CV: Isaac Reed Edelman, B.S.

CONTACT INFORMATION

Location: San Francisco, CA
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RESEARCH INTERESTS

Exoplanet Characterization: phase curves, eclipse mapping, spectroscopy, atmospheric chemistry, open-source software
Automation in Engineering: robotics, design, manufacturing, system engineering, control systems, multiagent systems, human-machine interface systems

EDUCATION

M.S. Mechanical Engineering & M.S Engineering Management
University of Colorado Boulder
8/2024-Current

B.S. Honors Physics
New Mexico Technical Institute of Mining and Technology
Minor in Mathematics, Option in Astrophysics
8/2017 - 5/2022

EMPLOYMENT

Stellartech Research Corporation, Milpitas, CA
R&D Test Automation Engineer
Supervisor: Vincent Sullivan
5/2024- Current

- Develop automated tools to assist in medical device development.
- Work alongside experienced professionals in researching, developing, and testing medical devices.
- Assist in product design and development, create technical documentation and test prototypes.
- Assist with regulatory compliance, quality assurance, and manufacturing processes.

Stellartech Research Corporation, Milpitas, CA
Engineer Intern
Supervisor: Vincent Sullivan
8/2022 - 5/2024

- Contributed to diverse R&D projects, spanning ablation, stroke damage reduction, and catheter design. Applied expertise in signal filtering for high-voltage signals, systems engineering, medical device verification & validation, and production automation.
- Developed a calibration to mitigate interference from high-voltage electrodes, ensuring precise delivery of voltage during surgeries.
- Worked with clients to develop, assemble, and troubleshoot clinical systems for first-in-human clinical trials.
- Authored comprehensive engineering documentation outlining calibration, construction, and validation procedures.
- Fabricated test fixtures for validating and testing subsystems within medical devices.
- Developed a Python-based automated process test system controlling various electromagnetic components based on sensor array inputs to conduct safety testing in a production environment.
- Applied scientific methodologies, statistical analyses, and hands-on expertise throughout the prototyping,

experimentation, and development phases of medical devices.

BAERI / NASA Ames Research Center, Mountain View, CA   12/2022 - 5/2023
Astrophysicist
Mentors: Dr. Thomas Greene, Dr. Taylor Bell
- Collaborated with NASA Ames astrophysics branch on the JWST (James Webb Space Telescope) Exoplanet and Young Star Team.
- Contributed to the development and optimization of the open-source Python-based Eureka! Data pipeline, a widely utilized tool for analyzing exoplanet phase curve and spectrum data.
- Created an Eureka! analysis tool to investigate JWST mirror tilt events, aiding in systematic error identification during data reductions.
- Engaged in data analysis with the MANATEE Team, focusing on JWST observations. Tasks included exploring data reduction methods, conducting spectrum analyses, and constructing advanced atmospheric and planetary models for exoplanets.
- Applied Markov Chain Monte Carlo analysis to probe model multiparameter parameter spaces.
- Examined exoplanet spectra to deduce atmospheric composition, planetary parameters, and astrophysical characteristics.
- Executed data reduction on pivotal photometric points for multiple exoplanets, contributing to efforts in modeling exoplanet spectra.
- Leveraged cross-disciplinary experience to investigate unknown sensor anomalies, enhancing the understanding and communication of analysis paths for studying exoplanets using JWST data.
- Presented research findings to the NASA Ames astrophysics branch.

NASA Ames Research Center, Mountain View, CA   8/2022 - 12/2022
Astrophysics JWST Exoplanet and Young Star Research Intern
Mentors: Dr.Thomas Greene, Dr.Taylor Bell, Dr.Ben Lew
- Collaborated with NASA Ames astrophysics branch JWST (James Webb Space Telescope) Exoplanet and Young Star Team to analyze JWST data, focusing on exoplanet phase curves, eclipse mapping, and young star spectra modeling.
- Applied Markov Chain Monte Carlo analysis to probe exoplanet & protostellar system multiparameter space, investigating both systematic and astrophysical parameters.
- Contributed to the Eureka! Data pipeline for analysis of exoplanet phase curve data, ensuring alignment with JWST observations.
- Constructed a 2D heat map of an exoplanet 72 light years away, providing insights into atmospheric circulation.
- Presented research on exoplanet eclipse mapping at the Bay Area Exoplanet Meeting (BEAM) hosted by the SETI Institute.
- Modeled stellar spectra using the Phoenix BT-Settl model and the Starfish tool, enhancing understanding of stellar

characteristics such as metallicity, surface gravity, and temperature. Confirmed key spectral lines suggested by theory and validated a custom-built model's interpretation of observations.

NASA Ames Research Center, Mountain View, CA   5/2021 - 8/2021
Autonomous Systems Engineer Intern
Mentor: Dr.Ritchie Lee
- Collaborated with the NASA Ames Autonomous Rover Team to create a simulated environment for training autonomous vehicles.
- The Mars Yard Team, Viper Rover Team, and others incorporated the simulated environment I developed at NASA Ames into their projects to assist in exploring autonomous systems.
- Designed a procedural terrain area to introduce edge scenarios and diverse challenges for autonomous systems.
- Developed a virtual realistic version of NASA Ames, enabling a direct comparison between virtual and real-world autonomous training.
- Implemented virtual control systems for vehicles and visual outputs.
- Presented my work to the broader NASA Ames research group, including the autonomous systems branch and Mars Yard group.

TheraNova (medical device incubator), San Francisco, CA   5/2020 - 8/2020
R&D Medical Device Intern Team Lead
Mentors: Julie Yip, Dan Burnett, Derek Hillstrom
- Collaborated with R&D engineering to create a pulse oximeter interpreter and co-developed the N100 filtration mask, "MyJustAir".
- Constructed multiple test apparatuses to assess filtration capability and visually demonstrate the qualitative effectiveness of the device.
- Developed an R script for parsing SpO2 data from clinical trials and current users, facilitating comprehensive pulse oximetry analysis.
- Presented the completed N100 mask, filtration test apparatuses, and pulse oximetry interpreter to the TheraNova team.
- Entered our N100 mask into the XPrize competition, achieving a top 10 ranking for our team.

SVXR (x-ray inspection equipment startup), San Jose, CA   5/2019 - 8/2019
R&D X-ray Lab Intern
Mentor: Dr.Kolo Wamba
- Created a C code application for X-ray tube product life testing and debugging.
- Established an X-ray test lab with radiation shielding for safe and consistent experimental tests.
- Assisted lead engineers in product testing and evaluation.
- Developed a system that integrated multiple sensor clusters into a comprehensive data record for lifetime analysis.
- Presented the completed X-ray tube life testing system and results to the engineering team, lead engineer, and CEO.

RESEARCH	● As an active member of the MANATEE Team, I help perform data reductions and analyses of exoplanet observations from JWST. I'm set to co-author multiple papers in 2024 and am currently involved in research proposals for JWST Cycle 3 observations.	5/2023 - Current
	● Recent collaborations include BAERI, the MANATEE Team, and the NASA Ames astrophysics branch JWST exoplanet and young star Team. My contributions encompass 2D eclipse mapping of exoplanets, protostellar spectrum analysis, exoplanet light curve data reductions, photometric data reductions, JWST mirror tilt analysis, and involvement in developing the Eureka! Data Pipeline (a widely used JWST astrophysics exoplanet research tool). Using open-source tools including Eureka!, Python, Phoenix BT-Settl model, and the Starfish tool, our team analyzed JWST and Keck observations.	8/2022 - 5/2023
	● My research journey, supported by collaborations with institutions like the New Mexico Institute of Mining and Technology, the VLA, NRAO, NSF, NASA, and BAERI, spans atmospheric physics to astrophysics. Beginning at the New Mexico Tech Physics Department, I studied lightning evolution through radio emissions, then transitioned to astrophysics research with the use of the VLA and Spitzer Space Telescope, focusing on protostar evolution and stellar shocks.	9/2020 - 5/2022

PUBLICATIONS

(Featured on Space.com https://www.space.com/exoplanet-sulfur-dioxide-gj3470b)
Beatty, T. G., Welbanks, L., Schlawin, E., Bell, T. J., Line, M. R., Murphy, M., **Edelman, I.**, Greene, T. P., Fortney, J. J., Henry, G. W., Mukherjee, S., Ohno, K., Parmentier, V., Rauscher, E., Wiser, L. S., & Arnold, K. E. (2024, June 6). *Sulfur dioxide and other molecular species in the atmosphere of the Sub-Neptune GJ 3470 B*. arXiv.org. https://arxiv.org/abs/2406.04450

(Featured on the cover of Nature Vol.630 No.8018)
Welbanks, L., Bell, T. J., Beatty, T. G., Line, M. R., Ohno, K., Fortney, J. J., Schlawin, E., Greene, T. P., Rauscher, E., McGill, P., Murphy, M., Parmentier, V., Tang, Y., **Edelman, I**., Mukherjee, S., Wiser, L. S., Lagage, P.-O., Dyrek, A., & Arnold, K. E. (2024). A high internal heat flux and large core in a warm Neptune Exoplanet. Nature. https://doi.org/10.1038/s41586-024-07514-w

Rodríguez, T. M., Hofner, P., **Edelman, I.**, Araya, E. D., & Rosero, V. (2023). Searching for Molecular Jets from high-mass protostars. *The Astrophysical Journal Supplement Series*, *264*(2), 30. https://doi.org/10.3847/1538-4365/aca4c6

Rodriguez, T. M., Hofner, P., **Edelman, I.**, Araya, D. E., & Rosero, V. (2021, November). *Searching for ionized jets from high-mass protostars with Vla Sio observations*. NASA/ADS. https://ui.adsabs.harvard.edu/abs/2021anms.confE..15R/abstract

Sonnenfeld, R., Stephan, K., Keul, A., **Edelman, I.**, & Jimenez, S. (2020). Applying modern meteorological tools to the study of Ball Lightning (Kugelblitz). *ESS Open Archive*. https://doi.org/10.1002/essoar.10505247.1

OPEN SOURCE SOFTWARE	[Eureka!](#) — An End-to-End Pipeline for JWST Time-Series Observations	
PRESENTATIONS	NASA Ames Astrophysics Branch Presentation, Mountain View, CA Exploring Exoplanets through JWST • I presented my work on exoplanet data reduction and analysis to the NASA Ames Astrophysics branch.	4/2023
	Bay Area Exoplanet Meeting (BAEM) 2022 Oct. 28 #42, Mountain View, CA Eclipse Mapping and Spectroscopy of HD 189733b with JWST/NIRCam • I presented on exoplanet eclipse mapping research at the Bay Area Exoplanet Meeting hosted by the SETI Institute.	10/2022
	37th New Mexico Tech Research Symposium, Socorro, NM Infrared and Radio Observations of Star-Forming Regions • I presented my undergraduate research on High-Mass Protostar HII region evolution, winning the best undergrad presentation.	5/2022
AWARDS	CU Boulder Mechanical Engineering Diversity Scholarship	2024
	New Mexico Institute of Mining and Technology Silver Scholarship	2017 - 2022
	New Mexico Tech Student Research Symposium Best Undergraduate presenter 2022; presented on protostellar evolution.	2022
	NMT Invest Club Scholarship	2022
	Physics Honors recipient from New Mexico Institute of Mining and Technology	2022
	Top 5 team in NASA MITTIC Competition	2021
	Top 10 team in global XPrize Competition	2020
VOLUNTEERING	New Mexico Tech Physics Club • NMT physics club member. Helped organize club events, outreach activities, and volunteer work. Presented physics concepts and explorations to the New Mexico community and taught physics to the local Socorro high school students.	2018 - 2022
	New Mexico Tech Climbing Club / Team • I was an NMT climbing club member and team officer. Sponsored rock climbing trips for 6-10 people. I helped fundraise and hand-build NMT a new climbing wall for the team, students, and public to climb on.	2018 - 2022
	Planet Granite, San Francisco, CA • Climbing: Camp Counselor and Private Instructor	2018 - 2019

The AIDS Foundation / Needle Exchange   2015 - 2017
  ● As a volunteer at various sites around San
    Francisco, we helped distribute medical supplies to
    educate and prevent the spread of diseases.

Independent Volunteering Work, Grenada, Nicaragua   2021
  ● I distributed toys and a home-cooked New Year's
    dinner for underserved children and families in
    Grenada, Nicaragua.