

# Daniel Foreman-Mackey

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Associate 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

Associate Research Scientist, Flatiron Institute, 2017–present.

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

## Selected invited talks & tutorials

*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.

*Data-driven discovery in the astronomical time domain*, 2018, Colloquium, University of California, Santa Cruz.

*A practical introduction to Gaussian Processes for astronomy*, 2017, Invited Talk, Statistical Challenges in Astrophysics, University of New South Wales, Australia.

*Data-driven discovery in the astronomical time domain*, 2017, Interdisciplinary Colloquium, CIERA, Northwestern University.

*Long-period transiting planets & their population*, 2016, Invited talk, Exoplanets I, Davos.

*Long-period transiting planets & their population*, 2016, Invited talk, Statistical Challenges of Modern Astrophysics, Carnegie Mellon.

*Long-period transiting planets & their population*, 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).

### Popular open-source software

**emcee** — 1159 stars / 400 forks

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

**exoplanet** — 131 stars / 39 forks

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

**corner.py** — 349 stars / 188 forks

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

**celerite2** — 31 stars / 4 forks

Fast & scalable Gaussian Processes in one dimension [\[docs\]](#)

**celerite** — 163 stars / 36 forks

Scalable 1D Gaussian Processes in C++, Python, and Julia [\[docs\]](#)

**daft** — 597 stars / 115 forks

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

### 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

Topic Editor — Journal of Open Source Software

Active Referee — AAS Journals, MNRAS, PASP, Journal of Statistical Software, Journal

## of Open Source Software