

# Megan Bedell, Ph.D.

RESEARCH INTERESTS: exoplanet discovery & characterization;  
extreme precision radial velocity measurements;  
stellar spectroscopy;  
galactic archaeology;  
astronomical data analysis

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## POSITIONS HELD

ASSOCIATE RESEARCH SCIENTIST, Flatiron Institute	2019 – present
RESEARCH ASSOCIATE, American Museum of Natural History	2021 – present
FLATIRON RESEARCH FELLOW, Flatiron Institute	2017 – 2019

## EDUCATION

PHD in Astronomy & Astrophysics, University of Chicago Dissertation Title: Illuminating the Origins of Planets with Solar Twins Advisor: Jacob L. Bean	2012 – 2017
B.S., Haverford College	2008 – 2012

## 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

## GRANTS

Co-I, *“Improving the sensitivity of radial velocity spectrographs with data-driven techniques,”* funded through the NASA ADAP program for \$308k in FY2019-2021 (P.I. Bean).  
Co-I, *“Performing The Most Comprehensive Exoplanet Survey Of The Southern Sky With TESS Full Frame Images,”* funded for \$200k as a TESS Guest Investigator large program in FY2019 (P.I. Montet).  
PI, *“Precise Stellar Characterization as a Critical Test of TTV Mass Measurements,”* funded for \$15k as a NASA Keck program, 2017B.  
PI, *“A transiting super-Earth around a solar twin with evidence for planet accretion?,”* funded for \$10k as a Priority 1 Spitzer Guest Observer program, Cycle 12 (2016).

## OBSERVING TIME

Lead observer at ESO La Silla/HARPS	47 nights, 2013 - 2017
PI & lead observer at Keck/HIRES (NASA time)	4 half-nights, 2017
PI of NASA Spitzer program	15.4 hours, 2016
Observer at Keck/HIRES	2 half-nights, 2015
Observer at KPNO/WIYN 0.9m	3 nights, November 2011
Lead observer at Maria Mitchell Observatory/Loines 24-inch	40 nights, July - Sept. 2010

## SELECTED INVITED SEMINARS

University of Cambridge, Exo-Cam Seminar	February 2020
University College London, Seminar	February 2020
Penn State CEHW, Seminar	December 2019
Princeton IAS, Seminar	September 2019
American Museum of Natural History, Colloquium	May 2019

Carnegie DTM, Colloquium  
Vanderbilt, Astro Seminar  
Harvard CfA, Stars & Planets Seminar

March 2019  
April 2018  
November 2016

## SELECTED CONFERENCE PRESENTATIONS

Sagan Summer Workshop (invited talk)	July 2019
Gordon Research Conference on Origins of Solar Systems (invited talk)	June 2019
TESS Data Workshop (invited talk)	February 2019
Cool Stars 20 (contributed plenary talk)	August 2018
Know Thy Star, Know Thy Planet (contributed talk)	October 2017
Linking Exoplanet & Disk Compositions (contributed talk)	September 2016
Extreme Solar Systems III (contributed talk)	November 2015
Planet Signatures from Precision Spectroscopy (invited talk)	August 2015

## TEACHING & MENTORSHIP

Research supervisor to Joann Roberts, Simons-NSBP Scholar	2020
Research supervisor to Lily Zhao, Flatiron CCA Pre-Doctoral Scholar (1 publication resulting)	2019 – 2020
Research supervisor to Ilana Doran, Barnard Summer Research Institute student	2019
Research supervisor to Angus Beane, Flatiron CCA intern (1 publication resulting)	2018
Guest Lecturer, Columbia University	2018
Guest Lecturer, Universidade de São Paulo	2015

## OUTREACH

TESS Roulette interactive data viewer ( <a href="https://tess.casino">https://tess.casino</a> ); 43000 pageviews	
Local organizer, NYC Dept of Education STEM Career Day	2018
Presenter, NYC Astronomy on Tap	2018
Co-founder, Chicago Astronomy on Tap	2016 – 2017
Presenter, Chicago Life Long Learning	2015 – 2017
Presenter, Adler Planetarium Space Visualization Lab	2014 – 2017
Public Observing Coordinator, Haverford College	2009 – 2012

## OTHER PROFESSIONAL ACTIVITIES

Gaia-Kepler crossmatch database ( <a href="https://gaia-kepler.fun">https://gaia-kepler.fun</a> ); used in 39 peer-reviewed publications to date	
Grant reviewer for NASA, NSF, Swiss National Science Foundation	
Time Allocation Committee, <i>Transiting Exoplanet Survey Satellite</i>	2017, 2020
Science Organizing Committee, <i>Telluric Line Hack Week</i>	2019
Science Organizing Committee, <i>Building Early Science with TESS</i> workshop	2019
Science Organizing Committee, <i>TESS Preparatory Workshop</i>	2018
Science Organizing Committee, <i>Precision Spectroscopy</i>	2017
Referee for AAS, MNRAS, A&A journals	

## PRESS

Interviewed for [NPR All Things Considered](#), [Nature](#), [PBS News Hour](#), [Scientific American](#).  
“[Next to its solar twins, the sun stands out](#),” Science News article, 2018.  
“[Astronomers discover dark past of planet-eating ‘Death Star,’](#)” UChicago press release, 2016.  
“[Jupiter Twin Discovered Around Solar Twin](#),” ESO press release, 2015, covered by Associated Press, Discovery News, Space.com, and others.  
“[Oldest Solar Twin Identified](#),” ESO press release, 2013, covered by Science News, Space.com, and others.

## REFEREED WORKS

1. David, T., Sandoval, A., Angus, R., et al. *Small Planet Sizes Evolve Over Billions of Years*, ApJ in review, [arXiv:2011.09894](#).
2. **Zhao, L. L.**,<sup>1</sup> Hogg, D. W., **Bedell, M.**, et al. *Excalibur: A Non-Parametric, Hierarchical Wavelength-Calibration Method for a Precision Spectrograph*, AJ in press, [arXiv:2010.13786](#).
3. Spina, L., Nordlander, T., Casey, A. R., **Bedell, M.**, et al. *How Magnetic Activity Alters What We Learn from Stellar Spectra*, 2020, ApJ, 895, 52.
4. Montet, B. T., Feinstein, A. D., Luger, R., **Bedell, M.**, et al. *The Young Planet DS Tuc Ab has a Low Obliquity*, 2020, AJ, 159, 112.
5. Vedantham, H. K., Callingham, J. R., Shimwell, T. W., et al. *Coherent radio emission from a quiescent red dwarf indicative of star-planet interaction*, 2020, Nature Astronomy, 4, 577
6. Pope, B. J. S., **Bedell, M.**, Callingham, J. R., et al. *No Massive Companion to the Coherent Radio-emitting M Dwarf GJ 1151*, 2020, ApJL, 890, L19
7. Angus, R., Morton, T. D., Foreman-Mackey, D., et al., *Toward Precise Stellar Ages: Combining Isochrone Fitting with Empirical Gyrochronology*, 2019, AJ, 158, 173.
8. Blancato, K., Ness, M., Johnston, K. V., et al. *Variations in  $\alpha$ -element ratios trace the chemical evolution of the disk*, 2019, ApJ, 883, 34.
9. Luger, R., **Bedell, M.**, Vanderspek, R., et al. *TESS Photometric Mapping of a Terrestrial Planet in the Habitable Zone: Detection of Clouds, Oceans, and Continents*, ApJ in review, [arXiv:1903.12182](#).
10. Feinstein, A. D., Montet, B. T., Foreman-Mackey, D., **Bedell, M.**, et al., *eleonor: An open-source tool for extracting light curves from the TESS Full-Frame Images*, 2019, PASP, 131, 094502.
11. **Bedell, M.**, Hogg, D. W., Foreman-Mackey, D., et al. *wobble: a data-driven analysis technique for time-series stellar spectra*, 2019, AJ, 158, 164.
12. Kreidberg, L., Luger, R., & **Bedell, M.** *No Evidence for Lunar Transit in New Analysis of Hubble Space Telescope Observations of the Kepler-1625 System*, 2019, ApJL, 877, L15.
13. Carlos, M., Meléndez, J., Spina, L., et al. *The Li-age correlation: the Sun is unusually Li deficient for its age*, 2019, MNRAS, 485, 4052.
14. Lorenzo de Oliveira, D., Meléndez, J., Galarza, J. Y., et al. *Constraining the evolution of stellar rotation using solar twins*, 2019, MNRAS, 485, L68.
15. Botelho, R. B., Milone, A. de C., Meléndez, J., et al. *Thorium in solar twins: implications for habitability in rocky planets*, 2019, MNRAS, 482, 1690.
16. Mingarelli, C. M. F., Anderson, L., **Bedell, M.**, et al. *Improving Binary Millisecond Pulsar Distances with Gaia*, [arXiv:1812.06262](#).
17. **Beane, A.**,<sup>1</sup> Ness, M., & **Bedell, M.**, *Actions are weak stellar age indicators in the Milky Way disk*, 2018, ApJ 867, 31.
18. Crossfield, I. J. M., Guerrero, N., David, T., et al., *A TESS Dress Rehearsal: Planetary Candidates and Variables from K2 Campaign 17*, 2018, ApJS 239, 5.
19. Lorenzo-Oliveira, D., Freitas, F. C., Meléndez, J., **Bedell, M.**, et al., *The Solar Twin Planet Search: The age - chromospheric activity relation*, 2018, A&A 619, A73.
20. Spina, L., Meléndez, J., Karakas, A. I., et al., *The temporal evolution of neutron-capture elements in the Galactic discs*, 2018, MNRAS 474, 2580.
21. **Bedell, M.**, Bean, J.L., Meléndez, J., et al., *The Chemical Homogeneity of Sun-like Stars in the Solar Neighborhood*, 2018, ApJ 865, 68.

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<sup>1</sup>student advised by M.B.

22. dos Santos, L., Meléndez, J., **Bedell, M.**, et al., *Spectroscopic binaries in the Solar Twin Planet Search program: from substellar-mass to M dwarf companions*, 2017, MNRAS 472, 3425
23. Gandolfi, D., Barragán, O., Hatzes, A. P., et al., *The Transiting Multi-planet System HD 3167: A 5.7  $M_E$  Super-Earth and an 8.3  $M_E$  Mini-Neptune*, 2017, AJ 154, 123
24. **Bedell, M.**, Bean, J.L., Meléndez, J., et al., *Kepler-11 is a Solar Twin: Revising the Masses and Radii of Benchmark Planets via Precise Stellar Characterization*, 2017, ApJ 839, 94
25. Malik, M., Grosheintz, L., Mendonça, J. M., et al., *HELIOS: An Open-Source, GPU-Accelerated Radiative Transfer Code For Self-Consistent Exoplanetary Atmospheres*, 2017, AJ 153, 56
26. Meléndez, J., **Bedell, M.**, Bean, J.L., et al., *The Solar Twin Planet Search V. Close-in, low-mass planet candidates and evidence of planet accretion in the solar twin HIP 68468*, 2017, A&A 597, A34
27. Barragán, O., Grziwa, S., Gandolfi, D., et al., *EPIC 211391664b: A 32- $M_{\oplus}$  Neptune-sized planet in a 10-day orbit transiting an F8 star*, 2016, AJ 152, 193
28. dos Santos, L.A., Meléndez, J., do Nascimento, J.-D., Jr., **Bedell, M.**, et al., *The Solar Twin Planet Search IV. The Sun as a typical rotator and evidence for a new rotational braking law for Sun-like stars*, 2016, A&A 592, A156
29. Tucci Maia, M., Ramírez, I., Meléndez, J., **Bedell, M.**, et al., *The Solar Twin Planet Search III. The [Y/Mg] clock: estimating stellar ages of solar type stars*, 2016, A&A 590, A32
30. **Bedell, M.**, Meléndez, J., Bean, J.L., et al., *The Solar Twin Planet Search II. A Jupiter twin around a solar twin*, 2015, A&A 581, A34
31. **Bedell, M.**, Meléndez, J., Bean, J.L., et al., *Stellar Chemical Abundances: In Pursuit of the Highest Achievable Precision*, 2014, ApJ 795, 23
32. Ramírez, I., Meléndez, J., Bean, J.L., et al., *The Solar Twin Planet Search I. Fundamental parameters of the stellar sample*, 2014, A&A 572, A48
33. Meléndez, J., Ramírez, I., Karakas, A., et al., *18 Sco: a solar twin rich in refractory and neutron-capture elements. Implications for chemical tagging*, 2014, ApJ 791, 14
34. Monroe, T., Meléndez, J., Ramírez, I., et al., *High Precision Abundances of the Old Solar Twin HIP 102152: Insights on Li Depletion from the Oldest Sun*, 2013, ApJ 773, L32
35. **Bedell, M.**, Villaume, A., et al., *Monitoring  $H\alpha$  Emission and Continuum of UXORs: RR Tauri*, 2011, AJ 142, 164

#### INVITED REVIEWS

1. Meléndez, J., Bean, J. L., **Bedell, M.**, et al., 2015, The Messenger, 161, 28

#### WHITE PAPERS

1. Ford, E., **Bedell, M.**, Ciardi, D. R., et al., *Advanced Statistical Modeling of Ground-Based RV Surveys as Critical Support for Future NASA Earth-Finding Missions*, 2019, Astro2020: Decadal Survey on Astronomy and Astrophysics, 2020, 466.
2. Gaudi, S., Blackwood, G., Howard, A., et al., *Extreme Precision Radial Velocity Working Group*, 2019, BAAS 51, 232.