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## RICHARD M. FEDER

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### RESEARCH INTERESTS

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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 through **galaxy surveys** and **intensity mapping**.

I am a member of the CIBER collaboration, working on both **data analysis of CIBER-1 data** and **hardware/laboratory work for the CIBER-2 experiment**. As an experimentalist, I built hardware for CIBER-2, ran laboratory measurements to characterize instrument performance, and helped integrate the experiment with the full sounding rocket payload. This work was done in collaboration with NASA's sounding rocket program and involved deployment to both NASA Wallops Flight Facility in Virginia and White Sands Missile Range in Las Cruces, New Mexico, where I participated in a **successful first flight and experiment recovery** ([Press release for CIBER-2 first flight, June 2021](#)).

### EDUCATION

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<b>California Institute of Technology</b> MA/PhD in Physics Division of Physics, Mathematics and Astronomy <i>Advisor: Jamie Bock</i>	September 2018 - Present
<b>Harvard University</b> Bachelor of Arts, Physics and Astrophysics, with Honors <i>Advisor: Douglas Finkbeiner</i>	August 2014 - May 2018

### RESEARCH POSITIONS/AFFILIATIONS

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<b>California Institute of Technology</b> <i>Member of SPHEREx L4 Cosmology team</i>	September 2021 - Present
<b>California Institute of Technology</b> <i>Member of Cosmic Infrared Background Experiment (CIBER) collaboration</i>	January 2019 - Present
<b>Harvard-Smithsonian Center for Astrophysics</b> <i>Supervised by Prof. Daniel Eisenstein (supported by the Harvard College Research Program and Harvard Physics Department)</i>	June 2017 - October 2017
<b>Harvard-Smithsonian Center for Astrophysics</b> <i>Research Assistant, including completion of Senior Thesis in Astrophysics, supervised by Prof. Douglas Finkbeiner, Tansu Daylan and Stephen Portillo</i>	June 2017 - October 2017
<b>Columbia University</b> <i>Research Assistant, supervised by Dr. Glenn Jones and Prof. Amber Miller</i>	June 2015 - August 2015
<b>Harvard-Smithsonian Center for Astrophysics</b> <i>Research Assistant, supervised by Dr. Francesca Civano</i>	July 2013 - September 2013

### ACADEMIC ACHIEVEMENTS

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ASA Astrostatistics Student Paper Finalist, 2020 Joint Statistical Meetings

## PROFESSIONAL ACTIVITIES, OUTREACH AND SERVICE

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### California Institute of Technology

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

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

Volunteer judge for Caltech Science Olympiad, October 2018 - Present

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 - present

ApJ, September 2020 - present.

Astronomy and Computing, September 2021 - present.

## PUBLICATIONS AND PROCEEDINGS

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I am an author on **10** papers, of which I am (co-)lead author on **4**. My current h-index is **5** and my ORCID ID is [0000-0002-9330-8738](https://orcid.org/0000-0002-9330-8738).

### In preparation

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**Feder R.**; ... ; et al. *The Universe SPHEREx Will See: Empirically Based Galaxy Simulations and Redshift Predictions* (in prep.)

### (Co-)Lead Author

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**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](https://arxiv.org/abs/2307.10385)

**Butler V.**; **Feder R.**; ... ; et al. *Measurement of the Relativistic Sunyaev-Zel'dovich Correction in RX J1347.5-1145* (2021). *The Astrophysical Journal*, 932:55.  
arXiv:[2110.13932](https://arxiv.org/abs/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](https://arxiv.org/abs/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](https://arxiv.org/abs/1907.04929), press release [here](#).

### Contributing Author

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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](https://arxiv.org/abs/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](https://arxiv.org/abs/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](https://arxiv.org/abs/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](https://arxiv.org/abs/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 [here](#)

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](https://arxiv.org/abs/1405.7039)

## SELECTED TALKS AND POSTERS

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**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: Empirically-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**).

Great Lakes Cosmology Workshop, August 2019. *Data driven cosmological emulation through deep generative modeling* (poster).

Astroinformatics Conference, June 2019. *Multiband probabilistic cataloging: a joint fitting approach to improved source detection and deblending* (poster).

231st American Astronomical Society Meeting, January 2018. *A Transdimensional Approach to Modeling the Cosmic X-ray Background* (poster).