

ILONA DEMLER

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EDUCATION

Harvard University

Cambridge, MA

B.A. Candidate in physics, secondary in computer science. GPA 3.91.

May 2023

- CS coursework: Machine Learning, Computer Vision, Inverse Graphics, Algorithms, Data Science
- Phys/Math coursework: Statistical Mechanics, Quantum Mechanics, Quantum Info, Electrodynamics, Solid State, Waves, Mechanics & Special Relativity, Statistics, Linear Algebra & Real Analysis

Boston University Academy

Boston, MA

High School Diploma Summa Cum Laude.

May 2018

- BU Dual Enrollment: Python I, Computer Systems, Linear Algebra, Diffeq, Multivariable Calculus.

SKILLS & INTERESTS

Research Interests: Computer vision, human-computer interaction, biomedical devices, secure ML

Computer Languages: Python, C++, C, JavaScript, Mathematica

Computer Tools: Git, Pytorch, Pytorch lightning, Tensorflow, JAX, Ray, Qiskit, SQL, gstreamer

EXPERIENCE

Brenner Lab *Student Researcher*

Harvard University June-Aug 2022

Pose-tracking device for running clinical trials from home ([repo](#))

- Prototyped device that runs continuous pose detection, computes biometrics, and stores data in cloud server, preserving patient privacy. Used in upcoming funded neurodegenerative treatment trial Nov 2022.
- Built solution to sync 2D device with motion capture lab data, finetuning PoseNet and Movenet models.

Disney Research *Intern*

Zurich, Switzerland June-Aug 2022

Machine learning and data intelligence group

- Implemented forward gradients training, building custom Python autograd and backprop libraries.
- Implemented synthetic gradients for asynchronous, data-preserving model training.
- Built POC of Fully Homomorphic Encryption in autoencoder using Microsoft's C++ SEAL library.

Dreams-AI *Software Engineering Intern*

Cambridge, UK Apr - Aug 2021

Odds estimation and crypto for online gaming

- Designed cryptocurrency holding platform using a hierarchical deterministic wallet setup compatible with Ethereum and Binance Smart chains. Created frontend for a working demo on an accelerated timeline.
- Promoted to higher-level leadership role, writing a 6-month company-wide report to investors.
- Led team of three software engineers developing horserace betting model. Improved web-scraping and feature engineering pipeline, boosting profits by 1.2x and data saving speed by 2x.

Acronis *AI Intern*

Remote Jan - Apr 2021

Basketball pose analysis.

- Built demo that detects and analyzes basketball free throws using Detectron2 and OpenPose, calculating elbow, knee, hip, and shoulder release angles, and whether player scores or misses.

Cadence Design Systems *Software Engineering Intern*

Remote May 2020 - Dec 2020

Power supply circuit simulation

- Modeled SPICE circuit outputs, reducing simulation time from 1 week to <2 hrs. Used Ray library for parallelization and parameter tuning, presenting results at quarterly R&D teams meeting.

Atomic and molecular optics research under Professor Kang-Kuen Ni

- Built and tested optical tweezer transport system from scratch, with an active temperature control routine.
- Presented results at joint group meeting at the Harvard-MIT Center for Ultracold Atoms

COURSE PROJECTS

Imaging Black Holes From VLBI Data (*MIT 6.819: Computer Vision* - [writeup](#), [colab](#)) May 2022

- Reconstructed images of black holes from VLBI data (sparsely sampled frequencies in the Fourier domain) collected by the Event Horizon Telescope, replicating the results from the Bouman et al. 2017 paper.
- Implemented two algorithms: CLEAN and RML (regularized maximum likelihood), and demonstrated that using closure phase data with a total variation denoising regularizer yields optimal results.

Predicting Exoplanets from Light Curves (*APMTH 216: Inverse Problems* - [colab](#)) May 2022

- Built a model that can identify exoplanets in astrophysical light curves using both local view and global view data, replicating the results from the Shallue and Vanderburg 2018 paper.

CNN for Quantum Error Correction (*Physics 160: Quantum Information*) May 2020

- Built a convolutional neural network to optimize quantum error correction algorithms for storing memory on 9 qubit systems, focusing on bit and phase flip errors.
- Tested our algorithm on IBM quantum computers, showing improvement over current methods.

ACTIVITIES

Harvard Women in Physics (WiP) Chair *September 2021 - present*
Building an inclusive, welcoming community for undergraduate WiPs. Organize events with faculty, lab tours, and collaborate with graduate WiP for mentorship and research opportunities.

Harvard Radio Broadcasting Station Programmer *September 2019 - present*
Give weekly radio broadcasts specializing in hip hop, rhythm and blues, and rap music. Interview artists and write reviews of local shows, published on radio website ([whrb.org](#)).

Harvard International Program of Negotiation *First author* *January 2019 - December 2021*
Together with four other students, co-created a curriculum on negotiation theory under Harvard Law School's Professor Shapiro. Book launch Oct 2022 and date of publication set for November 2022.

Small Claims Advisory Service (SCAS) Volunteer *January 2019 - December 2021*
Help socioeconomically disadvantaged people going through Massachusetts small claims court system.

Harvard Modern Dance Company member *September 2019 - December 2020*
Choreograph and perform in semesterly showcases at the Loeb Theater.

AWARDS

John Harvard Scholar; KERNEL fellowship; PRISE fellowship; Dartmouth Book Award; National Latin Exam Maxima Cum Laude; World Ballet Competition finalist; Youth America Grand Prix top 24 and finalist.

HOBBIES / NON-ACADEMIC INTERESTS

Ballet: Harvard Modern Dance Company, High School Student at Bolshoi Ballet Academy in Moscow, Clara in Jose Matteo Ballet Theater Nutcracker, offer at Boston Ballet Pre-Professional Program

Tennis: High school varsity team captain and league MVP

Languages: English (native), Russian (native)

Misc.: Journaling, Taoism, existentialism, flash fiction, and memoirs.