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 2025
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
Vera C. Rubin Observatory Builder Status	2025
LSST Dark Energy Science Collaboration (DESC) Builder Status	2025
NASA Euclid General Investigator Program, Science PI ($480,000)	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 October 2025, I have (co-)authored 13 papers, with a total of 86 citations and an h-index of 5.

First and Second 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) arXiv:2503.06016

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:

9. *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

8. *Redshift Assessment Infrastructure Layers (RAIL): Rubin-era photometric redshift stress-testing and at-scale production*
The RAIL Team, including **Crenshaw J. F.** (2025) arXiv:2505.02928

7. *RTN-095: The Vera C. Rubin Observatory Data Preview 1*
NSF-DOE Vera C. Rubin Observatory Team, including **Crenshaw J. F.** (2025)

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

Students Supervised

Graduate Students:

Ben Sherwin, Stanford University 2025 – present

Hurum Tohfa, University of Washington 2025 – present

Undergraduate Students:

Dominik Riemann, University of Washington 2022 – 2024

Software

`PZFlow`: 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:

Berkeley Center for Cosmological Physics Seminar	*Berkeley, CA*; Sept 2025
DESI-II Working Group	*Virtual*; Feb 2025
DES-DESC Special Session, AAS Winter 2025	*National Harbor, MD*; Jan 2025
Cosmopalooza 2023 Plenary	*Virtual*; Oct 2023
University of Chile Colloquium	*Santiago, Chile*; Mar 2023
AAS Astronomers Turned Data Scientists Meeting Plenary	*Virtual*; Mar 2022
DESC Winter Meeting Plenary	*Virtual*; Feb 2022
KIPAC Seminar	*Virtual*; Sept 2020

Contributed Talks:

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:

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

Astro on Tap: *Warning! Objects in Mirror Are Farther Than They Appear*	*San Francisco, CA*; Oct 2025
Astro on Tap: *Dark Matter Murder Mystery*	*Seattle, WA*; Mar 2025
Emerald City Comic Con	*Seattle, WA*; Mar 2025
Astro on Tap: *Dark Energy in the era of DESI*	*Seattle, WA*; May 2024
Astro on Tap: *Before the Big Bang*	*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: *Where Did We Come From and Are We Alone*	*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 Observatory Science Collaborations EDI Committee	2023 – present
Reviewer for the ML4Astro Workshop at ICML 2025	2025
Organized workshop on cosmology with LBGs at the Dunlap Institute	2025
DUSC Cosmology and Astroparticle Group Leader	2022 – 2024
University of Washington Astronomy Journal Club	2023 – 2024
Rubin Community Workshop Science Organizing Committee	2023 – 2024
DiRAC Machine Learning Group Leader	2022 – 2023
DESC Collaboration Meeting Science Organizing Committee	2022 – 2023
AAS Software Carpentry Workshop Volunteer	Jan 2023
University of Washington Academic Grievance Committee	2022
Physics Undergraduate Reading Course Leadership Committee	2022
Photo-z Commissioning Session Organizer	Aug 2022
Snowmass 2021 Summer Study A/V Co-coordinator	Jul 2022
Physicists for Inclusion and Equity Officer	2020 – 2021

updated: October 12, 2025