llenna Jones, PhD

Education

June 1, 2017	University of Pennsylvania,
– Sept 8, 2023	Neuroscience, Biomedical Graduate Studies, PhD.
	Advisor: Konrad Kording • Thesis: "Quantifying the Impact of Dendritic Properties on Neuronal Computation"
2011–2015	Dartmouth College,
	Neuroscience, Bachelor of Arts.

Current Employment

Nov 2023 - Kempner Research Fellow, HARVARD UNIVERSITY - KEMPNER INSTITUTE FOR THE STUDY OF Present NATURAL AND ARTIFICIAL INTELLIGENCE. Directors: Bernardo Sabatini and Sham Kakade

Past Employment

- 2022 Intern, JOHNS HOPKINS UNIVERSITY: APPLIED PHYSICS LABORATORY. Supervisors: Erik Johnson and William Gray-Roncal
 - Developed an novel data pipeline for using dendritic morphologies in EM connectomics analysis
- 2015–2017 Laboratory Research Technician, JOHNS HOPKINS UNIVERSITY.

Supervisor: Zachary Kaminsky

• Epigenetic methylation analysis of blood biomarkers for predicting risk of developing neuropsychiatric illnesses

Publications

Theoretical/Computational

- July 2024 **Ilenna Jones** and Konrad Kording, "Efficient optimization of ODE neuron models using gradient descent", ArXiv.
- May 2022 **Ilenna Jones** and Konrad Kording, "Do Biological Constraints Impair Dendritic Computation?", Neuroscience.
- March 2022 Bernard Hart... Ilenna Jones (et. al)..., "Neuromatch Academy: a 3-week, online summer school in computational neuroscience", Journal of Open Source Education.
 - May 2021 Ilenna Jones and Konrad Kording, "Might a Single Neuron Solve Interesting Machine Learning Problems Through Successive Computations on Its Dendritic Tree?", Neural Computation.
 - Previously entitled: "Can single neurons solve MNIST? The computational power of biological dendritic trees" in ArXiv 2020.
 - Nov 2019 **Ilenna Jones**, Konrad Kording, "Quantifying the role of neurons for behavior is a mediation question", Behavioral and Brain Sciences.
 - Sept 2019 Roozbeh Farhoodi, Kashayar Filom, **Ilenna Jones**, and Konrad Kording, "On functions computed on trees", Neural Computation.

Cellular/Molecular

- March 2021 Jennifer Payne, LM Osbourne, O Cox, ... **Ilenna Jones**, (et. al.), Zachary Kaminsky, "DNA methylation biomarkers prospectively predict both antenatal and postpartum depression", Psychiatry Research.
 - July 2020 Zachary Kaminsky, LM Osbourne, V Guglielmi, **Ilenna Jones**, (et. al.), *"Postpartum depression biomarkers predict exacerbation of OCD symptoms during pregnancy"*, Psychiatry Research.
 - Nov 2019 JL Payne, LM Osborne, O Cox, J Kelly, S Meilman, **Ilenna Jones**, (et. al.), and Zachary Kaminsky, "DNA Methylation Biomarkers Prospectively Predict Both Antenatal and Postpartum Depression", Psychiatry Research.

- Aug 2017 Falk Lohoff, Jill Sorcher, Allison Rosen, ..., **Ilenna Jones**, (et. al.), and Zachary Kaminsky, "*Methylomic profiling and replication implicates deregulation of PCSK9 in alcohol use disorder*", Molecular Psychiatry.
- May 2017 Zachary Kaminsky, **Ilenna Jones**, Arnold Bakker, (et. al.), and Jennifer Payne, "Discovery, Replication, and Application of an Epigenetic Biomarker Model to the Prediction of Postpartum Depression and Neuroimaging Endophenotypes", Biological Psychiatry.
- May 2017 Makena Clive, **Ilenna Jones**, Holly Wilcox, William Eaton, (et al) and Zachary Kaminsky, "Stress Vulnerability and Epigenetic Variation of a Suicide Biomarker Gene, Molecular Regulation and Neuroimaging Consequences of SKA2", Biological Psychiatry.
- July 2014 Zachary Kaminsky, **Ilenna Jones**, Ranjana Verma, Lena Saleh, Hersh Trivedi, Jerry Guintivano, Ryan Akman, Peter Zandi, Richard S Lee and James Potash, "DNA methylation and expression of KCNQ3 in bipolar disorder", Bipolar Disorders.

Invited Talks

- July 2024 **"Applying Supervised Learning to Quantify the Impact of Dendrites on Neuronal Computation"**, HARVARD UNIVERSITY.
 - KRANIUM (Kempner Research in Artificial & Natural Intelligence for Undergraduates with Mentorship)
 - In Person, Boston, Massachusetts
- June 2024 "Applying Supervised Learning to Quantify the Impact of Dendrites on Neuronal Computation", WELLESLEY COLLEGE.
 - Wellesley Summer Research Program
 - In Person, Wellesley, Massachusetts
- May 2024 "Efficient optimization of ODE neurons using gradient descent", ALLEN INSTITUTE.
 - Computation and Theory Seminar
 - In Person, Seattle, Washington
- May 2024 "Efficient optimization of ODE neurons using gradient descent", JANELIA RESEARCH CAMPUS. • Theory and Computation Lab Seminar
 - In Person, Washington, DC
- Oct 2023 "Quantifying the Impact of Dendritic Properties on Neuronal Computation", Wellesley College.
 - Neuroscience Seminar
 - In Person, Wellesley, Massachusetts
- Mar 2023 "Neural computation of machine learning tasks emerges from the interaction of dendritic properties", COSYNE.
 - COSYNE Workshop: "Dendritic computations and neuro-inspired AI"
 - In Person, Montreal, Canada
- Dec 2022 "Can a single neuron solve MNIST? Neural computation of machine learning tasks emerges from the interaction of dendritic properties", WORLD WIDE NEURO.
 - SNUFA (Spiking neural networks as universal function approximators) Talk SeriesVirtual
- May 2022 **"Do Biological Constraints Impair Dendritic Computation?"**, SEGEV LAB. • Virtual, Hebrew University of Jerusalem, Israel
- Feb 2021 "Solving MNIST with biological dendritic trees", COSYNE.
 - o Virtual
- Aug 2020 "Can single neurons solve MNIST? The computational power of biological dendritic trees", PROJECT ENCEPHALON.
 - Virtual, India
- Aug 2020 "Can single neurons solve MNIST? The computational power of biological dendritic trees", NUMENTA.
 - Brains@Bay
 - Virtual, Numenta, California

Posters and Presentations

Aug 2024	 "Optimization of fully differentiable ODE neurons using gradient descent", POSTER. Cognitive Computational Neuroscience 2024 Boston, MA, USA
Nov 2023	"Optimization of fully differentiable ODE neurons using the backpropagation of error algorithm", $Poster$.
	 Society for Neuroscience Conference 2023 Washington D.C., USA
May 2022	"Single Neurons Can Still Perform Machine Learning Tasks Despite the Addition of Biological Constraints", POSTER.
	 Dendrites 2022: Dendritic anatomy, molecules and function (EMBO Workshop) Heraklion, Greece
Dec 2022	 "Do Biological Constraints Impair Dendritic Computation?", PRESENTATION. NeuroMatch Conference 4.0 Virtual
Dec 2020	 "Can single neurons solve MNIST? The computational capabilities of biological dendritic trees", POSTER. Cognitive and Systems Neuroscience HHMI Science meeting
	 Virtual, Howard Hughes Medical Institute, Washington DC
Oct 2020	 "Can single neurons solve MNIST? The computational power of biological dendritic trees", PRESENTATION. NeuroMatch Conference 3.0 Virtual
April 2020	 "Which computational problems could a single neuron potentially solve in its dendritic tree?", PRESENTATION. Year of Brain Science Technology Conference
	• Virtual, Mahoney Institute of Neurosciences, University of Pennsylvania, Pennsylvania
June 2014	"Investigating Mechanisms Mediating Apolipoprotein E4 Induced Synaptogenesis in Human Embryonic Stem Cell Derived Induced Neurons", POSTER.
	 Stanford Summer Research Program Research Symposium Beckman Center For Molecular and Genetic Medicine, Stanford School of Medicine, California
June 2013	 "Spatial progression of perceptual learning in visual feature conjunction search", POSTER. Karen E. Wetterhahn Science Symposium Class of 1978 Life Sciences Center, Dartmouth College, New Hampshire
May 2012	 "The Role of Gene-Gene Interactions in Determining Alzheimer's Disease", POSTER. Karen E. Wetterhahn Science Symposium Class of 1978 Life Sciences Center, Dartmouth College, New Hampshire
	Funding and Awards
Aug 2024	 Neuroscience Graduate Group APICAL Award for Persistent Involvement in Community And Leadership, Award. For consistent and remarkable dedication to the neuroscience graduate group. A monetary award with a speech given to the graduate group for the neuroscience retreat. University of Pennsylvania
Aug 2020	 Howard Hughes Medical Institute Gilliam Fellowship Grant , Funding. 3-Year fellowship for underrepresented minorities in STEM with potential to be leaders in science University of Pennsylvania
Oct 2016	 Center for Talented Youth Distinguished Alumni Award, Award. Recognition of CTY's most accomplished alumni Johns Hopkins University
2013-2014	 Sophomore Science Scholar, Funding. Internship working with Dr. Peter Tse on "Influences of Brain Structure and Function on Cognitive Abilities"

• Dartmouth College

2013 Dean of Faculty Undergraduate Research Grant , Funding.

- Funded Research Assistantship with Dr. Mark Israel on "Investigating the Regulation of Anti-Invasive Transcription Factor Id4 in Brain Tumors"
- Dartmouth College

2012 Women In Science Project Internship, Funding.

- Internship working with Dr. Jason Moore on "Genetic Analysis of Complex Human Diseases"
- Dartmouth College

Relevant Courses

Jul-Aug 2022 Methods in Computational Neuroscience, Summer Course. • An in-depth summer course on the broad field of computational neuroscience • Marine Biological Laboratory, Woods Hole, Massachusetts Jan-May Advanced Philosophy of Science, University Course. 2021 • Professor Quayshawn Spencer • A seminar of history and philosophy of science • University of Pennsylvania, Philadelphia, PA Aug 2019 Cajal Course in Computational Neuroscience, Summer Course. • A hands-on summer course in the ideas, methods, and practice of modern computational neuroscience • Champalimaud Center for the Unknown, Lisbon, Portugal Jan–May **Deep Learning**, University Course. 2019 • Professor Konrad Kording • An introductory course on Deep Learning • University of Pennsylvania, Philadelphia, PA Jan–May Theoretical and Computational Neuroscience, University Course. 2018 • Professor Vijay Balasubramanian • A course developing theoretical and computational approaches to structural and functional organization in the brain University of Pennsylvania, Philadelphia, PA

Teaching

Jan 2024 Simons Computational Neuroscience Imbizo, Teaching Assistant and Mentor.

- An 3-week opportunity for African and international students to learn about cutting edge research techniques in computational neuroscience
- Responsible for writing and teaching tutorials, guiding student projects, and supporting a diverse group of students from the African continent and around the world
- Noordhoek, Cape Town, South Africa

April-May IBRO-Simons Computational Neuroscience Imbizo, Teaching Assistant and Mentor.

- 2023 An 3-week opportunity for African and international students to learn about cutting edge research techniques in computational neuroscience
 - Responsible for writing and teaching tutorials, guiding student projects, and supporting a diverse group of students from the African continent and around the world
 - Noordhoek, Cape Town, South Africa

Jan-May ENGR 344: Answering Questions with Data, Teaching Assistant.

- 2022 Professor Konrad Kording
 - A question- and project-oriented data science course taught at the undergraduate level
 - University of Pennsylvania, Philadelphia, PA

Aug 2021 NeuroMatch Academy: Deep Learning, Teaching Assistant.

- A deep learning online, synchronous summer school focused on projects and coding tutorials
- Responsible for teaching 10-12 students including undergraduates, graduates, and postdocs

University of Pennsylvania, Philadelphia, PA

July 2020 NeuroMatch Academy, Teaching Assistant.

- The first international computational neuroscience online, synchronous summer school with over 1700 interactive students
- Responsible for teaching 10-12 students including undergraduates, graduates, and postdocs
- University of Pennsylvania, Philadelphia, PA

Jan-May BBB 109: Introduction to Brain and Behavior, Teaching Assistant.

- 2020 $\,$ o Introductory neuroscience course taught at the undergraduate level
 - University of Pennsylvania, Philadelphia, PA

Academic Service

- Aug 2021 Academic Review Committee.
 - May 2023 A committee to provide guidance and feedback for 1st and 2nd year students in the Neuroscience Graduate Group
 - University of Pennsylvania, Philadelphia, PA
- July 2021 Computational Neuroscience Initiative (CNI) Seminar Committee.
 - July 2023 A committee to determine the speakers and other logistics for the CNI seminars • University of Pennsylvania, Philadelphia, PA

Nov 2020 - Cognitive Computational Neuroscience (CCN) Programming Committee.

- Aug 2021 \circ A committee to decide the programming of the CCN conference
 - Virtual Conference

July 2020 - Combatting Racial Inequities Committee.

- April 2021 A committee formed to address diversity and inclusion issues in BGS (Biomedical Graduate Studies) and BPP (Biomedical Postdoctoral Programs) at the Penn School of Medicine
 - Collect survey and interview data to advise the ACT (Action for Cultural Transformation) initiative
 - University of Pennsylvania, Philadelphia, PA

Community Activities

July 2020 - Co-chair of the E.E. Just Seminar and Workshop.

- June 2022 A committee to organize workshops, discussions, seminars, and reading groups for the Black student community in Biomedical Graduate Studies (BGS) as well as the wider BGS community
 - Actively invited students and professors from the Philosophy, History and Sociology of Science, and Africana Studies departments to discuss race ontology, race science, and scientific racism.
 - University of Pennsylvania, Philadelphia, PA

2017–2020 Elementary School Outreach.

- Neuroscience Graduate Group GLIA (Graduate Led Initiatives and Activities)
- ${\rm \circ}~$ Developed and taught lessons activities for grades 1 through 6
- University of Pennsylvania, Philadelphia, PA

2014–2019 Questbridge Ambassador.

• Informing high-school educators and students about the Questbridge college scholarship program targeting low-income, first-generation students

2011–2015 Dartmouth Quest Scholars.

- Founder, Student Mentor, Treasurer, Network Liaison, and Co-Director (at different times)
- Dartmouth Chapter of Quest Scholars Network guiding First-Generation Low-Income students
- Dartmouth College, Hanover, NH

Research Experiences

- 2015 "Optimization of Neuralbasal A Neuronal Cell Growth Medium", STANFORD UNIVERSITY.
 - Dr. Thomas Sudhof, Nobel Laureate
 - Howard Hughes Medical Institute Exceptional Research Opportunities Program Capstone Project

2014–2015 "Id4 Suppresses the Expression of Other Id Genes by Antagonistically Binding to Twist1", DARTMOUTH COLLEGE.

- o Dr. Mark Israel
- Senior Honors Research Thesis
- 2014 "Investigating Mechanisms Mediating Apolipoprotein E4 Induced Synaptogenesis in Human Embryonic Stem Cell Derived Induced Neurons", STANFORD UNIVERSITY.
 - Dr. Thomas Sudhof, Nobel Laureate
 - Stanford Summer Research Program and Howard Hughes Medical Institute Exceptional Research Opportunities Program

2013–2014 "Investigating the Regulation Anti-Invasive Transcription Factor Id4 in Brain Tumors", DART-MOUTH COLLEGE.

- o Dr. Mark Israel
- Presidential Scholars Program and Undergraduate Research Grant/Norris Cotton Cancer Center

2012–2013 **"Spatial progression of perceptual learning in visual feature conjunction search"**, DARTMOUTH COLLEGE.

- Dr. Peter Tse
- Sophomore Science Scholars/Department of Psychological and Brain Sciences
- 2012 **"The Role of Gene-Gene Interactions in Determining Alzheimer's Disease"**, DARTMOUTH COLLEGE.
 - Dr. Jason Moore
 - Women in Science Program/Institute for Quantitative Biomedical Science
- 2012 "DNA Methylation in the Mitochondrial Genome", JOHNS HOPKINS UNIVERSITY.
 - Dr. Sarven Sabunciyan and Dr. Robert Yolken
 - Stanley Summer Scholars Program / Stanley Division of Developmental Neurovirology
- 2011 **"Developing a Protocol Investigating mRNA Methylation Using High Throughput Sequencing"**, JOHNS HOPKINS UNIVERSITY.
 - Dr. Sarven Sabunciyan and Dr. Robert Yolken
 - Center Scholars Program/Stanley Division of Developmental Neurovirology

2010–2011 "Gene Expression and DNA Methylation of KCNQ2 and KCNQ3 in Bipolar Disorder", JOHNS HOPKINS UNIVERSITY.

- Dr. Zachary Kaminsky and Dr. James Potash
- Center Scholars Program/Mood Disorders Center