Edward Berman

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EdwardBerman

Education

Northeastern University **2021 – present**
Bachelor of Science Mathematics (with honors)

Northeastern University **2021 – present**
Bachelor of Science Applied Physics

(Full list of coursework at https://ebrmn.space/courses.)

Select Publications and Preprints

- Efficient Point-spread Function Modeling with ShOpt.jl: A Point Spread-function Benchmarking Study with JWST NIRCam Imaging.
  Edward Berman, Jacqueline McCleary, Anton M. Koekemoer, Maximilien Franco, Nicole E. Drakos, Daizhong Liu, James W. Nightingale, Marko Shuntov, Diana Scognamiglio, Richard Massey, Guillaume Mahler, Henry Joy McCracken, Brant E. Robertson, Andreas L. Faisst, Caitlin M. Casey, Jeyhan S. Kartaltepe, and COSMOS-Web: The JWST Cosmic Origins Survey. **The Astronomical Journal** [paper] [code]

- On Soft Clustering for Correlation Estimators: Model Uncertainty, Differentiability, and Surrogates.
  Edward Berman, Sneh Pandya, Jacqueline McCleary, Marko Shuntov, Caitlin Casey, Nicole Drakos, Andreas Faisst, Steven Gillman, Ghassem Gozaliasl, Natalie Hogg, Jeyhan Kartaltepe, Anton Koekemoer, Wilfried Mercier, Diana Scognamiglio, and COSMOS-Web: The JWST Cosmic Origins Survey. **Submitted to the Open Journal of Astrophysics** [paper] [website]

All Publications (Reverse Chronological Order)

2025

- The highest resolution map of (dark) matter.
  Diana Scognamiglio1, Gavin Leroy, David Harvey, Richard Massey, Jason Rhodes, Malte Brinch, **Edward Berman**, Caitlin Casey, Nicole Drakos, Andreas Faisst, Maximilien Franco, Leo W.H. Fung, Ghassem Gozaliasl, Qiuhan He, Eric Huff, Natalie Hogg, Jeyhan Kartaltepe, Anton Koekemoer, Shouwen Jin, Erini Lambrides, Alexie Leauthaud, Daizhong Liu, Guillaume Mahler, Claudia Maraston, Jacqueline McCleary, James Nightingale, Louise Paquereau, Sandrine Pires, Marko Shuntov, Greta Toni, Maximillian von Wietersheim-Kramsta, John Weaver, and & COSMOS-Web friends. **Submitted to Nature** [paper]

- On Uncertainty Calibration for Equivariant Functions.
  Edward Berman, Jacob Ginesin, Robin Walters. **In Preparation for Transactions on Machine Learning Research (TMLR)** [paper]

- On Uncertainty Calibration for Equivariant Functions.
  Edward Berman, Jacob Ginesin, Robin Walters. **Submitted to EquiSystems Workshop at RSS 2025** [paper]

- On Soft Clustering for Correlation Estimators: Model Uncertainty, Differentiability, and Surrogates.
  Edward Berman, Sneh Pandya, Jacqueline McCleary, Marko Shuntov, Caitlin Casey, Nicole Drakos, Andreas Faisst, Steven Gillman, Ghassem Gozaliasl, Natalie Hogg, Jeyhan Kartaltepe, Anton Koekemoer, Wilfried Mercier, Diana Scognamiglio, and COSMOS-Web: The JWST Cosmic Origins Survey. **Submitted to the Open Journal of Astrophysics** [paper] [website]

- The COSMOS-Web Lens Survey (COWLS) III: forecasts versus data.
  Natalie B. Hogg, James W. Nightingale, Quihan He, Jacqueline McCleary, Guillaume Mahler, Aristeidis Amvrosiadis, Ghassem Gozaliasl, **Edward Berman**, Richard J. Massey, Diana Scognamiglio, Maximilien Franco, Daizhong Liu, Marko Shuntov, Louise Paquereau, Olivier Ilbert, Natalie Allen, Sune Toft, Hollis B. Akins, Caitlin M. Casey, Jeyhan S. Kartaltepe, Anton M. Koekemoer, Henry Joy McCracken, Jason D. Rhodes, Brant E. Robertson, Nicole E. Drakos, Andreas L. Faisst, Hossein Hatamnia, and Sophie L. Newman. **Submitted to Monthly Notices of the Royal Astronomical Society (MNRAS)** [paper]

- The COSMOS-Web Lens Survey (COWLS) II: depth, resolution, and NIR coverage from JWST reveal 17 spectacular lenses.
  Guillaume Mahler, James W. Nightingale, Natalie B. Hogg, Ghassem Gozaliasl, Jacqueline McCleary, Qiuhan He, **Edward Berman**, Maximilien Franco, Daizhong Liu, Richard J. Massey, Wilfried Mercier, Diana Scognamiglio, Marko Shuntov, Louise Paquereau, Olivier Ilbert, Natalie Allen, Sune Toft, Hollis B. Akins, Caitlin M. Casey, Jeyhan S. Kartaltepe, Anton M. Koekemoer, Henry Joy McCracken, Jason D. Rhodes, Brant E. Robertson, Jorge A. Zavala, Nicole E. Drakos, Andreas L. Faisst, Georgios E. Magdis, Shuowen Jin, and COSMOS-Web collaboration members. **Submitted to Monthly Notices of the Royal Astronomical Society (MNRAS)** [paper]

- The COSMOS-Web Lens Survey (COWLS) I: Discovery of >100 high redshift strong lenses in contiguous JWST imaging.
  James W. Nightingale, Guillaume Mahler, Jacqueline McCleary, Qiuhan He, Natalie B. Hogg, Aristeidis Amvrosiadis, Ghassem Gozaliasl, Wilfried Mercier, Diana Scognamiglio, **Edward Berman**, Gavin Leroy, Daizhong Liu, Richard J. Massey, Marko Shuntov, Maximilian von Wietersheim-Kramsta, Maximilien Franco, Louise Paquereau, Olivier Ilbert, Natalie Allen, Sune Toft, Hollis B. Akins, Caitlin M. Casey, Jeyhan S. Kartaltepe, Anton M. Koekemoer, Henry Joy McCracken, Jason D. Rhodes, Brant E. Robertson, and COSMOS-Web collaboration members. **Submitted to Monthly Notices of the Royal Astronomical Society (MNRAS)** [paper]

- Tracing the galaxy-halo connection with galaxy clustering in COSMOS-Web from $\mathbf{z = 0.1}$ to $\mathbf{z \sim 12}$.
  L. Paquereau, C. Laigle, H.J. McCracken, M. Shuntov, O. Ilbert, H.B. Akins, N. Allen, R. Arango- Togo, **E.M. Berman**, M. Béthermin, C.M. Casey, J. McCleary, Y. Dubois, N.E. Drakos, A.L. Faisst, M. Franco, S. Harish, C.K. Jespersen, J.S. Kartaltepe, A.M. Koekemoer, V. Kokorev, E. Lambrides, R. Larson, D. Liu, D. Le Borgne, J.S.W. Lewis, J. McKinney, W. Mercier, J.D. Rhodes, B.E. Robertson, S. Toft, M. Trebitsch, L. Tresse, J.R. Weaver. **Submitted to Astronomy and Astrophysics** [paper]

- On Differentiable Correlation Functions.
  Edward Berman, Jacqueline McCleary. **American Astronomical Society Winter Session.** ***Oral.*** [paper]

2024

- The State of Julia for Scientific Machine Learning.
  Edward Berman*, Jacob Ginesin*. **NeurIPS Machine Learning and the Physical Sciences Workshop (ML4PS).** ***Oral Spotlight.*** [paper] [poster & slides] [video]

- Not-so-little Red Dots: Two massive and dusty starbursts at $\mathbf{z \sim 5-7}$ pushing the limits of star formation discovered by JWST in the COSMOS-Web survey.
  Fabrizio Gentile, Caitlin M. Casey, Hollis B. Akins, Maximilien Franco, Jed McKinney, **Edward Berman**, Olivia R. Cooper, Nicole E. Drakos, Michaela Hirschmann, Arianna S. Long, Georgios Magdis, Anton M. Koekemoer, Vasily Kokorev, Marko Shuntov, Margherita Talia, Natalie Allen, Santosh Harish, Olivier Ilbert, Henry J. McCracken, Jeyhan S. Kartaltepe, Daizhong Liu, Louise Paquereau, Jason Rhodes, Michael R. Rich, Brant Robertson, Sune Toft, Ghassem Gozaliasl. **Astrophysical Journal Letters** [paper]

- Can It Edit? Evaluating the Ability of Large Language Models to Follow Code Editing Instructions.
  Federico Cassano, Luisa Li, Akul Sethi, Noah Shinn, Abby Brennen-Jones, Jacob Ginesin, **Edward Berman**, George Chakhnashvili, Anton Lozhkov, Carolyn Jane Anderson, Arjun Guha. **Conference on Language Modeling (COLM)** [paper] [Open Review]

- Efficient Point-spread Function Modeling with ShOpt.jl: A Point Spread-function Benchmarking Study with JWST NIRCam Imaging.
  Edward Berman, Jacqueline McCleary, Anton M. Koekemoer, Maximilien Franco, Nicole E. Drakos, Daizhong Liu, James W. Nightingale, Marko Shuntov, Diana Scognamiglio, Richard Massey, Guillaume Mahler, Henry Joy McCracken, Brant E. Robertson, Andreas L. Faisst, Caitlin M. Casey, Jeyhan S. Kartaltepe, and COSMOS-Web: The JWST Cosmic Origins Survey. **The Astronomical Journal** [paper] [code]

2023

- ShOpt.jl: A Julia Package for Empirical Point Spread Function Characterization of JWST NIRCam Data.
  Edward Berman, Jacqueline McCleary. **Journal of Open Source Software** [paper] [code]

[Google Scholar]

Selected Work Experience

Research

Center for Astrophysics Harvard | Smithsonian. AstroAI: Visiting Scientist *Summer 2025*
Looking for life on other planets.

Khoury College Geometric Learning Lab: Undergraduate Researcher *12/2024 – present*
Symmetry in Deep Learning.

Northeastern Cosmology Group: Research Co-op *07/2023-12/2023*
James Webb Space Telescope NIRCam Calibration. COSMOS Cartographer.

Teaching

Math 4571 Advanced Linear Algebra: Course Assistant *Spring 2024*

Math 2331 Linear Algebra: Course Assistant *Fall 2022*

Service

Reviewer

NeurIPS ML4PS Workshop: 2024

Journal of Open Source Software: 2024 – present

Departmental

Mathematics Engagement and Mentorship Association (Northeastern): Co-President

Selected fellowships, awards, and telescope observing time

Paper Spotlights and Honors

Oral Spotlight ML4PS Workshop: Top 2% accepted papers. For "The State of Julia for Scientific Machine Learning"

Telescope Observing Time

COSMOS-Web "Jackpot" Lens: Awarded 4 hours, X-SHOOTER Telescope, Co-Investigator

Northeastern Internal Research Grants and Scholarships

Physics Research Co-op Fellowship: $6,500. Supported my research co-op with the Northeastern Cosmology Group.

Summit Award: $3,000. Highest award for undergraduate research from Northeastern Undergraduate Research and Fellowships Office.

College of Science Dean's Fund: $1,350. Inaugural awardee 2024. $2,700 repeat awardee 2025.

Ascent Award: $1,000.

Various Travel Grants: For NeurIPS 2024, COLM 2024, AAS 2025.

Dean's Scholarship: $12,000 annual merit scholarship for undergraduate study at Northeastern University

Service Awards

SPS Leadership Scholarship, SPS National Organization: For department leadership and service, academic performance, and research. $2,500.

Selected Talks

Invited

On the Uncertainty Calibration of Equivariant Functions: Center for Astrophysics Harvard | Smithsonian. [video] [slides]

The JWST Point Spread Function: Columbia University

Conference and Workshop Talks

The State of Julia for Scientific Machine Learning: NeurIPS ML4PS Workshop Oral [video]

Parameter Estimation of the PSF: Brown University SUMS

References

Professor Robin Walters: r.walters@northeastern.edu

Professor Jacqueline McCleary: j.mccleary@northeastern.edu

AstroAI Founding Director Cecilia Garraffo: cgarraffo@cfa.harvard.edu

Professor Jonathan Blazek: j.blazek@northeastern.edu