

CURRICULUM VITAE

Jonathan J. Fortney

OFFICE ADDRESS:

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CURRENT POSITION:

January 2008-present, Assistant Professor, Department of Astronomy and
Astrophysics, UCO/Lick Observatory, University of California, Santa Cruz

PREVIOUS RESEARCH POSITIONS:

August 2006-December 2007, Spitzer Fellow, NASA Ames Research Center and
Principal Investigator, Carl Sagan Center, the SETI Institute
March 2004-July 2006, NASA Postdoctoral Program (NPP) Research Fellow, NASA
Ames Research Center

EDUCATION:

2004 – Ph.D., Planetary Sciences, University of Arizona
Dissertation Title: “The Evolution of Giant Planets,” Advisor: W. B. Hubbard
1999 – B.S., Physics, Iowa State University, with Distinction and Honors Program

MAJOR FIELDS OF INTEREST:

Atmospheres and spectra of extrasolar giant planets, giant planet thermal evolution,
planetary interiors, extrasolar planet characterization through transit photometry,
formation of giant planets, atmospheres and evolution of brown dwarfs

HONORS and AWARDS:

2006-07, Spitzer Space Telescope Postdoctoral Fellowship
2006, NASA Early Career Fellowship in Planetary Sciences
2004-06, National Research Council Postdoctoral Fellowship
1999, Phi Beta Kappa, Iowa State University

COLLOQUIA and SEMINARS:

- University of Virginia, Department of Astronomy, 2/2008
- Michigan State University, Department of Physics & Astronomy, 9/2007
- Carnegie Institution of Washington, Department of Terrestrial Magnetism, 3/2007
- University of California, Berkeley, Center for Integrative Planetary Science, 3/2007
- University of California, Santa Cruz, Dept. of Astronomy & Astrophysics, 1/2007

- University of California, Santa Cruz, Dept. of Astronomy & Astrophysics, 11/2006
- Lawrence Livermore Nat'l Laboratory, Inst. for Geophys. & Planetary Phys., 10/2006
- The SETI Institute, 8/2006
- Harvard University, Department of Earth and Planetary Sciences, 3/2006
- MIT, Department of Earth, Atmospheric, and Planetary Sciences, 2/2006
- University of British Columbia, Department of Physics and Astronomy, 2/2006
- University of Florida, Department of Astronomy, 1/2006
- San Francisco State University, Department of Physics and Astronomy, 11/2005
- Harvard-Smithsonian CfA, Division of Solar, Stellar, and Planetary Science, 9/2005
- NASA Ames Research Center, Space Science and Astrobiology Division 4/2005
- UCLA, Institute for Geophysics and Planetary Physics, 2/2005
- SOFIA Science Center, NASA Ames, 10/2004
- Observatoire de la Cote d'Azur, Nice, France, 4/2004
- American Museum of Natural History, Astronomy and Astrophysics Division, 9/2003
- NASA Ames Research Center, Space Science and Astrobiology Division, 11/2002
- Lawrence Livermore National Laboratory, 11/2002

OUTREACH:

2005, Judge, National Finals of the Siemens Westinghouse Competition in Math, Science, and Technology

INVITED CONFERENCE TALKS:

- ISSI Workshop on Planetary Magnetism, 2008. The Structure of Jupiter, Saturn, and Extrasolar Giant Planets
- LANL and LLNL Astrophysics Initiative Workshop, 2008. The Structure, Formation, and Evolution of Giant Planets
- Michelson Summer Workshop—Planetary Transits: Detection to Characterization, 2007. Mass-Radius Relations for Giant Planets
- Extreme Solar Systems, 2007. The Impact of Transit Observations on Planetary Physics
- American Astronomical Society, May, 2007. Luminosity and Detectability of Young Giant Planets
- University of Tokyo Workshop on Development of Extra-solar Planetary Science, 2006. On the Luminosity of Young Jupiters
- High Energy Density Laboratory Astrophysics, Six, 2006. High Pressure Equations of State and the Structure of Jupiter, Saturn, and Exoplanets
- Ultra Low-Mass Star Formation and Evolution, 2005. Young Jupiters are Faint: New Models of the Early Evolution of Giant Planets

OTHER CONFERENCE TALKS:

- IAU Symposium #253: Transiting Planets, 2008. A Unified Theory for the Atmospheres of the Hot and Very Hot Jupiters
- Spirit of Lyot, 2007. Extreme Planetary Atmospheres: Modeling Hot Jupiters
- Cool Stars 14, 2006. Hot Jupiter Model Atmospheres and Spectra in the Spitzer Era

- Transiting Extrasolar Planets Workshop, 2006. Hot Jupiter Model Atmospheres and Spectra
- IAU Colloquium #200: Direct Detection of Exoplanets: Science and Techniques, 2005. What can we Learn about Giant Planets from Low Resolution Spectra?
- American Astronomical Society – Division for Planetary Sciences Meeting #37, 2005. On the Atmospheric and Interior Structure of New Transiting Planet HD 149026b.
- Tenth Anniversary of 51 Peg b: Status and Prospects for Hot Jupiter Studies, 2005. Comparative Planetary Atmospheres: Models of HD 20945b, TrES-1, and HD 149026b.
- Aspen Winter Conference on Astrophysics: Planet Formation and Detection, 2005. Reflection Spectra of Giant Planets.
- European Geosciences Union, 2004. Effects of Phase Separation on the Evolution of Giant Planets.
- American Astronomical Society – Division for Planetary Sciences Meeting #35, 2003. Effects of Phase Separation on the Evolution of Saturn and Implications for Extrasolar Giant Planets.
- American Astronomical Society - Division for Planetary Sciences Meeting #34, 2002. Inhomogeneous Evolution of Giant Planets: Jupiter and Saturn.

SERVICE:

Referee for: Science, Nature, Astrophysical Journal, Astronomy and Astrophysics, MNRAS, Astronomical Notes, NASA
 Space Interferometry Mission (SIM) Science Studies, Planets & “Super” Panels, 2008
 UC Santa Cruz, Dept. of Astronomy & Astrophysics, Colloquium Comm., Spring, 2008
 Keck Telescope Time Allocation Committee, NASA, 2007-2008
 Scientific Organizing Committee, High Energy Density Physics (HEDP) 1 / High Energy Density Laboratory Astrophysics (HEDLA) 8, 2008
 Local Organizing Committee, Navigator Program Forum-2007
 Spitzer Space Telescope Time Allocation Committee, Galactic Panel, 2007

PROFESSIONAL AFFILIATIONS:

American Astronomical Society, AAS Division for Planetary Sciences, American Geophysical Union

GRANT SUPPORT

Jonathan J. Fortney

PENDING SUPPORT

Source: NSF Planetary Astronomy

PI: Dr. Pascal Garaud

Title: "Numerical studies of double-diffusive convection in the interior of giant planets"

Period Covered by Award: September, 2008 - August, 2011

CURRENT SUPPORT

Source: NASA Outer Planets Research (OPR) Program

PI: Dr. Jonathan Fortney

Title: "A Consistent Evolutionary History for Jupiter and Saturn"

Period Covered by Award: April 1, 2006 - March 31, 2009

Source: National Science Foundation Astronomy & Astrophysics Program

PI: Dr. Jonathan Fortney

Title: "Evolutionary Models of Young Jupiters and Hot Jupiters"

Period Covered by Award: September 1, 2006 - August 31, 2009

Source: NASA Spitzer Space Telescope

PI: Heather Knutson, Harvard University

Title: "Portraits of Distant Worlds: Mapping the Atmospheres of Hot Jupiters"

Period Covered by Award: June, 2007 - June, 2010

Source: NASA Origins of Solar Systems

PI: Dr. Adam Showman

Title: "General Circulation Models of Hot Jupiter Atmospheres"

Period Covered by Award: May, 2008 - May, 2011

Source: NASA Spitzer Space Telescope

PI: Dr. Jonathan Fortney

Title: "Exploring Hot Neptune Atmospheres"

Period Covered by Award: June, 2008 - June, 2011

Source: NASA Spitzer Space Telescope

PI: Heather Knutson, Harvard University

Title: "Mapping the Atmospheres of the Smallest Transiting Exoplanets"

Period Covered by Award: June, 2008 - June, 2011

Source: NASA Kepler Mission Participating Scientists Program

PI: Dr. Jonathan Fortney

Title: "Giant Planet Science from the Kepler Mission"

Period Covered by Award: October, 2008 - October, 2011

PUBLICATIONS

Jonathan J. Fortney

PAPERS IN REFEREED JOURNALS:

- 23) A. P. Showman, **J. J. Fortney**, Y. Lian, M. S. Marley, R. S. Freedman, H. A. Knutson, D. Charbonneau, 2008. Atmospheric circulation of hot Jupiters: Coupled radiative-dynamical general circulation model simulations of HD 189733b and HD 209458b. *Astrophysical Journal*, submitted.
- 22) P. Nutzman, D. Charbonneau, J.N. Winn, H.A. Knutson, **J.J. Fortney**, M.J. Holman, E. Agol, 2008. A Precise Estimate of the Radius of the Exoplanet HD 149026b from Spitzer Photometry. *Astrophysical Journal*, submitted, arXiv:0805.0777.
- 21) H. A. Knutson, D. Charbonneau, N. B. Cowan, **J. J. Fortney**, A. P. Showman, E. Agol, G. W. Henry, M. E. Everett, L. E. Allen, 2008. Multi-Wavelength Constraints on the Day-Night Circulation Patterns of HD 189733b. *Astrophysical Journal*, in press, arXiv:0802.1705.
- 20) **J.J. Fortney**, M.S. Marley, D. Saumon, K. Lodders, 2008. Synthetic Spectra and Colors of Young Giant Planet Atmospheres: Effects of Initial Conditions and Atmospheric Metallicity. *Astrophysical Journal*, vol 683, 1104–1116.
- 19) A. P. Showman, C. S. Cooper, **J. J. Fortney**, M. S. Marley, 2008. Atmospheric Circulation of Hot Jupiters: Three-dimensional circulation models of HD 209458b and HD 189733b with Simplified Forcing. *Astrophysical Journal*, vol 682, 559-576.
- 18) **J. J. Fortney**, K. Lodders, M. S. Marley, R. S. Freedman, 2008. A Unified Theory for the Atmospheres of the Hot and Very Hot Jupiters: Two Classes of Irradiated Atmospheres. *Astrophysical Journal*, vol 678, 1419-1435.
- 17) **J. J. Fortney** & M. S. Marley, 2007. Analysis of Spitzer Spectra of Irradiated Planets: Evidence for Water Vapor? *Astrophysical Journal Letters*, vol 666, L45-L48.
- 16) H. A. Knutson, D. Charbonneau, L. E. Allen, **J. J. Fortney**, E. Agol, N. B. Cowan, A. P. Showman, C. S. Cooper, S. T. Megeath, 2007. A Map of the Day-Night Contrast of the Extrasolar Planet HD 189733b, *Nature*, vol 447, 183-186.
- 15) **J. J. Fortney**, M. S. Marley, J. W. Barnes, 2007. Planetary Radii across Five Orders of Magnitude in Mass and Stellar Insolation: Application to Transits, *Astrophysical Journal*, vol 659, 1661-1672.
- 14) M. S. Marley, **J. J. Fortney**, O. Hubickyj, P. Bodenheimer, J. J. Lissauer, 2007. On the Luminosity of Young Jupiters, *Astrophysical Journal*, vol 655, 541-548.
- 13) **J. J. Fortney**, C. S. Cooper, A. P. Showman, M. S. Marley, R. S. Freedman, 2006. The Influence of Atmospheric Dynamics on the Infrared Spectra and Light Curves of

Hot Jupiters. *Astrophysical Journal*, vol 652, 746-757.

12) N. Bozorgnia, **J. J. Fortney**, C. McCarthy, D. A. Fischer, G. W. Marcy, 2006. The Search for an Atmospheric Signature of the Transiting Exoplanet HD 149026b, *Publications of the Astronomical Society of the Pacific*, vol 118, 1252-1257.

11) P. K. G. Williams, D. Charbonneau, C. S. Cooper, A. P. Showman, **J. J. Fortney**, 2006. Resolving the Surfaces of Extrasolar Planets with Secondary Eclipse Light Curves. *Astrophysical Journal*, vol 649, 1020-1027.

10) **J. J. Fortney**, D. Saumon, M. S. Marley, K. Lodders, R. Freedman, 2006. Atmosphere, Interior, and Evolution of the Metal-Rich Transiting Planet HD 149026b. *Astrophysical Journal*, vol 642, 495-504.

9) **J. J. Fortney**, 2005. The Effect of Condensates on the Characterization of Transiting Planet Atmospheres with Transmission Spectroscopy, *Monthly Notices of the Royal Astronomical Society*, vol 364, 649-653.

8) **J.J. Fortney**, M.S. Marley, K. Lodders, D. Saumon, R. Freedman, 2005. Comparative Planetary Atmospheres: Models of TrES-1 and HD209458b. *Astrophysical Journal Letters*, vol 627, L69-L72.

7) J. Barnes and **J. J. Fortney**, 2004. Transit Detectability of Ring Systems around Extrasolar Giant Planets, *Astrophysical Journal*, vol 616, 1193-1203.

6) A. Burrows, I. Hubeny, W. B. Hubbard, D. Sudarsky, **J. J. Fortney**, 2004. Theoretical Radii of Transiting Giant Planets: The Case of OGLE-TR-56b, *Astrophysical Journal*, vol 610, L53-L56.

5) **J. J. Fortney** and W. B. Hubbard, 2004. Effects of Helium Phase Separation on the Evolution of Extrasolar Giant Planets, *Astrophysical Journal*, vol 608, 1039-1049.

4) **J. J. Fortney** and W. B. Hubbard, 2003. Phase Separation in Giant Planets: Inhomogeneous Evolution of Saturn. *Icarus*, vol. 164, 228-243.

3) **J. J. Fortney**, D. Sudarsky, I. Hubeny, C. S. Cooper, W. B. Hubbard, A. Burrows, J. I. Lunine, 2003. On the Indirect Detection of Sodium in the Atmosphere of the Planetary Companion to HD 209458. *Astrophysical Journal*, vol. 589, 615-622.

2) J. Barnes and **J. J. Fortney**, 2003. Measuring Oblateness and Rotation of Transiting Extrasolar Giant Planets. *Astrophysical Journal*, vol. 588, 545-556.

1) W. B. Hubbard, **J. J. Fortney**, J. I. Lunine, A. Burrows, D. Sudarsky, P. Pinto, 2001. Theory of Extrasolar Giant Planet Transits. *Astrophysical Journal*, vol. 560, 413-419.

REFEREED BOOK CHAPTERS:

M. S. Marley, **J. J. Fortney**, S. Seager, T. Barman, 2007. Atmospheres of Extrasolar Giant Planets. *Protostars and Planets V*. B. Reipurth, D. Jewitt, and K. Keil (eds.), University of Arizona Press, Tucson, 733-747.

M. S. Marley and **J. J. Fortney**, 2007. The Interiors of Giant Planets. *Encyclopedia of the Solar System*, Second Edition. L. McFadden, P. Weissman, T. Johnson (eds.), Academic Press, San Diego, 403-418.

COMMENTARIES:

J. J. Fortney, 2007. Extrasolar Planets: The one that Got Away, *Nature*, vol. 449, 147-148.

J. J. Fortney, 2004. Looking into the Giant Planets, *Science*, vol. 305, 1414-1415.

PAPERS IN CONFERENCE PROCEEDINGS:

J. J. Fortney, 2008. Two Classes of Hot Jupiter Atmospheres, IAU Symposium #253, submitted

J. J. Fortney, 2008. The Impact of Transit Observations on Planetary Physics. *Extreme Solar Systems*, in press. arXiv:0801.4943

J. J. Fortney, 2008. Hot Jupiter Model Atmospheres in the Spitzer Era. 14th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun, ASP Conference Series, Vol. 384, 264-269.

J. J. Fortney, 2007. Hot Jupiter Model Atmospheres and Spectra. *Transiting Planet Workshop (Heidelberg)*, ASP Conference Series, vol 366, pg. 297.

J. J. Fortney, 2007. The Structure of Jupiter, Saturn, and Exoplanets: Key Questions for High-Pressure Experiments. *High Energy Density Laboratory Astrophysics. Astrophysics and Space Science*, vol. 307, 279-283. (*refereed*)

J. J. Fortney, M. S. Marley, O. Hubickyj, P. Bodeheimer, 2005. Young Jupiters are Faint: Evolution Models for Giant Planets at Young Ages. *Ultra Low-Mass Star Formation and Evolution. Astronomical Notes*, vol. 325, 925-929. (*refereed*)

J. J. Fortney and M. S. Marley, 2005. What can we learn about giant planets from low resolution spectra? *IAU Colloquium 200: Direct Detection of Exoplanets: Science and Techniques*. pg. 145.

J. J. Fortney, M.S. Marley, K. Lodders, D. Saumon, R. Freedman, 2005. Comparative Planetary Atmospheres: Models of HD 20945b, TrES-1, and HD 149026b. *Tenth Anniversary of 51 Peg b: Status and Prospects for Hot Jupiter Studies*. pg. 234.

J. J. Fortney and W. B. Hubbard, 2004. Effects of Phase Separation on the Evolution

of Giant Planets. Maryland Astrophysics Conference: The Search for Other Worlds,
pg. 197.