Last updated: 12/22/2025

RICHARD M. FEDER

Berkeley Center for Cosmological Physics, Berkeley, CA 94720
(516) 497-3272 ◇ rmfeder@berkeley.edu ◇ richardfeder.github.io

RESEARCH INTERESTS

I work on a number of topics in **observational cosmology**, with a broad interest in developing and applying **computational techniques rooted in astrostatistics** that enhance studies of large-scale structure formation for **galaxy surveys** and **intensity mapping**. I am a member of the *SPHEREx*, *DESI* and *CIBER* collaborations.

EDUCATION AND RESEARCH POSITIONS

Berkeley Center for Cosmological Physics September 2024 - Present
Postdoctoral Fellow

California Institute of Technology July 2024 - September 2024
Postdoctoral Scholar

California Institute of Technology September 2018 - June 2024
MA/PhD in Physics
Division of Physics, Mathematics and Astronomy
Advisor: Jamie Bock
Dissertation title: Dissecting the Cosmic Infrared Background using Spaceborne Experiments

Harvard University August 2014 - May 2018
Bachelor of Arts, Physics and Astrophysics, with Honors
Advisor: Douglas Finkbeiner

OTHER RESEARCH POSITIONS/AFFILIATIONS

Harvard-Smithsonian Center for Astrophysics June 2017 - October 2017
Supervised by Prof. Daniel Eisenstein (supported by the Harvard College Research Program and Harvard Physics Department)

Harvard-Smithsonian Center for Astrophysics June 2017 - October 2017
Research Assistant, including completion of Senior Thesis in Astrophysics, supervised by Prof. Douglas Finkbeiner, Tansu Daylan and Stephen Portillo

Columbia University June 2015 - August 2015
Research Assistant, supervised by Dr. Glenn Jones and Prof. Amber Miller

Harvard-Smithsonian Center for Astrophysics July 2013 - September 2013
Research Assistant, supervised by Dr. Francesca Civano

ACADEMIC ACHIEVEMENTS

ASA Astrostatistics Student Paper Finalist, 2020 Joint Statistical Meetings

PROFESSIONAL ACTIVITIES, OUTREACH AND SERVICE

University of California, Berkeley

Organizer of Bakar Institute of Digital Materials for the Planet (BIDMaP) AI × Science seminar (speaker schedule here), July 2025 - Present.

California Institute of Technology

Volunteer teaching assistant/visiting lecturer in physics at Gabrelino High School, September 2022 - June 2024

Volunteer teacher for STARS science enrichment program, February 2021 - February 2022.

Volunteer judge for Caltech Science Olympiad, October 2018 - October 2021

Member of Scholarship and Financial Aid Committee at Caltech, October 2018 - 2019.

Caltech Physics graduate student representative, October 2019 - September 2020.

Manuscript Referee

Conference on Neural Information Processing Systems (NeurIPS) – Machine Learning and the Physical Sciences workshop. October 2019 - October 2024

ApJ, September 2020 - present.

Astronomy and Computing, September 2021 - present.

Journal of Astronomical Telescopes, Instruments and Systems (JATIS), January 2025 - present

Mentoring experience I've had the pleasure of working with a number of students on research projects, ranging from high school to graduate level:

- Two graduate students (Caltech)
- Three undergraduate/Masters students (RIT , UC Berkeley Summer 2025)
- Three high school students (Summer 2023 and Summer 2025)

PUBLICATIONS AND PROCEEDINGS

I am an author on **24** papers, of which I am a lead author on **8**. My current h-index is **8** and my ORCID ID is 0000-0002-9330-8738. My full list of publications can be found on ads.

(Co-)Lead Author

Feder R. and White, M. *Angular BAO Forecasts for the IBIS Medium-Band Survey* (2025). *Submitted to MNRAS*, arXiv:2512.06568

Feder R.; ... ; et *al. CIBER-1 4th flight fluctuation analysis: Measurements of near-IR auto- and cross-power spectra on arcminute to sub-degree scales* (2025). *The Astrophysical Journal (accepted)*, arXiv:2501.17933

Feder R.; ... ; et *al. CIBER-1 4th flight fluctuation analysis: Pseudo-power spectrum formalism, improved source masking and validation on mocks* (2025). *The Astrophysical Journal (accepted)*, arXiv:2501.17932

Feder R.; ... ; et *al. The Universe SPHEREx Will See: Empirically Based Galaxy Simulations and Redshift Predictions* (2024). *The Astrophysical Journal, 972:68*
arXiv:2312.04636

Feder R.; ... ; et *al.* *PCAT-DE: Reconstructing Pointlike and Diffuse Signals in Astronomical Images Using Spatial and Spectral Information* (2023). *The Astronomical Journal*, 166:98 arXiv:2307.10385

Feder R.; **Butler V.**; et al. *Measurement of the Relativistic Sunyaev-Zel'dovich Correction in RX J1347.5-1145* (2021). *The Astrophysical Journal*, 932:55. arXiv:2110.13932

Feder R., Berger, P., Stein, G. *Nonlinear 3D Cosmic Web Simulation with Heavy-Tailed Generative Adversarial Networks* (2020). *Physical Review D*: 102, Art. No. 103504. arXiv:2005.03050

Feder R., Portillo, S., Daylan, T., Finkbeiner, D. P. *Multiband Probabilistic Cataloging: A Joint Fitting Approach to Point Source Detection and Deblending* (2020). *The Astronomical Journal*, 159:4. arXiv:1907.04929, press release here.

Contributing Author (significant contributions)

Huai, Z.; ...; **Feder, R.**; et al. *Simulating spectral confusion in SPHEREx photometry and redshifts* (2025). *The Astrophysical Journal (in review)*, arXiv:2501.07420

Hall, K.; Hassan, J.; **Feder, R.**; Marriage, T.; et al. *A flux-limited sample of dusty star-forming galaxies from the Atacama Cosmology Telescope: physical properties and the case for multiplicity* (2025). *The Astrophysical Journal (in review)*, arXiv:2501.07420

Takimoto, K.; Matsuura, S.; Sano, K.; **Feder, R.** *Near-infrared Polarization Characteristics of the Zodiacal Light Observed with DIRBE/COBE* (2023). *The Astrophysical Journal*, 944:229. arXiv:2303.01458

Takimoto, K.; Bang, S.-C.; ...; **Feder, R.**; et al. *Polarization Spectrum of Near-Infrared Zodiacal Light Observed with CIBER* (2022). *The Astrophysical Journal*, 926:6. arXiv:2112.05350

Cheng, Y-T.; ...; **Feder, R.**; et *al. Probing Intra-Halo Light with Galaxy Stacking in CIBER Images* (2021). *The Astrophysical Journal*, 919:69. arXiv:2103.03882

Korngut, P.; ...; **Feder, R.**; et *al. Inferred Measurements of the Zodiacal Light Absolute Intensity through Fraunhofer Absorption Line Spectroscopy with CIBER* (2022). *The Astrophysical Journal*, 926:2. arXiv:2104.07104

Takimoto, K.; Bang, S.-C.; ...; **Feder, R.**; et al. *Pre-flight optical test and calibration for the Cosmic Infrared Background ExpeRiment 2 (CIBER-2)* (2020). Proceedings Volume 11443, Space Telescopes and Instrumentation (2020). SPIE link

Civano, F., Fabbiano, G., Pellegrini, S., Kim, D., **Feder, R.**, Elvis, M. *Early-Type Galaxies in the Chandra COSMOS Survey* (2014). *The Astrophysical Journal*, 790:16. arXiv:1405.7039

Software and Data release

Zemcov, M.; Wills, **Feder, R.**. SPIRE HeRS/HeLMS Combined SHIM Maps (2024). Access to maps here. arXiv:2410.00252

Feder, R.; Portillo, S.; Daylan, T. D. `Probabilistic CATaloger in the presence of Diffuse Emission (PCAT-DE)`. Github repository here, Read the Docs page here. DOI:10.5281/zenodo.8067131

AWARDED GRANTS

Characterizing the Distributions and Interactions of Gas and Dust in the Intra-cluster Medium Using Novel Analysis Techniques Applied to Multi-probe Observations. NASA ADAP, received October 2023. Total Award Amount: $599,913. PI: Dr. Michael Zemcov

SELECTED TALKS

Astrophysics, Relativity and Cosmology Seminar, University of Illinois Urbana-Champaign, November 2025. *From Pixels to Primordial Non-Gaussianity and Beyond: Cosmology and Intensity Mapping with the SPHEREx All-Sky Survey* (**invited talk**)

DESI Collaboration Meeting, July 2025. *Synergies between DESI and SPHEREx* (**invited plenary talk**)

Infrared Science and Technology Integration Group (IR STIG), May 2025. *Uncovering Surface Brightness Anisotropies with CIBER: Measurements of NIR auto- and cross-power spectra on arcminute to sub-degree scales* (**invited talk**).

KIPAC Seminar, Lawrence Berkeley National Laboratory, January 2025. *Science with the SPHEREx All-Sky Galaxy Survey* (**invited talk**).

INPA Seminar, Lawrence Berkeley National Laboratory, December 2023. *Uncovering the Near-Infrared Universe through Galaxy Surveys and Intensity Mapping* (**invited talk**).

Astrophysics Seminar, Laboratoire d'Astrophysique de Marseille, May 2023. *PCAT-DE: Reconstructing point-like and diffuse signals in astronomical images using spatial and spectral information* (**invited talk**).

Present and Future of Line Intensity Mapping, MPIA, April 2023. *The Universe SPHEREx Will See: Emprically-Based Galaxy Simulations and Redshift Predictions* (**selected talk**).

Astrophysics Student Seminar Series, University of Montreal, June 2022. *Predicting the Universe SPHEREx Will See through Empirically-Based Galaxy Simulations* (**invited talk**).

Astrophysics Seminar, University of Southern California, March 2022. *Measuring the Intracluster Medium Temperature of RX J1347.5-1145 through Relativistic Corrections to the Sunyaev-Zeldovich effect* (**invited talk**).

Greater IPAC Technology Seminar, October 2021. *Dissecting the Near Infrared Universe with the Cosmic Infrared Background Experiment* (**invited talk**).

Observing the millimeter universe with the NIKA-2 camera, July 2021. *Bridging the gap between large and small scales in astronomical images with simultaneous modeling of pointlike and diffuse emission* (**selected talk**).

Zemcov Group Meeting, Rochester Institute of Technology, February 2021. *Photometric methods in astronomy and probabilistic cataloging* (**invited talk**).

Joint Statistical Meetings (Astrostatistics Interest Group), August 2020. *Multiband probabilistic cataloging: a joint fitting approach to improved source detection and deblending* (**invited talk**).

Great Lakes Cosmology Workshop, August 2019. *Multiband probabilistic cataloging: a joint fitting approach to improved source detection and deblending* (**selected talk**).