

David Charbonneau
Curriculum vitae (July 2025)

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Current and Previous Positions

Chair, Department of Astronomy (2025+)
Fred Kavli Professor of Astrophysics (2021+)|
Harvard College Professor (2016–2021)
Professor of Astronomy (2010–2021), Associate Prof (2008–2009), Assistant Prof (2004–2007)
R. A. Millikan Postdoctoral Scholar in Astronomy, 2001–2004, Caltech

Education

Ph. D. (Astronomy, 2001), A. M. (Astronomy, 1999), Harvard University
Honors B. Sc. with high distinction (Math, Physics, & Astronomy, 1996), University of Toronto

Summary of Research Interests

Detection and characterization of exoplanets with the goal of studying inhabited worlds; stellar astrophysics focusing on the magnetic activity of nearby solar and low-mass stars; development of novel observational methods in support of these efforts.

Selected Research and Management Activities

Current:

co-Chair, NASA Habitable Worlds Observatory Community Science and Instrument Team
Principal Investigator, The Tierras Observatory (Science PI: Dr. Juliana García-Mejía)
co-Investigator, Transiting Exoplanet Survey Satellite (TESS), NASA Explorer Mission
PI & co-Investigator, NASA James Webb and Hubble Space Telescope Studies of Exoplanets
Science Team co-I & Past President, HARPS-North High-precision Radial Velocity Spectrograph
Team Member, Harvard Origins of Life Initiative

Selection of Recently Completed:

Member, Astro2020: Panel on Optical & Infrared Observations from the Ground, National Acad.
Co-chair, Exoplanet Science Strategy Report, National Academies of Sciences, Eng, & Medicine
Principal Investigator, MEarth Project to Detect Habitable Planets Orbiting Low-mass Stars
Principal Investigator, NASA K2 Guest Investigator Programs
Principal Investigator, NASA Spitzer Space Telescope Studies of Exoplanets
Principal Investigator, Opportunity M, John Templeton Foundation
Panel Member, WFIRST Independent External Technical/Management/Cost Review
Member, NASA TESS Mission Science Council
Principal Investigator, Alien Earths Initiative, John Templeton Foundation
Participating Scientist and Member of Kepler Science Council, NASA Kepler Mission
Co-Principal Investigator, Trans-Atlantic Exoplanet Survey (TrES) Network
Deputy Principal Investigator, EPOCH Investigation, NASA EPOXI Mission of Opportunity
Member, Decadal Survey in Astrophysics (2010), Panel on Star and Planet Formation
Member, Committee on the Status of Women in Astronomy, American Astronomical Society

Selected Honors and Awards

Kavli Prize in Astrophysics, The Norwegian Academy of Science and Letters, 2024
Everett Mendelsohn Excellence in Mentoring Award, Harvard Graduate School, 2023
Honorary Degree of Doctor of Science, University of Chicago, 2019
Member, National Academy of Sciences, elected 2017
Member, American Academy of Arts & Sciences, elected 2017
Blavatnik National Laureate, Physical Sciences and Engineering, 2016
The Raymond and Beverly Sackler Prize in the Physical Sciences, Tel Aviv University, 2012
UC University of Toronto Alumni of Influence Award, November 2012
Fannie Cox Prize for Excellence in Science Teaching, Harvard University, 2011
Alan T. Waterman Award, National Science Foundation, 2009
Scientist of the Year, Discover Magazine, 2007
David and Lucile Packard Fellowship for Science and Engineering, 2006 – 2011
NASA Exceptional Scientific Achievement Medal, 2006
Alfred P. Sloan Research Fellow, 2006 – 2008
Robert J. Trumpler Award for “PhD of unusual importance”, Astron Society of the Pacific, 2004
Bart J. Bok Prize in Astronomy, Harvard University, 2004
Fireman Award for PhD Thesis in Astronomy, Harvard University, 2001

Selected Named Lectureships

Fred Kavli Plenary Lecturer, American Astronomical Society, 2025
Robert M. Walker Lecturer, Washington University at St. Louis, 2018
Hintze Lecturer, Oxford University, 2014
Raymond and Beverly Sackler Lecturer, Leiden Observatory, 2013
Brinson Lecturer, University of Chicago, 2012
Hilldale Lecturer, University of Wisconsin – Madison, 2011
Rittenhouse Lecturer, University of Pennsylvania, 2011

Research Achievements with Corresponding Papers (354 Refereed Papers, 46500 Citations)

Discovery of First Transiting Exoplanet

Detection of Planetary Transits Across a Sun-like Star, Charbonneau, David; Brown, Timothy M.; Latham, David W.; Mayor, Michel, The Astrophysical Journal, 529, L45 (2000).

First Measurement of Exoplanet Atmosphere

Detection of an Extrasolar Planet Atmosphere, Charbonneau, David; Brown, Timothy M.; Noyes, Robert W.; Gilliland, Ronald L., The Astrophysical Journal, 568, 377 (2002).

First Planet Discovered by Small Aperture Wide-Field Transit Survey

TrES-1: The Transiting Planet of a Bright K0 V Star, Alonso, Roi; Brown, Timothy M.; Torres, Guillermo; Latham, David W.; et al., The Astrophysical Journal, 613, L153 (2004).

First Detection of Light from an Exoplanet

Detection of Thermal Emission from an Extrasolar Planet, Charbonneau, David; Allen, Lori E.; Megeath, S. Thomas; Torres, Guillermo; et al., The Astrophysical Journal, 626, 523 (2005).

First Map of an Exoplanet

A map of the day-night contrast of the extrasolar planet HD 189733b, Knutson, Heather A.; Charbonneau, David; Allen, Lori E.; et al., Nature, 447, 183 (2007).

Discovery of Many of the Most Favorable Small Exoplanets for Atmospheric Characterization

1. *A super-Earth transiting a nearby low-mass star*, Charbonneau, David; Berta, Zachory K.; Irwin, Jonathan; et al., Nature, Volume 462, Issue 7275, pp. 891-894 (2009).
2. *A rocky planet transiting a nearby low-mass star*, Z. K. Berta-Thompson, J. Irwin, D. Charbonneau, E. Newton, J. A. Dittmann, et al. Nature, 527, 204 (2015).
3. *A temperate rocky super-Earth transiting a nearby cool star*, J. A. Dittmann, J. M. Irwin, D. Charbonneau, X. Bonfils, et al. Nature, 544, 333 (2017)
4. *Three Red Suns in the Sky: A Transiting, Terrestrial Planet at 6.9 pc*, Winters, Jennifer G.; Medina, Amber A.; Irwin, Jonathan M.; Charbonneau, David; Astron Journal, 158, 152 (2019)
5. *LHS 475: A Venus-sized Planet Orbiting a Nearby M Dwarf*, Ment, Kristo; Charbonneau, David; Irwin, Jonathan; Winters, Jennifer G.; Pass, Emily; Astronomical Journal (2023)

Discovery of First Earth-size Exoplanet

Two Earth-sized planets orbiting Kepler-20; Fressin, Francois; Torres, Guillermo; Rowe, Jason F.; Charbonneau, David; Rogers, Leslie A.; et al., Nature, 482, 195 (2012)

Occurrence Rate of Planets Orbiting Sun-like Stars

The False Positive Rate of Kepler and the Occurrence of Planets, Fressin, François; Torres, Guillermo; Charbonneau, David; et al., The Astrophysical Journal, 766, article id. 81 (2013).

Determination of the Frequency of Habitable Planets

The Occurrence Rate of Small Planets around Small Stars, Dressing, Courtney D.; Charbonneau, David, The Astrophysical Journal, Volume 767, Issue 1, article id. 95 (2013).

Precise Density Constraints on Terrestrial Exoplanets

The Mass of Kepler-93b and The Composition of Terrestrial Planets, Dressing, Courtney D.; Charbonneau, David; et al. The Astrophysical Journal, 800, article id. 135 (2015).

Discovery that the Majority of Low-mass Stars Rotate Extremely Slowly

The Rotation and Galactic Kinematics of Mid M Dwarfs in the Solar Neighborhood, Newton, Elisabeth R.; Irwin, Jonathan; Charbonneau, David; et al.; Astrophysical Journal, 821, 93 (2016)

First Meaningful Constraints on the Atmospheres of Terrestrial Exoplanets

Ground-based Optical Transmission Spectroscopy of the Small, Rocky Exoplanet GJ 1132b, Diamond-Lowe, H; Berta-Thompson, Z; Charbonneau, D., et al.; Astron. Journal, 156, 42 (2018)

Absence of Jupiter-like Planets Orbiting Low-mass Stars

Mid-to-late M Dwarfs Lack Jupiter Analogs, Pass, Emily K.; Winters, Jennifer G.; Charbonneau, David; Irwin, Jonathan M.; Latham, David W.; et al. The Astronomical Journal, 166, id.11 (2023)

Teaching, Advising, and Service at Harvard University

Chair, Department of Astronomy, Harvard University (2025+)

Director of Undergraduate Studies, Astrophysics, Harvard University (2008–2013)

Chair, Graduate Admissions Committee, Department of Astronomy, Harvard (2015—2025)

Director, Harvard Future Faculty Leaders Postdoctoral Fellowship Program (2013—2024)

Advisor, 19 previous and current PhD students:

- Current: Adam Distler, Victoria DiTomaso, Matthew Leung, Collin Cherubim (co-advised by R. Wordsworth, EPS)
- Emily Pass (PhD 2024), “Terrestrial Planets in the Mid-to-Late M-Dwarf Context: Insights on the Spindown of Fully Convective Stars and the Rarity of Jupiter Analogs”
- Juliana García-Mejía (PhD 2023), “The Tierras Observatory: An Ultra-precise Time-series Photometer to Characterize Nearby Low-mass Stars and Their Terrestrial Exoplanets”
- Kristo Ment (PhD 2023), “Three Terrestrial Planets Transiting Mid-to-Late M Dwarfs and Constraints on the Occurrence of Such Worlds”
- Amber A. Medina (PhD 2021), “The Magnetic Connection Between Flares, Rotation, and Age for the Volume-Complete Sample of Fully Convective M Dwarfs Within 15 Parsecs”
- Hannah Z. Diamond-Lowe (PhD 2020), “A first reconnaissance of the atmospheres of terrestrial exoplanets using ground-based optical transits and space-based UV spectra”
- Elisabeth R. Newton (PhD 2016), “The Evolution of Rotation and Magnetism in Small Stars Near the Sun”
- Jason A. Dittmann (PhD 2016), “Distances, Masses, Radii, and Metallicities of the Small Stars in the Solar Neighborhood”
- Courtney D. Dressing (PhD 2015), “The Prevalence & Compositions of Small Exoplanets”
- Zachory K. Berta (PhD 2013), “Super-Earth and Sub-Neptune Exoplanets: a First Look from the MEarth Project”
- Sarah Ballard (PhD 2012), “In Pursuit of New Worlds: Searches for and Studies of Transiting Exoplanets from Three Space Based Observatories”
- Philip Nutzman (PhD 2010), “Transiting Exoplanets: Discovery from the Ground, Characterization from Space”
- Cullen H. Blake (PhD 2009), “Ultracool Dwarfs and Their Companions”
- Heather A. Knutson (PhD 2009), “Portraits of Distant Worlds: Characterizing the Atmospheres of Extrasolar Planets”
- Jonathan S. Devor (PhD 2008), "On the Development and Application of Automated Searches for Eclipsing Binaries"
- Francis T. O'Donovan (PhD 2007), “The Detection and Exploration of Planets from the Trans-Atlantic Exoplanet Survey”

Advisor, 23 current and previous postdoctoral scholars:

Jacob Bean, Jayne Birkby, Christopher Burke, Jessie Christiansen, Ryan Cloutier, Tim Cunningham, Francesca DeMeo, Jean-Michel Desert, Francois Fressin, Sara Gettel, Raphaëlle Haywood, Jonathan Irwin, Laura Kreidberg, Laura Mayorga, Caroline Morley, Antonija Oklopcic, Joseph Rodriguez, Romy Rodríguez-Martínez, Surangkhan Rukdee, Clara Sousa-Silva, Patrick Tamburo, Jennifer Winters, and Samuel Yee.