David S. Spiegel

CONTACT INFORMATION

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EDUCATION

COLUMBIA UNIVERSITY, New York, NY; Ph.D. in Astronomy, May 2008
Thesis Advisers: Frits Paerels, Kristen Menou, Caleb Scharf
M.Phil in Astronomy, May 2005; M.A. in Astronomy, May 2004
AMHERST COLLEGE, Amherst, MA; B.A. in Mathematics, 1999, *Summa Cum Laude*

POSDOCTORAL EXPERIENCE		
	INSTITUTE FOR ADVANCED STUDY, Postdoctoral Member	2011-2014
	PRINCETON UNIVERSITY, Postdoctoral Researcher	2008-2011

PREVIOUS PROFESSIONAL EXPERIENCE		
	COLUMBIA UNIVERSITY, Graduate Research/Teaching Assistant	Ph.D. 2008
	SCRIPPS INSTITUTION OF OCEANOGRAPHY, Scientific Programmer	2000-2001
	MIT, GODDARD SPACE FLIGHT CENTER, Scientific Programmer	1999-2000
	HARVARD SCHOOL OF PUBLIC HEALTH, Lab Assistant/Programmer	1996, 1997
	MIT DEPT. OF EARTH, ATMOSPH., AND PLANETARY SCIENCE, Programmer	1994, 1995

TEACHING

- Co-organized an REU-like program and taught a research class for the Princeton undergraduate summer researchers in summers of 2011—2013
- Quest University — I co-taught a course on astrobiology with David Helfand (president of Quest) at Quest University during the Fall Semester of 2011
- Prison Teaching Initiative at Princeton — I have taught algebra for 5 years (∼10-20 students per class) in New Jersey prisons for women and youth (2008—present).
- Anderson School (Manhattan, NY) — developed pilot course for introducing astronomy to (∼60) NYC public school 7th grade students (2007)
- Columbia Astronomy — named "*Outstanding Teaching Assistant*" (2005)
- Columbia Astronomy — as Head Teaching Assistant, I supervised and coordinated the curricula of 7 lab courses containing 63 students. (September 2003—May 2004)
- Columbia Astronomy — For 8 semesters, I taught an astronomy lab course (∼15 students per semester), co-taught an introductory astronomy course for majors (17 students) and co-taught an astronomy course for non-majors (10 students). (Sept. 2001—May 2004)

STUDENTS SUPERVISED

The projects I have supervised with Princeton undergraduates have led to four refereed journal publications (three in the Astrophysical Journal and one in the Proceedings of the National Academy of Sciences).

- Courtney Dressing, now an astronomy graduate student at Harvard
- Katie Silverio, now an astronomy graduate student at Berkeley
- Sarah Wellons, now an astronomy graduate student at Harvard
- Libby Tolman, now a junior undergraduate at Princeton
- Oderah Justin Otor, now a sophomore undergraduate at Princeton
- Morgan Presley, now a junior undergraduate at Princeton

AFFILIATIONS

- Adviser to HATPI
- Chair of the Selection Committee for proposed $5,000,000 Templeton ELSI Program for International Collaboration

Publications

As of 2 November 2014: 44 papers, 1300 citations; 16 lead-author papers, 480 citations; h-index: 18; lead-author h-index: 10. Below, unrefereed are in blue; these are either real research papers — possibly currently in press — or community white papers, not opinion pieces or popular writing.

1. Rein, Hanno; **Spiegel, D. S.** "IAS15: A fast, adaptive, high-order integrator for gravitational dynamics, accurate to machine precision over a billion orbits"; 2014 MNRAS in press, arXiv1:409.4779R
2. Brandt, T.; McElwain, M. W.; Turner, E. L.; Mede, K.; **Spiegel, D. S.**; et al. "A Statistical Analysis of SEEDS and Other High-contrast Exoplanet Surveys: Massive Planets or Low-mass Brown Dwarfs?"; 2014 ApJ, 794, 159
3. Brandt, T.; **Spiegel, D. S.**; "Prospects for Detecting Oxygen, Water, and Chlorophyll on an Exo-Earth"; 2014 PNAS, 111, 37, 13278
4. **Spiegel, D. S.**; Fortney, J.; Sotin, C.; "Structure of Exoplanets"; 2014 PNAS, 111, 35, 12622
5. Rein, H.; Fujii, Y.; **Spiegel, D. S.**; Fortney, J.; Sotin, C.; "Some inconvenient truths about biosignatures involving two chemical species on Earth-like exoplanets"; 2014 PNAS, 111, 19, 6871
6. Brandt, T. D.; McElwain, M. W.; Janson, M.; Knapp, G. R.; Mede, K.; Limbach, M. A.; Groff, T.; Burrows, A.; Gunn, J. E.; Guyon, O.; Hashimoto, J.; Hayashi, M.; Jovanovic, N.; Kasdin, N. J.; Kuzuhara, M.; Lupton, R. H.; Martinache, F.; Sorahana, S.; **Spiegel, D. S.**; Takato, N.; Tamura, M.; Turner, E. L.; Vanderbei, R.; Wisniewski, J.; "CHARIS science: performance simulations for the Subaru Telescope's third-generation of exoplanet imaging instrumentation"; 2014 SPIE 9148
7. Janson, M.; Brandt, T.; **Spiegel, D. S.**; "Direct Imaging Detection of Methane in the Atmosphere of GJ 504 b"; 2013 ApJL, 778, p. 4
8. Kipping, D. M.; **Spiegel, D. S.**; Sasselov, D. D.; "A simple, quantitative method to infer the minimum atmospheric height of small exoplanets"; 2013 MNRAS, 434, p. 1883
9. Lloyd, J. P.; Lunine, J. I.; Mamajek, E.; **Spiegel, D. S.**; et al. "Targeting Young Stars with Kepler: Planet Formation, Migration Mechanisms and the Early History of Planetary Systems"; 2013 arXiv:1309.1520 (in response to *Kepler* call for white papers for two-wheel operation mode)
10. Kuzuhara, M.; Tamura, M.; Kudo, T.; Janson, M.; Kandori, R.; Brandt, T. D.; Thalmann, C.; **Spiegel, D. S.**; et al. "Direct Imaging of a Cold Jovian Exoplanet in Orbit around the Sun-like Star GJ 504"; 2013 ApJ, 774, p. 11
11. **Spiegel, D. S.**; Burrows, A.; "Thermal Processes Governing Hot-Jupiter Radii"; 2013 ApJ, 772, p. 76
12. Nordhaus, J.; **Spiegel, D. S.**; "On the orbits of low-mass companions to white dwarfs and the fates of the known exoplanets"; 2013 MNRAS, 432, p. 500
13. Mesinger, A.; Ferrara, A.; **Spiegel, D. S.**; "Signatures of X-rays in the early Universe"; 2013 MNRAS, 431, p. 621
14. **Spiegel, D. S.**; Madhusudhan, N.; "Jupiter will become a hot Jupiter: Consequences of Post-Main-Sequence Stellar Evolution on Gas Giant Planets"; 2012 ApJ, 756, p. 132

15. **Spiegel, D. S.**; "Binary Evolution Leads to Two Populations of White Dwarf Companions"; 2012 arXiv:1208.2276
16. Metzger, B. D.; Giannios, D.; **Spiegel, D. S.**; "Optical and X-ray Transients from Planet-Star Mergers"; 2012 MNRAS, 425, p. 2778
17. McElwain, M. W.; Mandell, A.; Woodgate, B.; **Spiegel, D. S.**; et al.; "NIMBUS: The Near-Infrared Multi-Band Ultraprecise Spectroimager for SOFIA"; 2012 SPIE 84469B
18. McElwain, M. W.; Brandt, T. D.; Janson, M.; Knapp, G. R.; Peters, M. A.; Burrows, A.; Carlotti, A.; Carr, M. A.; Groff, T.; Gunn, J. E.; Guyon, O.; Hayashi, M.; Kasdin, N. J.; Kuzuhara, M.; Lupton, R. H.; Martinache, F.; **Spiegel, D.**; Takato, N.; Tamura, M.; Turner, E. L.; Vanderbei, R. J.; "Scientific Design of a High Contrast Integral Field Spectrograph for the Subaru Telescope"; 2012 SPIE 84469C
19. Farihi, J. Subasavage, J. P.; Nelan, E. P.; Harris, H. C.; Dahn, C. C.; Nordhaus, J.; **Spiegel, D. S.**; "Precision astrometry of the exoplanet host candidate GD 66"; 2012 MNRAS, 424, p. 519
20. Janson, M.; Carson, J. C.; Lafreniere, D.; **Spiegel, D. S.**; Bent, J. R.; Wong, P.; "Infrared Non-detection of Fomalhaut b: Implications for the Planet Interpretation"; 2012 ApJ, 747, p. 116
21. **Spiegel, D. S.**; Burrows, A.; "Spectral and Photometric Diagnostics of Giant Planet Formation Scenarios"; 2012 ApJ, 745, p. 174
22. **Spiegel, D. S.**; Turner, E. L.; "Bayesian analysis of the astrobiological implications of life's early emergence on Earth"; 2012 PNAS, 109, p. 395
23. Kipping, D. M.; **Spiegel, D. S.**; "Detection of visible light from the darkest world"; 2011 MNRAS, 417L, p. 88
24. Nordhaus, J.; Wellons, S.; **Spiegel, D. S.**; Metzger, B. D.; Blackman, E. G.; "The formation of high-field magnetic white dwarfs from common envelopes"; 2011 PNAS, 108, p. 3135
25. **Spiegel, D. S.**; Burrows, A.; Milsom, J. A.; "The Deuterium-Burning Mass Limit for Brown Dwarfs and Giant Planets"; 2011 ApJ, 727, p. 57
26. Ibgui, L.; **Spiegel, D. S.**; Burrows, A.; "Explorations into the Viability of Coupled Radius-Orbit Evolutionary Models for Inflated Planets"; 2011 ApJ, 727, p. 75
27. **Spiegel, D. S.**; Burrows, A.; "Atmosphere and Spectral Models of the *Kepler*-Field Planets HAT-P-7b and TrES-2"; 2010 ApJ, 722, p. 871
28. **Spiegel, D. S.**; Raymond, S. N.; Dressing, C. D.; Scharf, C. A.; Mitchell, J. L.; "Generalized Milankovitch Cycles and Longterm Climatic Habitability"; 2010 ApJ, 721, p. 1308
29. Dressing, C. D.; **Spiegel, D. S.**; Scharf, C. A.; Menou, K.; Raymond, S. N.; "Habitable Climates: The Influence of Eccentricity"; 2010 ApJ, 721, p. 1295
30. Burrows, A.; Rauscher, E.; **Spiegel, D. S.**; Menou, K.; "Photometric and Spectral Signatures of 3D Models of Transiting Giant Exoplanets"; 2010 ApJ, 719, p. 341
31. Ibgui, L.; Burrows, A.; **Spiegel, D. S.**; "Tidal Heating Models for the Radii of the Inflated Transiting Giant Planets WASP-4b, WASP-6b, WASP-12b, and TrES-4"; 2010 ApJ, 713, p. 751
32. Nordhaus, J.; **Spiegel, D. S.**; Ibgui, L.; Goodman, J.; Burrows, A.; "Tides and Tidal Engulfment in Post Main Sequence Binaries: Period Gaps for Planets and Brown Dwarfs Around White Dwarfs"; 2010 MNRAS, 408, p. 631

33. Lopez-Morales, M.; Coughlin, J. L.; Sing, D. K.; Burrows, A.; Apai, D.; Rogers, J. C.; **Spiegel, D. S.**; "Day-side z′-band emission and eccentricity of Wasp-12b"; 2010 ApJL, 716, p. 36

34. Fressin, F.; Knutson, H. A.; Charbonneau, D.; O'Donovan, F. T.; Burrows, A.; D., Drake; Mandushev, G.; **Spiegel, D. S.**; "The Broadband Infrared Emission Spectrum of the Exoplanet TrES-3"; 2010 ApJ, 711, p. 374

35. **Spiegel, D. S.**; Burrows, A.; Ibgui, L.; Hubeny, I.; Milsom, J. A.; "Models of Neptune-Mass Exoplanets: Emergent Fluxes and Albedos"; 2010 ApJ, 709, p. 149

36. **Spiegel, D. S.**; Silverio, K.; Burrows, A.; "Can TiO Explain Thermal Inversions in the Upper Atmospheres of Irradiated Giant Planets?"; 2009 ApJ, 299, p. 1487

37. **Spiegel, D. S.**; Menou, K., Scharf, C. A.; "Habitable Climates: The Influence of Obliquity"; 2009 ApJ, 691, p. 596

38. Scharf, C. A.; **Spiegel, D. S.**; et al.; "New Worlds: Evaluating terrestrial planets as astrophysical objects"; 2009 Astro2010 White Paper, arXiv:0902.2755

39. Gaudi, B. S.; Patterson, J.; **Spiegel, D. S.**; et al.; "Discovery of a Very Bright, Nearby Gravitational Microlensing Event"; 2008 ApJ, 677, p. 1268

40. **Spiegel, D. S.**; Menou, K., Scharf, C. A.; "Habitable Climates"; 2008 ApJ, 681, p. 1609

41. **Spiegel, D. S.**; Haiman, Z.; Gaudi, B. S.; "On Constraining a Transiting Exoplanet's Rotation Rate With Its Transit Spectrum"; 2007 ApJ, 669, p. 1324

42. **Spiegel, D. S.**; Paerels, F.; Scharf, C. A.; "A Possible Dearth of Hot Gas in Galaxy Groups at Intermediate Redshift"; 2007 ApJ, 658, p. 288

43. **Spiegel, D. S.**; Zamojski, M.; Gersch, A.; Donovan, J.; Haiman, Z.; "Can We Probe the Atmospheric Composition of an Extrasolar Planet from Its Reflection Spectrum in a High-Magnification Microlensing Event?"; 2005 ApJ, 628, p. 478

44. Pourati, J.; Maniotis, A.; **Spiegel, D. S.**; Schaffer, J. L.; Butler, J. P.; Fredberg, J. J.; Ingber, D. E.; Stamenovic, D.; Wang, N.; "Is Cytoskeletal Tension a Major Determinant of Cell Deformability in Adherent Endothelial Cells?"; 1998 Am. J. Physiol., c1283-c1289

Selected Invited Talks

- Tokyo Institute of Technology Colloquium; 18 April 2014
- Columbia University Astronomy Seminar; 4 April 2014
- Naval Research Laboratory; 21 March 2014
- Reed College Physics Colloquium; 12 March 2014
- University of Bern, Center for Space and Habitability; 15 October 2013
- Caltech, distinguished visitor in Astrophys. and Planetary Science; talk on 16 May 2013
- UC Berkeley Astronomy Department Colloquium; 18 April 2013
- University of Pennsylvania Physics Department Colloquium; 20 February 2013
- Invited talk at Princeton PCTS Conference "Origins of Life"; 21 January 2013
- AAS invited talk at session on planets around stellar remnants; 10 January 2013
- CITA; 20 October 2012
- Amherst College Physics Colloquium; 9 February 2012
- *"Planets Around Stellar Remnants"* conference; 25 January 2012
- University of Rochester; 10 November 2011
- New York Astrobiology Center Astrobiology Seminar (at RPI); 7 November 2011
- NYU CCPP seminar; 2 November 2011
- *Future of Astronomy: Fellows at the Frontiers of Astronomy* meeting; 1 September 2011
- Wellesley College; 4 March 2011
- University of Wisconsin, Madison; 8 February 2011
- University of Bordeaux; 25 January 2011
- AAS invited talk at session on habitability; January 2011
- Harvard University/CfA SSP; 29 November 2010
- Goddard Space Flight Center; 19 October 2010
- Space Telescope Science Institute; 18 October 2010
- Invited review talk at *"Revisiting the Habitable Zone"* meeting; 3 August 2010
- Penn State University Center for Exoplanets and Habitable Worlds; 16 July 2010
- Subaru Strategic Exploration of Exoplanets and Disks (SEEDS) meeting; 9 July 2010
- Invited speaker at University of Tokyo Exo-Earths Symposium; 31 May 2010
- Invited speaker on habitability at the 2010 Japan Geosciences Union; 28 May 2010
- Milutin Milankovitch 130th Anniversary Symposium; 24 September 2009
- Harvard University/CfA SSP; 1 December 2008
- Stanford University, KIPAC/SLAC; 19 June 2008
- Goddard Space Flight Center; Greenbelt, MD; 20 December 2007
- Colloquium speaker at Math Department, William Patterson University; 27 April 2005

Public Presentations and Media

- Lehigh Valley Amateur Astronomers Association; 13 April 2014
- 1-hour radio interview on Bel-Air radio; 7 April 2014
- Princeton Senior Center; 7 June 2013
- Franklin Institute, Philadelphia; 13 March 2013
- Interviewed on WAMC (an NPR affiliate); 7 November 2011
- Various publications (Sky & Telescope, Time.com, etc.) regarding "The Darkest World"; Summer 2011
- BBC show "Do We Really Need the Moon" (in production); 3 October 2010
- Interviewed for New Scientist article "Cosmic accidents: Mars attacks"; October 2010
- United Astronomy Clubs of New Jersey, October Meeting; 17 October 2009
- Interviewed on Science Radio Serbia; 24 September 2009
- Interviewed for New Scientist article "Why the universe may be teeming with aliens"; September 2008
- Columbia University Astronomy Department Public Lecture Series; 14 December 2007
- American Museum of Natural History; Manhattan, NY; 20 July 2007