MADISON LYTLE

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EDUCATION

Ph.D. in Computational and Applied Mathematics
Colorado School of Mines, Golden, CO — Anticipated 2029

M.S. in Mathematics (Applied Specialization)
California Polytechnic State University, San Luis Obispo, CA — June 2024
Graduate GPA: 3.97/4
Awards: Outstanding Graduate Student for Mathematics Department, Cal Poly Women in STEM Scholarship

B.S. in Mathematics (General Concentration)
B.S. in Aerospace Engineering (Astronautics Concentration)
California Polytechnic State University, San Luis Obispo, CA — June 2024
Undergraduate Higher Ed GPA: 3.85/4
Awards: President's Honors List, University Honors Program, Northrop Grumman Mustang Scholar, Cal Poly Merit Scholar, Accenture Outstanding Junior Aeronautical Engineering Award, MAA Award for International COMAP Mathematical Contest in Modeling 2022, MAA MathFest 2022 Outstanding Undergraduate Poster Award

MATHEMATICS AND ENGINEERING WORK EXPERIENCE

Student Research Assistant — Dec 2021 - June 2024
California Polytechnic State University/ National Science Foundation (NSF) — *San Luis Obispo, CA*

- NSF Grant Title: "Collaborative Research: Collapse, Rogue Waves, and their Applications: From Theory to Computation and Beyond"
- Used both analytical and numerical techniques to study both existence and stability of rogue waves in lattice dynamical systems (DNLS and AL wave models)
- Led to publication (*On the proximity of Ablowitz–Ladik and discrete nonlinear Schrödinger models: A theoretical and numerical study of Kuznetsov-Ma solutions*)

Student Researcher (Machine Learning for Atmospheric Science) — Aug 2022 - May 2023
University of Maryland/ Cooperative Institute for Satellite Earth System Studies (CISESS) — *College Park, MD*

- Developed machine learning tools for the Cooperative Institute for Satellite Earth System Studies
- Continued NOAA Atmospheric River Identification Neural Network research, presented at the 103rd American Meteorological Society (AMS) Annual Meeting

Lapenta Intern (NESDIS/ UCAR Affiliated) — June 2022 - Aug 2022
National Oceanic and Atmospheric Administration (NOAA) — *College Park, MD*

- Developed and tested a series of Atmospheric River Identification Neural Networks (ARINNs) using Python
- Retrieved and processed satellite data for use with ARINN

Software Team Member,
PowerSat Attitude Determination and Control System (ADCS) Lead — Sep 2021 - Sep 2022
ETOILES (Educational Tech. for Open and Interactive Learning via the Eng. of SmallSats) — *San Luis Obispo, CA*

- Simulated dynamical systems and control using reaction wheels using MATLAB and C++
- Selected Missions/ Projects:
  - StickCube (Project Co-lead): Project to produce a self-stabilizing inverted pendulum. Lead the development of microcontroller and sensor data processing code

- PowerSat: Technology demonstration mission for a 100 m deployable solar array onboard a 3U CubeSat. Previously lead ADCS subsystem team

Lab Manager, Mission Lead, and SRI Fellow Nov 2019 - Jun 2022
Cal Poly CubeSat Lab *San Luis Obispo, CA*

- Studied classical controls theory to apply to attitude determination and control systems
- Managed interdisciplinary research lab consisting of around 100 undergraduate students
- Selected Missions/ Projects:
  - AMDROHP (Student Mission Co-lead): Technology demonstration mission for a deployable radiator with oscillating heat pipes in collaboration with Cal State LA and NASA JPL. Managed a small interdisciplinary team of students, communicates between multiple parties, and works on system design
  - Spinnaker-3/CP 15 (Assemble, Test, and Launch Operations): Technology demonstration mission for a drag sail to deorbit the Firefly Capsule 1 of the Firefly-Alpha rocket. Worked to physically assemble and test the satellite-drag sail module. Launched in Sept. 2021 but launch vehicle failed to enter orbit.

NASA Earth Observing System (EOS) Factory Support Intern June 2021 - Oct 2021
Northrop Grumman *Redondo Beach, CA*

- Worked on a team to provide technical and operations support to the EOS Flight Operations team for Aqua and Aura spacecraft at NASA Goddard Space Flight Center.
- Adapted 17-year-old Excel-based solar string performance modeling tool into a MATLAB format with a GUI (made a 12 hour-long analysis task take less than 30 seconds on average).
- Performed State of Health Test for operational satellites using this constructed modeling tool.

2020-2021 Fellow July 2020 - June 2021
Rewriting The Code *Durham, NC*

- Fellowship to empower college and early career women in the technology industry
- Served as a mentor for younger women interested in STEM careers

Frost Undergraduate Mathematics Research Fellowship April 2020 - Dec 2020
California Polytechnic State University *San Luis Obispo, CA*

- Constructed and validated conceptual models of the Pleistocene glacial cycles using MATLAB
- Analyzed dynamical systems with varying free oscillations and external forcing
- Learned MATLAB programming

SKILLS

Computer	Python, MATLAB, Linux (Ubuntu), Raspberry Pi, Arduino, LaTeX, Excel, Beginner C/C++
Mechanical/Technical:	Red tag certification (licensed to operate machinery on Cal Poly campus), basic soldering experience, clean room assembly/ satellite assembly, Amateur Radio License, procedure drafting and execution
Language	State of Colorado Seal of Biliteracy in English and Spanish

PUBLICATIONS

1. Madison L. Lytle, Efstathios G. Charalampidis, Dionyssios Mantzavinos, Jesus Cuevas-Maraver, Panayotis G. Kevrekidis, Nikos I. Karachalios, On the proximity of Ablowitz–Ladik and discrete nonlinear Schrödinger models: A theoretical and numerical study of Kuznetsov-Ma solutions, Wave Motion, Volume 137, 2025, 103547, ISSN 0165-2125, https://doi.org/10.1016/j.wavemoti.2025.103547.
2. Munguia, Maria & Shibata, Gabriella & Castro, Osvaldo & Miesner, Spencer & Asadi, Sufi & Leon, Anthony & Hernandez, Allan & Molina, Christopher & Bell, Jered & Lytle, Madison & Wolk, Kieran & Roberts, Scott &

Furst, Benjamin & Sunada, Eric & Bellardo, John & Daimaru, Takuro & Kuo, Jim. (2021). Design, Modeling, Simulation, and Testing of Flexible Joint. 10.1115/IMECE2021-70558.

EXTRA-CURRICULAR ACTIVITIES

Mathematics Related:

- Mathematical Contest in Modeling (MCM) Competitor: International competition in mathematical modeling hosted by COMAP (Consortium for Mathematics and its Applications).
  - In 2022, my team won the MAA award for our category, making us one of the 27 teams to receive an award out of 15105 total competing teams.
  - Winning entry: "Applying Optimal Control with SQP (Sequential Quadratic Programming) to Cycling Performance Represented by Constituent Course Elements"
- AWM (Association for Women In Mathematics): President and Secretary, June 2023-June 2024

Aerospace Engineering Related:

- Cal Poly SWE (Society of Women Engineers): Member, Sep 2019 - June 2024
- Tau Beta Pi: Engineering Honor Society, Member, Jan 2021 - June 2024
- Cal Poly WINGS (Women Inspiring the Next Generation in STEM): Co-President, April 2020-April 2022
- Cal Poly Space Systems: Member, Sep 2019 - April 2020
- Cal Poly Disability Resource Center Aerospace Note-taking, Sep 2019 - Dec 2019

Other:

- Cal Poly Mycology Club: Secretary, February 2022 - June 2023

CONFERENCES AND WORKSHOPS

- Dynamics of Non-Equilibrium Variables: Multiscale-multiphysics applications of fluctuating hydrodynamics 2025 (Zaragosa, Spain) - Poster Presenter
  - Poster title: "A New Approach to Simulating Colloidal Suspensions Driven by AC Electric Fields"
- Rocky Mountain Fluid Mechanics Research Symposium 2025 (Boulder, CO) - Presenter
  - Talk title: "A New Approach to Simulating Colloidal Suspensions Driven by AC Electric Fields"
- SIAM Dynamical Systems Workshop on Stochastic Oscillators 2025 (Golden, CO) - Attendee
- SIAM Conference on Nonlinear Waves and Coherent Structures 2024 (Baltimore, MD) - Poster Presenter
  - Poster title: "Investigation of Kuznetsov-Ma Breather Solutions to Discrete Nonlinear Schrödinger Equations"
- American Meteorological Society 103rd Annual Meeting 2023 (Denver, CO) - Presenter
  - Talk title: "Atmospheric River Identification Neural Network (ARINN) for SmallSat Observations"
- Joint Mathematical Meeting (JMM) 2023 (Boston, MA) - Co-Presenter
  - Talk title: "Applying Optimal Control With SQP to Cycling Performance Represented by Constituent Course Elements"
- 9th Annual Lesbians Who Tech & Allies Summit 2022 (San Francisco, CA) - Attendee
- MAA MathFest 2022 (Philadelphia, PA) - Poster Co-Presenter/ Attendee
  - Poster title: "Applying Optimal Control With SQP to Cycling Performance Represented by Constituent Course Elements"

  - Won Outstanding Undergraduate Student Poster
- CubeSat Developers Workshop 2022 (San Luis Obispo, CA) - Organizer/ Volunteer/ Attendee
- Graduate Research Opportunities for Women (GROW) 2021 (virtual) - Attendee
- CubeSat Developers Workshop 2021 (San Luis Obispo, CA) - Volunteer/ Attendee