Naomi Gluck

516-661-9957 | naomi.gluck@yale.edu| ngluck.github.io

Education

Yale University | Physics PhD Program - 3rd Year Aug. 2021 – Present
Thesis Advisor: Prof. Daisuke Nagai *New Haven, CT*

Stony Brook University Aug. 2017 – May 2021
Bachelor of Science in Physics *Stony Brook, NY*
Bachelor of Science in Astronomy and Planetary Sciences *Stony Brook, NY*
Minor in Music *Stony Brook, NY*

Publications

Galactic Atmospheres Articles

- Singh, P., Nagai, D., Oppenheimer, B. D., Lau, E., Gluck, N., & Medlock, I. (2022). Galactic Gaseous Halos: Mini-Clusters Disrupted by Feedback. Galactic Atmospheres. Retrieved from https://galacticatmospheres.pubpub.org/pub/tqp15ozl
- Oppenheimer, B. D., Nagai, D., Lau, E., Singh, P., Contreras, A. B., Gluck, N., Jones, J. D., Medlock, I., & Villaescusa-Navarro, F. (2022). A Multi-Wavelength, Multi-Model Exploration of How Feedback Disrupts Gaseous Atmospheres. Galactic Atmospheres. Retrieved from https://galacticatmospheres.pubpub.org/pub/zrdhtddz

Royal Astronomical Society Main Journal April 2020

- Gofman, R., A., Gluck, N., & Soker, N. 2020, MNRAS 494, 5230: *Enhanced mass-loss rate evolution of stars with mass greater than 18 $M_{\odot}$, and missing optically-observed type II supernovae*

Submitted Manuscripts

Royal Astronomical Society Main Journal September 2023

- Gluck et al. 2023: *An Observationally Driven Approach for Probing the Circum-Galactic Medium with Convolutional Neural Networks*

Research Experience

Graduate Research September 2021 – Present
Yale University, Prof. Daisuke Nagai *New Haven, CT*

- Ph.D Thesis: "Data-Driven Modeling of Multi-Wavelength Cosmological Surveys""
- Working with the CAMELS (Cosmology and Astrophysics with MachinE Learning Simulations) dataset, detailing the correlation between dark matter, stellar, and gas densities. Using convolutional neural networks to infer properties of the circum-galactic medium with HI and X-ray observational limits.
- Baryon Pasting (BP) Collaboration: Updating the current BP pipeline with automatic differentiation techniques. Building a differentiable gas model to include dependence on mass accretion history and redshift.
- Projects in collaboration with faculty and researchers from The Flatiron Institute (Center for Computational Astrophysics), CalTech, University of Texas-Austin, Harvard-Smithsonian SAO, and Argonne National Lab High Energy Physics.

Argonne National Lab | Graduate Researcher May 2022 – August 2022
UChigaco Argonne, Dr. Andrew Hearin *Lemont, IL*

- Worked remotely in the Argonne National Lab High Energy Physics department as a graduate researcher, focusing on the Halo-Galaxy connection using forward modeling techniques.
- Focused on implementing new physical components into SatGen (galaxy evolution and tracking model), specifically implementing a differentiable pipeline for the orbital evolutionary history galactic halos and substructure.
- Created a diffsats pipeline to determine peri-centric distance and time of a simulated NFW subhalo, based on varying initial orbital conditions.

Undergraduate Research | Physics Thesis September 2019 – August 2021
Stony Brook University, Prof. Alan Calder *Stony Brook, NY*

- Studied Uncertainty Quantification for 1 $M_{\odot}$ following the MESA open source code to determine the validity and bounds of two different wind parameters.

- Analysed simulation results to extract data to quantify and visually assess the effects of uncertainty in the winds.
- Learned and applied Parallel Computing techniques by performing suites of MESA simulations on our campus cluster SeaWulf.
- Worked on this project as a paid researcher during Summer 2020.

Undergraduate Research | Astronomy Thesis September 2020 – December 2020
Stony Brook University, Prof. Fredrick Walter *Stony Brook, NY*

- Data analysis of Nova V1047 using archival spectroscopic data from Stony Brook/SMARTS to perform a spectral time analysis on two different events.
- Used Python for data analysis, along with spectral catalogues for result confirmation.

Undergraduate Research July. 2019 – April 2020
Technion Institute of Technology, Prof. Noam Soker *Haifa, Israel*

- Research conducted at the Technion Institute of Technology in Israel.
- Used MESA (Modules for Experiments in Stellar Astrophysics) open source code to simulate the evolution of several different progenitor stars with variations on wind and mass loss parameters, and Matlab for data analysis and calculations.

Observational Astronomy September 2020 – December 2020
Stony Brook University - Prof. Fredrick Walter *Stony Brook, NY*

- Observations of the cataclysmic variable star, SS Cygni, using Stony Brook's 14" telescope and CCD camera.
- Used computer programs CCDSoft and SkyChart to position the telescope throughout observational period.
- Analyzed FITS image files through Python, presented on a poster for final project presentations.

Presentations

Baryon Pasting Workshop May 2023
Yale University *New Haven, CT*

- Presentation on in-progress work of creating a differentiable gas model (diffgas) with JAX automatic differentiation as an update to the Baryon Pasting model.
- Gave tutorial on how to use JAX and implement it into existing Python scripts.

APS April Meeting 2023 April 2023
American Physical Society *Minneapolis, MN*

- Poster Presentation: *An Observationally Driven Approach for Probing the Circum-Galactic Medium with Neural Networks*

Center for Computational Astrophysics 2022 – Present
Flatiron Institute *New York City, NY*

- February 2023 KITP Workshop: *Deep Learning the Circumgalactic Medium (CGM): Take 1*, on using neural networks to infer CGM and dark matter halo properties for the first time via hydro-dynamic simulations.
- December 2022 CAMELS Workshop: *Multi-Wavelength Parameter Inference for the Circumgalactic Medium (CGM)*, on using machine learning and neural network applications to provide insights into dark matter halo properties via the CAMELS (Cosmology and Astrophysics with MachinE Learning Simulations) Multifield Dataset.

GAINS Conference April 2022
Yale University *New Haven, CT*

- Presentation on how to succeed while pursuing a STEM degree as women and minorities, using my Trial and Error website as inspiration.
- Answered questions in a panel format on graduate student lifestyle, work-life balance, my journey through my undergraduate degree, general advice on academic success, etc.

IACS Seminar April 2021
Stony Brook University, Dr. Douglas Swesty *Stony Brook, NY*

- Seminar on the propagation of incertitude through computer simulations.
- Discussed Uncertainty Quantification Research results and explained how models of incertitude propagation are used in the open source code, MESA.

SBYIR: Young Investigators Review November 2020
Stony Brook University *Stony Brook, NY*

- Live presentation via Zoom on research conducted at Stony Brook, specifically the current results of the Uncertainty Quantification (UQ) Study.

URECA: Undergraduate Research Symposium May 2020
Stony Brook University *Stony Brook, NY*
- Poster and live presentation via Zoom on research conducted at the Technion Institute in Israel.

Teaching and Mentoring

Guest Instructor September 2023 – Present
Yale University *New Haven, CT*
- Undergraduate Courses: PHYS 378 (Introduction to Scientific Computing and Data Science – Fall 2023)
- Responsibilities Include: restructuring course materials, creating new course materials including lectures and problem sets/solution manuals wherever necessary to align with student learning goals, and giving lectures throughout the semester.

Mentoring of Undergraduate Student Research January 2023 - Present
Yale University *New Haven, CT*
- Din-Ammar Tolj (Junior Research, Physics, Fall 2023–Present): "Dark Matter and Gas Halo Shape Correlations with Secondary Properties using TNG300-1"
- Finn Gibson (Senior Thesis, Physics, Fall 2023–Present): "KLLR Correlated Profiles with CAMELS Simulations"
- Daniel Chang (Senior Thesis, Yale Physics, Fall 2023–Present): "Probing CGM Physics with Interpretable Machine Learning"
- William Kline (Senior Thesis, Yale Applied Mathematics, Spring 2023): "Modeling Dynamical Friction of Infalling Cluster Galaxies"

Graduate Teaching Fellow September 2021 - Present
Yale University *New Haven, CT*
- Undergraduate Courses: PHYS 200 (Fundamentals of Physics – Fall 2021), PHYS 120 (Quantum Physics and Beyond – Spring 2022), PHYS/ASTR 343 (Gravity, Astrophysics, and Cosmology – Fall 2022), PHYS 378 (Introduction to Scientific Computing and Data Science – Spring 2023)
- Responsibilities Include: hold regular weekly and by-appointment office hours for students (in-person and via Zoom), grade weekly problem sets, grade midterm, and final exams/projects, provide insight to problem-solving techniques, positive motivation, and reinforcement.

Tutoring August 2016 – Present
Self-Employed *Oyster Bay, NY*
- Tutoring students both in-person and online in Physics (Regents, Honors, AP Physics 1, AP Physics C), Math (Algebra, Trigonometry, Geometry, Pre-Calculus, AP Calculus AB, AP Calculus BC, Exeter Calculus), Biology, Chemistry, and Earth Science.

Broader Impacts

High School Talks – Physics and Academia December 2022 - Present
Yale University *New Haven, CT*
- Syosset High School (3/2023 – Hosted by Jill Johansen): Presented on my journey in academia as a woman in STEM, what paths students can take from high school, throughout their undergraduate degree, and how to apply to graduate programs
- Notre Dame Academy - All Girl High School (12/2022 – Hosted by Owen Steele): Presented on my journey in academia as a woman in STEM, what a similar path may look like for future students, and the pieces of advice I've accumulated along the way.

Graduate Affiliate - Berkeley College October 2022 - Present
Yale University *New Haven, CT*
- Organizing 1-2 events per semester (helping with freshman move-in, info talks, study breaks, etc.) for the undergraduate students within Berkeley College.
- Serving as a mentor and providing undergraduate students with one-on-one advice on navigating their post-graduation journey.

Trial and Error | Link July 2021 - Present
Yale University *New Haven, CT*

- Website built to help physics students through their undergraduate journey and advice for applying to graduate programs. Includes textbook lists, advice on completing coursework, writing personal statements, and more.
- Based on personal experience with both the undergraduate and graduate application process, along with research experiences and recommendations.
- Offering advice on completing the physics program, or any program in general, alongside dealing with ADHD.

Seawolves for Israel | President August 2018 – May 2021

Stony Brook University *Stony Brook, NY*

- Organize and lead weekly general and executive body meetings to educate others about Israel's history, culture, and international relations. This includes working together with other student-led groups on campus, like the Jewish Student Association, College Republicans, The Environmental Club, Hillel, and the Iranian Jewish Club to broaden interactions between students.
- Previously served on the Executive Board as Secretary (2018), and Vice President (2019).
- Launched and taught a Hebrew 101 class over zoom. Created teaching materials, supplementary materials and assignments, taught vocabulary, conversational Hebrew, and reading comprehension (July - August 2020).

Relevant Coursework

Graduate 2021 – Present

Yale University *New Haven, CT*

- Fall 2021: Graduate Classical Mechanics, Graduate Quantum Mechanics I, Math Methods
- Spring 2022: Statistical Mechanics, Graduate Quantum Mechanics II, Computing for Scientific Research
- Fall 2022: The Theory of Galaxy Formation
- Spring 2023: Graduate Electricity and Magnetism I

Undergraduate 2019 – 2021

Stony Brook University *Stony Brook, NY*

- Galaxies, General Relativity, Electromagnetic Theory II, Stars and Radiation, Special Topics: Exoplanets, Cosmology

Technical Skills

Computational Science: Techniques of parallel computing including parallelization by both threads (OpenMP) and message passing (MPI), job submission with Slurm, and software management with Modules.
Languages: Python/Jupyter, C/C++, LaTeX, Matlab, Fortran, Mathematica
Libraries: NumPy, Matplotlib, pandas, rebound, Astropy, Scipy, Statistics
Software Skills: MESA, DS9, CCDSoft, SkyChart, Microsoft Office, Pages, Numbers, Keynote, Procreate, Photoshop, Pixelmator, iMovie, LTSpice, Sibelius
Operating Systems: Linux, MacOS, Windows

Class Projects

Computing for Scientific Research | Final Project Spring 2022

Yale University, Dr. David Moore *New Haven, CT*

- Project focused on the JAX-implemented optimization of a toy model representation of mass loss experienced by dark matter subhalos surrounding galaxies.
- Learned how to train a function such that it improves results given the best value for a set of target parameters, such that the now optimized function can be used in forward modeling techniques as the basis for modeling with AI.

Senior Tutorial in Advanced Topics Spring 2021

Stony Brook University, Dr. Michael Zingale *Stony Brook, NY*

- Tutorial on graduate-level computational astrophysics, to understand the design of numerical algorithms, limitations of numerical methods, and applications to astrophysics.

Work Experience

Boost Tutors and Mentors September 2021 – Present
Online Tutoring, Jesse Leibman *New Haven, CT*

- Tutoring students online in Physics (regents, honors, AP Physics 1, AP Physics C), Math (algebra/trigonometry, geometry, pre-calculus, AP Calculus AB, AP Calculus BC, Exeter Math Programs), and Biology. Preparing students for upcoming class exams, the math and science sections of SAT/ACT exams, and AP Exams.
- Helping students to build confidence in their abilities, introducing better study methods for improving their course grades, and becoming independent learners.

Business Partnership - ANG Designs.co May 2020 – Present
Online Startup *Oyster Bay, NY*

- Established online custom graphics art company.
- Use Procreate on iPad to design all custom artwork for merchandise including face masks, pillows, and blankets, specifically partnering with Stony Brook University Hillel, SUNY Geneseo Hillel, and Ohio State Hillel.

StandWithUs Emerson Fellowship August 2019 – May 2020
Stony Brook University *Stony Brook, NY*

- Partnered with other clubs and organizations at SUNY Stony Brook to create 12 Israel-related events that impacted approximately 150 students.
- Participated in the StandWithUs conference in January 2020 in Los Angeles, to enhance critical thinking, networking, and public speaking skills.

Leadership Roles and Activities

Yale Physics Graduate Programming March 2023 – Present
Yale University *New Haven, CT*

- Interpretable Machine Learning Working Group, Fall 2023: Leader and organizer of bi-weekly meetings on the importance of machine learning interpretability in computational research, including seminars/talks from invited external speakers, project updates from group members, and discussions on state-of-the-art analysis techniques.
- Physics Graduate Virtual Open House 2023: Led, organized, and edited the Physics and Astronomy research introduction video. Collaborated between varying research groups to obtain multiple video clips. Was also a panelist for the student-led Q&A session for prospective graduate students.
- Physics Graduate In-Person Open House 2023: Created research poster ("An Observationally Driven Approach for Probing the Circum-Galactic Medium with Neural Networks"); Met with students and discussed my current research under Prof. Daisuke Nagai, life at Yale, and the graduate Physics program.
- Baryon Pasting Workshop, Fall 2023: Helped organize the schedule for a 3-day hybrid workshop, including timings for research talks, co-work sessions, and tutorials.

Stony Brook Hillel Board of Directors August 2020 – May 2021
Stony Brook University *Stony Brook, NY*

- Discuss the changes necessary to adapt Hillel events, including holiday services, to the limitations of an online-only platform.
- Representative of the student-body to clarify to board members what will work more effectively to capture a student's interest.

Society of Physics Students | General Member August 2017 – May 2021
Stony Brook University *Stony Brook, NY*

University Orchestra | Principle Oboe August 2017 – May 2021
Stony Brook University *Stony Brook, NY*

For More Information

LinkedIn: http://linkedin.com/in/naomigluck
Trial and Error: https://www.physicstrialanderror.com/
Humans of Hillel: https://tinyurl.com/y3b53rf8