

Luke G. Bouma

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RESEARCH INTERESTS

- Exoplanets: formation, evolution, and long-term fates.
- Stellar and galactic astrophysics, including the evolution of young stars & dissolution of their host clusters.
- Computational methods in large-scale astrophysical data analysis (“big data”).

PROFESSIONAL APPOINTMENTS

Observatories of the Carnegie Institution for Science <i>Carnegie Fellow. Supervisor: J. Spake</i>	Pasadena, CA 09/2024–present
California Institute of Technology <i>Heising Simons 51 Pegasi b Fellow. Supervisor: L. Hillenbrand</i>	Pasadena, CA 09/2021–09/2024

EDUCATION

Princeton University <i>Ph.D, Astrophysics. Thesis: “Origins and Fates of Close-In Giant Planets”</i> <i>M.A, Astrophysics. Advisor: J. Winn</i>	Princeton, NJ 09/2018–08/2021 09/2016–08/2018
Massachusetts Institute of Technology <i>Physics Ph.D. program (transferred after completing first year). Advisor: J. Winn</i>	Cambridge, MA 09/2015–08/2016
University of Southern California <i>B.Sc, Physics; B.A, Mathematics; Minor, Astronomy</i>	Los Angeles, CA 09/2011–05/2015

PUBLICATION SUMMARY

Refereed publications: 74 (13 first author; 2 second author; 34 many author; 25 TESS collaboration).

Non-refereed publications: 2 (1 white paper; 1 research note).

Citations: 485 first & second author; 1862 many author; 7061 code. *h-index:* 29.

My first & second author publications are [listed here](#); a full publication list is [available here](#).

DISTINCTIONS

- 2024–26 Carnegie Fellowship *Postdoctoral fellowship in astrophysics.*
- 2021–24 Heising-Simons 51 Pegasi b Fellowship *Postdoctoral fellowship in planetary astronomy.*
- 2020–21 Charlotte Elizabeth Procter Fellowship *Honorific fellowship for final-year Ph.D. students.*
- 05/2015 USC Discovery Scholar *University fellowship based on research portfolio.*
- 04/2014 Goldwater Scholarship *National fellowship for undergraduates pursuing careers in STEM.*
- 2011–15 USC Trustee and University Scholarships *Full tuition award and merit stipend.*

GRANTS (The † symbol denotes active or pending awards)

- † 05/2025 Co-I: NASA TESS Cycle 7 GI Program G07140. (PI: A. Boyle)
The TESS Sco-Cen Legacy Survey.
- † 12/2023 PI: NASA TESS Cycle 6 GI Program G06030.
A Census Of Complex Periodic Variables.
- † 02/2023 Collaborator: NASA Astrophysics Data Analysis Program (PI: K. Pardo).
Detecting Gravitational Waves from Supermassive Black Holes with Kepler.

- 12/2021 PI: NASA TESS Cycle 4 GI Program G04032.
Difference Imaging of Stars in Clusters.
- 06/2020 Co-I: NASA TESS Cycle 3 GI Program G03064 (PI: J. Hartman).
Cluster Difference Imaging Photometric Survey.
- 07/2019 Co-I: NASA TESS Cycle 2 GI Program G022117 (PI: J. Hartman).
Cluster Difference Imaging Photometric Survey.
- 07/2018 Co-I: NASA TESS Cycle 1 GI Program G011103 (PI: J. Hartman).
Difference Imaging of Star Clusters at Low Galactic Latitude.

ADVISING

POST-BACCALAUREATE STUDENT

Andrew Boyle (Caltech): May 2022-May 2023. Grad school, astrophysics, UNC Chapel Hill.

UNDERGRADUATE STUDENTS

Elin Stenmark (Caltech 1st-2nd year): July 2023-Sept 2024. Currently at Caltech.

Elsa Palumbo (Caltech 3rd-4th year): Jan 2022-May 2023. Grad school, statistics, Carnegie Mellon.

HIGH SCHOOL STUDENTS

Thaddaeus Kiker (Sunny Hills High School, 11th grade): Jan 2022-Sep 2022. Undergrad, physics, Columbia.

Veronica Diaz (Sunny Hills High School, 11th grade): Jan 2022-Sep 2022. Undergrad, CS, Carnegie Mellon.

SERVICE & PUBLIC ENGAGEMENT

- *Prison Education Project*: Jan 2022 – present. Designed and facilitated academic workshops in prisons. Topics have included career development, astronomy, and a mix of astronomy and planetary science. 10-20 students attended each workshop per two-month term. Prisons have been in California (Spring 2022, Summer 2024, Fall 2024), Scotland (Summer 2022), and Hawaii (Fall 2022, Spring 2023, Fall 2023, Spring 2024); my current focus is on an Introduction to Astronomy workshop at Stanislaus Juvenile Hall in Modesto, CA.
- *Skype a Scientist*: Oct 2020 – Spring 2022. Gave 15 remote public talks in K-12 classrooms.
- *Resident Graduate Student*: Sept 2018 – May 2021. Resident advisor to 30 undergraduate students per year. Encouraged a supportive residential environment; hosted star-gazing nights, office hours, and social events; during COVID, focused on academic support and one-on-one advising.
- *Observing Outreach Organizer*: Sept 2016 – Sept 2019. Organized over 30 public observing events at Princeton's department telescope. Led outreach team to host groups ranging from 10 to 100 people; also hosted private groups (e.g., middle and high-school classes; student clubs; university staff).
- *Princeton LGBT Center Discussion Group Co-Organizer*: Sept 2018 – May 2019. Hosted a discussion group for students to speak about identity, orientation, relationships, and community.

PROFESSIONAL ACTIVITIES

Member, [TESS Users Committee](#) (2023-present).

Reviewer for NASA Keck Time Allocation Committee (2024)

Co-organizer for Caltech Tea Talk seminars (2023-2024).

Organizer of Caltech Star Formation and Young Stars reading group (2022-2024).

Reviewer for Caltech Optical Observatories Time Allocation Committee (2022).

Chair, [Emerging Researchers in Exoplanet Science \(ERES\) 2021](#).

Active referee for AJ, ApJ, ApJL, Nature Astronomy, A&A, MNRAS, PASP (15 articles; 2019-present).

Reviewer for NASA panels (2021, 2022, 2023).

Member, American Astronomical Society (AAS). (2018-present)

Member, Division for Planetary Sciences of the AAS. (2020-present)

Member, TESS Follow-up Observing Program (TFOP; 2018-present).

Organizer, TESS Extended Mission Working Group (2015-2018).

PUBLICATION LIST [[LINK TO ADS LIBRARY](#)]

First & second author

The † symbol highlights students for whom I served as the primary research mentor.

15. Bouma, L., Hillenbrand, L., et al. *Ages of Stars and Planets in the Kepler Field Younger Than Four Billion Years*. AJ, in press, [arXiv:2410.06246](#) (2024).
14. Bouma, L., Jayaraman, R., et al. *Transient Corotating Clumps Around Adolescent Low-Mass Stars From Four Years of TESS*. AJ, 167, 38 (2024).
13. †Boyle, A. and Bouma, L. *When Does Gyrochronology Start to Work? – Stellar Rotation and Structure of the α Persei Complex*. AJ, 166, 14 (2023).
12. Bouma, L., †Palumbo, E. and Hillenbrand, L. *The Empirical Limits of Gyrochronology*. ApJL, 947, 3 (2023).
11. Bouma, L., Kerr, R., et al. *Kepler and the Behemoth: Three Mini-Neptunes in a 40 Million Year Old Association*. AJ, 164, 215 (2022).
10. Bouma, L., Curtis, J., et al. *A 38 Million Year Old Neptune-Sized Planet in the Kepler Field*. AJ, 163, 121 (2022).
9. Bouma, L., Curtis, J., et al. *Rotation and Lithium Confirmation of a 500 Parsec Halo for the Open Cluster NGC 2516*. AJ, 162, 197 (2021).
8. Bouma, L., Hartman, J., et al. *Cluster Difference Imaging Photometric Survey. II. TOI 837: A Young Validated Planet in IC 2602*. AJ, 160, 239 (2020).
7. Bouma, L., Winn, J., et al. *PTFO 8-8695: Two Stars, Two Signals, No Planet*. AJ, 160, 86 (2020).
6. Bouma, L., Winn, J., et al. *WASP-4 is Accelerating Toward the Earth*. ApJL, 893, 2 (2020).
5. Bouma, L., Hartman, J., et al. *Cluster Difference Imaging Photometric Survey. I. Light Curves of Stars in Open Clusters from TESS Sectors 6 & 7*. ApJS, 245, 13 (2019).
4. Bouma, L., Winn, J., et al. *WASP-4b Arrived Early for the TESS Mission*. AJ, 157, 217 (2019).
3. Bouma, L., Masuda, K., and Winn, J. *Biases in Planet Occurrence Caused by Unresolved Binaries in Transit Surveys*. AJ, 155, 244 (2018).
2. Penev, K., Bouma, L., et al. *Empirical Tidal Dissipation in Exoplanet Hosts From Tidal Spin-Up*. AJ, 155, 165 (2018).
1. Bouma, L., Winn, J., et al. *Planet-Detection Simulations for Several Possible TESS Extended Missions*. [arXiv:1705.08891](#) (2017). Non-refereed white paper.

Many author

For each of these articles, I contributed key methods, data, code, and/or co-authored significant portions of the text.

34. Kerr, R. et al., incl. Bouma, L. *SPYGLASS. V. Spatially and Temporally Structured Star-Forming Environments in the Cepheus-Hercules Complex*. ApJ in press, [arXiv:2406.19530](#) (2024).
33. Dai, F. et al., incl. Bouma, L. *The Prevalence of Resonance Among Young, Close-in Planets*. AJ in press, [arXiv:2406.06885](#) (2024).

32. Sha, L., Vanderburg, A., Bouma, L., and Huang, C. *Confirming the Tidal Tails of the Young Open Cluster Blanco 1 with TESS Rotation Periods*. ApJ in press. [arXiv:2409.07550](https://arxiv.org/abs/2409.07550) (2024).
31. Kiker, T.[†], Diaz, V.[†], Bouma, L., et al., *HD 34382: A Photometrically Identified Candidate Centrifugal Magnetosphere Star*. *RNAAS*, **8**, 238 (2024).
30. Vach, S. et al., incl. Bouma, L. *The occurrence of small, short-period planets younger than 200 Myr with TESS*. *AJ*, **167**, 210 (2024).
29. Hartman, J. et al., incl. Bouma, L. *TOI 4201 b and TOI 5344 b: Discovery of Two Transiting Giant Planets Around M Dwarf Stars and Revised Parameters for Three Others*. *AJ*, **166**, 163 (2023).
28. Dai, F. et al., incl. Bouma, L. *A Mini-Neptune Orbiting the Metal-poor K Dwarf BD+29 2654*. *AJ*, **166**, 49 (2023).
27. Blunt, S. et al., incl. Bouma, L. *Overfitting Affects the Reliability of Radial Velocity Mass Estimates of the V1298 Tau Planets*. *AJ*, **166**, 62 (2023).
26. Wood, M. et al., incl. Bouma, L. *TESS Hunt for Young and Maturing Exoplanets (THYME) VII: a 27 Myr extended population of Lower-Centaurus Crux with a transiting two-planet system*. *AJ*, **165**, 85 (2023).
25. Yee, S. et al., incl. Bouma, L. *The TESS Grand Unified Hot Jupiter Survey. II. Twenty Hot Jupiters*. *ApJS*, **265**, 1 (2023).
24. Heitzmann, A. et al., incl. Bouma, L. *TOI-4562 b: A highly eccentric temperate Jupiter analog orbiting a young field star*. *AJ*, **165**, 121 (2023).
23. Dai, F. et al., incl. Bouma, L. *TOI-1136 is a Young, Coplanar, Aligned Planetary System in a Pristine Resonant Chain*. *AJ*, **165**, 33 (2023).
22. Hua, X. et al., incl. Bouma, L. *A Transiting Super-Earth in the Radius Valley and an Outer Planet Candidate Around HD 307842*. *AJ* **166**, 32 (2023).
21. Stassun, K. et al., incl. Bouma, L. *A Low-Mass Pre-Main-Sequence Eclipsing Binary in Lower Centaurus Crux Discovered with TESS*. *AJ*, **941**, 125 (2022).
20. Kounkel, M. et al., incl. Bouma, L. *Untangling the Galaxy. IV. Empirical Constraints on Angular Momentum Evolution and Gyrochronology for Young Stars in the Field*. *AJ*, **164**, 137 (2022).
19. Palumbo, E. et al., incl. Bouma, L. *Evidence for Centrifugal Breakout around the Young M Dwarf TIC 234284556*. *ApJ*, **925**, 75 (2022).
18. Zhou, G. et al., incl. Bouma, L. *A Mini-Neptune from TESS and CHEOPS Around the 120 Myr Old AB Dor member HIP 94235*. *AJ*, **163**, 289 (2022).
17. Günther, M. et al., incl. Bouma, L. *Complex Modulation of Rapidly Rotating Young M Dwarfs: Adding Pieces to the Puzzle*. *AJ*, **163**, 144 (2022).
16. Heitzmann, A. et al., incl. Bouma, L. *The obliquity of HIP 67522 b: a 17 Myr old transiting hot Jupiter-sized planet*. *ApJL*, **922**, 1 (2021).
15. Fausnaugh, M. et al., incl. Bouma, L. *The TESS Mission Target Selection Procedure*. *PASP*, **133**, 1027 (2021).
14. Grieves, N. et al., incl. Bouma, L. *Populating the brown dwarf and stellar boundary: Five stars with transiting companions near the hydrogen-burning mass limit*. *A&A*, **652**, 127 (2021)
13. Wirth, C. et al., incl. Bouma, L. *TOI-942b: A Prograde Neptune in a ~60 Myr old Multi-transiting System*. *ApJL*, **917**, 34 (2021).
12. Stassun, K. et al., incl. Bouma, L. *Discovery and Characterization of a Rare Magnetic Hybrid β Cephei Slowly Pulsating B-type Star in an Eclipsing Binary in the Young Open Cluster NGC 6193* *AJ*, **910**, 133 (2021).

11. Tofflemire, B. et al., incl. Bouma, L. *TESS Hunt for Young and Maturing Exoplanets (THYME) V: A Sub-Neptune Transiting a Young Field Star*. *AJ*, **161**, 171 (2021).
10. Zhou, G. et al., incl. Bouma, L. *Two young planetary systems around field stars with ages between 10–170 Myr from TESS*. *AJ*, **161**, 2 (2021).
9. Patra, K. et al., incl. Bouma, L. *The Continuing Search For Evidence of Tidal Orbital Decay For Hot Jupiters*. *AJ*, **159**, 150 (2020).
8. Soares-Furtado, M. et al., incl. Bouma, L. *A Catalog of Periodic Variables in Open Clusters M 35 and NGC 2158*. *ApJS*, **246**, 15 (2020).
7. Rodríguez Martínez, R. et al., incl. Bouma, L. *KELT-25b and KELT-26b: A Hot Jupiter and a Substellar Companion Transiting Young A-Stars Observed by TESS*. *ApJS*, **246**, 15 (2020).
6. Newton, E. et al., incl. Bouma, L. *TESS Hunt for Young and Maturing Exoplanets (THYME): A Planet in the 45 Myr Tucana-Horologium Association*. *ApJL*, **880**, 1, L17 (2019).
5. Zhan, Z. et al., incl. Bouma, L. *Complex Rotational Modulation of Rapidly Rotating M Stars Observed with TESS*. *ApJ*, **876**, 127 (2019).
4. Rappaport, S. et al., incl. Bouma, L. *Deep long asymmetric occultation in EPIC 204376071*. *MNRAS*, **485**, 2681 (2019).
3. Burt, J. et al., incl. Bouma, L. *Simulating the M-R Relation From APF Followup of TESS Targets: Survey Design and Strategies for Overcoming Mass Biases*. *AJ*, **156**, 255 (2018).
2. Louie, D. et al., incl. Bouma, L. *Simulated JWST/NIRISS Transit Spectroscopy of Anticipated TESS Planets Compared to Select Discoveries from Space-Based and Ground-Based Surveys*. *PASP* **130d** 4401 (2018).
1. Campante, T. et al., incl. Bouma, L. *The asteroseismic potential of TESS: Exoplanet-Host Stars*. *ApJ*, **830**, 2 (2016).

TESS Collaboration

These are papers for which my authorship results from my contributions to mission planning and internal data analysis in the TESS collaboration. In all such instances, I provided substantive feedback on the manuscripts.

25. Thao, P. et al., incl. Bouma, L. *TESS Hunt for Young and Maturing Exoplanets (THYME) X: a two-planet system in the 210 Myr MELANGE-5 Association*. *AJ*, **168**, 41 (2024).
24. Capistrant, B. et al., incl. Bouma, L. *TESS Hunt for Young and Maturing Exoplanets. XI. An Earth-sized Planet Orbiting a Nearby, Solar-like Host in the 400 Myr Ursa Major Moving Group*. *AJ*, **167**, 54 (2024).
23. Fairnington, T. et al., incl. Bouma, L. *TOI-5126: a hot super-Neptune and warm Neptune pair discovered by TESS and CHEOPS*. *MNRAS*, **527**, 3 (2024).
22. Naponiello, L. et al., incl. Bouma, L. *A super-massive Neptune-sized planet*. *Nature*, **622**, 255 (2023).
21. Osborn, A. et al., incl. Bouma, L. *TOI-332 b: a super dense Neptune found deep within the Neptunian desert*. *MNRAS*, **526**, 548 (2023).
20. Sha, L. et al., incl. Bouma, L. *TESS Spots a Mini-Neptune Interior to a Hot Saturn in the TOI-2000 System*. *MNRAS*, **524**, 1113 (2023).
19. Bozhilov, V. et al., incl. Bouma, L. *A 2:1 Mean-Motion Resonance Super-Jovian pair revealed by TESS, FEROS, and HARPS*. *ApJL*, **946**, 36 (2023).
18. El Mufti, M. et al., incl. Bouma, L. *TOI-560: Two Transiting Planets Orbiting a K Dwarf Validated with iSHELL, PFS and HIRES RVs*. *AJ*, **165**, 10 (2023).
17. Cadieux, C. et al., incl. Bouma, L. *TOI-1452 b: SPIRou and TESS reveal a temperate super-Earth around a nearby M4 dwarf*. *AJ*, **164**, 96 (2022).

16. Hord, B. et al., incl. Bouma, L. *The Discovery of a Planetary Companion Interior to Hot Jupiter WASP-132b*. [AJ, 164, 13](#) (2022).
15. Wittenmyer, R. et al., incl. Bouma, L. *TOI-1842b: A Transiting Warm Saturn Undergoing Reinflation around an Evolving Subgiant*, [AJ, 163, 82](#) (2022).
14. Cabot, S. H. C. et al., incl. Bouma, L. *TOI-1518b: A Misaligned Ultra-hot Jupiter with Iron in Its Atmosphere*. [AJ, 162, 218](#) (2021).
13. Addison, B. C. et al., incl. Bouma, L. *TOI-1431b/MASCARA-5b: A Highly Irradiated Ultra-Hot Jupiter Orbiting One of the Hottest & Brightest Known Exoplanet Host Stars*. [AJ, 162, 292](#) (2021).
12. Hedges, C. et al., incl. Bouma, L. *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](#) (2021).
11. Guerrero, N. et al., incl. Bouma, L. *The TESS Objects of Interest Catalog from the TESS Prime Mission*. [ApJS, 254, 39](#) (2021).
10. Dawson, B. et al., incl. Bouma, L. *Precise transit and radial-velocity characterization of a resonant pair: a warm Jupiter TOI-216c and eccentric warm Neptune TOI-216b*. [AJ, 161, 161](#) (2021).
9. Daylan, T. et al., incl. Bouma, L. *TESS discovery of a super-Earth and three sub-Neptunes hosted by the bright, Sun-like star HD 108236*. [AJ, 161, 85](#) (2021).
8. Fridlund, M. et al., incl. Bouma, L. *The TOI-763 system: sub-Neptunes orbiting a Sun-like star*. [MNRAS, 498, 3](#) (2020).
7. Rowden, P., et al., incl. Bouma, L. *TIC 278956474: Two Close Binaries in One Young Quadruple System Identified by TESS*. [AJ, 160, 2](#) (2020).
6. Jordán, A. et al., incl. Bouma, L. *TOI-677 b: A Warm Jupiter ($P=11.2d$) on an eccentric orbit transiting a late F-type star*. [AJ, 159, 145](#) (2020).
5. Quinn, S. et al., incl. Bouma, L. *Near-resonance in a system of sub-Neptunes from TESS*. [AJ, 158, 177](#) (2019).
4. Günther, M. et al., incl. Bouma, L. *A Super-Earth and two sub-Neptunes transiting the bright, nearby, and quiet M-dwarf TOI-270*. [Nature Astronomy, 3, 1099](#) (2019).
3. Dawson, B. et al., incl. Bouma, L. *TOI-216b and TOI-216c: Two warm, large exoplanets in or slightly wide of the 2:1 orbital resonance*. [AJ, 158, 65](#) (2019).
2. Shporer, A. et al., incl. Bouma, L. *TESS Full Orbital Phase Curve of the WASP-18b System*. [AJ, 157, 178](#) (2019).
1. Rodriguez, J. et al., incl. Bouma, L. *An Eccentric Massive Jupiter Orbiting a Sub-Giant on a 9.5 Day Period Discovered in the TESS Full Frame Images*. [AJ, 157, 191](#) (2019).

Software

4. Foreman-Mackey, D., et al., incl. Bouma, L. *exoplanet: Gradient-based probabilistic inference for exoplanet data & other astronomical time series*. [JOSS, 6, 62, 3285](#) (2021).
3. Bhatti, W. Bouma, L., and Yee S. *cdips-pipeline: difference-imaging photometry pipeline*. [Link](#).
2. Bhatti, W. Bouma, L., and Wallace J. *astrobases: package for variable star astronomy*. [Link](#).
1. Astropy Collaboration et al., incl. Bouma, L. *The Astropy Project*. [AJ, 156, 123](#) (2018).

RECENT SEMINARS & COLLOQUIA

- USC Physics & Astronomy Colloquium (Invited), February 2024
- OSU Astronomy Colloquium (Invited), February 2024
- Michigan State University Astrophysics Research Seminar (Invited), February 2024
- Caltech/IPAC Seminar (Invited), January 2024
- UH Manoa Institute for Astronomy Colloquium (Invited), January 2024
- MIT TESS Science Talks Seminar (Invited), January 2024
- Caltech Tea Talk Seminar, November 2023
- University of Geneva Exoplanets Seminar, March 2023
- Yale Exoplanets/Stars Seminar (Invited), February 2023
- Earth 2.0 Mission Science Seminar Series (Invited), October 2022
- University of Michigan Star and Planet Formation Seminar, September 2022
- MIT TESS Science Talks Seminar (Invited), March 2022
- Penn State Center for Exoplanets and Habitable Worlds (Invited), April 2021

RECENT TALKS & POSTERS

- Keck Science Meeting 2024 (Talk), Caltech, Pasadena, CA, September 2024.
- TESS Science Conference 3 (Talk), MIT, Cambridge, MA, July 2024.
- Cool Stars 22 (Talk), UC San Diego, San Diego, CA, June 2024.
- Astronomy on Tap (Invited Public Talk), Pasadena, CA, November 2023.
- TASC7 (Talk), UH Manoa, Oahu, HI, July 2023.
- SPIDI23 (Invited Review), IESC, Cargèse, Corsica, France, May 2023.
- ESA ESTEC Planet-ESLAB-2023 Symposium (Talk), Noordwijk, Netherlands, March 2023.
- Flatiron Institute / CCA Thursday Lunch Talk, New York, NY, February 2023.
- 51 Pegasi Summit (Talk & Fun-Talk), San Francisco, CA, August 2022.
- ERES-VII (Poster), State College, PA, July 2022.
- AAS Meeting #240 (Talk), Pasadena, CA, June 2022.
- Exoplanets IV (Talk), Las Vegas, NV, May 2022.
- JHU-APL Exoplanet Early Career Highlight Seminar (Talk), Online, January 2022.
- TESS Science Conference II (Talk), Online, August 2021.
- AAS Meeting #238 (Talk & Press Conference), Online, July 2021