

# 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.

**Publications** refereed: 68 / first author: 9 / citations: 9279 / h-index: 33 (2021-07-12)

## Refereed publications

- <sup>68</sup> 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)
- <sup>67</sup> Hitchcock, James A.; Hundertmark, Markus; **Foreman-Mackey, Daniel**; Bachelet, Etienne; *et al.*, 2021, *PyTorchDIA: a flexible, GPU-accelerated numerical approach to Difference Image Analysis*, MNRAS, **504**, 3561 (arXiv:2104.13715)
- <sup>66</sup> 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*, AJ, **161**, 265 (arXiv:2011.09894) [8 citations]
- <sup>65</sup> **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)
- <sup>64</sup> 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*, ApJ, **913**, 70 (arXiv:2101.07886) [2 citations]
- <sup>63</sup> Tamayo, Daniel; Gilbertson, Christian; & **Foreman-Mackey, Daniel**, 2021, *Stability constrained characterization of multiplanet systems*, MNRAS, **501**, 4798 (arXiv:2009.11831) [2 citations]
- <sup>62</sup> 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) [22 citations]
- <sup>61</sup> Hedges, Christina; Luger, Rodrigo; Dotson, Jessie; **Foreman-Mackey, Daniel**; & Barentsen, Geert, 2021, *Multiwavelength Photometry Derived from Monochromatic Kepler Data*, AJ, **161**, 95 (arXiv:2102.00044)
- <sup>60</sup> 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*, AJ, **160**, 240 (arXiv:2007.05799) [4 citations]
- <sup>59</sup> 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*, ApJ, **900**, 95 (arXiv:2006.16280) [3 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*, AJ, **160**, 90 (arXiv:2005.09387) [14 citations]
- 57 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 [2 citations]
- 56 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**
- 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) [39 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*, AJ, **159**, 202 (arXiv:2003.02379) [6 citations]
- 53 Agol, Eric; Luger, Rodrigo; & **Foreman-Mackey, Daniel**, 2020, *Analytic Planetary Transit Light Curves and Derivatives for Stars with Polynomial Limb Darkening*, AJ, **159**, 123 (arXiv:1908.03222) [30 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*, MNRAS, **492**, 1008 (arXiv:1911.09705) [11 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) [45 citations]
- 50 Angus, Ruth; Morton, Timothy D.; **Foreman-Mackey, Daniel**; van Saders, Jennifer; *et al.*, 2019, *Toward Precise Stellar Ages: Combining Isochrone Fitting with Empirical Gyrochronology*, AJ, **158**, 173 (arXiv:1908.07528) [32 citations]
- 49 David, Trevor J.; Petigura, Erik A.; Luger, Rodrigo; **Foreman-Mackey, Daniel**; *et al.*, 2019, *Four Newborn Planets Transiting the Young Solar Analog V1298 Tau*, ApJ, **885** (arXiv:1910.04563) [32 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*, AJ, **158**, 164 (arXiv:1901.00503) [17 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*, PASP, **131**, 94502 (arXiv:1903.09152) [61 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) [19 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 [9

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*, AJ, **158**, 32 (arXiv:1903.08017) [45 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) [2 citations]
- 42 Van Eylen, Vincent; Albrecht, Simon; Huang, Xu; MacDonald, Mariah G.; *et al.* (incl. **DFM**), 2019, *The Orbital Eccentricity of Small Planet Systems*, AJ, **157**, 61 (arXiv:1807.00549) [74 citations]
- 41 Luger, Rodrigo; Agol, Eric; **Foreman-Mackey, Daniel**; Fleming, David P.; *et al.*, 2019, *starry: Analytic Occultation Light Curves*, AJ, **157**, 64 (arXiv:1810.06559) [69 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*, ApJ, **867** (arXiv:1810.10009) [21 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*, ApJ, **866**, 15 (arXiv:1805.04519) [5 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) [25 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 Kp = 15*, AJ, **156**, 99 (arXiv:1702.05488) [88 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) [29 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*, ApJ, **860** (arXiv:1805.10290) [124 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) [68 citations]
- 33 Angus, Ruth; Morton, Timothy; Aigrain, Suzanne; **Foreman-Mackey, Daniel**; & Rajpaul, Vinesh, 2018, *Inferring probabilistic stellar rotation periods using Gaussian processes*, MNRAS, **474**, 2094 (arXiv:1706.05459) [88 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) [25 citations]
- 31 **Foreman-Mackey, Daniel**; Agol, Eric; Ambikasaran, Sivaram; & Angus, Ruth, 2017, *Fast and Scalable Gaussian Process Modeling with Applications to Astronomical Time Series*, AJ, **154**, 220 (arXiv:1703.09710) [249 citations]
- 30 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*, AJ, **154**, 254 (arXiv:1706.05865) [35 citations]
- 29 Montet, Benjamin T.; Tovar, Guadalupe; & **Foreman-Mackey, Daniel**, 2017, *Long-term Photometric Variability in Kepler Full-frame Images: Magnetic Cycles of Sun-like Stars*, ApJ, **851**, 116 (arXiv:1705.07928) [46 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) [10 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 [13 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) [182 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*, ApJ, **837**, 20 (arXiv:1610.07602) [47 citations]
- 24 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*, PASP, **128**, 124401 (arXiv:1512.09142) [58 citations]
- 23 **Foreman-Mackey, Daniel**; Morton, Timothy D.; Hogg, David W.; Agol, Eric; & Schölkopf, Bernhard, 2016, *The Population of Long-period Transiting Exoplanets*, AJ, **152**, 206 (arXiv:1607.08237) [60 citations]
- 22 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*, ApJ, **833**, 262 (arXiv:1601.05413) [55 citations]
- 21 Luger, Rodrigo; Agol, Eric; Kruse, Ethan; Barnes, Rory; *et al.* (incl. **DFM**), 2016, *EVEREST: Pixel Level Decorrelation of K2 Light Curves*, AJ, **152**, 100 (arXiv:1607.00524) [169 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*, PASP, **128**, 94503 (arXiv:1508.01853) [18 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*, PASP, **128**, 66001 (arXiv:1602.07939) [169 citations]
- 17 **Foreman-Mackey, Daniel**, 2016, *corner.py: Scatterplot matrices in Python*, The Journal of Open Source Software, **1**, 2 [964 citations]
- 16 Schölkopf, Bernhard; Hogg, David W.; Wang, Dun; **Foreman-Mackey, Daniel**; *et al.*, 2016, *Modeling confounding by half-sibling regression*, PNAS, **113**, 27 [38 citations]
- 15 Angus, Ruth; **Foreman-Mackey, Daniel**; & Johnson, John A., 2016,



- Systematics-insensitive Periodic Signal Search with K2*, ApJ, **818**, 109 (arXiv:1505.07105) [23 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) [375 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*, ApJ, **809**, 25 (arXiv:1503.07866) [97 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*, ApJ, **809**, 7 (arXiv:1505.01845) [25 citations]
  - 11 Angus, Ruth; Aigrain, Suzanne; **Foreman-Mackey, Daniel**; & McQuillan, Amy, 2015, *Calibrating gyrochronology using Kepler asteroseismic targets*, MNRAS, **450**, 1787 (arXiv:1502.06965) [107 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*, ApJ, **806**, 215 (arXiv:1502.04715) [97 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*, ApJ, **806**, 198 (arXiv:1502.06621) [36 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) [9 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*, ApJ, **800**, 46 (arXiv:1408.3149) [53 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*, ApJ, **795**, 64 (arXiv:1406.3020) [180 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*, ApJ, **791**, 89 (arXiv:1405.5229) [56 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?*, ApJ, **779**, 103 (arXiv:1310.4179) [45 citations]
  - 3 Brewer, Brendon J.; **Foreman-Mackey, Daniel**; & Hogg, David W., 2013, *Probabilistic Catalogs for Crowded Stellar Fields*, AJ, **146**, 7 (arXiv:1211.5805) [30 citations]
  - 2 **Foreman-Mackey, Daniel**; Hogg, David W.; Lang, Dustin; & Goodman, Jonathan, 2013, *emcee: The MCMC Hammer*, PASP, **125**, 306 (arXiv:1202.3665) [4903 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*, ApJ, **762**, 123 (arXiv:1211.6105) [30 citations]

### Preprints & white papers

- 12 Hattori, Soichiro; **Foreman-Mackey, Daniel**; Hogg, David W.; Montet, Benjamin T.; *et al.*, 2021, The unpopular Package: a Data-driven Approach to De-trend TESS Full Frame Image Light Curves, arXiv e-prints (arXiv:2106.15063)
- 11 Bartolić, Fran; Luger, Rodrigo; **Foreman-Mackey, Daniel**; Howell, Robert R.; & Rathbun, Julie A., 2021, Occultation mapping of Io's surface in the near-infrared I: Inferring static maps, arXiv e-prints (arXiv:2103.03758) [2 citations]
- 10 Luger, Rodrigo; Agol, Eric; Bartolić, Fran; & **Foreman-Mackey, Daniel**, 2021, Analytic Light Curves in Reflected Light: Phase Curves, Occultations, and Non-Lambertian Scattering for Spherical Planets and Moons, arXiv e-prints (arXiv:2103.06275)
- 9 Luger, Rodrigo; **Foreman-Mackey, Daniel**; & Hedges, Christina, 2021, Mapping stellar surfaces II: An interpretable Gaussian process model for light curves, arXiv e-prints (arXiv:2102.01697) [7 citations]
- 8 Luger, Rodrigo; **Foreman-Mackey, Daniel**; & Hedges, Christina, 2021, starry\_process: Interpretable Gaussian processes for stellar light curves, arXiv e-prints (arXiv:2102.01774)
- 7 Luger, Rodrigo; **Foreman-Mackey, Daniel**; Hedges, Christina; & Hogg, David W., 2021, Mapping stellar surfaces I: Degeneracies in the rotational light curve problem, arXiv e-prints (arXiv:2102.00007) [6 citations]
- 6 Van Eylen, Vincent; 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, arXiv e-prints (arXiv:2101.01593) [5 citations]
- 5 Martin, David V.; El-Badry, Kareem; Kunovac Hodžić, Vedad; Triaud, Amaury H. M. J.; *et al.* (incl. **DFM**), 2021, TOI-1259Ab – a gas giant planet with 2.7% deep transits and a bound white dwarf companion, arXiv e-prints (arXiv:2101.02707)
- 4 Wang, Dun; Hogg, David W.; **Foreman-Mackey, Daniel**; & Schölkopf, Bernhard, 2017, A pixel-level model for event discovery in time-domain imaging, arXiv e-prints (arXiv:1710.02428) [6 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 e-prints (arXiv:1608.06919) [49 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 e-prints (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 e-prints (arXiv:1309.0653)

### 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