Jacob H. Adamczyk

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Education

Cleveland State University (CSU) — **Cleveland, OH**
Honors B.S. Physics, B.S. Mathematics. GPA: 3.91 — *2017-2020*

University of Massachusetts - Boston (UMB) — **Boston, MA**
Applied Physics Doctoral Candidate. GPA: 3.98 — *2020-*

Experience

Research Internship at SJSU — **San José, CA**
Advisor: Stas Tiomkin — *Summer 2024*
Developing novel algorithms for deep reinforcement learning

Research Assistant at UMB — **Boston, MA**
Advisor: Rahul Kulkarni — *2021-*
Theoretical and computational application of large deviations theory to reinforcement learning

Instructor at UMB — **Boston, MA**
Lecture series on deep learning for undergraduates, graduates, and faculty — *Spring 2023, Spring 2024*

SI Instructor at UMB — **Boston, MA**
Supervisor: Niraj Kumar — *Spring '22, Spring '23, Fall '23*
Instructed discussion sections for calculus-based introductory physics

Teaching Assistant at UMB — **Boston, MA**
Supervisor: Thomas Endicott — *2020-2021*
Instructed laboratory sessions for calculus-based physics: thermodynamics and electromagnetism

Research Assistant at CSU — **Cleveland, OH**
Advisor: Thijs Heus — *2019-2020*
Translating Large Eddy Simulation code for atmospheric simulations on GPU

Independent Study at CSU — **Cleveland, OH**
Advisor: Kiril Streletzky — *Fall 2019*
Analyzing theory of Depolarized Dynamic Light Scattering to characterize nanoparticle systems

Undergraduate Researcher at Néel Institute — **Grenoble, France**
Advisors: Clemens Winkelmann, Hervé Courtois — *Summer 2019*
Superconducting device research, apparatus construction for quick measurements

Independent Study at CSU — **Cleveland, OH**
Advisors: Miron Kaufman, Kiril Streletzky — *2018-2019*
Continued microgel project, advanced the theory of microgel phase transitions for our system

NSF Research Experience for Undergraduates at CSU — **Cleveland, OH**
Advisors: Kiril Streletzky, Miron Kaufman — *Summer 2018*
Analysis of microgel phase transitions, explored in-depth with theory and experimental data

Skills

Computational: Python, PyTorch, git, LaTeX

Experimental: Soldering, Liquid Helium Transfer, Cryogenic Apparatus Construction

Theoretical: Statistical mechanics, Reinforcement Learning, Flory-Huggins, Superconductivity

Languages: French (intermediate)

Memberships

CSU Machine Learning Club: 2019-2020 Treasurer position

American Physical Society (APS): Graduate Student Member

Institute for Artificial Intelligence and Fundamental Interactions: Junior Investigator

2024 $\Sigma\Pi\Sigma$ Honors Society: Inducted with Lifetime Membership at CSU Chapter

Awards

2019 Society of Physics Students: Travel Award from SPS for $200 *CSU*

2019 Honors College Scholarship: Mandel Honors College fully-paid tuition *CSU*

2019 SPS National Scholarship: Leadership Award for $2000 *CSU*

2020 Outstanding Physics Senior Award: Academic excellence *CSU*

2020 Outstanding Mathematics Major: Academic excellence *CSU*

2023 Spring CSM Dean's Doctoral Research Fellowship: Research excellence *UMB*

2023 AAAI-23 Student Scholarship: Research Travel Award from AAAI for $500 *AAAI*

2023 UAI-23 Scholarship: Conference Award from UAI for $325 *UAI*

2023 Fall CSM Dean's Doctoral Research Fellowship: Research excellence *UMB*

2024 GDS IMPACT Award: Research Excellence Award for $500 *APS GDS*

2024 Graduate Student Leadership Award: Academic Service and Excellence Award *UMB*

Presentations

2018 NOURS: Poster presenter at 15^{th} Northeast Ohio Undergraduate Research Symposium

2018 CSU Research Day: Presenter at poster session for science undergraduates

2019 APS March Meeting: Poster Sessions (Boston, MA):

- G70.00036: Phase Transitions in Polymeric Gels Induced by Crosslinking Entropy
  - *Jacob Adamczyk, Miron Kaufman, Kiril Streletzky*
- G70.00031: The Dynamics of Polymeric Microgels with Varying Crosslinker Concentration
  - *Samantha Tietjen, Jacob Adamczyk, Kiril Streletzky*
- L70.00116: Towards Optimizing Synthesis Temperature for Microgels with Large Degree of Deswelling
  - *Kiril A. Streletzky, Krista G. Freeman, Jacob Adamczyk*

2019 OSAPS Meeting: Poster presentation at Ohio Sectional APS Conference (Flint, MI):

- A02.00004: Studying shunted SQUID measurements in a controlled magnetic field setting
  - *Jacob Adamczyk, Rini Ganguly, Clemens Winkelmann*

2022 APS March Meeting: Oral presentation at APS Conference (Chicago, IL):

- D32.00002: Novel approaches and bounds for maximum entropy reinforcement learning using nonequilibrium statistical mechanics
  - *Jacob Adamczyk, Argenis Arriojas, Stas Tiomkin, Rahul V Kulkarni*
- D32.00003: Closed-Form Analytical Results for Maximum Entropy RL Using Large Deviation Theory
  - *Argenis Arriojas, Jacob Adamczyk, Stas Tiomkin, Rahul V Kulkarni*

2022 UMB Physics Grad Student Club: Oral Presentation: "Physics-Based Proofs in Mathematics"

2023 APS March Meeting: Oral presentation at APS Conference (Las Vegas, NV):

- D02.00002: Results from a Mapping Between Reinforcement Learning and Non-Equilibrium Stat Mech
  - *Jacob Adamczyk, Argenis Arriojas, Stas Tiomkin, Rahul V Kulkarni*

7th Annual CSM Student Success Showcase: Poster presentation at In-House Conference (UMB):

- Utilizing Prior Solutions for Reward Shaping and Composition in Entropy-Regularized Reinforcement Learning
  - *Jacob Adamczyk, Argenis Arriojas, Stas Tiomkin, Rahul V Kulkarni*

2024 APS March Meeting: Oral presentation at APS Conference (Minneapolis, MN):

- S28.00002: Average-Reward Reinforcement Learning Using Insights from Non-Equilibrium Stat. Mech.
  - *Jacob Adamczyk, Argenis Arriojas, Stas Tiomkin, Rahul V Kulkarni*

8th Annual CSM Student Success Showcase: Poster presentation at In-House Conference (UMB):

- Boosting Soft Q-Learning by Bounding
  - *Jacob Adamczyk, Volodymyr Makrenko, Stas Tiomkin, Rahul V Kulkarni*

Publications

- Effect of Synthesis Temperature on Size, Structure, and Volume Phase Transition of Polysaccharide Microgels
  - *Krista G. Freeman, **Jacob Adamczyk**, and Kiril A. Streletzky. Macromolecules 2020 53 (21), 9244-9253*
- Utilizing Prior Solutions for Reward Shaping and Composition in Entropy-Regularized Reinforcement Learning.
  - ***Jacob Adamczyk**, Argenis Arriojas, Stas Tiomkin, Rahul V Kulkarni. Proceedings of the Thirty-Seventh AAAI Conference on Artificial Intelligence (2023).*
- Entropy regularized reinforcement learning using large deviation theory.
  - *Argenis Arriojas, **Jacob Adamczyk**, Stas Tiomkin, and Rahul V. Kulkarni. Phys. Rev. Research **5**, 023085*
- Bounding the Optimal Value Function in Compositional Reinforcement Learning.
  - ***Jacob Adamczyk**, Volodymyr Makarenko, Argenis Arriojas, Stas Tiomkin, and Rahul V. Kulkarni. Uncertainty in Artificial Intelligence 2023.*
- Bayesian Inference Approach for Entropy Regularized Reinforcement Learning with Stochastic Dynamics.
  - *Argenis Arriojas, **Jacob Adamczyk**, Stas Tiomkin, and Rahul V. Kulkarni. Uncertainty in Artificial Intelligence 2023.*
  - **Received Spotlight Award, Top 5%**
- Boosting Soft Q-Learning by Bounding.
  - ***Jacob Adamczyk**, Volodymyr Makarenko, Stas Tiomkin, and Rahul V. Kulkarni. Reinforcement Learning Conference 2024.*
- Reinforcement Learning for Control of Non-Markovian Cell Dynamics
  - *Josiah Kratz*, **Jacob Adamczyk***. Neural Information Processing Systems ML4PS Workshop 2024.*

Under Review

- Average-Reward Deep Reinforcement Learning with Entropy Regularization.
  - ***Jacob Adamczyk**, Volodymyr Makarenko, Stas Tiomkin, and Rahul V. Kulkarni. (Under review at the Association for the Advancement of Artificial Intelligence 2025.)*
- Bootstrapped Reward Shaping.
  - ***Jacob Adamczyk**, Volodymyr Makarenko, Stas Tiomkin, and Rahul V. Kulkarni. (Under review at the Association for the Advancement of Artificial Intelligence 2025.)*
- Reinforcement Learning for Control of Non-Markovian Cell Dynamics
  - *Josiah Kratz, **Jacob Adamczyk**. (Under review at the International Conference on Learning Representations 2025.)*
- Complex hyperbolic secant pulses for quantum control and sensing.
  - ***Jacob Adamczyk**, Tharon Holdsworth. (Under review at Quantum Science and Technology.)*
- Eigenvector-based Average-Reward Learning.
  - ***Jacob Adamczyk**, Volodymyr Makarenko, Stas Tiomkin, and Rahul V. Kulkarni. (Under review at the 24th International Conference on Autonomous Agents and Multiagent Systems.)*

Service

- Student Panelist: "PEAAII & Oracle: Exploring the Technical, Social, Ethical, and Diversity Challenges and Opportunities of Emerging AI Tools".
- Reviewed 15 papers across NeurIPS 2024 Main Track & Workshops; ICLR 2025; AISTATS 2025.