

John Franklin Crenshaw

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Summary: I am a KIPAC Rubin Fellow at the Kavli Institute for Particle Astrophysics and Cosmology. My research focuses on observational cosmology, large-scale structure, Lyman-break galaxies, photo-z estimation, weak lensing, active optics for wide-field telescopes, galaxy evolution, and AI for science.

Professional Appointments

KIPAC Rubin Fellow, Stanford Univ. & SLAC National Accelerator Laboratory Sept 2025 – present
Faculty Mentor: Pat Burchat

Education

University of Washington, MS, PhD in Physics Sept 2019 – Jun 2025
Advisor: Andrew Connolly
Thesis: Towards High-redshift Cosmology with Lyman-break Galaxies Detected by LSST

Duke University, BS in Physics Aug 2015 – May 2019
summa cum laude with highest distinction
Advisor: Kate Scholberg
Thesis: Sensitivity of the Helium and Lead Observatory to Core-Collapse Supernova Neutrino Bursts

Fellowships, Grants, & Awards

KIPAC Rubin Fellowship (\$368,000)	2025 – 2029
NASA Euclid General Investigator Program, Science PI (\$480,000)	2025
Vera C. Rubin Observatory Builder Status	2025
LSST Dark Energy Science Collaboration (DESC) Builder Status	2025
Dunlap Institute Workshop Grant (\$6,500)	2024
DOE Cosmic Frontier Grant, Contributor (\$360,000)	2023
DOE SCGSR Fellowship (\$10,400)	2023
Rubin Observatory ISSC Ambassador (\$4,500)	2021 – 2022
DOE Scholar (\$12,000)	2021
Duke Faculty Scholar (\$10,000)	2018 – 2019
Daphne Chang Memorial Award (\$1,000)	2019
DAAD RISE Research Exchange Fellowship (€5,000)	2018

Publications

As of April 2026, I have (co-)authored 20 publications with a total of 202 citations (*h*-index 8).

First Author:

4. *Quantifying the Impact of LSST u-band Survey Strategy on Photometric Redshift Estimation and the Detection of Lyman-break Galaxies*
Crenshaw J. F., Leistedt B., Graham M. L., Payerne C., et al. (2025) ApJS 281 54
3. *Probabilistic Forward Modeling of Galaxy Catalogs with Normalizing Flows*
Crenshaw J. F., Kalmbach J. B., Gagliano A., Yan Z., et al. (2024) AJ 168 80
2. *Using AI for Wave-front Estimation with the Rubin Observatory Active Optics System*
Crenshaw J. F., Connolly A. J., Meyers J. E., Kalmbach J. B., et al. (2024) AJ 167 86

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

Co-Author with Major Contributions:

11. *The Vera C. Rubin Observatory Data Preview 1*
Vera C Rubin Observatory Team, including **Crenshaw J. F.** (2026) arXiv:2603.23786
10. *Redshift Assessment Infrastructure Layers (RAIL): Rubin-era photometric redshift stress-testing and at-scale production*
RAIL Team, van den Busch J. L., Charles E., et al., including **Crenshaw J. F.** (2026) OJAp 9 58200
9. *An Information-based Metric for Observing Strategy Optimization, Demonstrated in the Context of Photometric Redshifts for LSST*
Malz A. I., Lanusse F., **Crenshaw J. F.**, Scott B., et al. (2026) ApJS 282 69
8. *Diagnosing the Effects of Spectroscopic Training Set Imperfection on Photometric Redshift Performance*
Crafford A., Malz A. I., Zhang T., et al., including **Crenshaw J. F.** (2026) arXiv:2601.10797
7. *Photometric Redshift Estimation for Rubin Observatory Data Preview 1 with Redshift Assessment Infrastructure Layers (RAIL)*
Zhang T., Charles E., **Crenshaw J. F.**, Schmidt S. J., et al. (2025) arXiv:2510.07370
6. *Impact of survey spatial variability on galaxy redshift distributions and the cosmological 3×2 -point statistics for the Rubin Legacy Survey of Space and Time (LSST)*
Hang Q., Joachimi B., Charles E., **Crenshaw J. F.**, et al. (2024) MNRAS 535 2970
5. *The Active Optics System on the Vera C. Rubin Observatory: Optimal Control of Degeneracy among the Large Number of Degrees of Freedom*
Megias Homar G., Kahn S. M., Meyers J. M., **Crenshaw J. F.**, et al. (2024) ApJ 974 108
4. *Improving Photometric Redshift Estimates with Training Sample Augmentation*
Moskowitz I., Gawiser E., **Crenshaw J. F.**, Andrews B. H., et al. (2024) ApJ 967 L6
3. *The simulated catalogue of optical transients and correlated hosts (SCOTCH)*
Lokken M., Gagliano A., Narayan G., et al., including **Crenshaw J. F.** (2023) MNRAS 520 2887
2. *The Sensitivity of GPz Estimates of Photo-z Posterior PDFs to Realistically Complex Training Set Imperfections*
Stylianou N., Malz A. I., Hatfield P., **Crenshaw J. F.**, et al. (2022) PASP 134 044501
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. (2021) arXiv:2104.08229

Other Co-Author Papers:

The following include white papers and papers for which I was granted authorship due to more minor contributions, my role collecting or calibrating data, or my builder status within the Rubin Observatory and the Dark Energy Science Collaboration.

5. *A Path to an All-Sky Survey with Roman*
Han J. J., Chiti A., Chen K., et al., including **Crenshaw J. F.** (2026) arXiv:2602.21280

4. *Photometric Redshifts in JWST Deep Fields: A Pixel-Based Alternative with DeepDISC*
Merz G., Zhuang M., Li J., et al., including **Crenshaw J. F.** (2026) OJAp 9 56099
3. *Fast Radio Bursts in the Era of the Vera C. Rubin Observatory's Legacy Survey of Space and Time*
James C. W., Smith B., Dage K., et al., including **Crenshaw J. F.** (2026) arXiv:2603.00371
2. *Opportunities in AI/ML for the Rubin LSST Dark Energy Science Collaboration*
LSST Dark Energy Science Collaboration, including **Crenshaw J. F.** (2026) arXiv:2601.14235
1. *NSF-DOE Vera C. Rubin Observatory Observations of Interstellar Comet 3I/ATLAS (C/2025 N1)*
Chandler C. O., Bernardinelli P. H., Jurić M., et al., including **Crenshaw J. F.** (2025) arXiv:2507.13409

Students Mentored



Graduate Students:



<i>Ben Sherwin</i> , Stanford University	2025 – present
<i>Maya Redden</i> , Stanford University	2025 – present
<i>Zhuoqi (Jackie) Zhang</i> , Stanford University	2025 – present
<i>Linda Jin</i> , University of Washington	2025 – present
<i>Hurum Tohfa</i> , University of Washington	2024 – present


Undergraduate Students:



<i>Dominik Riemann</i> , University of Washington	2022 – 2024
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Software

PZF1ow: Creator and lead developer of a Python package for efficient, high-dimensional probabilistic modeling of tabular data using normalizing flows.  

PhotErr: Creator and lead developer of a Python package for estimating photometric errors for astronomical imaging surveys, including the Rubin, Euclid, and Roman observatories.  

ts-wep: Contributing developer of a Python package for wave-front inference for the active optics system of the Rubin Observatory. 

RAIL: Contributing developer of the RAIL photometric redshift (photo-z) estimation pipeline, including forward modeling galaxy catalogs and sources of systematic error.  

Selected Presentations

Invited Talks:

University of California, Santa Cruz	<i>Santa Cruz, CA</i> ; Feb 2026
Pontificia Universidad Católica de Chile de Valparaíso	<i>Valparaíso, Chile</i> ; Oct 2025
Berkeley Center for Cosmological Physics Seminar	<i>Berkeley, CA</i> ; Sept 2025
DESI-II Working Group	<i>Virtual</i> ; Feb 2025
DES-DESC Special Session, AAS Winter 2025	<i>National Harbor, MD</i> ; Jan 2025
Cosmopalooza 2023 Plenary	<i>Virtual</i> ; Oct 2023
University of Chile Colloquium	<i>Santiago, Chile</i> ; Mar 2023
AAS Astronomers Turned Data Scientists Meeting Plenary	<i>Virtual</i> ; Mar 2022
DESC Winter Meeting Plenary	<i>Virtual</i> ; Feb 2022
KIPAC Seminar	<i>Virtual</i> ; Sept 2020

Contributed Talks:

Special Session on Rubin Observatory Early Results, AAS Winter 2026	<i>Phoenix, AZ</i> ; Jan 2026
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DESC Summer Meeting	Chicago, IL; Aug 2022
DESC Winter Meeting	Virtual; Feb 2022
Rubin Observatory Project & Community Workshop	Virtual; Aug 2020
DESC Winter Meeting	Tucson, AZ; Jan 2020

Posters:

New Synergies in Multi-Probe Cosmology	Santa Barbara, CA; Feb 2026
American Astronomical Society 247th Meeting	Phoenix, AZ; Jan 2026
Adaptive Optics for Extremely Large Telescopes 8	Viña del Mar, Chile; Oct 2025
Rubin Observatory Community Workshop	Palo Alto, CA; Jul 2024
American Astronomical Society 241st Meeting	Seattle, WA; Jan 2023
American Astronomical Society 238th Meeting	Virtual; Jun 2021
Statistical Challenges in Modern Astronomy VII	Virtual; Jun 2021
Duke Physics Research Symposium	Durham, NC; Apr 2019
5th Joint Meeting of the APS and JPS	Waikoloa, HI; Oct 2018
28th International Conference on Neutrino Physics and Astrophysics	Heidelberg, Germany; Jun 2018

Teaching

Guest Lecturer, Extragalactic Astronomy	University of Washington; 2025
Reading Course Instructor	University of Washington; 2020 – 2022
Teaching Assistant	Duke University; 2016 – 2019
Undergraduate Tutor	Duke University; 2016 – 2019

Outreach

Astronomy on Tap, San Francisco Co-organizer	San Francisco, CA; 2025 – present
Astro on Tap: <i>Warning! Objects in Mirror Are Farther Than They Appear</i>	San Francisco, CA; Oct 2025
Astro on Tap: <i>Dark Matter Murder Mystery</i>	Seattle, WA; Mar 2025
Emerald City Comic Con	Seattle, WA; Mar 2025
Astro on Tap: <i>Dark Energy in the era of DESI</i>	Seattle, WA; May 2024
Astro on Tap: <i>Before the Big Bang</i>	Seattle, WA; Apr 2023
Class at ScioŠkola Praha 11	Prague, CR; May 2022
UC Berkeley Graduate Student Q&A Panel	Virtual; Jul 2021
STEM Pals Organizer & Pedagogical Simulation Lead	Virtual; 2021
Duke University Teaching Observatory	Durham, NC; 2018 – 2019
Queer in Research Discussion Panel	Durham, NC; Oct 2018
Public Lecture: <i>Where Did We Come From and Are We Alone</i>	Durham, NC; Jan 2018

Service and Leadership

DESC Lyman-break Galaxy Topical Team Creator & Leader	2024 – present
Co-chair of the DESC Equity, Diversity, and Inclusion Committee	2023 – present
Rubin 2036 Workshop Science & Local Organizing Committees	2026
Reviewer for ICML 2025 ML4Astro Workshop	2025
Organized workshop on cosmology with LBGs at the Dunlap Institute	2025
DUSC Cosmology and Astroparticle Journal Club	2022 – 2024
University of Washington Astronomy Journal Club	2023 – 2024
Rubin Community Workshop Science Organizing Committee	2023 – 2024

DESC Collaboration Meeting Science Organizing Committee
Physics Undergraduate Reading Course Leadership Committee
Physicists for Inclusion and Equity Officer

2022 – 2023
2022
2020 – 2021

updated: April 1, 2026