Alemayehu Solomon Bogale

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Research Interests

α Laboratory Plasma Astrophysics, High Energy Density Plasma Physics

Education

2020 - Present **Ph.D**, Engineering Physics, Department of Mechanical and Aerospace Engineering, University of California San Diego, La Jolla, CA.

2020 **B.A.**, Physics, Department of Physics, University of Chicago, Chicago, IL.

2020 **Minor**, Computer Science, Department of Computer Science, University of Chicago, Chicago, IL.

2016 **Diploma**, Whitney M. Young Magnet High School, Chicago, IL.

2016 **Community College Courses**, Harry S. Truman City College, Chicago, IL.

Professional Experience

Jun. 2021 - Oct. 2021 **Graduate Summer Student**, High Energy Density Physics Summer Student Program, Lawrence Livermore National Lab(LLNL), Livermore, CA.

During the summer my mentor Walt Nissen and I addressed the problem of mesh generation in shock hydrodynamic simulations. These problems were addressed with use of high-order simplicial meshes and BLAST a high-order Lagrangian hydrocode The quality of these meshes were assessed by comparing their performance on verification test problems to existing mesh generation outputs. I presented my work at the annual LLNL Summer Slam.

Sept. 2020 - Present **Graduate Student Researcher**, HEDP Group, University of California San Diego(UCSD) , San Diego, CA.

I assisted with laser-based high-energy-density (HED) experiments at various high-power laser facilities. These experiments focused on magnetized hydrodynamic evolution in HED physics relevant to laboratory astrophysics and inertial confinement fusion. Where my role included analyzing data from a variety of diagnostics, and running simulations on PIC and MHD codes.

Apr. 2019 - Sep. 2019 **Undergraduate Summer Student**, High Energy Density Physics Summer Student Program, Lawrence Livermore National Lab(LLNL), Livermore, CA.

This position included working under Dr.David Larson, where I implemented a high-order elliptic solver in a one-dimensional PIC code to achieve better energy conservation using higher-order shape functions and symplectic time integration algorithms. In order to evaluate energy conservation, I used standard plasma phenomena, Landau Damping, and Two stream instability. The results will inform future multi-component plasma simulations. At the end of the summer, I gave a talk to staff scientists and peers on my work.

Apr. 2019 - Jun. 2020 **Learning Assistant**, *Learning Assistantship*, Dept. of Physics, University of Chicago, Chicago, IL.

I served as an assistant to a graduate teaching assistant during an introductory mechanics class. My responsibilities included setting up laboratory apparatuses, facilitating student discussion, and grading assignments.

Jun. 2018 - Aug. 2018 **Software Engineering Intern**, *IT Internship Program*, Principal Financial Group, Des Moines, IA.

I was placed on the Life Insurance team, where I reimplemented their claim application software used by underwriters and clients. The applications were rebuilt using Java, MySQL, and JavaServer Pages Fragment to prevent potential inaccuracies in their legacy code. I also was a participant of the company-wide hackathon, where we built a web assessment for possible breaches in security that alerts and organizes meetings with appropriate personnel using Amazon Web Services and Node.js for backend scripting.

Jun. 2017 - Jun. 2020 **Student Researcher**, *Flash Center for Computational Science*, Department of Astrophysics and Astronomy, University of Chicago, Chicago, IL.

As a student researcher at the Flash Center, I built PRaLine code, a publicly available Python-based Proton Radiography Reconstruction tool for experimental purposes based on Graziani et al. 2017 Review of Scientific Instruments 88 (12), 123507. The code is being used as an analysis tool in high energy density plasma experiments. In addition, I executed and analyzed two-dimensional FLASH simulations of the National Ignition Facility TDYNO experiments. I also redesigned and coded the website for the High Energy Density Association, HEDSA, which facilitates collaboration and communication within the HED community.

Jul. 2016 - Aug. 2016 **Trainee**, *Google Computer Science Summer Institute*, Chicago, IL.

I participated in an intensive 4-week program at Google offices taught by software engineer with a focus on app development using git, HTML, CSS, Javascript, Python, and hosting through Google App Engine. The training culminated in the creation of a web-based application with two other students. It was built on a Python backend using a Jinja framework for HTML templating and presented it to an audience of Google engineers.

Jun. 2015 - Aug. 2015 **Intern**, *TARGET Internship*, Fermilab, Batavia, IL.

I participated in a program at Fermilab that gave high school students a chance to work with staff scientists and to learn through hands-on experimental learning. I created and desinged web pages for the Feyman Computing Center using Microsoft Sharepoint. We also learned to solder by constructing radios and batteries. In addition, we programmed simple robots in Python.

Fellowships, Travel Awards & Scholarships

Fellowships **2020**, Sloan Scholar, $40,000.

The Sloan Scholar Fellowship provides financial and professional support to accelerate and catalyze the success of doctoral students. The Sloan Scholar Fellowship is awarded to 12 incoming graduate students in the Division of Physical Sciences or the Jacobs School of Engineering.

Travel Award **2019**, NIF and JLF User Group Meeting, $1050.

Travel Award **2018**, Omega Laser Facility Users Group Workshop, $1400.

Travel Award **2018**, NIF and JLF User Group Meeting, $1050.

Scholarship **2016**, Odyssey.

The Odyssey Scholarship Program provides financial aid and gives students access to study abroad programs, mentoring, and internships

Scholarship **2016**, Questbridge, Acceptance Rate for 2016: 5.3%.

Questbridge aims to increase the percentage of talented low-income students attending the nation's best colleges by providing full four year scholarships

Presentations

2022 **Omega Laser Facility Users Group Workshop**, *Mitigation of Backward Stimulated Raman Scattering using external magnetic fields (poster). A.S.Bogale, M. Bailly-Grandvaux, S. Bolaños, M. J.-E. Manuel, B. J. Winjum, C. A. Walsh, J. Saret, R.Lee, F.Tsung, W.Mori, D. Froula, T. Filkins, and F. N. Beg.*

2021 **LLNL Summer Slam**, *Attacking the Mesh Generation Bottleneck (slides). A.S. Bogale, W. Nissen, R.Rieben.*

2019 **LLNL Summer Student Presentations**, *High-Order Particle-In-Cell Plasma Simulations (slides). A.S. Bogale, D. Larson.*

2019 **NIF and JLF User Group Meeting**, *Two-Dimensional FLASH Simulations of the NIF TDYNO Experiments; "Deposition Efficiency" (poster). A.S. Bogale, S. Feister, E.C. Hansen,C.Graziani, N. Flocke, D. Q. Lamb, C.K. Li, J.T. Laune, K. Weide, P.Tzeferacos.*

2018 **Omega Laser Facility Users Group Workshop**, *PRaLine: An Open Source Python solver for linear reconstruction of magnetic fields from proton radiographs" (poster). A.S. Bogale, S. Feister, C.Graziani, N. Flocke, D. Q. Lamb, C.K. Li, J.T. Laune, K. Weide, P.Tzeferacos.*

2018 **NIF and JLF User Group Meeting**, *PRaLine: An Open Source Python solver for linear reconstruction of magnetic fields from proton radiographs" (poster). A.S. Bogale, S. Feister, C.Graziani, N. Flocke, D. Q. Lamb, C.K. Li, J.T. Laune, K. Weide, P.Tzeferacos.*

Outreach Experience

Jun. 2022 - Present **Tutor**, *San Diego Tutoring Tree.*
SDTT gives UCSD students the opportunity to provide free tutoring for K-12 students in need of assistance.

Sept. 2021 - Present **Mentor**, *Sloan Scholar Program.*
Sloan Scholar program is committed to supporting and serving a diverse graduate student body as they progress through their PhDs. To that goal, a group of us scholars served as mentors to incoming graduate students to help ease the transition and guide them through their first-years

Sept. 2018 - Jun. 2020 **Mentor**, *Society for Scientists of Color.*
I served as a leader for groups of both physics and computer science majors, consisting of roughly ten members each. Responsibilities included organizing monthly lectures and gatherings to facilitate relationships between the student members and faculty. We also helped underclassmen find internships and research opportunities along with holding workshops for technical interviews.

Sept. 2018 - Present **Student Member**, *High Energy Density Science Association.*
Organization of scientists to promote and advocate federal funding in high energy density science.

Sept 2018 - Jun 2020 **Community Outreach Chair**, *CompileHer.*
CompileHer is an organization dedicated to closing the gender gap in technology. I led outreach to schools in the Chicago public system to recruit middle school female students for our program. I taught a 7-week Python workshop to introduce middle school female students to computer science and applications such as robotics, music production, and video game design. We also hold a city-wide hackathon, where we help female students collaborate with UChicago students to design their apps.

Jul. 2017 - Present **Student Member**, *American Physical Society*.
Membership organization to promote scientific research through scientific meetings, journals, and education

Sept. 2013 - Jun. 2016 **Tutor**, *By The Hand*.
By the Hand is an organization partnered with Chicago Churches that serves the 20th percentile of Chicago Pubic School students. I provided after-school help for 20 elementary school students in Chicago's South and West side for 5 hours a week. Outside of homework help, I also assisted in serving meals and leading Bible study.

Sept. 2013 - Jun. 2016 **Founder**, *Refugee Relief Club*.
The process of entering the USA is quite challenging, and those hardships don't stop once you finally receive asylum. Many of the refugee centers throughout Chicago are overworked and underfunded. The goal of the club is to assist refugees assimilate to their new environment. Our members have helped us raise over 2000 dollars towards refugee relief. We also volunteer at refugee centers to help tutor students, assist ESL classes, and fix up apartments

Sept. 2012 - Jun. 2016 **Football Player**, *Whitney M. Young Varsity Football*.
Achieved Academic All-City Honors and served as co-captain for 2014 Junior Varsity team.

Computer and Programming Skills

Languages: Python, Fortran 90, C, Matlab, Java, Javascript, LaTeX, Racket, SML

Tools and Software: Numpy, Matplotlib, VisIT, Tecplot, Django, AWS, GDB, Valgrind

Coursework Projects

2022 **Galactic Collision Simulations**, *C, Python*, Modeled common galaxy interactions that can be interpreted as either a major or minor interaction with the final result recreating the Mice Galaxy via an N-body simulation described by Barnes et al.

2021 **Modeling the Quantum Electron**, *Python*, Applied the Metropolis Monte Carlo path-integral approximation to a quantum harmonic oscillator; allowing us to extract out the discrete energy levels and average Temps of the system..

2019 **Naive Programming Language**, *SML*, Implemented a programming language with a term system, type checker, and evaluator with the ability to define variables, abstractions, and applications.

2018 **NBA Season Simulator**, *Python*, Applied a Monte Carlo method to the NBA Season using basketball performance metrics to build a probability distribution from which I sampled. .

2017 **Man in the Middle Attack Implementation**, *Python*.

2017 **Simplified NetCat Client Server Model**, *C*, Set up a client and server using the socket programming API.

2016 **Chess Board Game**, *Racket*, Used the Dr.Racket GUI features to build a fully-functioning Chess Game.

2016 **User-space UNIX Shell**, *C*, I implemented a UNIX shell with the ability to make, move, alter directories as well as create files and execute programs.

Languages

English	Fluent
Amharic	Fluent