

# John Franklin Crenshaw

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Department of Physics  
 University of Washington, Seattle  
 Seattle, WA

<b>Education</b>	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 <i>summa cum laude</i> with highest distinction Advisor: Kate Scholberg	
<b>Research Experience</b>	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	
<b>Fellowships &amp; Awards</b>	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
<b>Invited Talks</b>	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

<b>Contributed Talks</b>	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
<b>Posters</b>	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
<b>Software</b>	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. ( <a href="#">Github</a> ) ( <a href="#">PyPI</a> )	
	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. ( <a href="#">Github</a> ) ( <a href="#">PyPI</a> )	
	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. ( <a href="#">Github</a> ) ( <a href="#">PyPI</a> )	
	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. ( <a href="#">Github</a> )	
<b>Observing Experience</b>	Rubin Observatory AuxTel - 4 nights Apache Point Observatory ARC 3.5m - 3 nights	
<b>Mentored Students</b>	DOMINIK RIEMANN	2022-present
	Developing deep learning methods for the active optics system of the Vera C. Rubin Observatory's Auxiliary Telescope (AuxTel).	
<b>Teaching Experience</b>	READING COURSE INSTRUCTOR, UNIVERSITY OF WASHINGTON	2020-2022
	Independently designed syllabi and taught advanced reading courses to undergraduates. Courses included <i>Tensions in <math>\Lambda</math>CDM Cosmology</i> and <i>Gravitational Lensing: From Exoplanets to Large Scale Structure</i> .	
	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.	

<b>Outreach</b>	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.	
<b>Service &amp; Leadership</b>	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.	
	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.	

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UNIVERSITY OF WASHINGTON ACADEMIC GRIEVANCE COMMITTEE Served on a committee including faculty and deans, adjudicating academic grievance cases brought forward by graduate students.	Nov 2022
PHYSICS UNDERGRADUATE READING COURSE LEADERSHIP COMMITTEE Organized reading course for undergraduates, including reviewing student applications, verifying progress during the term, and hosting final presentations.	2022
PHOTO-Z COMMISSIONING SESSION ORGANIZER 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.	Aug 2022
SNOWMASS 2021 SUMMER STUDY A/V CO-COORDINATOR Coordinated audio/visual equipment for the hybrid Snowmass 2021 Summer Study in Seattle, Washington. Work included determining needs, securing and setting up equipment, and training volunteers how to use the equipment.	Jul 2022
PHYSICISTS FOR INCLUSION AND EQUITY OFFICER Lead group in the University of Washington Physics Department, with a focus on providing community and programming for underrepresented groups in physics.	2020-2021

## Publication List

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### 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

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<b>Conferences</b>	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
<b>Workshops</b>	Astronomical Software Development Workshop, Center for Computational Astrophysics, New York City, NY	May 2022
	Summer School in Statistics for Astronomers 2021, online	June 2021
<b>Collab. Meetings</b>	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