Megan Bedell

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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

Positions Held

2019 – present | **Associate Research Scientist**, Center for Computational Astrophysics, Flatiron Institute
Junior faculty equivalent at a non-profit research institute

2021 – present | **Research Associate**, American Museum of Natural History
Zero-time honorary affiliation with NYC-area academic institution

2017 – 2019 | **Flatiron Research Fellow**, Center for Computational Astrophysics, Flatiron Institute
Independent postdoctoral research fellowship

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 Processing 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 *LSST 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

- 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

- 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

- 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

- 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

Publications *view on ADS*

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 α-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 $M_\oplus$ Super-Earth and an 8.3 $M_\oplus$ 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
- 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**
- 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**
- **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**
- 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
- 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**
- **Bedell, M.**, Meléndez, J., Bean, J., Ramírez, I., *et al.*, 2014, Stellar Chemical Abundances: In Pursuit of the Highest Achievable Precision, ApJ, **795**, 23
- 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**
- **Bedell, M.**, Villaume, A., Weiss, L., Sliski, D., *et al.*, 2011, Monitoring Hα Emission and Continuum of UXORs: RR Tauri, AJ, **142**, 164

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