rodrigo **luger**

coordinates

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Center for Computational Astrophysics, NY

about

I am a postdoctoral fellow at the Center for Computational Astrophysics in New York City, working on finding novel ways to discover and characterize exoplanets. I am broadly interested in exocartography, astrostatistics, noise modeling, & general analytic techniques for astronomy. Outside of the office I love to hike, cycle, swim, craft lattes, faulty parallelism, and Oxford commas.

stats

Total Pubs	**45**
Refereed	**37**
First Author	**14**
Citations	**1737**
h-index	**21**

popular code

`starry`
Analytic light curves

`planetplanet`
P-P occultations

`everest`
K2 de-trending

education

2012–2017 **PhD** Astronomy and Astrobiology — University of Washington, Seattle WA
+ On the evolution, detection, and characterization of small planets in the habitable zones of M dwarfs
+ Advised by Eric Agol, Rory Barnes, and Victoria Meadows

2012–2013 **MSc** Astronomy and Astrobiology — University of Washington, Seattle WA

2006–2010 **BA** Astrophysics — Swarthmore College, Swarthmore PA
+ Minor in English Literature

positions

2018– **Flatiron Fellow** — Center for Computational Astrophysics, New York, NY
+ Work on statistical and computational data analysis problems applied to stellar and exoplanetary astronomy
+ Develop algorithms and open-source software for timeseries analysis

2017–2018 **Postdoctoral Researcher** — University of Washington
+ Developed photometric de-trending methods to aid in the search for small planets transiting small stars; developed and maintained the `everest` pipeline

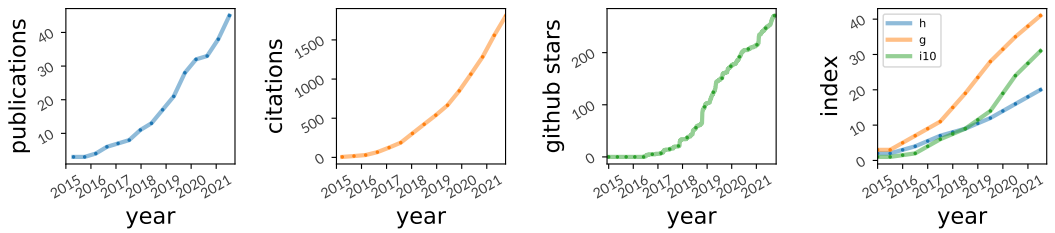
2012–2017 **Research Associate** — University of Washington
+ Developed techniques to detect and characterize habitable zone planets
+ Investigated the atmospheric evolution of planets orbiting M dwarfs

2008–2009 **Student Researcher** — Swarthmore College
+ Research under Professor Eric Jensen on planet formation and T Tauri disks

honors

2018–2022	**Flatiron Fellowship**	Center for Computational Astrophysics, New York, NY
2018	**Hubble Postdoctoral Fellowship**	(Declined)
2018	**51 Pegasi b Fellowship**	(Declined)
2012–2015	**ARCS Fellowship**	University of Washington
2010	**Bobby Berman Memorial Prize**	Swarthmore College
2010	**The Phi Beta Kappa Society**	Swarthmore College

metrics



references

eric agol
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dan foreman-mackey
foreman.mackey@gmail.com

rory barnes
rory@astro.washington.edu

teaching & outreach

2020- **Mentor, Simons-NSBP Program** Flatiron Institute
+ Mentor black undergraduate students through the Simons-National Society of Black Physicists summer program

2019- **Mentor, AstroCom** AMNH / CUNY
+ Mentor undergraduate students from underrepresented groups in the sciences at the City University of New York

2019- **Lecturer, LSST Data Science Fellowship** Carnegie Mellon / Flatiron Institute
+ Lectured on various topics related to statistical inference at week-long schools for early-career astronomers

2012–2017 **Mobile Planetarium** University of Washington
+ Presented planetarium shows at schools and public venues throughout Washington state using UW's inflatable mobile planetarium

2012–2013 **Teaching Assistant** University of Washington
+ Taught two bi-weekly tutorial sessions for two college astronomy courses

2010–2012 **High School Teacher** St. Luke's School, New Canaan CT
+ Created and taught a rigorous, college-level elective course in astrophysics aimed at seniors interested in pursuing college classes in the field
+ Taught three sections of 11th grade physics with a focus on astronomy , helping students develop critical thinking and creative problem solving skills

2009–2010 **Science Associate & Tutor** Swarthmore College
+ Directed weekly large-group study sessions for an introductory course in astronomy; tutored students in courses in mechanics and E&M

students

2020– **Shashank Dholakia** University of California, Berkeley
+ Developing analytic transit light curve models for oblate stars

2020– **Shishir Dholakia** University of California, Berkeley
+ Developing analytic transit light curve models for oblate stars

2020–2021 **Rebecca Young** Simons-NSBP Scholars Program, CCA
+ Inferring differential rotation rates from Kepler light curves

2020– **Fran Bartolić** Pre-doctoral Program, CCA
+ Mapping the surface of Io from Jupiter occultation data

2019– **Asmaa Elsayed** AstroCom Program, CUNY/CCA
+ Understand the time evolution of spotted stellar surfaces

2019 **Brynner Hidalgo** AstroCom Program, CUNY/CCA
+ Understand the time evolution of spotted stellar surfaces

2016–2018 **Nicholas Saunders** University of Washington
+ Develop tools to mitigate systematics in K2 data

other

2018– **Organizer, Stars and Exoplanets Meeting** CCA
+ Organize weekly meeting for NYC area graduate students, postdocs, & faculty

2013–2017 **IT Manager** Virtual Planet Laboratory, University of Washington
+ Managed VPL's virtual conferencing system and network

2010–2012 **Head Coach** St. Luke's School, New Canaan CT
+ Head coach of the JV Boys Soccer and Fencing Teams

publications

citations ⟶
(refereed in **bold**)

7 **Luger, R.**, Foreman-Mackey, D., & Hedges, C., 2021, Mapping Stellar Surfaces. II. An Interpretable Gaussian Process Model for Light Curves, AJ, **162**, 124

7 **Luger, R.**, Foreman-Mackey, D., Hedges, C., & Hogg, D., 2021, Mapping Stellar Surfaces. I. Degeneracies in the Rotational Light-Curve Problem, AJ, **162**, 123

– Dholakia, S., **Luger, R.**, & Dholakia, S., 2021, Efficient and Precise Transit Light Curves for Rapidly-Rotating, Oblate Stars, arXiv e-prints

– Hedges, C., **Luger, R.**, Martinez-Palomera, J., Dotson, J., & Barentsen, G., 2021, Linearized Field Deblending: Point-Spread Function Photometry for Impatient Astronomers, AJ, **162**, 107

– Zinn, J., Stello, D., Elsworth, Y., García, R., et al. (including **Luger, R.**), 2021, The K2 Galactic Archaeology Program Data Release 3: Age-Abundance Patterns in C1-C8, C10-C18, arXiv e-prints

1 **Luger, R.**, Foreman-Mackey, D., & Hedges, C., 2021, starry_process: Interpretable Gaussian Processes for Stellar Light Curves, The Journal of Open Source Software, **6**, 3071

9 Foreman-Mackey, D., **Luger, R.**, Agol, E., Barclay, T., et al., 2021, Exoplanet: Gradient-Based Probabilistic Inference for Exoplanet Data & Other Astronomical Time Series, The Journal of Open Source Software, **6**, 3285

2 Bartolić, F., **Luger, R.**, Foreman-Mackey, D., Howell, R., & Rathbun, J., 2021, Occultation Mapping of Io's Surface in the Near-Infrared I: Inferring Static Maps, arXiv e-prints

1 **Luger, R.**, Agol, E., Bartolić, F., & Foreman-Mackey, D., 2021, Analytic Light Curves in Reflected Light: Phase Curves, Occultations, and Non-Lambertian Scattering for Spherical Planets and Moons, arXiv e-prints

26 Agol, E., Dorn, C., Grimm, S., Turbet, M., et al. (including **Luger, R.**), 2021, Refining the Transit-Timing and Photometric Analysis of TRAPPIST-1: Masses, Radii, Densities, Dynamics, and Ephemerides, The Planetary Science Journal, **2**, 1

2 Hedges, C., **Luger, R.**, Dotson, J., Foreman-Mackey, D., & Barentsen, G., 2021, Multiwavelength Photometry Derived From Monochromatic Kepler Data, AJ, **161**, 95

9 Zinn, J., Stello, D., Elsworth, Y., García, R., et al. (including **Luger, R.**), 2020, The K2 Galactic Archaeology Program Data Release 2: Asteroseismic Results From Campaigns 4, 6, and 7, The Astrophysical Journal Supplement Series, **251**, 23

15 Cunningham, E., Garavito-Camargo, N., Deason, A., Johnston, K., et al. (including **Luger, R.**), 2020, Quantifying the Stellar Halo's Response to the LMC's Infall With Spherical Harmonics, ApJ, **898**, 4

40 Agol, E., **Luger, R.**, & Foreman-Mackey, D., 2020, Analytic Planetary Transit Light Curves and Derivatives for Stars With Polynomial Limb Darkening, AJ, **159**, 123

13 Montet, B., Feinstein, A., **Luger, R.**, Bedell, M., et al., 2020, The Young Planet DS Tuc Ab Has a Low Obliquity, AJ, **159**, 112

12 Fleming, D., Barnes, R., **Luger, R.**, & VanderPlas, J., 2020, On the XUV Luminosity Evolution of

TRAPPIST-1, ApJ, **891**, 155

18 Barnes, R., **Luger, R.**, Deitrick, R., Driscoll, P., et al., 2020, VPLanet: The Virtual Planet Simulator, PASP, **132**, 24502

38 David, T., Petigura, E., **Luger, R.**, Foreman-Mackey, D., et al., 2019, Four Newborn Planets Transiting the Young Solar Analog V1298 Tau, ApJ, **885**

20 Bedell, M., Hogg, D., Foreman-Mackey, D., Montet, B., & **Luger, R.**, 2019, WOBBLE: A Data-Driven Analysis Technique for Time-Series Stellar Spectra, AJ, **158**, 164

76 Feinstein, A., Montet, B., Foreman-Mackey, D., Bedell, M., et al. (including **Luger, R.**), 2019, Eleanor: An Open-Source Tool for Extracting Light Curves From the TESS Full-Frame Images, PASP, **131**, 94502

26 Kruse, E., Agol, E., **Luger, R.**, & Foreman-Mackey, D., 2019, Detection of Hundreds of New Planet Candidates and Eclipsing Binaries in K2 Campaigns 0-8, The Astrophysical Journal Supplement Series, **244**, 11

20 Fleming, D., Barnes, R., Davenport, J., & **Luger, R.**, 2019, Rotation Period Evolution in Low-Mass Binary Stars: The Impact of Tidal Torques and Magnetic Braking, ApJ, **881**, 88

81 Eastman, J., Rodriguez, J., Agol, E., Stassun, K., et al. (including **Luger, R.**), 2019, EXOFASTv2: A Public, Generalized, Publication-Quality Exoplanet Modeling Code, arXiv e-prints

2 Kislyakova, K., Fossati, L., Shulyak, D., Günther, E., et al. (including **Luger, R.**), 2019, Detecting Volcanically Produced Tori Along Orbits of Exoplanets Using UV Spectroscopy, arXiv e-prints

25 Kreidberg, L., **Luger, R.**, & Bedell, M., 2019, No Evidence for Lunar Transit in New Analysis of Hubble Space Telescope Observations of the Kepler-1625 System, ApJ, **877**

1 Saunders, N., **Luger, R.**, & Barnes, R., 2019, The Pointing Limits of Transiting Exoplanet Light Curve Characterization With Pixel Level Decorrelation, AJ, **157**, 197

10 **Luger, R.**, Bedell, M., Vanderspek, R., & Burke, C., 2019, TESS Photometric Mapping of a Terrestrial Planet in the Habitable Zone: Detection of Clouds, Oceans, and Continents, arXiv e-prints

84 **Luger, R.**, Agol, E., Foreman-Mackey, D., Fleming, D., et al., 2019, Starry: Analytic Occultation Light Curves, AJ, **157**, 64

– Barnes, R., **Luger, R.**, Smotherman, H., Deitrick, R., & Fleming, D., 2019, After the Habitable Zone, Memorie della Societa Astronomica Italiana, **90**, 641

20 Lustig-Yaeger, J., Meadows, V., Tovar Mendoza, G., Schwieterman, E., et al. (including **Luger, R.**), 2018, Detecting Ocean Glint on Exoplanets Using Multiphase Mapping, AJ, **156**, 301

64 Lincowski, A., Meadows, V., Crisp, D., Robinson, T., et al. (including **Luger, R.**), 2018, Evolved Climates and Observational Discriminants for the TRAPPIST-1 Planetary System, ApJ, **867**, 76

93 **Luger, R.**, Kruse, E., Foreman-Mackey, D., Agol, E., & Saunders, N., 2018, An Update to the EVEREST K2 Pipeline: Short Cadence, Saturated Stars, and Kepler-Like Photometry Down to Kp = 15, AJ, **156**, 99

22 Fleming, D., Barnes, R., Graham, D., **Luger, R.**, & Quinn, T., 2018, On the Lack of Circumbinary Planets Orbiting Isolated Binary Stars, ApJ, **858**, 86

10 Tian, F., Güdel, M., Johnstone, C., Lammer, H., et al. (including **Luger, R.**), 2018, Water Loss From Young Planets, Space Science Reviews, **214**, 65

100 Meadows, V., Arney, G., Schwieterman, E., Lustig-Yaeger, J., et al. (including **Luger, R.**), 2018, The Habitability of Proxima Centauri B: Environmental States and Observational Discriminants, Astrobiology, **18**, 133

22 **Luger, R.**, Lustig-Yaeger, J., & Agol, E., 2017, Planet-Planet Occultations in TRAPPIST-1 and Other Exoplanet Systems, ApJ, **851**, 94

11 **Luger, R.**, Foreman-Mackey, D., & Hogg, D., 2017, Linear Models for Systematics and Nuisances, Research Notes of the American Astronomical Society, **1**, 7

188 **Luger, R.**, Sestovic, M., Kruse, E., Grimm, S., et al., 2017, A Seven-Planet Resonant Chain in TRAPPIST-1, Nature Astronomy, **1**, 129

25 **Luger, R.**, Lustig-Yaeger, J., Fleming, D., Tilley, M., et al., 2017, The Pale Green Dot: A Method to Characterize Proxima Centauri B Using Exo-Aurorae, ApJ, **837**, 63

175 **Luger, R.**, Agol, E., Kruse, E., Barnes, R., et al., 2016, EVEREST: Pixel Level Decorrelation of K2 Light Curves, AJ, **152**, 100

51 Barnes, R., Deitrick, R., **Luger, R.**, Driscoll, P., et al., 2016, The Habitability of Proxima Centauri B I: Evolutionary Scenarios, arXiv e-prints

64 Schwieterman, E., Meadows, V., Domagal-Goldman, S., Deming, D., et al. (including **Luger, R.**), 2016, Identifying Planetary Biosignature Impostors: Spectral Features of CO and O_4 Resulting From Abiotic O_2/O_3 Production, ApJ, **819**

254 **Luger, R.**, & Barnes, R., 2015, Extreme Water Loss and Abiotic O_2 Buildup on Planets Throughout the Habitable Zones of M Dwarfs, Astrobiology, **15**, 119

79 **Luger, R.**, Barnes, R., Lopez, E., Fortney, J., et al., 2015, Habitable Evaporated Cores: Transforming Mini-Neptunes Into Super-Earths in the Habitable Zones of M Dwarfs, Astrobiology, **15**, 57

14 Deitrick, R., Barnes, R., McArthur, B., Quinn, T., et al. (including **Luger, R.**), 2015, The Three-Dimensional Architecture of the υ Andromedae Planetary System, ApJ, **798**, 46

selected talks

Signal or Noise: My love-hate relationship with stellar variability, University of Michigan Astronomy Department Colloquium, Ann Arbor, MI, September 23, 2021

Linear Models for TESS Systematics, TESS Science Conference II, Online, August 05, 2021

A Bunch of Random Things I'm Working On (don't worry, they're all related to spherical harmonics), Center for Computational Astrophysics Lunch Talk, New York, NY, April 29, 2021

Gaussian Processes for Stellar Variability, University of New South Wales AstroSeminar, Sydney, Australia, February 03, 2021

Gaussian Processes for Stellar Variability, Center for Computational Astrophysics Lunch Talk, New York, NY, November 05, 2020

Toward Maps of Exoplanet Surfaces, University of British Columbia Astronomy Seminar, Vancouver, Canada, April 12, 2020

Toward Maps of Exoplanet Surfaces, American Museum of Natural History Astronomy Colloquium, New York, NY, March 10, 2020

Lots of Fun With TRAPPIST-1, Stanford KIPAC Tea, Stanford, CA, February 07, 2020

Toward Maps of Exoplanet Surfaces, Stanford Astrophysics Colloquium, Stanford, CA, February 06, 2020

Toward Maps of Exoplanet Surfaces, Oxford Physics Department Seminar, Oxford, UK, January 15, 2020

Toward Maps of Exoplanet Surfaces, Yale University Exoplanet Journal Club, New Haven, CT, October 08, 2019

Toward Maps of Exoplanet Surfaces, Villanova University Astronomy Department Colloquium, Villanova, PA, September 20, 2019

Regularization and Ridge Regression, LSSTC Data Science Fellowship Program, New York, NY,

September 12, 2019

- An Introduction to Gaussian Process Regression, LSSTC Data Science Fellowship Program, Pittsburgh, PA, June 08, 2019
- Gradient-based Inference Techniques for Exoplanet Light Curves, Kepler Science Conference V, Glendale, CA, March 05, 2019
- STARRY: Analytic Occultation and Rotation Light Curves, TESS Data Workshop, Baltimore, MD, February 11, 2019
- Probing the TRAPPIST-1 System with K2, JWST, and Beyond, AAS Meeting 231, **410.02**, National Harbor, MD, January 2018
- Probing the TRAPPIST-1 System with Planet-Planet Occultations, Stars & Planets Seminar, Center for Astrophysics, Cambridge, MA, October 30, 2017
- Probing the TRAPPIST-1 System with Planet-Planet Occultations, Dept. Colloquium, Penn State University, State College, PA, September 11, 2017
- On the Evolution, Detection, and Characterization of Small Planets in the Habitable Zones of Low Mass Stars, Dissertation Talk, Seattle, WA, August 11, 2017
- EVEREST Tutorial and Workshop, Kepler Science Conference IV, Mountain View, CA, June 21, 2017
- TRAPPIST-1: A Seven-Planet Resonant Chain Unveiled by K2, Kepler Science Conference IV, Mountain View, CA, June 21, 2017
- Evolution of the Water Content of Proxima Centauri b, Astrobiology Science Conference, **3534**, Mesa, AZ, April 28, 2017
- Habitable Zone Planets with K2, Astrobiology Science Conference, **3338**, Mesa, AZ, April 26, 2017
- Extreme Water Loss and Abiotic O_2 Buildup on Planets Throughout the Habitable Zones of M Dwarfs, AAS Meeting 225, **407.04**, Seattle, WA, January 2015
- Habitable Evaporated Cores: Converting Mini-Neptunes into Super-Earths in the Habitable Zone of M Dwarfs, AAS Meeting 223, **325.05**, National Harbor, MD, January 2014