Mahlet Shiferaw
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STANFORD UNIVERSITY Stanford, CA
Ph.D. Candidate in Physics
National Science Foundation & Stanford Graduate Fellow

HARVARD COLLEGE Cambridge, MA
A.B. in Astrophysics & Physics May 2020
Secondary in Studies of Women, Gender, and Sexuality
Magna Cum Laude with Highest Honors in Field. *Phi Beta Kappa*, GPA: 3.95/4.00

Scholarships and Awards

NSF Graduate Research Fellowship Program (April 2023); Honorable Mention (April 2020): This program supports outstanding graduate students who are pursuing research-based master's and doctoral degrees in STEM.

Stanford Graduate Fellowship (SGF) in Science & Engineering, Gabilan Fellow (September 2021): Students pursuing doctoral degrees in science and engineering are nominated for the SGF by their degree program.

Enhancing Diversity in Graduate Education Doctoral Fellowship Program (September 2021 – June 2023): Fellows are outstanding students who have the potential to contribute to the diversity of their academic fields.

Kavli Institute for Particle Astrophysics and Cosmology (KIPAC) Fellowship (September 2021 – June 2023): A two-year departmental fellowship awarded to select incoming doctoral students in astrophysics and cosmology.

Fulbright U.S. Student Program Grant (January 2021): This grant, sponsored by the U.S. Department of State, provides funding for students, scholars, teachers, and professionals for graduate study, research, and teaching.

Carl A. Rouse Memorial Fellowship (July 2019): This fellowship is presented annually to provide summer research support for an undergraduate, preferably an underrepresented minority, in the LIGO SURF program.

Eliot House Junior Prize in Physics (May 2019): This prize is awarded to a junior at Harvard College for excellence in their field of study.

USRA Scholarship Award (November 2018): The Universities Space Research Association (USRA) presents this award each fall to up to four college students with interests in space or engineering.

Harvard College Scholar (May 2018, May 2017): This honorary scholarship is awarded to sophomores, juniors, and seniors in the top 10% of their classes.

Research Experience

STANFORD UNIVERSITY Stanford, CA
Graduate Student Researcher September 2021 – Present
Prepare a framework to compare different galaxy formation models using their bias parameters in Dr. Wechsler's group. Studied a new statistical method for cosmological clustering as a function of distance, called nearest neighbor distributions, in my first rotation. Used Cobaya to perform Bayesian analysis in my third rotation.

FLATIRON INSTITUTE New York, NY
Flatiron Machine Learning (ML) X Science Summer School Intern June – August 2022
Translated a neural network for N-body cosmological simulations into an analytic expression. Utilized PySR, a symbolic regression library, to search for the most important features, such as the displacement, velocity, density, and tidal tensor fields. Attended relevant lectures in the first two weeks and presented a poster in the last week.

MAX PLANCK INSTITUTE FOR GRAVITATIONAL PHYSICS Potsdam, Germany
Fulbright U.S. Student Program Study/Research Fellow November 2020 – July 2021
Assessed the accuracy of several state-of-the-art waveform models for binary black holes (BBHs) compared to a set of numerical-relativity waveforms using a particle swarm optimization code. Analyzed the impact of such systematics on BBH parameter inference, e.g. mass, spin, distance, localization, and inclination.

HARVARD-SMITHSONIAN CENTER FOR ASTROPHYSICS (CFA) Cambridge, MA

Astronomy 99a: Senior Thesis in Astrophysics September 2019 – April 2020

Built mock galaxy surveys to test the nature of gravity, i.e. GR and Modified Gravity f(R), working with Dr. Sownak Bose and Daniel Eisenstein. Used the Halo Occupation Distribution model to create an automated pipeline for converting dark matter simulations into galaxy catalogues. Wrote thesis and presented at the CfA.

Astronomy 98: Research Tutorial in Astrophysics September – December 2018

Compared large-scale clustering of galaxies and halos in cold (CDM) and warm dark matter (WDM) N-body simulations. Computed the mass and correlation functions in Python and found that WDM is more clustered when sorted by fixed abundance, as this mimics a true survey. Wrote a report and gave a final presentation at the CfA.

LIGO SUMMER UNDERGRADUATE RESEARCH FELLOWSHIP (SURF) Pasadena, CA

Caltech Summer Undergraduate Research Fellow June – August 2019

Determined aLIGO's capabilities for detecting higher order modes (HOMs) in gravitational-wave signals produced by binary black hole mergers. Used numerical relativity waveform models with and without HOMs to calculate the overlap integral and luminosity distance. Wrote final paper and presented research to LIGO faculty.

NORTHWESTERN UNIVERSITY'S CIERA SUMMER REU PROGRAM Evanston, IL

Summer Research Experiences for Undergraduates (REU) Student June – August 2018

Implemented colormapping functionality in Firefly, an interactive visualization application for particle-based data. Visualized HII regions in FIRE galaxy simulations, which were found to be smaller than the Strömgren Radius model. Wrote a final paper and presented a poster to faculty, as well as the public at Adler Planetarium.

Teaching Experience

STANFORD UNIVERSITY Stanford, CA

Physics 42: Classical Mechanics Laboratory Teaching Assistant September 2023 – Present

Lead weekly laboratory sections on various topics in classical mechanics. Staff office hours to answer questions on homework. Help facilitate active learning during lecture. Grade laboratory reports, exams and homework.

Physics 71L: Modern Physics Laboratory Teaching Assistant June – August 2018

Helped lead weekly laboratory sections and lectures on optics, heat, and modern physics. Staffed office hours to answer questions on the laboratory assignments. Graded laboratory reports and wrote a solution.

Outreach Experience

STANFORD UNIVERSITY Stanford, CA

Stanford Physics, Identity, and Equity (PIE) Mentor November 2023 – Present

Provide graduate school application advice to a student from an underrepresented group that would like to apply to doctoral programs.

Enhancing Diversity in Graduate Education Doctoral Fellowship Mentor September 2023 – Present

Mentor two first-year doctoral students in Physics. Arrange bi-quarterly meetings and check in with them regularly. Provide academic and social advice to mentees.

APS CUWiP @ Stanford & SLAC National Accelerator Laboratory Volunteer September 2023 – Present

Serve on the Programming subcommittee prior to the Conference for Undergraduate Women in Physics to help plan the Physics Slam!. Volunteer day of to run the Physics Slam!, where graduate students present their research.

Black In Physics (BIP) @ Stanford Organizer December 2022 – Present

Co-organize the first group for Black physicists at Stanford University. Run semi-regular social events and plan for a Black History Month panel and lecture series in February 2024.

Physics Equity & Inclusion Committee Member September 2022 – June 2023

Served on the Physics Equity & Inclusion Committee during the 2022-2023 academic year. Proposed a budget to start the first BIP group at Stanford.

Physics Recruiting & Outreach Committee Member September 2021 – June 2022

Served on the Physics Recruiting & Outreach Committee during the 2021-2022 academic year. Traveled to the 2022 SACNAS National Diversity in STEM Conference to recruit prospective graduate students.

Academic Conferences, Presentations, and Workshops

KIPAC@20: 2023 September 12-15; Stanford University, Stanford, CA. Presented poster: *Shiferaw, Mahlet; Kokron, Nick; Wechsler, Risa. Comparing Galaxy Formation Models using the Bias Expansion.*

2023 Santa Cruz Galaxy Workshop: 2023 August 7-11; University of California Santa Cruz, Santa Cruz, CA.

Michigan Cosmology Summer School 2023: 2023 June 5-9; University of Michigan, Ann Arbor, MI.

Future Cosmology: 2023 April 23-29; Institut d'Études Scientifiques, Cargèse, France. Presented talk: *Shiferaw, Mahlet; Kokron, Nick; Wechsler, Risa. Comparing Galaxy Formation Models using the Bias Expansion.*

The SACNAS National Diversity in STEM Conference: 2022 October 27-29; San Juan, Puerto Rico.

The NSF-AGEP RUA Professional Conference: 2022 September 12-13; California Institute of Technology, Pasadena, CA.

National Society of Black Physicists (NSBP) Conference: 2021 November 4-7; Virtual.

The SACNAS National Diversity in STEM Conference: 2021 October 25-29; Virtual.

235th American Astronomical Society (AAS) Meeting: 2020 January 4-8; Honolulu, HI. Presented poster: *Shiferaw, Mahlet; Bose, Sownak; Eisenstein, Daniel. Building Mock Galaxy Catalogues to Test the Nature of Gravity.*

Discover UChicago: 2019 November 7-9; University of Chicago, Chicago, IL.

The SACNAS National Diversity in STEM Conference: 2019 October 31-November 2; Honolulu, HI. Presented poster: *Shiferaw, Mahlet; Weinstein, Alan; Liting, Xiao. Optimal Mass, Spin, and Orientation Parameters for Detecting Higher Order Gravitational-wave Modes from Binary Black Hole Mergers.* Funded to attend with the SACNAS Travel Scholarship.

FUTURE of Physics: 2019 October 13-16; California Institute of Technology, Pasadena, CA.

Introduction to Graduate Education (IGEN)*:* 2019 October 10-12; Northwestern University, Evanston, IL.

Conference for Undergraduate Women in Physics (CUWiP) @ UMass Amherst: 2019 January 18-20; University of Massachusetts Amherst, Amherst, MA. Presented poster: *Shiferaw, Mahlet; Gurvich, Alexander; Geller, Aaron; Faucher-Giguère, Claude-André; Richings, Alex. Visualizing HII Abundance in FIRE Data.*

233rd AAS Meeting: 2019 January 6-10; Seattle, WA. Presented poster: *Shiferaw, Mahlet; Gurvich, Alexander; Geller, Aaron; Faucher-Giguère, Claude-André; Richings, Alex. Visualizing HII Abundance in FIRE Data.*

UM Astronomy Fall Preview Weekend: 2018 October 25-27; University of Michigan, Ann Arbor, MI.

Maria Mitchell Women in Science Symposium (MWISS): 2018 October 5-6; Babson College, Wellesley, MA. Presented poster: *Shiferaw, Mahlet; Gurvich, Alexander; Geller, Aaron; Faucher-Giguère, Claude-André; Richings, Alex. Visualizing HII Abundance in FIRE Data.* Attendance sponsored by the MWISS Scholarship.

Preprint Publications

Ramos-Buades, Antoni, et al. "SEOBNRv5PHM: Next generation of accurate and efficient multipolar precessing-spin effective-one-body waveforms for binary black holes." arXiv preprint arXiv:2303.18046 (2023).

Language, Technical Skills, and Interests

Languages: German (A2) and Amharic (Listening C1, Speaking B1).
Programming: Proficient in Python, Latex, Mathematica, HTML/CSS. Experience with JavaScript, GLSL, C, PHP/MySQL, Java, MATLAB.
Software: Windows/MacOS, Clip Studio Paint, Houdini, GIMP, Paint Tool Sai, ArtRage, TVPaint Animation, Android Studio, and Adobe Photoshop/Illustrator/AfterEffects/Premiere.
Interests: Art, Running, Traveling.