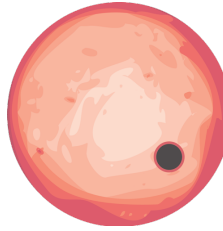


Zachory K. Berta-Thompson

Assistant Professor, Exoplaneteer
Dept. of Astrophysical and Planetary Sciences,
University of Colorado at Boulder
UCB 391; Boulder, CO 80309



zach.bertathompson@colorado.edu
Office: Duane D213, 303-735-6821
casa.colorado.edu/~bertathompson

Research Interests:

I use small telescopes to discover transiting exoplanets and large telescope to study these planets' atmospheres. My work makes practical advances toward the long-term goal of searching for life around other stars.

Teaching Statement:

My goal is to nurture seeds of curiosity into lifelong scientific mindsets. I believe engaging hands-on with the beautiful mysteries of the Universe is the best way for students of diverse backgrounds and strengths to cultivate a passion for discovery and a willingness to explore.

Academic Experience:

University of Colorado at Boulder, Assistant Professor, 2016–
MIT, Torres Fellow for Exoplanet Research, 2013–2016
Harvard University, Ph.D. in Astronomy, 2008–2013
Princeton University, A. B. in Astrophysical Sciences with Highest Honors, 2003–2007

Ongoing Collaborations:

Collaborator on the NASA Transiting Exoplanet Survey Satellite (TESS) science team (2013–) investigating new mode for satellite data collection; designing onboard cosmic ray mitigation strategy; simulating realistic data products to aid pipeline development; serving as scientific liaison to CHEOPS, the next European ESA exoplanet mission
Member of the MEarth Project, a search for planets transiting nearby small stars (2008–) creating pipeline to detect planets; helping commission survey; discovering and confirming two benchmark exoplanetary systems; leading follow-up observations of small and rocky exoplanet atmospheres; planning future directions for the survey

Honors:

MIT Spot Awards, for Art of Astrophysics & Astrophysics Outreach events (2014 & 2015)
Induction to Rockford Public Schools Hall of Fame, Rockford, MI (2014)
First Place Student Poster Prize at Cool Stars 17 in Barcelona, Spain (2012)
Harvard University Certificate of Distinction in Teaching (spring 2010 & spring 2011)
Harvard University Merit Fellowship (2011)
Princeton Alumni Weekly "Tiger of the Week" (2009)
Election to Sigma Xi & Phi Beta Kappa (2007)

Favorite Telescopes:

Small Telescopes (essential for discovery and confirmation of interesting new exoplanets):
extensive experience using 0.4m telescopes for published academic research
Large Space Telescopes (essential for characterization of exoplanet atmospheres):
substantial experience observing with the Hubble & Spitzer Space Telescopes

Talks:

contributed Exoclimes, Quest University, British Columbia, Canada, Aug. 2016
invited Exoplanets I Conference, Davos, Switzerland, Jul. 2016
invited University of Toledo Colloquium, Toledo, OH, Apr. 2016
invited Harvard-Smithsonian Small-Scale Seminar, Cambridge, MA, Feb. 2016
invited MIT Physics IAP Colloquium, Cambridge, MA, Jan. 2016
contributed Extreme Solar Systems, Waikoloa, HI, Dec. 2015
invited TESS Team Meeting, Cambridge, MA, Sep. 2015
contributed From Super-Earths to Brown Dwarfs, IAP, Paris, France, Jun. 2015
invited CHEOPS Science Workshop, Madrid, Spain, Jun. 2015
colloquium University of Washington Astrophysics, Seattle, WA, May 2015
invited TESS Team Meeting, Cambridge, MA, May 2015
invited Hogg/Blanton group meeting, NYU, New York, NY, Mar. 2015
invited Atmosphere Science (CHEOPS, TESS, K2) workshop, Berlin, Mar. 2015
colloquium Amherst College, Physics & Astronomy, Amherst, MA, Nov. 2014
colloquium JHU/STScI Planets, Life, & the Universe Lecture, Baltimore, MD, Nov. 2014
colloquium Université de Montréal Astronomy Dept., Montréal, Canada, Oct. 2014
invited Observatoire Astronomique Exoplanet Seminar, Geneva, Switz., Jun. 2014
invited Boston University Space Physics Seminar, Boston, MA, Mar. 2014
contributed AAS, Washington, DC, Jan. 2014
contributed AAS, Long Beach, CA, Jan. 2013
contributed MIT Astrophysics Brown Bag Lunch Talk, Cambridge, MA, Dec. 2012
invited Brown Astrophysics Seminar Series, Providence, RI, Nov. 2012
contributed Extreme Solar Systems, Jackson Hole, WY, Sep. 2011
colloquium Wellesley College REU Summer Colloquium, Wellesley, MA, Aug. 2011
colloquium Harvard-Smithsonian REU Summer Colloq., Cambridge, MA, Jun. 2011
invited Low-Mass Stellar Science (Large Surveys), AAS, Boston, MA, May 2011
invited Habitability of Terrestrial Planets, AAS, Seattle, WA, Jan. 2011
invited NASA Goddard Space Flight Center Exoplanets Club, Nov. 2010
invited TESS Team Meeting, Washington, D.C., Jan. 2010
contributed American Astronomical Society (AAS), Washington, D.C., Jan. 2010
contributed Unsinkable Planets Exeter Exoplanet Workshop, Exeter, U. K., Sep. 2009

Posters:

Transiting Exoplanets with JWST, STScI, Baltimore, MD, Nov. 2015
Exoplanet Statistics Focus Meeting, IAU, Honolulu, HI, Aug. 2015
AAS, Boston, MA, Jun. 2014
Habitable Worlds across Space & Time, Baltimore, MD, Apr. 2014
Exoclimes III, Davos, Switzerland, Feb. 2014
Cool Stars 17, Barcelona, Spain, Jun. 2012
AAS, Seattle, WA, Jan. 2011
Towards Other Earths, Porto, Portugal, Oct. 2009

Teaching Experience:

CU Boulder — ASTR1030: an accelerated introduction to modern astrophysics & planetary science, emphasizing quantitative reasoning and scientific thought (spring 2017)

CU Boulder — ASTR2600: an introduction to scientific computing in Python, emphasizing creativity and curiosity in coding as a craft (fall 2016)

Original Course:

MIT "Crafting the Cosmos", Independent Activities Period, (January 2016)
creating a new six-session non-credit course for MIT undergrads, designed to pair basic astrophysics concepts (e.g. the curvature of space-time) with hands-on craft activities (knitting the Schwarzschild metric with yarn), intended to inspire student creativity and to develop a growth mindset (bit.ly/craftingcosmos)

Teaching Assistant:

Harvard Univ. "Methods of Observational Astronomy" (spring 2010 & spring 2011)
developing a hands-on astrophysics lab course with Prof. Edo Berger and co-leading field trips to use professional telescopes at Mt. Hopkins, AZ

Princeton Univ. "The Universe (Astro for Non-Majors)" (spring 2006 & spring 2007)
leading sections & tutoring, Profs. Chris Chyba, Michael Strauss, J. Richard Gott

Guest Lectures:

MIT "Astroinformatics for Exoplanets," Prof. Sara Seager (2015)

MIT "Exoplanets, Physics, & Detection Techniques," Prof. Hilke Schlichting (2015)

Boston Univ. "Alien Worlds" online edX class, Prof. Andrew West (2014)

Tufts Univ. "Life on Earth and Beyond", Lecturer Sarah Rugheimer (2013)

MIT "Exoplanets" freshman seminar, two classes, Prof. Kerri Cahoy (2012)

Development & Training:

Participant, UMass Amherst "Teaching at Teaching Intensive Institutions", (fall 2015)

Enrolled Student, Harvard Univ. "Scientists Teaching Science", Prof. Phil Sadler (2011)
semester-long class on active learning and effective undergrad science education

Outreach Activities:

Major Initiatives:

Coordinator for MIT IAP Astrophysics Outreach, bit.ly/astrolAP (winter 2015)

Co-founder of MIT Art of Astrophysics Competition, bit.ly/ArtofAstro (winter 2014)

Public Lectures:

on seeing the unseeable, Pint of Science, Boston, MA, spring 2015

on exoplanets, astronomy, and careers in science, Rockford High School, MI, fall 2014

on the science of the movie *Interstellar* (panel discussion), MIT Sloan School, fall 2014

on planetary atmospheres, Berkeley School of Music Astronomy Club, spring 2014

on space observations of exoplanets, MIT Independent Activities Period, winter 2014

on science with small telescopes, Rhode Island Amateur Astronomers, fall 2013

on transiting planets, Grand Rapids Amateur Astronomical Society, summer 2012

Interactive Demos:

Planetarium talks at Christa McAuliffe Center, Framingham State University, fall 2015

Making exoplanet toys for kids and adults, MIT Space Day, MIT Museum, spring 2014

Guest instructor at Brooke Charter School, Roslindale, MA, spring 2012

Volunteer for "Cambridge Explores the Universe," spring 2010 & spring 2011

Refereed Publications:

(as Z. K. Berta until 2013)

- (28) J. A. Dittmann, J. Irwin, D. Charbonneau, **Z. K. Berta-Thompson**, E. R. Newton, "A Search for Additional Bodies in the GJ 1132 Planetary System from 21 Ground-based Transits and a 100 Hour Spitzer Campaign", 2016, in press, *arXiv:1611.09848*
- (27) L. Schaefer, R. Wordsworth, **Z. K. Berta-Thompson**, D. Sasselov, "Predictions of the Atmospheric Composition of GJ 1132b", 2016, *The Astrophysical Journal*, 829, 2, 63.
- (26) J. A. Dittmann, J. Irwin, D. Charbonneau, **Z. K. Berta-Thompson**, E. R. Newton, D. W. Latham, C. Latham, G. Esquerdo, P. Berlind, M. Calkins, "Discovery and Precise Characterization by the MEarth Project of LP 661-13, an Eclipsing Binary Consisting of Two Fully Convective Low-mass Stars", 2016, in press, *arXiv:1609.03591*
- (25) E. R. Newton, J. Irwin, D. Charbonneau, **Z. K. Berta-Thompson**, J. A. Dittmann, "The Impact of Stellar Rotation on the Detectability of Habitable Planets around M Dwarfs", 2016, *The Astrophysical Journal Letters*, 821, 1, L19
- (24) **Z. K. Berta-Thompson**, J. Irwin, D. Charbonneau, E. R. Newton, J. A. Dittmann, N. Astudillo-Defru, X. Bonfils, M. Gillon, E. Jehin, A. A. Stark, B. Stalder, F. Bouchy, X. Delfosse, T. Forveille, C. Lovis, M. Mayor, V. Neves, F. Pepe, N. C. Santos, S. Udry, A. Wunsche "A rocky planet transiting a nearby low-mass star", 2015, *Nature*, 527, 204-207
- (23) E. R. Newton, J. Irwin, D. Charbonneau, **Z. K. Berta-Thompson**, J. A. Dittmann, A. A. West "The rotation and Galactic kinematics of mid M dwarfs in the Solar Neighborhood", submitted to *The Astrophysical Journal*, available at <http://arxiv.org/abs/1511.00957>
- (22) A. West, K. Weisenbruger, J. Irwin, **Z. K. Berta-Thompson**, J. Dittmann, J. S. Pineda "An Activity-Rotation Relationship and Kinematic Analysis of Nearby Mid-to-Late-type M Dwarfs", 2015, *The Astrophysical Journal*, 812, 3
- (21) P. W. Sullivan, J. N. Winn, **Z. K. Berta-Thompson**, D. Charbonneau, D. Deming, C. D. Dressing, D. W. Latham, A. M. Levine, P. R. McCullough, T. Morton "The Transiting Exoplanet Survey Satellite: Simulations of Planet Detections and Astrophysical False Positives", 2015, *The Astrophysical Journal*, 807, 77
- (20) P. K. G. Williams, E. Berger, J. Irwin, **Z. K. Berta-Thompson**, D. Charbonneau, "Simultaneous Multiwavelength Observations of Magnetic Activity in Ultracool Dwarfs. IV. The Active, Young Binary NLTT 33370 AB (=2MASS J13142039+1320011)", 2015, *The Astrophysical Journal*, 799, 192
- (19) G. R. Ricker, J. N. Winn, R. Vanderspek and 58 others including **Z. K. Berta-Thompson**, "Transiting Exoplanet Survey Satellite," (2015), *Journal of Astronomical Telescopes, Instruments, and Systems* 1(1), 014003
- (18) J. Dittmann, J. Irwin, D. Charbonneau, **Z. K. Berta-Thompson**, "Trigonometric Parallaxes for 1507 Nearby Mid-to-late M Dwarfs" 2014, *The Astrophysical Journal*, 784, 156
- (17) L. Kreidberg, J. Bean, J.-M. Désert, B. Benneke, D. Deming, K. Stevenson, S. Seager, **Z. K. Berta-Thompson**, A. Seifahrt, D. Homeier, "Clouds in the atmosphere of the super-Earth exoplanet GJ1214", 2014, *Nature*, 505, 7841, 69-72

- (16) E. Newton, D. Charbonneau, J. Irwin, **Z. K. Berta-Thompson**, B. Rojas-Ayala, K. Covey, J. Lloyd, "Near-infrared Metallicities, Radial Velocities, and Spectral Types for 447 Nearby M Dwarfs" 2014, *The Astronomical Journal*, 147, 1
- (15) **Z. K. Berta**, J. Irwin, D. Charbonneau, "Constraints on Planet Occurrence around Nearby Mid-to-late M Dwarfs from the MEarth Project" 2013, *The Astrophysical Journal*, 775, 91
- (14) **Z. K. Berta**, J. Irwin, D. Charbonneau, C. Burke, E. Falco, "Transit Detection in the MEarth Survey of Nearby M Dwarfs: Bridging the Clean-First, Search-Later Divide" 2012, *The Astronomical Journal*, 144, 145
- (13) R. Foley, M. Kromer, H. Marion and 20 others including **Z. K. Berta**, "The First Maximum-light Ultraviolet through Near-infrared Spectrum of a Type Ia Supernova" 2012, *The Astrophysical Journal*, 753, 1
- (12) **Z. K. Berta**, D. Charbonneau, J.-M. Désert, E. Kempton, P. McCullough, C. Burke, J. Fortney, J. Irwin, P. Nutzman, D. Homeier "The Flat Transmission Spectrum of the Super-Earth GJ1214b from Wide Field Camera 3 on the Hubble Space Telescope" 2012, *The Astrophysical Journal*, 747, 35
- (11) J. Irwin, S. Quinn, **Z. K. Berta**, D. Latham, G. Torres, C. Burke, D. Charbonneau, J. Dittmann, G. Esquerdo, R. Stefanik, A. Oksanen, L. Buchhave, P. Nutzman, P. Berlind, M. Calkins, E. Falco, "LSPM J1112+7626: detection of a 41-day M-dwarf eclipsing binary from the MEarth transit survey" 2011, *The Astrophysical Journal*, 742, 123
- (10) J. Bean, J.-M. Désert, P. Kabath, B. Stalder, S. Seager, E. Kempton, **Z. K. Berta**, D. Homeier, S. Walsh, A. Seifahrt, "The Optical and Near-Infrared Transmission Spectrum of the Super-Earth Planet GJ1214b: Further Evidence for a Metal-Rich Atmosphere" 2011, *The Astrophysical Journal*, 743, 92
- (9) **Z. K. Berta**, D. Charbonneau, J. Bean, J. Irwin, C. J. Burke, J.-M. Désert, P. Nutzman, E. E. Falco, "The GJ1214 Super-Earth System: Stellar Variability, New Transits, and a Search for Additional Planets" 2011, *The Astrophysical Journal*, 736, 1
- (8) J.-M. Désert, J. Bean, E. Miller-Ricci Kempton, **Z. K. Berta**, D. Charbonneau, J. Irwin, J. Fortney, C. J. Burke, P. Nutzman, "Observational evidence for a metal rich atmosphere on the super-Earth GJ1214b" 2011, *The Astrophysical Journal Letters*, 731, 2
- (7) J. A. Carter, J. N. Winn, M. J. Holman, D. Fabrycky, **Z. K. Berta**, C. J. Burke, P. Nutzman, "The Transit Light Curve Project. XIII. Sixteen Transits of the Super-Earth GJ 1214b" 2011, *The Astrophysical Journal*, 730, 2
- (6) J. Irwin, **Z. K. Berta**, C. J. Burke, D. Charbonneau, P. Nutzman, A. A. West, E. E. Falco, "On the Angular Momentum Evolution of Fully Convective Stars: Rotation Periods for Field M-dwarfs from the MEarth Transit Survey" 2011, *The Astrophysical Journal*, 727, 56
- (5) J. Irwin, L. Buchhave, **Z. K. Berta**, and 13 others "NLTT 41135: A Field M Dwarf + Brown Dwarf Eclipsing Binary in a Triple System, Discovered by the MEarth Observatory" 2010, *The Astrophysical Journal*, 718, 2
- (4) D. Charbonneau, **Z. K. Berta**, J. Irwin, C. J. Burke, P. Nutzman, L. A. Buchhave, C. Lovis, X. Bonfils, D. W. Latham, S. Udry, R. A. Murray-Clay, M. J. Holman, E. E. Falco, J. N. Winn, D. Queloz, F. Pepe, M. Mayor, X. Delfosse, T. Forveille, "A super-Earth transiting a nearby low-mass star", 2009, *Nature*, 462, 7275

(3) F. Pont, G. Hébrard, J. M. Irwin, and 24 others including **Z. K. Berta** "Spin-orbit misalignment in the HD 80606 planetary system" 2009, *Astronomy & Astrophysics*, 502, 2

(2) J. Irwin, D. Charbonneau, **Z. K. Berta**, and 14 others "GJ 3236: A New Bright, Very Low Mass Eclipsing Binary System Discovered by the MEarth Observatory", 2009, *The Astrophysical Journal*, 701, 2

(1) **Z. K. Berta**, R. Jimenez, A. F. Heavens, B. Panter, "The role of spin in the formation and evolution of galaxies" 2008, *Monthly Notices of the Royal Astronomical Society*, 391, 197