

Yuhong Liu

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EDUCATION

- Jun. 2025 (expected) **Dr. rer. nat.**, Faculty of Mathematics and Natural Sciences UNIVERSITY OF BONN
Advised by Prof. Tatjana Tchumatchenko
- Jun. 2021 **M.S.**, Department of Applied Mathematics UNIVERSITY OF WASHINGTON
Advised by Prof. Douglas Martin, Prof. Juris Vagners
- May 2019 **B.S. Magna Cum Laude**, Department of Mathematics BARUCH COLLEGE, CUNY

PUBLICATION

JOURNAL PAPER

- [J1] Federico Tesler, Pierre Houzelstein, Ambre Ledoux, Christoffer G. Alexandersen, **Yuhong Liu**, Chloé Duprat, Aitakin Ezzati, Sandra Saghir, Alain Destexhe, Damien Depannemaecker “A mean-field to capture asynchronous irregular dynamics of spiking networks of adaptive quadratic integrate-and-fire neuron models” *Neural Computation* (**Under Review**)

CONFERENCE PAPER

- [C1] Christopher R. Hayner, Timothy Zhou, Neil Gupta, **Yuhong Liu**, Parker Mayhew, and Juris Vagners. “Real-time Human Detection with Integration of Visual and Thermal Data from High Altitude sUAS,” *AIAA 2021-0397. AIAA Scitech 2021 Forum*. January 2021

POSTER

- [P7] **Yuhong Liu**, Tatjana Tchumatchenko. “Frugal Neuron: A Comprehensive Study of Protein Uptake Dynamics under ATP Constraints in Neuronal Synapses”, Bernstein Conference 2023, Berlin, Germany
- [P6] **Yuhong Liu**, Sybille Krauß, Tatjana Tchumatchenko. “Mutant Huntington Reduces mRNA Level in In-vivo Mice Model of Huntingtong’s Disease”, Bonn Brain Conference 2023, Bonn, Germany
- [P5] **Yuhong Liu**, Sybille Krauß, Tatjana Tchumatchenko. “Mutant Huntington Reduces mRNA Level in In-vivo Mice Model of Huntingtong’s Disease”, Dendrites: Molecules, Structure and Function, Gordon Research Conference 2023, Barga, Italy
- [P4] **Yuhong Liu**, Jennifer Krummeich, Susann Schweiger-Seemann, Tatjana Tchumatchenko. “Data-Driven Model of Multi-Protein Activity Quantitatively Links Mutations to Synaptic Pathophysiology”, Society for Neuroscience Conference 2022
- [P3] **Yuhong Liu**, Jennifer Krummeich, Susann Schweiger-Seemann, Tatjana Tchumatchenko. “A Multi-Protein Activity Model Pinpoints the Cause of Change in Synaptic Protein Composition”, Bernstein Conference 2022
- [P2] **Yuhong Liu**, Jennifer Krummeich, Susann Schweiger-Seemann, Tatjana Tchumatchenko. “A Protein Network Model of mTOR Signaling Pathway under Tuberous Sclerosis Complex Condition”, FENS Forum 2022
- [P1] Christopher R. Hayner, **Yuhong Liu**, Howard Peng, Parker Mayhew, Neil Gupta, Helen Kuni, Juris Vagners, “An Autonomous Machine Learning Approach to Search and Locate Operations”, *AIAA PNW Symposium* 2020

 IN PREPARATION

JOURNAL PAPER

[J2-I] Yuhong Liu, Sybille Krauss, Tatjana Tchumatchenko. “A Biochemical Model Reveals Reduced mRNA Level in Huntington’s Disease”

 EMPLOYMENT RECORD

Jul. 2023 - Aug. 2023

Institute of Biology, University of Siegen - Visiting Researcher**Sybille Krauß Group**

assist in real time PCR and western blot of mouse brain tissue

Oct. 2022 - Current

University of Bonn Medical Center - Research Assistant**Institute of Experimental Epileptology and Cognition Research (IEECR)**

constructed theoretical framework to study the synergy between energy efficiency and protein uptake patterns, aiming to unveil neuron’s innate approach to optimizing energy utilization in neuronal function

Collaboration with Sybille Krauß Group, University of Siegen

built a mathematical model implementing MID1-complex formation mechanism that links CAG repeat length to translation rate in Huntington’s Disease model. Together with measurements from previous studies, I used this translation rate model to determine the steady-state Huntington protein level in neurons and predict mRNA level in mutant neurons

Oct. 2021 - Aug. 2023

University of Mainz Medical Center - Research Assistant**Collaboration with Michael Schmeißer Group**

helped design a new ongoing experiment to measure temporal dynamics of 6 synaptic proteins that are downstream of mTOR signaling pathway

Collaboration with Susann Schweiger Group

constructed protein network that is critical for the function of mTOR signal pathway and built a mathematical model to study the affected protein synthesis dynamics under disease condition

Nov. 2019 - Jun. 2021

University of Washington - Research Assistant**Autonomous Flight Systems Lab (AFSL)**

helped build visual and thermal data sets to train computer vision models for spotting humans in wilderness environment and design algorithms to fuse the visual and thermal data

Jun. 2020 - Aug. 2020

Google Summer of Code (GSoC) - Contributor

developed a package in R-language for estimating GARCH process model parameters that addresses the issue of robustness toward additive outliers. Two approaches are implemented: 1) the basic approach obtains parameters using a modified likelihood function based on a bounded loss function, 2) the second approach improves on the first by using a filter that limits the effect of additive outliers on subsequent predictors of conditional variance. The package exposes interfaces to a C++ library, which speeds up the total computation when estimating the likelihood function

Jan. 2020 - Mar. 2020

University of Washington - Teaching Assistant**CFRM 425 B: R Programming for Quantitative Finance**

worked with the instructor to develop homework assignments and exam problems for a class of >50 students

MENTORSHIP

UNDERGRADUATES

Pembe Gizem Özdil (PhD student in Computational Neuroscience at EPFL)
 Sabrina Zerrade (Now applying for graduate school in Computational Biology)
 Karen Ji (Master's student in Applied Mathematics at Columbia University)
 Samuel Bouiss (Master's student in Applied Mathematics at Columbia University)

AWARD

2020 **Stipend** - Google Summer of Code Program
 2019 **Travel Award** - 50 Years of Applied Mathematics at University of Washington
 2019 **Fifth Place** - City University of New York Math Challenge
 2018, 2019 **Dean's List** - City University of New York, Baruch College

PUBLIC OUTREACH

OUTREACH AND SERVICE

Jan. 2022 - Current **Women in Network Science (WiNS) Society**

Feb. 2023 - Current **Mentorship Program** - Founder
 initiated the women mentorship program to advocate opportunities for women and increase their visibility in the network science community

Jan. 2022 - Current **Seminar** - Co-organizer
 currently helping organize weekly seminar promoting the influence of female network science researchers

Sep. 2022 **Bernstein Conference 2022** - Photographer

May 2022 **12th German Neuroscience Olympiads** - Backyard Brain Experiment Demonstrator

Mar. 2022 **Cosyne 2022 Tutorial on Spiking Neural Networks** - Teaching Assistant

Mar. 2021 - Jun. 2021 **UW Women in Applied Mathematics Mentorship Program** - Mentor

RESEARCH FEATURE

"Hide and Seek: Training a drone to save lives"

SKILL

PACKAGE DEVELOPMENT

developed an R package, `robGarch`

PROGRAMMING

competent with **Python** (NEST, Pytorch, Brian2, NEURON), **MATLAB**, **C++** (Eigen, Boost), **Linux**, **Git**. Working knowledge in **Julia**

LANGUAGE

fluent in Mandarin and English. Basic in German

PROFESSIONAL ACTIVITY

TRAINING PROGRAM

Sep. 2022 **EITN Fall School in Computational Neuroscience 2022** - Student

Jul. 2022 **First Italian Summer School in Geometric Deep Learning 2022** - Student

MEMBERSHIP

AIAA Student Member

Bernstein Network Student Member

SfN Student Member

REFERENCE

TATJANA TCHUMATCHENKO

- **Position:** Professor, Institute of Experimental Epileptology and Cognition Research, University of Bonn
- **Relationship:** PhD Advisor, Tchumatchenko Group PI
- **Email:** tatjana.tchumatchenko@uni-bonn.de

SYBILLE KRAUSS

- **Position:** Professor, Institute of Biology, University of Siegen
- **Relationship:** Collaborator
- **Email:** sybille.krauss@uni-siegen.de

JURIS VAGNERS

- **Position:** Professor Emeritus, Aeronautics and Astronautics Department, University of Washington
- **Relationship:** Autonomous Flight Systems Lab PI
- **Email:** vagners@uw.edu

DOUGLAS MARTIN

- **Position:** Professor Emeritus, Statistics and Applied Mathematics Department, University of Washington
- **Relationship:** Master's Advisor, Google Summer of Code Mentor
- **Email:** doug@amath.washington.edu