

Christopher Spalding

51 Pegasi b Postdoctoral Researcher
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Professional Preparation

2013 - 2018 *Planetary Science* Ph.D. Calif. Institute of Technology
2009 - 2013 *Astrophysics* BA/MSci (1st class honors) University of Cambridge, UK

Appointments

2022 - 2023 Postdoctoral Associate Mass. Institute of Technology
2020 - 2022 51 Pegasi b Postdoctoral Fellow Princeton University
2018 - 2020 51 Pegasi b Postdoctoral Fellow Yale University
2013 - 2018 Graduate Research Assistant California Institute of Technology
2015 Geophysical Fluid Dynamics Summer Woods Hole Oceanographic Inst.
Fellow
2012 CTAMOP Summer Research Fellowship Queen's University, Belfast

Publications, first author (**represents student's contribution):

1. **Spalding, C.** & Winn, J. N., (2022), Tidal erasure of stellar obliquities constrains the timing of hot Jupiter formation, *The Astrophysical Journal*, *in press*.
2. **Spalding, C.** & Hull, P. M., (2021), Towards Quantifying the Mass Extinction Debt of the Anthropocene, *Proc. R. Soc. B.*, 288, 20202332.
3. **Spalding, C.** & Millholland, S. C., (2020) Stellar Oblateness versus Distant Giants in Exciting Kepler Planet Mutual Inclinations, *The Astronomical Journal*, 160, 105.
4. **Spalding, C.** & Adams, F. C., (2020) The Solar wind prevents re-accretion of debris after Mercury's giant impact, *The Planetary Science Journal*, 1, 1.
5. **Spalding, C.** (2019). Stellar winds as a mechanism to tilt the spin axes of Sun-like stars, *The Astrophysical Journal*, 879, 1.
6. **Spalding, C.** & Fischer, W., W., (2019). A shorter Archean day-length biases interpretations of the faint young Sun paradox, *Earth and Planetary Science Letters*, 514, 28.
7. **Spalding, C.**, Fischer, W., W. & Laughlin, G., (2018). An orbital window into the ancient Sun's mass, *The Astrophysical Journal Letters*, 896, L17.
8. **Spalding, C.** (2018). The Solar wind as a sculptor of terrestrial planet formation, *The Astrophysical Journal Letters*, 896, L19.
9. **Spalding, C.**, Marx, N. W., & Batygin, K., (2018). The resilience of *Kepler* systems to stellar obliquity, *The Astronomical Journal*, 155, 4.
10. **Spalding, C.**, Doering, C. & Flierl, G., (2017). Resonant activation of population extinctions, *Phys. Rev. E*, 96, 042411.
11. **Spalding, C.** & Batygin, K., (2017). A secular resonant origin for the loneliness of hot Jupiters, *The Astronomical Journal*, 154, 3.
12. **Spalding, C.**, Finnegan, S. & Fischer, W., W., (2017). Energetic costs of calcification under ocean acidification, *Global Biogeochemical Cycles*, 31, 866.
13. **Spalding, C.** & Batygin, K., (2016), Spin-orbit misalignment as a driver of the *Kepler* dichotomy, *The Astrophysical Journal*, 830, 5.

14. **Spalding, C.**, Batygin, K. & Adams, F. C. (2016). Resonant removal of exomoons during planetary migration. *The Astrophysical Journal*, 817(1), 18.
15. **Spalding, C.** & Batygin, K. (2015). Magnetic origins of the stellar mass-obliquity correlation in planetary systems. *The Astrophysical Journal*, 811(2), 82.
16. **Spalding, C.**, Batygin, K. & Adams, F. C. (2014). Alignment of protostars and circumstellar disks during the embedded phase. *The Astrophysical Journal Letters*, 797(2), L29.
17. **Spalding, C.** & Batygin, K. (2014). Early excitation of spin-orbit misalignments in close-in planetary systems. *The Astrophysical Journal*, 790(1), 42.

Publications, co-author (represents student's contribution):**

1. **Dodici, M. & **Spalding, C.**, A Trojan horse for white dwarfs: Metal pollution on white dwarfs, *in prep*
2. **Schultz, K., **Spalding, C.**, & Batygin, K. (2021). The distribution of mutual inclinations arising from the stellar quadrupole moment. *Monthly Notices of the Royal Astronomical Society*, 506(2), 2999-3009.
3. Millholland, S. C. & **Spalding, C.** (2020) Formation of Ultra-Short-Period Planets by Obliquity-Driven Tidal Runaway, *The Astrophysical Journal*, 905, 71
4. Gaudi, B. S., Seager, S. ,... **Spalding, C.**, ... & Gelino, D. (2020). The Habitable Exoplanet Observatory (HabEx) mission concept study final report. *arXiv preprint arXiv:2001.06683*.
5. Lapôtre, M. G. A., O'Rourke, J. G., Schaefer, L. K., Siebach, K. L., **Spalding, C.**, Tikoo, S. M. & Wordsworth, R. D. (2020), Probing space to know Earth, *Nat Rev Earth Environ*, 1-12.

Outreach talks

- "Lesser-known wonders in the history of life," Science Cafe Yale: Exploring Science - 2020
- "Flesh, Blood and Bone: The Animal Niche," Yale Science in the News - 2019
- "Upside-down, inside-out solar systems: the weirdest worlds within the cosmos," Leitner Family Observatory & Planetarium - Nov 2018
- "Lesser-known wonders in the history of life on Earth," Science Cafe, Yale- Nov 2018
- "Alien worlds in our Solar System and beyond," Astronomy on Tap - September 2018
- "Challenges of Life," Science Saturdays Outreach Series, Caltech 2018
- "Up-side down, Inside-out Solar Systems," South Bay Observatory Presentation - April 2018
- "Earth, Power of the Planet: Rare Earth," Science Saturdays Outreach Series, Caltech, 2017
- "Up-side down, Inside-out Solar Systems," Los Angeles BIL conference - April 2016

Service

- *Instructor*, Prison Teaching Initiative, Edna Mahan Correctional Facility, *Elementary algebra* (2021)
- *Departmental colloquium co-organiser*, Department of Astrophysical Sciences, Princeton 2021-2022.
- *Podcast guest*, "Walking on Sunshine," astro[sound]bites, Feb 2021
- *Interpretive volunteer*, the Natural History Museum of Los Angeles County (March 2016 - Sep 2016, Aug 2017 - Dec 2017)
- Planetary lunch discussion group co-leader, Caltech, 2016
- *Mentor*, Caltech Summer Research Connection with K12 teacher and student (2016)

- Reviewer: *AAS Journals, Science Advances, MNRAS, Physics Letters A, Global Biogeochemical Cycles, Advances in Space Research*

Teaching

- Guest lecturer, “*Exoplanet detection and habitability*”, Princeton undergraduate class AST/ GEO/CHM 255 “*Life in the Universe*” (2 lectures), 2021
- Guest lecturer, Ge/Ay 133, Formation and Evolution of Planetary Systems, “*The formation of the Galilean Satellites*,” Caltech, 2016, 2017.
- Teaching Assistant, Ge/Ay 133, Formation and Evolution of Planetary Systems, 2016, Caltech.
- Calculus: A refresher course for graduate students 2016. Caltech.
- Teaching Assistant, Ge 150, Planetary Atmosphere, 2016, Caltech.
- Guest lecturer, Ge 150, “*Introduction to fluid mechanics*,” Caltech
- Teaching Assistant, Ge/Ay 137 Planetary Physics, 2015, Caltech.

Students:

Roberto Tejada Arevalo (graduate student, Princeton, 2021)
Mark Dodici (Princeton Senior, 2020-2021)
Henry Yuan (Princeton Junior, 2021)
Zizi Coleman (Princeton Junior, 2020)
Kathleen Schultz (University of Maine Masters student, 2018-2020)
Noah Marx (high school student, 2016)

Prizes/Awards

Lyman Spitzer, Jr Postdoctoral Fellowship Sept 2021-2024
51 Pegasi b Postdoctoral Fellowship July 2018-present.
NESSF Graduate Fellowship in Earth and Planetary Science, 2015-2018
Ray Duncombe Prize for Dynamical Astronomy, 2015
1912 Senior Scholarship, University of Cambridge, 2013
Barnes Scholarship, Cambridge University, 2012
QinetiQ Prize for Natural Sciences, 2012

Invited Talks

1. Removing Mercury's mantle: The ancient Solar wind as a sculptor of terrestrial planetary formation (2021), University of California Santa Cruz
2. The Solar wind's role in the formation of the inner planets, (2020), Yale University
3. The Solar wind's role in the formation of the inner planets (2019), *ETH* Zurich.
4. Primordial Sculpting of Exoplanetary System Architectures (2019), University of Maine
5. The Solar Wind's Role in the Formation and Long-Term Climate of the Terrestrial Planets (2019), Harvard University, Earth & Planetary Sciences.
6. *Habex*: A Closer Look at Planetary System Architectures, (2019), AAS meeting, St Louis, MO
7. Extinction Dynamics Across Multiple Timescales (2018) Yale University, Geology & Geophysics
8. Primordial Sculpting of Exoplanetary System Architectures (2018) Yale University, Geology & Geophysics
9. Primordial Sculpting of Exoplanetary System Architectures (2018) Chicago, Geophysical Sciences
10. Primordial Sculpting of Exoplanetary System Architectures (2017) Cornell, Astronomy
11. Primordial Sculpting of Exoplanetary System Architectures (2017) Berkeley, Astronomy

12. The Most Catastrophic Catastrophe: Extinction dynamics within a fluctuating environment (2017) Berkeley, Integrative Biology
13. The Primordial Origins of Stellar Obliquity and the Kepler Dichotomy (2017) Harvard, Cfa
14. The Primordial Origins of Stellar Obliquity and the Kepler Dichotomy (2017) Ann Arbor, Michigan

Conference Presentations

1. Stellar Tilts and Tides: The Origin of Hot Jupiters (2021), DPS meeting, virtual (oral prep.)
2. Metallicity Matters: The Origin of Spin-Orbit Misalignments (2021), DDA meeting, virtual (oral pres.)
3. The Solar Wind's Key Role in Mercury's Formation (2020), DDA meeting, virtual (oral pres.)
4. The Origin of Planetary Mutual Inclinations: Stellar Oblateness versus Distant Giants, Exoplanets III conference, virtual (poster pres.)
5. The Solar Wind as a Sculptor of Terrestrial Planet Formation (2019), DDA meeting, Boulder, CO (oral pres.)
6. The Role of Rotation Rate in the Earth's Climate Under a Faint Early Sun (2018), GSA meeting, Indianapolis, IN, (oral pres.)
7. The Resilience of *Kepler* Systems to Stellar Obliquity (2018), DPS meeting, Knoxville TN, (oral pres.)
8. The Resilience of *Kepler* Systems to Stellar Obliquity (2018), DDA meeting, San Jose CA, (oral pres.)
9. A Minimum Population Extinction Time Driven by Stochastic Environmental Forcing (Dec 2017), Palaeontological Association Annual Meeting, London, UK (oral pres.)
10. A Minimum Population Extinction Time Driven by Stochastic Environmental Forcing (2017), GSA meeting, Seattle WA (oral pres.)
11. A Secular Resonant Origin for the Loneliness of Hot Jupiters (2017), DPS meeting. Provo Utah (oral pres.)
12. The Intrinsic Multiplicity of Single-Transiting *Kepler* Systems (2017), C. Spalding, & K. Batygin, DDA, London, UK (oral pres.)
13. Spin-Orbit Misalignments as a Driver of the *Kepler* Dichotomy (2017), C. Spalding, & K. Batygin, Aspen Winter Conference, Formation and Dynamical Evolution of Exoplanets (oral pres.)
14. Spin-Orbit Misalignments as a Driver of the *Kepler* Dichotomy (2016), C. Spalding, & K. Batygin, DPS meeting, Pasadena CA (oral pres.)
15. Planetary system architectures as sculpted from binary-disk interactions (2015), C. Spalding, & K. Batygin, ExSS meeting III, Hawaii DC (poster pres.)
16. The Primordial Destruction of Moons around Giant Exoplanets through Disk-Driven Migration (2015), C. Spalding, K. Batygin & F. C. Adams, AAS/DPS meeting, Washington DC (oral pres.)
17. The Energetic Costs of Calcification Under Ocean Acidification, C. Spalding, Seth Finnegan & W. W. Fischer, GSA meeting 2015, Baltimore, MD (oral pres.)
18. Alignment of protostars and disks in the embedded phase (2015) C. Spalding, K. Batygin, 2015 DDA, Pasadena, CA (oral pres.)
19. Origins of Spin-Orbit Misalignments (2014) C. Spalding, K. Batygin, AAS/DPS meeting #46, Tucson, AZ (oral pres.)