical Institute for Data Science (MINDS), Center for Imaging Science (CIS), KAVLI Neuroscience Discovery Institute, Data Science and AI Institute (DSAI)	10-2018 – present
<b>IBM Research Labs</b> Research Intern, Medical Imaging Analytics Group, Haifa, Israel Deep learning for breast cancer classification, Digital Mammography Dream Challenge Organizer.	Summer 2016

## AWARDS & HONORS

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<b>William R. Brody Faculty Scholar</b> Johns Hopkins University	2025
<b>Catalyst Award Winner</b> Johns Hopkins University	2024
<b>National Science Foundation's Early CAREER Award</b> Interpretable and Robust Machine Learning Models: Analysis and Algorithms (NSF CISE)	2023
<b>Karen Toffler Charitable Trust</b> Toffler Scholar	2022
<b>WSE Teaching and Mentoring Awards</b> Finalist Johns Hopkins University	2022
<b>Best Paper Award</b> ICML Workshop on Interpretable Machine Learning in Healthcare, 2021.	2021
<b>Best Student Poster Award</b> Signal Processing Meets Deep Learning IEEE Summer School on Signal Processing, Italy	2017
<b>Best Graduates of Argentine Universities</b> Argentinean National Academy of Engineering.	2013
<b>Student Paper Award</b> XX Jornadas de Jovens Pesquisadores AUGM. Curitiba, Brasil.	2012

## GRANTS AND RESEARCH SUPPORT

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My group has received more than **\$4,400,000**, and I have contributed to over \$17.9M in collaborative projects, since joining Hopkins in 2018.

### CURRENT .....

**NSF Mathematical Foundatoins of AI (DMS) (coPI) \$1,000,000** (share 30%) 08/2023 – 07/2028  
title: MFAI: Any-Dimensional Equivariant Learning

**NSF CAREER (PI) \$572,922** (share 100%) 07/2023 – 06/2028  
title: Interpretable and Robust Machine Learning Models: Analysis and Algorithms

**NIH RO1 SCH (PI) \$888,750** (share: 81%) 07/2023 – 06/2026  
title: Quantifying and Mitigating Demographic Biases of Machine Learning in Real World Radiology

**NSF Collaborative Research: (MPI) \$399,994** (share: 100%) 07/2023 – 06/2026  
title: CIF: Medium: Principles for Optimization, Robustness and Generalization via Deep Neural Collapse

**Chan Zuckerberg Initiative (MPI) \$100,000** (share: 100%) 01/2024 – 06/2025  
title: Collaborative Pairs Pilot Project: Brain-wide maps of myelin patterns in plasticity and repair

**Catalyst Award, Johns Hopkins (PI) \$75,000** (share: 100%) 07/2024 – 06/2025  
title: Understanding Large Language Models, one hypothesis at a time

**Discovery Award, Johns Hopkins (PI) \$100,000** (share: 25%) 07/2024 – 06/2025  
title: Data Valuation in Distributed and Private Large-Scale Radiology

**NSF Collaborative Research (co-PI) \$900,000** (share: 33.3%) 07/2023 – 06/2026  
title CIF: Medium: Understanding Robustness via Parsimonious Structures

**NIH P41 Collaborative Research (co-PI) \$939,770** (share: 24%) 07/2021 – 04/2026  
title: MRI Resource for Physiologic, Metabolic and Anatomic Biomarkers

**NIH R21 (co-PI) \$669,997** (share: 17%) 07/2022 – 06/2025  
title: General Linear Modeling For Magnetic Resonance Spectroscopy

**NIH R01 (co-PI) \$574,322** (share: 19%) 08/2024 – 04/2028  
title: Model Selection for Magnetic Resonance Spectroscopy

### PAST .....

**NSF Collaborative Research (PI) \$281,251** (share: 100%) 07/2020 – 06/2023  
title: CIS: Small: Deep Sparse Models: Analysis and Algorithms

**DARPA GARD (co-PI) \$1,002,497** (share: 8%) 01/2020 – 08/2022  
title: Understanding and Improving Robust Learning Against Adversarial Attacks

**NIH R01 (senior personnel) \$3,550,431** (share: 2%) 09/2019 – 08/2022  
title: Accessible technologies for high-throughput, whole-brain reconstruction of molecularly characterized mammalian neurons

**NIH R01(co-PI) \$2,013,158** (share: 3%) 01/2021 – 12/2022  
title: Nonlinear performance analysis and prediction for robust low dose lung CT

**The Lung Ambition Alliance (PI) \$50,000** (share: 100%) 01/2021 – 12/2021  
title: Modeling and Synthesis of COVID-19 Positive Chest Radiographs & Computed Tomography Scans in Lung Cancer Patients via Deep Learning Generative Models

**NSF TRIPODS (co-PI) \$1,500,000** (share: 3%) 10/2019 – 09/2022  
title: Institute for the Foundations of Graph and Deep Learning

**Malone Center Seed Grant (co-PI) \$50,000** (share: 100%) 07/2021 – 06/2022  
title: Evaluating and Solving Performance Biases Against Underrepresented Populations in Deep Learning-Based Diagnosis of Disease on Chest Radiographs

**Karen Toffler Charitable Trust (PI) \$30,000** (share: 100%) 04/2022 - 03/2023  
title: Data-driven methods for susceptibility tensor imaging in vivo

<b>CISCO Tech for Health Grant (PI) \$103,725</b> (share: 100%)	06/2021 – 08/2022
title: Weakly supervised learning for biomarkers discovery in medical imaging	
<b>Johns Hopkins Discovery Award (co-PI) \$100,000</b> (share: 25%)	06/2021 – 06/2022
title: Evaluating and Overcoming Performance Biases Against Underrepresented Populations in Deep Learning for Diagnosis of Disease on Medical Images	
<b>Canon Medical Systems (co-PI) \$368,000</b> (share: 50%)	01/2022 – 12/2023
title: Advanced CT Denoising Neural Networks: Task, Control, and Certainty	
<b>PENDING</b> .....	
<b>NIH R21 (MPI) \$450,313</b>	04/2025 – 03/2027
Identification of imaging biomarkers using data on multiplexed digital pathology to predict clinical outcomes in triple-negative breast cancer. <b>Share: 5%.</b>	
<b>CZI Acceleration Award (MPI) \$1,600,000</b>	12-2025 – 11-2029
Brain-wide mapping of myelin patterning in plasticity and repair. <b>Share: 40%.</b>	
<b>NIH P41 Collaborative Research (co-PI) \$939,770</b> <i>Planned renewal.</i>	07/2026 – 04/2031
MRI Resource for Physiologic, Metabolic and Anatomic Biomarkers. <b>Share: 24%.</b>	
<b>ARPA-H (co-PI) \$939,770</b>	09/2025 – 08/2030
DITTO: DIgiTal Twin Optimized Scaffolds for Regenerating Facial Bones. <b>Share: 6.3%.</b>	

## PUBLICATIONS

Citations > 2,900. h-index: 27. i10-index: 44  
[Advised or co-advised students colored.](#)

[Google Scholar Profile](#)

### Submitted and Working papers

- [J. Teneggi](#), Z. Wang, P.H. Yi, T. Shu, **J. Sulam**, “Aligning Explanations with Human Communication”, *submitted*.
- [Z. Fang](#), S. Buchanan, M. Diaz Diaz, **J. Sulam** “Beyond Scores: Proximal Diffusion Models”, *submitted*.
- [R. Muthukumar](#), **J. Sulam**, “Generalization through local stability analysis”, *under preparation*.
- [J. Teneggi](#), N. Varela-Long, P. H. Yi, **J. Sulam** “Testing for explanations in medical imaging: a flexible betting framework”, *under preparation*.

### Journal Papers

- [J-40] [Z. Wang](#), C.A. Santa-Maria, A.S. Popel, **J. Sulam**. “Bi-level Graph Learning Unveils Prognosis-Relevant Tumor Microenvironment Patterns from Breast Multiplexed Digital Pathology”, *PATTERNS (CELL PRESS) – (COVER FEATURE)*, 2025.
- [J-39] P.H. Yi, P. Bachina, [B. Bharti](#), S.P. Garin, A. Kanhere, P. Kulkarni, D. Li, V.S. Parekh, S.M. Santomartino, L. Moy, **J. Sulam**. “Pitfalls and Best Practices in Evaluation of AI Algorithmic Biases in Radiology”, *RADIOLOGY*, Vol. 315 No. 2, 2025.
- [J-38] M. Tivnan, [J. Teneggi](#), T.C. Lee, R. Zhang, K. Boedeker, L. Cai, G.J. Gang, **J. Sulam**, J.W. Stayman. “Fourier diffusion models: A method to control mtf and nps in score-based stochastic image generation”, *IEEE TRANSACTIONS ON MEDICAL IMAGING*, 2025.
- [J-37] [A. Pal](#), R. Vidal, **J. Sulam**. “Certified Robustness against Sparse Adversarial Perturbations via Data Localization”, *TRANSACTIONS OF MACHINE LEARNING RESEARCH*, 2024.
- [J-36] N. Goldenstein, **J. Sulam**, Y Romano. “Pivotal Auto-Encoder via Self-Normalizing ReLUN”, *IEEE TRANSACTIONS ON SIGNAL PROCESSING*, 2024.
- [J-35] H.J. Zöllner, C. Davies-Jenkins, D. Simicic, A. Tal, **J. Sulam**, G. Oeltzschner. “Simultaneous multi-transient linear-combination modeling of MRS data improves uncertainty estimation”, *MAGNETIC RESONANCE IN MEDICINE*, 2024.

- [J-34] K. Venkatesh, S. Mutasa, F. Moore, **J. Sulam**, P.H. Yi. “Gradient-based saliency maps are not trustworthy visual explanations of automated AI musculoskeletal diagnoses”, *JOURNAL OF IMAGING INFORMATICS IN MEDICINE*, 2024.
- [J-33] C.L. LiBrizzi, **Z. Wang**, **J. Sulam**, A.W. James, A.S. Levin, C.D. Morris. “The use of weakly supervised machine learning for necrosis assessment in patients with osteosarcoma: A pilot study”, *JOURNAL OF ORTHOPAEDIC RESEARCH*, 2024.
- [J-32] **J. Teneggi**, **B. Bharti**, Y. Romano, **J. Sulam**. “SHAP-XRT: The Shapley Value Meets Conditional Independence Testing”, *TRANSACTIONS OF MACHINE LEARNING RESEARCH (TMLR)*, 2023.
- [J-31] **J. Teneggi**, P. H. Yi, **J. Sulam**. “Examination-level Supervision for Deep Learning-based Intracranial Hemorrhage Detection at Head CT”, *RADIOLOGY: ARTIFICIAL INTELLIGENCE – (COVER FEATURE)*, 2023.
- [J-30] **R. Muthukumar**, **J. Sulam**. “Adversarial robustness of sparse local Lipschitz predictors”, *SIAM JOURNAL ON MATHEMATICS OF DATA SCIENCE*, 5.4: 920-948, 2023.
- [J-29] X. Jiang, T. Borkum, S. Shprits, **J. Boen**, S. Arshavsky-Graham, B. Rofman, M. Strauss, R. Colodner, **J. Sulam**, S. Halachmi, H. Leonard, E. Segal. “Accurate Prediction of Antimicrobial Susceptibility for Point-of-Care Testing of Urine in Less than 90 Minutes via iPRISM Cassettes”, *ADVANCED SCIENCE*, 2023.
- [J-28] P. van Gelderen, X. Li, J.A. de Zwart, E.S. Beck, S.V. Okar, Y. Huang, K. Lai, **J. Sulam**, P.C. van Zijl, D.S. Reich, J.H. Duyn. “Effect of motion, cortical orientation and spatial resolution on quantitative imaging of cortical R2\* and magnetic susceptibility at 0.3 mm in-plane resolution at 7 T”, *NEUROIMAGE*, 270:119992, 2023.
- [J-27] **Z. Fang**, **K.W. Lai**, P. van Zijl, X. Li, **J. Sulam**. “DeepSTI: Towards Tensor Reconstruction using Fewer Orientations in Susceptibility Tensor Imaging”, *MEDICAL IMAGE ANALYSIS*, 87:102829, 2023.
- [J-26] **Y.K.T. Xu**, A.R. Graves, . . . , R.L. Haganir, D.E. Bergles, A.S. Charles, **J. Sulam**. “Cross-modality supervised image restoration enables nanoscale tracking of synaptic plasticity in living mice”, *NATURE METHODS*, 2023: 1-10, 2023.
- [J-25] S. Garin, V.S. Parekh, **J. Sulam**, P.H. Yi. “Medical imaging data science competitions should report dataset demographics and evaluate for bias”, *NATURE MEDICINE*, 2023: 1-2, 2023.
- [J-24] **A. Pal** and **J. Sulam**. “Understanding Noise-Augmented Training for Randomized Smoothing”, *TRANSACTIONS ON MACHINE LEARNING RESEARCH*, 2023.
- [J-23] D. Li, **B. Bharti**, J. Wei, **J. Sulam**, P.H. Yi. “Sex imbalance produces biased deep learning models for knee osteoarthritis detection”, *CANADIAN ASSOCIATION OF RADIOLOGISTS JOURNAL*, 74.1: 219-221, 2023.
- [J-22] **Z. Wang**, C. Saoud, S. Wangsiricharoen, A.W. James, A.S. Popel, **J. Sulam**. “Label Cleaning Multiple Instance Learning: Refining Coarse Annotations on Single Whole-Slide Images”, *IEEE TRANSACTIONS ON MEDICAL IMAGING*, 2022.
- [J-21] K. Venkatesh, S.M. Santomartino, **J. Sulam**, P.H. Yi. “Code and Data Sharing Practices in the Radiology AI Literature: A Meta-Research Study”, *RADIOLOGY: ARTIFICIAL INTELLIGENCE*, 2022.
- [J-20] **J. Teneggi**, A. Luster, **J. Sulam**. “Fast Hierarchical Games for Image Explanations”, *IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE*, 2022.
- [J-19] Z. Murphy, K. Venkatesh, **J. Sulam**, P.H. Yi. “Visual Transformers And Convolutional Neural Networks For Disease Classification In Radiographs: A Comparison of Performance, Sample Efficiency, and Hidden Stratification”, *RADIOLOGY: ARTIFICIAL INTELLIGENCE*, 4.6: e220012, 2022.
- [J-18] **J. Sulam**, C. You, Z. Zhu. “Recovery and generalization in over-realized dictionary learning”, *JOURNAL OF MACHINE LEARNING RESEARCH*, 23(135): 1-23, 2022.
- [J-17] D. Li, C.T. Lin, **J. Sulam**, P.H. Yi. “Deep learning prediction of sex on chest radiographs: a potential contributor to biased algorithms”, *EMERGENCY RADIOLOGY*, 29(2): 365-370, 2022.
- [J-16] J.A. Ruffolo, **J. Sulam**, J.J. Gray. “Antibody structure prediction using interpretable deep learning”, *PATTERNS*, 3.2: 100406, 2022.
- [J-15] **Y.K.T. Xu**, C.L. Call, **J. Sulam**, D.E. Bergles. “Automated in vivo tracking of cortical oligodendrocytes”, *FRONTIERS IN CELLULAR NEUROSCIENCE*, 2021.

- [J-14] G. Franca, **J. Sulam**, D.P. Robinson, R. Vidal. “Conformal symplectic and relativistic optimization”, *JOURNAL OF STATISTICAL MECHANICS: THEORY AND EXPERIMENT*, 2020(12): 124008, 2020.
- [J-13] W. Gao, S.P. Mahajan, **J. Sulam**, J.J. Gray. “Deep Learning in Protein Structural Modeling and Design”, *PATTERNS*, 100142, 2020.
- [J-12] H. Mi, C. Gong, **J. Sulam**, E.J. Fertig, A.S. Szalay, E.M. Jaffee, V. Stearns, L.A. Emens, A.M. Cimino-Mathews, A.S. Popel. “Digital pathology analysis quantifies spatial heterogeneity of CD3, CD4, CD8, CD20, and FoxP3 immune markers in triple-negative breast cancer”, *FRONTIERS IN PHYSIOLOGY*, 11, 2020.
- [J-11] I. Rey Otero, **J. Sulam**, M. Elad. “Variations on the Convolutional Sparse Coding Model”, *IEEE TRANSACTIONS ON SIGNAL PROCESSING*, 2020.
- [J-10] Y. Romano, A. Aberdam, **J. Sulam**, M. Elad. “Adversarial Noise Attacks of Deep Learning Architectures – Stability Analysis via Sparse Modeled Signals”, *JOURNAL OF MATHEMATICAL IMAGING AND VISION*, 2020.
- [J-9] **J. Sulam**, A. Aberdam, A. Beck, M. Elad. “On Multi-Layer Basis Pursuit, Efficient Algorithms and Convolutional Neural Networks”, *IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE (TPAMI)*, 2019.
- [J-8] D. Simon, **J. Sulam**, Y. Romano, Y. Lue, M. Elad. “Improving Pursuit Algorithms Using Stochastic Resonance”, *IEEE TRANSACTIONS ON SIGNAL PROCESSING*, 2019.
- [J-7] A. Aberdam, **J. Sulam**, M. Elad. “Multi Layer Sparse Coding: the Holistic Way”, *SIAM JOURNAL ON MATHEMATICS OF DATA SCIENCE*, 1:1, 46-77, 2019.
- [J-6] V. Pappyan, Y. Romano, **J. Sulam**, M. Elad. “Theoretical Foundations of Deep Learning via Sparse Representations”, *IEEE SIGNAL PROCESSING MAGAZINE*, 35:4, 72-89, 2018.
- [J-5] **J. Sulam**, V. Pappyan, Y. Romano, M. Elad. “Multi-Layer Convolutional Sparse Modeling: Pursuit and Dictionary Learning”, *IEEE TRANSACTIONS ON SIGNAL PROCESSING*, 66:15, 4090-4104, 2018.
- [J-4] V. Pappyan\*, **J. Sulam\***, M. Elad. “Working Locally Thinking Globally: Theoretical Guarantees for Convolutional Sparse Coding”, *IEEE TRANSACTIONS ON SIGNAL PROCESSING*, 65:21, 5687-5701 (\*CONTRIBUTED EQUALLY), 2017.
- [J-3] **J. Sulam**, Y. Romano, R. Talmon. “Dynamical system classification with diffusion embedding for ECG-based person identification”, *SIGNAL PROCESSING*, VOL. 130, 403–411, 2017.
- [J-2] **J. Sulam**, M. Elad. “Large Inpainting of Face Images with Trainlets”, *IEEE SIGNAL PROCESSING LETTERS*, 2016.
- [J-1] **J. Sulam**, B. Ophir, M. Zibulevsky, M. Elad. “Trainlets: Dictionary Learning in High Dimensions”, *IEEE TRANSACTIONS ON SIGNAL PROCESSING*, 64:12, 3180–3193, 2016.

## Conference Papers

- [C-34] **J. Teneggi**, J. Webster Stayman, **J. Sulam**. “Conformal risk control for semantic uncertainty quantification in computed tomography”, *INTERNATIONAL CONFERENCE ON MEDICAL IMAGING COMPUTING & COMPUTER ASSISTED INTERVENTION (MICCAI)*, 2026.
- [C-33] **B. Bharti**, M.V. Clemens-Sewall, P.H. Yi, **J. Sulam**. “Multiaccuracy and Multicalibration via Proxy Groups”, *INTERNATIONAL CONFERENCE ON MACHINE LEARNING (ICML)*, 2025.
- [C-32] **R. Muthukumar**, A. Pal, **J. Sulam**, R. Vidal. “Disentangling Safe and Unsafe Corruptions via Anisotropy and Locality”, *CONFERENCE ON COMPUTER VISION AND PATTERN RECOGNITION (CVPR)*, 2025.
- [C-31] **Z. Wang**, A.S. Popel, **J. Sulam**. “CBM-zero: Concept Bottleneck Model With Zero Performance Loss”, *2ND CONFERENCE ON PARSIMONY AND LEARNING (CPAL)*, 2025.
- [C-30] **B. Bharti**, P.H. Yi, **J. Sulam**. “Sufficient and Necessary Explanations (and What Lies in Between)”, *2ND CONFERENCE ON PARSIMONY AND LEARNING (CPAL)*, 2025.
- [C-29] **J. Teneggi**, **J. Sulam**. “Testing semantic importance via betting”, *38TH CONFERENCE ON NEURAL INFORMATION PROCESSING SYSTEMS (NEURIPS)*, 2024.



- [C-28] [S. Orenstein](#), [Z. Fang](#), P. van Zijl, X. Li, **J. Sulam**. “ProxiMO: Proximal Multi-operator Networks for Quantitative Susceptibility Mapping”, [INTERNATIONAL WORKSHOP ON MACHINE LEARNING IN CLINICAL NEUROIMAGING @ MICCAI](#), 2024.
- [C-27] [Z. Fang](#), S. Buchanan, **J. Sulam**. “What’s in a prior? Learned proximal networks for inverse problems”, [INTERNATIONAL CONFERENCE ON LEARNING REPRESENTATIONS](#), 2024.
- [C-26] [B. Bharti](#), P.H. Yi, **J. Sulam**. “Estimating and Controlling for Fairness via Sensitive Attribute Predictors”, [37TH CONFERENCE ON NEURAL INFORMATION PROCESSING SYSTEMS \(NEURIPS\)](#), 2023.
- [C-25] [A. Pal](#), **J. Sulam**, R. Vidal. “Adversarial Examples Might be Avoidable: The Role of Data Concentration in Adversarial Robustness”, [37TH CONFERENCE ON NEURAL INFORMATION PROCESSING SYSTEMS \(NEURIPS\)](#), 2023.
- [C-24] [Z. Fang](#), H.G. Shin, P. van Zijl, X. Li, **J. Sulam**. “WaveSep: A Flexible Wavelet-Based Approach for Source Separation in Susceptibility Imaging”, [INTERNATIONAL WORKSHOP ON MACHINE LEARNING IN CLINICAL NEUROIMAGING](#), [SPRINGER NATURE SWITZERLAND](#), pp. 56-66, 2023.
- [C-23] [J. Teneggi](#), M. Tivnan, J.W. Stayman, **J. Sulam**. “How to trust your diffusion model: A Convex Optimization Approach to Conformal Risk Control”, [INTERNATIONAL CONFERENCE ON MACHINE LEARNING \(ICML\)](#), PMLR, 2023.
- [C-22] [R. Muthukumar](#), **J. Sulam**. “Sparsity-aware generalization theory for deep neural networks”, [CONFERENCE ON LEARNING THEORY \(COLT\)](#), PMLR, 2023.
- [C-21] M. Tivnan, T.C. Lee, R. Zhang, K. Boedeker, L. Cai, **J. Sulam**, J.W. Stayman. “Task-driven CT image quality optimization for low-contrast lesion detectability with tunable neural networks”, [MEDICAL IMAGING 2023: PHYSICS OF MEDICAL IMAGING](#), SPIE, VOL. 12463, pp. 338-343, 2023.
- [C-20] M. Tivnan, G. Gang, P. Noel, **J. Sulam**, J.W. Stayman. “Tunable neural networks for multi-material image formation from spectral CT measurements”, [7TH INTERNATIONAL CONFERENCE ON IMAGE FORMATION IN X-RAY COMPUTED TOMOGRAPHY](#), SPIE, VOL. 12304, pp. 185-191, 2022.
- [C-19] J. Li, W. Wang, M. Tivnan, **J. Sulam**, J.L. Prince, M. McNitt-Gray, . . . , G.J. Gang. “Local linearity analysis of deep learning CT denoising algorithms”, [7TH INTERNATIONAL CONFERENCE ON IMAGE FORMATION IN X-RAY COMPUTED TOMOGRAPHY](#), SPIE, VOL. 12304, pp. 174-178, 2022.
- [C-18] J. Agterberg, **J. Sulam**. “Entrywise Recovery Guarantees for Sparse PCA via Sparsistent Algorithms”, [25TH INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE AND STATISTICS \(AISTATS\)](#), 2022.
- [C-17] [J.A. Ruffolo](#), J.J. Gray, **J. Sulam**. “Deciphering antibody affinity maturation with language models and weakly supervised learning”, [MACHINE LEARNING FOR STRUCTURAL BIOLOGY WORKSHOP](#), NEURIPS, 2021.
- [C-16] Z. Zhu, T. Ding, J. Zhou, X. Li, C. You, **J. Sulam**, Q. Qu. “A Geometric Analysis of Neural Collapse with Unconstrained Features”, [ADVANCES IN NEURAL INFORMATION PROCESSING SYSTEMS \(NEURIPS\)](#), 34, 2021.
- [C-15] [J. Teneggi](#), [A. Luster](#), **J. Sulam**. “Fast Hierarchical Games for Image Explanations”, [ICML WORKSHOP ON INTERPRETABLE MACHINE LEARNING FOR HEALTHCARE](#), BEST PAPER AWARD, 2021.
- [C-14] **J. Sulam**, [R. Muthukumar](#), R. Arora. “Adversarial Robustness of Supervised Sparse Coding”, [CONFERENCE ON NEURAL INFORMATION PROCESSING SYSTEMS \(NEURIPS\)](#), 2020.
- [C-13] H. Cherkaoui, **J. Sulam**, T. Moreau. “Learning to solve TV regularised problems with unrolled algorithms”, [CONFERENCE ON NEURAL INFORMATION PROCESSING SYSTEMS \(NEURIPS\)](#), 2020.
- [C-12] G. França, **J. Sulam**, D.P. Robinson, R. Vidal. “Conformal Symplectic and Relativistic Optimization”, [CONFERENCE ON NEURAL INFORMATION PROCESSING SYSTEMS \(NEURIPS\)](#), 2020.
- [C-11] [K.W. Lai](#), X. Li, M. Aggarwal, P.V. Zijl, **J. Sulam**. “Learned Proximal Networks for Quantitative Susceptibility Mapping”, [INTERNATIONAL CONFERENCE ON MEDICAL IMAGING COMPUTING & COMPUTER ASSISTED INTERVENTION \(MICCAI\)](#), 2020.
- [C-10] [J.A. Ruffolo](#), C. Guerra, S.P. Mahajan, **J. Sulam**, J.J. Gray. “Geometric potentials from deep learning improve prediction of CDR H3 loop structures”, [BIOINFORMATICS](#), VOLUME 36, ISSUE SUPPLEMENT 1, PAGES i268–i275, 2020.

- [C-9] E. Zisselman, **J. Sulam**, M. Elad. “A Local Block Coordinate Descent Algorithm for the CSC Model”, [CVPR](#), 2019.
- [C-8] **J. Sulam**, V. Pappayan, Y. Romano, M. Elad. “Projecting onto the Multi-Layer Convolutional Sparse Coding Model”, [ICASSP, ORAL PRESENTATION @ SPECIAL SESSION ON LEARNING SIGNAL REPRESENTATION USING DEEP LEARNING](#), 2018.
- [C-7] V. Pappayan, Y. Romano, **J. Sulam**, M. Elad. “Convolutional Dictionary Learning via Local Processing”, [ICCV](#), 2017.
- [C-6] **J. Sulam**, R. Ben-Ari, P. Kisilev. “Maximizing AUC with Deep Learning for Classification of Imbalanced Mammogram Datasets”, [EUROGRAPHICS WORKSHOP ON VISUAL COMPUTING FOR BIOLOGY AND MEDICINE](#), 2017.
- [C-5] **J. Sulam\***, Y. Romano\* and M. Elad. “Gaussian Mixture Diffusion”, [ICSEE INTERNATIONAL CONFERENCE ON THE SCIENCE OF ELECTRICAL ENGINEERING](#), 2016.
- [C-4] J. Turek, **J. Sulam**, I. Yavne, M. Elad. “Fusion of Ultrasound Harmonic Imaging with Clutter Removal Using Sparse Signal Separation”, [INTERNATIONAL CONFERENCE ON ACOUSTICS, SPEECH AND SIGNAL PROCESSING \(ICASSP\)](#), 2015.
- [C-3] **J. Sulam**, M. Elad. “Expected Patch Log Likelihood with a Sparse Prior”, [EMMCVPR, ORAL PRESENTATION](#), 2015.
- [C-2] **J. Sulam**, B. Ophir, M. Elad. “Image Denoising Through Multi-Scale Learnt Dictionaries”, [IEEE INTERNATIONAL CONFERENCE ON IMAGE PROCESSING \(ICIP\), ORAL PRESENTATION](#), 2014.
- [C-1] **J. Sulam**, G. Schlotthauer, M.E. Torres. “Nonlinear slight parameter changes detection: a forecasting approach”, [41ST ARGENTINEAN WORKSHOP ON INFORMATICS JAIIO](#), ISSN 1850-2806, p. 168-179, 2012.

## Book Chapters

- [B-1] A. Aberdam, **J. Sulam**. Deep Learning as Sparsity-Enforcing Algorithms. Mathematical Aspects of Deep Learning. Cambridge University Press. 2022 Dec 22:314.

## Patents

- [P-1] R. Ben-Ari, P. Kisilev, **J. Sulam**. *Classifying medical images using deep convolution neural network (cnn) architecture*, U.S. Patent Application No. 15/697,454, 2020.

## Thesis

- [T-1] **J. Sulam**. From Local to Global Sparse Modeling. Computer Science Department, Technion - Israel Institute of Technology, 2018.

## INVITED TALKS AND SEMINARS

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- 06-2025: Tutorial** Foundations of Interpretable AI @ CVPR 2025 (w/R. Vidal and A. Chattopadhyay).
- 06-2025: Invited Talk** AWS Responsible AI Seminar Series (online).
- 02-2025: Invited Talk** Theory of Interpretable AI Seminar (online).
- 01-2025: Invited Talk** International Biomedical and Astronomical Signal Processing (Switzerland).
- 12-2024: Invited Talk** International Conference on Statistics and Data Science, Nice (France).
- 12-2024: Invited Panelist** Mentoring hour LatinX@Neurips, Vancouver.
- 11-2024: Invited Seminar** ASSET Seminar, University of Pennsylvania. *Host: René Vidal*.
- 10-2024: Invited Seminar** University of Michigan at Ann Arbor. *Host: Jeffrey Fessler*.
- 10-2024: Invited Talk** Mathematics of Interpretable AI @ SIAM MDS. *Organizer: A. Miroshnikov*.
- 09-2024: Invited Talk** Math. and Scient. Foundations of Deep Learning, SIMONS Foundation.

**09-2024: Invited Seminar** Cornell Biomedical Engineering Seminar. *Host: Steve Adie.*

**09-2024: Invited Talk** Comp. Harmonic Analysis in Data Science, Oaxaca. *Host: T. Strohmer.*

**07-2024: Invited Seminar** JHU Applied Physics Lab.

**07-2024: Invited Talk** NIH Office of Data Science Strategy Track @ ISBM 2024, Montreal.

**05-2024: Invited Seminar** École Normale Supérieure de Lyon. *Host: Rémi Gribonval.*

**05-2024: Invited Seminar** Graz University, Austria. *Host: Thomas Pock.*

**04-2024: Invited Seminar** Applied Math. and Statistics Department, Johns Hopkins University.

**03-2024: Invited Seminar** Boston University, BME/CISE/Hariri. *Host: John White.*

**12-2023: Panelist** Emerging Tech Governance Symposium @ JHU 555 Penn, Washington DC.

**11-2023: Invited Seminar** Toyota Technological Institute at Chicago (TTIC). *Host: Sam Buchanan.*

**11-2023: Invited Seminar** University of Madison-Wisconsin, SILO Series. *Host: Robert Nowak.*

**11-2023: Contributed Talk** RSNA Deep Learning Lab: Evaluating for Fairness of AI Radiology.

**11-2023: Invited Talk** Institute for Basic Biomedical Sciences, Johns Hopkins Medicine.

**08-2023: Invited Talk** MSRI@Berkeley. Algorithms, Fairness, and Equity. *Host: Moon Duchin.*

**08-2023: Invited Talk** Foundations of Computational Math (FoCM), Paris.

**03-2023: Invited Seminar** University of California Berkeley, *Host: Bruno Olshausen.*

**03-2023: Invited Talk** Khipu: Latin American Meeting in Artificial Intelligence, Montevideo (Uruguay).

**09-2022: Invited Talk** Int. Conference on Comp. Harmonic Analysis. *Host: Gitta Kutyniok.*

**09-2022: Invited Seminar** Applied Mathematics Seminar, Yale University. *Host: Ofir Lindenbaum.*

**08-2022: Invited Seminar** Institute for signals, systems and computational intelligence, Argentina.

**04-2021: Invited Seminar** Biomedical Engineering, Columbia University. *Host: Andrew Laine.*

**10-2020: Invited Seminar** Computer Science Department, Johns Hopkins University.

**09-2019: Invited Seminar** SEAS, Harvard University. *Host: Demba Ba.*

**05-2019: Invited Talk** Deep Geometric Learning of Big Data (IPAM) *Hosts: R. Willett, X. Bresson.*

**12-2018: Invited Talk** Neurips Workshop on Deep Learning Theories, *Host: Richard Baraniuk.*

**10-2018: Invited Talk** Facultad de Ingeniería, UNER (Argentina).

**12-2017: Invited Lecture** CoSIP Intense Course on Deep Learning, Berlin. *Host: Gitta Kutyniok.*

## IN THE MEDIA

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### Podcasts

**04-2024** Research Renaissance: Exploring the future of Brain Sciences:  
*Revolutionizing Brain Imaging.*

**02-2023** Radiology AI Podcasts — RSNA: *Weakly-Supervised Learning for Global, Examination Labels and Code-Sharing Practices*

### General Audience Online Articles

**12-2024** Wanna bet? Testing conceptual importance for more explainable AI  
JHU Computer Science Department

**02-2024** Small changes, big consequences: Defending machine learning against adversarial attacks JHU Computer Science Department.

**04-2023** Scientists Use Machine Learning to ‘See’ How the Brain Adapts to Different Environments. Hopkins Medicine News and Publications.



- 10-2023** Putting trust to the test. JHU Computer Science Department.
- 12-2023** Brain imaging technique allows researchers to achieve more with less data. Hopkins HUB.
- 11-2022** Should expert radiologists label individual images or entire examinations?  
Microsoft Research.

## TEACHING

<b>WSE Teaching and Mentoring Awards Finalist</b>	2022
Johns Hopkins University	
<b>Sparse Representations in Computer Vision and Machine Learning</b>	Johns Hopkins Uni.
EN.580.709, Instructor	
<a href="#">Fall 2019, 2020, 2021</a>	
Graduate & Under-graduate	
Last student rating of 4.75/5 (department mean: 3.99, school mean: 4.15)	
<b>Gateway Data Science</b>	Johns Hopkins University
EN.500.115, co-Instructor and co-designer	
<a href="#">Spring 2022</a>	
Under-graduate	
Last student rating of 4.4/5 (school mean of 4.17)	
<b>Advanced Data Science for Biomedical Engineering</b>	Johns Hopkins University
EN.580.464, Instructor	
<a href="#">Spring 2023, 2024, 2025</a>	
Graduate & Under-graduate	
Average student rating 4.23/5 (department mean 3.96)	

## MENTORING

<b>PH.D. STUDENTS</b> .....	
<b>Ambar Pal</b>	<b>Johns Hopkins University</b>
PhD Student, CS ( <a href="#">Graduated, now @ Amazon Research</a> )	2018 – 2024
Research: Theory and Algorithms for Adversarially Robust Machine Learning via Geometric Properties of Data Distributions	
Co-advised w/R. Vidal	
<b>Jeff Ruffolo</b>	<b>Johns Hopkins University</b>
Ph.D Student, Molecular Biophysics ( <a href="#">Graduated, now @ Profluent</a> )	2019 – 2023
Research: Deep Learning Methods for Antibody Structure Prediction and Design	
Co-advised w/J. Gray.	
<b>Ramchandran Muthukumar</b>	<b>Johns Hopkins University</b>
Ph.D. Student, CS – GBO: <a href="#">completed 10-2023</a> . Graduation: <a href="#">August 2025</a>	2019 – Present
Research: Robust and Parsimonious Machine Learning	
Thesis defense planned for Feb 2025.	
<b>Y.K.T. (Tiger) Xu</b>	<b>Johns Hopkins University</b>
Ph.D. Student, Neuroscience – GBO: <a href="#">completed 2021</a>	2021 – Present
Research: Computational Methods in Oligodendrocytes Analysis	
Co-advised w/Dwight Bergles; Thesis defense scheduled for May 1st, 2025	
<b>Beepul Bharti</b>	<b>Johns Hopkins University</b>
Ph.D. Student, BME – DBO: <a href="#">completed 03-2023</a>	2021 – Present
Research: Fair and Interpretable Machine Learning	
<b>Zhenzhen Wang</b>	<b>Johns Hopkins University</b>
Ph.D. Student, BME – DBO: <a href="#">completed 10-2023</a>	2021 – Present

**Zhenghan Fang**  
Ph.D. Student, BME – DBO: [completed 11-2023](#)  
Research: Data-Driven Methods for Inverse Problem in Neuroimaging

**Jacopo Teneggi**  
Ph.D. Student, CS  
Research: Interpretability for Machine Learning

**Emeline Haroldsen**  
Ph.D. Student, ChemBE  
Research: Data-Driven Methods in Protein Docking  
Co-advised w/Jeff Gray

M.S. STUDENTS.....

**Zhenzhen Wang**  
M.S.E., BME  
Research: Machine Learning Methods in Computational Pathology

**Jacopo Teneggi**  
M.S.E. Student, BME  
Research: Interpretability for Machine Learning

**Kuo-Wei Lai**  
M.S.E. Student, Robotics  
Research: Quantitative Susceptibility Mapping

Johns Hopkins University  
2018 – 2020

UNDERGRADUATE STUDENT (RESEARCH MENTORING) .....

**Joseph Boen**  
BME Major  
Research: Sample-efficient Generative Models

Johns Hopkins University  
2019 – 2022

**Kesavan Venkatesh**  
BME Major  
Research: Interpretability in ML for Radiology

Johns Hopkins University  
2021 – 2022

**Malika Shah**  
Bachelor of Science in Mathematics on the Statistics  
Research: Neuronal Tracing in Microscopy Imaging  
Johns Hopkins Neuroscience Scholar Program

University of Maryland  
2020 – 2022

**Taher Haitami**  
BME Major  
Research: Generalization Studies in Deep Learning

Johns Hopkins University  
2023 – 2024

**Nicolás Varela-Long**  
Visiting Student  
Research: Explainability for Medical Imaging

Universidad Nacional de Entre Ríos, Argentina  
Aug-2024 – Dec-2024

EXTERNAL MENTORING.....

**Vitória Barin Pacela** **University of Helsinki**  
MSE in Data Science 2020 – 2021  
Research: Independent component analysis for binary data  
*Mentee in the LatinX in AI Mentoring Program* (now at Mila, Université de Montréal, Meta FAIR)

**Carlos Mendoza** **University of Delaware**  
Ph.D., Electrical and Computer Engineering 2020 – 2020  
Research: Dictionary learning in signal processing  
*Mentee in the LatinX in AI Mentoring Program* (now at Twitch)

STUDENTS RECOGNITIONS .....

- **Radiology Society of North America, Trainee Research Prize 2022**, awarded to PhD mentee Jacopo Teneggi, for his work “Weakly Supervised Learning Significantly Reduces the Number of Labels Required for Intracranial Hemorrhage Detection on Head CT”.
- **Society for Imaging Informatics in Medicine, Roger A. Bauman, MD Award 2022**, awarded to JHU undergraduate mentee K. Venkatesh for his work “Can We Trust Saliency Maps to Explain Deep Learning Algorithms for Musculoskeletal Radiograph Abnormality Detection?”.
- **Rising Star award from the Conference on Parsimony and Learning 2024**, awarded to PhD Candidate in my Lab Ramchandran Muthukumar, for his work “Sparsity-aware generalization theory for deep neural networks”.

PROFESSIONAL COMMUNITY SERVICE AND OUTREACH

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University Service .....

**Biomedical Engineering Department** Faculty Search co-chair 2025

**Rising Stars in Engineering and Health** Organizing Committee member (JHU) 2022 – present

**KAVLI Neuroscience Discovery Institute** Steering Committee member 2024 – present

**DSAI Colloquium Committee, *Inaugural Chair of the committee until 2024*** 2022 – present

**Biomedical Engineering Department** 2020 – present  
Diversity, Inclusion, Culture and Equity (D.I.C.E.), Committee Member

**Biomedical Engineering Department** 2020 – 2023  
Biomedical Data Science Graduate Program, Lead.

**MINDS Awards Committee** Chair 2019 – 2022

**Mathematical Institute for Data Science (MINDS)** 2020-2022  
Faculty Search, committee member in 2 searches

**CIS & MINDS Seminar series** organizer 2018 – 2022

External Organizations .....

**IEEE Signal Processing Society’s Computational Imaging** Jan 2025 – Dec 2027  
Technical Committee

**“Theory and Methods of Machine Learning,”** March 2025 – Dec 2026  
Technical Committee 7 (TC7) of the International Federation for Information Processing (IFIP)  
Member.

Scientific Meetings .....

**DeepMath Conference**, organizing committee 2022 – 2024

<b>Seeking Low-dimensionality in Deep Neural Networks</b> SlowDNN Organizing committee	2020–2024
<b>Mathematics of Interpretable Machine Learning</b> Organizer at SIAM’s Conference on Mathematics of Data Science.	2022
<b>Mathematics of Trustworthy Machine Learning</b> Organizer at SIAM’s Conference on Mathematics of Data Science.	2024
<b>Conference on Parsimony and Learning (CPAL)</b> <i>Program Chair for 2025</i>	2024–2025

## Outreach .....

<b>LatinX in AI</b> Faculty Mentor (see Mentoring)	2020 – 2022
<b>Whiting Internships in Science and Engineering (WISE)</b> Connects Baltimore City Public Schools students to STEM research	2023 – present
<b>ISPEED</b> Faculty Mentor	2023 – present
<b>Johns Hopkins Neuroscience Scholar</b> Supports underrepresented, and/or deaf/hard of hearing undergraduate students in neuroscience	2020

## Editorial Services .....

<b>(Associate Editor)</b> Medical Imaging Analysis
<b>(Associate Editor)</b> Information and Inference: a Journal of the IMA
<b>(Action Editor)</b> Transactions of Machine Learning Research
<b>(Associate Editor)</b> Medical Physics ( <i>ad-hoc</i> )
<b>(Area Chair)</b> Int. Conf. on Med. Image Computing and Computer-Assisted Intervention (MICCAI)
<b>(Area Chair)</b> Conference on Neural Information Processing Systems (Neurips)
<b>(Area Chair)</b> International Conference on Learning Representations (ICLR)
<b>(Area Chair)</b> International Conference on Machine Learning (ICML)

## Technical Reviewing .....

**Journals:** Transactions of Machine Learning Research (TMLR), Journal of Machine Learning Research (JMLR), IEEE Transactions on Signal Processing (IEEE TSP), IEEE Transaction on Image Processing (IEEE TIP), Journal of Mathematical Imaging and Vision (JMIV), SIAM Journal on Imaging Sciences, SIAM Journal on Mathematics of Data Science, IEEE Signal Processing Letters.

**Conferences:** Conference on Neural Information Processing Systems (Neurips), IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), International Conference on Learning Representations (ICLR), International Conference on Machine Learning (ICML), International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI), IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP).