

# Daniel Foreman-Mackey

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Center for Cosmology and Particle Physics, Department of Physics, New York University  
Citizenship: Canadian

## Education

PhD 2015 (expected) 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.

## Academic awards

James Arthur Graduate Fellowship (2014)  
Horizon Fellowship in the Natural & Physical Sciences (2012)  
Henry M. MacCracken Fellowship (2010)  
NSERC Undergraduate Summer Research Award (2007)

## Refereed publications

- Barclay, T., Endl, M., Huber, D., **Foreman-Mackey, D.**, *et al*, 2014, *Radial Velocity Observations and Light Curve Noise Modeling Confirm That Kepler-91b is a Giant Planet Orbiting a Giant Star*, ApJ accepted [arXiv:1408.3149](#)
- Foreman-Mackey, D.**, Hogg, D. W., & Morton, T. D., 2014, *Exoplanet population inference and the abundance of Earth analogs from noisy, incomplete catalogs* ApJ, **795**, 64
- Dawson, R. I., Johnson, J. A., Fabrycky, D. C., **Foreman-Mackey, D.**, *et al*, 2014, *Large Eccentricity, Low Mutual Inclination: The Three-dimensional Architecture of a Hierarchical System of Giant Planets* ApJ, **791**, 89
- Dorman, C. E., Widrow, L. M., Guhathakurta, P., Seth, A. C., **Foreman-Mackey, D.**, *et al*, 2013, *A New Approach to Detailed Structural Decomposition from the SPLASH and PHAT Surveys: Kicked-up Disk Stars in the Andromeda Galaxy?*, ApJ, **779**, 103
- Weisz, D. R., *et al*, 2013, *The Panchromatic Hubble Andromeda Treasury. IV. A Probabilistic Approach to Inferring the High-mass Stellar Initial Mass Function and Other Power-law Functions*, ApJ, **762**, 123
- Brewer, B. J., **Foreman-Mackey, D.**, & Hogg, D. W., 2013, *Probabilistic Catalogs for Crowded Stellar Fields*, AJ, **146**, 7
- Foreman-Mackey, D.**, Hogg, D. W., Lang, D., & Goodman, J., 2013, *emcee: The MCMC Hammer*, PASP, **125**, 306

## Unrefereed publications & white papers

- Angus, R., Aigrain, S., **Foreman-Mackey, D.**, & McQuillen, A., 2014, *Calibrating gyrochronology using Kepler asteroseismic targets*, submitted to MNRAS
- Ambikasaran, S., **Foreman-Mackey, D.**, Greengard, L., Hogg, D. W., & O'Neil, M., 2014, *Fast Direct Methods for Gaussian Processes and the Analysis of NASA Kepler Mission Data*, submitted to *IEEE Transactions on Pattern Analysis and Machine Intelligence* [arXiv:1403.6015](#)
- Montet, B. T., *et al*, 2014, *Maximizing Kepler science return per telemetered pixel: Searching the habitable zones of the brightest stars* [arXiv:1309.0654](#)

Hogg, D. W., *et al*, 2014, *Maximizing Kepler science return per telemetered pixel: Detailed models of the focal plane in the two-wheel era* [arXiv:1309.0653](#)

### Recent talks & tutorials

*Time series analysis, Gaussian Processes, and the search for exo-Earths*, 2014, PyData NYC conference, New York.

*An astronomer's introduction to Gaussian processes*, 2014, Astronomy Department, University of Texas, Austin.

*Inferring exoplanet populations from noisy, incomplete catalogs*, 2014, Astronomy Department, University of Texas, Austin.

*Inferring exoplanet populations from noisy, incomplete catalogs*, 2014, Astronomy Department, University of Washington.

*Introduction to Gaussian Processes, probabilistic graphical models, and deep learning*, 2014, Astro Hack Week, University of Washington.

*Inferring exoplanet populations from noisy, incomplete catalogs*, 2014, Physics Department, University of Delaware.

*Inferring exoplanet populations from noisy, incomplete catalogs*, 2014, Physics Department, Queen's University, Kingston, Canada.

*Exoplanet population inference*, 2014, Max-Planck-Institut für Astronomie, Heidelberg, Germany.

*Hierarchical inference for astronomers*, 2014, Strasbourg Observatory, France.

*Exoplanet population inference*, 2014, ExoStat conference, Carnegie Mellon University.

*An astronomer's introduction to Gaussian processes*, 2014, Bayesian Computing for Astronomical Data Analysis (Summer school at Penn State University).

*The rate of Earth analogs*, 2014, NASA Ames.

*An astronomer's introduction to Gaussian processes*, 2014, Harvard-Smithsonian Center for Astrophysics.

*Large-scale systematic characterization of transiting exoplanets*, 2014, Astronomy Department, Oxford University.

*Practical data analysis using MCMC*, 2014, Astronomy Department, University of Hertfordshire.

*Practical data analysis using MCMC*, 2013, Astronomy Department, UCSC.

*From pixels to aliens (Public Talk)*, 2013, Astronomy on Tap, NYC.

*A noise model for Kepler light curves*, 2013, MPIA, Heidelberg, Germany.

*Data analysis using MCMC*, 2013, Astronomy Department, Columbia University.

*Probabilistic detection of exoplanet candidates*, 2013, CCPP, NYU.

*Data analysis using MCMC*, 2013, Physics Department, Vanderbilt University.

**Popular open-source software**

**emcee** — MCMC sampling in Python. Popular in astronomy; the paper has 209 citations as of 2014-10-28. [dfm.io/emcee](http://dfm.io/emcee)

**George** — Blazingly fast Gaussian processes for regression. Implemented in C++ and Python bindings. Joint work with applied mathematicians at NYU. [dfm.io/george](http://dfm.io/george)

**triangle.py** — Simple corner plots (or scatterplot matrices) in Python.  
[github.com/dfm/triangle.py](https://github.com/dfm/triangle.py)

**Professional service & activities**

American Astronomical Society — Full Member

Active Referee — Astrophysical Journal, Journal of Statistical Software