GORDON J. BERMAN

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CURRENT POSITION

- **Emory University**, Atlanta, GA
  Assistant Professor, Department of Biology
  September 2015 - present
  O. Wayne Rollins Research Center, Room 2107
  1510 Clifton Road NE, Atlanta, GA 30322
  Phone: 404-727-0071

OTHER CURRENT AFFILIATIONS

- **Emory University Physics Graduate Program**, Atlanta, GA
  Member (2015 - present)
- **Emory University Neuroscience Graduate Program**, Atlanta, GA
  Member (2015 - present)
- **Emory Department of Quantitative Theory and Methods**, Atlanta, GA
  Affiliated Faculty Member (2015 - present)
- **Simons-Emory International Consortium on Motor Control**
  co-Director (2020 - present)
- **Emory Theory and Modeling of Living Systems Initiative**, Atlanta, GA
  Member (2018 - present)
- **Yerkes National Primate Research Center**, Atlanta, GA
  Affiliate Scientist in the Division of Behavioral Neuroscience and Psychiatric Disorders
  (2020 - present)
- **Georgia Institute of Technology**, Atlanta, GA
  Adjunct Assistant Professor, WH Coulter Department of Biomedical Engineering (2016 - present)

EDUCATION

- **Doctor of Philosophy** in Physics with a Minor in Applied Mathematics
  Cornell University, Ithaca, NY, August 2009
  Thesis: Optimization, Control, and Flies: Quantitative Studies of Insect Flight
  Mentor: Z. Jane Wang
- **Master of Science** in Physics with a Minor in Applied Mathematics
  Cornell University, Ithaca, NY, May 2007
- **Bachelor of Science** with Highest Honors in Physics and Mathematics
  University of Michigan, Ann Arbor, MI, April 2003
  Honors Thesis: Measurement of the ATLAS Endcap Muon Spectrometer
  Sagitta Resolution at the 2002 H8 Test Beam
  Mentors: Bing Zhou and Daniel Levin

PREVIOUS POSITIONS

- **Princeton University**, Princeton, NJ
  Associate Research Scholar
  Lewis-Sigler Institute for Integrative Genomics & Department of Physics
  September 2009 - August 2015
  Mentors: William Bialek and Joshua Shaevitz
- **HHMI Janelia Research Campus**, Ashburn, VA
  Visiting Research Scientist
  January 2012 - January 2017

RESEARCH

PUBLICATIONS

An updated publication list can be found on my Google Scholar page here

Underlined names are students/postdocs at Emory University.

Published peer-reviewed research:

- Marshall, JD, Aldarondo, DE, Dunn, TW, Wang, WL, **Berman, GJ**, and Ölveczky, BP. "Long-term continuous tracking of 3D whole-body kinematics across the rodent behavioral repertoire" *Neuron*, 109, 2021, 420-437.e8. [Link]

  Role: I advised and helped to develop the extensive data analysis methods for behavioral analysis that appear in the article, and I heavily participated in the manuscript's drafting and editing.

- Saravanan, V, **Berman, GJ**, and Sober, SJ. "Application of the hierarchical bootstrap to multi-level data in neuroscience," *Neurons, Behavior, Data Analysis, and Theory*, 3, 2020. [Link]

  Role: I co-conceived the study with the other authors, either advised or performed all analyses, and I heavily participated in the manuscript's its drafting and editing.

- Ding, Y, Lillvis, JL, Cande, J, **Berman, GJ**, Arthur, BJ, Xu, M, Dickson, BJ, Stern, DL. "Neural Evolution of Context-Dependent Fly Song," *Current Biology*, 29, 2019, 1089-1099. [Link]

  Role: I developed a novel algorithm for identifying different song types in multiple species that was instrumental to the analyses underlying the study's results. I had some participation in the manuscript's its drafting and editing.

- Saravanan, V, Hoffman, LA, Jacobs, A, **Berman, GJ**, and Sober, SJ. "Dopamine depletion affects vocal acoustics and disrupts sensorimotor adaptation in songbirds," *eNeuro*, 6, 2019, e0190-19.2019. [Link]

  Role: I advised and help develop the data analysis methods that appear in the article, and I assisted in writing of the manuscript.

- Cande, J, Namiki S, Qiu, J, Korff, W, Card, G, Shaevitz, JW, Stern, DL, and **Berman, GJ**. "Optogenetic dissection of descending behavioral control in *Drosophila*," *eLife*, 7, 2018, e34275. [Link].
  - Highlighted as an eLife Insight by Louis, M and Simpson JH. "Descending neurons: Disentangling the strings that organize behavior."

  Role: I co-conceived the study, helped to design the experiments, designed the data analysis framework, and supervised all data analysis portions of the project. I co-wrote the initial draft of the manuscript, and was involved heavily in the editing process. Although input on experimental design and construction was provided by JWS (he wrote the data acquisition software), a previous research mentor, all other aspects of the project were led by DLS and me.

- Tabler, JM, Mitchell, MM, **Berman, GJ**, Gopalakrishna, S, Fitch, R, Carter, C, Vokes, S, Tajbakhsh, S, Egnor, SER, and Wallingford, J. "Cilia-mediated Hedgehog signaling controls form and function in the mammalian larynx," *eLife*, 6, 2017, e19153. [Link]

  Role: I developed, coded, and applied a novel analysis for the analysis of mouse ultrasonic vocalizations that provided essential backing for the paper's findings.

- Billings, JC, Medda, A, Shakil, S, Shen, X, Kashyap, A, Chen, S, Abbas, A, Zhang, X, Nezafati, M, Pan, W, **Berman, GJ**, and Keilholz, SD. "Instantaneous Brain Dynamics Mapped to a Continuous State Space," *NeuroImage*, 162, 2017, 344-352. [Link]
- Billings, JC, Medda, A, **Berman, GJ** and Keilholz, SD. "Functional connectivity metrics for wavelet clustering of rs-fMRI data," *2016 50th Asilomar Conference on Signals, Systems and Computers*, 2016, 1295-1299. [Link]

  Role: I worked with the lead author of these two studies to help develop the fMRI analyses that appear in the above two articles.

- Klibaite, U, **Berman, GJ**, Cande J, Stern, DL, and Shaevitz, JW. "An unsupervised method for quantifying the behavior of interacting individuals," *Physical Biology*, 14, 2017, 015006. [Link]

Role: I co-initiated the project, performed some analyses, and helped advise the lead author throughout the project.

- **Berman, GJ**, Bialek, W, and Shaevitz, JW. "Predictability and hierarchy in *Drosophila* behavior," *Proc. Nat. Acad. Sci.*, 113, 2016, 11943-11948. [Link]

  Role: I co-initiated the project, and performed all data analysis, and wrote the article.

- LaRue, K, Clemens, J, **Berman, GJ**, and Murthy, M. "Acoustic duetting relies on the integration of auditory and tactile signals in *Drosophila virilis*," *eLife*, 2015, e07277. [Link]

  Role: I developed a novel algorithm for fly song analysis and assisted the lead author in the development of the project.

- **Berman, GJ**, Choi, DM, Bialek, W, and Shaevitz, JW. "Mapping the stereotyped behaviour of freely moving fruit flies," *J. R. Soc. Interface*, 11, 2014, 20140672. [Link]

  Role: I co-initiated the project, and performed all data analysis, and wrote the article.

- Ristroph, L, Bergou, AJ, **Berman GJ**, Guckenheimer, J, Wang, ZJ, and Cohen, I. Dynamics, Control, and Stabilization of Turning Flight in Fruit Flies. In: Childress, S, Hosoi, A, Schultz, WW, and Wang, ZJ, eds. *Natural Locomotion in Fluids and on Surfaces*, Springer, New York, 2012, 83-100. [Link]

  Role: I co-initiated the project, performed analyses, and co-wrote the article.

- Ristroph, L, Bergou, AJ, Ristroph, G, Coumes, K, **Berman, GJ**, Guckenheimer, J, Wang, ZJ, and Cohen, I. "Discovering the flight autostabilizer of fruit flies by inducing aerial stumbles" *Proc. Nat. Acad. Sci.*, 107, 2010, 4820-4824.[Link]

  Role: I designed the tracking code used in the article and participated in the writing of the manuscript.

- Ristroph, L, **Berman, GJ**, Bergou, AJ, Wang, ZJ, and Cohen, I. "Automated hull reconstruction motion tracking (HRMT) applied to sideways maneuvers of free-flying insects" *Journal of Experimental Biology*, 212, 2009, 1324-1335. [Link]

  Role: I designed the tracking code that was the basis for the manuscript, performed many of the analyses, and co-wrote the article.

- **Berman, GJ** and Wang, ZJ. "Energy-minimizing kinematics in hovering insect flight," *Journal of Fluid Mechanics*, 582, 2007, 153-167. [Link]

  Role: I co-initiated the project, performed all calculations, and wrote the article.

Accepted peer-reviewed review articles:

- **Berman, GJ**. "Measuring behavior across scales," *BMC Biology*, 16, 2018, 23. [Link]

Submitted manuscripts and preprints:

- Hernández, DG, Rivera, C, Cande, J, Zhou, B, Stern, DL, and **Berman, GJ**. "A framework for studying behavioral evolution by reconstructing ancestral repertoires" (Submitted. Preprint: doi:10.1101/2020.07.17.209361v1, under revision at *eLife*) [Link]

  Role: I designed the initial project, advised all aspects of experimental design and data analysis, and co-wrote the manuscript.

- Overman, KE, Choi, DM, Leung, K, Shaevitz, JW, and **Berman, GJ**. "Measuring the repertoire of age-related behavioral changes in *Drosophila melanogaster*" (Submitted. Preprint: bioRxiv:2021.06.13.448265, under revision at *PLoS Computational Biology*) [Link]

  Role: I designed the initial project. Data was collected in JWS's group, but all analysis was performed by KEO and KL with me. The manuscript was written by KEO and me, with comments from the other authors.

- Nande A, Dubinkina, V, Ravasio, R, Zhang, GH, and **Berman, GJ**. "Modeling bottlenecks, modularity, and context-dependency in behavioral control" (Submitted. Preprint: bioRxiv:2021.08.08.455452, submitted to *PLoS Computational Biology*) [Link]

Role: I designed and advised all aspects of the project and co-wrote the manuscript. Paper resulted from a project at the 2019 Boulder Summer School for Condensed Matter Physics

- Borie, AM, Agezo, S, Lunsford, P, Boender, A, Guo, J, **Berman, GJ**, Young, LJ, and Liu, RC. "Social experience alters oxytocinergic modulation in the nucleus accumbens of female prairie voles" (Submitted. Preprint: bioRxiv:10.1101/2021.07.06.451323, under revision at *Current Biology*) [Link]

  Role: I advised the lead authors on technical aspects of the behavioral analysis.

- Alba, V, **Berman, GJ**, Bialek, W, and Shaevitz, JW. "Exploring a strongly non-Markovian animal behavior" (Submitted. Preprint: arXiv:2012.15681v1, under revision at *Physical Review Letters*) [Link]

  Role: I advised the lead author on technical aspects of the analysis and assisted in editing the manuscript.

- Larsen, LB, Adam, I, **Berman, GJ**, Hallam, J, and Elemans, CPH. "Driving singing behaviour in songbirds using multi-modal, multi-agent virtual reality" (Submitted. Under review at *eLife*)

  Role: I hosted the lead author in my group for several weeks, and I helped him develop the data analysis methods described in the article.

Invited preview articles:

- Jain, K and **Berman, GJ**. "Opening the black box of social behavior," *Nature Neuroscience*, 22, 2019, 1947-1948. [Link]
  -Preview of Calhoun et al, Nature Neuroscience*, 2019*
- **Berman, GJ**. "How to build a behavior," *Neuron*, 100, 2018, 1275-1277. [Link]
  -Preview of Duistermars et al, Neuron*, 2018*

RESEARCH SUPPORT

Current:

- "CRCNS: Predictability as a new paradigm for rodent social neurobiology"
  National Institute of Mental Health (Role: MPI, MPI: Robert Liu, co-I: Larry Young)
  $2,209,695, 2017-2022
- "Remembering the future: Interactions between sensation, memory, and behavior"
  Human Frontiers Science Program (Role: MPI, other MPIs: Jakob Macke, Aman Saleem)
  $1,050,000, 2018-2023
- "Information bottlenecks and the neural control of behavior in fruit flies"
  Research Corporation for Scientific Advancement Cottrell Scholars Program (Role: PI)
  $100,000, 2019-2022
- "Simons-Emory International Consortium on Motor Control"
  Simons Foundation (Role: co-Director, Director: Samuel Sober)
  $2,520,000, 2020-2024
- "Formation of High a High-Flux Student Research Network (HF-SRN) as a Laboratory for Enhancing Interaction in the PoLS SRN"
  Georgia Institute of Technology / NSF (Role: co-PI, PIs: Ilya Nemenman & Daniel Goldman)
  $500,000 to Emory, 2018-2023
- "Mapping the human gait-ome: Automated analysis of individual-specific walking patterns in health and disease"
  Emory University Nexus/Synergy II Grant (Role: co-I, PI: Lena Ting)
  $100,000, 2019-2021

Completed:

- "Developing data-driven models to understand sex differences in stress susceptibility"
  McGill University/National Research Council of Canada (Role: co-PI, PI: Rosemary Bagot)
  $25,000, 2019-2021

Pending:

- "Data-driven approaches to enable precision rehabilitation of walking impairments after stroke"
  National Institutes of Health (Role: MPI, MPIs: Trisha Kesar and Lena Ting)
  $3,706,465, 2021-2026
- "Mapping the social trajectories of infant-caregiver interactions to diagnose the development of ASD"
  Simons Foundation/SAFARI (Role: MPI, MPI: Sarah Schultz)
  $750,000, 2021-2024

HONORS AND AWARDS

- Cottrell Scholar Award (2019) *(for both teaching and research)*
- Finalist, Burroughs Wellcome Fund Career Award at the Scientific Interface (2011)
- National Science Foundation IGERT graduate fellowship for the study of nonlinear and complex systems (2004-2006)
- University of Michigan "Outstanding Achievement in Mathematics" Award (2003)
- Phi Beta Kappa (2003)
- National Science Foundation/Ford Summer Undergraduate Research Fellowship at CERN (2002)

INVITED TALKS

Invited Conference/Workshop Talks:

- *Inferring dynamical models of animal behavior*, Princeton/CUNY Center for the Physics of Biological Function Workshop on Neuroscience and Behavior, September 2021 (virtual).
- *Measuring the hidden dynamics of animal behavior*, CVPR 2021, Workshop on Multi-agent Behavior: Representation, Modeling, Measurement, and Applications, June 2021 (virtual).
- *Variability, hierarchy, and the evolution of behavior*, NSF Physics of Living Systems Research Network Seminar, December 2020 (virtual)
- *Measuring behavior across scales*, Munich Center for Neuroscience Workshop on Linking Behavioral and Neural Dynamics, October 2020 (virtual).
- *Measuring behavior across scales*, Society for Neuroscience Meeting, Short course on Quantifying Behavior as a Lens into the Brain, Chicago, IL, October 2019.
- *Measuring the hidden dynamics of animal behavior*, American Physical Society March Meeting, Invited session on machine learning and inference in biophysics, Boston, MA, March 2019.
- *Why two is tough: conceptual challenges (and some potential solutions) in measuring social behavior*, CoSyNe, Workshop on quantifying social behavioral, Lisbon, Portugal, March 2019.
- *Measuring behavior across scales*, Banbury Conference on Quantitative Approaches to Naturalistic Behaviors, Cold Spring Harbor, NY, September 2018.
- *Time scales, hierarchy, and the neural control of behaviors in flies and rodents*, Federation of European Neuroscience Societies Forum, Symposium on Computational Neuroethology, Berlin, Germany, July 2018.
- *Predictability and hierarchy in Drosophila behavior*, Tel Aviv University and University of Konstanz research conference on movement and migration, Tel Aviv, Israel, September 2017.
- *Predictability and hierarchy in animal behavior*, American Physical Society March Meeting, Invited session on patterns and sequences of behavior, New Orleans, LA, March 2017.
- *Predictability and hierarchy in animal behavior*, Georgia Institute of Technology, Suddath Symposium on Neuromodulation and Synaptic Control: Modern Tools and Applications, Atlanta, GA, February 2017.
- *Uncovering the latent structure of animal behavior using behavioral embedding*, CoSyNe, Workshop on behavioral and neural data analysis, Snowbird, CO, February 2017.
- *Uncovering the latent structure of animal behavior using behavioral embedding*, Simons Institute, Quantitative Behavior Workshop, New York, NY, December 2016

- *Decoding descending commands in Drosophila through behavioral space analysis*, Society for Neuroscience Meeting, Mini-symposium on computational ethology, San Diego, CA, November 2016.
- *Mapping the structure of animal behavior*, Instituto de Neurociencias de Alicante, Severo Ochoa Symposium: Behavior and Circuits, Alicante, Spain, October 2016.
- *Mapping animal behavior*, The Allied Genetics Conference, Workshop on automated tracking for quantitative phenotyping, Orlando, FL, July 2016.
- *Mapping the structure of Drosophila behavior*, Drosophila Research Conference, Workshop on behavioral phenotyping in *Drosophila*, Chicago, IL, March 2015.
- *Hierarchy and Predictability in Spontaneous Behavior*, Flies, Worms and Robots: Symposium Combining Perspectives on Minibrains and Behaviour, Sant Feliu, Spain, November 2014.
- *Stereotypy and the Structure of Behavioral Space*, Society for Integrative and Comparative Biology, Symposium on quantitative approaches to behavior, Charleston, SC, January 2012.

Invited Departmental Seminars/Colloquia:

- *Measuring the hidden dynamics of animal behavior*, Rockefeller University, Center for Studies in Physics and Biology Seminar Series, New York, NY, November 2021.
- *Measuring behavior across scales*, University of Washington, Physics Department Colloquium, May 2021 (virtual).
- *Measuring the hidden dynamics of animal behavior*, École Polytechnique Fédérale de Lausanne, Physics of Living Systems - Biological Data Sciences Colloquium, April 2021 (virtual).
- *Measuring behavior across scales*, Johns Hopkins University, Computational Sensing and Robotics Seminar, April 2021 (virtual).
- *Measuring behavior across scales*, McGill University, Seminar in Quantitative Life Sciences and Medicine, February 2021 (virtual).
- *Measuring the hidden dynamics of animal behavior*, Bernstein Computational Neuroscience Colloquium, Universität Tübingen, November, 2020 (virtual).
- *Measuring behavior across scales*, University of Illinois, Mind in-vitro Colloquium, Urbana-Champagne, IL, May 2020. (Rescheduled due to COVID-19).
- *Measuring the hidden dynamics of animal behavior*, University of Minnesota, Center for Neuroengineering Colloquium, April 2020 (vitrual).
- *Measuring the hidden dynamics of animal behavior*, Georgia Institute of Technology, Neuroscience Seminar, Atlanta, GA, April 2020 (Rescheduled due to COVID-19).
- *Measuring the hidden dynamics of animal behavior*, Ohio State University, Biophysics Seminar, Columbus, OH, October 2019.
- *Measuring the hidden dynamics of animal behavior*, Colloquium, Okinawa Institute of Science and Technology, Okinawa, Japan, December 2018.
- *Measuring behavior across scales*, Champalimaud Centre for the Unknown, Lisbon, Portugal, July 2018.
- *Predictability and generative models of behavior*, University College London, Institute of Behavioral Neuroscience, London, England, July 2018.
- *Measuring the hidden dynamics of animal behavior*, Harvard University, Center for Brain Science, Cambridge, MA, January 2018.
- *Mapping the structure of animal behavior*, University of Pennsylvania, Biology Department Colloquium, Philadelphia, PA, October 2017.
- *Mapping the structure of animal behavior*, Georgia State University, Spineless Seminar, Atlanta, GA, April 2017.
- *Mapping the structure of animal behavior*, Georgia Institute of Technology, Neuroscience Seminar, Atlanta, GA, December 2016.
- *Mapping the structure of animal behavior*, Champalimaud Centre for the Unknown, Lisbon, Portugal, October 2016.

- *Mapping the structure of animal behavior*, Cornell University, Neuroscience and Behavioral Biology Seminar, Ithaca, NY, October 2016.
- *Predictability and hierarchy in animal behavior*, Georgia Institute of Technology, Physics of Living Systems Seminar, Atlanta, GA, September 2016.
- *Predictability and hierarchy in Drosophila behavior*, University of Pennsylvania, Computational Neuroscience Seminar, Philadelphia, PA, May 2016.
- *Mapping the structure of animal behavior*, HHMI Janelia Research Campus, Ashburn, VA, April 2015.
- *Mapping the structure of animal behavior*, NYU Langone Medical Center, New York, NY, February 2015.
- *Mapping the structure of animal behavior*, Emory University, Department of Biology Seminar, Atlanta, GA, February 2015.
- *Mapping the structure of animal behavior*, Columbia University, Physics Seminar, New York, NY, January 2015.
- *Mapping the structure of animal behavior*, FOM Institute AMOLF (Amsterdam), Biophysics Seminar, Amsterdam, Netherlands, December 2014.
- *Mapping the structure of animal behavior*, Vrije Universiteit Amsterdam, Physics of Living Systems Colloquium, Amsterdam, Netherlands, December 2014.
- *Stereotypy and the Structure of Behavioral Space*, NIST, Biophysics Seminar, Gaithersburg, MD, April 2014.
- *Data-Driven Classification of Animal Behavior*, HHMI Janelia Research Campus, Ashburn, VA, November 2011.
- *Optimization, Control, and Flies: Quantitative Studies of Insect Flight*, Harvard University, School of Engineering and Applied Sciences, Cambridge, MA, February 2009.
- *Optimization, Control, and Flies: Quantitative Studies of Insect Flight*, Princeton University, Biophysics Seminar, Princeton, NJ, February 2009.
- *Optimization, Control, and Flies: Quantitative Studies of Insect Flight*, University of California at Santa Barbara, Condensed Matter Seminar, Santa Barbara, CA, January 2009.
- *Optimization, Control, and Flies: Quantitative Studies of Insect Flight*, Rockefeller University, Center for Physics and Biology Seminar, New York, NY, January 2009.

Invited internal talks at Emory University:

- *Themes and variations in animal behavior*, Emory Theory and Modeling Systems Workshop on Stereotypy and Variability in Humans and Animals, March 2021 (virtual).
- *Measuring behavior across scales*, Yerkes National Primate Research Center Seminar, November 2020 (virtual).
- *Measuring the hidden dynamics of animal behavior*, Emory University, Biology Department Seminar, October 2018.
- *Mapping the structure of animal behavior*, Emory University, Frontiers in Neuroscience Seminar, September 2016.
- *Mapping the structure of animal behavior*, Emory University, ENTICE Innovation Forum, April 2016.
- *Compressing animal behavior*, Emory University, Dimensionality Reduction Workshop, Center for Mind, Brain, and Behavior, October, 2015.
- *Mapping the structure of animal behavior*, Emory University, Physics Department Colloquium, August, 2015.

CONTRIBUTED CONFERENCE PRESENTATIONS

Underlined names are students/postdocs at Emory University

Contributed conference presentations:

- Jain, K, Muzzu, T, Menichini, E, Macke, J, Saleem, A, and **Berman, GJ**. "Multi-timescale representations of rat behavior," HFSP Investigators Meeting, July 2021 (virtual).
- Schulz, A, Saleem, A, **Berman, GJ**, and Macke, JH. "Sequential variational autoencoders for simultaneously recorded neural and behavioural data," HFSP Investigators Meeting, July 2021 (virtual).
- Winner, T, Kesar, T, **Berman, GJ**, and Ting, L. "Data-driven models of stroke gait dynamics can discriminate individual differences better than discrete gait descriptors," Neural Control of Movement, April 2021 (virtual).

- Winner, T, Kesar, T, **Berman, GJ**, and Ting, L. "Developing Dynamical Models to Characterize Stroke Gait Impairments," American Physical Society, March 2021 (virtual).
- Jain, K, Menichini, E, Muzzu, T, Macke, J, Saleem, A, and **Berman, GJ**. "Multi-timescale representation of rat behavior," American Physical Society, March 2021 (virtual).
- Agezo, S, Borie, A, Kocsoh, D, Young, L, Liu, RC, and **Berman, GJ**. "A pipeline for robustly measuring social behavior using deep learning," American Physical Society, March 2021 (virtual).
- Jain, K, Menichini, E, Muzzu, T, Macke, J, Saleem, A, and **Berman, GJ**. "Representing rat behavioral dynamics," FENS, July, 2020 (virtual).
- Braun, J, Schultz, A, **Berman, GJ**, Saleem, A, and Macke, J. "Timescales of predictability as a tool to analyse neuronal dynamics across brain areas," FENS, July, 2020 (virtual).
- Pinkovezky, I, and **Berman, GJ**. "Uncovering the dynamical structure of behavioral repertoires," American Physical Society, Denver, CO, March 2020. (Cancelled due to COVID-19)
- Overman, K, Pinkovezky, I, and **Berman, GJ**. "Inferring behavioral homologies from dynamical models," American Physical Society, Denver, CO, March 2020. (Cancelled due to COVID-19)
- Jain, K, Menichini, E, Muzzu, T, Macke, J, Saleem, A, and **Berman, GJ**. "Long timescale dynamics in freely behaving rats," American Physical Society, Denver, CO, March 2020. (Cancelled due to COVID-19)
- Marshall, J, Aldarondo, D, Dunn, T, Wang, W, **Berman, GJ**, and Ölveczky, B. "Probing the neural substrates of movement generation across the rodent behavioral repertoire," American Physical Society, Denver, CO, March 2020. (Cancelled due to COVID-19)
- Calderon, J, and **Berman, GJ**. "Inferring causality in highly-synchronized dynamics," American Physical Society, Denver, CO, March 2020. (Cancelled due to COVID-19)
- Marshall, J, Aldarondo, D., Dunn, T, Wang, W, **Berman, GJ**, and Ölveczky, B. "Probing the neural substrates of movement generation across the rodent behavioral repertoire," CoSyNe, Denver, CO, February 2020.
- Agezo, S, Borie, A, Jain, K, Kwon, Y, Young, L, Liu, R, and **Berman, GJ**. "Pair bonding increases the predictability of the behavioral repertoire in prairie voles," Society for Neuroscience, Chicago, IL, October, 2019.
- Menichini, E, Muzzu, T, Jain, K, Macke, J, **Berman, GJ**, and Saleem, A. "Quantifying the predictability of rat behavior," Society for Neuroscience, Chicago, IL, October, 2019.
- Marshall, J, Aldarondo, D., Dunn, T, Wang, W., **Berman, GJ**, and Ölveczky, B. "Continuous recordings of whole-body kinematics across the rodent behavioral repertoire," Society for Neuroscience, Chicago, IL, October, 2019.
- Tian, K, **Berman GJ**, and Prinz, A. "Neuronal and synaptic parameter degeneracy in central pattern generator activity," Society for Neuroscience, Chicago, IL, October, 2019.
- Xu, K, Seagraves, K, Egnor, S, and **Berman, GJ**. "Context and Complexity in Mouse Vocalizations," Gordon Research Conference on Neuroethology, West Dover, VT, July, 2019.
- Overman, K, Pinkovezky, I, and **Berman, GJ**. "Modeling the hidden dynamics of Drosophila behavior with recurrent neural networks," American Physical Society, Boston, MA, March 2019.
- Pinkovezky, I, Roman, A, Amadei, E, Liu, R., and **Berman, GJ**. "The role of neural excitability and coupling in the formation of social bonds," American Physical Society, Boston, MA, March 2019.
- Rivera, C, Zhou, B, Hernandez-Lahme, D, Cande, J, Stern, D, and **Berman, GJ**. "Modeling behavioral evolution in fruit flies through reconstructing ancestral states," American Physical Society, Los Angeles, CA, March 2018.
- Calderon, J, Inman, C, Willie, J, and **Berman, GJ**. "Decoding human behavior from complex neural interactions," American Physical Society, Los Angeles, CA, March 2018.
- Pinkovezky, I, Roman, A, Amadei, E, Liu, R, and **Berman, GJ**. "Modeling the Dynamics of Phase-Amplitude-Coupling During Social Bond Formation," American Physical Society, Los Angeles, CA, March 2018.
- Overman, K, Gao, J, Choi, D., Shaevitz, J, and **Berman, GJ**. "Inferring the role of internal dynamics in *Drosophila* aging," American Physical Society, Los Angeles, CA, March 2018.
- Manley, J, **Berman, GJ**, and Shaevitz, J. "Quantification of Behavioral Stereotypy in Flies," American Physical Society, New Orleans, LA, March 2017.

- Alba, V, **Berman, GJ**, Bialek, Q, and Shaevitz, J. "Exploring a strongly non-Markovian behavior," American Physical Society, New Orleans, LA, March 2017.
- Kwon, Y, Adams, GK, **Berman, GJ**, and Liu, RC. "Unbiased automated phenotyping of rodent behavior in nonsocial and social contexts," Society for Neuroscience, San Diego, CA, November, 2016.
- Billings, J, Shakil, S, **Berman, GJ**, and Keilholz, S. "Embedding dynamic functional connectivity into two dimensions with tSNE", Organization for Human Brain Mapping Annual Meeting, Geneva, Switzerland, June 2016.
- Deny, S, Mackevicius, E, Okubo, T, **Berman, GJ**, Shaevitz, J, and Fee, M. "Learning stable representations in a changing world with on-line t-SNE: proof of concept in the songbird," 4th International Conference on Learning Representations, San Juan, Puerto Rico, May 2016.
- Cande, J, Namiki S, Korff, W, Card, G, Shaevitz, J, Stern, D, and **Berman, GJ**. "Optogenetic dissection of descending behavioral control in *Drosophila*," CoSyNe, Salt Lake City, UT, March 2016.
- Klibaite, U, **Berman, GJ**, Wang, W, Cande, J, Stern, D, and Shaevitz, J. "Unsupervised quantifications of social interactions in fruit flies," CoSyNe, Salt Lake City, NY, September 2015.
- **Berman, GJ**, Bialek, W, and Shaevitz, J. "Hierarchy and predictability in Drosophila behavior," Cold Spring Harbor Neurobiology of Drosophila meeting, Cold Spring Harbor, TX, March 2015.
- **Berman, GJ**, Bialek, W, and Shaevitz, J. "Hierarchy and predictability in spontaneous behavior," APS March Meeting, San Antonio, TX, March 2015.
- **Berman, GJ**, Choi, D, Klibaite, U, Bialek, W, and Shaevitz, J. "Stereotypy and the structure of behavioral space," Sloan-Swartz Meeting for Theoretical Neuroscience, Seattle, WA, June 2014.
- LaRue, K, **Berman, GJ**, Perez, T, Guan, G, Stern, D, and Murthy, M. "Evolution of female song production in *Drosophila virilis* group species," Evolution, Raleigh, NC, June 2014.
- **Berman, GJ**, Choi, D, Bialek, W, and Shaevitz, J. "Mapping the structure of animal behavior," APS March Meeting, Denver, CO, March 2014.
- LaRue, K, **Berman, GJ**, Perez, T, Guan, G, Stern, D, and Murthy, M. "Acoustic Duetting During Courtship in *Drosophila virilis*," Drosophila Research Conference, San Diego, CA, March 2014.
- **Berman, GJ**, Choi, D, Bialek, W, and Shaevitz, J. "Mapping the structure of animal behavior," Gordon Conference on Genes and Behavior, Galveston, TX, February 2014.
- **Berman, GJ**, Choi, D, Bialek, W, and Shaevitz, J. "Discovery of stereotypy through behavioral space embedding," American Physical Society, Baltimore, MD, March 2013.
- **Berman, GJ**, Choi, D, Bialek, W, and Shaevitz, J. "Stereotypy and the structure of behavioral space," Society for Integrative and Comparative Biology, San Francisco, CA, January 2013.
- **Berman, GJ**, Bialek, W, and Shaevitz, J. "Data-driven classification of animal behavior," American Physical Society, Boston, MA, March 2012.
- **Berman, GJ**, Bialek, W, and Shaevitz, J. "Reconstructing the behavior of terrestrial fruit flies," American Physical Society, Portland, OR, March 2010.
- **Berman, GJ**, Ristroph, L, Lyon, B, Bergou, A, Cohen, I, and Wang ZJ. "The ascent of freely-flying fruit flies," Society for Integrative and Comparative Biology, Boston, MA, January 2009.
- Bergou, AJ, Ristroph, L, **Berman, GJ**, Cohen, I, and Wang, ZJ. "Wing deformation and control in insect flight," Society for Integrative and Comparative Biology, Boston, MA, January 2009.
- Ristroph, L, **Berman, GJ**, Bergou, AJ, Cohen, I, and Wang, ZJ. "Sideways flying by phased wing flipping," Society for Integrative and Comparative Biology, Boston, MA, January 2009.
- **Berman, GJ**, Ristroph, L, Bergou, A, Cohen, I, and Wang ZJ. "A novel automated method for studying free-flight insect maneuvers," American Physical Society Division of Fluid Dynamics, San Antonio, TX, November 2008.
- Ristroph, L, **Berman, GJ**, Bergou, A., Wang, Z.J, and Cohen, I. "Sideways flight of insects by phased wing flips," American Physical Society Division of Fluid Dynamics, San Antonio, TX, November 2008.
- Bergou, A, Ristroph, L, **Berman, GJ**, Wang, ZJ, and Cohen, I. "Wing Deformation and Control in Insect Flight," American Physical Society Division of Fluid Dynamics, San Antonio, TX, November 2008.
- **Berman, GJ**, Ristroph, L, Cohen, I, and Wang ZJ. "An interspecific comparison of fruit fly flight," American Physical Society Division of Fluid Dynamics, Salt Lake City, UT, November 2007.

- Cohen, I, Ristroph, L, **Berman, GJ**, and Wang ZJ. "Comparing flight strategies in species of fruit flies," American Physical Society Division of Fluid Dynamics, Salt Lake City, UT, November 2007.
- **Berman, GJ**, and Wang, ZJ. "Kinematics, power, and optimization in hovering insect flight," American Physical Society Division of Fluid Dynamics, Chicago, IL, November 2005.

MEDIA

- Honey bees rally to their queen via 'game of telephone', Science, April 2021.
- Taming the Data from Freely Moving Animals, Simons Foundation Global Brain News, August 2020.
- Emory-led consortium explores brain and behavior, across the tree of life, Emory News, June 2020.
- Deep learning powers a motion-tracking revolution, Nature, September 2019.
- Emory professor named Cottrell Scholar for outstanding contributions to science, Emory News, July 2019.
- Artificially Intelligent Tools Capture Animal Movement, The Scientist, May 2019.
- The secret language of behavior, BMC 'On Biology' Blog, January 2017.

TEACHING

COURSES TAUGHT AT EMORY

- Biology 485/Physics 741R:
  Measuring and Modeling Animal Behavior
  Developed for Fall 2016 and taught Fall 2016 & Fall 2017
- Biology 355/Quantitative Theory and Methods 355:
  Introduction to Time Series Analysis
  Developed for Spring 2017 and taught Spring 2017, Spring 2018, & Spring 2019.
- Biology 450/IBS 534:
  Computational Neuroscience
  Directed course during Spring 2019 and Spring 2021 and taught two lectures each in Spring 2016, 2017, & 2018, and three lectures in 2020 (will direct the course again in Spring 2022).
- Biology 385/QTM 385:
  Analyzing Data in Many Dimensions
  New interdisciplinary course focusing on theory-driven analysis of high-dimensional data.
  Developed for Fall 2020 as part of a Cottrell Scholar Award (was taught virtually) and taught in-person for Fall 2021.

OTHER TEACHING

- Developed and taught a tutorial on multi-scale behavioral analysis at the Cajal School on the Behavior of Neural Systems in Lisbon, Portugal (July, 2018). I will co-direct the course in 2022.
- Organized and taught at the Simons-Emory International Consortium on Motor Control Computational Methods Workshop (May, 2021)
- Developed a tutorial on behavioral analysis for the Emory TMLS Motor Control Symposium (March, 2021)
- Mentor for the Neuromatch Academy summer school on computational neuroscience (Summer 2020).
- Taught at a Short Course at the 2019 Society for Neuroscience Meeting on modern methods in behavioral analysis in neuroscience (October, 2019).
- Developed and taught a four lecture sequence on the Physics of Behavior for the 2019 Boulder Summer School on Condensed Matter Physics (School topic: Theoretical biophysics).
- Mentor for Emory Neuroscience Graduate Program grant writing class (Fall 2019 and Fall 2020).

- Developed a lecture on local field potential analysis for Emory Neuroscience 551 (Fall 2018 and Fall 2019).
- Developed a lecture and tutorial on analyzing behavioral data at the Severo Ochoa Symposium on Behavior and Circuits in Alicante, Spain (October 2016).
- Developed and taught a behavioral analysis tutorial during the Emory University Dimensionality Reduction Workshop (October, 2015).

TEACHING EXPERIENCE PRIOR TO EMORY

Lecturer — Princeton University — September 2011 - June 2012
Physics Department — Princeton, NJ

Taught introductory physics, chemistry, and biology as part of the Integrated Science curriculum

Visiting Lecturer — Cornell University — August 2007 - December 2007
Mathematics Department — Ithaca, NY

Lectured on introductory calculus for engineers

Teaching Assistant — Cornell University — August 2003 - May 2004
Physics Department — Ithaca, NY — January 2008 - May 2008

Recitation instruction of introductory physics classes

Undergraduate Student Instructor — University of Michigan — June 2003 - August 2003
Mathematics Department — Ann Arbor, MI

Co-taught a summer class to high schoolers on "The Nature of Infinity" as part of the Michigan Math and Science Scholars summer program

TEACHING HONORS AND AWARDS

- Cottrell Scholar Award (2019) *(for both teaching and research)*

GRADUATE MENTEES

- Jirui Qiu, MS, Physics (2016 - 2017)
  Thesis: *Context-dependent Encoding of Descending Neurons in Drosophila*
- Katherine Overman, PhD Candidate, Physics (2016 -)
- Josuan Calderon, PhD Candidate, Physics (2017 -)
- Sena Agezo, PhD Candidate, Neuroscience (2018 -), co-mentored with Robert Liu
- Kanishk Jain, PhD Candidate, Physics (2018 -)
- Taniel Winner, PhD Candidate, Biomedical Engineering (2019 -), primary mentor: Lena Ting
- Rajpreet Kaur, PhD Candidate, Physics (2021 -)

Rotation Students

- Eslam Abdelaleem (Physics, 2019)
- Kelvin Chng (Physics, 2021)
- Masud Ehsani (Physics, 2016)
- Aiden Ford (Neuroscience, 2020)
- Weijie Li (Physics, 2017)
- Chen Pang (Physics, 2015)
- Gary Vestal (Physics, 2019)
- Jin Qian (Physics, 2018)

POSTDOCTORAL MENTEE

- Itai Pinkovezky (2016 - 2020)

UNDERGRADUATE MENTEES

- Sherry An, Emory University (Class of 2022)
- Xiaoyi Chen, Emory University (Class of 2019)
- Xiaotong (Kary) Fang, Emory University (Class of 2022)
- Jeff Gao, Emory University (Class of 2018)
- Kevin Ge, Emory University (Class of 2024)
- Ken Igarza, Emory University (Class of 2019)
- Rauf Iftikhar, Emory University (Class of 2023)
- Jessica Ji, Emory University (Class of 2022)
- Shinyoung Kang, Emory University (Class of 2021): **Senior Thesis with High Honors**
  Thesis: *Mapping Behavioral and Neural Data with Variational Autoencoders*
- Ruolan Lin, Emory University (Class of 2022)
- Priyam Mazumdar (Class of 2020)
- Kiana Kim, Emory University (Class of 2021)
- Elizabeth O'Gorman, Emory University (Class of 2018): **Senior Thesis with Highest Honors**
  Thesis: *Low-Dimensional Mapping of Corticostriatal Neural Circuitry Dynamics Underlying Female Prairie Vole Pair Bonding*
  2018 National Science Foundation Graduate Research Fellowship
- Ishan Saran, Emory University (Class of 2020): **Senior Thesis with Highest Honors**
  Thesis: *Representing Behaviors with Recurrent Neural Networks*
- Margo Shen, Emory University (Class of 2022)
- Hanyao Sun, Emory University (Class of 2019)
- Kevin Xu, Emory University (Class of 2020): **Senior Thesis with Highest Honors**
  Thesis: *Context and Complexity in Mouse Vocalizations*
  Beckman Scholar in Computational Neuroscience (2017-2019)
- Yating Yang, Emory University (Class of 2018): **Senior Thesis with High Honors**
  Thesis: *Low-Dimensional Dynamics Encoding in Human Brain Data*

GRADUATE COMMITTEE MEMBER

Emory Neuroscience:

- Sena Agezo
- Rachel Conn
- Aiden Ford
- James MacGregor (PhD, 2021)
- Taylor Kahl
- Andrea Pack
- Leila Pascual
- Kayla Peelman
- Varun Saravanan (PhD, 2019)
- Kun Tian (PhD, 2019)
- Yunmiao Wang
- Feng Zhu

Emory Physics:

- Eslam Abdelaleem
- Josuan Calderon
- Mahan Ghafari (MS, 2018)
- Kanishk Jain
- Rajpreet Kaur
- KaWai Leung (PhD, 2017)
- Qihan Liu
- Kavinda Nissanka
- Joseph Natale (PhD, 2020)
- Tomilola Obadiya

- Katherine Overman
- Charles Packard
- Mahajabin Rahman
- Catalina Rivera (PhD, 2020)
- Ahmed Roman
- Tyler Smith (PhD, 2021)
- Jirui Qiu (MS, 2017)
- Baohua Zhao (PhD, 2019)

Emory & Georgia Tech Biomedical Engineering:

- W. Alexander Calhoun
- Kim Le
- Sean O'Connell
- Anderson Speed
- Mattia Rigotti Thompson
- Lahiru Wimalasena
- Taniel Winner

Emory Clinical Psychology:

- Steven Riley

External:

- Kathleen Bates, Georgia Tech BioEngineering (PhD, 2020)
- Shivesh Chaudhary, Georgia Tech Chemical Engineering
- Francisco Romero Ferrero, Universidade Nova de Lisboa Neuroscience (PhD, 2021)
- Jake Graving, Universität Konstanz Collective Behaviour (PhD, 2021)
- Ugne Klibaite, Princeton Quantitative and Computational Biology (PhD, 2018)
- Daniel Porto, Georgia Tech BioEngineering (PhD, 2018)
- Varun Sharma, Georgia Tech Quantitative Biosciences

UNDERGRADUATE HONORS COMMITTEE MEMBER

- Gustavo Borjas (Physics, Class of 2021)
- Tony Chen (Biology, Class of 2021)
- Peijian Ding (Mathematics, Class of 2021)
- Kary Fang (Quantitative Sciences, Class of 2021) (*chair*)
- Shinyoung Kang (Quantitative Sciences, Class of 2021) (*chair*)
- Ishan Saran (Physics, Class of 2020) (*chair*)
- Kevin Xu (Quantitative Sciences, Class of 2020) (*chair*)
- Danial Arslan (Biology, Class of 2020)
- Mia Morrell (Physics, Class of 2020)
- Nick Green (Biology, Class of 2019)
- Shalini Sreedhar (Biology, Class of 2019)
- Veronica Chiu (NBB, Class of 2019)
- Ruomin Zhu (Physics, Class of 2019)
- Elizabeth O'Gorman (NBB, Class of 2018) (*chair*)
- Yating Yang (Biology, Class of 2018) (*chair*)
- Cyrillus Tan (Physics, Class of 2018)
- Caroline Holmes (Physics & Biology, Class of 2017)
- Hugh Phillis (Physics, Class of 2017)

SERVICE

COMMITTEE-BASED SERVICE

Emory College of Arts and Sciences:

- Member, Emory College High-Performance Computing Committee (2020 - current)

- Member, Emory Biology Department Curriculum Task Force (2021 - current)
- Member, Emory Biology Department Computing Committee (2021 - current)
- Member, Emory QTM Department Faculty Search Committee (2020-2021)
- Member, Emory Physics Department Strategic Advisory Committee (Spring/Fall 2018)
- Member, Emory Biology Department Search Committee in Theoretical/Computational Epigenetics (2019-2020)
- Member, Task Force on Biology Hires within Emory QTM (Summer 2019 - current)
- Member, Task Force on Emory Physics Post-baccalaureate Program (Fall 2019)
- Member, Emory Physics Department Strategic Advisory Committee (Spring/Fall 2018)

Emory University:

- Judge, Emory STEM Symposium (2016 - current)
- Member, Organizing Committee, Georgia Tech/Emory Kavli Brain Forum (2016 - 2019)
- Member, Emory STEM Symposium Admissions Committee (2016 - 2018)

Emory Laney Graduate School:

- Member, Emory Neuroscience Graduate Program Executive Committee (2019 - current)
- Co-Chair, Emory Neuroscience Graduate Program Admissions Committee (2019 - current)
- Chair, Emory Neuroscience Graduate Program Admissions Subcommittee on International Applications (2018 - current)
- Member, Emory Neuroscience Graduate Program Admissions Committee (2016 - current)
- Member, Emory Neuroscience Graduate Program Awards Committee (2019 - 2020)
- Member, Emory Physics Graduate Program Admissions Committee (2015 - 2019)
- Member, Emory Physics Graduate Program Matching Committee (2020 - current)
- Member, Emory Physics Graduate Program Task Force on Faculty Admissions (Fall 2020)

PROFESSIONAL AFFILIATIONS

- American Physical Society
  - Division of Biological Physics
  - Division of Soft Matter
  - Data Science Working Group
  - Statistical and Nonlinear Physics Working Group
- Atlanta Society of Mentors

CONFERENCES/SESSIONS ORGANIZED or CO-ORGANIZED

- Summer 2021 Aspen Center for Physics Working Group on “Long Timescale Dynamics in Animal Behavior"
- Inaugural Symposium (virtual) of the Simons-Emory International Consortium on Motor Control (June 2020)
- Theory and Modeling in Living Systems Virtual Workshop on the Physics of Behavior (April 2020)
- Theory and Modeling in Living Systems Initiative Workshop on "What is Theoretical Biological Physics in The Age of Quantitative Biology and Big Data?” (Emory University, 2019)
- Symposium on "Computational Neuroethology" at the 2018 FENS Meeting (Berlin, Germany)
- Summer 2018 Aspen Center for Physics Workshop on "The Physics of Behavior" (Aspen, CO)
- "Neural Control of Behavior" Session at 2018 American Physical Society March Meeting (Los Angeles, CA)

- "Neural Control of Behavior" Session at 2017 American Physical Society March Meeting (New Orleans, LA)
- "Neural Control of Behavior" Session at 2016 American Physical Society March Meeting (Baltimore, MD)

JOURNAL & CONFERENCE REVIEWS

Over 60 papers total, including papers from: eLife, Frontiers in Human Neuroscience, iScience, Journal of the Royal Society Interface, Nature, Nature Communications, Nature, Nature Methods, Nature Neuroscience, Nature Physics, Neuroinformatics, PLoS Computational Biology, PLoS One, Physical Biology, Physical Review Letters, Physical Review E, Proceedings of the National Academy of Sciences, Reviews of Modern Physics, and Scientific Reports

- Member, Board of Reviewing Editors at *eLife*, 2019 - current
- Reviewer, CoSyNe, 2016 - current

GRANT REVIEWS

- Ad hoc grant review for National Science Foundation (IOS)
- German-Israel Foundation for Scientific Research and Development
- Emory University Research Council Internal Grants
- Great Ormond Street Hospital Charity Clinical Research Grants
- Human Frontiers Science Program Young Investigator Grants
- NRSEC (Canada) Discovery Grant Competition

Dated: August 16, 2021