

# Daniel Foreman-Mackey

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Research Scientist, Center for Computational Astrophysics, Flatiron Institute

## 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

Research Scientist, Flatiron Institute, 2022–present.

Associate Research Scientist, Flatiron Institute, 2017–2022.

Sagan Postdoctoral Fellow, University of Washington, 2015–2017.

## Popular open-source software

**tinygp** — 277 stars / 22 forks

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

**showyourwork** — 533 stars / 43 forks

A workflow for reproducible and open scientific articles [\[docs\]](#)

**emcee** — 1421 stars / 430 forks

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

**corner.py** — 490 stars / 227 forks

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

**exoplanet** — 200 stars / 54 forks

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

**daft** — 670 stars / 119 forks

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

## Publications

refereed: 101 / first author: 9 / citations: 19,404 / h-index: 45 (2024-04-27)

### Refereed publications

- 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](#)) [5 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](#)) [3 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](#)) [9 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) [9 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) [44 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) [14 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) [6 citations]
- 94 Wong, Kaze W. K.; Gabri  , Marylou; & **Foreman-Mackey, Daniel**, 2023, *flowMC: Normalizing flow enhanced sampling package for probabilistic inference in JAX*, The Journal of Open Source Software, **8**, 5021 [4 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) [91 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) [9 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) [7 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) [9 citations]
- 89 Brande, Jonathan; Crossfield, Ian J. M.; Kreidberg, Laura; Oklop    , 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) [10 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) [2 citations]
- 87 Eilers, Anna-Christina; Hogg, David W.; Sch  lkopf, Bernhard; **Foreman-Mackey, Daniel**; *et al.*, 2022, *A Generative Model for Quasar Spectra*, The Astrophysical Journal, **938**, 17 (arXiv:2209.02725) [5 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) [4 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) [1328 citations]
- <sup>84</sup> 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) [2 citations]
- <sup>83</sup> 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) [10 citations]
- <sup>82</sup> 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 [10 citations]
- <sup>81</sup> 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) [29 citations]
- <sup>80</sup> 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) [20 citations]
- <sup>79</sup> 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) [17 citations]
- <sup>78</sup> 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)
- <sup>77</sup> 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) [4 citations]
- <sup>76</sup> 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) [18 citations]
- <sup>75</sup> 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) [15 citations]
- <sup>74</sup> 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) [13 citations]
- <sup>73</sup> 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) [82 citations]
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- 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) [4 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) [136 citations]
- 65 David, Trevor J.; Contardo, Gabriella; Sandoval, Angeli; 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) [39 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) [33 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) [12 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) [207 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) [6 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) [16 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) [9 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) [38 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 [3 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) [159 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) [16 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) [120 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) [39 citations]
- 51 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) [118 citations]
- 50 **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) [179 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) [94 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) [43 citations]
- 47 Feinstein, Adina D.; Montet, Benjamin T.; **Foreman-Mackey, Daniel**; Bedell, Megan E.; *et al.*, 2019, *eleonor: 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) [189 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) [56 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 [12 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](#)) [98 citations]
- 43 Siemiginowska, Aneta; Eadie, Gwendolyn; Czekala, Ian; Feigelson, Eric; *et al.* (incl. **DFM**), 2019, *The Next Decade of Astrominformatics and Astrostatistics*, *Bulletin of the American Astronomical Society*, **51**, 355 ([arXiv:1903.06796](#)) [6 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](#)) [218 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](#)) [168 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](#)) [36 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](#)) [10 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](#)) [42 citations]
- 37 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](#)) [86 citations]
- 36 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](#)) [138 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](#)) [241 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](#)) [177 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](#)) [164 citations]
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- 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](#)) [594 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](#)) [80 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) [68 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) [18 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 [24 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) [272 citations]
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- 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) [71 citations]
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- 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) [28 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) [246 citations]
- 17 **Foreman-Mackey, Daniel**, 2016, *corner.py: Scatterplot matrices in Python*, The Journal of Open Source Software, **1**, 2 [1940 citations]
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- 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) [130 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) [35 citations]
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- 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) [109 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) [59 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) [11 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) [69 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) [234 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) [72 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) [52 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) [39 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) [8749 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) [33 citations]

### Preprints & white papers

- 14 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 Garcia, Lionel; **Foreman-Mackey, Daniel**; Murray, Catriona A.; Aigrain, Suzanne; *et al.*, 2024, *nuance: Efficient detection of planets transiting active stars*, ArXiv (arXiv:2402.06835)
- 12 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*, ArXiv (arXiv:2402.15204)
- 11 Cabezas, Alberto; Corenflos, Adrien; Lao, Junpeng; Louf, Rémi; *et al.* (incl. **DFM**), 2024, *BlackJAX: Composable Bayesian inference in JAX*, ArXiv (arXiv:2402.10797)
- 10 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)
- 9 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) [5 citations]
- 8 Edwards, Thomas D. P.; Wong, Kaze W. K.; Lam, Kelvin K. H.; Coogan, Adam; *et al.* (incl. **DFM**), 2023, *ripple: Differentiable and Hardware-Accelerated Waveforms for Gravitational Wave Data Analysis*, ArXiv (arXiv:2302.05329) [12 citations]
- 7 Wong, Kaze W. K.; Gabrié, Marylou; & **Foreman-Mackey, Daniel**, 2022, *flowMC: Normalizing-flow enhanced sampling package for probabilistic inference in Jax*, ArXiv (arXiv:2211.06397) [7 citations]
- 6 Chance, Quadry; **Foreman-Mackey, Daniel**; Ballard, Sarah; Casey, Andrew; *et al.*, 2022, *paired: A Statistical Framework for Determining Stellar Binarity with Gaia RVs. I. Planet Hosting Binaries*, ArXiv (arXiv:2206.11275) [4 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) [38 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) [11 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) [64 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

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