Ulyana Piterbarg

up2021@cims.nyu.edu · upiterbarg.github.io

Education

NYU Courant Institute of the Mathematical Sciences 09/2021 – 06/2026

Ph.D. student in CILVR Laboratory, co-advised by Prof. Rob Fergus and Prof. Lerrel Pinto.

Research Interests: Planning, Reasoning, Imitation, Reinforcement Learning, Differentiable Computing.

Massachusetts Institute of Technology 09/2017 – 05/2021

B.S. in Math with Computer Science · GPA: 4.9/5.0 · Recipient of more than $18500 in research funding.

Relevant Coursework: Algorithms for Inference, Statistical Learning and Data Mining, Underactuated Robotics, Artificial Intelligence, Computational Cognitive Science, Probability Theory, ODEs/PDEs, Analysis, Algebra.

Industry

Research Intern, Google AI 05/2021 – 08/2021

- Advised by Dr. Dmitrii Kochkov (Google Research), Dr. Stephan Hoyer (Google Research), and Prof. Michael Brenner (Google Research, Harvard University) in the Google Accelerated Sciences (GAS) team.
- Investigated structured loss functions for training machine learning-powered simulators of turbulent flows.

Investment Associate Intern, Bridgewater Associates 07/2020 – 08/2020

- Studied the macroeconomic effects of the SARS-CoV-2 pandemic on financial markets around the world.

Software Engineering Intern, Spell AI 01/2019 – 02/2019

- Developed several features for a deep learning/ML development platform via full-stack engineering.

Design Intern, American Museum of Natural History (AMNH) 05/2017 – 08/2017

- Researched and aided in the development of the AMNH exhibition "Our Senses," visited by millions of people from around the world during its showing from Nov 2017 to Jan 2019.

Research

Undergraduate Researcher, Climate Modeling Alliance 05/2020 – 05/2021

- Advised by Prof. Raffaele Ferrari (MIT).
- Experimented with equation discovery and neural differential equations for uncovering novel parameterizations of large-scale turbulence, evaluating results via uncertainty quantification.

Research Assistant, Computational Cognitive Science Group 09/2018 – 05/2020

- Advised by Prof. Joshua B. Tenenbaum (MIT) and Dr. Kelsey R. Allen (DeepMind).
- Conducted experiments studying the cognitive bases of strategy learning and physics-engine representations in humans, analyzing results with Bayesian hierarchical models.
- Developed novel model-based reinforcement learning (RL) architectures for fluid manipulation tasks, able to adaptively simulate particle-based physical dynamics via graph networks.

Summer Research Fellow, Laboratory of Computational Neuroscience 06/2018 – 09/2018

- Advised by Prof. Wulfram Gerstner (École polytechnique fédérale de Lausanne).
- Investigated the versatility of a hybrid deep reinforcement learning (RL) planning algorithm in dynamic and partially-observable environments, evaluating response to large-scale environmental changes.

Technical Assistant, MIT Lincoln Laboratory Space Systems and Controls Division 01/2018 – 05/2018

- Advised by Dr. Lulu Liu (MIT Lincoln Laboratory).
- Performed proof-of-concept system analytics for a novel adaptive optics system using idealized turbulence models as well as true turbulence profiles from astronomical sites all over the world.

Publications

1. A. Ramadhan, J. Marshall, A. Souza, XK. Lee, **U. Piterbarg**, A. Hillier, G. Wagner, C. Rackauckas, C. Hill, JM. Campin, R. Ferrari: "Capturing missing physics in climate model parameterizations using neural differential equations." In submission to the *Journal of Advances in Modeling Earth Systems* (JAMES) as of 09/23/22.
2. KR. Allen, KA. Smith, **U. Piterbarg**, R. Chen, JB. Tenenbaum: "Abstract strategy learning underlies flexible transfer in physical problem solving." *42nd Annual Virtual Meeting of the Cognitive Science Society (CogSci 2020).*

Poster Sessions

1. **U. Piterbarg**. *Optimizing Parameterizations of Turbulent Planetary Flows for Climate Modeling with Machine Learning.* MIT SuperUROP Showcase (2020).
2. KR. Allen, KA. Smith, **U. Piterbarg**, R. Chen, JB. Tenenbaum: *Abstract strategy learning underlies flexible transfer in physical problem solving.* "Developing a Mind: Learning in Humans, Animals, and Machines," 42nd Annual Virtual Meeting of the Cognitive Science Society (CogSci 2020).
3. **U. Piterbarg**, J. Brea. *Investigating the Efficacy of Option-Conditional Value Prediction in Reinforcement Learning.* Life Sciences SRP, École polytechnique fédérale de Lausanne (2018).

Professional Service

Teaching and Grading

Teaching Assistant, Seminar in Analysis (18.104), MIT	2021
Grading Assistant, Fundamentals of Statistics (18.650), MIT	2020
Undergraduate Teaching Assistant, Computational Cognitive Science (6.804/9.66), MIT	2019

Outreach

Representative, MIT Council for Math Majors (CoMM)	2020-2021
Mentor, MIT Undergraduate Society of Women in Math (USWIM)	2020-2021
Member, MIT Society of Women Engineers (SWE)	2017-2021

Honors and Awards

NSF Graduate Research Fellowship	2022-2025
DeepMind Ph.D. Scholarship	2021-2022
NYU Henry M. MacCracken Doctoral Fellowship	2021-2026
MIT Mathematics Directed Reading Program Scholar	2021
MIT Quest for Intelligence Undergraduate Research and Innovation Scholar	2020-2021
MIT January Scholar in France	2020
EPFL Life Sciences Summer Research Program Fellow	2018
AMNH Design for Science Communication Student	2017
National Merit Scholar	2017
Moody's Math Modeling (M^3) Challenge Finalist	2016

Skills

Programming: Python, Julia, MATLAB, JavaScript, JAVA, goLang, LaTeX, shell scripting.
Packages and Libraries: pytorch, tensorflow, pymc3, pybullet, scikit-learn, JAX, Taichi, Mujoco.
Languages: English (native/fluent), French (Delf B2), Ukrainian (intermediate).

Nationality

United States Citizen.