Last updated: 8/17/20

RICHARD M. FEDER

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RESEARCH INTERESTS

Observational cosmology; crowded field photometry and other astrostatistics; deep generative modeling for studying large scale structure; near-Infrared instrumentation

EDUCATION

California Institute of Technology September 2018 - Present
MA/PhD in Physics
Division of Physics, Mathematics and Astronomy
Advisor: Jamie Bock

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

RESEARCH EXPERIENCE

Harvard-Smithsonian Center for Astrophysics September 2017 - July 2019
Senior Thesis in Astrophysics

- Worked with Prof. Douglas Finkbeiner to expand the tools of probabilistic cataloging (PCAT) for use with multiband data products
- Developed programs in Python and IDL to optimize positional calibration/cross-matching across multiple observations and convergence properties of sampling algorithm

Harvard-Smithsonian Center for Astrophysics June 2017 - October 2017
Member of DESI BGS Working Group

- Designed target selection strategy for the Bright Galaxy Survey (BGS) of the Dark Energy Spectroscopic Instrument (DESI), which will take high resolution spectra of ~ 10 million galaxies.
- Research done under guidance of Prof. Daniel Eisenstein, sponsored by the Harvard College Research Program and Harvard Physics Department.

Harvard-Smithsonian Center for Astrophysics June 2017 - October 2017
Research Assistant

- Worked with Prof. Douglas Finkbeiner and Tansu Daylan on application of probabilistic cataloging to the Chandra Deep Field - South Survey
- Used combination of statistical techniques and simulation tools to characterize AGN populations near and below the telescope detection limit

Columbia University June 2015 - August 2015
Research Assistant

- Designed instrumentation parts for EBEX, a high altitude balloon-borne experiment deployed at the South Pole to measure CMB polarization.
- Research done under guidance of Prof. Amber Miller and Dr. Glenn Jones

New York University June 2014 - August 2014
Data Analyst

· Wrote Python code to scrape missing person data from separate online databases, compiled into a more complete database to be cross-referenced with instances of human trafficking. Project presented at PyGotham conference (August 2014)
· Work done under guidance of mentor Eric Schles (Adjunct Professor, NYU)

Harvard-Smithsonian Center for Astrophysics July 2013 - September 2013
Research Assistant

· Worked with Dr. Francesca Civano to identify sample of elliptical galaxies with non-active supermassive black holes from the COSMOS survey using Chandra X-ray data. This sample was used to constrain total galactic mass estimates through X-ray gas luminosities.

WORK EXPERIENCE

Lumina Tech August 2018 - September 2018
Data Scientist/Consultant

· Developed prototype software for automatic processing of images for autostereoscopic devices.
· Consulted on decisions regarding product development for 3D visualization.

VORO Real Estate June 2018 - July 2018
Data Analyst

· Developed several web scraping tools for agent recruitement, along with software to automate listing postings.

ACADEMIC ACHIEVEMENTS

Intel Science Talent Search semifinalist, 2014

ASA Astrostatistics Student Paper Finalist, 2020 Joint Statistical Meetings

TECHNICAL SKILLS

Programming Experience (8 years)	Python, C, HTML, Javascript, Matlab, Mathematica IDL
Languages	Spanish (conversational), Italian
Laboratory	CIAO 4.9, TOPCAT, MARX 5.0, SolidWorks, Arduino microcontrollers, EAGLE

OUTREACH AND SERVICE

Volunteer Judge for Caltech Science Olympiad, October 2018 - Present

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

Caltech Physics graduate student representative, October 2019 - Present

Referee for Neural Information Processing Systems Conference – Machine Learning and the Physical Sciences, October 2019

PUBLICATIONS

Feder, R., Berger, P., Stein, G. *Nonlinear 3D Cosmic Web Simulation with Heavy-Tailed Generative Adversarial Networks* (2020). *Physical Review D*, in preparation.

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.

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

POSTERS AND SELECTED TALKS

Joint Statistical Meetings (Astrostatistics Interest Group), 8/6/20. *Multiband probabilistic cataloging: a joint fitting approach to improved source detection and deblending* (invited talk).

Great Lakes Cosmology Workshop, 8/5/19 - 8/8/19. *Multiband probabilistic cataloging: a joint fitting approach to improved source detection and deblending* (selected talk).

Great Lakes Cosmology Workshop, 8/5/19 - 8/8/19. *Data driven cosmological emulation through deep generative modeling* (poster).

Astroinformatics Conference, 6/24/19-6/28/19. *Multiband probabilistic cataloging: a joint fitting approach to improved source detection and deblending* (poster).

231st American Astronomical Society Meeting, 1/21/18-1/25/18. *A transdimensional approach to modeling the cosmic X-ray background* (poster).

16th Meeting of the High Energy Astrophysics Division, August 2017. *Transdimensional cataloging of the Chandra Deep Field South*