JACKSON FALK

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EDUCATION

University of California, Santa Cruz *September 2022 - Present*
Physics, B.S.
- GPA (4.0 Scale): 3.88
- Honors: UCSC College Scholars Program (Honors College)

Oakland Technical High School *August 2018 - June 2022*

PUBLICATIONS

First Author

Jackson E. Falk, Philip M. Hinz, R. Deno Stelter, Matt Radovan, Daren Dillon, *Development of free-form slumping techniques for thin glass facesheets*, J. Astron. Telesc. Instrum. Syst. 11(4), 044005 (2025), doi: 10.1117/1.JATIS.11.4.044005.

Jackson E. Falk, Phillip Hinz, Deno Stelter, *"Developments of an empirical approach for free form slumping of large thin shells,"* Proc. SPIE 13624, Astronomical Optics: Design, Manufacture, and Test of Space and Ground Systems V, 136241A (18 September 2025); https://doi.org/10.1117/12.3064122

Co-author

Hinz, P. M., Falk, J., Stelter, R. D., Radovan, M., & Dillon, D. (2024, August). *Progress on creating thin curved glass face sheets for deformable mirrors via free-form slumping.* In *Advances in Optical and Mechanical Technologies for Telescopes and Instrumentation VI (Vol. 13100, pp. 284-294)*. SPIE.

PRESENTATIONS AND TALKS

Falk, J. E. "Development of free-form slumping techniques for fabricating adaptive secondary face sheets." Oral presentation, SPIE Optics + Photonics 2025, 6 August 2025, San Diego Convention Center, Room 6C, San Diego, CA. (Paper 13624-48)

Falk, J. E., Baumbach, R. E. (2025, October 11). Synthesis and characterization of BiTeI single crystals using the Bridgman growth method [Conference presentation]. 2025 Annual Meeting of the APS Far West Section, Stevenson Event Center, UC Santa Cruz, CA. (Session I01; Abstract I01.00009)

Falk, J. E., Furniss, A. (2025, October 12). Development of pedagogical tools like a directional map of learning for introductory physics [Poster presentation]. 2025 Annual Meeting of the APS Far West Section, Stevenson Campus, UC Santa Cruz, CA. (Session S00; Abstract S00.00036)

RESEARCH AND PROFESSIONAL EXPERIENCE

University of California Observatories (Instrumentation Shops) July 2023 - Present
Optical Lab Assistant *Advisor: Phil M. Hinz*

- Contributed to telescope mirror fabrication projects, part fabrication, cleaning, coating, and installation.
- Work with precise optics.

Condensed Matter Lab, UC Santa Cruz July 2024 - Present
Student Researcher *Advisor: Ryan E. Baumbach*

- Set up and operated lab equipment to grow binary and tertiary crystal samples with exotic material properties.

- Built and tested new experimental setups under the guidance of Professor Ryan Baumbach.
- Built and characterized a Bridgman crystal growth furnace.
- Grew candidate bulk photovoltaic material BiTeI in large single crystals.
- Prepare and test samples using Quantum Design PPMS, Rigaku X-Ray Diffractometer.

Curriculum Development Researcher (UCSC) April 2025 - Present
Student Intern *Advisor: Amy Furniss*

- Developed curriculum and implemented interactive teaching software for introductory college physics classes at UCSC.
- Built and tested a unit on thermodynamics for the UCSC Physics 6B course.
- Built interactive learning maps for students and faculty with introductory course learning objectives.

Santa Cruz Organization for Outreach in Physics (SCOOP) Current
Active Member

- Organized outreach events for the physics department, including high school visits, community events, and public outreach programs.

Physics Undergraduate Peer Mentor Current

Offer mentorship to two underclassmen Physics students. Help them through classes, homework, internship applications, and general college experience.

Lab for Adaptive Optics, UC Santa Cruz January 2023 - June 2023
Student Researcher

- Developed Python simulations for adaptive optics on Keck telescopes, focusing on atmospheric simulation and image quality analysis.

Cal Teach Intensive Internship (El Sausal Middle School) August 2024 - September 2024
Student Teacher

- Designed and delivered lessons in geology and biology for 8th-grade science classes.
- Collaborated with teaching coaches to develop engaging curricula.

Cal Teach Fall Internship (Harbor High School) September 2024 - December 2024
Student Teacher

- Developed and taught a 9th-grade physics curriculum on optics, waves, and energy.

Cal Teach Winter Internship (Santa Cruz High School) January 2025 - April 2025
Student Teacher

- Developed and taught a 11th and 12th-grade physics curriculum.
- Personally designed and taught the unit on electromagnetism.

SELECTED PROJECTS

Adaptive Optics Simulations for Keck Telescope *2022-2023*
Python
- Built Python simulations to evaluate adaptive optics systems for improved telescope performance.

Adaptive Secondary Telescope Mirror Fabrication *2023-Present*
Python, Experimental Physics, Optical Engineering
- Developed methods to shape thin glass into aspheric telescope secondary mirrors using thermal slumping.

- Built a unique deflectometry testing setup for the specific metrology of our experiments. - Built a model of the deformation process with analytical Python simulation and FEM analysis using temperature and weight parameters.

Bridgman growth and analysis of Bismuth Tellurium Iodine (BiTeI) Crystal *2025-Present*
Python, C++, IO
- Built a programmable linear movement stage controlled by a stepper motor.
- Refurbished vertical furnace for Bridgman Crystal growth technique.
- Grew Multiple single-crystal samples of BiTeI.
- Conducted resistivity measurements using Quantum Design's PPMS Device.
- Conducted X-Ray Diffraction analysis of crystals.

Furnace and Pump Micro-controller Interface *2025*
Python
- Designed a Python-based GUI to interface with various micro-controllers for pump control and precision temperature control on furnaces.

Constraining Axionic Dark Matter Candidates using Plasma Instabilities *2025-Present*
-Constraining Axionic Dark Matter Candidates by looking at coupling to the Electromagnetic fields in the plasma instability regimes.
-Working on constraints, looking at the Weibel and filamentation instability.

Development of Pedagogical Learning Tools *2025*
-Developed homework modules for an introductory thermodynamics course.
- Tested and consulted on alternative homework interface (Kudu).

Interactive Learning Map for Introductory Physics Courses *2025-Present*
JavaScript, HTML
- Developed an interactive learning map with the course modules and learning objectives for an introductory physics course. Built a data set with classifications and connections for all learning objectives.
- **Link:** https://github.com/jefalk/Public-Projects

SKILLS

- **Programming:** Python(4+ yrs), C++(> 1 yr), Mathematica (1 yr), GSAS II (> 1 yr)
- **Technical:** CAD (AutoCAD, Ansys, SolidWorks), Basic circuitry and design, Arduino system control, Spot welding, Soldering, 3D printing, Optical Alignment, Zygo Interferometer, machining, and metal working (lathe, drill press, band-saw)

AWARDS AND HONORS

- **Loyd Robinson Fellowship for Astronomical Instrumentation (2023)**
- UCSC Dean's List
- Graduated from Oakland Technical High School with Honors

LANGUAGES

- English: Native
- Spanish: Conversational