Megan Bedell

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

Positions Held

2024 – present | **Research Scientist**, Center for Computational Astrophysics, Flatiron Institute

2019 – 2024 | **Associate Research Scientist**, Center for Computational Astrophysics, Flatiron Institute

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

- Extensive experience mentoring postdoctoral fellows, graduate students, and undergraduate students (see **Current & Former Mentees**)
- External examiner on thesis committees at Columbia, NYU, Yale
- Mentor for Cientifico Latino GSMI, 2024
- Instructor for the *LSST Data Science Fellowship Program* Session 10, 2019
- 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, 2021–2024
- Member, *Terra Hunting Experiment* Science Team, 2024–present
- Member, Keck Planet Finder Science Team, 2020–present
- Significant leadership responsibilities in the Astronomical Data and Exoplanets groups at CCA, with internal service work including:
  - Organizer, Astronomical Data Group weekly meeting, 2019–present
  - Organizer, CCA Colloquium, 2021–2024

  - Member, CCA Pre-Doctoral Scholar Hiring Committee, 2022–2023 & 2025–present
  - Member, Flatiron Institute Committee for Diversity, Equity, and Inclusion, 2020–2023
  - Member, CCA Flatiron Research Fellow Hiring Committee, 2022–2024
  - 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 for **11** conferences/workshops to date, including:
  - *Sun-as-a-Star Workshop* (2023, NYC; SOC chair)
  - Two conferences in the *EPRV* series (2023, Santa Barbara & 2024, Porto)
  - Two conferences in the *HoRSE* series (2024, Berlin & 2026, Grenada)
  - *Telluric Line Hack Week* (2019, NYC)
- Time Allocation Committee or Panel member for **4** NASA cycles to date, including serving as Panel Chair
- 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`, `lightkurve`

Outreach & Press

- Featured panelist, SF Presents: Imagining Other Worlds, October 2024
- 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

Current & Former Mentees

- **Independent postdoctoral fellows** mentored through the Flatiron Research Fellowship program, including:
  - Jiayin Dong — 2022–present
  - Dax Feliz — 2024–present
  - Lionel Garcia — 2023–present
  - Michael Palumbo — 2024–present
  - Ryan Rubenzahl — 2024–present
  - Lily L. Zhao — 2021–2024, now a Sagan Fellow at UChicago
  - ... & substantial co-mentoring contributions with a number of other FRFs.
- **Graduate students** supervised (mostly) through the CCA Visiting Pre-Doctoral Scholar program:
  - Caprice Phillips (The Ohio State University) — 2024
  - Isabel Angelo (UCLA) — 2023–2025, resulting in 1 publication
  - 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

Selected Talks

- Five Colleges Astronomy Department Colloquium, March 2025
- Know Thy Star, Know Thy Planet 2 (invited talk), February 2025 **[slides / watch online]**
- SONG 2024 Science Meeting (invited talk), September 2024
- Two HoRSEs (invited panelist), July 2024
- 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

Publications *view on ADS*

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

First- and Second-Author Papers:

1. **Savel, A. B.***, **Bedell, M.**, Kempton, E. M.-R., et al. 2025, Peering into the black box: forward-modeling the uncertainty budget of high-resolution spectroscopy of exoplanet atmospheres, AJ **169**, 135.
2. Zhao, L. L., **Bedell, M.**, Hogg, D. W., et al. 2024, A Compact, Coherent Representation of Stellar Surface Variation in the Spectral Domain, ApJ **977**, 140.
3. **Lam, C.***, **Bedell, M.**, Zhao, L., et al. 2024, gaspery: Optimized Scheduling of Radial Velocity Follow-Up Observations for Active Host Stars, AJ **168**, 200.
4. **Angelo, I.***, **Bedell, M.**, Petigura, E., et al. 2024, A Data-driven Spectral Model of Main Sequence Stars in Gaia DR3, ApJ **974**, 43.
5. **Savel, A. B.***, **Bedell, M.**, & Kempton, E. M.-R. 2024, cortecs: A Python package for compressing opacities, JOSS, **9**, 6104
6. **Gupta, A.F.*** & **Bedell, M.**, 2023, Fishing for Planets: A Comparative Analysis of EPRV Survey Performance in the Presence of Correlated Noise, AJ, **168**, 29.
7. **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
8. 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
9. 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
10. 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**
11. **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
12. 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
13. **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
14. **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
15. 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**
16. **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**
17. **Bedell, M.**, Meléndez, J., Bean, J., Ramírez, I., *et al.*, 2014, Stellar Chemical Abundances: In Pursuit of the Highest Achievable Precision, ApJ, **795**, 23
18. **Bedell, M.**, Villaume, A., Weiss, L., Sliski, D., *et al.*, 2011, Monitoring Hα Emission and Continuum of UXORs: RR Tauri, AJ, **142**, 164

Other Papers:

1. Freckelton, A. V., Mortier, A., **Bedell, M.,** et al. 2025, gr8stars – I. A homogeneous spectroscopic study of bright FGKM dwarfs and a public library of their high-resolution spectra, MNRAS **540**, 2, 1786.
2. Vieytes, M. C., Zhao, L. L., & **Bedell, M.** 2025, The influence of chromospheric activity on line formation, ApJ **981**, 4.
3. Lu, Y., Colman, I., Sayeed, M., et al. 2025, Evidence of Truly Young high-α Dwarf Stars, AJ **169**, 168.
4. Godoy-Rivera, D., Mathur, S., García, R. A., et al. 2025, Kepler meets Gaia DR3: homogeneous extinction-corrected color-magnitude diagram and binary classification, A&A **696**, A243.
5. Hon, M., Huber, D., Li, Y., et al. 2024, Asteroseismology of the Nearby K-Dwarf σ Draconis using the Keck Planet Finder and TESS, ApJ **975**, 147.

6. 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.
7. 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.
8. 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.
9. 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.
10. 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.
11. 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.
12. **Behmard, A.***, Ness, M., Cunningham, E., & **Bedell, M.**, 2023, Elemental Abundances of Kepler Objects of Interest in APOGEE DR17, AJ **165**, 178.
13. Moran, A., Mingarelli, C., **Bedell, M.**, & Good, D., 2023, Improving Distances to Binary Millisecond Pulsars with Gaia, ApJ **954**, 89.
14. 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.
15. 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.
16. 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.
17. 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.
18. 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.
19. 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.
20. 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.
21. **Zhao, L.***, Hogg, D., **Bedell, M.**, & Fischer, D., 2021, Excalibur: A Nonparametric, Hierarchical Wavelength Calibration Method for a Precision Spectrograph, AJ textbf161, 80.
22. Spina, L., Nordlander, T., Casey, A., **Bedell, M.**, *et al.*, 2020, How Magnetic Activity Alters What We Learn From Stellar Spectra, ApJ **895**, 52.
23. Montet, B., Feinstein, A., Luger, R., **Bedell, M.**, *et al.*, 2020, The Young Planet DS Tuc Ab Has a Low Obliquity, AJ **159**, 112.
24. 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.
25. 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.
26. 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.
27. Blancato, K., Ness, M., Johnston, K., Rybizki, J., & **Bedell, M.**, 2019, Variations in α-element Ratios Trace the Chemical Evolution of the Disk, ApJ **883**, 34.
28. 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**, L15.
29. Lorenzo-Oliveira, D., Meléndez, J., Yana Galarza, J., Ponte, G., *et al.*, 2019, Constraining the Evolution of Stellar Rotation Using Solar Twins, MNRAS **485**, L68.
30. 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.
31. Botelho, R., Milone, A., Meléndez, J., **Bedell, M.**, *et al.*, 2019, Thorium in Solar Twins: Implications for Habitability

in Rocky Planets, MNRAS **482**, 1690.
32. Lorenzo-Oliveira, D., Freitas, F., Meléndez, J., **Bedell, M.**, *et al.*, 2018, The Solar Twin Planet Search. The Age-Chromospheric Activity Relation, A&A **619**, A73.
33. **Beane, A.***, Ness, M., & **Bedell, M.**, 2018, Actions Are Weak Stellar Age Indicators in the Milky Way Disk, ApJ **867**, 31.
34. 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.
35. 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.
36. 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.
37. 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.
38. 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.
39. 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.
40. 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**
41. 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, A&A **590**, A32.
42. Ramírez, I., Meléndez, J., Bean, J., Asplund, M., *et al.*, 2014, The Solar Twin Planet Search. I. Fundamental Parameters of the Stellar Sample, A&A **572**, A48.
43. 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.
44. 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**, L32.

White Papers:

1. 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
2. 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.
3. 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.
4. Meléndez, J., Bean, J., **Bedell, M.**, Ramírez, I., *et al.*, 2015, *Using Solar Twins to Explore the Planet-Star Connection With Unparallelled Precision*, The Messenger **161**, 28.