

Jiaxin (Margot) Yuan

College Park, MD | (240)-423-0251 | jyuan98@umd.edu | <https://margotyix.github.io/>

Efficient Ph.D. candidate with 4+ years in stochastic process modeling, programming, and data mining. Extensive experience with using statistical and mathematical methods to solve molecule dynamical system problems by combining machine learning and traditional models.

Education

Ph.D. in Applied Mathematics, University of Maryland | College Park, MD | May 2025 | GPA: 3.84/4.00

- Area of interest: Stochastic differential equation, Molecular dynamics, Machine learning, Optimal control
- Advisor: Maria Cameron

B.S. in Mathematics, The Pennsylvania State University, State College, PA | May 2020

- Minor in **Economics** | **Schreyer Honors College** | Honor Roll and best student award every year | **GPA: 4.0/4.0**
- Dean's list; The President's Freshman Award; The President Sparks Award

Publications and Preprints

- **Jiaxin Yuan**, Amar Shah, Channing Bentz, and Maria Cameron. *Optimal control for sampling the transition path process and estimating rates*. Communications in Nonlinear Science and Numerical Simulation, 2023. Accepted.
- Xiaoyu Liu, **Jiaxin Yuan**, Bang An, Yuancheng Xu, Yifan Yang, and Furong Huang. *C-Disentanglement: Discovering Causally-Independent Generative Factors under an Inductive Bias of Confounder*. International Conference on Machine Learning (ICML) workshop on Structured Probabilistic Inference & Generative Modeling, 2023.
- Xiaoyu Liu, **Jiaxin Yuan**, Bang An, Yuancheng Xu, Yifan Yang, and Furong Huang. *C-Disentanglement: Discovering Causally-Independent Generative Factors under an Inductive Bias of Confounder*. Conference on Neural Information Processing Systems (NeurIPS), 2023.

Research Projects

Discovery of collective variables that minimizes error from model reduction | University of Maryland

College Park, MD | May 2023 - Current

- Introduces a method to learn collective variables that preserves original dynamics with variational autoencoder

Optimal controller and estimation of transition rate in Transition Path Theory | University of Maryland

College Park, MD | May 2022 – June 2023

- Derived an optimal controller that is applicable to both overdamped Langevin dynamics and full Langevin dynamics
- Developed an innovative method for estimating the transition rate of rare events with high precision under Transition Path Theory
- Obtained transition rates for rare transitions effectively and robustly with simulation of controlled process using committors from reduced model or rough approximation, outperforming ones from Transition Path Theory formula
- Improved the accuracy of estimating transition rate by at most 200% in high-dimensional systems

C-Disentanglement: Discovering Causally-Independent Generative Factors under an Inductive Bias of Confounder | University of Maryland

College Park, MD | September 2022 – June 2023

- Learned causally disentangled representation with inductive bias of confounder, and proved bounded interventional robustness
- Provided a unified framework that solves the conflict between human annotated-labels and causally disentangled representation

Computing Committor function using the tensor train format | University of Maryland

College Park, MD | October 2021 – April 2022

- Solved high dimensional committor function using tensor train format in Python
- Adapted the method to example with Mueller's potential in 2D, whose results outperformed the ones solved by neural network

Pricing and hedging variable annuity via Monte Carlo simulation | The Pennsylvania State University

State College, PA | August 2018 – May 2020

- Created a pricing estimation model for Variable Annuity via Monte Carlo simulation in C++ for different assumptions
- Constructed various methods of hedging strategies and made comparisons under different scenario

Skills

Programming: Proficient in Python (Pandas, PyTorch, NumPy, Scikit-learn, Matplotlib), MATLAB, R, C++ , LaTeX

Languages: English, Mandarin, Cantonese

Leadership

Secretary | Women in Math | College Park, MD | September 2022 – April 2023

- Provided support for the organization running via recording minutes and advertising events through emails and social media

Teaching Assistant | University of Maryland | College Park, MD | September 2020 – Current

- Guided discussion sessions in pre-calculus, calculus I, II, and fundamental statistic courses and taught pre-calculus as sole instructor
- Won Osborn Gold Medal in Teaching Excellence
- Helped supervising REU program in summer 2022 as a teaching assistant

Sisterhood Development chair | Kappa Beta Gamma Phi Chapter | Harrisburg, PA | April 2017 - December 2017

- Led and organized a trip to Eastern State Penitentiary and raised funding from educational institutions, and organized weekly and monthly bonding events for new members and other active members