

Megan Bedell

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Major Research Interests: stellar spectroscopy; exoplanet detection & characterization; data analysis methods

Positions Held

2019 – present | **Associate Research Scientist**, Center for Computational Astrophysics, Flatiron Institute

2021 – present | **Research Associate**, American Museum of Natural History

2017 – 2019 | **Flatiron Research Fellow**, Center for Computational Astrophysics, Flatiron Institute

Education

2012 – 2017 | **University of Chicago**
Ph.D. in Astronomy & Astrophysics
Dissertation Title: Illuminating the Origins of Planets with Solar Twins
Advisor: Jacob L. Bean

2008 – 2012 | **Haverford College**
B.S. with Honors in Physics and with Highest Honors in Astronomy

Honors & Awards

- 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)

Mentorship & Teaching

- **Graduate students** supervised through the CCA Visiting Pre-Doctoral Scholar program (est. 2019):
 - Caprice Phillips (The Ohio State University) — 2024
 - Arjun Savel (UMD College Park) — 2022–2023, resulting in 2 publications
 - Chris Lam (University of Florida) — 2022–2023, resulting in 1 publication
 - Quang Tran (UT Austin) — 2021–2022, resulting in 1 publication
 - Arvind Gupta (Penn State) — 2021–2022, resulting in 1 publication
 - Lily L. Zhao (Yale University) — 2019–2020, resulting in 1 publication
- **Undergraduates** supervised through summer programs including the Simons–NSBP Scholars Program, CUNY AstroCOM, and the Barnard Summer Research Institute:
 - Nusrat Jahan (CUNY Hunter College) — 2022
 - Lianys Feliciano (CUNY Hunter College) — 2022
 - 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 *LSST Data Science Fellowship Program* Session 10, 2019

- External examiner on thesis committees at Columbia, NYU, Yale
- Guest lecturer for graduate classes at Columbia University, CUNY Graduate Center, and Universidade de São Paulo

Leadership & Service

- Leader, *Terra Hunting Experiment* Data Reduction Working Group, 2021–present
- Member, Keck Planet Finder Science Team
- Organizer, CCA Colloquium, 2021–present
- Organizer, Astronomical Data Group weekly meeting, 2019–present
- Member, Flatiron Institute Committee for Diversity, Equity, and Inclusion, 2020–2023
- Member, CCA Flatiron Research Fellow Hiring Committee, 2022–2024
- Member, CCA Pre-Doctoral Scholar Hiring Committee, 2022–2023
- Member, Hiring Process Committee, 2020–2023 [*group responsible for defining and overseeing the annual postdoc hiring process at CCA*]
- Member, Director Search Committee, 2020 [*small committee responsible for hiring of new CCA director*]
- Science Organizing Committee member or chair for **10** conferences/workshops to date, including: *EPRV 6* (2025, Porto); *Two HoRSEs* (2024, Berlin); *New York Area Exoplanets Meeting* (2024, NYC); *Sun-as-a-Star Workshop* (2023, NYC); *EPRV 5* (2023, Santa Barbara); *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 **3** NASA cycles to date
- Grant reviewer for NASA, NSF, and others
- Active referee for AAS, MNRAS, A&A, Nature journals

Contributions to Open Science

- Creator of the [gaia-kepler.fun](#) crossmatch database, used in **>50 peer-reviewed publications to date**
- Co-creator (with Annelies Mortier) of the [gr8stars](#) database, a public-access repository of high-resolution spectra for a *Gaia*-selected sample of bright Northern-hemisphere FGK stars
- Developer of the [wobble](#) open-source code in python + TensorFlow
- Contributor to astronomical open-source software including [eleanor](#), [radvel](#), [lightkurve](#)

Outreach & Press

- Interviewed for [NPR All Things Considered](#), [Nature](#), [PBS News Hour](#), [Scientific American](#).
- Featured profile for the [Flatiron Scientist Spotlight](#).
- **3** first-author papers covered by press including [Science News article](#), [ESO press release](#) [picked up by Associated Press]
- Creator of TESS Roulette interactive data viewer (<https://tess.casino>); 43000 pageviews
- Volunteer for solar viewing events with SF *Path to Totality* eclipse program in NYC and Austin, 2024
- 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

Selected Talks

- NASA Goddard ASD Colloquium, October 2023
- EPRV Research Coordination Network Colloquium, June 2023
- San Francisco State University Physics Colloquium, April 2023
- University of Hawaii IfA Colloquium, April 2023
- EPRV5, March 2023 [[watch online](#)]

- University of Pennsylvania Astro Seminar, April 2021
- Flatiron Institute Seminar, April 2021
- University of Cambridge Exo-Cam Seminar, February 2020
- University College London Seminar, February 2020
- Precision Spectroscopy, January 2021
- 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 EPL 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

Starred* entries are undergrad or graduate student-led papers on which M. Bedell acted as a senior author.

First- and Second-Author Papers:

- **Angelo, I.***, **Bedell, M.**, Petigura, E., et al. 2024, *A Data-driven Spectral Model of Main Sequence Stars in Gaia DR3*, ApJ submitted
- **Savel, A. B.***, **Bedell, M.**, Kempton, E. M.-R., et al. 2024, *Peering into the black box: forward-modeling the uncertainty budget of high-resolution spectroscopy of exoplanet atmospheres*, ApJ in review
- **Savel, A. B.***, **Bedell, M.**, & Kempton, E. M.-R. 2024, [cortecs: A Python package for compressing opacities](#), JOSS in review
- **Gupta, A.F.*** & **Bedell, M.**, 2023, [Fishing for Planets: A Comparative Analysis of EPRV Survey Performance in the Presence of Correlated Noise](#), AJ in review
- **Tran, Q.H.***, **Bedell, M.**, Foreman-Mackey, D., et al. 2023, [Joint Modeling of Radial Velocities and Photometry with a Gaussian Process Framework](#), ApJ, 950, 162
- 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
- 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
- **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
- 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
- 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
- **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
- **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
- Meléndez, J., **Bedell, M.**, Bean, J., Ramírez, I., et al., 2017, [The Solar Twin Planet Search. V. Close-In, Low-Mass Planet Candidates and Evidence of Planet Accretion in the Solar Twin HIP 68468](#), Astronomy and Astrophysics, 597
- **Bedell, M.**, Meléndez, J., Bean, J., Ramírez, I., et al., 2015, [The Solar Twin Planet Search. II. A Jupiter Twin Around a Solar Twin](#), Astronomy and Astrophysics, 581
- **Bedell, M.**, Meléndez, J., Bean, J., Ramírez, I., et al., 2014, [Stellar Chemical Abundances: In Pursuit of the Highest Achievable Precision](#), ApJ, 795, 23
- **Bedell, M.**, Villaume, A., Weiss, L., Sliski, D., et al., 2011, [Monitoring H \$\alpha\$ Emission and Continuum of UXORs: RR Tauri](#), AJ, 142, 164

Other Papers:

- Eisner, N. L., Grunblatt, S. K., Barragán, O., et al. 2024, [Planet Hunters TESS. V. A Planetary System Around a Binary Star, Including a Mini-Neptune in the Habitable Zone](#), AJ, 167, 241
- Rampalli, R., Ness, M. K., Edwards, G. H., et al. 2024, [The Sun Remains Relatively Refractory Depleted: Elemental Abundances for 17,412 Gaia RVS Solar Analogs and 50 Planet Hosts](#), ApJ, 965, 176.
- Sayeed, M., Ness, M. K., Montet, B. T., et al. 2023, [Many Roads Lead to Lithium: Formation Pathways For Lithium-Rich Red Giants](#), ApJ, 964, 42.
- Zhao, L. L., Dumusque, X., Ford, E. B., et al. 2023, [The Extreme Stellar-signals Project. III. Combining Solar Data from HARPS, HARPS-N, EXPRES, and NEID](#), AJ, 166, 173.
- Ferreira, T., Meléndez, J., Lorenzo-Oliveira, D., Bean, J.L., et al., 2023, [A Jupiter analogue and a cold Super-Neptune](#)

- orbiting the solar-twin star HIP 104045, arXiv e-prints
- Bonfanti, A., Gandolfi, D., Egger, J., Fossati, L., *et al.*, 2023, [TOI-1055 B: Neptunian Planet Characterised With HARPS, TESS, and CHEOPS](#), *A&A*, **671**, L8
 - **Behrmard, A.***, Ness, M., Cunningham, E., & **Bedell, M.**, 2023, [Elemental Abundances of Kepler Objects of Interest in APOGEE DR17](#), *AJ*, **165**, 178
 - Moran, A., Mingarelli, C., **Bedell, M.**, & Good, D., 2023, [Improving Distances to Binary Millisecond Pulsars with Gaia](#), *ApJ*, **954**, 89
 - Angus, R., Price-Whelan, A., Zinn, J., **Bedell, M.**, *et al.*, 2022, [The 3D Galactocentric Velocities of Kepler Stars: Marginalizing Over Missing Radial Velocities](#), *AJ*, **164**, 25
 - Zhao, L., Fischer, D., Ford, E., Wise, A., *et al.*, 2022, [The EXPRES Stellar Signals Project II. State of the Field in Disentangling Photospheric Velocities](#), *AJ*, **163**, 171
 - Gan, T., Lin, Z., Wang, S., Mao, S., *et al.*, 2022, [TOI-530b: A Giant Planet Transiting an M-Dwarf Detected by TESS](#), *MNRAS*, **511**, 83
 - 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*, **5**, 1163
 - 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
 - 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
 - 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
 - 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**
 - Lorenzo-Oliveira, D., Meléndez, J., Yana Galarza, J., Ponte, G., *et al.*, 2019, [Constraining the Evolution of Stellar Rotation Using Solar Twins](#), *MNRAS*, **485**
 - 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
 - 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
 - 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
 - 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**
 - **Beane, A.***, Ness, M., & **Bedell, M.**, 2018, [Actions Are Weak Stellar Age Indicators in the Milky Way Disk](#), *ApJ*, **867**,

- 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
- 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_{\oplus}\$ Super-Earth and an 8.3 \$M_{\oplus}\$ Mini-Neptune](#), AJ, **154**, 123
- 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
- Barragán, O., Grziwa, S., Gandolfi, D., Fridlund, M., *et al.*, 2016, [EPIC 211391664b: A 32 \$M_{\oplus}\$ Neptune-Size Planet in a 10 Day Orbit Transiting an F8 Star](#), AJ, **152**, 193
- dos Santos, L., Meléndez, J., do Nascimento, J., **Bedell, M.**, *et al.*, 2016, [The Solar Twin Planet Search. IV. The Sun as a Typical Rotator and Evidence for a New Rotational Braking Law for Sun-Like Stars](#), Astronomy and Astrophysics, **592**
- Tucci Maia, M., Ramírez, I., Meléndez, J., **Bedell, M.**, *et al.*, 2016, [The Solar Twin Planet Search. III. The \[Y/Mg\] Clock: Estimating Stellar Ages of Solar-Type Stars](#), Astronomy and Astrophysics, **590**
- Meléndez, J., Bean, J., **Bedell, M.**, Ramírez, I., *et al.*, 2015, [Using Solar Twins to Explore the Planet-Star Connection With Unparalleled Precision](#), The Messenger, **161**, 28
- Ramírez, I., Meléndez, J., Bean, J., Asplund, M., *et al.*, 2014, [The Solar Twin Planet Search. I. Fundamental Parameters of the Stellar Sample](#), Astronomy and Astrophysics, **572**
- Meléndez, J., Ramírez, I., Karakas, A., Yong, D., *et al.*, 2014, [18 Sco: A Solar Twin Rich in Refractory and Neutron-Capture Elements. Implications for Chemical Tagging](#), ApJ, **791**, 14
- Monroe, T., Meléndez, J., Ramírez, I., Yong, D., *et al.*, 2013, [High Precision Abundances of the Old Solar Twin HIP 102152: Insights on Li Depletion From the Oldest Sun](#), ApJ, **774**