PERSONAL INFORMATION

Jeremy D Harris

📍 1325 McLendon Ave NE APT 2, Atlanta, GA 30307

📱 (717) 329 - 7892

✉ jharris387@gatech.edu

WORK EXPERIENCE

June 2020 – present — **Postdoctoral Fellow Researcher**

Department of Biological Sciences, Georgia Tech

- Advisor: Joshua Weitz, PhD, Associate Professor
- Aim: In our work on virus-microbe entanglement, we aim to build a theoretical framework —guided, in part, by communication with experimentalists—to better understand the long-term interactions of viruses and their hosts.

August 2017 – May 2020 — **Postdoctoral Fellow Researcher**

Department of Biology, Emory University

- Advisor: Katia Koelle, PhD, Associate Professor
- Developed mathematical models influenza virus. In collaboration with experimental virologists, we studied the effects of multiplicity of infection (MOI) on influenza viral infection outcomes in cell culture. We also modeled a serial passage study in which varying MOIs of wild-type and defective interfering particles gave rise to cycling dynamics. Lastly, we developed a within-host stochastic exponential growth with mutations model to estimate between-host bottleneck sizes based on the number of de novo variants in recipient hosts.

EDUCATION

2017 — **Ph.D. in Mathematics**

University of Pittsburgh, Pittsburgh, PA
Advisor: Bard Ermentrout, PhD, Distinguished University Professor

- Thesis: "Analysis of a spatially-distributed Wilson-Cowan model of cortex"

2011 — **B.S. in Mathematics, minor in Bioengineering**

University of Pittsburgh, Pittsburgh, PA

- Honors College, Graduated Summa Cum Laude

PUBLICATIONS

In preparation.

- Harris, J.D., Johnson, K.E., Koelle, K.V. (2020). "Estimation of transmission bottleneck sizes from de novo genetic variation in recipient hosts." (in preparation, anticipated date of submission: Sept. 2020)

- Harris, J.D.*, Martin, B.E*., Koelle, K.V., and Brooke, C.B. (2020). "Influenza virus population cycles emerge from collections of variably responding cells." *authors contributed equally. (in preparation, anticipated date of submission: Oct. 2020)

Published.

- Martin, B.E.*, Harris, J.D.* et al. (2020). "Cellular co-infection can modulate the efficiency of influenza A virus production and shape the interferon response." PLoS pathogens 16.10: e1008974. *authors contributed equally https://doi.org/10.1371/journal.ppat.1008974

- Harris, J.D. and Ermentrout, G.B. (2018). "Traveling waves in a spatially-distributed Wilson-Cowan model of cortex: From fronts to pulses." Physica D: Nonlinear Phenomena, 369, 30-46. https://doi.org/10.1016/j.physd.2017.12.011

- Ali, R., Harris, J.D., and Ermentrout, G.B. (2016). "Pattern formation in oscillatory media without lateral inhibition." Physical Review E, 94(1), 012412. https://doi.org/10.1103/PhysRevE.94.012412

- Harris, J.D. and Ermentrout, G.B. (2015). "Bifurcations in the Wilson–Cowan equations with nonsmooth firing rate." SIAM Journal on Applied Dynamical Systems, 14(1), 43-72. https://doi.org/10.1137/140977953

PRESENTATIONS

2014 – present   Talks & Posters (external)

- Invited speaker – "Modeling asymptomatic transmission in COVID-19." Virtual talk for University of Florida Math Bio seminar (Feb. 4, 2021)

- Poster presentation – "Modeling asymptomatic transmission in COVID-19." Student Conference on COVID-19 modeling (May 28-29, 2021)

- Invited speaker – "Modeling asymptomatic transmission in COVID-19." Virtual talk for Pitt Math Bio seminar (Nov. 19, 2020)

- Conference talk – "Estimating transmission bottleneck sizes from viral variants unique to recipient hosts." Epidemics Conference 2019 (Dec. 3-6, 2019)

- Invited speaker – "Cellular co-infection increases viral production but the constituents of the output depend on frequencies of the input." Kennesaw State University, Applied Math seminar (Nov. 15, 2019)

- Invited speaker – "How do defective interfering particles impact influenza virus dynamics?" University of Pittsburgh, Center for Vaccine Research (April 16, 2019)

- Discussion moderator – summarized conference talks/posters and facilitated "Big picture" discussion on the future of quantitative biology. A TMLS-sponsored conference at Emory (Jan. 16-18, 2019)

- Poster presentation – "Complex viral dynamics emerge in vitro from collections of heterogeneously-responding infected cells." Evolution of Complex Life at Georgia Tech (May 15-17, 2019)

- Conference talk – "Traveling waves in a (nonsmooth) neural firing rate model." SIAM 2017 Annual Meeting (Pittsburgh, PA, July 10-14, 2017)

- Conference talk – "Patterns and waves in a spatially-extended neural field model." SIAM 2017 Conference on Applications of Dynamical Systems
(Snowbird, Utah, May 21-25, 2017)

- Conference talk – "Travelling fronts and pulses in a nonsmooth neural mass model." SIAM 2015 Conference on Applications of Dynamical Systems
(Snowbird, Utah, May 17-21, 2015)

- Conference talk – "The Wilson-Cowan equations with nonsmooth firing rate." (George Mason University, March 20-21, 2015)

- Conference talk – "Bifurcation analysis of the Wilson-Cowan equations with nonsmooth firing rate function." IEEE International Meeting on Analysis and Applications of Nonsmooth Systems (Como, Italy, August 10-12, 2014)

2011 – present   ## Seminar Presentations (internal)

- Presented, "Modeling asymptomatic transmission in COVID-19." Complex microbial dynamics and infections seminar (Oct. 9, 2020)

- Presented, "Data literacy in the sciences." Academic Learning Community on data literacy, Emory (March 31, 2020)

- Presented Rubin et al., "Revealing neural correlates of behavior without behavioral measurements." BioRxiv (2019). Theoretical Biophysics seminar, Emory (Oct. 21, 2019)

- Presented Shoval et al., "Evolutionary Trade-Offs, Pareto Optimality, and the Geometry of Phenotype Space." Science (2012). Theoretical Biophysics seminar, Emory (Feb. 18, 2019)

- Presented on current methods of estimating transmission bottlenecks. Koelle lab meeting, Emory (Feb. 11, 2019)

- Presented Allesina and Levine, "A competitive network theory of species diversity." PNAS (2011). Theoretical Biophysics seminar, Emory (Oct. 2017)

- Presented "The community ecology of influenza A defective interfering particles." Ecology and Evolution seminar, Emory (Oct. 2017)

- Presented "Pattern formation in the Wilson-Cowan equations." Applied Math seminar, Pitt (September 25, 2015)

- Presented on "Bifurcations of piecewise smooth flows." Colombo et al., Physica D: Nonlinear Phenomena (2012). Math Bio seminar, Pitt (Sept. 12 & 17, 2015)

- Presented an introduction to rigidity in the tensegrity model – In preparation for the guest speaker, R. Connelly, as part of a themed semester on networks. Math Bio seminar, Pitt (Sept. 17, 2014)

- Presented on "Iterated Prisoner's Dilemma contains strategies that dominate any evolutionary opponent." Press and Dyson, PNAS (2012). Math Bio seminar, Pitt (March 6, 2014)

- Presented "Processes taking place on networks." Math Bio seminar, Pitt (Feb. 5, 2013)

- Presented an existence proof of travelling waves in a shape-space model of antigenic variation in Trypanosomes. Applied Math seminar, Pitt (April 5, 2013)

- Presented on modelling antigenic variation in Trypanosome infections. Math Bio seminar, Pitt (Dec. 9, 2011 & Oct. 29, 2012.)

AWARDS & FELLOWSHIPS

2011 – 2013   ## NSF-RTG, Complex Biological Systems Group

- Complex biological systems across multiple space and time scales
  Award number 0739261
- Funding for the first two years of graduate school

April 2011   ## Culver Award for undergraduate research, Department of Mathematics

- For work on modeling antigenic variation in Trypanosome infections

2010 – 2011   NSF-RTG, Complex Biological Systems Group
- Complex biological systems across multiple space and time scales
  Award number 0739261
- Undergraduate research experience: summer (2010) & spring/summer (2011)

2007 – 2011   University of Pittsburgh scholarships
- University of Pittsburgh, 2007-2011
- Swanson School of Engineering, 2007-2009

TEACHING EXPERIENCE

2015 – 2017   Teaching – Pitt
- Graduate Linear Algebra – Teaching Assistant
- Intro to Finite and Discrete Mathematics – Instructor
- Intro to Real Analysis – Teaching Assistant
- Intro to College Algebra – Instructor
- Calculus I (2 sections) – Instructor
- Intro to College Algebra (2 sections) – Instructor
- Intro to College Algebra – Instructor
- Calculus III – Teaching Assistant

2015 – 2016   Teaching Assistant Workshops – Pitt
- Topics include: developing a teaching philosophy, syllabus construction, encouraging participation, teaching with Powerpoint, navigating difficult situations

SERVICE

2015 – present   Journal manuscript reviews
- Kähne, M., Rüdiger, S., Kihara, A. H., and Lindner, B. (2019). Gap junctions set the speed and nucleation rate of stage I retinal waves. PLoS computational biology, 15(4), e1006355.
- Nielsen, B. F. (2017). "Regularization of Ill-posed point neuron models." The Journal of Mathematical Neuroscience, 7(1), 6.
- Ji, Y., Zhang, X., Liang, M., Hua, T., and Wang, Y. (2015). "Dynamical analysis of periodic bursting in piece-wise linear planar neuron model." Cognitive Neurodynamics, 9(6), 573-579.

2018 – Spring 2020   Volunteering at Graduate and Undergraduate events – Emory
- Data Literacy Academic Learning Community – six 1.5 hour discussions on data literacy, with a focus on interdisciplinary educational approaches, skill-building in data literacy; deliverables include a package on data literacy for lessons and curriculum to support undergraduate education
- Data Science for Scientists ATL – monthly meetings and special sessions on all things data (e.g. Jupyter notebook demos, version control with git, visualization with R)
- Software carpentry workshop – hosted by Data Science for Scientists ATL (Nov. 23-24, 2019) – to learn and help others learn basic shell commands, version control with git, and to use jupyter notebooks and some basic python code
- Datafest at Emory – undergraduates analyze a large dataset as part of the quantitative theory and methods initiative (April 2019)
- Graduate Research Symposium – helped with judging of research talks/posters (2018-2020)
- Volunteer for Atlanta Bike Emory: participating in Emory Cares International Service Day (Saturday Nov. 9, 2019)

2019 – present   Committee on Environment – Emory
- We discuss, review, and make recommendations on campus projects and initiatives that have an environmental impact on campus (committee website)

April 2020 – present **Volunteering – Hearts to Nourish Hope Food Bank**
- Volunteer through Hands on Atlanta – monthly, from April-August 2020

2018 – 2019 **Volunteering – Human Rights Campaign (HRC)**
- Volunteer for HRC Atlanta Pride Brunch (Oct. 13, 2019)

2013 – 2017 **Officer of the Graduate Student Organization – Pitt**
- Representative from the math department in general body meetings; planned and organized graduate student events, including socials and the new student teaching orientation

2014 – 2015 **Graduate Student Seminar Organizer – Pitt**
- Organized for graduate students as an opportunity to practice presenting their work

2014 – 2016 **Volunteer at Pitt's Integration Bees**
- Helped with the undergraduate bee (2014 & 2015); high school bee (2015 & 2016)

2013 – 2014 **Volunteer for Neighborhood Learning Alliance (NLA)**
- Helped high school students complete online coursework to obtain equivalent credit for a failed or incomplete course-requirement, Pittsburgh, PA (July and August of 2013 & 2014).

GROUPS & ORGANIZATIONS

2019 – present **Emory, UGA, GA Tech**
- Emory-UGA-GATech SARS-CoV-2 journal club (co-organizer) – to collect, organize, and share information on high output of COVID-19 papers. We read papers anywhere from epidemiological data analysis to vaccine efficacy studies. We meet weekly, and the google doc is kept up-to-date – first meeting April 20; updated August 14.

- Postdoctoral Science Magazine (editor) – to highlight research being done at Emory University and other research institutions in Atlanta; develop skills in communicating science; blog post (Emory PDA) on working remotely – March 25, 2020; last updated December 2020

2017 – Spring 2020 **Emory University**
- Biology Postdoctoral Cohort – created to build social and professional connections amongst postdocs in biology and related areas

- Theory and Modeling of Living Systems (TMLS) Initiative

- EmoRy R & coding club – to learn R studio, R markdown, version control with git

- Data Science for Scientists ATL – to engage with the data science community at Emory, both learning and helping with events (meetings, workshops, etc.)

- Data Literacy Academic Learning Community – seeks to provide a space for discussion and exploration of data literacy, with a focus on interdisciplinary educational approaches, skill-building in data literacy (6 meetings during spring semester 2020); one of our main goals is to develop a data literacy package that includes lessons and curriculum to support undergraduate education

CURRENT PROFESSIONAL
MEMBERSHIPS

National/international Organizations

- Society for Industrial and Applied Mathematics (SIAM)
- Society for Mathematical Biology (SMB)
- American Mathematical Society (AMS)
- Models of infectious disease agent study (MIDAS)

FUNDING
ACKNOWLEDGMENTS

August 2017 – present

DARPA INTERCEPT W911NF-17-2-0034

Principal Investigator: Chris B. Brooke, PhD, Assistant Professor
- Funding source of my postdoctoral fellowship
- As part of the INTERCEPT program, our research team has aimed to investigate the potential for defective interfering particles to be used as a novel therapeutic against viral infections by understanding their basic evolutionary consequences within- and between-hosts.

2013 – 2014

NSF DMS 1219753

Principal Investigator: G. Bard Ermentrout, PhD, Distinguished University Professor
- Interactions between Stimuli and Spatiotemporal Activity
- Working with an undergraduate REU student (summer 2014), we published our results in PRE (2016). (see publications section)

REFERENCES

Katia Koelle
Associate Professor
Department of Biology
Emory University
1510 Clifton Road NE
Atlanta, GA 30322
(404) 727-6292
katia.koelle@emory.edu

Bard Ermentrout
Distinguished University Professor
Department of Mathematics
University of Pittsburgh
301 Thackeray Hall
Pittsburgh, PA 15260
(412) 624-8324
bard@pitt.edu

Brent Doiron
Associate Professor
Department of Mathematics
University of Pittsburgh
301 Thackeray Hall
Pittsburgh, Pa 15260
(412) 624-1759
bdoiron@pitt.edu

Chris B. Brooke
Assistant Professor
Department of Microbiology
Carl R. Woese Institute for Genomic Biology
University of Illinois at Urbana-Champaign
601 S. Goodwin Ave
Urbana, IL 61801
(217) 265-0991
cbrooke@illinois.edu