Lucia A. Perez

Future Faculty in the Physical Sciences Postdoctoral Fellow, Princeton University
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Academic Appointments

- 2022 - present: **Future Faculty in the Physical Sciences Postdoctoral Fellowship, Department of Astrophysics, Princeton University**, Princeton NJ 08540. Fall 2022 - 2023 and 2026 - present full-time, visiting appointment otherwise.
- 2026 - present: **Guest Researcher, Center for Computational Astrophysics**, Flatiron Institute & Simons Foundation, New York NY 10010.
- 2023 - 2026: **Flatiron Research Fellowship, Center for Computational Astrophysics**, Flatiron Institute & Simons Foundation, New York NY 10010.
- Fall 2020: **PreDoctoral Fellow, Center for Computational Astrophysics**, New York NY 10010. (*Successful research grant from a competitive call.*)
- 2016 - 2022: **Research & Teaching Assistant, School of Earth and Space Exploration, Arizona State University,** Tempe AZ 85281. PhD Advisors: Drs. Sangeeta Malhotra & James Rhoads.

Education

Arizona State University, Astrophysics PhD, GPA: 4.00 / 4.00

Defended April 2022. "The Void Clustering of Ly-Alpha Emitters as a Probe of Reionization."

Wellesley College: B.A. in Astrophysics, 2014. GPA: 3.55 / 4.00

Fellowships, Honors, and Awards (abridged)

- Arizona State University Graduate College Fellowship, Spring 2018 and Fall 2019 - Spring 2020
- National GEM Consortium University Fellow, Ph.D. Science Fellowship, with Arizona State University and Pacific Northwest National Laboratory, April 2015-2017. *Successful grant from a competitive call.*
- Fulbright Fellow, Student Program, South Africa, carried out November 2015 - July 2016. *Successful research grant from a competitive call.*

Academic Supervision

Richard Stiskalek, University of Oxford PhD student

Spring 2025 for CCA PreDoctoral Program to present, on cosmological rescaling project.

Anne Moore, University of Arizona PhD candidate

2025-26, on project building b_ϕ priors conditioned on observations and the Santa Cruz SAM.

Angeli Sandoval, City University of New York Master's Student

2023-2025 for CUNY Master's Program in Astrophysics.

Ishika Gobin, University of Virginia Undergraduate

Summer 2024 for Simons-National Society of Black Physicists Fellowship.

James Robinson, Princeton University Undergraduate

Summer 2023 for Department of Astrophysics' Undergraduate Summer Research Program.

Teaching

- *2023-4:* Work with Dr. Viviana Acquaviva (CUNY, Simons Foundation) to translate her 'Machine Learning for Physics and Astronomy' course into Spanish; includes lecture slides, Python notebooks, and select video lectures. Course targeted to advanced undergraduates/master's-level students.
- *Spring 2023:* Guest lecturer for Prof. Kelle Cruz's *Astro 100* undergraduate class at Hunter College. Topics covered: Moon Phases & Eclipses, The Copernican & Keplerian Revolutions, and an overview of Cultural Astronomy. **Teaching creativity & Innovation: proposed Cultural Astronomy curriculum and sample lecture.**
- *2022*: Teaching assistant with Dr. Frank Timmes. Managed online undergraduate astronomy class.
- *Spring 2018*: Teaching assistant with Dr. Jennifer Patience. Ran three sections of an introductory astronomy lab for a class of 60 astrophysics undergraduates, in which I was responsible for teaching and grading each lesson.
- *Fall 2017:* Teaching assistant with Dr. Alyssa Rhoden. Created assignments, guide lectures, grade, and interface for a class of 300 introductory astronomy undergraduate students.
- *November 2014-May 2015:* I worked as a tutor for Bespoke Education in New York City, specializing in mathematics for middle school students and physics for high school students. I also worked with Varsity Tutors helped students with GRE prep and college-level calculus.

Professional Service

- Co-organizer and SOC co-head for MockNYC ~ 50 person workshop on the galaxy-halo connection and improving galaxy modeling for cosmological inference. January 13-15, 2026 at the Flatiron Institute. `https://mocknyc.owlstown.net/`
- Hubble Cycles 32, 32 Bridge, and 33 external reviewer for galaxies, 2024 and 2025.
- Career Mentor for CUNY Master's program, 2023-2024.
- Reviewer for MNRAS and ApJ.

Selected Public & Educational Outreach

- *March 2026:* Public talk at the Brooklyn Public Library's π Day celebration, as part of the 'Infinite Sums' campaign by the Science, Society, and Culture team at the Simons Foundation. On using cosmic rulers to measure dark energy.
- *January 2024: SF Presents: To the Stars and Back* panel with Dr. Thebe Medupe, reflecting on our work and time together during my Fulbright Fellowship to South Africa.
- *January 2024:* Part of panel about Women in STEM Careers, co-hosted by the Parent's League and Community Bots.
- *2019-2024*: Letters to a PreScientist program, where I was a penpal to a middle schooler as part of their science curriculum, to familiarize them to what science is actually like.
- *May 2023:* Commencement Address to the the graduating class of the Nightingale-Bamford School.
- *Fall 2022, 2026:* Organized and ran a public observing night at Princeton's observatory wholly in Spanish.
- *August 2017, Spring 2018*: academic facilitator with SunDial, an ASU early start program for incoming Physics/SESE undergraduate students. I led lessons covering the Stefan-Boltzmann law and coarsely deriving planets' temperatures, as well as conversations about impostor syndrome and mental health. I guided students through a coding project analyzing Kepler light curves to derive exoplanet properties.
- *September 2016-May 2018:* telescope operator with the SESE Open Houses and Night of the Open Door.

Other Research Experience

- Aug 19 - 29, 2018: **La Serena School for Data Science, La Serena, Chile.** *Drs. Matthew Graham (Caltech), Amelia Bayo (U. de Valparaiso), Mauricio Cerda (U. Chile).*
  - Practiced implementing statistical regression, (un)supervised machine learning, deep learning, databases, high performance computing, and image processing in the context of big astronomical data.
  - Led a group project implementing supervised and unsupervised machine learning to a catalog of possible variable stars from the Asteroid Terrestrial-Impact Last Alert System.
  - *Successful award from a competitive call.*
- Aug 14 - 18, 2018: **Observations for LAGER.** *with Dr. James Rhoads and Weida Hu*
  - Five nights of observations using the N9640 filter of Cerro Tololo's DECam.
- 2017: **LOFAR Collaboration, Hamburg, Germany** *Drs. Evan Scannapieco and Chris Groppi. (ASU)*
  - Imaged and analyzed magnetic field signatures of M51 using the new LOFAR software FACTOR at 143 MHz, 9 arcsecond resolution, and noise levels around 125 μJy.
- 2015 - 2016: **Fulbright Fellowship at North West University, Mafikeng, South Africa** *Dr. Thebe Medupe*
  - Fourier analysis of archived SuperWASP light curves in search of pulsating A-type stars
  - Mentor for the NAAO Winter School, which brings 50 young black South African physics students to carry out astronomy projects and learn about their country's astronomical resources and history
  - *Successful research grant from a competitive call.*

Select Presentations & Invited Talks

- Selected Presentation at New Frontiers in Cosmology, A Coruña, Spain. *Learning the Universe with CAMELS-SAM : Joint Simulation-Based Inference of Cosmology and Astrophysics on SDSS-like Galaxy Clustering*, August 8-12, 2026.
- Invited presentation at SEA 2026 meeting, Mock Catalogs for Stage IV Surveys Symposium, Tarragona Spain. *Learning the Universe with CAMELS-SAM : Joint Simulation-Based Inference of Cosmology and Astrophysics on Realistic Galaxy Clustering*, July 13-17, 2026.
- Advancing Field Level and Simulation Based Inference for Cosmology, Perimeter Institute, Canada. *Learning the Universe with CAMELS-SAM : Joint Simulation-Based Inference of Cosmology and Astrophysics on SDSS-like Galaxy Clustering*, June 8-12, 2026.
- Workshop for mock ELG challenge development, Donostia, Spain. *Semi-analytic modeling of ELGs? Lessons & Resources from CAMELS-SAM*, February 17-21, 2025.
- Cosmology and galaxy astrophysics with simulations and machine learning 2024 in New York, NY. Talk: *Toward Constraints on Cosmology and Astrophysics with Observed Galaxy Clustering: the new photometric expansion to CAMELS-SAM*, December 10, 2024.
- Invited seminar for Institut de Física D'Altes Energies (IFAE) in Barcelona, Spain. (*Machine*) *Learning the Universe with CAMELS-SAM and beyond*, October 11, 2024.
- Oral presentation at Mock Barcelona in Spain. *The Influence of Galaxy Formation Modeling on b_ϕ, b_1, and constraints on $f_{\rm NL}$*, October 10, 2024.
- Invited oral presentation at LACAR in Bogota, Colombia. *CAMELS-SAM: how to crack open the galaxy-halo connection and (machine) learn the Universe*, June 27, 2024.
- Oral presentation at COSMO21 in Chania, Greece. *CAMELS-SAM and beyond: untangling the galaxy-halo connection with machine learning in observation space*, May 23, 2024.
- University of Washington, Department of Astronomy 'DUSC' Seminar, *CAMELS-SAM and beyond: untangling the galaxy-halo connection with machine learning*, Apr. 30, 2024.
- University of Arizona, Department of Astronomy 'TACOS' Seminar on CAMELS-SAM, Apr. 24, 2024.

- Wesleyan University, Department of Astronomy invited Colloquium *CAMELS-SAM and beyond: cracking open the galaxy-halo connection with machine learning*, Oct. 11, 2023.
- Invited seminar for the Observatório Nacional of Brazil's Ciclo de Seminários da COAST 2023, August 2023 via Youtube Live. *CAMELS-SAM: untangling the galaxy-halo connection with machine learning.*
- Oral presentation at EAS2023, July 2023 in Krakow, Poland. *CAMELS-SAM: untangling the galaxy-halo connection with machine learning.*
- Attendance and oral presentation at Future Cosmology school at L'Institut d'Etude Scientifique de Cargèse, Corsica, France. *CAMELS-SAM: untangling the galaxy-halo connection with machine learning.*
- Dissertation talk at AAS240, June 2022. *Constraining cosmology and reionization with the Void Probability Function, feat. the new CAMELS-SAM suite for machine learning.*
- Presentation at ASU's SESE Colloquium, 17 November 2021. *Constraining Reionization with the Void Clustering of Lyman-α Emitters.*
- iPoster/pre-recorded talk at the Galaxy Formation and Evolution in the Era of the Nancy Grace Roman Space Telescope Conference, 5-9 October 2020. *Probing Inhomogeneous Reionization with the Void Probability Function in the era of RST.*
- Presentation at the 2020 WFIRST Jamboree, 2 March 2020, Flatiron Institute. *Probing Patchy Reionization with the Void Probability Function in the era of WFIRST.*
- ComSciCon-AIP 2019, A Communicating Science Workshop for Graduate Students, 23-24 September 2019, American Institute of Physics in College Park, MD. I learned from a large variety of science communication professionals and drafted a short piece of writing about WFIRST.
- Presentation at the 2019 COSMOS Team Meeting, 14–17 May 2019, Flatiron Institute. *The Clustering of LAGER $z \approx 0.9$ [OIII] and $z \approx 0.4$ Hα Emitters in the COSMOS field.*
- Poster Presentation at the Snowbird Cosmic Lyman-Alpha Workshop (SnowCLAW), 19 - 24 March 2017. *Comparison of Clustering Analysis Methods for Lyα-Emitter-Inhabited Dark Matter Halo Simulations.*

Publications — Lucia A. Perez — ORCID 0000-0002-8449-1956

- **Perez, et al. 2026, arXiv:2602.04987 (under review with ApJ).**
  The Impact of Galaxy Formation on Galaxy Biasing, and Implications for Primordial non-Gaussianity Constraints.
- **Perez, Genel, et al. 2023, 2023ApJ...954....11P.**
  CAMELS-SAM: new simulations for constraining cosmology with galaxy clustering and machine learning
- **Perez et al. 2023, 2023ApJ...949....3P.**
  Constraints on the Epoch of Reionization with Roman Space Telescope and the Void Probability Function of Lyman-α Emitters.
- **Perez et al. 2022. 2022ApJ...940..102P.**
  Probing Patchy Reionization with the Void Probability Function of Lyman-α Emitters.
- **Perez et al. 2021. 2021ApJ...906...58P.**
  The Void Probability Function of simulated surveys of high-redshift Lyman-α Emitters.

- **Publications by students I have mentored:**
  - Moore, **Perez**, & Krause. *Informative Priors on Primordial non-Gaussianity Bias b_ϕ From Galaxy Formation*; 2026arXiv260421790M and under review with JCAP, for my data, SAM expertise, writing support, and general supervision.
  - Stiskalek, **Perez**, et al. 2026ApJ..1007..112S. *Cosmological Rescaling of Merger Trees for Semi-Analytic Galaxy Modelling*; for conceptualization, SC-SAM pipeline support, and general supervision.
  - Huang, Stiskalek, ..., **Perez**, et al. 2025. *CosmoBench: A Multiscale, Multiview, Multitask Cosmology Benchmark for Geometric Deep Learning*, 2025arXiv250703707H, accepted to the competitive NeurIPS2025 and to be published in conference proceedings. For my expert input on CAMELS-SAM merger tree data, correlation function methods, and results relating to each.
  - Robinson, **Perez**, et al. 2025, *The Clustering and Halo Occupation of $z = 0.47$ and $z = 0.92$ Emission Line Galaxies in COSMOS*, in final prep. Read draft here: `https://tinyurl.com/2s4badrc`
- **Learning the Universe collaboration co-authorships:**
  - *Introducing `sapphire`: Towards Hybrid Physics-Informed, Data-Driven Modeling of Galaxy Formation*, Viraj et al. 2026arXiv260406318P and in press, due to my involvement with the SC-SAM and writing support.
  - *Learning the Universe: physically-motivated priors for dust attenuation curves*, Sommovigo et al. 2025ApJ...990..114S , due to my involvement with the Synthetic Observations group and upcoming application of priors to photometric work with CAMELS-SAM.
  - *How does feedback affect the star formation histories of galaxies?* Iyer et al. 2025arXiv250821152I , involvement in the Synthetic Observations groups and hands-on testing with CAMELS-SAM star formation histories.
  - *LtU-ILI: An All-in-One Framework for Implicit Inference in Astrophysics and Cosmology*, Ho et al. 2024OJAp....7E..54H, due to my involvement with the pipeline and support in completing the manuscript.
- **CAMELS collaboration co-authorships:**
  - *Galaxy Phase-Space and Field-Level Cosmology: The Strength of Semi-Analytic Models*, de Santi, et al. 2026ApJ..1007...34D, for assistance with SAMs, results interpretation, and thorough manuscript support.
  - *Field-level simulation-based inference with galaxy catalogs: the impact of systematic effects*, de Santi, et al. 2025JCAP...01..082D, for assistance with SAMs, guidance on galaxy large scale structure, and thorough manuscript support.
  - *The CAMELS Multifield Dataset: Learning the Universe's Fundamental Parameters with Artificial Intelligence*, Villaescusa-Navarro, et al. 2022ApJS..259...61V, due to my development and public release of CAMELS-SAM.
  - *The CAMELS Project: Public Data Release*, Villaescusa-Navarro et al. 2023ApJS..265...54V, due to my development and public release of CAMELS-SAM.
- **LAGER collaboration co-authorships:**
  - *New Spectroscopic Confirmations of Ly-α Emitters at $z \sim 7$ from the LAGER Survey*, Harish et al. 2022ApJ...934..167H, in which I helped visually confirm candidate LAEs for spectroscopic follow-up.
  - *LAGER Lyα Luminosity Function at z$\sim$ 7: Implications for Reionization*, Wold, et al. 2022ApJ...927...36W, in

which I helped visually confirm candidate LAEs for spectroscopic follow-up.
- *A Lyman-α protocluster at redshift 6.9*, Hu, ..., **Perez**, et al. 2021NatAs...5..485H, in which I helped visually confirm candidate LAEs for spectroscopic follow-up.
- *Correlations between Hα equivalent width and galaxy properties at z = 0.47: Physical or selection-driven?* Khostovan, ..., Perez, et al. 2021MNRAS.503.5115K, which uses the sample of Hα emitters I helped select in the COSMOS field.
- *A large, deep 3 deg^2 survey of Hα, [O III], and [O II] emitters from LAGER: constraining luminosity functions*, Khostovan, ..., **Perez**, et al. 2020MNRAS.493.3966K. I carried out half the ELG selection based on COSMOS2015 photometric redshifts.
- *The Lyα Luminosity Function and Cosmic Reionization at z $\sim$ 7.0*, Hu, ..., **Perez**, et al. 2019ApJ...886...90H, for membership in LAGER.
- *Design for the First Narrowband Filter for the Dark Energy Camera: Optimizing the LAGER Survey for z$\sim$7 Galaxies*, Zheng, ..., **Perez**, et al. 2019PASP..131g4502Z, for membership in LAGER.

- **Other Co-authorships:**
  - *A Comprehensive Study of Hα Emitters at z $\approx$ 0.62 in the DAWN Survey: The Need for Deep and Wide Regions*, Harish et al. 2020ApJ...892...30H, assisted with finalizing the Hα emitter selection and general publication support.
  - *Calibrating the relation of low-frequency radio continuum to star formation rate at 1 kpc scale with LOFAR*, Heesen et al. 2019A&A...622A...8H. I calibrated and processed the LOFAR data that created the 145 MHz image of NGC 5194 in Fig. 2a.