Adam S. Charles

Department of Biomedical Engineering

Center for Imaging Science (CIS),
Mathematical Institute for Data Science (MINDS),
Department of Neuroscience,

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Research Interests

Signal processing, machine learning, neural imaging, data science, cybernetics, statistical inference, computational neuroscience, efficient sensing of structured signals.

Education

2015	Ph.D. in Electrical and Computer Engineering Thesis: *Dynamics and correlations in sparse signal acquisition* Advisor: Dr. Christopher J. Rozell	Georgia Institute of Technology
2009	M.E in Electrical and Computer Engineering (*Summa Cum Laude*) Thesis: *Adjustable Subband Allocation Algorithm for Critically Sampled Subband Adaptive Filters*	Cooper Union
2009	B.E in Electrical and Computer Engineering (*Summa Cum Laude*)	Cooper Union

Positions

2020-Present	The Johns Hopkins University	Assistant Professor
2019-2020	The Johns Hopkins University	Assistant Research Professor
2015-2020	Princeton University	Post-Doctoral Fellow
2016-2018	Princeton University	Assistant Instructor
2009-2015	Georgia Institute of Technology	Research Assistant
2009	Georgia Institute of Technology	Teaching Assistant
2007-2009	Southwest Research Institute	Intern
2008-2009	Cooper Union	Teaching Assistant

Metrics (as of March 18, 2025)

citations	1376
h-index	19
i10 index	27

Honors and Awards

2024	NSF CAREER Award
2016	Georgia Tech Sigma Xi 2015 Best Doctoral Thesis Award
2015	Selected as a recipient of funding from T32 training grant, "NRSA Training Grant in Quantitative Neuroscience"
2015	Georgia Tech Electrical and Computer Engineering Graduate Research Excellence Award
2014	Georgia Tech Center for Information and Signal Processing (CSIP) Outstanding Research Award
2010	1st Place, Science Applications International Corp. (SAIC) Georgia Tech student paper competition
2009	Harold S. Goldberg Leadership Prize (Cooper Union)
2009	Dale E. Zand Prize for Outstanding Achievement in Electrical Engineering (Cooper Union)
2009	Honorable Mention, IEEE Region 1 2009 paper contest
2005-2009	Cooper Union dean's list

2008	Inducted to Eta Kappa Nu
2007	Inducted to Tau Beta Pi
2006	Inducted to National Society of Collegiate Scholars
2005	3rd place Team Engineering Award, International Science and Engineering Fair
2005	Special award from the American Assn. for Artificial Intelligence (AAAI), Itnl. Sci. and Eng. Fair
2005	Robert Luby Jr. Award "For excellence in scientific research", Itnl. Sci. and Eng. Fair

Professional Affiliations

2017-present	Society for Neuroscience (SfN)
2013-present	IEEE Signal Processing Society
2012-present	American Association for the Advancement of Science (AAAS)
2012-present	Society for Industrial and Applied Mathematics (SIAM)
2009-present	Institute of Electrical and Electronics Engineers (IEEE)

Professional Service

Instructor:	Cold Spring Harbor Summer Course: Imaging Structure & Function in the Nervous System (2025)
Co-Instructor:	Cold Spring Harbor Summer Course: Imaging Structure & Function in the Nervous System (2023, 2024)
Panelist:	NSF CRCNS, NSF SBIR, NIH, NSF BIO
Poster Judge (2024):	NIH BRAIN NeuroAI workshop
Grant Review:	DoD CDMRP, Agence Nationale de la Recherche (ANR), Israel Science Foundation (ISF)
Senior Program Committee:	Conference for the Association for the Advancement of Artificial Intelligence (AAAI) (2025)
Area Chair:	International Conference on Machine Learning (ICML) Conference (2024,2025)
Area Chair:	International Conference on Learning Representations (ICLR) Conference (2023,2025)
Area Chair:	Neural Inforamtion Processing Systems (NeurIPS) Conference (2021,2022,2023)
Co-Organizer:	Conference on the Mathematical Theory of Deep Learning (2019-Present)
Co-Founder:	Conference on the Mathematical Theory of Deep Learning
Advising member:	AAIH Regulatory and Data working groups (2021-2022)
Guest Editor:	PLoS Computational Biology
Co-Organizer:	Workshop entitled *Interpretable statistical neuroscience: What are we modeling and what does it have to do with the brain?* at the 2020 Computational and Systems Neuroscience (CoSyNe) Conference
Program Committee:	2020 Association for the Advancement of Artificial Intelligence (AAAI) Conference on Artificial Intelligence
Co-Organizer:	2018 Joint Princeton University and Institute for Advanced Study Symposium on the Mathematical Theory of Deep Learning
Technical Program Chair:	2017 Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP) Conference
Co-Organizer:	Special Session on *Low-dimensional dynamical systems in signal processing and data analysis* at the 2017 Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP) Conference
Co-Organizer:	Workshop on *New methods for understanding neural dynamics and computation* at the 2017 Computational and Systems Neuroscience (CoSyNe) Conference
Co-Organizer:	Workshop on *Dimensionality reduction for the analysis and interpretation of high-dimensional neural datasets* at the 2016 Computational and Systems Neuroscience (CoSyNe) Conference
Session Co-Chair:	2015 Information Theory and Applications Workshop

Reviewer:	Nature Methods • Nature Neuroscience • Nature Communications • Nature Computational Science • Cell Reports Methods • Journal of Machine Learning Research • Journal of Neuroscience • Journal of Computational Neuroscience • PLOS Computational Biology • eLife • SPIE Neurophotonics • IEEE Transactions on Signal Processing • IEEE Transactions on Image Processing • IEEE Transactions on Information Theory • IEEE International Symposium on Information Theory • IEEE Transactions on Molecular • Biological • and Multi-Scale Communications • IEEE Signal Processing Letters • IEEE Transactions of Geoscience and Remote Sensing • IEEE Journal of Special Topics in Applied Earth Observations and Remote Sensing • IEEE Geoscience and Remote Sensing Letters • IEEE Letters of the Computer Society • IEEE Transactions of Pattern Analysis and Machine Intelligence • Remote Sensing Letters • Applied Optics
Reviewer:	International Conference on Artificial Intelligence and Statistics (AISTATS) • Conference on Neural Information Processing Systems (NIPS) • Conference on Computational and Systems Neuroscience (CoSyNe) • Conference on Information Sciences and Systems (CISS) • Conference on Cognitive • Computational Neuroscience • Sampling Theory and Applications (SampTA) • Signal Processing with Adaptive Sparse Structured Representations (SPARS) • AWM/Springer Proceedings of the Women in Data Science and Mathematics (WiSDM) workshop
Code Reviewer:	Nature Neuroscience

Departmental Service

2025	Biomedical data science faculty search committee
2025	BME felloship review committee
2024-Present	Biomedical Engineering Departmental Seminar co-organizer
2024	DSAI internal application review
2022-Present	Biomedical Data Science focus area PhD admissions coordinator
2022-Present	JHU PURA Review group
2022-Present	BME MSE Financial aid review
2021-Present	Biomedical Data Science masters focus area coordinator
2021-Present	BME MSE Financial aid review committee
2021-2024	CIS/MINDS Seminar co-organizer
2020	MINDS faculty search committee
2020	BME MSE student admissions committee

Other Activities

2025	Organizer: Kavli Neuroimaging workshop
2021	Organizer: Kavli Neural Imaging Analysis Working Group
2016-2018	Organizer: Princeton computational neuroscience journal club
2011-2012	Manager: Lab server
2011-2012	Coordinator: Lab group

Teaching

Spring 2025	Instructor (Johns Hopkins): EN580.495/EN580.695 “Neural Signals and Computation”
Fall 2024	Instructor (Johns Hopkins): EN.580.746 “Center for Imaging Science Seminar”
Spring 2024	Instructor (Johns Hopkins): EN580.495/EN580.695 “Neural Signals and Computation”, EN.580.438/EN.580.638 “Biomedical Data Design II”, EN.580.746 “Center for Imaging Science Seminar”
Fall 2023	Instructor (Johns Hopkins): EN.580.437/EN.580.637 “Biomedical Data Design I”, EN.580.746 “Center for Imaging Science Seminar”
Spring 2023	Instructor (Johns Hopkins): EN.580.438/EN.580.638 “Biomedical Data Design II”, EN.580.426 “The Neural Control of Movement”, EN.580.747 “Center for Imaging Science Seminar”
Fall 2022	Instructor (Johns Hopkins): EN.580.437/EN.580.697 “Biomedical Data Design I”, EN.580.746 “Center for Imaging Science Seminar”
Spring 2022	Instructor (Johns Hopkins): EN.580.426 “The Neural Control of Movement”, EN.580.746 “Center for Imaging Science Seminar”
Fall 2021	Instructor (Johns Hopkins): EN.580.746 “Center for Imaging Science Seminar”
Fall 2016	Assistant Instructor (Princeton University): NEU314 “Mathematical Tools for Neuroscience”
Spring 2014	Guest Lecture (Georgia Tech): “Inferring Materials in Hyperspectral Imaging using Maximum A-Posteriori Estimation”

Fall 2012	Guest Lecture (Georgia Tech): "Causal Inference of Sparse Time-dependent Signals"
2011-2018	Undergraduate student mentor
2009	Teaching Assistant (Georgia Tech): ECE3075 "Probability and Stochastic Processes", ECE4270 "Digital Signal Processing"
2008	Teaching Assistant (Cooper Union): ECE101 "Communication Theory", ECE114 "Digital Signal Processing"
2008-2009	Instructor (Cooper Union): ECE211 "MATLAB Seminar: Signals & Systems"

Peer-reviewed Publications

[P1] **A.S. Charles**. Data mining the functional architecture of the brain's circuitry. 2025. SIAM International Conference on Data Mining (SDM), Alexandria, VA

[P2] Z. Chen, G.I. Coste, E. Li, R.L. Huganir, A.R. Graves, and **A.S. Charles**. Automatic detection of fluorescently labeled synapses in volumetric in vivo imaging data. 2025. Submitted

[P3] R.-H. Wei, O.R. Stanley, **A.S. Charles**, and K.E. Cullen. Contextual neck muscle control enables flexible head stabilization across locomotion conditions. 2024. Submitted

[P4] Y. Wang, Y. Dai, W-C Hsu, **A.S. Charles**, Z. Jiao, and H. Bai. Position: Less is more for large language models medical outcome reasoning. 2025. Submitted

[P5] E. Whang, J. Yi, and **A.S. Charles**. Fast two-photon microscopy with a subsampling elliptical beam. 2025. Photonics West, San Francisco, CA

[P6] A.H. Daraie, **A.S. Charles**, L.A. Sanchez, A. Chandler, M.A. Hays, L. Talley, S.K. Inati, K. Zaghloul, J.L. Hopp, A. Marashly, N.E. Crone, J. Gonzalez-Martinez, J.-Y. Kang, and S.V. Sarma. Seizure detection and localization using spectral entropy of the intracranial eeg network. 2024. Submitted

[P7] E. Yezerets, N. Mudrik, and **A.S. Charles**. Decomposed linear dynamical systems (dlds) models reveal context-dependent dynamic connectivity in *C. elegans*. *biorxiv*, (10.1101/2024.05.31.596903), 2024. Submitted

[P8] N. Mudrik, R. Ly, O. Ruebel, and **A.S. Charles**. Creimbo: Cross-ensemble interactions in multi-view brain observations. 2024. Submitted

[P9] S.S. Koukuntla, J.B. Julian, J.C. Kaminsky, M. Schottdorf, D.W. Tank, C.D. Brody, and **A.S. Charles**. Discovering shared and private geometry in multi-view data. 2024. Submitted

[P10] J. Xie, L.C. Voinov, N. Mudrik, G. Mishne, and **A.S. Charles**. Multiway Multislice PHATE: Visualizing hidden dynamics of rnns through training. 2024. Submitted

[P11] K.A. Johnsen, N.A. Cruzado, Z.C. Menard, A.A. Willats, **A.S. Charles**, and C.J. Rozell. Cleo: A testbed for bridging model and experiment by simulating closed-loop stimulation, electrode recording, and optophysiology. 2024. Submitted

[P12] S. Moore*, Z. Wang*, Z. Zhu, R. Sun, A. Lee, **A. S. Charles**, and K. V. Kuchibhotla. Revealing abrupt transitions from goal-directed to habitual behavior. *bioRxiv 2023.07.05.547783*, 2023. Submitted, *Equal contribution

[P13] I. Dmitrieva, S. Babkin, and **A. S. Charles**. realSEUDO for real-time calcium imaging analysis. *Neural Information Processing Systems (NeurIPS), Vancouver, Canada*, 2024

[P14] Y. Chen, N. Mudrik, K.A. Johnsen, S. Alagapan, **A.S. Charles**, and C.J. Rozell. Probabilistic decomposed linear dynamical systems for robust discovery of latent neural dynamics. *Neural Information Processing Systems (NeurIPS), Vancouver, Canada*, 2024

[P15] N. Mudrik, E. Yezerets, Y. Chen, C. J. Rozell, and **A. S. Charles**. Linocs: Lookahead inference of networked operators for continuous stability. *Transactions of Machine Learning Research (TMLR)*, 2024. https://arxiv.org/pdf/2404.18267

[P16] V. Geadah, G. Barello, D. Greenidge, **A. S. Charles**, and J. W. Pillow. Sparse-coding variational auto-encoders. *Neural Computation*, 2024

[P17] N. Mudrik, G. Mishne, and **A. S. Charles**. Sibblings: Similarity-driven building-block inference using graphs across states. *International Conference on Machine Learning (ICML)*

[P18] N. Mudrik*, Y. Chen*, E. Yezerets, C. J. Rozell, and **A. S. Charles**. Decomposed linear dynamical systems (dLDS) for learning the latent components of neural dynamics. *Journal of Machine Learning Research*, 2024. *Co-first author

[P19] G. Mishne and **A.S. Charles**. Deep and shallow data science for multi-scale optical neuroscience. *Photonics West, San Francisco, California*, 2024. Invited submission

[P20] C. Lamaitre, **A.S. Charles**, and S. Sridevi. Exploration of a network-based eeg marker for major depressive disorder. *IEEE Conference of the IEEE Engineering in Medicine and Biology (EMBC), Orlando, FL, USA*, 2024

[P21] J. Stefanowicz, J.S. Choi, K. Wingel, J. Haggerty, **A.S. Charles**, and B. Pesaran. Wide-field super-resolution feature matching of the primate cortical surface enables real-time localization. *IEEE Conference of the IEEE Engineering in Medicine and Biology (EMBC), Orlando, FL, USA*, 2024

[P22] A. H. Daraie, **A.S. Charles**, A. Chandler, L. Sanchez, J.-Y. Kang, and S. Sridevi. Localizing the seizure onset zone with bayesian learning during ieeg monitoring. *IEEE Conference of the IEEE Engineering in Medicine and Biology (EMBC), Orlando, FL, USA*, 2024

[P23] X. Yuan, J. I. Colonell, A. Lebedeva, **A. S. Charles**$^{+}$, and T. D. Harris^{+}. Multi-day neuron tracking in high density electrophysiology recordings using EMD. *eLife*, 2023. +joint last author

[P24] C. Bao and **A.S. Charles**. Comparing spike sorting algorithms on simulated extracellular multi-electrode array recordings. *Proc. of the IEEE Bioinformatics and Biomedicine (BIBM), Istambul, Turkey*, December 2023

[P25] A. El Hady*, D. Takahashi*, R. Sun, O. Akinwale T. Boyd-Meredith, Y. Zhang, **A. S. Charles**$^{+}$, and C. D. Brody^{+}. Chronic functional ultrasound imaging for cognitive behaviors in freely moving rodents. *Journal of Neuroscience Methods*, 2023. In Press, *Equal contribution, +joint last author

[P26] Noga Mudrik and **Charles, A.S.** Multi-lingual dall-e storytime. *IEEE Integrated STEM Education Conference (ISEC)*, March 2023. Best paper competition 3rd place award

[P27] T. Xu*, A. R. Graves*, G. Coste, R. Huganir, D. Bergles, **A. S. Charles**$^{+}$, and J. Sulam^{+}. Cross-modality supervised image restoration enables nanoscale tracking of synaptic plasticity in living mice. *Nature Methods*, 20:935–944, 2023. *Equal Contribution. +joint last author

[P28] Joshua T. Vogelstein, Timothy Verstynen, Konrad P. Kording, Leyla Isik, John W. Krakauer, Ralph Etienne-Cummings, Elizabeth L. Ogburn, Carey E. Priebe, Randal Burns, Kwame Kutten, James J. Knierim, James B. Potash, Thomas Hartung, Lena Smirnova, Paul Worley, Alena Savonenko, Ian Phillips, Michael I. Miller, Rene Vidal, Jeremias Sulam, **Adam S. Charles**, Noah J. Cowan, Maxim Bichuch, Archana Venkataraman, Chen Li, Nitish Thakor, Justus M Kebschull, Marilyn Albert, Jinchong Xu, Marshall Hussain Shuler, Brian Caffo, Tilak Ratnanather, Ali Geisa, Seung-Eon Roh, Eva Yezerets, Meghana Madhyastha, Javier J. How, Tyler M. Tomita, Jayanta Dey, Ningyuan, Huang, Jong M. Shin, Kaleab Alemayehu Kinfu, Pratik Chaudhari, Ben Baker, Anna Schapiro, Dinesh Jayaraman, Eric Eaton, Michael Platt, Lyle Ungar, Leila Wehbe, Adam Kepecs, Amy Christensen, Onyema Osuagwu, Bing Brunton, Brett Mensh, Alysson R. Muotri, Gabriel Silva, Francesca Puppo, Florian Engert, Elizabeth Hillman, Julia Brown, Chris White, and Weiwei Yang. Prospective learning: Back to the future, 2023

[P29] Noga Mudrik and **Charles, A.S.** Multi-lingual dall-e storytime. *IEEE Integrated STEM Education Conference (ISEC)*, March 2023. Best paper competition 3rd place award

[P30] H. Benisti, A. Song, G. Mishne, and **A. S. Charles**. Data processing of functional optical microscopy for neuroscience. *Neurophotonics*, 9(4):041402, 2022

[P31] J. L. Gauthier, S. A. Koay, E. H. Nieh, D. W. Tank, J. W. Pillow, and **A. S. Charles**. Detecting and correcting false transients in calcium time-trace inference. *Nature Methods*, 19:470—478, March 2022

[P32] **A. S. Charles**, N. Cermak, R. Affan, B. Scott, J. Schiller, and G. Mishne. Graft: Graph filtered temporal dictionary learning for functional neural imaging. *IEEE Transactions of Image Processing*, 31:3509—3524, 2022

[P33] S. A. Koay, **A. S. Charles**, S. Y. Thiberge, C. D. Brody, and D. W. Tank. Sequential and efficient neural-population coding of complex task information. *Neuron*, 110(2):328–349.e11, 2022

[P34] A. Song, J. L. Gauthier, D. W. Tank J. W. Pillow, and **A. S. Charles**. Neural anatomy and optical microscopy (NAOMi) simulation for evaluating calcium imaging methods. *Journal of Neuroscience Methods*, 358:109173, July 2021

[P35] R. She, X. Wu, B. Jelfs, **A. S. Charles**, , and R. H. M. Chan. Network modeling of short over-dispersed spike-counts: A hierarchical parametric empirical bayes framework. *IEEE Transactions of Signal Processing*, 69:3236–3251, 2021

[P36] J. Choi, K. Kumar, M. Khazali, K. Wingel, M. Choudhury, **A. S. Charles**, and B. Peseran. Optimal adaptive electrode selection to maximize simultaneously recorded neuron yield. *Neural Information Processing Systems (NeurIPS), Vancouver, Canada*, December 2020

[P37] **A. S. Charles**, B. Falk, N. Turner, T. D. Pereira, D. Tward, B. D. Pedigo, J. Chung, R. Burns, S. S. Ghosh, J. M. Kebschull, W. Silversmith, and J. T. Vogelstein. Toward community-driven big open brain science: Open big data and tools for structure, function, and genetics. *Annual Reviews of Neurosceince*, 43, July 2020

[P38] S. Gigante, **A. S. Charles**, S. Krishnaswamy, and G. Mishne. Visualizing the phate of neural networks. *Neural Information Processing Systems (NeurIPS), Vancouver, Canada*, December 2019

[P39] N. P. Bertrand*, **A. S. Charles***, J. Lee*, P. B. Dunn, and C. J. Rozell. Efficient tracking of sparse signals via an earth mover's distance dynamics regularizer. *IEEE Signal Processing Letters*, 27:1120–1124, 2020. *Joint first author

[P40] G. Mishne and **A. S. Charles**. Learning spatially-corellated temporal dictionaries for calcium imaging. *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Brighton, UK*, May 2019. (Selected for oral presentation)

[P41] **A. S. Charles***, M. Park*, J. Patrick Weller, Gregory D. Horwitz, and J. W. Pillow. Dethroning the fano factor: a flexible, model-based approach to partitioning neural variability. *Neural Computation*, 30(4):1012–1045, 2018. *Joint first author

[P42] **A. S. Charles** and J. W. Pillow. Additive continuous-time joint partitioning of neural variability. *Proceedings of the Conference on Cognitive Computational Neuroscience (CCN), Philadelphia, PA, USA*, September 2018

[P43] **A. S. Charles**, H. L. Yap, D. Lin, and C. J. Rozell. Short-term sequence memory: Compressive effects of recurrent network dynamics. *Proceedings of the Conference on Cognitive Computational Neuroscience (CCN), Philadelphia, PA, USA*, September 2018

[P44] N. P. Bertrand, J. Lee, **A. S. Charles**, P. Dunn, and C. J. Rozell. Sparse dynamic filtering via earth mover's distance regularization. *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Calgary, Alberta, Canada*, April 2018

[P45] M. Shvartsman, N. Sudaram, M. C. Aoi, **A. S. Charles**, T. L. Wilke, and J. D. Cohen. Matrix-variate models for fMRI analysis. *The International Conference on Artificial Intelligence and Statistics (AISTATS), Playa Blanca, Lanzarote, Canary Islands*, April 2018

[P46] A. Song*, **A. S. Charles***, S. A. Koay, J. L. Gauthier, S. Y. Thiberge, J. W. Pillow, and D. W. Tank. Volumetric two-photon imaging of neurons using stereoscopy (vTwINS). *Nature Methods*, 14(4):420–426, Apr. 2017. *Joint first author

[P47] **A. S. Charles**, N. P. Bertrand, J. Lee, and C. J. Rozell. Earth-mover's distance as a tracking regulaizer. *Proceedings of the IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP), Curacao, Dutch Antilles*, December 2017

[P48] **A. S. Charles**, D. Yin, and C. J. Rozell. Distributed sequence memory of multidimensional inputs in recurrent networks. *Journal of Machine Learning Research*, 18(7):1–37, 2017

[P49] **A. S. Charles**, A. Song, S. A. Koay, D. W. Tank, and J. W. Pillow. Stochastic filtering of two-photon imaging using reweighted ℓ_1. *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), New Orleans, Louisiana*, Mar 2017

[P50] **A. S. Charles**, A. Balavoine, and C. J. Rozell. Dynamic filtering of time-varying sparse signals via ℓ_1 minimization. *IEEE Transactions on Signal Processing*, 64(21):5644–5656, 2016

[P51] **A. S. Charles**, H. L. Yap, and C. J. Rozell. Short term network memory capacity via the restricted isometry property. *Neural Computation*, 26(6), June 2014

[P52] **A. S. Charles** and C. J. Rozell. Spectral superresolution of hyperspectral imagery using reweighted-ℓ_1 spatial filtering. *IEEE Geoscience and Remote Sensing Letters*, 11(3):602–606, March 2014

[P53] **A. S. Charles** and C. J. Rozell. Convergence of basis pursuit de-noising with dynamic filtering. *Proceedings the IEEE Global Conference on Signal and Information Processing (GlobalSIP), Atlanta, Georgia*, December 2014

[P54] **A. S. Charles**, D. Yin, and C. J. Rozell. Can random linear networks store multiple long input streams? *Proceedings the IEEE Global Conference on Signal and Information Processing (GlobalSIP), Atlanta, Georgia*, December 2014

[P55] **A. S. Charles** and C. J. Rozell. Dynamic filtering of sparse signals using reweighted ℓ_1. *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Vancouver, Canada*, May 2013

[P56] **A. S. Charles**, A. Ahmed, A. Joshi, S. Conover, C. Turnes, and M. A. Davenport. Cleaning up toxic waste: Removing nefarious contributions to recommendation systems. *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Vancouver, Canada*, May 2013

[P57] **A. S. Charles**, P. Garrigues, and C. J. Rozell. A common network architecture efficiently implements a variety of sparsity-based inference problems. *Neural Computation*, 24(12):3317–3339, 2012

[P58] H. L. Yap, **A. S. Charles**, and C. J. Rozell. The restricted isometry property for echo state networks with application to sequential memory capacity. *Proceedings of the Statistical Signal Processing Workshop (SSP), Ann Arbor, Michigan*, August 2012

[P59] S. Shapero, **A. S. Charles**, C. J. Rozell, and P. Hasler. Low power sparse approximation on reconfgurable analog hardware. *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, 2(3):530–541, 2011

[P60] M. S. Asif, **A. S. Charles**, J. Romberg, and C. J. Rozell. Estimation and dynamic updating of time-varying signals with sparse variations. *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Prague, Czech Republic*, May 2011

[P61] **A. S. Charles**, B. A. Olshausen, and C. J. Rozell. Learning sparse codes for hyperspectral imagery. *IEEE Journal of Selected Topics in Signal Processing*, 5(5):963–978, 2011

[P62] **A. S. Charles**, M. S. Asif, J. Romberg, and C. J. Rozell. Sparsity penalties in dynamical system estimation. *Proceedings of Conference for Inforamtion Sciences and Systems (CISS), Baltimore, Maryland*, March 2011. (Selected for oral presentation)

[P63] **A. S. Charles**, A. A. Kressner, and C. J. Rozell. Causal sparse decompositions of audio signals. *Proceedings of the IEEE Digital Signal Processing Workshop, Sedona, Arizona*, January 2011. (Nominated for best student paper)

[P64] **A. S. Charles**, B. A. Olshausen, and C. J. Rozell. Sparse coding for spectral signatures in hyperspectral images. *Proceedings of the Asilomar Conference on Signals, Systems and Computers, Pacific Grove, California*, November 2010

Conference Abstracts

[A1] N. Mudrik, R. Ly, O. Ruebel, and **A. S. Charles**. Modeling multi-regional and non-stationary neural dynamics via latent sub-circuits

[A2] E. Yezerets, N. Mudrik, and **A.S.** Charles. Uncovering nonstationary dynamics in c. elegans with decomposed linear dynamical systems. *Conference: SIAM Conference on Applications of Dynamical Systems (DS25) Denver, Colorado*, May 2025

[A3] Z. Wang, S. Moore, Z. Zhu, J. Wang, R. Sun A. Lee, **A.S. Charles**, and K.V. Kuchibhotla. Revealing abrupt transitions from goal-directed to habitual behavior. *Computational and Systems Neuroscience (CoSyNe), Montreal, Canada*, March 2025

[A4] L. Gomez, N. Mudrik, K. Cullen, and **A.S. Charles**. Understanding sensory-motor integration in the pivc through ensemble analysis. *Computational and Systems Neuroscience (CoSyNe), Montreal, Canada*, March 2025

[A5] N. Mudrik, G. Mishne, and **A.S. Charles**. Sibblings: Similarity-driven building-block inference using graphs across states. *ICML AI for Science Workshop, Vienna, Austria*, Jul. 2024

[A6] N. Mudrik, Y. Chen, E. Yezerets, C.J. Rozell, and **A.S. Charles**. Decomposed linear dynamical systems (dlds) for identifying the latent dynamics underlying high-dimensional time-series. *ICML Workshop on Geometry-grounded Representation Learning and Generative Modeling, Vienna, Austria*, Jul. 2024

[A7] I. Garwood, J. Choi, K. Wingel, J. Stefanowicz, K. Chiang, A. Dubey, J. Viventi, **A.S. Charles**, and B. Pesaran. Multiregional neuronal calcium imaging during cortical electrical stimulation. *Simian Collective Conference, Pittsburg, PA, USA*, Sep. 2024

[A8] S. Moore, Z. Wang, R. Sun, A. Lee, **A. S. Charles**, and K. Kuchibhotla. Revealing abrupt transitions from goal-directed to habitual behavior. *Advances and perspectives in Auditory Neuroscience (APAN), Chicago, IL, USA*, Oct. 2024

[A9] Z. Zhu, **A.S. Charles**, and K. Kuchibhotla. Multi-area cortical mechanisms underlying continual learning. *Advances and perspectives in Auditory Neuroscience (APAN), Chicago, IL, USA*, Oct. 2024

[A10] M.E. Xie, A. Negrean, L. Kinsey, G. Jaindl, **A.S. Charles**, K. Podgorski, and K. Svoboda. Measurement of input-output signals in vivo using high-speed two-photon microscopy. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Oct. 2024

[A11] P. Jiang, **A.S. Charles**, and M. Aoi. Rnn discovery of linear dynamical systems features. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Oct. 2024

[A12] A. Estrada, G. Kang, G. Mishne, and **A.S. Charles**. Fast and accessible morphology-free calcium imaging analysis. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Oct. 2024

[A13] Z. Zhu, **A.S. Charles**, and K. Kuchibhotla. Multi-area cortical mechanisms underlying continual learning. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Oct. 2024

[A14] B. Pesaran, I.C. Garwood, K. Wingel, J. Haggerty, **A.S. Charles**, J. Choi, and A. Dubey. System and method for calcium imaging and electrophysiology in non-human primates. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Oct. 2024

[A15] Z. Zhu, **A.S. Charles**, and K. Kuchibhotla. Revealing abrupt transitions from goal-directed to habitual behavior. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Oct. 2024

[A16] A. Rupasinghe, **A.S. Charles**, and J.W. Pillow. Continuous partitioning of neuronal variability. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Oct. 2024

[A17] N. Mudrik, G. Mishne, and **A. S. Charles**. Sibblings: Similarity-driven building-block inference using neural graphs across states. *Computational and Systems Neuroscience (CoSyNe), Lisbon, Portugal*, March 2024

[A18] S. Susheel, T. Harris, **A. S. Charles**, and C. Brody. Unsupervised discovery of nonlinear and interpretable communication submanifolds. *Computational and Systems Neuroscience (CoSyNe), Lisbon, Portugal*, March 2024

[A19] A.H. Daraie, **A.S. Charles**, L.A. Sanchez, L. Talley, J.Y. Kang, and S.V. Sarma. A comprehensive seizure detection, localization and classification tool for epilepsy monitoring. *AI Epilepsy Conference, Salt Lake City, Utah, USA*, Mar. 2024

[A20] N. Mudrik, G. Mishne, and **A.S. Charles**. Exploring temporal and structural variability in neural ensembles across trials and conditions. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Nov. 2023. Selected for Nanosymposium presentation

[A21] E. Yezerets, N. Mudrik, Y. Chen, C. Rozell, and **A.S. Charles**. Decomposed linear dynamical systems for *C. elegans* functional connectivity. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Nov. 2023. Selected for Nanosymposium presentation

[A22] L. Xiang, P. Kanold, and **A.S. Charles**. Unsupervised extraction of neural activity motifs encoding stimulus and choice information in mice primary auditory cortex. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Nov. 2023

[A23] G.I. Coste, A.R. Graves, Z. Chen, T. Li, Y.T. Xu, D.E. Bergles, J. Sulam **A.S. Charles**, and R.L. Huganir. Tracking plasticity of millions of synapses induced by learning and memory in vivo. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Nov. 2023

[A24] K. Podgorski, **A.S. Charles**, D.A. Flickinger, G. Jaindl, A. Negrean, J. Rohde, and M.E. Xie. Second-generation scanned line projection microscopy (SLAP2) for in vivo imaging of synaptic input. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Nov. 2023

[A25] K. Johnsen, N. Cruzado, **A.S. Charles**, and C.J. Rozell. Enhancing the cleo experiment simulation testbed to support all-optical control, multi-channel optogenetics, and easier integration into data analysis pipelines. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Nov. 2023

[A26] B. Pesaran, J. Choi, K. Wingel, J. Haggerty, and **A.S. Charles**. Multiregional calcium imaging of neurons in the non-human primate brain. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Nov. 2023

[A27] S. Moore, Z. Wang, R. Sun, A. Lee, **A. S. Charles**, and K. Kuchibhotla. Revealing abrupt transitions from goal-directed to habitual behavior during audio-motor learning. *Advances and Perspecitves in Auditory Neuroscience (APAN), Washington DC, USA*, Nov. 2023

[A28] Y. Cheng, R. Magnard, C. Drieu, D. Garr, L.A. Castell, A. Langdon **A.S. Charles**, D. Lee, and P.H. Janak. Chronic ethanol vapor exposure in adult rats persistently reduces behavioral flexibility in protracted withdrawal. *Society of Neuroscience (SfN) Conference, Washington D.C., USA*, Nov. 2023

[A29] A.H. Daraie, L.A. Sanchez, L. Talley, **A.S. Charles**, J.Y. Kang, and S.V. Sarma. Seizure detection using entropy of source-sink nodal dynamics in the epileptic network. *Annual meeting of the American Epilepsy Society (AES), Orlando, Florida, USA*, Dec. 2023

[A30] N. Mudrik, G. Mishne, and **A. S. Charles**. Studying latent neuronal functional circuits underlying brain activity across task conditions. *IEEE EMBS Conference on Neural Engineering (NER), Baltimore, Maryland, USA*, April 2023

[A31] A. H. Daraie, L. Sanchez, K. Gunnarsdottir, J. Yi-Kang, **A. S. Charles**, and S. Sarma. A patient-specific approach for epileptic seizure prediction by tracking network dynamics using source-sink connectivity. *IEEE EMBS Conference on Neural Engineering (NER), Baltimore, Maryland, USA*, April 2023

[A32] E. Yezerets, N. Mudrik, Y. Chen, C. Rozell, and **A. S. Charles**. Decomposed linear dynamical systems for c. elegans functional connectivity. *Computational and Systems Neuroscience (CoSyNe), Montreal, Canada*, March 2023

[A33] I. Dmitrieva, S. Babkin, and **A. S. Charles**. On-line seudo for real-time cell recognition in calcium imaging. *Computational and Systems Neuroscience (CoSyNe), Montreal, Canada*, March 2023

[A34] S. Susheel, T. Harris, and **A. S. Charles**. Automatic spike sorting correction and burst detection for high-density electrophysiological recordings. *Computational and Systems Neuroscience (CoSyNe), Montreal, Canada*, March 2023

[A35] D. Zoltowski, **A. S. Charles**, J. Pillow, and S. Keeley. Improved estimation of latent variable models from calcium imaging data. *Computational and Systems Neuroscience (CoSyNe), Montreal, Canada*, March 2023

[A36] S. Moore, Z. Wang, R. Sun, A. Lee, **A. S. Charles**, and K. Kuchibhotla. Revealing sudden transitions from goal-directed to habitual behavior during learning in mice. *Computational and Systems Neuroscience (CoSyNe), Montreal, Canada*, March 2023

[A37] J. Haggerty, J. Choi, M. W. Choudhury, K. Wingel, B. Pesaran, and **A. S. Charles**. Mapping and localizing neurons using a robotic multiphoton microscope in nhp. *Society for Neuroscience (SfN), San Diego, California*, November 2022. Selected for nanosymposium

[A38] B. Pesaran, **A. S. Charles**, J. Choi, K. Wingel, J. Haggerty, H. Hafizi, A. Dubey, M. W. Choudhury, and R. Bakhshi. A robotic platform for multiregional calcium imaging in the non-human primate brain. *Society for Neuroscience (SfN), San Diego, California*, November 2022. Selected for nanosymposium

[A39] K. Wingel, J. Choi, M. Choudhury, **A. S. Charles**, H. Hafizi, A. Dubey, R. Bakhshi, and B. Pesaran. Multi-regional functional two photon calcium imaging in an awake behaving rhesus macaque. *Society for Neuroscience (SfN), San Diego, California*, November 2022

[A40] X. Yuan, J. Colonell, **A. S. Charles**, and T. Harris. Neuron tracking with chronic neuropixels 2.0 recordings from mouse visual cortex. *Society for Neuroscience (SfN), San Diego, California*, November 2022

[A41] S. Moore, Z. Wang, R. Sun, Z. Zhu, A. Lee, **A. S. Charles**, and K. Kuchibhotla. Sudden transition from goal-directed to habitual behavior during sensorimotor learning in mice. *Society for Neuroscience (SfN), San Diego, California*, November 2022

[A42] T. Xu, A. Graves, G. Coste, R. Huganir, D. Bergles, **A. S. Charles**, and J. Sulam. Cross-modality supervised image restoration enables nanoscale tracking of synaptic plasticity in living mice. *Society for Neuroscience (SfN), San Diego, California*, November 2022

[A43] D. Day, J. Gauthier, D. Tank, and **A. S. Charles**. Classifying transients in calcium imaging via convolutional neural nets. *Neuromatch Acadamy 4.0*, November 2021

[A44] T. Xu, A. Graves, G. Coste, R. Huganir, D. Bergles, **A. S. Charles**, and J. Sulam. Cross-modality supervised image restoration enables nanoscale tracking of synaptic plasticity in living mice. *Neuromatch Acadamy 4.0*, November 2021

[A45] J. Choi, M. Khazali, **A. S. Charles**, and B. Pesaran. Multi-scale measurements of primate motor cortex during free reaching. *Brain Initiative Investigator's Meeting*, June 2021

[A46] S. Keeley, D. Zoltowski, **A. S. Charles**, and J. W. Pillow. Improved estimation of neural encoding models from calcium imaging data. *Brain Initiative Investigator's Meeting*, June 2020

[A47] **A. S. Charles**, N. Cermak, J. Shiller, and G. Mishne. Calcium imaging analysis with graph filtered temporal dictionary learning. *Society for Neuroscience (SfN), Chicago, Illinois*, October 2019

[A48] **A. S. Charles** and J. W. Pillow. Continuous-time partitioning of neural variability. *Society for Neuroscience (SfN), Chicago, Illinois*, October 2019

[A49] G. Mishne, N. Cermak, J. Shiller, and **A. S. Charles**. Spatially-filtered temporal dictionary learning for calcium imaging analysis. *Signal Processing with Adaptive Sparse Structured Representations (SPARS), Toulouse, France*, June 2019

[A50] G. Mishne, B. Scott, S. Thiberge, N. Cermak, J. Schiller, C. Brody, D. W. Tank, and **A. S. Charles**. Graph-filtered temporal dictionary learning for calcium imaging analysis. *Computational Neuroscience Meeting (CNS), Barcelona, Spain*, July 2019. (Selected for oral presentation)

[A51] J. L. Gauthier, S. A. Koay, E. Nieh, D. W. Tank, J. W. Pillow, and **A. S. Charles**. Detecting and correcting false transients in calcium imaging. *Computational and Systems Neuroscience (CoSyNe), Lisbon, Portugal*, February 2019

[A52] G. Mishne, B. Scott, S. Thiberge, N. Cermak, J. Schiller, C. Brody, D. W. Tank, and **A. S. Charles**. Temporal dictionary learning for calcium imaging analysis. *Computational and Systems Neuroscience (CoSyNe), Lisbon, Portugal*, February 2019

[A53] G. Barello, **A. S. Charles**, and J. W. Pillow. Sparse-coding variational auto-encoders. *Computational and Systems Neuroscience (CoSyNe), Lisbon, Portugal*, February 2019

[A54] **A. S. Charles**, H. L. Yap, D. Yin, and C. J. Rozell. Rigorous guarantees on sequence memory capacity in recurrent neural networks using randomized dimensionality reduction. *Theoretical Foundation of Deep Learning*, October 2018

[A55] J. L. Gauthier, **A. S. Charles**, D. W. Tank, and J. W. Pillow. Robust identification and removal of false transients in calcium fluorescence imaging data. *Society for Neuroscience (SfN), San Diego, California*, September 2018

[A56] M. Shvartsman, N. Sudaram, M. C. Aoi, **A. S. Charles**, T. L. Wilke, and J. D. Cohen. Matrix-normal models for fMRI analysis. *Organization for Human Brain Mapping (OHBM), Singapore*, June 2018. (Selected for oral presentation)

[A57] M. Shvartsman, N. Sudaram, M. C. Aoi, **A. S. Charles**, T. L. Wilke, and J. D. Cohen. Matrix-normal models for fMRI analysis. *Computational and Systems Neuroscience (CoSyNe), Denver, Colorado*, March 2018

[A58] M. Shvartsman, N. Sudaram, M. C. Aoi, **A. S. Charles**, T. L. Wilke, and J. D. Cohen. Matrix-variate models for fMRI analysis. *Neural Information Processing Systems (NIPS) Workshops, Long Beach, California*, December 2017

[A59] J. Lee, **A. S. Charles**, N. P. Bertrand, and C. J. Rozell. An optimal transport tracking regularizer. *Neural Information Processing Systems (NIPS) Workshops, Long Beach, California*, December 2017

[A60] A. Song, **A. S. Charles**, S. Y. Thiberge, J. L. Gauther, S. A. Koay, J. W. Pillow, and D. W. Tank. Volumetric two-photon imaging via stereoscopy and two-photon calcium imaging simulator. *Emerging Tools for Acquisition and Interpretation of Whole-Brain Functional Data, Ashburn, Virginia*, November 2017

[A61] J. L. Gauthier, **A. S. Charles**, D. W. Tank, and J. W. Pillow. Robust estimation of calcium transients by modeling contamination. *Society for Neuroscience (SfN), Washington D.C.*, November 2017

[A62] J. L. Gauthier, **A. S. Charles**, J. W. Pillow, and D. W. Tank. Evidence for distinct hippocampal representations of current location and distance to goal. *Society for Neuroscience (SfN), Washington D.C.*, November 2017

[A63] M. Shvartsman, N. Sudaram, M. C. Aoi, **A. S. Charles**, T. L. Wilke, and J. D. Cohen. Matrix-variate models for fMRI analysis. *Society for neuroscience (SfN), Washington D.C.*, November 2017

[A64] A. Song, **A. S. Charles**, D. W. Tank, and J. W. Pillow. A two-photon microscopy simulation framework for optimizing optics and benchmarking cell-finding algorithms. *Society for Neuroscience (SfN), Washington D.C.*, November 2017

[A65] **A. S. Charles**, A. Song, S. A. Koay, J. L. Gauthier, S. Y. Thiberge, D. W. Tank, and J. W. Pillow. Adaptive orthogonal basis pursuit for volumetric two-photon microscopy. *Signal Processing with Adaptive Sparse Structured Representations (SPARS), Lisbon, Portugal*, June 2017

[A66] **A. S. Charles**, D. Yin, and C. J. Rozell. Compression of multiple input streams into recursive neural networks. *Signal Processing with Adaptive Sparse Structured Representations (SPARS), Lisbon, Portugal*, June 2017

[A67] **A. S. Charles**, J. Lee, N. P. Bertrand, and C. J. Rozell. Dynamic filtering with earth mover's distance regularization. *Signal Processing with Adaptive Sparse Structured Representations (SPARS), Lisbon, Portugal*, June 2017

[A68] **A. S. Charles** and J. W. Pillow. Continuous-time partitioning of binned spike counts. *Computational and Systems Neuroscience (CoSyNe), Salt Lake City, Utah*, February 2017

[A69] J. L. Gauthier, **A. S. Charles**, J. W. Pillow, and D. W. Tank. Robust estimation of calcium transients by modeling contamination. *Computational and Systems Neuroscience (CoSyNe), Salt Lake City, Utah*, February 2017

[A70] A. Song, **A. S. Charles**, J. L. Gauthier, S. A. Koay, D. W. Tank, and J. W. Pillow. Two-photon microscopy simulation for optics optimization and benchmarking. *Computational and Systems Neuroscience (CoSyNe), Salt Lake City, Utah*, February 2017

[A71] **A. S. Charles**, H. L. Yap, D. Yin, and C. J. Rozell. Short-term sequence memory in recurrent networks. *Neural Information Processing Systems (NIPS) Workshops, Barcelona, Spain*, December 2016

[A72] N. P. Bertrand, H. L. Yap, **A. S. Charles**, and C. J. Rozell. Efficient randomized filtering for dimensionality reduction in electrophysiology data. *Neural Information Processing Systems (NIPS) Workshops, Barcelona, Spain*, December 2016

[A73] A. Song, **A. S. Charles**, S. Y. Thiberge, J. L. Gauthier, S. A. Koay, J. W. Pillow, and D. W. Tank. Two-photon imaging of neurons using stereoscopy (twins). *Society for Neuroscience (SfN), San Diego, California*, November 2016

[A74] **A. S. Charles** and C. J. Rozell. Learning a dynamics dictionary for time-varying sparse signals. *Signal Processing with Adaptive Sparse Structured Representations (SPARS), Cambridge, United Kingdom*, July 2015

[A75] **A. S. Charles** and C. J. Rozell. Robust estimation of sparse time-varying signals. *Information Theory and Applications Workshop (ITA), La Jolla, California*, February 2015. Invited contribution

[A76] C. J. Rozell, M. Zhu, **A. S. Charles**, H. L. Yap, and M. Norko. The role of sparsity in visual perception. *Conference on Biologically Inspired Cognitive Architectures (BICA), Cambridge, Massachusetts*, November 2014

[A77] **A. S. Charles**, C. J. Rozell, and N. Tufillaro. Sparsity based spectral super-resolution and applications to ocean water color. *International Geoscience and Remote Sensing Symposium, (IGARSS), Québec, Canada*, May 2014. Invited contribution

[A78] **A. S. Charles** and C. J. Rozell. Stochastic filtering via reweighted ℓ_1. *Signal Processing with Adaptive Sparse Structured Representations (SPARS), Laussane, Switzerland*, July 2013

[A79] **A. S. Charles**, H. L. Yap, and C. J. Rozell. Using compressed sensing to study sequence memory capacity in networked systems. *Signal Processing with Adaptive Sparse Structured Representations (SPARS), Laussane, Switzerland*, July 2013

[A80] A. A. Kressner, **A. S. Charles**, and C. J. Rozell. Causal locally competitive algorithm for the sparse decomposition of audio signals. *IEEE Women's Workshop on Communications and Signal Processing, Banff, Canada*, July 2012

[A81] **A. S. Charles**, H. L. Yap, , and C. J. Rozell. Short-term memory in neural networks via the restricted isometry property. *Computational Neuroscience Meeting (CNS) Workshop on Methods of Information Theory in Computational Neuroscience, Atlanta, Georgia*, July 2012

[A82] C. J. Rozell and **A. S. Charles**. Spectral super-resolution of hyperspectral images. *SIAM Conference on Imaging Science, Philadelphia, Pennsylvania*, May 2012

[A83] C. J. Rozell and **A. S. Charles**. Recursive estimation of dynamic signals with sparsity models via re-weighted ℓ_1 minimization. *Janelia Farm Conference on Machine Learning, Statistical Inference, and Neuroscience, Ashburn, Virginia*, May 2012

[A84] **A. S. Charles**, H. L. Yap, and C. J. Rozell. Short-term memory capacity in recurrent networks via compressed sensing. *Janelia Farm Conference on Machine Learning, Statistical Inference, and Neuroscience, Ashburn, Virginia*, May 2012

[A85] H. L. Yap, **A. S. Charles**, and C. J. Rozell. Short-term memory capacity in recurrent networks via compressed sensing. *Challenges in Geometry, Analysis and Computation: High-dimensional Synthesis, Yale University, New Haven, Connecticut*, June 2012

[A86] **A.S. Charles**, H.L. Yap, and C.J. Rozell. Short-term memory capacity in recurrent neural networks via compressive sensing. *Computational and Systems Neuroscience (CoSyNe), Salt Lake City, Utah*, February 2012

[A87] **A.S. Charles**, B. Olshausen, and C.J. Rozell. Learning sparse codes for hyperspectral images. *Duke Workshop on Sensing and Analysis of High-dimensional Data (SAHD), Durham, North Carolina*, July 2011

[A88] **A. S. Charles** and C. J. Rozell. A hierarchical re-weighted-$\ell 1$ approach for dynamic sparse signal estimation. *Signal Processing with Adaptive Sparse Structured Representations (SPARS), Edinburgh, Scotland, United Kingdom*, June 2011

Other Publications

[O1] **A. S. Charles**. Interpreting deep learning: The machine learning rorschach test? *Society for Applied and Industrial Mathematics (SIAM) News*, July/August 2018

[O2] **A. S. Charles**. Interpreting deep learning: The machine learning rorschach test? *arXiv:1806.00148*, June 2018. Extended version of *SIAM* News artical

[O3] M. Shvartsman, N. Sudaram, M. C. Aoi, **A. S. Charles**, T. L. Wilke, and J. D. Cohen. Matrix-variate models for fMRI analysis. *arXiv:1711.03058*, November 2017

[O4] **A. S. Charles**. *Dynamics and Correlations in Sparse Signal Acquisition*. PhD thesis, Georgia Institute of Technology, 2015

[O5] **A. S. Charles**. Adjustable subband allocation algorithm for critically sampled subband adaptive filters. *The Cooper Union for the Advancement of Science and Art, Albert Nerkin School of Engineering*, pages 1–127, 2009

[O6] **A. S. Charles**. Bayesian derivation of the Kalman Filter. January 2011. Connexions: http://cnx.org/content/m36679/1.1/

Presentations

2024	Panelist: Multimodal AI in Biomedical Data Analysis and Disease Diagnosis. Biomedical Engineering Society (BMES) Conference, Baltimore Maryland.
2024	Multi-view models for systems level understanding of the brain. Biomedical Engineering Society (BMES) Conference, Baltimore Maryland.
2024	Micron brain data at scale: computational challenges in imaging and analysis. Center for Theoretical Neuroscience Seminar Series, Columbia University.
2024	Enabling big neuroscience through computational advances. Accelerating AI Algorithms for Data-Driven Discovery (A3D3) Seminar Series, National Science Foundation, Virtual.
2024	Micron brain data at scale: computational challenges in imaging and analysis. Distinguished Speaker Series, Allen Institute, Seattle.
2024	Data science for neuronal imaging: the micro, the meso, and the macro. Photonics West, Invited Plenary talk. San Francisco
2023	Micron brain data at scale: computational challenges in imaging and analysis. Neural Engineering Seminar. University of Alabama, Birmingham
2023	Micron brain data at scale: computational challenges in imaging and analysis. Biomedical Engineering, NeuroPhotonics Center, and Center for Systems Neuroscience Seminar. Boston University
2022	Consider the data: The computational side of neural imaging, Stanford University
2022	Analyzing and modeling neural data: The sparse way, Rensselaer Polytechnic Institute (RPI) Department of Biomedical Engineering Seminar Series
2022	Analyzing and modeling neural data: The sparse way, Johns Hopkins Applied Physics Lab (APL)
2022	Consider the data: The computational side of big imaging, NSF Neuronex Big Brain Imaging Workshop, Boston University
2020	Data science in neuroscience: From sensors to theory, Johns Hopkins University MINDS&CIS Seminar
2020	Computational Advances in Calcium Imaging of Neural Populations, Janelia research campus Optics Interest Group Seminar
2020	Detecting and correcting false transients in calcium imaging, Johns Hopkins Kavli Neuroscience Discovery Institute
2019	Signals and Noise in Two-Photon Calcium Imaging, Princeton University PNI Seminar
2019	Neural data science: from recordings to theoretical models, University of California at San Diego ECE Seminar
2019	Neural information representation: From single neuron responses to neural populations, NYU CNS/CDS Seminar

2019	Neural data science at the cellular level: From recordings to theoretical models, Columbia University & Biomedical Engineering Seminar
2019	Neural data science: from recordings to theoretical models, John Hopkins University & Biomedical Engineering Seminar
2019	Neural data science: from recordings to theoretical models, Yale Statistics & Data Science Seminar
2019	Modern methods for calcium imaging, NYU Langone Tech4Health Seminar
2018	New methods for two-photon calcium imaging, Emory University
2018	New signal processing methods for robust and volumetric calcium imaging, Simons Foundation, New York City
2018	Signal processing for functional neural calcium imaging, DSO National Laboratories, Singapore
2018	Matrix-normal models for fMRI analysis, Organization for Human Brain Mapping, Singapore
2018	Modern methods for neural signal processing, Massachusetts Institute of Technology
2018	Modern methods for neural signal processing, University of Michigan
2017	Volumetric two-photon imaging of neurons using spectroscopy (vTwINS), Rutgers University
2017	Distributed short-term memory in recurrent neural networks, Computational and Systems Neuroscience (CoSyNe) Workshops
2017	Volumetric two-photon imaging via spectroscopy, Georgia Tech CSIP Seminar Series
2016	Denoising calcium imaging, Georgia Tech CSIP Seminar Series
2014	Bounds on distributed memory of networked systems, Princeton University
2014	Robust tracking of high-dimensional signals, Rehabilitation Clinic of Chicago
2014	Can an echo-state network remember what you did last summer?, Georgia Tech CSIP Seminar Series
2014	Sparsity based techniques for hyperspectral image analysis, Georgia Tech CSIP Seminar Series
2011	Sparsity penalties in dynamical system estimation, CISS, Baltimore, MD, USA
2011	Causal sparse decompositions of audio signals, DSP Workshop, Sedona, AZ, USA
2011	A hierarchical re-weighted-ℓ_1 approach for dynamic sparse signal estimation, SPARS, Edinburgh, UK
2011	Modern signal processing and sparse coding, The Cooper Union IEEE series

Mentorship

Brian Tseng	(2025-pres.)	PhD Student, Johns Hopkins University Department of Biomedical Engineering
Eva Yezerets	(2021-pres.)	PhD Student, Johns Hopkins University Department of Biomedical Engineering
Noga Mudrik	(2021-pres.)	PhD Student, Johns Hopkins University Department of Biomedical Engineering
Liang Xiang	(2021-pres.)	PhD Student, Johns Hopkins University Department of Biomedical Engineering (Co-advised with Patrick Kanold)
Michael Xie	(2022-pres.)	MD/PhD Student, Johns Hopkins University Department of Biomedical Engineering (Co-advised with Karel Svoboda)
Sai Koukuntla	(2022-pres.)	PhD Student, Johns Hopkins University Department of Biomedical Engineering (Co-advised with Tim Harris)
Esther Whang	(2023-pres)	PhD Student, Johns Hopkins University Department of Biomedical Engineering (Co-advised with Ji Yi)
Clara Lemaitre	(2023-pres)	PhD Student, Johns Hopkins University Department of Biomedical Engineering (Co-advised with Sri Sarma)
Amir Daraie	(2023-pres)	PhD Student, Johns Hopkins University Department of Biomedical Engineering (Co-advised with Sri Sarma)
Amanda Kwok	(2023-pres)	Undergraduate Student, Johns Hopkins University Department of Biomedical Engineering

Past mentees

Jiancheng (Joe) Xie	(2022-2024)	MSE Student, Johns Hopkins University Department of Biomedical Engineering (Next: PhD at BU)
Zhining Chen	(2023-2024)	MSE Student, Johns Hopkins University Department of Biomedical Engineering (Next: PhD at UCSD)
Gabby Kang	(2020-2024)	Undergraduate Student, Johns Hopkins University Department of Biomedical Engineering (Next: PhD at MIT)
Iuliia Dmitrieva	(2022-2024)	Undergraduate Student, Johns Hopkins University Department of Biomedical Engineering
Xiaoran (Augustine) Yuan	(2020-2021)	MSE Student, Johns Hopkins University Department of Biomedical Engineering (Next: PhD at LMU)
Tong Li	(2022-2023)	MSE Student, Johns Hopkins University Department of Applied Math and Statistics (Next: PhD at Wash U)
David Day	(2020-2021)	Undergraduate Student, Johns Hopkins University Department of Biomedical Engineering

Thesis committees

Zhenghan Fang	Johns Hopkins University Department of Biomedical Engineering
Tate DeWeese	Johns Hopkins University XD-Bio
Jade Daher	Johns Hopkins University Department of Biomedical Engineering
Manhari Anant	Johns Hopkins University Department of Biomedical Engineering
Oliver Stanley	Johns Hopkins University Department of Biomedical Engineering
Xinghao Fan	Johns Hopkins University Department of Neuroscience
Diptodip Deb	Johns Hopkins University Department of Neuroscience
Jaesung Yoo	University of North Carolina
Kion Fallah	Georgia Institute of Technology Department of Electrical and Computer Engineering (Graudated 2023)
Miguel Lazo	Johns Hopkins University Department of Neuroscience (Graduated 2022)
Tomer Hamam	Georgia Institute of Technology Department of Electrical and Computer Engineering (Graduated 2022)
Nick Bertrand	Georgia Institute of Technology Department of Electrical and Computer Engineering (Graduated 2021)

Funding and Support (current)

NSF	2340338 (PI) CAREER: RI: Uncovering principles of robust intelligence by disentangling the functional architecture of the brain: $718,681
RCF	Raynor Cerebellar Foundation (MPI) Development of a High-Density Cerebellar Prosthesis: A Neural Engineering Approach to Restore Function: $1,100,000 (04/2025-03/2027)
Kavli	KICK award (MPI) Brain-wide mechanisms of risk-taking in larval zebrafish: $100,000 (2025)
KSIT	P246800139 (Co-I) Next-Generation Organoid Scan: Automated Platform for 3D Imaging and Electrochemical Sensing for Organoid Drug Response Analysis: $4,498,375 (08/2024-07/2027)
JHU	Discovery award (MPI) The neural basis of continual learning in the face of early life adversity. $100,000 (2024)
NIH	1R01MH138935 (Co-I) Cross-brain, multi-region interactions in decision formation and decision commitment: $186,438 (08/2024-07/2029)
NIH	2R01DC018061-06 (Co-I) Neural Computations Underlying Cancellation of the Vestibular Consequences of Voluntary Movement: $3,345,000 (09/2024-08/2029)
NIH	2R01DC002390-26 (Co-I) The Physiology of Vestibular Compensation: $3,500,000 (09/2024-08/2029)
CZI	CP2-1-0000000704 (PI) Integrated tools to measure neural input-output operations. $200,000 (01/2024-12/2025)
NIH	1R01NS134842-01 (Co-I) Exploring synaptic encoding of circuit-specific memory in behaving mice: $4,000,000 (09/2023-08/2028)
NIH	1U19NS132720-01 (Co-I) Mechanisms of neural circuit dynamics in working memory and decision-making JHU subcontract: $56,614 (08/2023-06/2028)
JHU	Discovery award (Co-PI) Sensor fusion for navigation in 3D space. $100,000 (01/2024-12/2025)

Funding and Support (prior)

JHU	Bridge Grant (PI) Functional Ultrasound Imaging of Global Brain Dynamics. $50,000 (2023)
NSF	AN:2041303 (PI) Broadening Participation at The Conference on the Mathematical Theory of Deep Learning. $20,000 (2020)