John Franklin Crenshaw

Contact Information

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University of Washington Physics Dept
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Education

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

Duke University, Durham, NC USA
B.S. in Physics, May 2019
summa cum laude with Highest Distinction
Advisor: Kate Scholberg

Research Experience

Dark Energy Science Collaboration (DESC) 2019 - present
Developing the photometric redshift pipeline for DESC cosmology
Deconvolving galaxy spectra from photometry and studying galaxy evolution
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 to improve telescope wavefront estimation
Leading photometric redshift commissioning efforts
Advisors: Andrew Connolly and Sandrine Thomas

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

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

Fellowships & Awards

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

First Author Publications

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

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, submitted* (2022)

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)

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)

Invited Talks

DESC Summer Meeting (*Chicago*) Aug 2022
Seeing the Forest for the Trees: Detecting a Photometric Lyman-α Signal with the Vera Rubin Observatory

AAS Astronomers Turned Data Scientists (ATDS) Meeting (*online*) Mar 2022
Simulating Astronomical Data with True Posteriors using Normalizing Flows

Plenary Talk, DESC Winter Meeting (*online*) Feb 2022
Deep Generative Modeling for the Photo-z RAIL Pipeline

Gruen Weak Lensing Group, KIPAC, SLAC National Lab (*online*) Sep 2020
Deconvolving Galaxy Spectra from Broadband Photometry

Contributed Talks

DESC Winter Meeting (*online*) Feb 2021
Rubin Observatory Project & Community Workshop (*online*) Jul 2020
DESC Winter Meeting (*Tucson, AZ*) Jan 2020

Research Posters

AAS 238th Meeting (*online*) Jun 2021
SCMA VII Meeting (*online*) Jun 2021
Duke Physics Research Symposium (*Durham, NC*) Apr 2019
5th Joint Meeting of APS and Phys. Soc. of Japan (*Waikoloa, HI*) Oct 2018
Neutrino 2018 (*Heidelberg, Germany*) Jun 2018

Software Packages

PZFlow: Probabilistic modeling of tabular data with normalizing flows
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
Lead developer. Python package for estimating photometric errors for both point and extended sources observed with 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 forward modeling framework, including systematic errors, which enables pipeline validation and numerous scientific studies. [Github] [PyPI]

ts-wep: wavefront estimation for the Rubin Observatory Active Optics System
Contributing developer. Software that drives the Rubin Observatory Active Optics System. I contribute to the wavefront estimation algorithms, and am implementing deep learning methods for wavefront estimation. [Github]

Teaching Experience

Reading Course Instructor, University of Washington 2021 - present
Independently designed syllabi and taught advanced reading courses to undergraduates, including *Tensions in ΛCDM Cosmology* (2021-2022) and *Gravitational Lensing: From Exoplanets to Large Scale Structure* (2022 – present).

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

Undergraduate Tutor, Duke University 2016 - 2019
Worked as a tutor for introductory physics, modern physics, calculus I-III, and linear algebra.

Outreach

Graduate Student Research Panel, UC Berkeley — Jul 2021
STEM Pals organizer & pedagogical simulation lead — 2021
Duke University Teaching Observatory, volunteer — 2018 - 2019
"Queer in Research" Discussion Panel — Oct 2018
Duke University Public Lecture: *Where Did We Come From and Are We Alone: Cosmic Origins and the Search for Life* — Jan 2018

Service & Leadership

Physics Undergraduate Reading Course Leadership Committee, University of Washington — 2022 – present
Photo-z Commissioning Organizer, 2022 Rubin Observatory Project and Community Workshop (*Tucson, AZ*) — Aug 2022
Snowmass 2021 Summer Study, Organizing Volunteer — Jul 2022
Physicists for Inclusion and Equity (PIE) Officer, UW — 2020 – 2021
Departmental Review Student Committee, Duke Physics Department — 2018

Professional Societies	American Astronomical Society (AAS) American Physical Society (APS) Phi Beta Kappa Duke Society of Physics Students (SPS)

Last updated: September 3, 2022