

Clara M. Larson

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EDUCATION

University of California, Berkeley

Masters of Science in Energy and Resources

expected May 2025

Berkeley, CA

Grinnell College

Bachelor of Arts in Physics w/ honors and French w/ honors

May 2021

Grinnell, IA

- GPA: 3.83/4.00
- Dean's List 6 semesters
- Semester of courses at Aix-Marseille University (Fall 2019 Wellesley-in-Aix study abroad program)

RESEARCH EXPERIENCE

Researcher I - Computational Science

November 2021 – April 2023

National Renewable Energy Lab, Complex System Simulation and Optimization Group

Golden, CO

HPC User and Applications Support

- Lead NREL's HPC applications benchmarking plan, including the development of an automated workflow for running benchmarking tests and creating/managing a database to store performance results. Lead weekly meetings and managed a GitHub repository to coordinate the project collaboratively with 4 others.
- Supported computational chemistry codes VASP and jdftx on NREL's HPC clusters. Responsibilities included creating documentation, working directly with users, compiling code, developing recommendations for performance efficiency, and de-bugging issues with VASP and jdftx across all three of NREL's clusters.
- As a member of NREL's Kestrel Readiness team, prepared the benchmarking workflow to be used to assess performance of key application on NREL's incoming HPC cluster, Kestrel, and compiled and ran codes on Kestrel's Test and Development System to assess and optimize I/O performance, MPI, and multi-threading and parallelization schemes on the new hardware.

Electric Grid Modeling and Visualization Research

- Created geographic visualization tools in Jupyter Notebook that automate the process of generating interactive geospatial maps of electric grid data and power flow optimization results, and presented a tutorial on geographic information packages in python. The notebooks are available to researchers at NREL and were used for the Resilience Science LDRD project.
- Developed a workflow for generating timeseries of rooftop PV potential generation across the US using NREL's Renewable Energy Potential model (reV), NSRDB irradiation data, and data from Google's Project Sunroof. Developed additional code for the ExaSGD project that spatially integrates the timeseries into national transmission/distribution grid datasets and modifies existing loads, providing the capability to include rooftop PV scenario timeseries in stochastic load scenario generation.

DOE SULI Research Intern

June 2021 – November 2021

National Renewable Energy Lab, Complex System Simulation and Optimization Group

Golden, CO (remote)

- Conducted DFT calculations on Hydrogen fuel cell membranes using the Gaussian application on NREL's Eagle HPC cluster in order to investigate fuel cell degradation rates. Project completed in collaboration with 3M and GM.
- Created and tested a python-based machine learning model that leverages the results of our DFT calculations to predict the degradation rates of novel membrane monomers.
- Presented results at end-of-summer internship poster fair and compiled results into a 15-page report, which **contributed to a paper that was recently published in ACS Physical Chemistry Au**.
- Internship extended 3 months (beyond the timeline covered by DOE funding) to continue working with the Complex Systems Simulation and Optimization Group in order to prepare for a role as a Researcher within the group.

NSF REU Fellow

June 2020 – May 2021

University of Minnesota MRSEC, Birol Group

Minneapolis, MN (remote)

- Using the HPC resources at the Minnesota Supercomputing Institute, ran the VASP application to perform DFT calculations of band structures, phonons and structural distortions to assess the transition between GdCuAs₂ and GdCuP₂ compounds and the instabilities in both compounds. GdCuAs₂ contains square nets of atoms that display topological phases which are not yet understood.
- Worked with a graduate student (beyond official summer Fellowship dates) to finalize project results and compile them into a manuscript for journal submission.

DOE SULI Research Intern

June 2019 – August 2019

National Renewable Energy Lab, Geothermal Group

Golden, CO

- Independently conducted a data-driven project to assess how fast geothermal drilling occurs globally and to understand the effects of lithology and local economic factors on drilling rates. Presented my paper for this project at the **2020 World Geothermal Congress** in Reykjavik, Iceland (postponed to 2021, remote).

- Completed a second project on the potential for technology transfer between geothermal and hydrocarbon drilling. Used global sources of information on hydrocarbon drilling to locate hydrocarbon reservoirs with lithologies that matched those of geothermal reservoirs in order to highlight the potential uses of geothermal drilling technologies in hydrocarbon drilling and encourage the funding of geothermal drilling technology development.
- Participated in the SULI program's science communication courses, culminating in a paper and an abstract for each project and a poster presentation of my research at the end of the summer.

TEACHING AND LEADERSHIP EXPERIENCE

Graduate Student Instructor

UC Berkeley Physics Department

August 2023 - December 2023

- Graduate student instructor for Physics 8B. Responsibilities included planning and running discussion sections, leading labs, constructing review material, and grading.

UC Berkeley Environmental Science, Policy and Management Department

January 2024 - present

- Graduate Student Instructor for ESPM C10: Environmental Issues.

Calculus Peer Tutor

August 2018 – October 2021

Grinnell College Math Lab

Grinnell, IA

- Worked with students weekly at the college's Math Lab, assisting them with their calculus homework and reviewing key calculus concepts. Learned to adapt teaching style to meet individual students' learning styles.

Science Community Leader

January 2020 – March 2021

Grinnell College Physics Department

Grinnell, IA

- Acted as a mentor for three terms of Intro Physics II courses. Attended class sessions, created practice tests, and held mentor sessions twice per week to assist students with homework and help them understand class material.
- Participated in training through the Science Learning Center, including bias training and regular discussions of best teaching practices to ensure inclusivity. Worked with a small group of students to develop classroom inclusivity practices and frameworks.

SPECIALIZED SKILLS

Computer: Python (numpy, scipy, matplotlib, pandas, geopandas, bokeh, scikit-learn), HPC application benchmarking, HPC workflow automation, building/running/debugging HPC applications, Linux/Bash, VASP, Gaussian, jdftx, Anaconda, Jupyter, C/C++, GitHub, Mathematica, LaTeX, SQL, Grafana

Technical: Analog and digital circuitry, Microcontroller interfacing with Arduino

Language: French (fluent, C2-level certification), Spanish (conversational)

PUBLICATIONS AND CONFERENCE PROCEEDINGS

Long, H., Larson, C., Coms, F., Pivivar, B., Dahlke, G., Yandrasits, M. (2022). The Role of H₃O[·] Radical in the Degradation of Fuel Cell Proton Exchange Membranes. *ACS Physical Chemistry Au*. DOI: 10.1021/acspchemau.2c00037.

Larson, C., Robins, J., Young, K. R., & Eustes, A. (2020). Establishing a Baseline for Global Geothermal Drilling Rates. *World Geothermal Congress 2020*. www.osti.gov/biblio/1860487.

RESEARCH PRESENTATIONS AND POSTERS

Evolution of Scenario Generation Capabilities in the ExaSGD Project

Poster, 2023 Exascale Computing Project Annual Meeting, Houston, TX

Satkauskas, I., Reynolds, M., Maack, J., Sigler, D., Panda, K., Larson, C., Jones, W.

Investigating Fuel Cell Membrane Degradation Through DFT Calculations and Machine Learning

Presentation, Poster Session, The National Renewable Energy Laboratory, Golden, CO (2021)

Larson, C., Long, H.

Assessing the Transition Between GdCuAs₂ and GdCuP₂ Using DFT

Lightning Talk, Conference for Undergraduate Women in Physics (2021, remote)

Larson, C., Saha, A., & Birol, T.

GdCuAs₂ and GdCuP₂: Transition Between the Compounds and their Potential as Topological Insulators

Presentation, Birol Group Meeting, University of Minnesota MRSEC (2020, remote)

Larson, C., Saha, A., & Birol, T.

Establishing a Baseline for Global Geothermal Drilling Rates

Presentation, 2020 World Geothermal Congress (postponed to 2021, remote)

Presentation, Weekly Physics Seminar, Grinnell College Physics Department, Grinnell, IA (2020)

Presentation, Poster Session, The National Renewable Energy Laboratory, Golden, CO (2019)

Larson, C., Robins, J., Young, K. R., & Eustes, A.

TUTORIALS PRESENTED

Optimizing VASP Performance on Eagle and Swift

Computational Science Tutorials, National Renewable Energy Laboratory, Golden, CO (2022)

Plotting Electric Grid Data with Bokeh and Geopandas Python Packages

Computational Science Tutorials, National Renewable Energy Laboratory, Golden, CO (2022)

Interpreting VASP Output Data using Jupyter Notebook

Interview Seminar, National Renewable Energy Laboratory, Golden, CO (2021)

TRAININGS COMPLETED

H8PG3X: HPE Cray EX Programming and Optimization, 4 day course on HPC programming and optimization in the HPE Cray programming environment.

AWARDS

Director's Award for Exceptional Performance, National Renewable Energy Laboratory, August 2022: for contributions to deploying NREL's high performance computer cluster "Swift" (received along with a group of 6 others).

Key Contributor Award, National Renewable Energy Laboratory, December 2022: for commitment and outstanding contributions to the laboratory.