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Department of Physics
University of Washington, Seattle
Seattle, WA

Education

University of Washington, Seattle
Ph.D. in Physics, expected June 2025
M.S. in Physics, December 2020
Advisor: Andrew Connolly

Duke University
B.S. in Physics, May 2019
summa cum laude with highest distinction
Advisor: Kate Scholberg

Research Experience

LSST Dark Energy Science Collaboration (DESC) — 2019-present
Developing the photometric redshift pipeline for DESC cosmology
Measuring high-redshift UV Luminosity Function in Rubin data
Photometric measurements of the intergalactic and circumgalactic media
Advisor: Andrew Connolly

The Vera C. Rubin Observatory — 2021-present
Commissioning the active optics system
Developing deep learning methods for wavefront estimation
Photometric redshift commissioning team
Observing support
Advisors: Andrew Connolly and Sandrine Thomas

Duke University Neutrino and Cosmology Group — 2016-2019
Simulated core-collapse supernova neutrino bursts
Quantified sensitivity of the Helium and Lead Observatory (HALO)
Advisor: Kate Scholberg

Karlsruhe Institute of Technology — 2018
Studied muon content of cosmic rays detected with the IceTop Array
Developed machine learning methods for data analysis
Advisor: Andreas Haungs

Fellowships & Awards

DOE SCGSR Fellowship	2023
AAS Chambliss Astronomy Achievement Award Honorable Mention	2023
Rubin Observatory ISSC Ambassador	2021-2022
DOE Scholar	2021
NSF Graduate Research Fellowship Honorable Mention	2021
Duke Faculty Scholar	2018-2019
Daphne Chang Memorial Award, Duke Physics Department	2019
Highest Distinction for Undergraduate Thesis Research	2019
DAAD RISE Research Exchange Scholarship	2018

Invited Talks

Plenary, Cosmopalooza 2023, online	Oct 2023
Colloquium, University of Chile, Santiago, Chile	Mar 2023
Plenary, AAS Astronomers Turned Data Scientists Meeting, online	Mar 2022
Plenary, DESC Winter Meeting, online	Feb 2022
Seminar, KIPAC, SLAC National Laboratory, online	Sep 2020

Contributed Talks

DESC Summer Meeting, Chicago, IL	Aug 2022
DESC Winter Meeting, online	Feb 2022
Rubin Observatory Project & Community Workshop, online	Aug 2020
DESC Winter Meeting, Tucson, AZ	Jan 2020

Posters

American Astronomical Society 241st Meeting, Seattle, WA	Jan 2023
American Astronomical Society 238th Meeting, online	Jun 2021
Statistical Challenges in Modern Astronomy VII, online	Jun 2021
Duke Physics Research Symposium, Durham, NC	Apr 2019
5th Joint Meeting of the American Physical Society and the Physical Society of Japan, Waikoloa, HI	Oct 2018
28th International Conference on Neutrino Physics and Astrophysics, Heidelberg, Germany	Jun 2018

Software

PZFlow: Probabilistic modeling of tabular data with normalizing flows
Creator and lead developer. Python package for efficient, high-dimensional joint density estimation and generative modeling of any tabular data. (Github) (PyPI)

PhotErr: Photometric error model for astronomical imaging surveys
Creator and lead developer. Python package for estimating photometric errors for point and extended sources observed in astronomical imaging surveys, including the Rubin, Euclid, and Roman observatories. (Github) (PyPI)

RAIL: Redshift Assessment Infrastructure Layers
Contributing developer. Python package for photo-z estimation and evaluation on large scale data. I lead development of the galaxy catalog and systematic error forward modeling framework. (Github) (PyPI)

ts-wep: Wavefront estimation for the Rubin Observatory Active Optics System
Contributing developer. Python package that infers the optical wavefront using out-of-focus images from Rubin's Curvature Wavefront Sensors. I contribute to the wavefront estimation algorithms, and am leading the development of deep learning methods for wavefront estimation. (Github)

Observing Experience

Rubin Observatory AuxTel - 4 nights
Apache Point Observatory ARC 3.5m - 3 nights

Mentored Students

Dominik Riemann 2022-present
Developing deep learning methods for the active optics system of the Vera C. Rubin Observatory's Auxiliary Telescope (AuxTel).

Teaching Experience

Reading Course Instructor, University of Washington 2020-2022
Independently designed syllabi and taught advanced reading courses to undergraduates. Courses included *Tensions in ΛCDM Cosmology* and *Gravitational Lensing: From Exoplanets to Large Scale Structure*.

Teaching Assistant, Duke University 2016-2019
Led lab and discussion sections. Lectured on introductory mechanics, fluid dynamics, electromagnetism, and optics.

Undergraduate Tutor, Duke University 2016-2019
Tutored undergraduate students in introductory physics, modern physics, calculus I-II, and linear algebra.

Outreach

Astronomy on Tap — Apr 2023
Public talk at a Seattle brewery on the CMB, inflation, primordial perturbations, and the potential for an inflationary multiverse.

Outreach at ScioŠkola Praha 11 — May 2022
Taught a class of Czech middle school students about how Earth's magnetic field protects us from solar radiation, and how the environment of Mars was impacted by the loss of its magnetic field.

Graduate Student Q&A Panel, UC Berkeley — Jul 2021
Spoke on panel serving undergraduate students. Discussed aspects of graduate student life and research, with an emphasis on work-life balance, and navigating academic spaces as a queer person.

STEM Pals Organizer & Pedagogical Simulation Lead — 2021
Helped launch a STEM outreach program at the University of Washington. Designed interactive simulations to teach high school students how simulations allow researchers to study complex systems.

Duke University Teaching Observatory Volunteer — 2018-2019
Held star parties for members of the public, where we used telescopes to observe binary stars, star clusters, planets, etc.

Queer in Research Discussion Panel — Oct 2018
Spoke on panel discussing experiences as a queer person in STEM. Gave advice on how to find queer-friendly research groups, and how to build queer support systems in a professional context.

Public Lecture: Where Did We Come From and Are We Alone – Cosmic Origins and the Search for Life — Jan 2018
Public lecture for undergraduates at Duke University, explaining the standard model of cosmology, the search for life in the solar system and on exoplanets.

Service & Leadership

DESC Equity, Diversity, and Inclusion Committee — 2023-present
Serving on the equity, diversity, and inclusion committee of the Dark Energy Science Collaboration (DESC).

DUSC Cosmology and Astroparticle Group Meeting Leader — 2022-present
Leading the cosmology and astroparticle group meetings of the Dark Universe Science Center (DUSC) at the University of Washington. Duties include setting the agenda, inviting speakers, and organizing social events.

DiRAC Machine Learning Group Leader — 2022-present
Leading the machine learning group of the DiRAC institute at the University of Washington. Duties include setting the agenda and inviting speakers.

Rubin Observatory PCW Science Organizing Committee — 2023
Planning Summer 2023 Rubin Observatory Project and Community Workshop (PCW).

DESC Collaboration Meeting Science Organizing Committee — 2022-2023
Planned the Winter 2023 meeting of the Dark Energy Science Collaboration (DESC), with a focus on the poster session, events for early career researchers, and the DESC spokesperson election.

AAS Software Carpentry Workshop Volunteer — Jan 2023
Assisted instruction in command line and Python programming in the Software Carpentry Workshop at the 241st meeting of the American Astronomical Society, in Seattle, WA.

University of Washington Academic Grievance Committee — Nov 2022
Served on a committee including faculty and deans, adjudicating academic grievance cases brought forward by graduate students.

Physics Undergraduate Reading Course Leadership Committee — 2022
Organized reading course for undergraduates, including reviewing student applications, verifying progress during the term, and hosting final presentations.

Photo-z Commissioning Session Organizer — Aug 2022
Organized the Photo-z Commissioning Session at the 2022 Rubin Observatory Project and Community Workshop in Tucson, AZ. Work included planning the session, inviting speakers, and facilitating group discussion.

Snowmass 2021 Summer Study A/V Co-coordinator — Jul 2022
Coordinated audio/visual equipment for the hyrbrid Snowmass 2021 Summer Study in Seattle, Washington. Work included determining needs, securing and setting up equipment, and training volunteers how to use the equipment.

Physicists for Inclusion and Equity Officer — 2020-2021
Lead group in the University of Washington Physics Department, with a focus on providing community and programming for underrepresented groups in physics.

Publication List

First-Author Publications

1. Learning Spectral Templates for Photometric Redshift Estimation from Broadband Photometry
Crenshaw, J.F. & Connolly, A.J. 2020 *AJ*, 160, 191. (ADS)

Co-Author Publications

3. The Simulated Catalogue of Optical Transients and Correlated Hosts (SCOTCH)
Lokken, M., Gagliano, A., Narayan, G., Hložek, R., Kessler, R., **Crenshaw, J. F.**, Salo, L., Alves, C. S., Chatterjee, D., Vincenzi, M., Malz, A. *MNRAS* (2023). (ADS)

2. The Sensitivity of GPz Estimates of Photo-z Posterior PDFs to Realistically Complex Training Set Imperfections
Stylianou, N., Malz, A., Hatfield, P., **Crenshaw, J.F.**, Gschwend, J. *PASP* (2022). (ADS)

1. An information-based metric for observing strategy optimization, demonstrated in the context of photometric redshifts with applications to cosmology
Malz, A.I., Lanusse, F., **Crenshaw, J.F.**, Graham, M.L. *arXiv* (2021). (ADS)

Conferences & Workshops

Conferences	241st Meeting of the American Astronomical Society, Seattle, WA	Jan 2023
	4th Annual Astronomers Turned Data Scientists Meeting	Mar 2022
	238th Meeting of the American Astronomical Society, online	Jun 2021
	Statistical Challenges in Modern Astronomy VII, online	June 2021
	5th Joint Meeting of the American Physical Society and the Physical Society of Japan, Waikoloa, HI	Oct 2018
	28th International Conference on Neutrino Physics and Astrophysics, Heidelberg, Germany	Jun 2018
Workshops	LSSTC Data Science Fellowship Workshop: Image Processing for Wide Field Surveys, Seattle, WA	Jun 2023
	Michigan Summer Cosmology School 2023, Ann Arbor, MI	Jun 2023
	Astronomical Software Development Workshop, Center for Computational Astrophysics, New York City, NY	May 2022
	Summer School in Statistics for Astronomers 2021, online	Jun 2021
Collab. Meetings	Rubin Observatory Active Optics Workshop, hydrid	May 2023
	2023 Rubin Observatory Joint Technical Meeting, La Serena, Chile	Mar 2023
	2022 Rubin Observatory Project & Community Workshop, Tucson, AZ	Aug 2022
	Summer 2022 Meeting of the Dark Energy Science Collaboration, Chicago, IL	Aug 2022
	Winter 2022 Meeting of the Dark Energy Science Collaboration, online	Feb 2022
	2021 Rubin Observatory Project & Community Workshop, online	Aug 2021
	Dark Energy Science Collaboration Sprint Week 2021, online	Oct 2021
	Summer 2021 Meeting of the Dark Energy Science Collaboration, online	Jul 2021
	Winter 2021 Meeting of the Dark Energy Science Collaboration, online	Feb 2021
	Dark Energy Science Collaboration Sprint Week 2020, online	Dec 2020
	2020 Rubin Observatory Project & Community Workshop, online	Aug 2020
	Summer 2020 Meeting of the Dark Energy Science Collaboration, online	Jul 2021
	Winter 2020 Meeting of the Dark Energy Science Collaboration, online	Jan 2020