Qingyang (Alice) **Wang**
Neuro – AI Researcher

🎓 Education

2018-present	Ph.D. candidate in Neuroscience Johns Hopkins University
2014-2018	B.Sc. in Biochemistry and Cell Biology (International Research Enrichment) & Computer science w/ *Honors* (GPA:4.0) Hong Kong University of Science & Technology
Aug-Dec 2016	Exchange student (GPA:4.0) Cornell University

⚗ Selected Research Experiences

Jan 2022 –Present

Ph.D. Researcher

JHU NeuroData   Advised by Dr. Joshua Vogelstein & Dr. Carey Priebe

> Conceived and experimentally verified that the signs of weights (bio-inspired) is a more effective medium of transferring task-related knowledge than weights (signs and magnitudes).   <u>ICML2023</u>

> Formally proved networks without negative weights are *not* Universal Approximators.   <u>ICCV2023</u>

> Conceived and designed a novel measurement on the functional complexity of networks. Leveraged it to reveal the optimal excitatory-inhibitory structure in EM-connectome-constrained RNNs.   <u>SfN, in prep</u>

> 2 first author publications, 1 pre-print, selected oral at SfN, TPDA award.

Aug 2019 –Dec 2021

Ph.D. Researcher

JHU MBI   Neuroscience Training Program

> Developed, designed, implemented a set of B-spline based generative texture system and accompanied genetic algorithm to probe the tuning landscape for both DNN and neural recordings.

> Developed an interpretability framework that visualizes circuit level mechanisms like surround-inhibition in DNNs.

> 1 publication, 2+ poster presentations.

2017 –2018	**Undergraduate Researcher**
	HKUST Advised by Dr. Karl Herrup & Dr. Kai-Hei Tse

- Investigated the role of myelin degeneration in Alzheimer's disease.
- Developed image analysis pipeline that reduced data analysis time from hours to minutes, with more simultaneous feature detection enabled.
- 1 journal publication (under review).
- 2+ poster presentations, including international AD conference and best undergraduate thesis award.

June – Aug 2017	**Summer Researcher**
	Harvard Advised by Dr. Joshua Sanes

- Doubled genetically identified retinal ganglion cell subtypes by analyzing scRNA-seq data and performing various imaging experiments.
- 1 poster presentation.

👥 Conference Proceedings

- **Q. Wang**, M. A. Powell, A. Geisa, E. W. Bridgeford, and J. T. Vogelstein, "Polarity is all you need to learn and transfer faster," in *Proceedings of the 40th International Conference on Machine Learning*, PMLR, 2023.

  h5-index:.237
- **Q. Wang**, M. A. Powell, A. Geisa, E. Bridgeford, C. E. Priebe, and J. T. Vogelstein, "Why do networks have inhibitory/negative connections?" In *Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV)*, Oct. 2023, pp. 22 551–22 559.

  h5-index:.228

📑 Pre-prints

- **Q. Wang**, A. Cardona, M. Zlatic, J. T. Vogelstein, and C. E. Priebe, *Why do we have so many excitatory neurons?* Oct. 2024. doi: `10.1101/2024.09.24.614724`.
- J. T. Vogelstein, J. Dey, H. S. Helm, W. LeVine, R. D. Mehta, T. M. Tomita, H. Xu, A. Geisa, **Q. Wang**, G. M. van de Ven, C. Gao, W. Yang, B. Tower, J. Larson, C. M. White, and C. E. Priebe, *A simple lifelong learning approach*, May 2024. arXiv: `2004.12908`.
- K.-H. Tse, A. Cheng, S. H.-S. Yeung, G. W.-Y. Cheng, **Q. Wang**, B. Zhu, Y. Cui, L. Jiang, J. Kofler, and K. Herrup, *Myelin pathology in ataxia-telangiectasia is the cell-intrinsic consequence of atm deficiency in the oligodendrocytes*, 2021.

📄 Journal Articles

- R. Srinath, A. Emonds, **Q. Wang**, A. A. Lempel, E. Dunn-Weiss, C. E. Connor, and K. J. Nielsen, "Early emergence of solid shape coding in natural and deep network vision," *Current Biology*, 2021. doi: `10.1016/j.cub.2020.09.076`.

  Impact Factor:.9.6

✊ Public Talks

- **Q. Wang**, *Why do networks need negative weights?* Center for Imaging Science Retreat, Baltimore, MD, Dec. 2023.
- **Q. Wang**, M. A. Powell, A. Geisa, E. Bridgeford, C. E. Priebe, and J. T. Vogelstein, *Polarity is all you need to learn and transfer faster*, Society for Neuroscience (nanosymposium - Networks: Functional Connectivity and Computation) San Diego, CA, Nov. 2022.

  <div align="right">23000 attended SfN</div>
- **Q. Wang** and A. Deza, *3D information may make dnn more robust*, CBMM summer school, Woods Hole MA, Aug. 2021.

👥 Posters

- **Q. Wang**, A. Cardona, M. Zlatic, J. T. Vogelstein, and C. E. Priebe, "Why do we have so many excitatory neurons? — from nanosclae connectome to functional complexity," NeuroNex Investigator Meeting, Chicago IL, Oct. 2024.
- **Q. Wang**, A. Cardona, M. Zlatic, J. T. Vogelstein, and C. E. Priebe, "Why do we have so many excitatory neurons? — from nanosclae connectome to functional complexity," Society for Neuroscience 2024, Chicago IL, Oct. 2024.
- **Q. Wang**, A. Cardona, M. Zlatic, J. T. Vogelstein, and C. E. Priebe, "Why do we have so many excitatory neurons? — from nanosclae connectome to functional complexity," From Neuroscience to Artificially Intelligent Systems, Cold Spring Harbor Laboratory NY, Oct. 2024.
- **Q. Wang**, M. A. Powell, E. Bridgeford, J. T. Vogelstein, and C. E. Priebe, "Deciphering the function space of nanoscale connectomes," 10th Annual BRAIN Initiative Conference, Bathesda MD, Jun. 2024.
- **Q. Wang**, M. A. Powell, E. Bridgeford, and J. T. Vogelstein, "Why do we have so many excitatory neurons?" Society for Neuroscience 2023, D.C., Nov. 2023.
- **Q. Wang**, M. A. Powell, A. Geisa, E. Bridgeford, C. E. Priebe, and J. T. Vogelstein, "Why do networks have inhibitory/negative connections?" 4th NeuroNex Investigator Meeting: Beyond Neurons, San Diego CA, Nov. 2022.
- R. Srinath, **Q. Wang**, A. Emonds, C. E. Connor, and K. J. Nielsen, "Solid shape representation in biological and artificial vision," SfN, Chicago, IL, Oct. 2019.
- **Q. Wang**, I. Whitney, E. Martersteck, K. Shekhar, and J. R. Sanes, "Retinal ganglion cell classification by high-throughput single-cell transcriptomics," Harvard UndergraduateSummer Internship Poster Session, Cambridge MA, Aug. 2017.
- **Q. Wang**, K.-H. Tse, and K. Herrup, "Oxidative stress-induced dna double strand breaks in oligodendrocyte progenitor cells - a potential mechanism of myelin degeneration in alzheimer's disease," International Alzheimer's Disease Conference, HK SAR, May 2017.

🏆 Awards and Honors

2024	Mathmatical Institute for Data Science Fellow
2024	Brain Initiative Scholar Spotlight Honorable Mention
2023	SfN Trainee Professional Development Award
2021	Center for Brains, Minds, and Machines (CBMM) Summer School
2021	CBMM Summer School project award (1/20)
2016-2018	University's Scholarship Scheme for Continuing Undergraduate Students
2015-2017	D H Chen Foundation Life Science Scholarship
2015-2016	HKSAR Government Scholarship Fund - Reaching Out Award
2014-2016	University Scholarship (HKUST) (full tuition, merit-based)

⬙ Teaching and Outreach

Spring 2024	**Invited Lecturer**
	JHU Computational Neuroscience (AS.080.321)
Spring 2023	**Independent Instructur for Undergrad Course**
	JHU Neuro-AI Synergy: A Dual Perspective
2017-present	**Mentor**
	Haoran Li (JHU CS master), Pel Ozel (JHU, neuro), Kate Maximov (JHU, neuro), Deyue Kong (HKUST, Bio), Yanbang Wang (HKUST, CS)
2022	**High school summer intern mentor**
	THREAD
	Mentored one underrepresented local high school student to work on a research-related internship project; The student gained so much interest into research that afterwards continued to participate in more research activities.
Fall 2020	**Teaching Assistant**
	JHU Fundamental Principles of Vision
Spring 2018 – Fall 2019	**Volunteer**
	Girl's Coding Club
	Got middle school girls excited about computer science and STEM through fun coding activities.