Luke G. Bouma

he/him/his

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Research Interests

- The formation, evolution, and long-term fates of planetary systems.
- Discovery and characterization of exoplanets using ground and space-based observatories.
- Evolution of young stars and their host clusters.

Professional Appointments

California Institute of Technology — Pasadena, CA
51 Pegasi b Fellow in Planetary Astronomy. Supervisor: L. Hillenbrand — *09/2021–present*

Education

Princeton University — Princeton, NJ
Ph.D, Astrophysics. Thesis: "Origins and Fates of Close-In Giant Planets" — *09/2018–08/2021*
M.A, Astrophysics. Supervisor: J. Winn — *09/2016–08/2018*

Massachusetts Institute of Technology — Cambridge, MA
Physics Ph.D. program (transferred after completing first year). Supervisor: J. Winn — *09/2015-08/2016*

University of Southern California — Los Angeles, CA
B.Sc, Physics; B.A, Mathematics; Minor, Astronomy — *09/2011-05/2015*

Publication Summary

Refereed & submitted publications: 45 (10 first author; 1 second author).

White papers: 1 (1 first author).

Total citations to publications: 3,418 (223 first & second author; 652 many author; 2543 code).

A full listing of my publications is available in the publication list below, and online.

Awards

2021–24 Heising-Simons 51 Pegasi b Fellowship

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 towards graduate study.*

05/2014 Caltech Summer Undergraduate Research Fellowship (Pasadena, CA)

04/2014 Goldwater Scholarship *National fellowship for undergraduates pursuing careers in STEM.*

05/2013 NIST Summer Undergraduate Research Fellowship (Boulder, CO)

2011–15 USC Trustee and University Scholarships *Full tuition award and merit stipend.*

Service & Public Engagement

- *Skype a Scientist*: Spring 2020 – present. Gave 15 remote public talks in K-12 classrooms.
- *Resident Graduate Student*: Fall 2018 – May 2021. Resident advisor to 30 undergraduate students per year. Encouraged a civilized and supportive residential environment; hosted star-gazing nights, office hours, and social events; post-COVID, focused on academic support and 1-on-1 advising.

- *Observing Outreach Organizer*: Fall 2016 – Fall 2019. Organized over 20 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*: Fall 2018 – Summer 2019. Hosted a discussion group for students to speak about identity, orientation, relationships, and community.
- *Computational Astrophysics Seminar Co-Founder & Organizer*: Jan 2017 – June 2018. With a team of two other students, proposed and received funding from Princeton's graduate student initiatives to run a seminar. Invited speakers, advertized events, and chaired talks.
- *Princeton Thunch Co-Organizer*: Jan 2017 – Dec 2017. Invited speakers; made hosting arrangements; chaired talks; developed new lunch delivery system.

Professional Activities

Chair, Emerging Researchers in Exoplanet Science (ERES) 2021.

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

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

Active referee for AJ, ApJL, Nature Astronomy, A&A, MNRAS, PASP.

Reviewer for NASA and NOIRLab panels (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

11. Bouma, L., Kerr, R., et al. *Kepler and the Behemoth: Three Mini-Neptunes in a 40 Million Year Old Association*. arXiv:2205.01112. AAS journals, submitted.
10. Bouma, L., Curtis, J., et al. *A 38 Million Year Old Neptune-Sized Planet in the Kepler Field*. AJ, 163, 3, 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, 5, 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, 5, 239 (2020).
7. Bouma, L., Winn, J., et al. *PTFO 8-8695: Two Stars, Two Signals, No Planet*. AJ, 160, 2, 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., 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

36. Hord, B. et al., incl. Bouma, L. *The Discovery of a Planetary Companion Interior to Hot Jupiter WASP-132b*. AAS journals, submitted.
35. Heitzmann, A. et al., incl. Bouma, L. *TOI-4562 b: A highly eccentric cold Jupiter analog orbiting a young star*. AAS journals, submitted.
34. Cadieux, C. et al., incl. Bouma, L. *TOI-1452 b: SPIRou and TESS reveal a temperate super-Earth around a nearby M4 dwarf*. AAS Journals, submitted.
33. El Mufti, M. et al., incl. Bouma, L. *TOI 560 : Two Transiting Planets Orbiting a K Dwarf Validated with iSHELL, PFS and HIRES RVs*. AAS journals, submitted. arXiv: 2112.13448.
32. Palumbo, E. et al., incl. Bouma, L. *Evidence for Centrifugal Breakout around the Young M Dwarf TIC 234284556*. AAS journals, submitted. arXiv: 2107.05649.
31. Zhou, G.. et al., incl. Bouma, L. *A Mini-Neptune from TESS and CHEOPS Around the 120 Myr Old AB Dor member HIP 94235*. AAS journals, submitted.
30. 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).
29. Fausnaugh, M. et al., incl. Bouma, L. *The TESS Mission Target Selection Procedure*. PASP. 133, 1027 (2021).
28. 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)
27. Wirth, C. et al., incl. Bouma, L. *TOI-942b: A Prograde Neptune in a ∼60 Myr old Multi-transiting System* . ApJL, 917, 34 (2021).
26. 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).
25. Günther, M. et al., incl. Bouma, L. *Complex Modulation of Rapidly Rotating Young M Dwarfs: Adding Pieces to the Puzzle*. AAS journals, submitted. arXiv: 2008.11681.
24. 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).
23. Guerrero, N. et al., incl. Bouma, L. *The TESS Objects of Interest Catalog from the TESS Prime Mission*. ApJS, 254, 39 (2021).
22. 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).
21. 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).
20. 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).
19. 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).
18. 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).
17. Fridlund, M.. et al., incl. Bouma, L. *The TOI-763 system: sub-Neptunes orbiting a Sun-like star*. MNRAS, 498, 3 (2020).

16. Rowden, P., et al., incl. Bouma, L. *TIC 278956474: Two Close Binaries in One Young Quadruple System Identified by TESS*. AJ, 160, 2 (2020).
15. Patra, K. et al., incl. Bouma, L. *The Continuing Search For Evidence of Tidal Orbital Decay For Hot Jupiters*. AJ, 159, 150 (2020).
14. 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).
13. 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).
12. 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).
11. 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).
10. Quinn, S. et al., incl. Bouma, L. *Near-resonance in a system of sub-Neptunes from TESS*. AJ, 158, 177 (2019).
9. 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 (2019).
8. 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).
7. Shporer, A. et al., incl. Bouma, L. *TESS Full Orbital Phase Curve of the WASP-18b System*. AJ, 157, 178 (2019).
6. Zhan, Z. et al., incl. Bouma, L. *Complex Rotational Modulation of Rapidly Rotating M Stars Observed with TESS*. ApJ, 876, 127 (2019).
5. Rappaport, S. et al., incl. Bouma, L. *Deep long asymmetric occultation in EPIC 204376071*. MNRAS, 485, 2681 (2019).
4. 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).
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).

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. `astrobase`*: package for variable star astronomy*. Link.
1. Astropy Collaboration et al., incl. Bouma, L. *The Astropy Project*. AJ, 156, 123 (2018).

Selected Grants

10/2021 PI: TESS Cycle 4 GI Program G04032.
Difference Imaging of Stars in Clusters.

06/2020 Co-I: TESS Cycle 3 GI Program G03064 (PI: Hartman).
Cluster Difference Imaging Photometric Survey.

07/2019 Co-I: TESS Cycle 2 GI Program G022117 (PI: Hartman).
Cluster Difference Imaging Photometric Survey.

07/2018 Co-I: TESS Cycle 1 GI Program G011103 (PI: Hartman).
Difference Imaging of Star Clusters at Low Galactic Latitude.

Selected Observing Programs

06/2021 PI: Keck/HIRES (2 nights).
Confirming Transiting Planets Around Young Stars.

12/2021 Co-I: NOAO LCOGT 1 m, 2 m, & MuSCAT3 (20, 1.2, & 1.1 nights) (PI: J. Hartman, 2022A-934009).
Confirming and Characterizing Transiting Planets From HAT+TESS with LCO.
Note: Long-term status awarded for 2022A, 2022B, 2023A.

06/2021 Co-I: Keck/HIRES (1 night) (PI: L. Hillenbrand).
Confirming a 30 Million Year Old Mini-Neptune and Measuring its Stellar Obliquity.

06/2021 Co-I: NOAO LCOGT 1 m & 2 m (20 & 2.5 nights) (PI: J. Hartman, 2021B-0004).
Confirming and Characterizing Transiting Planets From HAT+TESS with LCO.

06/2021 Co-I: TESS GI Program G04240 (PI: E. Gillen).
Planets And Stellar Activity Through Time

06/2021 Co-I: TESS GI Program G04168 (PI: R. Jayaraman).
Complex Photometric Modulations of Rapidly-Rotating M Dwarfs in the Northern Sky and the Ecliptic

12/2020 PI: NOIRLab Minerva-Australis (2 nights).
Confirming and Characterizing Transiting Planets Around Young Stars.

12/2020 Co-I: NOAO LCOGT 1 m & 2 m (20 & 2 nights) (PI: J. Hartman, 2021A-0045).
Confirming and Characterizing Transiting Planets From HAT+TESS with LCO.

11/2020 PI: Magellan/PFS (2 nights; Princeton TAC).
Confirming and Characterizing Transiting Planets Around Young Stars

10/2020 PI: TESS Director's Discretionary Time
Complex Modulation of Rapidly Rotating Young M Dwarfs

06/2020 PI: NOIRLab CTIO1.5m/CHIRON & AAT/Veloce (4 nights & 2.5 nights).
A Search for Transiting Giant Planets Around Young Stars.

06/2020 Co-I: NOAO LCOGT 1 m & 2 m (22 & 2.5 nights) (PI: J. Hartman, 2020B-0047).
Confirming and Characterizing Transiting Planets From HAT+TESS with LCO.

06/2020 Co-I: TESS GI Program G03007 (PI: G. Zhou).
Anchoring Planet Evolution Through Time.

06/2020 Co-I: TESS GI Program G03064 (PI: S. Quinn).
The Confirmation And Characterization Of Small TESS Planets.

05/2020 PI: Magellan/PFS (2 nights; Princeton TAC).
Confirming and Characterizing Transiting Planets Around Young Stars.

12/2019 Co-I: NOAO LCOGT 1 m & 2 m (27 nights & 2.5 nights) (PI: Hartman, 2020A-0141).
Confirming and Characterizing Transiting Planets From HAT+TESS with LCO.

12/2019 PI: NOAO CTIO1.5m/CHIRON; AAT/Veloce (3 nights & 2.5 nights).
A Search for Transiting Giant Planets Around Young Stars.

11/2019 PI: Magellan/PFS (1 night; Princeton TAC).
A Search for Transiting Giant Planets Around Young Stars.

Seminars & Colloquia

- MIT TESS Science Talks Seminar (Invited), March 2022
- Penn State Center for Exoplanets and Habitable Worlds (Invited), April 2021
- Harvard Exoplanet Pizza Lunch, April 2021
- JPL Astrophysics Colloquium (Invited), October 2020
- Caltech Dix Planetary Science Seminar, October 2020
- UCLA Physics and Astronomy Lunch Talk Series, September 2020
- University of Chicago Exoplanet Seminar, March 2020
- Princeton Thunch Seminar, January 2019

Conference Talks & Posters

- Exoplanets IV (Talk), *The Youngest Planets from the Prime Kepler Mission*, May 2022
- JHU-APL Exoplanet Early Career Highlight Seminar (Talk), *A 38 Million Year Old Neptune-Sized Planet in the Kepler Field*, January 2022
- TESS Science Conference II (Talk), *Young Planets in the Halos of Nearby Open Clusters*, August 2021
- AAS Meeting #238 (Talk & Press Conference), *An Open Cluster Spread Across 500 Parsecs*, July 2021
- THYME 2020 Conference (Invited Talk), *Snapshots of Planet Evolution taken by the Cluster Difference Imaging Photometric Survey*, December 2020
- ExSoCal 2020 (Poster), *PTFO 8-8695: Two Stars, Two Signals, No Planet*, September 2020
- TESS Science Team Meeting #19 (Talk), *PTFO 8-8695: Two Stars, Two Signals, No Planet*, June 2020
- Princeton Club of Chicago - Research on the Road Alumni Meeting (Invited Talk), *Planets Around Other Stars*, March 2020
- TESS Science Team Meeting #18 (Talk), *TESS Planet Candidates in Open Clusters*, December 2019
- Extreme Solar Systems IV (Poster), *TESS Planet Candidates in Open Clusters*, August 2019
- STScI TESS Data Workshop (Invited Talk), *Homogeneous Light Curves for Stars in Clusters from TESS*, February 2019
- TESS Science Conference I (Talk & Invited Panel), *The Early Arrival of WASP-4b*, July 2019
- TESS Science Team Meeting #16 (Talk), *Extending the Planet Search with TESS*, October 2018
- Exoplanets II (Poster), *How do Unresolved Binaries Bias Transit Survey Occurrence Rates?*, June 2018

- TESS Science Team Meeting #10 (Talk), *Planet-Detection Simulations for Several Possible TESS Extended Missions*, December 2016
- TESS Science Team Meeting #8 (Talk), *The TESS Extended Mission*, May 2016
- NExScI Sagan Summer Workshop (Poster), *Planet-Detection Simulations for Several Possible TESS Extended Missions* May 2016
- TESS Science Team Meeting #7 (Talk), *TESS from 2019 to 2021*, February 2016