

Daniel Foreman-Mackey

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Member of Technical Staff, Anthropic, New York, NY

Education

PhD 2015, Department of Physics, New York University. Advisor: Hogg
MSc 2010, Department of Physics, Queen's University, Canada. Advisor: Widrow
BSc 2008, Department of Physics, McGill University, Canada.

Positions

Member of Technical Staff, Anthropic, 2025–present.
Research Engineer, Google DeepMind, 2024–2025.
Research Scientist, Flatiron Institute, 2022–2024.
Associate Research Scientist, Flatiron Institute, 2017–2022.
Sagan Postdoctoral Fellow, University of Washington, 2015–2017.

Popular open-source software

jax — 34919 stars / 3432 forks

Composable transformations of Python+NumPy programs: differentiate, vectorize, JIT to GPU/TPU, and more [\[docs\]](#)

tinygp — 333 stars / 32 forks

The tiniest of Gaussian Process libraries [\[docs\]](#)

emcee — 1567 stars / 440 forks

The Python ensemble sampling toolkit for affine-invariant MCMC [\[docs\]](#)

corner.py — 559 stars / 235 forks

Make some beautiful corner plots [\[docs\]](#)

exoplanet — 233 stars / 56 forks

Fast & scalable MCMC for all your exoplanet needs! [\[docs\]](#)

daft — 684 stars / 120 forks

Render probabilistic graphical models using matplotlib [\[docs\]](#)

Publications

refereed: 111 / first author: 9 / citations: 29,883 / h-index: 53 (2026-02-22)

Refereed publications

- ¹¹¹ Hapitas, Timothy; Widrow, Lawrence M.; Dharmawardena, Thavisha E.; & **Foreman-Mackey, Daniel**, 2025, *Gaussian Process Methods for Very Large Astrometric Data Sets*, The Astrophysical Journal, **995**, 35 ([arXiv:2507.10317](#))
- ¹¹⁰ Chance, Quadry; **Foreman-Mackey, Daniel**; Ballard, Sarah; Casey, Andrew R.; et al., 2025, *paired: A Statistical Framework for Detecting Stellar Binarity with Gaia RVs. I. Sensitivity to Unresolved Binaries*, The Astrophysical Journal, **992**, 131 ([arXiv:2206.11275](#)) [11 citations]
- ¹⁰⁹ Hattori, Soichiro; Angus, Ruth; **Foreman-Mackey, Daniel**; Lu, Yuxi (Lucy); & Colman, Isabel, 2025, *Measuring Long Stellar Rotation Periods (>10 days) from TESS FFI Light Curves is*

- Possible: An Investigation Using TESS and ZTF*, The Astronomical Journal, **170**, 15 (arXiv:2505.10376) [7 citations]
- 108 Evans-Soma, Thomas M.; Sing, David K.; Barstow, Joanna K.; Piette, Anjali A. A.; *et al.* (incl. **DFM**), 2025, *SiO and a super-stellar C/O ratio in the atmosphere of the giant exoplanet WASP-121 b*, Nature Astronomy, **9**, 845 (arXiv:2506.01771) [12 citations]
- 107 Sayeed, Maryum; Angus, Ruth; Berger, Travis A.; Lu, Yuxi(Lucy); *et al.* (incl. **DFM**), 2025, *Exoplanet Occurrence Rate with Age for FGK Stars in Kepler*, The Astronomical Journal, **169**, 112 (arXiv:2501.13809) [4 citations]
- 106 Garrison, Lehman H.; **Foreman-Mackey, Daniel**; Shih, Yu-hsuan; & Barnett, Alex, 2024, *NIFTY-LS: Fast and Accurate Lomb-Scargle Periodograms Using a Non-uniform FFT*, Research Notes of the American Astronomical Society, **8**, 250 (arXiv:2409.08090) [5 citations]
- 105 Edwards, Thomas D. P.; Wong, Kaze W. K.; Lam, Kelvin K. H.; Coogan, Adam; *et al.* (incl. **DFM**), 2024, *Differentiable and hardware-accelerated waveforms for gravitational wave data analysis*, Physical Review D, **110**, 64028 (arXiv:2302.05329) [39 citations]
- 104 Dharmawardena, T. E.; Bailer-Jones, C. A. L.; Fouesneau, M.; **Foreman-Mackey, Daniel**; *et al.*, 2024, *All-sky three-dimensional dust density and extinction Maps of the Milky Way out to 2.8 kpc*, Monthly Notices of the Royal Astronomical Society, **532**, 3480 (arXiv:2406.06740) [21 citations]
- 103 Garcia, Lionel J.; **Foreman-Mackey, Daniel**; Murray, Catriona A.; Aigrain, Suzanne; *et al.*, 2024, *nuance: Efficient Detection of Planets Transiting Active Stars*, The Astronomical Journal, **167**, 284 (arXiv:2402.06835) [5 citations]
- 102 Fortune, Mark; Gibson, Neale P.; **Foreman-Mackey, Daniel**; Evans-Soma, Thomas M.; *et al.*, 2024, *How do wavelength correlations affect transmission spectra? Application of a new fast and flexible 2D Gaussian process framework to transiting exoplanet spectroscopy*, Astronomy and Astrophysics, **686** (arXiv:2402.15204) [6 citations]
- 101 Lu, Yuxi(Lucy); Angus, Ruth; **Foreman-Mackey, Daniel**; & Hattori, Soichiro, 2024, *In This Day and Age: An Empirical Gyrochronology Relation for Partially and Fully Convective Single Field Stars*, The Astronomical Journal, **167**, 159 (arXiv:2310.14990) [31 citations]
- 100 Yahalom, Daniel A.; Angus, Ruth; Spergel, David N.; & **Foreman-Mackey, Daniel**, 2023, *Detecting Solar System Analogs through Joint Radial Velocity/Astrometric Surveys*, The Astronomical Journal, **166**, 258 (arXiv:2302.05064) [8 citations]
- 99 Dong, Jiayin; & **Foreman-Mackey, Daniel**, 2023, *A Hierarchical Bayesian Framework for Inferring the Stellar Obliquity Distribution*, The Astronomical Journal, **166**, 112 (arXiv:2305.14220) [44 citations]
- 98 Gagliano, Alexander; Contardo, Gabriella; **Foreman-Mackey, Daniel**; Malz, Alex I.; & Aleo, Patrick D., 2023, *First Impressions: Early-time Classification of Supernovae Using Host-galaxy Information and Shallow Learning*, The Astrophysical Journal, **954**, 6 (arXiv:2305.08894) [35 citations]
- 97 Aigrain, Suzanne; & **Foreman-Mackey, Daniel**, 2023, *Gaussian Process Regression for Astronomical Time Series*, Annual Review of Astronomy and Astrophysics, **61**, 329 (arXiv:2209.08940) [137 citations]
- 96 Blunt, Sarah; Carvalho, Adolfo; David, Trevor J.; Beichman, Charles; *et al.* (incl. **DFM**), 2023, *Overfitting Affects the Reliability of Radial Velocity Mass Estimates of the V1298 Tau Planets*, The Astronomical Journal, **166**, 62 (arXiv:2306.08145) [46 citations]

- ⁹⁵ Tran, Quang H.; Bedell, Megan; **Foreman-Mackey, Daniel**; & Luger, Rodrigo, 2023, *Joint Modeling of Radial Velocities and Photometry with a Gaussian Process Framework*, The Astrophysical Journal, **950**, 162 (arXiv:2305.00988) [14 citations]
- ⁹⁴ Wong, Kaze W. K.; Gabrié, Marylou; & **Foreman-Mackey, Daniel**, 2023, *flowMC: Normalizing flow enhanced sampling package for probabilistic inference in JAX*, The Journal of Open Source Software, **8**, 5021 (arXiv:2211.06397) [42 citations]
- ⁹³ Alderson, Lili; Wakeford, Hannah R.; Alam, Munazza K.; Batalha, Natasha E.; et al. (incl. **DFM**), 2023, *Early Release Science of the exoplanet WASP-39b with JWST NIRSpec G395H*, Nature, **614**, 664 (arXiv:2211.10488) [255 citations]
- ⁹² Mikal-Evans, Thomas; Sing, David K.; Dong, Jiayin; **Foreman-Mackey, Daniel**; et al., 2023, *A JWST NIRSpec Phase Curve for WASP-121b: Dayside Emission Strongest Eastward of the Substellar Point and Nightside Conditions Conducive to Cloud Formation*, The Astrophysical Journal, **943** (arXiv:2301.03209) [41 citations]
- ⁹¹ Dharmawardena, T. E.; Bailer-Jones, C. A. L.; Fouesneau, M.; **Foreman-Mackey, Daniel**; et al., 2023, *The three-dimensional structure of galactic molecular cloud complexes out to 2.5 kpc*, Monthly Notices of the Royal Astronomical Society, **519**, 228 (arXiv:2210.03615) [17 citations]
- ⁹⁰ Jo, Yongseok; Genel, Shy; Wandelt, Benjamin; Somerville, Rachel S.; et al. (incl. **DFM**), 2023, *Calibrating Cosmological Simulations with Implicit Likelihood Inference Using Galaxy Growth Observables*, The Astrophysical Journal, **944**, 67 (arXiv:2211.16461) [19 citations]
- ⁸⁹ Brande, Jonathan; Crossfield, Ian J. M.; Kreidberg, Laura; Oklopčić, Antonija; et al. (incl. **DFM**), 2022, *A Mirage or an Oasis? Water Vapor in the Atmosphere of the Warm Neptune TOI-674 b*, The Astronomical Journal, **164**, 197 (arXiv:2201.04197) [19 citations]
- ⁸⁸ Nagaraj, Gautam; Forbes, John C.; Leja, Joel; **Foreman-Mackey, Daniel**; & Hayward, Christopher C., 2022, *Empirical Dust Attenuation Model Leads to More Realistic UVJ Diagram for TNG100 Galaxies*, The Astrophysical Journal, **939**, 29 (arXiv:2204.06449) [7 citations]
- ⁸⁷ Eilers, Anna-Christina; Hogg, David W.; Schölkopf, Bernhard; **Foreman-Mackey, Daniel**; et al., 2022, *A Generative Model for Quasar Spectra*, The Astrophysical Journal, **938**, 17 (arXiv:2209.02725) [9 citations]
- ⁸⁶ Farrell, Eoin; Jermyn, Adam S.; Cantiello, Matteo; & **Foreman-Mackey, Daniel**, 2022, *The Initial Magnetic Field Distribution in AB Stars*, The Astrophysical Journal, **938**, 10 (arXiv:2210.11180) [5 citations]
- ⁸⁵ Astropy Collaboration; Price-Whelan, Adrian M.; Lim, Pey Lian; Earl, Nicholas; et al. (incl. **DFM**), 2022, *The Astropy Project: Sustaining and Growing a Community-oriented Open-source Project and the Latest Major Release (v5.0) of the Core Package*, The Astrophysical Journal, **935**, 167 (arXiv:2206.14220) [4628 citations]
- ⁸⁴ Luger, Rodrigo; Agol, Eric; Bartolić, Fran; & **Foreman-Mackey, Daniel**, 2022, *Analytic Light Curves in Reflected Light: Phase Curves, Occultations, and Non-Lambertian Scattering for Spherical Planets and Moons*, The Astronomical Journal, **164**, 4 (arXiv:2103.06275) [14 citations]
- ⁸³ Angus, Ruth; Price-Whelan, Adrian M.; Zinn, Joel C.; Bedell, Megan; et al. (incl. **DFM**), 2022, *The 3D Galactocentric Velocities of Kepler Stars: Marginalizing Over Missing Radial Velocities*, The Astronomical Journal, **164**, 25 (arXiv:2205.08901) [4 citations]

- 82 Hattori, Soichiro; **Foreman-Mackey, Daniel**; Hogg, David W.; Montet, Benjamin T.; *et al.*, 2022, *The unpopular Package: A Data-driven Approach to Detrending TESS Full-frame Image Light Curves*, The Astronomical Journal, **163**, 284 (arXiv:2106.15063) [54 citations]
- 81 Powell, Brian P.; Kruse, Ethan; Montet, Benjamin T.; Feinstein, Adina D.; *et al.* (incl. **DFM**), 2022, *The NASA GSFC TESS Full Frame Image Light Curve Data Set*, Research Notes of the American Astronomical Society, **6**, 111 [25 citations]
- 80 Johnson, Marshall C.; David, Trevor J.; Petigura, Erik A.; Isaacson, Howard T.; *et al.* (incl. **DFM**), 2022, *An Aligned Orbit for the Young Planet V1298 Tau b*, The Astronomical Journal, **163**, 247 (arXiv:2110.10707) [34 citations]
- 79 Nagaraj, Gautam; Forbes, John C.; Leja, Joel; **Foreman-Mackey, Daniel**; & Hayward, Christopher C., 2022, *A Bayesian Population Model for the Observed Dust Attenuation in Galaxies*, The Astrophysical Journal, **932**, 54 (arXiv:2202.05102) [35 citations]
- 78 Hitchcock, J. A.; Bramich, D. M.; **Foreman-Mackey, Daniel**; Hogg, David W.; & Hundertmark, M., 2022, *The Thresher: Lucky imaging without the waste*, Monthly Notices of the Royal Astronomical Society, **511**, 5372 (arXiv:2202.04686)
- 77 Bartolić, Fran; Luger, Rodrigo; **Foreman-Mackey, Daniel**; Howell, Robert R.; & Rathbun, Julie A., 2022, *Occultation Mapping of Io's Surface in the Near-infrared. I. Inferring Static Maps*, The Planetary Science Journal, **3**, 67 (arXiv:2103.03758) [5 citations]
- 76 Dharmawardena, T. E.; Bailer-Jones, C. A. L.; Fouesneau, M.; & **Foreman-Mackey, Daniel**, 2022, *Three-dimensional dust density structure of the Orion, Cygnus X, Taurus, and Perseus star-forming regions*, Astronomy and Astrophysics, **658** (arXiv:2111.06672) [27 citations]
- 75 Feinstein, Adina D.; David, Trevor J.; Montet, Benjamin T.; **Foreman-Mackey, Daniel**; *et al.*, 2022, *V1298 Tau with TESS: Updated Ephemerides, Radii, and Period Constraints from a Second Transit of V1298 Tau e*, The Astrophysical Journal, **925** (arXiv:2111.08660) [25 citations]
- 74 Martin, David V.; El-Badry, Kareem; Hodžić, Vedad Kunovac; Triaud, Amaury H. M. J.; *et al.* (incl. **DFM**), 2021, *TOI-1259Ab - a gas giant planet with 2.7 per cent deep transits and a bound white dwarf companion*, Monthly Notices of the Royal Astronomical Society, **507**, 4132 (arXiv:2101.02707) [19 citations]
- 73 Van Eylen, V.; Astudillo-Defru, N.; Bonfils, X.; Livingston, J.; *et al.* (incl. **DFM**), 2021, *Masses and compositions of three small planets orbiting the nearby M dwarf L231-32 (TOI-270) and the M dwarf radius valley*, Monthly Notices of the Royal Astronomical Society, **507**, 2154 (arXiv:2101.01593) [131 citations]
- 72 Gan, Tianjun; Bedell, Megan; Wang, Sharon Xuesong; **Foreman-Mackey, Daniel**; *et al.*, 2021, *HD 183579b: a warm sub-Neptune transiting a solar twin detected by TESS*, Monthly Notices of the Royal Astronomical Society, **507**, 2220 (arXiv:2107.14015) [7 citations]
- 71 Luger, Rodrigo; **Foreman-Mackey, Daniel**; & Hedges, Christina, 2021, *Mapping Stellar Surfaces. II. An Interpretable Gaussian Process Model for Light Curves*, The Astronomical Journal, **162**, 124 (arXiv:2102.01697) [41 citations]
- 70 Luger, Rodrigo; **Foreman-Mackey, Daniel**; Hedges, Christina; & Hogg, David W., 2021, *Mapping Stellar Surfaces. I. Degeneracies in the Rotational Light-curve Problem*, The Astronomical Journal, **162**, 123 (arXiv:2102.00007) [57 citations]
- 69 Dong, Jiayin; Huang, Chelsea X.; Dawson, Rebekah I.; **Foreman-Mackey, Daniel**; *et al.*, 2021, *Warm Jupiters in TESS Full-frame Images: A Catalog and Observed Eccentricity*

- Distribution for Year 1*, The Astrophysical Journal Supplement Series, **255**, 6 (arXiv:2104.01970) [35 citations]
- 68 Luger, Rodrigo; **Foreman-Mackey, Daniel**; & Hedges, Christina, 2021, *starry_process: Interpretable Gaussian processes for stellar light curves*, The Journal of Open Source Software, **6**, 3071 (arXiv:2102.01774) [5 citations]
- 67 Hitchcock, James A.; Hundertmark, Markus; **Foreman-Mackey, Daniel**; Bachelet, Etienne; et al., 2021, *PyTorchDIA: a flexible, GPU-accelerated numerical approach to Difference Image Analysis*, Monthly Notices of the Royal Astronomical Society, **504**, 3561 (arXiv:2104.13715) [7 citations]
- 66 **Foreman-Mackey, Daniel**; Luger, Rodrigo; Agol, Eric; Barclay, Thomas; et al., 2021, *exoplanet: Gradient-based probabilistic inference for exoplanet data & other astronomical time series*, The Journal of Open Source Software, **6**, 3285 (arXiv:2105.01994) [218 citations]
- 65 David, Trevor J.; Contardo, Gabriella; Sandoval, Angel; Angus, Ruth; et al. (incl. **DFM**), 2021, *Evolution of the Exoplanet Size Distribution: Forming Large Super-Earths Over Billions of Years*, The Astronomical Journal, **161**, 265 (arXiv:2011.09894) [54 citations]
- 64 Gordon, Tyler A.; Davenport, James R. A.; Angus, Ruth; **Foreman-Mackey, Daniel**; et al., 2021, *Stellar Rotation in the K2 Sample: Evidence for Modified Spin-down*, The Astrophysical Journal, **913**, 70 (arXiv:2101.07886) [53 citations]
- 63 Tamayo, Daniel; Gilbertson, Christian; & **Foreman-Mackey, Daniel**, 2021, *Stability constrained characterization of multiplanet systems*, Monthly Notices of the Royal Astronomical Society, **501**, 4798 (arXiv:2009.11831) [14 citations]
- 62 Agol, Eric; Dorn, Caroline; Grimm, Simon L.; Turbet, Martin; et al. (incl. **DFM**), 2021, *Refining the Transit-timing and Photometric Analysis of TRAPPIST-1: Masses, Radii, Densities, Dynamics, and Ephemerides*, The Planetary Science Journal, **2**, 1 (arXiv:2010.01074) [326 citations]
- 61 Hedges, Christina; Luger, Rodrigo; Dotson, Jessie; **Foreman-Mackey, Daniel**; & Barentsen, Geert, 2021, *Multiwavelength Photometry Derived from Monochromatic Kepler Data*, The Astronomical Journal, **161**, 95 (arXiv:2102.00044) [7 citations]
- 60 Gordon, Tyler A.; Agol, Eric; & **Foreman-Mackey, Daniel**, 2020, *A Fast, Two-dimensional Gaussian Process Method Based on Celerite: Applications to Transiting Exoplanet Discovery and Characterization*, The Astronomical Journal, **160**, 240 (arXiv:2007.05799) [27 citations]
- 59 Villaume, Alexa; **Foreman-Mackey, Daniel**; Romanowsky, Aaron J.; Brodie, Jean; & Strader, Jay, 2020, *The Assembly History of M87 through Radial Variations in Chemical Abundances of Its Field Star and Globular Cluster Populations*, The Astrophysical Journal, **900**, 95 (arXiv:2006.16280) [10 citations]
- 58 Angus, Ruth; Beane, Angus; Price-Whelan, Adrian M.; Newton, Elisabeth; et al. (incl. **DFM**), 2020, *Exploring the Evolution of Stellar Rotation Using Galactic Kinematics*, The Astronomical Journal, **160**, 90 (arXiv:2005.09387) [50 citations]
- 57 Plavchan, Peter; Barclay, Thomas; Gagné, Jonathan; Gao, Peter; et al. (incl. **DFM**), 2020, *Publisher Correction: A planet within the debris disk around the pre-main-sequence star AU Microscopii*, Nature, **583** [2 citations]
- 56 Hey, Daniel; Murphy, Simon; **Foreman-Mackey, Daniel**; Bedding, Timothy; et al., 2020, *Maelstrom: A Python package for identifying companions to pulsating stars from their light travel time variations*, The Journal of Open Source Software, **5**, 2125 [6 citations]

- 55 Plavchan, Peter; Barclay, Thomas; Gagné, Jonathan; Gao, Peter; *et al.* (incl. **DFM**), 2020, *A planet within the debris disk around the pre-main-sequence star AU Microscopii*, *Nature*, **582**, 497 (arXiv:2006.13248) [224 citations]
- 54 Hey, Daniel R.; Murphy, Simon J.; **Foreman-Mackey, Daniel**; Bedding, Timothy R.; *et al.*, 2020, *Forward Modeling the Orbits of Companions to Pulsating Stars from Their Light Travel Time Variations*, *The Astronomical Journal*, **159**, 202 (arXiv:2003.02379) [21 citations]
- 53 Agol, Eric; Luger, Rodrigo; & **Foreman-Mackey, Daniel**, 2020, *Analytic Planetary Transit Light Curves and Derivatives for Stars with Polynomial Limb Darkening*, *The Astronomical Journal*, **159**, 123 (arXiv:1908.03222) [156 citations]
- 52 Gillen, Edward; Briegal, Joshua T.; Hodgkin, Simon T.; **Foreman-Mackey, Daniel**; *et al.*, 2020, *NGTS clusters survey - I. Rotation in the young benchmark open cluster Blanco 1*, *Monthly Notices of the Royal Astronomical Society*, **492**, 1008 (arXiv:1911.09705) [52 citations]
- 51 **Foreman-Mackey, Daniel**; Farr, Will; Sinha, Manodeep; Archibald, Anne; *et al.*, 2019, *emcee v3: A Python ensemble sampling toolkit for affine-invariant MCMC*, *The Journal of Open Source Software*, **4**, 1864 (arXiv:1911.07688) [272 citations]
- 50 David, Trevor J.; Petigura, Erik A.; Luger, Rodrigo; **Foreman-Mackey, Daniel**; *et al.*, 2019, *Four Newborn Planets Transiting the Young Solar Analog V1298 Tau*, *The Astrophysical Journal*, **885** (arXiv:1910.04563) [149 citations]
- 49 Angus, Ruth; Morton, Timothy D.; **Foreman-Mackey, Daniel**; van Saders, Jennifer; *et al.*, 2019, *Toward Precise Stellar Ages: Combining Isochrone Fitting with Empirical Gyrochronology*, *The Astronomical Journal*, **158**, 173 (arXiv:1908.07528) [123 citations]
- 48 Bedell, Megan; Hogg, David W.; **Foreman-Mackey, Daniel**; Montet, Benjamin T.; & Luger, Rodrigo, 2019, *Wobble: A Data-driven Analysis Technique for Time-series Stellar Spectra*, *The Astronomical Journal*, **158**, 164 (arXiv:1901.00503) [55 citations]
- 47 Feinstein, Adina D.; Montet, Benjamin T.; **Foreman-Mackey, Daniel**; Bedell, Megan E.; *et al.*, 2019, *eleanor: An Open-source Tool for Extracting Light Curves from the TESS Full-frame Images*, *Publications of the Astronomical Society of the Pacific*, **131**, 94502 (arXiv:1903.09152) [251 citations]
- 46 Kruse, Ethan; Agol, Eric; Luger, Rodrigo; & **Foreman-Mackey, Daniel**, 2019, *Detection of Hundreds of New Planet Candidates and Eclipsing Binaries in K2 Campaigns 0-8*, *The Astrophysical Journal Supplement Series*, **244**, 11 (arXiv:1907.10806) [70 citations]
- 45 Angus, Ruth; Morton, Timothy; & **Foreman-Mackey, Daniel**, 2019, *stardate: Combining dating methods for better stellar ages*, *The Journal of Open Source Software*, **4**, 1469 [17 citations]
- 44 Kostov, Veselin B.; Schlieder, Joshua E.; Barclay, Thomas; Quintana, Elisa V.; *et al.* (incl. **DFM**), 2019, *The L 98-59 System: Three Transiting, Terrestrial-size Planets Orbiting a Nearby M Dwarf*, *The Astronomical Journal*, **158**, 32 (arXiv:1903.08017) [119 citations]
- 43 Siemiginowska, Aneta; Eadie, Gwendolyn; Czekala, Ian; Feigelson, Eric; *et al.* (incl. **DFM**), 2019, *The Next Decade of Astroinformatics and Astrostatistics*, *Bulletin of the American Astronomical Society*, **51**, 355 (arXiv:1903.06796) [11 citations]
- 42 Luger, Rodrigo; Agol, Eric; **Foreman-Mackey, Daniel**; Fleming, David P.; *et al.*, 2019, *starry: Analytic Occultation Light Curves*, *The Astronomical Journal*, **157**, 64 (arXiv:1810.06559) [307 citations]

- 41 Van Eylen, Vincent; Albrecht, Simon; Huang, Xu; MacDonald, Mariah G.; *et al.* (incl. **DFM**), 2019, *The Orbital Eccentricity of Small Planet Systems*, The Astronomical Journal, **157**, 61 (arXiv:1807.00549) [230 citations]
- 40 Brewer, John M.; Wang, Songhu; Fischer, Debra A.; & **Foreman-Mackey, Daniel**, 2018, *Compact Multi-planet Systems are more Common around Metal-poor Hosts*, The Astrophysical Journal, **867** (arXiv:1810.10009) [51 citations]
- 39 Ness, Melissa K.; Silva Aguirre, Victor; Lund, Mikkel N.; Cantiello, Matteo; *et al.* (incl. **DFM**), 2018, *Inference of Stellar Parameters from Brightness Variations*, The Astrophysical Journal, **866**, 15 (arXiv:1805.04519) [12 citations]
- 38 Brewer, Brendon; & **Foreman-Mackey, Daniel**, 2018, *DNest4: Diffusive Nested Sampling in C++ and Python*, Journal of Statistical Software, **86**, 1 (arXiv:1606.03757) [64 citations]
- 37 Luger, Rodrigo; Kruse, Ethan; **Foreman-Mackey, Daniel**; Agol, Eric; & Saunders, Nicholas, 2018, *An Update to the EVEREST K2 Pipeline: Short Cadence, Saturated Stars, and Kepler-like Photometry Down to $K_p = 15$* , The Astronomical Journal, **156**, 99 (arXiv:1702.05488) [160 citations]
- 36 Teague, Richard; & **Foreman-Mackey, Daniel**, 2018, *A Robust Method to Measure Centroids of Spectral Lines*, Research Notes of the American Astronomical Society, **2**, 173 (arXiv:1809.10295) [140 citations]
- 35 Teague, Richard; Bae, Jaehan; Bergin, Edwin A.; Birnstiel, Tilman; & **Foreman-Mackey, Daniel**, 2018, *A Kinematical Detection of Two Embedded Jupiter-mass Planets in HD 163296*, The Astrophysical Journal, **860** (arXiv:1805.10290) [301 citations]
- 34 Hogg, David W.; & **Foreman-Mackey, Daniel**, 2018, *Data Analysis Recipes: Using Markov Chain Monte Carlo*, The Astrophysical Journal Supplement Series, **236**, 11 (arXiv:1710.06068) [273 citations]
- 33 Angus, Ruth; Morton, Timothy; Aigrain, Suzanne; **Foreman-Mackey, Daniel**; & Rajpaul, Vinesh, 2018, *Inferring probabilistic stellar rotation periods using Gaussian processes*, Monthly Notices of the Royal Astronomical Society, **474**, 2094 (arXiv:1706.05459) [211 citations]
- 32 **Foreman-Mackey, Daniel**, 2018, *Scalable Backpropagation for Gaussian Processes using Celerite*, Research Notes of the American Astronomical Society, **2**, 31 (arXiv:1801.10156) [226 citations]
- 31 **Foreman-Mackey, Daniel**; Agol, Eric; Ambikasaran, Sivaram; & Angus, Ruth, 2017, *Fast and Scalable Gaussian Process Modeling with Applications to Astronomical Time Series*, The Astronomical Journal, **154**, 220 (arXiv:1703.09710) [856 citations]
- 30 Montet, Benjamin T.; Tovar, Guadalupe; & **Foreman-Mackey, Daniel**, 2017, *Long-term Photometric Variability in Kepler Full-frame Images: Magnetic Cycles of Sun-like Stars*, The Astrophysical Journal, **851**, 116 (arXiv:1705.07928) [93 citations]
- 29 Grunblatt, Samuel K.; Huber, Daniel; Gaidos, Eric; Lopez, Eric D.; *et al.* (incl. **DFM**), 2017, *Seeing Double with K2: Testing Re-inflation with Two Remarkably Similar Planets around Red Giant Branch Stars*, The Astronomical Journal, **154**, 254 (arXiv:1706.05865) [84 citations]
- 28 Luger, Rodrigo; **Foreman-Mackey, Daniel**; & Hogg, David W., 2017, *Linear Models for Systematics and Nuisances*, Research Notes of the American Astronomical Society, **1**, 7 (arXiv:1710.11136) [17 citations]
- 27 Price-Whelan, Adrian M.; & **Foreman-Mackey, Daniel**, 2017, *schwimmbad: A uniform interface to parallel processing pools in Python*, The Journal of Open Source Software, **2**, 357

[40 citations]

- 26 Luger, Rodrigo; Sestovic, Marko; Kruse, Ethan; Grimm, Simon L.; *et al.* (incl. **DFM**), 2017, *A seven-planet resonant chain in TRAPPIST-1*, *Nature Astronomy*, **1**, 129 ([arXiv:1703.04166](#)) [331 citations]
- 25 Price-Whelan, Adrian M.; Hogg, David W.; **Foreman-Mackey, Daniel**; & Rix, Hans-Walter, 2017, *The Joker: A Custom Monte Carlo Sampler for Binary-star and Exoplanet Radial Velocity Data*, *The Astrophysical Journal*, **837**, 20 ([arXiv:1610.07602](#)) [141 citations]
- 24 **Foreman-Mackey, Daniel**; Morton, Timothy D.; Hogg, David W.; Agol, Eric; & Schölkopf, Bernhard, 2016, *The Population of Long-period Transiting Exoplanets*, *The Astronomical Journal*, **152**, 206 ([arXiv:1607.08237](#)) [87 citations]
- 23 Hogg, David W.; Casey, Andrew R.; Ness, Melissa; Rix, Hans-Walter; *et al.* (incl. **DFM**), 2016, *Chemical Tagging Can Work: Identification of Stellar Phase-space Structures Purely by Chemical-abundance Similarity*, *The Astrophysical Journal*, **833**, 262 ([arXiv:1601.05413](#)) [82 citations]
- 22 Henderson, Calen B.; Poleski, Radosław; Penny, Matthew; Street, Rachel A.; *et al.* (incl. **DFM**), 2016, *Campaign 9 of the K2 Mission: Observational Parameters, Scientific Drivers, and Community Involvement for a Simultaneous Space- and Ground-based Microlensing Survey*, *Publications of the Astronomical Society of the Pacific*, **128**, 124401 ([arXiv:1512.09142](#)) [65 citations]
- 21 Luger, Rodrigo; Agol, Eric; Kruse, Ethan; Barnes, Rory; *et al.* (incl. **DFM**), 2016, *EVEREST: Pixel Level Decorrelation of K2 Light Curves*, *The Astronomical Journal*, **152**, 100 ([arXiv:1607.00524](#)) [261 citations]
- 20 Angus, Ruth; Aigrain, Suzanne; & **Foreman-Mackey, Daniel**, 2016, *Stellar rotation period inference with Gaussian processes*, *IAU Focus Meeting*, **29A**, 191
- 19 Wang, Dun; Hogg, David W.; **Foreman-Mackey, Daniel**; & Schölkopf, Bernhard, 2016, *A Causal, Data-driven Approach to Modeling the Kepler Data*, *Publications of the Astronomical Society of the Pacific*, **128**, 94503 ([arXiv:1508.01853](#)) [35 citations]
- 18 Fischer, Debra A.; Anglada-Escude, Guillem; Arriagada, Pamela; Baluev, Roman V.; *et al.* (incl. **DFM**), 2016, *State of the Field: Extreme Precision Radial Velocities*, *Publications of the Astronomical Society of the Pacific*, **128**, 66001 ([arXiv:1602.07939](#)) [302 citations]
- 17 **Foreman-Mackey, Daniel**, 2016, *corner.py: Scatterplot matrices in Python*, *The Journal of Open Source Software*, **1**, 2 [2650 citations]
- 16 Schölkopf, Bernhard; Hogg, David W.; Wang, Dun; **Foreman-Mackey, Daniel**; *et al.*, 2016, *Modeling confounding by half-sibling regression*, *PNAS*, **113**, 27 [89 citations]
- 15 Angus, Ruth; **Foreman-Mackey, Daniel**; & Johnson, John A., 2016, *Systematics-insensitive Periodic Signal Search with K2*, *The Astrophysical Journal*, **818**, 109 ([arXiv:1505.07105](#)) [33 citations]
- 14 Ambikasaran, Sivaram; **Foreman-Mackey, Daniel**; Greengard, Leslie; Hogg, David W.; & O'Neil, Michael, 2016, *Fast Direct Methods for Gaussian Processes*, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, **38**, 252 ([arXiv:1403.6015](#)) [868 citations]
- 13 Montet, Benjamin T.; Morton, Timothy D.; **Foreman-Mackey, Daniel**; Johnson, John Asher; *et al.*, 2015, *Stellar and Planetary Properties of K2 Campaign 1 Candidates and Validation of 17 Planets, Including a Planet Receiving Earth-like Insolation*, *The Astrophysical Journal*, **809**, 25 ([arXiv:1503.07866](#)) [165 citations]

- ¹² Barclay, Thomas; Quintana, Elisa V.; Adams, Fred C.; Ciardi, David R.; *et al.* (incl. **DFM**), 2015, *The Five Planets in the Kepler-296 Binary System All Orbit the Primary: A Statistical and Analytical Analysis*, The Astrophysical Journal, **809**, 7 (arXiv:1505.01845) [39 citations]
- ¹¹ Angus, Ruth; Aigrain, Suzanne; **Foreman-Mackey, Daniel**; & McQuillan, Amy, 2015, *Calibrating gyrochronology using Kepler asteroseismic targets*, Monthly Notices of the Royal Astronomical Society, **450**, 1787 (arXiv:1502.06965) [191 citations]
- ¹⁰ **Foreman-Mackey, Daniel**; Montet, Benjamin T.; Hogg, David W.; Morton, Timothy D.; *et al.*, 2015, *A Systematic Search for Transiting Planets in the K2 Data*, The Astrophysical Journal, **806**, 215 (arXiv:1502.04715) [121 citations]
- ⁹ Weisz, Daniel R.; Johnson, L. Clifton; **Foreman-Mackey, Daniel**; Dolphin, Andrew E.; *et al.*, 2015, *The High-mass Stellar Initial Mass Function in M31 Clusters*, The Astrophysical Journal, **806**, 198 (arXiv:1502.06621) [74 citations]
- ⁸ Schölkopf, Bernhard; Hogg, David W.; Wang, Dun; **Foreman-Mackey, Daniel**; *et al.*, 2015, Removing systematic errors for exoplanet search via latent causes, ICML, **37**, 2218 (arXiv:1505.03036) [12 citations]
- ⁷ Barclay, Thomas; Endl, Michael; Huber, Daniel; **Foreman-Mackey, Daniel**; *et al.*, 2015, *Radial Velocity Observations and Light Curve Noise Modeling Confirm that Kepler-91b is a Giant Planet Orbiting a Giant Star*, The Astrophysical Journal, **800**, 46 (arXiv:1408.3149) [76 citations]
- ⁶ **Foreman-Mackey, Daniel**; Hogg, David W.; & Morton, Timothy D., 2014, *Exoplanet Population Inference and the Abundance of Earth Analogs from Noisy, Incomplete Catalogs*, The Astrophysical Journal, **795**, 64 (arXiv:1406.3020) [261 citations]
- ⁵ Dawson, Rebekah I.; Johnson, John Asher; Fabrycky, Daniel C.; **Foreman-Mackey, Daniel**; *et al.*, 2014, *Large Eccentricity, Low Mutual Inclination: The Three-dimensional Architecture of a Hierarchical System of Giant Planets*, The Astrophysical Journal, **791**, 89 (arXiv:1405.5229) [79 citations]
- ⁴ Dorman, Claire E.; Widrow, Lawrence M.; Guhathakurta, Puragra; Seth, Anil C.; *et al.* (incl. **DFM**), 2013, *A New Approach to Detailed Structural Decomposition from the SPLASH and PHAT Surveys: Kicked-up Disk Stars in the Andromeda Galaxy?*, The Astrophysical Journal, **779**, 103 (arXiv:1310.4179) [56 citations]
- ³ Brewer, Brendon J.; **Foreman-Mackey, Daniel**; & Hogg, David W., 2013, *Probabilistic Catalogs for Crowded Stellar Fields*, The Astronomical Journal, **146**, 7 (arXiv:1211.5805) [45 citations]
- ² **Foreman-Mackey, Daniel**; Hogg, David W.; Lang, Dustin; & Goodman, Jonathan, 2013, *emcee: The MCMC Hammer*, Publications of the Astronomical Society of the Pacific, **125**, 306 (arXiv:1202.3665) [12217 citations]
- ¹ Weisz, Daniel R.; Fouesneau, Morgan; Hogg, David W.; Rix, Hans-Walter; *et al.* (incl. **DFM**), 2013, *The Panchromatic Hubble Andromeda Treasury. IV. A Probabilistic Approach to Inferring the High-mass Stellar Initial Mass Function and Other Power-law Functions*, The Astrophysical Journal, **762**, 123 (arXiv:1211.6105) [35 citations]

Preprints & white papers

- ⁹ Hey, Daniel; Huber, Daniel; Ong, Joel; Stello, Dennis; & **Foreman-Mackey, Daniel**, 2024, *Precise Time-Domain Asteroseismology and a Revised Target List for TESS Solar-Like*

Oscillators, ArXiv ([arXiv:2403.02489](#)) [13 citations]

- 8 Cabezas, Alberto; Corenflos, Adrien; Lao, Junpeng; Louf, Rémi; *et al.* (incl. **DFM**), 2024, *BlackJAX: Composable Bayesian inference in JAX*, ArXiv ([arXiv:2402.10797](#)) [50 citations]
- 7 Blanton, Michael R.; Evans, Janet D.; Norman, Dara; O'Mullane, William; *et al.* (incl. **DFM**), 2023, *The Future of Astronomical Data Infrastructure: Meeting Report*, ArXiv ([arXiv:2311.04272](#))
- 6 Eadie, Gwendolyn M.; Speagle, Joshua S.; Cisewski-Kehe, Jessi; **Foreman-Mackey, Daniel**; *et al.*, 2023, *Practical Guidance for Bayesian Inference in Astronomy*, ArXiv ([arXiv:2302.04703](#)) [15 citations]
- 5 Luger, Rodrigo; Bedell, Megan; **Foreman-Mackey, Daniel**; Crossfield, Ian J. M.; *et al.*, 2021, *Mapping stellar surfaces III: An Efficient, Scalable, and Open-Source Doppler Imaging Model*, ArXiv ([arXiv:2110.06271](#)) [62 citations]
- 4 Wang, Dun; Hogg, David W.; **Foreman-Mackey, Daniel**; & Schölkopf, Bernhard, 2017, *A pixel-level model for event discovery in time-domain imaging*, ArXiv ([arXiv:1710.02428](#)) [13 citations]
- 3 Barnes, Rory; Deitrick, Russell; Luger, Rodrigo; Driscoll, Peter E.; *et al.* (incl. **DFM**), 2016, *The Habitability of Proxima Centauri b I: Evolutionary Scenarios*, ArXiv ([arXiv:1608.06919](#)) [69 citations]
- 2 Montet, Benjamin T.; Angus, Ruth; Barclay, Tom; Dawson, Rebekah; *et al.* (incl. **DFM**), 2013, *Maximizing Kepler science return per telemetered pixel: Searching the habitable zones of the brightest stars*, ArXiv ([arXiv:1309.0654](#))
- 1 Hogg, David W.; Angus, Ruth; Barclay, Tom; Dawson, Rebekah; *et al.* (incl. **DFM**), 2013, *Maximizing Kepler science return per telemetered pixel: Detailed models of the focal plane in the two-wheel era*, ArXiv ([arXiv:1309.0653](#))

Mentorship

I collaborate with and mentor many students and postdocs, often on a single project. Below is a list of the group members who I have formally mentored as part of the Flatiron Research Fellowship and Pre-doctoral Fellowship at the Center for Computational Astrophysics.

Current postdocs: Thavisha Dharmawardena, Jiayin Dong, Nora Eisner, Lionel Garcia, Joseph Long.

Current students: Quadry Chance, Soichiro Hattori.

Former postdocs: Megan Bedell, Trevor David, Rodrigo Luger.

Former students: Fran Bartolić, Eoin Farrell, Alex Gagliano, Karl Jaehnig, Gautam Nagaraj, Pa Chia Thao, Nhat Quang Hoang Tran.

Selected invited talks & tutorials

Open software for Astrophysics, 2023, Invited Plenary, 241st AAS Meeting, Seattle.

Gaussian Processes for EPRV, 2022, Invited Tutorial, University of Oxford, UK.

Methods for scalable probabilistic inference, 2022, Colloquium, University of Illinois Urbana-Champaign.

2022, Colloquium, UC Berkeley.

- 2022, Colloquium, University of Oxford, UK.
- 2021, Invited Talk, Institute for Pure & Applied Mathematics, UCLA.
- Advanced probabilistic modeling*, 2021, Tutorial, Harley Wood Winter School of Astronomy, Australia.
- Open-source software for probabilistic data analysis in astronomy*, 2021, Seminar, Instituto de Astrofísica, Portugal.
- Gaussian processes & stellar variability*, 2021, Seminar, CARMENES Team Meeting.
- Extending JAX with custom C++ & CUDA*, 2021, Invited Talk, IRIS-HEP Topical Meeting, CERN.
- Open source software for probabilistic data analysis*, 2020, Invited Talk, OzGrav Early Career Researcher Symposium, Australia.
- The why & how of exoplanet, a domain-specific PyMC3 extension*, 2020, Contributed Talk, PyMC Con.
- A modular ecosystem for probabilistic data analysis*, 2019, Invited Talk, Open Digital Infrastructure in Astronomy conference, Kavli Institute for Theoretical Physics.
- Exoplanet population inference, a tutorial*, 2019, Invited Talk, Exostar19 conference, Kavli Institute for Theoretical Physics.
- Astronomy as a testbed for statistical method development*, 2019, Colloquium, Center for Statistics and Machine Learning, Princeton.
- Data-driven discovery in the astronomical time domain*, 2018, Colloquium, Institute for Theory and Computation, Harvard-Smithsonian Center for Astrophysics.
- 2018, Colloquium, University of California, Santa Cruz.
- 2017, Interdisciplinary Colloquium, CIERA, Northwestern University.
- A practical introduction to Gaussian Processes for astronomy*, 2017, Invited Talk, Statistical Challenges in Astrophysics, University of New South Wales, Australia.
- Long-period transiting planets & their population*, 2016, Invited talk, Exoplanets I, Davos.
- 2016, Invited talk, Statistical Challenges of Modern Astrophysics, Carnegie Mellon.
- 2016, Colloquium, Villanova.
- Scalable Gaussian processes & the search for transiting exoplanets*, 2015, Data Science at the LHC, CERN, Geneva.
- Discovery & characterization of transiting exoplanets & their population*, 2015, Colloquium, University of Washington.
- Hierarchical inference for exoplanet population inference*, 2015, IAU Symposium, Honolulu.
- Data-driven models*, 2015, Extreme precision radial velocities, Yale.
- Population inference from noisy & incomplete catalogs*, 2015, Local Group Astrostatistics, University of Michigan.
- Time series analysis, Gaussian Processes, and the search for exo-Earths*, 2014, PyData NYC conference, New York.
- Introduction to Gaussian Processes, probabilistic graphical models, and deep learning*, 2014, Astro Hack Week, University of Washington.
- An astronomer's introduction to Gaussian processes*, 2014, Bayesian Computing for Astronomical Data Analysis (Summer school at Penn State University).

Grants

NSF-CDS&E (PI: Agol) *Development of fast, multi-dimensional Gaussian Processes for Exoplanet discovery and beyond*, \$471,048.00, 2019–2022

NSF-AAG (PI: Agol), *Collaborative Research: Masses and architectures of (potentially habitable) exoplanet systems*, \$491,950, 2016–2018

K2 Guest Observer – Cycle 3 (PI: Penny), *Free-Floating and Bound Planet Mass Measurements with K2: Ground- and Space-Based Photometry, Event Detection and Modeling*, \$84,000, 2016–2017

K2 Guest Observer – Cycle 3 (PI: Hogg), *Ultra-precise photometry in crowded fields: A self-calibration approach*, \$100,000, 2016–2017

XSEDE (PI: Foreman-Mackey), *A systematic search for transiting exoplanets using K2*, 100,000 CPU hours, 2015–2016

Honors

Kavli Fellow, 2015.

Sagan Postdoctoral Fellowship, 2015–2017.

James Arthur Graduate Fellowship, 2014.

Horizon Fellowship in the Natural & Physical Sciences, 2012.

Henry M. MacCracken Fellowship, 2010.

NSERC Undergraduate Summer Research Award, 2007.

Professional service & activities

Associate Editor-in-Chief — Journal of Open Source Software, 2019–2025

Active Referee — AAS Journals, MNRAS, PASP, A&A, Journal of Statistical Software, Journal on Uncertainty Quantification, Journal of Open Source Software

Panelist — NSF, NASA, LSSTC