Kelby T. Hahn

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OVERVIEW

I am a PhD candidate conducting post-secondary physics education research. I have extensive experience organizing and implementing physics outreach, science communication, and inclusivity efforts in STEM. My goal is to promote inclusive and equitable teaching, particularly in the STEM fields. I have a passion for informal education, free-choice learning, and science literacy that drives my research and community involvement.

EDUCATION

PhD in Physics Education Research - In Progress Sept. 2018 - 2022 *
Oregon State University, Corvallis, OR
Co-Advisor: Cory Buxton Ph.D. - College of Education
Co-Advisor: Elizabeth Gire Ph.D. - Department of Physics
**anticipated*

Masters in Physics Sept. 2015 - August 2018
Oregon State University, Corvallis, OR
Advisor: Elizabeth Gire Ph.D
Thesis: *"Student Evaluative Sensemaking on Homework in Intermediate Mechanics"*

B.S. in Physics Sept. 2011 - June 2015
Utah State University, Logan, UT
Minor in Mathematics
Advisor: J.R. Dennison Ph.D.
Senior Thesis: *"Simulation of UV Radiation Degradation of Polymers on MISSE-6 in the Low Earth Orbit Environment"*

A.S. with Biotechnology Emphasis Sept. 2009 - June 2011
Salt Lake Community College, Salt Lake City, UT
Concurrent enrollment through Itineris Early College High School
President's List

TEACHING EXPERIENCE

OSU Center for Teaching & Learning, *Graduate Assistant* March 2020 - Present
Designing and facilitating a 3-term gamified course to support development of teaching skills for new faculty. Facilitating weekly talks on teaching and educational technology. Designing, facilitating, and assisting in workshops for faculty, teaching staff, post-docs, and graduate teaching assistants on various aspects of teaching, pedagogy, teaching philosophies, and more. Facilitated a book club focused on addressing race and racism in the classroom. Co-created instructional strategy cards.

Fostering Inclusivity in Physics Workshop, *Facilitator* Feb. 2017 - Present
Dr. Michael Vignal, Dr. MacKenzie Lenz, and I designed a workshop focused on promoting inclusivity in physics by having participants to practice inclusive language embedded specifically in a physics context. We have versions of the workshop tailored specifically to undergraduate students, graduate students, and instructors. We designed this workshop in 2016 and have facilitated it at OSU, conferences, and universities across the country.

Inquiring into Physical Phenomena, *Instructor of Record* March 2021 - June 2021
Overhauling and updating a physics course on climate change designed for pre-service teachers for remote instruction. The course is designed to teach both physics content knowledge and pedagogy through exploration and hands-on activities.

OSU Physics Department, *Graduate Teaching Assistant* Sept. 2015 - June 2021
Teaching labs or recitation for introductory courses: astronomy (PH 104), algebra-based physics (PH 20X), calculus-based physics (PH 21X). Assisting faculty members with sophomore and junior-level courses: modern physics (PH 314), physics of contemporary challenges (PH 315), and classical mechanics and special relativity (PH 335). Grading and student support for introductory, non-major, online, astronomy courses (PH 205 & 206).

Linn Benton Community College, *Part-Time Faculty* March 2020 - March 2021
Teaching labs for introductory calculus-based physics (PH 21X). All instruction done during emergency remote teaching in response to COVID-19. Designed and implemented all new labs and projects for remote instruction.

Inquiring into Physical Phenomena, *Teaching Practicum* Jan. 2018 - March 2018
Assisting Dr. Elizabeth Gire and Dr. Emily van Zee through a physics course designed for pre-service elementary and middle school teachers. The course is designed to teach both physics content knowledge and pedagogy through exploration and hands-on activities.

USU Physics Department, *Teaching Assistant* Jan. 2015 - May 2015
Grading and student support for an introductory, non-major, online, astronomy course titled 'The Universe.'

RESEARCH EXPERIENCE

OSU Physics Education Research Group, *Graduate Student Researcher* Sept. 2015 - Present
Studying middle- and upper-division physics students engagement with and understanding of physics concepts as well as the intersection of their identities and the classroom environment. Using primarily qualitative and mixed method approaches.

National Institute of Standards & Technology, *Intern* May 2014 - Aug. 2014
Biophysics internship through the Society of Physics Students. Research on nanopore sensing of an anthrax protein. Developed and tested various exfoliation techniques for tungsten diselenid.

Utah State University, Undergraduate Research and Creative Opportunity Minigrant Summer 2013
"Simulation of the Degradation Affects of UV Exposure in the ISS Low Earth Orbit Environment"

USU Undergraduate Research Fellowship Aug. 2011- May 2015

Materials Physics Lab, *Undergraduate Student Researcher* June 2011 - May 2015
Group focuses on ground-based testing of space environment effects on aerospace materials. Preformed post-flight characterization of materials subjected to the International Space Station environment. Created impact ejecta model of micrometeroid space impact and analysis of atomic oxygen degradation of polymers. Assisted in modeling the energy dependent cathodoluminescent intensity of a carbon composite materials.

PHYSICS OUTREACH EXPERIENCE

OSU Physicists for Inclusion in Science (PHiS) Club - Officer Sept. 2016 - June 2021
Co-founded and served as Vice President (2017-2019) and Recruitment and Retention Chair (2019-2020) for PhIS. PhIS seeks to support members of underrepresented groups as they pursue their careers.

OSU Physics Departmental Outreach - Assistant Sept. 2015 - 2020
Various events organized through the OSU Physics department to reach out the the local community including public astronomy nights and science nights at local elementary schools.

OMSI Meet a Scientist Family Nights - Coordinator May 2017 - 2019

Hands-on interactive demos designed to engage the general public in my metacognition & sense-making physics education research.

March for Science - Corvallis - Organizer April 2017
Organized a local march and rally to promote science literacy and education. Emphasis on inclusion, diversity, and science communication.

Oregon Science Olympiad - Assistant April 2016
Assisted in running 'Time' competition including competition design, organizing team check-in, judging, etc.

Discovery Days - Instructional Assistant 2016 - 2020
Local elementary school students are brought to OSU campus for a day of interactive demos.

Discovering the Scientist Within - Organizer Annually, 2016 - Present
Approximately an hour with a group of 15-20 middle school girls to engage them in physics activities designed to promote a sense of science identity.

Conference for Undergraduate Women in Physics - Organizer Jan. 2016
CUWiP is through the American Physical Society and is designed to help connect and educate undergraduate women in physics. Organized OSU hosting the 2 day conference including tour organization, volunteer coordination, speaker check-in, etc.

USU Society of Physics Students - Coordinator Aug. 2011 - May 2015
Countless outreach events to elementary schools, public demo shows, physics days at local amusement parks, community fairs, tabling at campus science talks, camps for underrepresented communities, recruitment events, etc.

ADDITIONAL PROFESSIONAL EXPERIENCE

Physics Education Research Conference, *Organizer* Summer 2022
We are planning a PERC 2022 that focuses on "queering physics education" through an intersectional lens. By "queering," we are centering queer theory which breaks down social constructions and hierarchies to unpack normalized assumptions. In the context of physics education, we want to apply the theory to unpack who has power in physics to control the production of future physicists, how physics policies and practices are sometimes built on ideas of punishment and power, and how PER embeds binaries in both its content and sociological research. Further, we want to encourage a dialogue that is both a critique and an imagining of a queer future for PER. Explicit attention will be given to constructions of race, (dis)ability, gender, sexuality and how they interact and impact lived experiences.

Community for the Advancement of Antiracist Instruction, *Facilitator* Spring 2022
Participated in the community in Spring 2021 and was invited to revise and co-facilitate the following year. This is a faculty learning community led by and for instructors and TAs from colleges across campus. Participants' experience in the community culminated in an antiracist teaching action plan grounded in critical and inclusive pedagogies. As a participant my action plan focused on overhauling the global climate change unit in the Inquiring into Physical Phenomena course.

46th Annual POD Network Conference, *Awardee* Winter 2021
Conference theme of Evolving Beyond Crisis — Connecting to the Future, attended via the GPPD Career Development Grant. Focused learning on how to teach others to implement inclusive and critical pedagogies.

Are you (IN)CLUSIVE? Read, Reflect, Reform, *Facilitator* Fall 2020
This book club focused on reading either *Teaching about Race and Racism in the College Classroom: Notes from a White Professor* by Cyndi Kernahan or *Why are all the Black Kids Sitting Together in the Cafeteria?* by Dr. Beverly Daniel Tatum and discussing implementation in your own classroom. As a facilitator I read both books, organized the small and whole group discussions, facilitated a Person of Color (POC) Student Discussion, and facilitated a culminating discussion with Cyndi Kernahan.

BoxSand Project, *Content Creator* May - Sept. 2016
The Boxsand Project is a website designed to replace the textbook for algebra-based introductory physics. Content creators author and design webpages, on Drupal, dedicated to common

misconceptions, guides to problem solving, and write original sample questions to be included on the website.

ResCare Youthtrack, *Direct Care Provider* May - Aug. 2015

Youthtrack is a 24 hour rehabilitation facility for delinquent, youth, male, sex offenders. Direct Care Providers provide support to the counseling structures, design and teach lessons on life skills, assist with schooling, provide emotional support, administer medications, document client progress, and ensure day-to-day operation and security of the facility.

USU Housing & Residence Life, *Resident Assistant* Jan. 2013 - May 2014

Performed necessary administrative and overhead duties for USU Residence Halls; as well as provided support structures, emotional and administrative to building residents. In addition, planned bi-weekly small-scale events (15-20 people), semesterly mid-scale events (200-400 people), and yearly large-scale events (500-1500 people) designed to promote a sense of community, healthy lifestyle habits, and to ease the transition into university life.

SELECTED PUBLICATIONS

- **Hahn, Kelby T.**, Gire, Elizabeth, *Waving Arms Around to Teach Quantum Mechanics* (under review).
- van Zee, Emily, Gire, Elizabeth, and **Hahn, Kelby T.**, *"Teaching and Learning about Global Climate Change Online"* (2021). Paper accepted for publication in Journal of College Science Teaching.
- **Hahn, Kelby T.**, Emigh, Paul, Gire, Elizabeth, *"Sensemaking in special relativity: developing new intuitions"* (2019). Paper published in Physics Education Research Conference Proceedings, Provo, UT.
- **Hahn, Kelby T.**, Emigh, Paul, Lenz, MacKenzie, and Gire, Elizabeth, *"Student sense-making on homework in a sophomore mechanics course"* (2017). Paper published in Physics Education Research Conference Conference Proceedings, Cincinnati, OH.
- Lenz, MacKenzie, **Hahn, Kelby T.**, Emigh, Paul, and Gire, Elizabeth, *"Student perspective of and experience with sense-making: a case study"* (2017). Paper published in Physics Education Research Conference Proceedings, Cincinnati, OH.

PRESENTATIONS, WORKSHOPS, POSTERS, & PANELS

- **Hahn, Kelby T.** and Gire, Elizabeth, *"Waving Arms & Skits in Quantum Mechanics"* (2022). Invited talk at Winter Meeting of American Association of Physics Teachers, Virtual.
- **Hahn, Kelby T.** and panelists, *"Professional Skills for Students Panel: Activism and PER"* (2022). Invited panelist at Winter Meeting of American Association of Physics Teachers, Virtual.
- **Hahn, Kelby T.** and panelists, *"Incorporating Open-Source Materials in Learning and Teaching about Climate Change"* (2022). Poster presented at Winter Meeting of American Association of Physics Teachers, Virtual.
- Howland, Brooke and **Hahn, Kelby T.**, *"Center for Teaching & Learning New Graduate Student Orientation: Timely Teaching Tips"* (2021). Presented at OSU Graduate Student Orientation, Virtual.
- **Hahn, Kelby T.** and Gire, Elizabeth, *"Teaching Relative & Overall Phase with the Arms Representation"* (2021). Presented at Physics Education Research Conference, Virtual.
- **Hahn, Kelby T.** and Gire, Elizabeth, *"Using Arms to Represent Complex-Valued Vectors in Quantum Mechanics"* (2021). Presented at American Association of Physics Teachers Summer Meeting, Virtual.
- van Zee, Emily, **Hahn, Kelby T.**, Gire, Elizabeth, and Adams, Olivia, *"Exploring Physical Phenomena: A Physics Course for Prospective Teachers"* (2021). Presented at the American Association of Physics Teachers Summer Meeting, Virtual.

- **Hahn, Kelby T.** and Gire, Elizabeth, *"Embodying Complex Numbers and Quantum States"* (2021). Presented at American Association of Physics Teachers Winter Meeting, Virtual.
- Gire, Elizabeth, Price, Edward, Manogue, Corinne A., Dray, Tevian, De Leone, Charles J., **Hahn, Kelby T.**, and Alfson, Jonathan W., *"Structural Features of External Representations in Physics"* (2021). Presented at American Association of Physics Teachers Winter Meeting, Virtual.
- Howland, Brooke and **Hahn, Kelby T.**,*"Identifying and Writing Your Teaching Philosophy"* (2021). Presented at OSU Post-Doctoral Training Series, Virtual.
- Howland, Brooke and **Hahn, Kelby T.**, *"Center for Teaching & Learning: New Graduate Student Orientation"* (2020). Presented at OSU Graduate Student Orientation, Virtual.
- Howland, Brooke, Schlosser, Alexis, **Hahn, Kelby T.**, and Raynsford, Jennifer, *"Identifying and Writing Your Teaching Philosophy"* (2020). Presented at OSU Post-Doctoral Training Series, Corvallis, OR.
- Vignal, Mike, **Hahn, Kelby T.**, and Lenz, MacKenzie, *"Fostering Inclusivity Workshop"* (2019). Workshop facilitated at American Association of Physics Teachers Summer Meeting, Provo, UT.
- **Hahn, Kelby T.**, Emigh, Paul, Lenz, MacKenzie, Gire, Elizabeth, *"Prompting Special-Case Analysis in Classical Mechanics"* (2019). Presented at American Association of Physics Teachers Summer Meeting, Provo, UT.
- **Hahn, Kelby T.**, Emigh, Paul, Gire, Elizabeth, *"Sensemaking in special relativity: developing new intuitions"* (2019). Poster presented at Physics Education Research Conference, Provo, UT.
- Herring, Travis, Lenz, MacKenzie, **Hahn, Kelby T.**, Emigh, Paul J., and Gire, Elizabeth, *"Evaluative sensemaking: frequency of and variance among instructors"* (2019). Poster presented at Physics Education Research Conference, Provo, UT.
- Lenz, MacKenzie, **Hahn, Kelby T.**, Emigh, Paul J., and Gire, Elizabeth, *"Students' Sensemaking Skills and Habits: Two Years Later"* (2019). Poster presented at Physics Education Research Conference, Provo, UT.
- **Hahn, Kelby T.**, Emigh, Paul, Lenz, MacKenzie, and Gire, Elizabeth, *"Student Application of Special-Case Analysis for Physics Sense-Making"* (2018). Poster presented at American Physical Society Northwest Regional Meeting, Tacoma, WA. **-Outstanding Poster Presentation Award**
- Gire, Elizabeth, Lenz, MacKenzie, **Hahn, Kelby T.**, and Emigh, Paul, *"Making Sense of Physics Sensemaking"* (2018). Invited talk presented at American Physical Society Northwest Regional Meeting, Tacoma, WA.
- Vignal, Mike, **Hahn, Kelby T.**, and Lenz, MacKenzie, *"Fostering Inclusivity Workshop"* (2018). Workshop facilitated at Pacific Northwest Association for College Physics, Bothell, WA.
- Lenz, MacKenzie, **Hahn, Kelby T.**, Emigh, Paul J., and Gire, Elizabeth, *"Students' Perspectives of and Experiences with Sensemaking in Mechanics"* (2018). Presented at American Association of Physics Teachers Summer Meeting, Washington, DC.
- Gire, Elizabeth, Emigh, Paul J., **Hahn, Kelby T.**, and Lenz, MacKenzie, *"Teaching Physics Sensemaking to Physics Majors"* (2018). Presented at Foundations and Frontiers of Physics Education Research Puget Sound, Diablo, WA.
- **Hahn, Kelby T.**, Emigh, Paul, Lenz, MacKenzie, and Gire, Elizabeth, *"Student sense-making on homework in a sophomore mechanics course"* (2017). Poster presented at American Association of Physics Teachers Summer Meeting, Cincinnati, OH.
- Lenz, MacKenzie, **Hahn, Kelby T.**, Emigh, Paul J., and Gire, Elizabeth, *"Student perspectives of and experiences with sense-making: a case study"* (2017). Poster presented at Physics Education Research Conference, Cincinnati, OH.
- **Hahn, Kelby T.** and panelists, *"What is Grad School Really Like? Panel"* (2016). Invited panelist at 2016 Quadrennial Physics Congress (PhysCon), San Francisco, CA.
- **Peterson, Kelby T.**, *"Detergent Stabilized Nanopore Formation Kinetics of an Anthrax Protein"* (2015). Presented at American Physical Society March Meeting, San Antonio, TX. **-Outstanding Undergraduate Presentation Award**

- **Peterson, Kelby T.**, Joseph Robertson and John Suehle, *"Nanopore Sensing of An Anthrax Protein"* (2014). Presented at American Center for Physics, College Park, MA.
- **Peterson, Kelby T.**, and Dennison, JR, *"Simulation of UV Radiation Degradation of Polymers on MISSE-6 in the Low Earth Orbit Environment"* (2015). Senior Theses and Projects.
- Christensen Justin, **Peterson, Kelby T.**, Dekany Justin, and Dennison, JR, "Modeling the Energy Dependent Cathodoluminescent Intensity of a Carbon Composite Material," American Physical Society Four Corner Section Meeting, Utah Valley University, Orem, UT, October 17-18, 2014.
- **Peterson, Kelby T.**, and Dennison, JR, *"Simulation of UV Induced Discoloration on Space Polymers"* (2013). Poster at Society of Physics Students, Zone 15 Conference. Presentations.
- **Peterson, Kelby T.**, and Dennison, JR (2013, October 18). *"Atomic Oxygen Modification of the Nanodielectric Surface Composition of Carbon-Loaded Polyimide Composites"* (2013). Presented at Meeting of the Four Corner Section of the American Physical Society, Denver, CO.
- **Peterson, Kelby T.**, and Dennison, JR, *"Atomic Oxygen Modification of the Nanodielectric Surface Composition of Carbon-Loaded Polyimide Composites"* (2013). Poster at American Physical Society Four Corner Section Meeting.
- **Peterson, Kelby T.**, and Dennison, JR, *"Simulation of UV Radiation Degradation of Polymers on MISSE-6 in the Low Earth Orbit Environment"* (2013). Posters on the Hill; Salt Lake City; 2013. Research on the Hill, Salt Lake City, UT.
- **Peterson, Kelby T.**, and Dennison, JR, *"Space Impact Ejecta Model of Micrometeoroid Collision on MISSE-6"* (2012). Presented at Phillips Air Force Research Laboratory, Albuquerque, NM.
- **Peterson, Kelby T.**, and Dennison, JR, *"Micrometeoroid from MISSE Examined to Understand the Effects of the Space Environment on Space Suit"* (2012). Poster at National Conference on Undergraduate Research; Weber State University.
- **Peterson, Kelby T.**, and Dennison, JR, *"Space Impact Ejecta Model of Micrometeoroid Collision on MISSE-6"* (2012). Presented at Meeting of the Four Corner Section of the American Physical Society New Mexico Institute of Mining and Technology Socorro, NM.
- **Peterson, Kelby T.**, and Dennison, JR, *"Micrometeoroids from MISSE Examined to Understand the Effects of the Space Environment on Space Suit Materials"* (2012). Invited Colloquium Presentation.
- **Peterson, Kelby T.**, and Dennison, JR, *"Micrometeoroid from MISSE Examined to Understand the Effects of the Space Environment on Space Suit"* (2012). Presented at Utah State University Student Showcase. **- Honorable Mention in the Physical Science Department**

HONORS & AWARDS

GPPD Career Development Grant Recipient — Winter 2021
46th Annual POD Network Conference, Virtual

Inclusive Excellence Award, Physicists for Inclusion in Science — Fall 2019
College of Science, Oregon State University, Corvallis, OR

Outstanding Poster Presentation Award — Spring 2018
American Physical Society Northwest Regional Conference, Tacoma, WA

OMSI Science Communications Fellow — Spring 2017
Oregon Museum of Science & Industry, Portland, OR

Sigma Xi Honors Society Inductee — March 2017
Corvallis, Oregon, OSU Chapter

Outstanding Undergraduate Presentation Award — March 2015
American Physical Society March Meeting, San Antonio, TX

Associate Zone Councilor, Society of Physics Students — 2014 - 2015

Society of Physics Students Leadership Scholarship — Aug. 2014

Society of Physics Students Research Intern — Summer 2014
National Institute of Standard & Technology, Gaithersburg, MA

Research and Creative Opportunity Minigrant — Summer 2013

Utah State University, Logan, UT

Sigma Pi Sigma Honors Society Inductee May 2013

Utah State University, Logan, UT

Student Showcase Poster Honorable Mention April 2012

Utah State University, Logan, UT

Undergraduate Research Fellowship Aug. 2011

Utah State University, Logan, UT