Qiuyang Wang

🏠 https://qiuyoungwang.github.io/   ✉ qw2319@columbia.edu   📱 +1 6465150054

EDUCATION

M.S. in Applied Mathematics   **Columbia University in the city of New York**, U.S. (GPA 3.89/4.0)   2021.9-2022.12

Relevant Coursework: Theoretical Neuroscience, Differentiable Manifolds, Computing with Brain Circuits, Topology, Dynamic Systems, Mathematics for Data Science, Numerical Optimization, Numerical Mathematics, Partial Differential Equations, Modern Algebra, Modern Analysis, Applied Analysis

B.S. in Chemistry (Honors Degree)   **Wuhan University**, China (GPA 3.81/4.0)   2017.9-2021.6

Thesis: A molecular cascade model of synaptic plasticity and its application on artificial neural network
Relevant Coursework: Data Structure, Machine Learning, Neurobiology, Programming in C, Physical Chemistry, Ordinary Differential Equations, Functions of Complex Variables, Statistics, Probability Theory, Molecular Modeling, Organic Chemistry

Visiting Student in Columbia College   **Columbia University in the city of New York**, U.S.   2020.1-2020.5

RESEARCH EXPERIENCES

Reduced phototransduction models for retina photoreceptors in Drosophila and the visual neuropils integration   2022.5-2023.1

Advisor: Aurel Lazar & Yiyin Zhou   (Department of Electronic Engineering, **Columbia University**)   Research Assistant

(ongoing project):

· Developed a series of Reduced Phototransduction Models (RPMs) for the phototransduction process in the photoreceptor of retina based on the population dynamics of microvilli and the NARMAX model.

· Implemented the RPMs on the retina model of *Drosophila* on GPU via CUDA and accelerated its simulation to 15 times its original speed.

· Integrated the retina model with other visual neuropils (e.g. lamina, amacrine cells layer) based on the Neurokernel aiming to achieve motion detection with the *first principle*.

Kinetic PDEs for the population dynamics of Integrate-and-Fire neural network   2020.9-2021.5

Advisor: Jiwei Zhang   (School of Math and Statistics, **Wuhan University**)   Research Assistant

· Studied and simulated the kinetic Fokker-Planck equation governing the population dynamics of the Integrate-and-Fire (IF) neural network as well its numerical solution based on the moments closure and the maximum entropy principle.

· Modelled the CaMKII pathway and the CREB pathway in synaptic plasticity based on biochemical reactions to show their On/Off property in the Long-Term Potentiation (LTP).

· Built a large spatially ordered IF network model that matches the experimental result about neural variability.

Implementation of the cascade synapse model to strengthen the history effect of hippocampus model   2020.5- 2020.9

Advisor: Stefano Fusi   (Centre of Theoretical Neuroscience, **Columbia University**)   Research Assistant

· Designed a Hopfield recurrent neural network with the cascade synapse model to improve the memory capacity.

· Built an auto-encoder hippocampus model which can naturally generate place cells, and implemented the cascade synapse model above to strengthen its history effect.

Enhanced photodynamic antimicrobial therapy with bacterial membrane-binding chimeric peptide   2018.6 - 2019.6

Advisor: Xianzheng Zhang   (College of Chemistry and Molecular Science, **Wuhan University**)   Research Assistant

· Developed a novel anti-bacterial method combining photodynamic therapy with chimeric peptides.

· Explored the idea about non-systematic drug delivery strategy to central neural system through axoplasmic transport.

PUBLICATIONS

1. Ai-Nv Zhang[1], Wei Wu[1], Chi Zhang, **Qiu-yang Wang**, Ze-Nan Zhuang, Han Cheng, and Xian-Zheng Zhang* *A Versatile Bacterial Membrane-Binding Chimeric Peptide with Enhanced Photodynamic Antimicrobial Activity* **2019** Journal of Materials Chemistry B, 7, 1087-1095.

SKILLS

Programming: python (most proficient), C, MATLAB, Julia, R
Tools: PyTorch, LaTeX, CUDA, PyCUDA, Numba, Neurokernel, networkx, scikit-learn, pandas, scipy, numpy
Experimental skills: Material Synthesis, Tumor Transplantation, Confocal Laser-Scanning Microscopy, Fluorescence Imaging

Honors

WHU Outstanding Scholarship for Visiting Student	2020
Honor Scholarship for Hongyi College	2019
Outstanding Student Scholarship (grade 2)	2019

Social Activities and Volunteer

Columbia University Multi-Faith Fellowship	2022.9-now
General Dog Volunteer in Animal Haven, Now York	2022.8-now