

# Megan Bedell

✉ [mbedell@flatironinstitute.org](mailto:mbedell@flatironinstitute.org)

☎ +1 518 488 9348

📍 162 5th Avenue, New York, NY 10010

🆔 0000-0001-9907-7742

🌐 [megbedell](https://megbedell)

🌐 <https://bedell.space>

## Education

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| 2012 – 2017 | <b>University of Chicago</b><br>Ph.D. in Astronomy & Astrophysics<br><i>Dissertation Title: Illuminating the Origins of Planets with Solar Twins</i><br><i>Advisor: Jacob L. Bean</i> |
| 2008 – 2012 | <b>Haverford College</b><br>B.S. with Honors in Physics and with Highest Honors in Astronomy  |

## Positions Held

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| 2019 – present | <b>Associate Research Scientist</b> , Center for Computational Astrophysics, Flatiron Institute<br><i>Junior faculty equivalent at a non-profit research institute</i> |
| 2021 – present | <b>Research Associate</b> , American Museum of Natural History<br><i>Zero-time honorary affiliation with NYC-area academic institution</i>                             |
| 2017 – 2019    | <b>Flatiron Research Fellow</b> , Center for Computational Astrophysics, Flatiron Institute<br><i>Independent postdoctoral research fellowship</i>                     |

## Current Research Themes

- **Statistical methods for extreme precision radial velocity (EPRV) planet-finding:** I developed the influential wobble method for data-driven RV measurement, which is now being used by multiple EPRV groups worldwide through [my open-source software implementation](#). I also work on EPRV challenges including instrument calibration and stellar variability using similarly novel statistical techniques.
- **Precise spectroscopic characterization of exoplanet search target stars:** I co-lead (with Annelies Mortier) the [gr8stars](#) collaboration, a large international effort to robustly & uniformly determine parameters and abundances of >2,000 bright, nearby, Sun-like stars that are crucial to near-future exoplanet searches. I am an expert in cutting-edge high-precision characterization of solar twins.
- **Next-generation exoplanet survey planning:** I am a consortium representative, Science Working Group member, and Data Analysis sub-group lead for the *Terra Hunting Experiment*, a next-generation EPRV mission. I am also member of the Science Team for the *Keck Planet Finder*, an EPRV instrument with first light planned for 2022.

## Mentorship & Teaching

- **Graduate students** supervised through the CCA Visiting Pre-Doctoral Scholar program (est. 2019):
  - Quang Tran (UT Austin) — 2021–present
  - Arvind Gupta (Penn State) — 2021–present
  - Lily L. Zhao (Yale University) — 2019–2021, resulting in 1 publication
- **Undergraduates** supervised through summer programs including the Simons–NSBP Scholars Program and the Barnard Summer Research Institute:
  - Joann Roberts (Chicago State University) — 2020, resulting in senior thesis
  - Ilana Doran (Barnard College) — 2019–2021
  - Angus Beane (University of Pennsylvania) — 2018, resulting in 1 publication
- Instructor for the *LSSST Data Science Fellowship Program* Session 10, 2019
- External examiner on thesis committees at Columbia University and Yale University
- Guest lecturer for graduate classes at Columbia University and Universidade de São Paulo
- Laboratory instructor for University of Chicago astronomy courses, 2012–2013

## Leadership & Service

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- Organizer, CCA Colloquium, 2021–present
- Member, Director Search Committee, 2020 [*small committee responsible for executing a hiring search for the new director of the CCA*]
- Member, Flatiron Institute Committee for Diversity, Equity, and Inclusion, 2020–present
- Member, FRF Hiring Process Committee, 2020–present, & Chair, FRF Hiring Helper Committee, 2020 [*groups responsible for defining and overseeing the annual postdoc hiring process at CCA*]
- Science Organizing Committee member or co-chair for 5 conferences/workshops to date, including: *TESS Science Conference II* (2021, virtual); *Telluric Line Hack Week* (2019, NYC); *Building Early Science with TESS* (2019, Chicago); *TESS Preparatory Workshop* (2018, NYC); *Precision Spectroscopy* (2017, São Paulo)
- Time Allocation Committee member for 2 NASA cycles to date
- Grant reviewer for NASA, NSF, Swiss National Science Foundation
- Active referee for AAS, MNRAS, A&A journals

## Outreach

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- Interviewed for [NPR All Things Considered](#), [Nature](#), [PBS News Hour](#), [Scientific American](#).
- 3 first-author papers covered by press including [Science News article](#), [ESO press release](#) [picked up by A.P.]
- Creator of TESS Roulette interactive data viewer (<https://tess.casino>); 43000 pageviews
- Local organizer for NYC Dept of Education STEM Career Day, 2018
- Astronomy on Tap presenter in NYC & Chicago, co-founder of Chicago AoT branch, 2016–2018
- Presenter, Chicago Life Long Learning, 2015–2017
- Presenter, Adler Planetarium Space Visualization Lab, 2014–2017
- Public Observing Coordinator, Haverford College, 2009–2012

## Honors

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- Outstanding Paper Award, International Astrostatistics Association (2020)
- Josephine DeKarman Fellow (2016–2017)
- Lewis & Clark Field Scholar in Astrobiology (2016–2017)
- Illinois Space Grant Fellow (2016–2017)
- University of Chicago Harper Dissertation Fellow (2016–2017)
- NSF Graduate Research Fellow (2013–2016)
- Phi Beta Kappa (2012)

## Selected Invited Talks

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- University of Pennsylvania Astro Seminar, April 2021
- University of Cambridge Exo-Cam Seminar, February 2020
- University College London Seminar, February 2020
- Penn State CEHW Seminar, December 2019
- Flatiron-Wide Algorithms and Mathematics Workshop, October 2019 [[slides online](#)]
- Princeton IAS Seminar, September 2019
- Sagan Summer Workshop, July 2019 [[watch online](#)]
- American Museum of Natural History Colloquium, May 2019
- Gordon Research Conference on Origins of Solar Systems, May 2019
- Carnegie DTM Colloquium, March 2019 [[watch online](#)]
- Cool Stars 20 (contributed plenary talk), August 2018 [[slides online](#)]
- Princeton Computational Astrophysics Workshop Series, May 2018 [[materials online](#)]
- Vanderbilt Astro Seminar, April 2018

*Bolded and starred\* entries are junior scientists supervised by M. Bedell during the writing of the listed paper.*

- Luger, R., **Bedell, M.**, Foreman-Mackey, D., Crossfield, I., *et al.*, 2021, [Mapping Stellar Surfaces III: An Efficient, Scalable, and Open-Source Doppler Imaging Model](#), arXiv e-prints
- Gan, T., **Bedell, M.**, Wang, S., Foreman-Mackey, D., *et al.*, 2021, [HD 183579b: A Warm Sub-Neptune Transiting a Solar Twin Detected by TESS](#), MNRAS, **507**, 2220
- Hedges, C., Hughes, A., Zhou, G., David, T., *et al.*, 2021, [TOI-2076 and TOI-1807: Two Young, Comoving Planetary Systems Within 50 Pc Identified by TESS That Are Ideal Candidates for Further Follow Up](#), AJ, **162**, 54
- Spina, L., Sharma, P., Meléndez, J., **Bedell, M.**, *et al.*, 2021, [Chemical Evidence for Planetary Ingestion in a Quarter of Sun-Like Stars](#), Nature Astronomy
- David, T., Contardo, G., Sandoval, A., Angus, R., *et al.*, 2021, [Evolution of the Exoplanet Size Distribution: Forming Large Super-Earths Over Billions of Years](#), AJ, **161**, 265
- Anderson, S., Dittmann, J., Ballard, S., & **Bedell, M.**, 2021, [Higher Compact Multiple Occurrence Around Metal-Poor M-Dwarfs and Late-K-Dwarfs](#), AJ, **161**, 203
- **Zhao, L.\***, Hogg, D., **Bedell, M.**, & Fischer, D., 2021, [Excalibur: A Nonparametric, Hierarchical Wavelength Calibration Method for a Precision Spectrograph](#), AJ, **161**, 80
- Spina, L., Nordlander, T., Casey, A., **Bedell, M.**, *et al.*, 2020, [How Magnetic Activity Alters What We Learn From Stellar Spectra](#), ApJ, **895**, 52
- Montet, B., Feinstein, A., Luger, R., **Bedell, M.**, *et al.*, 2020, [The Young Planet DS Tuc Ab Has a Low Obliquity](#), AJ, **159**, 112
- Vedantham, H., Callingham, J., Shimwell, T., Tasse, C., *et al.*, 2020, [Coherent Radio Emission From a Quiescent Red Dwarf Indicative of Star-Planet Interaction](#), Nature Astronomy, **4**, 577
- Pope, B., **Bedell, M.**, Callingham, J., Vedantham, H., *et al.*, 2020, [No Massive Companion to the Coherent Radio-Emitting M Dwarf GJ 1151](#), ApJ, **890**
- Angus, R., Morton, T., Foreman-Mackey, D., van Saders, J., *et al.*, 2019, [Toward Precise Stellar Ages: Combining Isochrone Fitting With Empirical Gyrochronology](#), AJ, **158**, 173
- **Bedell, M.**, Hogg, D., Foreman-Mackey, D., Montet, B., & Luger, R., 2019, [WOBBLE: A Data-Driven Analysis Technique for Time-Series Stellar Spectra](#), AJ, **158**, 164
- Feinstein, A., Montet, B., Foreman-Mackey, D., **Bedell, M.**, *et al.*, 2019, [Eleanor: An Open-Source Tool for Extracting Light Curves From the TESS Full-Frame Images](#), PASP, **131**, 94502
- Blancato, K., Ness, M., Johnston, K., Rybizki, J., & **Bedell, M.**, 2019, [Variations in  \$\alpha\$ -element Ratios Trace the Chemical Evolution of the Disk](#), ApJ, **883**, 34
- Kreidberg, L., Luger, R., & **Bedell, M.**, 2019, [No Evidence for Lunar Transit in New Analysis of Hubble Space Telescope Observations of the Kepler-1625 System](#), ApJ, **877**
- Carlos, M., Meléndez, J., Spina, L., dos Santos, L., *et al.*, 2019, [The Li-Age Correlation: The Sun Is Unusually Li Deficient for Its Age](#), MNRAS, **485**, 4052
- Lorenzo-Oliveira, D., Meléndez, J., Yana Galarza, J., Ponte, G., *et al.*, 2019, [Constraining the Evolution of Stellar Rotation Using Solar Twins](#), MNRAS, **485**
- Ford, E., **Bedell, M.**, Ciardi, D., Dodson-Robinson, S., *et al.*, 2019, [Advanced Statistical Modeling of Ground-Based RV Surveys as Critical Support for Future NASA Earth-Finding Missions](#), Astro2020: Decadal Survey on Astronomy and Astrophysics, **2020**, 466
- The MSE Science Team, Babusiaux, C., Bergemann, M., Burgasser, A., *et al.*, 2019, [The Detailed Science Case for the Maunakea Spectroscopic Explorer, 2019 Edition](#), arXiv e-prints
- Luger, R., **Bedell, M.**, Vanderspek, R., & Burke, C., 2019, [TESS Photometric Mapping of a Terrestrial Planet in the Habitable Zone: Detection of Clouds, Oceans, and Continents](#), arXiv e-prints
- Bergemann, M., Huber, D., Adibekyan, V., Angelou, G., *et al.*, 2019, [Stellar Astrophysics and Exoplanet Science With the Maunakea Spectroscopic Explorer \(MSE\)](#), arXiv e-prints
- Botelho, R., Milone, A., Meléndez, J., **Bedell, M.**, *et al.*, 2019, [Thorium in Solar Twins: Implications for Habitability in Rocky Planets](#), MNRAS, **482**, 1690

- Mingarelli, C., Anderson, L., **Bedell, M.**, & Spergel, D., 2018, *Improving Binary Millisecond Pulsar Distances With Gaia*, arXiv e-prints
- Lorenzo-Oliveira, D., Freitas, F., Meléndez, J., **Bedell, M.**, *et al.*, 2018, *The Solar Twin Planet Search. The Age-Chromospheric Activity Relation*, *Astronomy and Astrophysics*, **619**
- Crossfield, I., Guerrero, N., David, T., Quinn, S., *et al.*, 2018, *A TESS Dress Rehearsal: Planetary Candidates and Variables From K2 Campaign 17*, *The Astrophysical Journal Supplement Series*, **239**, 5
- **Beane, A.\***, Ness, M., & **Bedell, M.**, 2018, *Actions Are Weak Stellar Age Indicators in the Milky Way Disk*, *ApJ*, **867**, 31
- **Bedell, M.**, Bean, J., Meléndez, J., Spina, L., *et al.*, 2018, *The Chemical Homogeneity of Sun-Like Stars in the Solar Neighborhood*, *ApJ*, **865**, 68
- Spina, L., Meléndez, J., Karakas, A., dos Santos, L., *et al.*, 2018, *The Temporal Evolution of Neutron-Capture Elements in the Galactic Discs*, *MNRAS*, **474**, 2580
- dos Santos, L., Meléndez, J., **Bedell, M.**, Bean, J., *et al.*, 2017, *Spectroscopic Binaries in the Solar Twin Planet Search Program: From Substellar-Mass to M Dwarf Companions*, *MNRAS*, **472**, 3425
- Gandolfi, D., Barragán, O., Hatzes, A., Fridlund, M., *et al.*, 2017, *The Transiting Multi-Planet System HD 3167: A 5.7 M<sub>⊕</sub> Super-Earth and an 8.3 M<sub>⊕</sub> Mini-Neptune*, *AJ*, **154**, 123
- **Bedell, M.**, Bean, J., Meléndez, J., Mills, S., *et al.*, 2017, *Kepler-11 Is a Solar Twin: Revising the Masses and Radii of Benchmark Planets via Precise Stellar Characterization*, *ApJ*, **839**, 94
- Malik, M., Grosheintz, L., Mendonça, J., Grimm, S., *et al.*, 2017, *HELIOS: An Open-Source, GPU-accelerated Radiative Transfer Code for Self-Consistent Exoplanetary Atmospheres*, *AJ*, **153**, 56
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- Barragán, O., Grziwa, S., Gandolfi, D., Fridlund, M., *et al.*, 2016, *EPIC 211391664b: A 32 M<sub>⊕</sub> Neptune-Size Planet in a 10 Day Orbit Transiting an F8 Star*, *AJ*, **152**, 193
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- **Bedell, M.**, Meléndez, J., Bean, J., Ramírez, I., *et al.*, 2014, *Stellar Chemical Abundances: In Pursuit of the Highest Achievable Precision*, *ApJ*, **795**, 23
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## Metrics

