

# JOSEPH HARRINGTON

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## Education

1994 Ph.D., Planetary Science, Massachusetts Institute of Technology  
1988 S.B., Physics, Massachusetts Institute of Technology

## Current Research Interests

Planetary and exoplanetary atmospheres.  
Astrobiology and the astrophysical search for life.  
Astronomical data analysis methodology.  
Infrared observing techniques.

## Employment

University of Central Florida, Orlando, Florida  
2013 – *present* Professor, Department of Physics, Planetary Sciences Group  
2009 – 2013 Associate Professor (tenured), Department of Physics, Planetary Sciences Group  
2006 – 2009 Assistant Professor, Department of Physics, Planetary Sciences Group  
Cornell University, Ithaca, New York  
2003 – 2006 Senior Research Associate, Center for Radiophysics and Space Research  
1997 – 2003 Research Associate, Center for Radiophysics and Space Research  
National Research Council  
1995 – 1997 Research Associate, NASA Goddard Space Flight Center, Greenbelt, Maryland  
Massachusetts Institute of Technology, Cambridge, Massachusetts  
1988 – 1994 Graduate assistantships  
Institute for Astronomy, University of Hawai'i, Honolulu, Hawai'i  
*Spring 1992* Visiting Graduate Student, Jovian Aurora project

## Secondary Joint Appointment

Florida Space Institute, University of Central Florida, Orlando, Florida  
2016 – *present* Scientist

## Visiting Appointments

Max-Planck-Institut für Astronomie, Heidelberg, Germany  
2012 – 2013 Sabbatical Visiting Scientist, Star and Planet Formation Division  
Cornell University, Ithaca, New York  
2010 – 2013 (summers) Visiting Professor, Department of Astronomy

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## External Funding

Period	Role	\$k	Source	Short title
Current/Awarded UCF:		\$1.86M total		
2017–2020	PI	552	NASA Exoplanets Res. Prog.	Atmosph. Retrieval from Exoplanets w/ BART
2013–2018	PI	589	NASA Astrophys. Data Anal.	Characterizing Exoplanets w/ Spitzer Eclipses
2012–2017	PI	649	NASA Planetary Atmospheres	Exoplanet Eclipses & Bayesian Radiat. Fitting
2011–2016	Co-I*	66.5a	NASA Planetary Atmospheres	Jupiter Impact Modeling
* = Co-I and managing PI for remote grantholder, amounts are as credited to me as Co-I.				
a = Total \$475k, balance to PI and Co-Is elsewhere.				
Past UCF:		\$1.77M total		
2012–2017	Co-I	105.6	NSF Astronomy & Astrophys.	Jovian Impact Waves, Bubbles, Splashes
2012–2016	Adv.	90	NASA Earth, Space Sci. Fellow.	Jasmina Blečić
2012–2014	Co-I	19.4	Spitzer Space Telescope	Metallicity effects on exoplanets
2010–2013	PI	49.9	Spitzer Space Telescope	ToO: Transiting Exoplanets V, Cycle 7
2009–2012	Co-I	43.5	Spitzer Space Telescope	Phase Curve of Exoplanet WASP-18b
2009–2012	Co-I	10c	Spitzer Space Telescope	Secondary Eclipse of Exoplanet HAT-P-11b
2009–2012	PI	200	Spitzer Space Telescope	ToO: Transiting Exoplanets IV, Warm Spitzer
2009–2011	PI	85	NSF Astronomy & Astrophys.	Realistic SL9 Impact Model
2008–2011	PI	245d	Spitzer Space Telescope	ToO: Transiting Exoplanets III, Legacy
2008–2011	Co-I	34	Spitzer Space Telescope	Hot Stratospheres from the WASP Survey
2006–2011	PI	324	NSF Astronomy & Astrophys.	Learning from SL9: Modeling Phase 2
2007–2010	PI	127	Spitzer Space Telescope	ToO: New Transiting Extrasolar Planets II
2007–2010	PI	116	Spitzer Space Telescope	Intense Photometry of HD 149026b
2007–2010	Co-I	26	Spitzer Space Telescope	Spectroscopy of Exoplanet HD 209458b
2008–2010	Co-I	8	Spitzer Space Telescope	First Atmos. Study of a Young Massive Planet
2008–2009	PI	52	NSF Astronomy & Astrophys.	Transit Spectrum of HD 209458b
2006–2009	PI	115	Spitzer Space Telescope	ToO: New Transiting Extrasolar Planets
2005–2008	PI	19	Spitzer Space Telescope	8- $\mu$ m Photometry of HD 149026b
2005–2008	PI	105	Spitzer Space Telescope	Photometry of Extrasolar Planets
Past Cornell:		\$1.327M total		
2004–2007	PI	127	NASA Planetary Atmospheres	Synthesis of SL9 Models and Data
2004–2007	Sci. PI	42	NASA Planetary Atm. E/PO	Center of Excellence in Astronomy Education
2003–2007	PI	178	NSF Astronomy & Astrophys.	Transit Spectrum of HD 209458b
2003–2009	PI	171	NSF Astronomy & Astrophys.	Realistic SL9 Impact Model
2003–2007	PI	396	NASA Origins of Solar Sys.	Composition and Temp. of HD 209458b
2000–2004	Co-I	199	NASA Planetary Atmospheres	Shoemaker-Levy 9 Revisited
1999–2000	PI	74	NASA Planetary Atmospheres	Jovian Planetary Waves
1998–2001	Co-I	97	NASA Planetary Astronomy	Observations of Jovian Thermal Waves
1997–1999	PI	43	Hubble Space Telescope	Jovian Planetary Waves (archival)

c = total \$45k, balance to PI and Co-Is elsewhere

d = total \$375k, balance to Co-Is elsewhere

# JOSEPH HARRINGTON

## Refereed Journal Articles

2,987 total citations.

h-index: 29 (see Wikipedia article)

Citation counts only include citations by refereed journal articles.

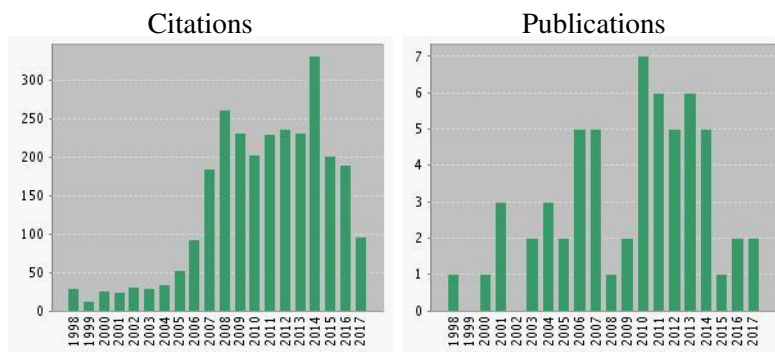
Plots may lag current-year totals.

Source: Thompson Reuters

*Italic names* indicate my students. See also Submitted for Publication, below.

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ResearcherID: <http://www.researcherid.com/rid/E-6250-2011>



Item	Cites	Reference
J61	0	<i>Hardy, R. A., J. Harrington, M. R. Hardin, N. Madhusudhan, T. J. Loredo, R. C. Challener, A. S. D. Foster, P. E. Cubillos, and J. Blecic</i> 2017. Secondary eclipses of HAT-P-13b. <i>ApJ</i> <b>836</b> , 143.
J60	1	<i>Cubillos, P. E., J. Harrington, T. J. Loredo, N. B. Lust, J. Blecic, and M. M. Stemm</i> 2017. On correlated-noise analyses applied to exoplanet light curves. <i>AJ</i> <b>153</b> , 3.
J59	3	<i>Blecic, J., J. Harrington, and M. O. Bowman</i> 2016. TEA: A code for calculating thermochemical equilibrium abundances. <i>ApJS</i> <b>225</b> , 4.
J58	3	<i>Lust, N. B., D. T. Britt, J. Harrington, S. Nymeyer, K. B. Stevenson, E. L. Lust, W. C. Bowman, and J. Fraine</i> 2014. Least asymmetry centering method and comparisons. <i>PASP</i> <b>126</b> , 1092–1101.
J57	6	<i>Cubillos, P. E., J. Harrington, N. Madhusudhan, A. S. D. Foster, N. B. Lust, R. A. Hardy, and M. O. Bowman</i> 2014. A Spitzer five-band analysis of the Jupiter-sized planet TrES-1. <i>ApJ</i> <b>797</b> , 42.
J56	29	<i>Stevenson, K. B., J. L. Bean, N. Madhusudhan, and J. Harrington</i> 2014. Deciphering the atmospheric composition of WASP-12b: A comprehensive analysis of its dayside emission. <i>ApJ</i> <b>791</b> , 36.
J55	3	<i>Rostron, J. W., P. J. Wheatley, D. R. Anderson, A. Collier Cameron, J. J. Fortney, H. A. Knutson, J. Harrington, and D. Pollacco</i> 2014. The thermal emission of the exoplanet WASP-3b. <i>MNRAS</i> <b>441</b> , 3666–3678.
J54	20	<i>Blecic, J., J. Harrington, N. Madhusudhan, K. B. Stevenson, R. A. Hardy, P. E. Cubillos, M. Hardin, M. O. Bowman, S. Nymeyer, D. R. Anderson, C. Hellier, A. M. S. Smith, and A. Collier Cameron</i> 2014. <i>Spitzer</i> observations of the thermal emission from WASP-43b. <i>ApJ</i> <b>781</b> , 116.
J53	19	<i>Blecic, J., J. Harrington, N. Madhusudhan, K. B. Stevenson, R. A. Hardy, P. E. Cubillos, M. R. Hardin, C. J. Campo, W. C. Bowman, S. Nymeyer, T. J. Loredo, D. R. Anderson, and P. F. L. Maxted</i> 2013. Thermal emission of WASP-14b revealed with three <i>Spitzer</i> eclipses. <i>ApJ</i> <b>779</b> , 5.
J52	7	<i>Hueso, R., S. Pérez-Hoyos, A. Sánchez-Lavega, A. Wesley, G. Hall, C. Go, M. Tachikawa, K. Aoki, M. Ichimaru, J. W. T. Pond, D. G. Korycansky, C. Palotai, G. Chappell, N. Rebeli, J. Harrington, M. Delcroix, M. Wong, I. de Pater, L. N. Fletcher, H. Hammel, G. S. Orton, I. Tabe, J. Watanabe, and J. C. Moreno</i> 2013. Impact flux on Jupiter: From superbolides to large-scale collisions. <i>A&amp;A</i> <b>560</b> , A55.

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- J51 0 Glauser, A. M., R. van Boekel, O. Krause, T. Henning, B. Benneke, J. Bouwman, *P. E. Cubillos*, I. J. M. Crossfield, Ö. H. Detre, M. Ebert, U. Grözing, M. Güdel, **J. Harrington**, K. Justtanont, U. Klaas, R. Lenzen, N. Madhusudhan, M. R. Meyer, C. Mordasini, F. Müller, R. Ottensamer, J.-Y. Plessier, S. P. Quanz, A. Reiners, E. Renotte, R.-R. Rohloff, S. Scheithauer, H. M. Schmid, J.-R. Schrader, U. Seemann, D. Stam, B. Vandenbussche, and U. Wehmeier 2013. Characterizing exoplanets in the visible and infrared: A spectrometer concept for the EChO space mission. *J. Astron. Instrum.* **2**, 50004.
- J50 6 Mahtani, D. P., P. F. L. Maxted, D. R. Anderson, A. M. S. Smith, B. Smalley, J. Tregloan-Reed, J. Southworth, N. Madhusudhan, A. Collier Cameron, M. Gillon, **J. Harrington**, C. Hellier, D. Pollacco, D. Queloz, A. H. M. J. Triaud, and R. G. West 2013. Warm *Spitzer* occultation photometry of WASP-26b at 3.6 and 4.5  $\mu\text{m}$ . *MNRAS* **432**, 693–701.
- J49 18 *Cubillos, P. E., J. Harrington*, N. Madhusudhan, *K. B. Stevenson, R. A. Hardy, J. Blečić*, D. R. Anderson, *M. Hardin*, and *C. J. Campo* 2013. WASP-8b: Characterization of a cool and eccentric exoplanet with *Spitzer*. *ApJ* **768**, 42.
- J48 22 Anderson, D. R., A. M. S. Smith, N. Madhusudhan, P. J. Wheatley, A. Collier Cameron, C. Hellier, *C. J. Campo*, M. Gillon, **J. Harrington**, P. F. L. Maxted, D. Pollacco, D. Queloz, B. Smalley, A. H. M. J. Triaud, and R. G. West 2013. Thermal emission at 3.6–8  $\mu\text{m}$  from WASP-19b: a hot Jupiter without a stratosphere orbiting an active star. *MNRAS* **430**, 3422–3431.
- J47 33 Maxted, P. F. L., D. R. Anderson, A. P. Doyle, M. Gillon, **J. Harrington**, N. Iro, E. Jehin, D. Lafrenière, B. Smalley, and J. Southworth 2013. *Spitzer* 3.6 and 4.5  $\mu\text{m}$  full-orbit light curves of WASP-18. *MNRAS* **428**, 2645–2660.
- J46 12 Smith, A. M. S., D. R. Anderson, N. Madhusudhan, J. Southworth, A. Collier Cameron, *J. Blečić*, **J. Harrington**, C. Hellier, P. F. L. Maxted, D. Pollacco, D. Queloz, B. Smalley, A. H. M. J. Triaud, and P. J. Wheatley 2012. Thermal emission from WASP-24b at 3.6 and 4.5  $\mu\text{m}$ . *A&A* **545**, A93.
- J45 26 *Stevenson, K. B., J. Harrington, N. B. Lust*, N. K. Lewis, G. Montagnier, J. I. Moses, C. Visscher, *J. Blečić, R. A. Hardy, P. E. Cubillos*, and *C. J. Campo* 2012. Two nearby sub-Earth-sized exoplanet candidates in the GJ 436 system. *ApJ* **755**, 9.
- J44 25 Deming, D., J. D. Fraine, P. V. Sada, N. Madhusudhan, H. A. Knutson, **J. Harrington**, *J. Blečić*, *S. Nymeyer*, A. M. S. Smith, and B. Jackson 2012. Infrared eclipses of the strongly irradiated planet WASP-33b, and oscillations of its host star. *ApJ* **754**, 106.
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- J42 3 *Pond, J. W. T., C. J. Palotai, T. Gabriel, D. G. Korycansky, J. Harrington*, and *N. Rebeli* 2012. Numerical modeling of the 2009 impact event on Jupiter. *ApJ* **745**, 113.
- J41 63 Demory, B.-O., M. Gillon, D. Deming, D. Valencia, S. Seager, C. Lovis, *P. E. Cubillos, J. Harrington, K. B. Stevenson*, M. Mayor, F. Pepe, D. Queloz, D. Segransan, and S. Udry 2011. Detection of a transit of the super-Earth 55 *Cnc* e with *Warm Spitzer*. *A&A* **533**, A114.
- J40 27 *Nymeyer, S., J. Harrington, R. Hardy, K. B. Stevenson, C. Campo*, N. Madhusudhan, A. Collier Cameron, T. J. Loredo, *J. Blečić, W. C. Bowman, C. B. T. Britt, P. E. Cubillos, C. Hellier, M. Gillon, P. F. L. Maxted, L. Hebb, P. J. Wheatley, D. Pollacco*, and D. R. Anderson 2011. *Spitzer* secondary eclipses of WASP-18b. *ApJ* **742**, 35.

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- J39 45 Anderson, D. R., A. M. S. Smith, A. A. Lanotte, T. S. Barman, A. Collier Cameron, C. J. Campo, M. Gillon, **J. Harrington**, C. Hellier, P. F. L. Maxted, D. Queloz, A. H. M. J. Triaud, and P. J. Wheatley 2011. Thermal emission at 4.5 and 8  $\mu\text{m}$  of WASP-17b, an extremely large planet in a slightly eccentric orbit. *MNRAS* **416**, 2108–2122.
- J38 3 Palotai, C. J., D. G. Korycansky, **J. Harrington**, *N. Rebeli*, and *T. Gabriel* 2011. Plume development of the Shoemaker-Levy 9 comet impact. *ApJ* **731**, 3.
- J37 146 Madhusudhan, N., **J. Harrington**, *K. B. Stevenson*, *S. Nymeyer*, *C. Campo*, P. J. Wheatley, D. Deming, *J. Blecic*, *R. Hardy*, *N. B. Lust*, D. R. Anderson, A. Collier Cameron, *C. B. T. Britt*, *W. C. Bowman*, L. Hebb, C. Hellier, P. F. L. Maxted, D. Pollacco, and R. G. West 2011. A high C/O ratio and weak thermal inversion in the atmosphere of exoplanet WASP-12b. *Nature* **469**, 64–67.
- J36 65 *Campo*, *C. J.*, **J. Harrington**, *R. A. Hardy*, *K. B. Stevenson*, *S. Nymeyer*, D. Ragozzine, *N. B. Lust*, D. R. Anderson, A. Collier Cameron, *J. Blecic*, *C. B. T. Britt*, *W. C. Bowman*, P. J. Wheatley, T. J. Loredó, D. Deming, L. Hebb, C. Hellier, P. F. L. Maxted, D. Pollacco, and R. G. West 2011. On the orbit of exoplanet WASP-12b. *ApJ* **727**, 125.
- J35 70 Crossfield, I. J. M., B. M. S. Hansen, **J. Harrington**, J. Cho, D. Deming, K. Menou, and S. Seager 2010b. A new 24  $\mu\text{m}$  phase curve for *v* Andromedae b. *ApJ* **723**, 1436–1446.
- J34 7 **Harrington, J.**, R. G. French, and K. Matcheva 2010. The 1998 November 14 occultation of GSC 0622-00345 by Saturn: II. Stratospheric thermal profile, power spectrum, and gravity waves. *ApJ* **716**, 404–416.
- J33 3 **Harrington, J.**, and R. G. French 2010. The 1998 November 14 occultation of GSC 0622-00345 by Saturn: I. Techniques for ground-based stellar occultations. *ApJ* **716**, 398–403.
- J32 131 *Stevenson, K. B.*, **J. Harrington**, *S. Nymeyer*, N. Madhusudhan, S. Seager, *W. C. Bowman*, *R. Hardy*, D. Deming, E. Rauscher, and *N. Lust* 2010. Possible thermochemical disequilibrium in the atmosphere of the exoplanet GJ 436b. *Nature* **464**, 1161–1164.
- J31 59 Gillon, M., A. A. Lanotte, T. Barman, N. Miller, B. Demory, M. Deleuil, J. Montalbán, F. Bouchy, A. Collier Cameron, H. J. Deeg, J. J. Fortney, M. Fridlund, **J. Harrington**, P. Magain, C. Moutou, D. Queloz, H. Rauer, D. Rouan, and J. Schneider 2010. The thermal emission of the young and massive planet CoRoT-2b at 4.5 and 8  $\mu\text{m}$ . *A&A* **511**, A3.
- J30 37 O’Donovan, F. T., D. Charbonneau, **J. Harrington**, N. Madhusudhan, S. Seager, D. Deming, and H. A. Knutson 2010. Detection of planetary emission from TrES-2 using *Spitzer*/IRAC. *ApJ* **710**, 1551–1556.
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- J28 135 Deming, D., **J. Harrington**, G. Laughlin, S. Seager, *S. B. Navarro*, *W. C. Bowman*, and *K. Horning* 2007. *Spitzer* transit and secondary eclipse photometry of GJ 436b. *ApJ* **667**, L199–L202.
- J27 109 **Harrington, J.**, *S. H. Luszcz*, S. Seager, D. Deming, and L. J. Richardson 2007. The hottest planet. *Nature* **447**, 691–693.
- J26 21 Deming, D., L. J. Richardson, and **J. Harrington** 2007. 3.8- $\mu\text{m}$  photometry during the secondary eclipse of the extrasolar planet HD209458b. *MNRAS* **378**, 148–152.
- J25 125 Richardson, L. J., D. Deming, K. Horning, S. Seager, and **J. Harrington** 2007b. A spectrum of an extrasolar planet. *Nature* **445**, 892–895.
- J24 156 **Harrington, J.**, B. M. Hansen, *S. H. Luszcz*, S. Seager, D. Deming, K. Menou, J. Y.-K. Cho, and L. J. Richardson 2006. The phase-dependent infrared brightness of the extrasolar planet *v* Andromedae b. *Science* **314**, 623–626.

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- J22 5 Rojo, P. M., and **J. Harrington** 2006. A Method to Remove Fringes from Images Using Wavelets. *ApJ* **649**, 553–560.
- J21 9 Korycansky, D. G., **J. Harrington**, D. Deming, and M. E. Kulick 2006. Shoemaker-Levy 9 impact modeling. I. High-resolution three-dimensional bolides. *ApJ* **646**, 642–652.
- J20 173 Deming, D., **J. Harrington**, S. Seager, and J. L. Richardson 2006. Strong infrared emission from the extrasolar planet HD 189733b. *ApJ* **644**, 560–564.
- J19 401 Deming, D., S. Seager, L. J. Richardson, and **J. Harrington** 2005. Infrared radiation from an extrasolar planet. *Nature* **434**, 740–743.
- J18 57 Deming, D., T. M. Brown, D. Charbonneau, **J. Harrington**, and L. J. Richardson 2005. A new search for carbon monoxide absorption in the transmission spectrum of the extrasolar planet HD 209458b. *ApJ* **622**, 1149–1159.
- J17 18 Deming, D., D. Charbonneau, and **J. Harrington** 2004. Spectroscopy of molecular hydrogen emission from KH 15D. *ApJ* **601**, L87–L90.
- J16 40 Richardson, L. J., D. Deming, G. Wiedemann, C. Goukenleuque, D. Steyert, **J. Harrington**, and L. W. Esposito 2003. Infrared observations during the secondary eclipse of HD 209458b. I. 3.6 micron occultation spectroscopy using the Very Large Telescope. *ApJ* **584**, 1053–1062.
- J15 10 Deming, D., and **J. Harrington** 2001. Models of the Shoemaker-Levy 9 impacts. II. Radiative-hydrodynamic modeling of the plume splashback. *ApJ* **561**, 468–480. Publisher’s erratum: *ApJ* **566**, 618.
- J14 9 **Harrington, J.**, and D. Deming 2001. Models of the Shoemaker-Levy 9 impacts. I. Ballistic Monte Carlo plume. *ApJ* **561**, 455–467. Publisher’s erratum: *ApJ* **566**, 617.
- J13 23 Giovanelli, R., J. Darling, M. Sarazin, J. Yu, P. Harvey, C. Henderson, W. Hoffman, L. Keller, D. Barry, J. Cordes, S. Eikenberry, G. Gull, **J. Harrington**, J. D. Smith, G. Stacey, and M. Swain 2001. The optical/infrared astronomical quality of high Atacama sites. I. preliminary results of optical seeing. *PASP* **113**, 789–802.
- J12 30 Nicholson, P. D., R. G. French, E. Tollestrup, J. N. Cuzzi, **J. Harrington**, K. Matthews, O. Perkovic, and R. J. Stover 2000. Saturn’s rings I. Optical depth profiles from the 28 Sgr occultation. *Icarus* **145**, 474–501.
- J11 65 Dowling, T. E., A. S. Fischer, P. J. Gierasch, **J. Harrington**, R. P. Lebeau, and C. M. Santori 1998. The Explicit Planetary Isentropic-Coordinate (EPIC) atmospheric model. *Icarus* **132**, 221–238.
- J10 39 Hubbard, W. B., C. C. Porco, D. M. Hunten, G. H. Rieke, M. J. Rieke, D. W. McCarthy, V. Haemmerle, J. Haller, B. McLeod, L. A. Lebofsky, R. Marcialis, J. B. Holberg, R. Landau, L. Carrasco, J. Elias, M. W. Buie, E. W. Dunham, S. E. Persson, T. Boroson, S. West, R. G. French, **J. Harrington**, J. L. Elliot, W. J. Forrest, J. L. Pipher, R. J. Stover, A. Brahic, and I. Grenier 1997. Structure of Saturn’s mesosphere from the 28 Sgr occultations. *Icarus* **130**, 404–425.
- J9 14 **Harrington, J.**, T. E. Dowling, and R. L. Baron 1996b. Jupiter’s tropospheric thermal emission. II. Power spectrum analysis and wave search. *Icarus* **124**, 32–44.
- J8 6 **Harrington, J.**, T. E. Dowling, and R. L. Baron 1996a. Jupiter’s tropospheric thermal emission. I. Observations and techniques. *Icarus* **124**, 22–31.
- J7 54 Baron, R. L., T. Owen, J. E. P. Connerney, T. Satoh, and **J. Harrington** 1996. NOTE: Solar wind control of Jupiter’s H<sub>3</sub><sup>+</sup> auroras. *Icarus* **120**, 437–442.

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- J6 155 Hammel, H. B., R. F. Beebe, A. P. Ingersoll, G. S. Orton, J. R. Mills, A. A. Simon, P. Chodas, J. T. Clarke, E. de Jong, T. E. Dowling, **J. Harrington**, L. F. Huber, E. Karkoschka, C. M. Santori, A. Tiogo, D. Yeomans, and R. A. West 1995. HST imaging of atmospheric phenomena created by the impact of comet Shoemaker-Levy 9. *Science* **267**, 1288–1296.
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P1 **Harrington, J.**, and P. E. Barrett 1997. Interactive data analysis environments BoF session. In G. Hunt and H. E. Payne (Eds.), *Astronomical Data Analysis Software and Systems VI*, Volume 125 of *ASP Conf. Ser.*, pp. 69–72.

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T1 **Harrington, J.** 1988. *An Upper Magnitude Limit for Additional Neptune-Orbiting Debris Between 3.7 and 7 Neptune Radii*. Bachelor’s thesis in Physics, Massachusetts Institute of Technology.

**Draft in Preparation** Research complete, paper circulating among co-authors.

D1 *Garland, J., J. Harrington, P. E. Cubillos, J. Blečić, A. S. D. Foster, M. O. Bowman, and P. F. L. Maxted* 2018. Spitzer secondary eclipses of WASP-32b. *ApJ*, in preparation.

D1 *Challener, R. C., J. Harrington, P. E. Cubillos, J. Blečić, D. Deming, and C. Hellier* 2018a. BLISS and PLD applied to WASP-29b eclipses. *ApJ*, in preparation.

### Astronomical Software

*The following freely-available software packages implement both original and standard techniques.*

*To download, visit <http://planets.ucf.edu/resources/open-source-software>.*

*Thermochemical Equilibrium Abundances:* Calculates molecular abundances given atomic abundances, temperature, and pressure. Paper: *Blečić et al.* (2016). Code: *Blečić, J., J. Harrington, and M. O. Bowman* 2015. TEA: Thermal Equilibrium Abundances. Astrophysics Source Code Library.

*Least Asymmetry:* Centering method for point sources. Paper: *Lust et al.* (2014). Code: *Lust, N. B., D. Britt, J. Harrington, S. Nymeyer, K. B. Stevenson, E. L. Ross, W. Bowman, and J. Fraine* 2015. Least Asymmetry: Centering method. Astrophysics Source Code Library. Original implementation of unpublished method by graduate student N. Lust.

*Defringeflat:* *Rojo and Harrington* (2006). Method to remove fringes from images such as spectral flat fields, in IDL. Original, developed with graduate student P. Rojo.

*Optspecextr:* Optimal spectrum extraction package for IDL. Improved version of standard technique, developed with undergraduates J. Dermody and D. Zeehandelaar.

*Synthespec:* Spectrograph output simulator. Generates noisy, optically-distorted spectral frames. Original. Developed with undergraduate J. Dermody.

*Maskinterp:* In IDL Astronomy Library. Mask-based, non-linear, surface-model-driven, 2D pixel interpolator. Original. Developed with undergraduates S. Vatanavigkit and A. Ruane.

*Jiggle:* **Harrington et al.** (1996a). Finds mosaic registrations automatically. Original.

*Limbctr:* **Harrington et al.** (1996a). Finds planetary limbs and centers automatically. Original.

### Reviewed Related Publications

*The following publications present analyses of datasets I acquired and shared:*

R9 *Christiansen, J. L., S. Ballard, D. Charbonneau, N. Madhusudhan, S. Seager, M. J. Holman, D. D. Wellnitz, D. Deming, M. F. A’Hearn, and the EPOXI Team* 2010. Studying the Atmosphere of the Exoplanet HAT-P-7b Via Secondary Eclipse Measurements with EPOXI, Spitzer, and Kepler. *ApJ* **710**, 97–104.

R8 *Demory, B.-O., M. Gillon, T. Barman, X. Bonfils, M. Mayor, T. Mazeh, D. Queloz, S. Udry, F. Bouchy, X. Delfosse, T. Forveille, F. Mallmann, F. Pepe, and C. Perrier* 2007. Characterization of the hot Neptune GJ 436 b with Spitzer and ground-based observations. *A&A* **475**, 1125–1129.

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- R7 Gillon, M., B.-O. Demory, T. Barman, X. Bonfils, T. Mazeh, F. Pont, S. Udry, M. Mayor, and D. Queloz 2007. Accurate Spitzer infrared radius measurement for the hot Neptune GJ 436b. *A&A* **471**, L51–L54.
- R6 Cooray, A. R., J. L. Elliot, A. S. Bosh, L. A. Young, and M. A. Shure 1998. Stellar occultation observations of Saturn’s north-polar temperature structure. *Icarus* **132**, 298–310.
- R5 Satoh, T., J. E. P. Connerney, and R. L. Baron 1996. Emission source model of Jupiter’s  $H_3^+$  aurorae: A generalized inverse analysis of images. *Icarus* **122**, 1–23.
- R4 Connerney, J. E. P., T. Satoh, and R. L. Baron 1996. Interpretation of auroral “lightcurves” with application to Jovian  $H_3^+$  emissions. *Icarus* **122**, 24–35.
- R3 Bosh, A. S. 1994. *Stellar occultation studies of Saturn’s rings with the Hubble Space Telescope*. Ph. D. thesis, Massachusetts Institute of Technology.
- R2 Hubbard, W. B., C. C. Porco, D. M. Hunten, G. H. Rieke, M. J. Rieke, D. W. McCarthy, V. Haemmerle, R. Clark, E. P. Turtle, J. Haller, B. McLeod, L. A. Lebofsky, R. Marcialis, J. B. Holberg, R. Landau, L. Carrasco, J. Elias, M. W. Buie, S. E. Persson, T. Boroson, S. West, and D. J. Mink 1993. The occultation of 28 Sgr by Saturn: Saturn pole position and astrometry. *Icarus* **103**, 215–234.
- R1 Connerney, J. E. P., R. Baron, T. Satoh, and T. Owen 1993. Images of excited  $H_3^+$  at the foot of the Io flux tube in Jupiter’s atmosphere. *Science* **262**, 1035–1038.

### Abstracts and Presentations at Scientific Meetings

- Challener, R. C., J. Harrington, P. E. Cubillos, J. Blečić, D. Deming, and C. Hellier* 2018b. A comparison of BLISS and PLD on low-SNR WASP-29b Spitzer observations. *AAS Meeting Abstracts* **231**, 410.04.
- Cubillos, P., J. Blečić, and **J. Harrington** 2018. Open-source software for exoplanet atmospheric modeling. *AAS Meeting Abstracts* **231**, 439.18.
- Harrington, J., M. D. Himes, P. E. Cubillos, J. Blečić, and R. C. Challener** 2018. BARTTest: Community-standard atmospheric radiative-transfer and retrieval tests. *AAS Meeting Abstracts* **231**, 148.08.
- McIntyre, K. J., J. Harrington, R. C. Challener, M. Lenius, J. D. Hartman, G. A. Bakos, J. Blečić, P. E. Cubillos, and A. Cameron* 2018. Atmospheric retrievals of HAT-P-16b and WASP-11b/HAT-P-10b. *AAS Meeting Abstracts* **231**, 148.02.
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- Himes, M. D., **J. Harrington**, and N. B. Lust 2016. Inter-pixel size variations as source of Spitzer systematics. *AAS/DPS Meeting Abstracts* **48**, 122.19.
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- Challener, R. C., **J. Harrington**, P. E. Cubillos, J. Garland, A. S. D. Foster, J. Blecic, A. J. Foster, and B. Smalley 2016. Constraining the atmosphere of exoplanet WASP-34b. *AAS Meeting Abstracts* **227**, #212.03.
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- Blumenthal, S. D., A. M. Mandell, **J. Harrington**, E. Hébrard, P. E. Cubillos, O. Venot, J. Blečić, and R. C. Challener 2015. Equilibrium and disequilibrium chemistry in hot Jupiters. In *Enabling Transiting Exoplanet Science*. 16–18 November 2015, Space Telescope Science Institute, Baltimore, MD, USA.
- Cubillos, P. E., **J. Harrington**, J. Blečić, P. M. Rojo, M. M. Stemm, N. B. Lust, A. J. Foster, R. C. Challener, A. S. D. Foster, S. D. Blumenthal, D. Bruce, and T. J. Loredó 2015. The open-source Bayesian Atmospheric Radiative Transfer (BART) code. In *Enabling Transiting Exoplanet Science*. 16–18 November 2015, Space Telescope Science Institute, Baltimore, MD, USA.
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- Richardson, L. J., D. Deming, K. Horning, S. Seager, and **J. Harrington** 2006b. Infrared spectroscopy of an extrasolar planet. In *AGU Fall Meeting Abstracts*, pp. C1300+.
- Harrington, J.**, *S. H. Luszcz*, D. Deming, S. Seager, and J. L. Richardson 2006. The secondary eclipse of HD 149026b observed by Spitzer at 8 microns. *BAAS* **38**, 481.
- Harrington, J.**, D. Fischer, D. Deming, J. L. Richardson, S. Seager, and *S. H. Luszcz* 2006. The Spitzer Transiting Planet Target of Opportunity Program. Presented at the Transiting Extrasolar Planets Workshop, 25–28 September 2006, Heidelberg, Germany.
- Deming, D., J. L. Richardson, S. Seager, and **J. Harrington** 2005. Spitzer MIPS observations of the primary eclipse of the extrasolar planet HD 209458b. Presented at the 2005 Winter Conference on Astrophysics: Planet Formation and Detection, 6–12 February 2005, Aspen, CO.
- Harrington, J.**, *S. Luszcz*, D. Deming, J. L. Richardson, and S. Seager 2005. The secondary eclipse and transit of HD 209458b at 24  $\mu\text{m}$ . *BAAS* **37**, 671.
- Richardson, J. L., S. Seager, **J. Harrington**, and D. Deming 2005. The radius of HD 209458b at 24  $\mu\text{m}$ . *BAAS* **37**, 1488.
- Richardson, J. L., D. Deming, S. Seager, and **J. Harrington** 2005. A Spitzer MIPS search for the secondary eclipse of the extrasolar planet HD 209458b. Presented at the 2005 Winter Conference on Astrophysics: Planet Formation and Detection, 6–12 February 2005, Aspen, CO.
- Rojo, P. M.*, and **J. Harrington** 2005a. A method to remove fringes from images using wavelets. *BAAS* **37**, 653.
- Rojo, P. M.*, and **J. Harrington** 2005b. A wavelet-based method to remove fringes from images. *BAAS* **37**, 653.
- Harrington, J.**, and R. G. French 2004. The 14 Nov 1998 occultation of GSC 0622-00345 by Saturn. *BAAS* **36**, 1133.
- Rojo, P.*, **J. Harrington**, *J. Dermody*, *D. Zeelandelaar*, D. Deming, G. Wiedemann, S. Seager, N. Iro, J. J. Fortney, and A. Burrows 2004. Transit spectroscopy of extrasolar planet HD209458b: The radiative transfer model. *BAAS* **36**, 1151.
- Deming, D., T. Brown, D. Charbonneau, **J. Harrington**, and L. J. Richardson 2003. A new search for CO absorption in the transmission spectrum of HD 209458b. *BAAS* **35**, 1410.
- Harrington, J.**, and R. G. French 2003. IRTF observations of the 14 Nov 1998 occultation by Saturn. *BAAS* **35**, 995–996.
- Deming, L. D., L. J. Richardson, C. Goukenleuque, **J. Harrington**, and G. Wiedemann 2002. Toward the infrared spectrum of the extrasolar planet HD209458b. *BAAS* **34**, 1263.
- Harrington, J.**, L. D. Deming, K. Matthews, L. J. Richardson, *P. Rojo*, D. Steyert, G. Wiedemann, and

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- Harrington, J.**, L. D. Deming, K. Matthews, L. J. Richardson, *P. Rojo*, D. Steyert, G. Wiedemann, and *D. Zeehandelaar* 2002b. HD209458b transit spectroscopy. *BAAS* **34**, 893.
- Harrington, J.**, D. Deming, *A. Ruane*, and *S. Vatanavikit* 2001. Jupiter's short-term tropospheric and stratospheric thermal dynamics before and during the Cassini encounter. *BAAS* **33**, 1025.
- Harrington, J.**, and D. Deming 2000a. Models of the SL9 impacts. *BAAS* **32**, 689.
- Harrington, J.**, and D. Deming 2000b. Physics of the SL9 impacts. *BAAS* **32**, 998.
- Harrington, J.**, and D. Deming 1999. Jovian planetary waves as drivers of dynamical change. *BAAS* **31**, 1186.
- Harrington, J.**, and D. Deming 1998. Simple models of SL-9 impact plumes in flight. *BAAS* **30**, 1075–1076.
- Harrington, J.**, and D. Deming 1997. Jovian planetary waves. *BAAS* **29**, 1017.
- Harrington, J.**, and L. D. Deming 1996. Simple models of SL-9 impact plumes. *BAAS* **28**, 1150–1151.
- Harrington, J.**, T. E. Dowling, and R. L. Baron 1995. A power spectrum analysis of Jupiter's tropospheric thermal emission. *BAAS* **27**, 1134.
- Harrington, J.** 1995. Jiggle: A program for noninteractive mosaic assembly. Presented at the Fifth Annual Conference on Astronomical Data Analysis Software and Systems, Tucson, Arizona.
- Harrington, J.**, T. E. Dowling, C. M. Santori, H. B. Hammel, J. R. Mills, A. P. Ingersoll, R. F. Beebe, G. S. Orton, P. Chodas, and D. Yeomans 1995. Observations of the dynamic response of Jupiter's atmosphere to the impact of comet Shoemaker-Levy 9. Presented at IAU Colloquium 156: The Collision of Comet P/Shoemaker-Levy 9 and Jupiter, Space Telescope Science Institute, Baltimore, Maryland.
- Harrington, J.**, T. E. Dowling, H. B. Hammel, J. R. Mills, W. F. Hoffmann, A. Dayal, K. Wells, A. Sprague, J. L. Hora, L. K. Deutsch, G. G. Fazio, K. H. Baines, A. J. Friedson, G. S. Orton, and P. A. Yanamandra-Fisher 1994. IRTF and HST observations of the dynamic response of Jupiter's atmosphere to the impact of comet Shoemaker-Levy 9. *BAAS* **26**, 1579.
- Harrington, J.**, R. P. Lebeau, K. A. Backes, and T. E. Dowling 1993. Dynamical response of Jupiter's atmosphere to its collision with comet P/Shoemaker-Levy 9. *BAAS* **25**, 1043–1044.
- Harrington, J.**, T. E. Dowling, L. R. Baron, and T. Owen 1992. Jupiter at 4.9  $\mu\text{m}$ , 1992 January 11 through April 19 UT. *BAAS* **24**, 1041.
- Harrington, J.**, M. L. Cooke, E. W. Dunham, W. J. Forrest, J. L. Pipher, and J. L. Elliot 1991. Saturn ring masses and lightcurve morphology from IRTF observations of the occultation of 28 Sgr. *BAAS* **23**, 1178–1179.
- Harrington, J.**, E. W. Dunham, W. J. Forrest, and J. L. Pipher 1989. IRTF infrared imaging observation of the occultation of 28 Sgr by Saturn. *BAAS* **21**, 954.
- Harrington, J.**, and H. B. Hammel 1989. Disk-integrated methane-band photometry of Neptune: Long term variability and latitudinal variation. *BAAS* **21**, 917.
- Harrington, J.**, H. B. Hammel, and O. P. Kuhn 1988. An upper magnitude limit for Neptune-orbiting debris between 3.7 and 7 Neptune radii. *BAAS* **20**, 1088.
- In addition, 19 co-author presentations, including many by students.*

### Press Releases and Other Media-Related Activities

*“Broad coverage” means appearance of at least hundreds of related stories in the popular press on six continents, in multiple languages and media.*

- 2012 *NBCLearn* educational video on planetary impacts,  
<http://www.nbclearn.com/sciencenews/cuecard/63312>
- 2012 Discovery of UCF-1.01 and UCF-1.02, the closest rocky exoplanet candidates, first discoveries by Spitzer or UCF, Spitzer and UCF press releases, TV interview (Stevenson), broad coverage
- 2011 TV news appearance, Fox35 (WOFL), Orlando, FL, Glory Launch Failure, 4 Mar

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- 2011 TV news appearance, Fox35 (WOFL), Orlando, FL, Solar Storms, 21 Feb
  - 2011 TV news appearance, Fox35 (WOFL), Orlando, FL, Kepler's 1000+ planet candidates, 2 Feb
  - 2010 TV news appearance, Fox35 (WOFL), Orlando, FL, Arsenic-based bacterium, 2 Dec
  - 2010 First carbon-rich planet, *Nature* article, Spitzer, UCF, MIT, WASP press releases, broad coverage
  - 2010 Missing methane on a hot Neptune, *Nature* article, NASA, UCF, MIT press rel., broad coverage
  - 2007 Detection of the hottest planet ever: HD 149026b, *Nature* article, UCF press rel., broad coverage
  - 2007 First detection of molecules in atmosphere of extrasolar planet, *Nature* article, NASA and Spitzer Space Telescope press releases, TV interview, broad coverage
  - 2007 *Planetary Radio* interview (Feb 5), syndicated science interview program, <http://planetary.org/radio>
  - 2006 First measurement of night and day on extrasolar planet, *Science* cover article, NASA and Spitzer Space Telescope press releases, broad coverage
  - 2006 Detection of strong infrared radiation from HD 189733b, NASA Goddard press release
  - 2005 Direct detection of an extrasolar planet, *Nature* article  
TV interview, NASA Science Update press conference, broad coverage.
  - 1995 Observation of atmospheric effects of the Shoemaker-Levy 9 Impacts, *Science* cover article  
NASA, *Science*, and institutional press releases, broad coverage
  - 1994 Prediction of observable atmospheric effects of the Shoemaker-Levy 9 Impacts, *Nature* cover article  
Broad coverage. Prime-time news interviews broadcast on all major US television networks  
Personal appearances or coverage of research on several PBS programs, including some recent  
Several popular magazine covers
  - 1989 World's first failure to reproduce Pons and Fleischmann "cold fusion"  
Interview on BBC program *Confusion in a Jar*, aired in UK and US (PBS *Nova* series)
- In addition, I am regularly asked by international reporters to comment on work in my research areas.*

### Professional Invited Reviews, Colloquia, and Seminars

#### *Exoplanets: Lessons from the Spitzer Space Telescope*

- 2014 Dec 1 New York University, Abu Dhabi
- 2014 Sep 23 Invited review, Exoplanets with JWST - MIRI, Heidelberg, Germany

#### *Two Classes of Exoplanets Identified Without Modeling*

- 2014 Mar 13 Southwest Research Institute, Boulder, CO
- 2014 Mar 11 National Weather Center, University of Oklahoma, Oklahoma City, OK
- 2013 Aug 28 Florida Space Institute, University of Central Florida, Orlando, FL
- 2013 Jul 31 Astronomy Department, Cornell University, Ithaca, NY
- 2013 May 29 Vatican Observatory, Castel Gandolfo, Vatican City
- 2012 Nov 13 Max-Planck-Institut für Astronomie Planet and Star Form. Retreat, Odenwald, Germany
- 2012 Jun 26 Invited review, Comparative Climatology of Terrestrial Planets, Boulder, CO
- 2012 Jun 4 Department of Terrestrial Magnetism, Carnegie Institution of Washington, DC
- 2012 Apr 23 Max-Planck-Institut für Astronomie, Heidelberg, Germany

#### *Photometry and Spectroscopy of Exoplanetary Atmospheres*

- 2011 Feb 18 Dept. of Physics and Space Sciences, Florida Institute of Technology, Melbourne, FL
- 2010 Apr 2 Department of Physics, University of South Florida, Tampa, FL
- 2009 Jul 22 Invited review, New Tech. for Probing Divers. of B. Dwarfs and Exopl., Shanghai, China
- 2009 Feb 17 Invited review, AKARI meeting, University of Tokyo, Tokyo, Japan
- 2009 Jan 30 UF-UCF Star and Planet Formation Days, Astronomy Dept., U. Florida, Gainesville, FL
- 2008 Nov 25 Department of Earth, Atmospheric, and Planetary Sciences, MIT, Cambridge, MA
- 2008 Nov 24 Harvard-Smithsonian Center for Astrophysics, Harvard University, Cambridge, MA
- 2008 Nov 20 Invited review, Molecules in the Atmospheres of Extrasolar Planets mtg, Paris, France

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- 2008 Oct 12 Invited review, Division for Planetary Sciences meeting, Ithaca, NY
- 2008 Sep 24 Colloquium, Physics Department, University of Central Florida, Orlando, FL
- 2008 Sep 7 Planetary Journal Club, Physics Department, University of Central Florida, Orlando, FL
- 2008 Jul 24 Invited review, Cool Stars 15 workshop, St. Andrews, Scotland, UK

### *Photometry of Extrasolar Planets*

- 2008 Feb 19 Institute of Astronomy, Swiss Federal Institute of Technology (ETH), Zurich, Switzerland
- 2008 Feb 18 Department of Astronomy, University of Geneva, Switzerland

### *The Pioneering Direct Measurements of Extrasolar Planets*

- 2007 Jul 7 Physics Department, Ithaca College, Ithaca, NY
- 2007 Jan 24 Department of Astronomy, University of Florida, Gainesville, FL
- 2006 Apr 12 Department of Physics and Astronomy, University of Western Ontario, London, ON
- 2006 Feb 20 Department of Physics and Astronomy, George Mason University, Fairfax, VA
- 2006 Jan 25 Physics Department, University of Central Florida, Orlando, FL
- 2006 Jan 19 Planetary Lunch, Astronomy Department, Cornell University, Ithaca, NY

### *A Painless (but Quantitative) Introduction to Wavelets, with Planetary Examples*

- 2008 Jan 9 Planetary Journal Club, Physics Department, University of Central Florida, Orlando, FL
- 2004 Nov 29 Planetary Lunch, Astronomy Department, Cornell University, Ithaca, NY

### *How to Increase the S/N of Your Existing Data by 30%*

- 2003 Sep 22 Planetary Lunch, Astronomy Department, Cornell University, Ithaca, NY

### *Measuring Extrasolar Planets with Transit Spectroscopy*

- 2003 Dec 16 Physics Department, Notre Dame University, South Bend, IN
- 2003 Nov 5 Physics Department, Ithaca College, Ithaca, NY
- 2002 Nov 7 Astronomy Department, Cornell University, Ithaca, NY

### *Direct Detection and Characterization of Extrasolar Planets*

- 2002 Jul 11 Space Grant Seminar, Cornell University, Ithaca, NY
- 2001 Nov 19 Atacama Telescope Project, Cornell University, Ithaca, NY
- 2001 Oct 11 Planetary Lunch, Astronomy Department, Cornell University, Ithaca, NY

### *Physics of the Shoemaker-Levy 9 Impacts*

- 2002 Aug 6 Department of Astrophysics, American Museum of Natural History, New York, NY
- 2002 Jun 7 Department of Space Studies, Southwest Research Institute, Boulder, CO
- 2001 Mar 21 Department of Earth, Atmospheric, and Planetary Sciences, MIT, Cambridge, MA
- 2001 Mar 19 Astronomy Department, Boston University, Boston, MA
- 2001 Mar 1 Astronomy Department, Cornell University, Ithaca, NY

### *Physical Phenomenology of SL9 Impact Plumes*

- 2000 Feb 14 Planetary Lunch, Astronomy Department, Cornell University, Ithaca, NY

### *Jovian Planetary Waves*

- 1998 Mar 12 Five-College Astronomy Department, University of Massachusetts, Amherst, MA
- 1997 Jun 5 NASA Jet Propulsion Laboratory, Pasadena, CA

### *Jupiter's Tropospheric Thermal Emission*

- 1997 Mar 13 LEP Colloquium, NASA Goddard Space Flight Center, Greenbelt, MD
- 1997 Feb 18 Space Telescope Science Institute, Johns Hopkins University, Baltimore, MD
- 1996 Sep 20 Astronomy Department, Boston University, Boston, MA

## **Honors, Teams, Fellowships, and Societies**

- 2017 Inducted, UCF Scroll and Quill Society (Faculty Excellence honor society)
- 2016 UCF Research Incentive Award (~11 awarded/year/college, eligibility every 5 years)
- 2012 UCF College of Sciences Excellence in Research Award (College's top researcher)

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- 2011 UCF Research Incentive Award (~5 awarded/year/college, eligibility every 5 years)
- 2002 Science Team Associate, NASA CONTOUR Mission, CRISP IR Spectrometer Calibration
- 1999 Asteroid 5034 named Joe Harrington in my honor
- 1995–7 National Research Council Associateship
- 1994 Science Team Associate, NASA Infrared Telescope Facility, Shoemaker-Levy 9 Impact
- 1994 Science Team Associate, Hubble Space Telescope, Shoemaker-Levy 9 Impact
- 1989– Member, American Astronomical Society, Division for Planetary Sciences
- 1988 Member, Sigma Pi Sigma (physics honor society)

### Relevant Consulting (*None since arrival at UCF.*)

- 2004 Division for Planetary Sciences Meeting Conference network services
- 2003–2004 Wellesley College 14 Nov 1998 Saturn Occultation Analysis
- 1999–2000 Wellesley College 14 Nov 1998 Saturn Occultation Analysis
- 1998 Comparative Planetology Lab, U. Louisville, KY Designed and built Beowulf supercomp.
- 1997 Comparative Planetology Lab, U. Louisville, KY Designed and built research computer

### Directly Supported Senior Staff *I employed/employ the following non-Co-I/non-Co-PI staff.*

- 2016–2017 Michael Himes, Research Assistant, full time.
- 2016 Kathleen McIntyre, Research Assistant, full time.
- 2015– Austin Foster, System Manager, part time.
- 2014–2016 Sarah Blumenthal, Research Assistant, full time.
- 2013–2014 Madison Stemm, Research Assistant, part time.
- 2012–2013 Matthew Hardin, Research Assistant, part time. Placement: PhD program, Clemson Univ.
- 2010–2011 Sarah Nymeyer, Research Assistant, full time. Placement: PhD program, UCLA
- 2010 William Bowman, Research Assistant, full time.
- 2010– Dr. Thomas Loredo (Cornell), Co-I/Consultant, ~1 mo/year.
- 2009–2010 David Goldsmith, Technical Editor, full time
- 2009 Vladimir Blečić, HPC System Specialist, short-term full time
- 2008–2013 Dr. Carthik Sharma, System Manager, full, then part time
- 2008–2009 Daren Wilson, Computer Research Specialist, full time
- 2008–2010 Teresa Jeffcott, Research Support Specialist, full time
- 2008 Stéfan van der Walt, Documentation Writer (consultant, Stellenbosch, South Africa)
- 2008 Prof. Maria Womack, Visiting Research Scientist (sabbatical from St. Cloud State Univ., MN)

### Teaching Experience

University of Central Florida, Orlando, Florida

- Fall 2017* AST 5765 Advanced Astronomical Data Analysis
- Spring 2017* PHY 3930 ST Introduction to Numerical Computing  
Proposed course (permanent number: PHZ 3150), developed mostly new lectures, assignments, project, based on first year's experience.
- Fall 2016* AST 5765 Advanced Astronomical Data Analysis
- Fall 2016* AST 4762 Astronomical Data Analysis
- Spring 2016* AST 5165 Planetary Atmospheres
- Fall 2015* AST 5765 Advanced Astronomical Data Analysis
- Fall 2015* AST 4762 Astronomical Data Analysis

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<i>Spring 2015</i>	AST 3905 Introduction to Numerical Computing Pilot for new course. Developed lectures, assignments, course project.
<i>Fall 2014</i>	AST 5765 Advanced Astronomical Data Analysis
<i>Fall 2014</i>	AST 4762 Astronomical Data Analysis
<i>Spring 2014</i>	AST 5165 Planetary Atmospheres
<i>Fall 2013</i>	AST 5765 Advanced Astronomical Data Analysis
<i>Fall 2013</i>	AST 4762 Astronomical Data Analysis
<i>Spring 2012</i>	AST 5165 Planetary Atmospheres
<i>Fall 2011</i>	AST 5765 Advanced Astronomical Data Analysis
<i>Fall 2011</i>	AST 4762 Astronomical Data Analysis
<i>Fall 2010</i>	AST 5765 Advanced Astronomical Data Analysis
<i>Fall 2010</i>	AST 4762 Astronomical Data Analysis
<i>Spring 2010</i>	AST 5165 Planetary Atmospheres
<i>Fall 2009</i>	AST 5765 Advanced Astronomical Data Analysis
<i>Fall 2009</i>	AST 4762 Astronomical Data Analysis
<i>Fall 2008</i>	AST 5765 Advanced Astronomical Data Analysis (renumbered) New project, refactored content based on first year's experience. Course satisfies restricted elective in core of Physics PhD and Physics, Planetary Sciences Track PhD.
<i>Fall 2008</i>	AST 4762 Astronomical Data Analysis (renumbered) Shared lecture and 50% content with AST 5765. New project, refactored content based on first year's experience.
<i>Spring 2008</i>	AST 5165 Planetary Atmospheres New course for UCF (was listed in catalog but never taught). Developed lectures, exams, assignments. Included video link to Univ. of Florida Department of Physics.
<i>Fall 2007</i>	AST 5937 Advanced Astronomical Data Analysis New course for UCF. Proposed course. Developed lectures, assignments, course project.
<i>Fall 2007</i>	AST 4932 Astronomical Data Analysis New course for UCF. Proposed course. Developed lectures, assignments, course project. Shared lecture and 70% content with AST 5937.
<i>Spring 2007</i>	AST 2002H Honors Astronomy New course assignment. Developed lectures, assignments, exams.
<i>Fall 2006</i>	AST 2002 Astronomy New course assignment. Developed lectures, assignments, exams.
Cornell University, Ithaca, New York	
<i>2003, 2004</i>	Astronomy 234: Modern Astrophysical Techniques
<i>2000 – 2003</i>	Astronomy 105/107: An Introduction to the Universe (without/with lab option)
Massachusetts Institute of Technology, Cambridge, Massachusetts	
<i>Fall 1990, 1991</i>	Teaching Assistant, 12S23 Observing Stars and Planets (Lecturer)
<i>Fall 1989</i>	Teaching Assistant, 12S23 Observing Stars and Planets (Curriculum Development)
<i>Spring 1989</i>	Teaching Assistant, 12.400 Introduction to Planetary Sciences (TA, Grader)
<i>Fall 1988</i>	Teaching Assistant, 12.117J Observational Techniques of Optical Astronomy (TA)

### **Mentoring: Postdoctoral Scholars and Assistant Scientists**

2014–2015 Nate Lust, Postdoctoral Associate. Exoplanet Bayesian statistics, scientific programming, system management. Placement: Postdoctoral Associate with Prof. Robert Lupton, Large Synoptic Survey Telescope project, Princeton University.

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2006–2011 Csaba Palotai, Assistant Scientist. SL9 impact modeling. Was awarded his first two PI grants under my advice and promoted to (independent) Associate Scientist at UCF.

### Mentoring: Graduate Students

At UCF (all PhD students, I am principal advisor and PhD committee chair, except as noted):

- 2017– Michael Himes, Extrasolar Planets, UCF Office of Research Fellow
- 2016– Justin Reyes, Quantum Computing (PhD committee member, E. Mucciolo, chair).
- 2016– Kathleen McIntyre, Extrasolar Planets, UCF Office of Research Fellow  
2017 Department of Physics Award for Graduate Teaching Excellence.  
2017 College of Sciences Award for Excellence by a Graduate Teaching Assistant.
- 2014– Ryan Challener, Extrasolar Planets.  
2016 Department of Physics Award for Graduate Teaching Excellence.
- 2014–2017 Emerson DeLarme, Extrasolar Planets, UCF Presidential Fellow. Left program.
- 2009–2015 Patricio Cubillos, Extrasolar Planets, Fulbright Scholar. *Characterizing Exoplanet Atmospheres: From Light-Curve Observations to Radiative-Transfer Modeling*. Exoplanet eclipse and transit observations, correlated-noise assessment techniques, Bayesian atmospheric characterization. Placement: Postdoctoral associate with Prof. Luca Fossati, University of Graz, Austria.
- 2009–2015 Jasmina Blečić, Extrasolar Planets, NASA Earth & Space Sciences Fellow, Florida Space Grant Fellowship (declined). *Observations, Thermochemical Calculations, and Modeling of Exoplanetary Atmospheres*. Exoplanet eclipse observations, open-source atmospheric thermochemical equilibrium code, Bayesian atmospheric characterization. Placement: Postdoctoral associate with Prof. Ian Dobbs-Dixon, New York University Abu Dhabi.
- 2009–2014 Nathaniel Lust, Extrasolar Planets (advised a project in his dissertation with Prof. D. Britt).
- 2009–2013 Jarrad Pond, SL9 Impacts, co-chair with C. Palotai, changed degree tracks.
- 2009 Bryce Bolin, SL9 Impacts (1-semester project).
- 2007–2012 Kevin Stevenson, Extrasolar Planets. *Detecting and Characterizing Exoplanets in the GJ 436 and HD 149026 Systems*. Exoplanet eclipse and transit observations, atmospheric characterization, data analysis techniques, small rocky planet discovery. UCF Order of Pegasus (top student honor, given to 6 of ~8500 grad students in 2012). Placement: Postdoctoral associate with Prof. Jacob Bean, University of Chicago; 2014 Sagan Fellow.
- 2007–2010 Robert Macke, Meteorite Lab Measurements (PhD committee member, D. Britt, chair). Placement: Curator of Meteorites, Vatican Observatory, Castel Gandolfo, Italy
- At Cornell (PhD student):
- 2002–2006 Patricio Rojo, Extrasolar Planets. *Transit Spectroscopy of the Extrasolar Planet HD 209458b: The Search For Water*. Principal advisor and PhD committee chair, co-signed by P. Gierasch. Transit spectroscopy observations, analysis tools, and radiative-transfer model of extrasolar planet HD 209458b. Placement: Assistant Professor of Physics, Universidad de Chile, Santiago, Chile.

### Mentoring: Undergraduate Students

At UCF:

- 2017– M. Raechel Green '19, Extrasolar planets, research.
- 2017– Simone Landry '19, Extrasolar planets, research.
- 2016– Zacchaeus Scheffer '19, Extrasolar planets, research.
- 2016–2017 Caroline Arteaga '19, Extrasolar planets, research.
- 2016 Michael Himes '16, Extrasolar planets, research, see Sr. Staff, above.



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- 2015– Matthew Reinhard '19, Physics, Extrasolar planets, research.
- 2014–2015 Dylan Bruce '18, Physics, Extrasolar planets, research.
- 2014–2015 Austin Foster '15, Mathematics, system management, see Sr. Staff, above.
- 2013–2017 Justin Garland '15, Physics, Extrasolar planets, research.
- 2013–2014 Sarah Blumenthal '14, Chemistry, Extrasolar planets, research, see Sr. Staff, above.
- 2012–2016 Andrew Foster '16, Physics/Astronomy, Extrasolar planets, research. Astronaut Scholarship.
- 2011–2014 Oliver Bowman '14, Physics/Astronomy, Extrasolar planets, research.  
Placement: PhD student, Planetary Sciences, University of California, Los Angeles.
- 2010–2012 Matthew Hardin '12, Physics/Astronomy, Extrasolar planets, research, see Sr. Staff, above.
- 2010–2012 Travis Gabriel '13, Physics/Astronomy, SL9 impacts, research and system management.  
Placement: PhD student, Geophysics, Univ. Colorado, Boulder.
- 2010–2012 Noémi Rebeli '13, Physics/Astronomy, SL9 impacts, research.
- 2008–2013 Ryan Hardy '13, Physics/Astronomy, Extrasolar planets, research.  
Winning Co-I, 2012 UCF Showcase for Undergraduate Research, Physical Sciences II  
Placement: PhD student, Astrodynamics, University of Colorado, Boulder.
- 2008–2012 Christopher Campo '12, Physics/Comp. (Minors: Math, CS), Extrasolar planets, research.  
UCF Research and Mentoring Program scholarship.  
Winner, 2012 UCF Showcase for Undergraduate Research, Physical Sciences I  
Placement: Scientific programmer, Northrup Grumman Corporation.
- 2010–2011 Armando Anzellini '13, Physics/Astronomy, Extrasolar planets, research.
- 2008–2011 Christopher Britt '13, Extrasolar planets, research.
- 2008 Michelle Petty '09, Aerospace Engineering, SL9 impacts, research.
- 2007–2010 Sarah Nymeyer '10, Physics, Extrasolar planets, research, see Senior Staff, above.
- 2007–2010 William Bowman '10, Physics, Extrasolar planets, research, see Senior Staff, above.
- 2007 Karen Horning '08, FIT Astronomy, Extrasolar planets, research.
- 2007 Jason Moore '07, Physics, teaching assistant.
- 2007 Clinton Reece '08, Physics, SL9 impacts, system management and research.
- 2006 Nathaniel Lust '08, Physics, teaching assistant. Placement: PhD student, Physics/Planetary Sciences, University of Central Florida.
- At Cornell:
- 2006–2007 Catherine Elder '08, Astronomy, Extrasolar planets, research. Placement: PhD student, University of Arizona.
- 2005–2006 Nathan Sloat '08, Applied and Engineering Physics, SL9 impacts, programming.
- 2004–2006 Statia Luszczyk '06, Astronomy, Extrasolar planets, research. Placement: PhD student, Astronomy, University of California, Berkeley.
- 2004–2006 Matthew Kulick '07, Information Sciences, SL9 impacts, system management.
- 2004–2005 Nicholas Stone '08, Physics, Extrasolar planets, programming.
- 2003–2005 John Dermody '05, Electrical and Computer Eng., Extrasolar planets, programming and research. Winner, 2005 Cranson W. and Edna B. Shelley Award for Undergraduate Research in Astronomy. Placement: Investment analyst, Putnam Inv., Boston, MA.
- 2002–2003 Dara Zeehandelaar '03, Astronomy, Extrasolar planets, programming. Space Grant Fellow (summer 2002). Placement: PhD student, Astronomy, University of Maryland.
- 1999–2002 Alexander C. Ruane '02, Atmospheric Sciences, Jovian planetary waves, programming and research. Space Grant Fellow (summer 2001). Senior Honors Thesis: *Examining Wave Propagation Patterns in the Jovian Atmosphere Using the EPIC Model*. Placement: PhD student, Atmospheric Sciences, University of California, San Diego.
- 1999 Siree Vatanavigkit '01, Electrical and Computer Eng., Jovian planetary waves, programming.

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### **Mentoring: High-School Interns**

2017– Parker Jochum, Senior, Trinity Preparatory School, Exoplanets

### **Educational Infrastructure Development**

#### **SciPy Documentation Project**

I formed and led a group of 75+ graduate and PhD-level volunteers worldwide, and paid and supervised one full-time writer, to produce reference documentation to this open-source, numerical programming environment. SciPy can now rapidly be learned by students who have never programmed before, making a modern, free, open-source, numerical programming environment available to them and their instructors for the first time. Its core, NumPy, is on the One Laptop Per Child base release.

#### **Peer-Based Method for Grading a Writing Assignment in Large Classes**

I developed a method that allows a writing assignment to be given without creating an impossibly large grading load even in classes of hundreds of students. Each student receives six anonymized papers to evaluate on a rubric via a web site. A paper's score is the sum of the medians of its scores on the rubric questions, which ranks the papers. The instructor reads selected papers to find the grading cutoff levels. The students have thus evaluated the papers but the instructor has assigned the grades. Students participate authentically in the review because their participation and scoring consistency produce their grade in a second assignment, which is participation in the peer review. The method is essentially cheat-proof. Faculty grading effort is manageable, about 25 papers regardless of class size. Students are exposed to peer review, now common in professional life. They study six other responses to the same assignment, giving perspective and ideas for improving their writing. A test in a class of 25 where I read all the papers showed good agreement between my assessment and the peer scoring. I plan a full implementation when I again teach hundreds of students, and then publication of the method and the web software needed to implement it.

### **Professional Service**

- 2017– US National Academies Committee on Best Practices for a Future Open Code Policy for NASA Space Studies
- 2015–16 Scientific Organizing Committee Chair, Exoclimes 2016 workshop, exoclimes.org
- 2015– Steering Committee, Exoclimes workshop series, exoclimes.org
- 2014 Scientific Organizing Committee, 2014 AAS DPS Meeting, Tucson, Arizona, dps.aas.org
- 2013–15 *Icarus* Editorial Board member (journal of the AAS Division for Planetary Sciences)
- 2012–14 Scientific Organizing Committee, Exoclimes 2014 workshop, Davos, Switzerland, exoclimes.org
- 2009–10 Program Committee Chair, UCF Winter Workshop 2010: Exoplanets for Planetary Scientists
- 2008– Lead 75+ volunteers documenting SciPy open-source numerical environment (docs.scipy.org)
- 2007–8 Led successful bylaws amendment including exoplanets in AAS Division for Planetary Sciences
- 2006–7 Local and Program Organizing Committees, 2007 AAS DPS meeting, UCF
- 2004 Conference network services consultant, 2004 AAS DPS meeting, Louisville, KY
- 2002 Candidate, Division for Planetary Sciences Committee
- 1999 Local Organizing Committee, Asteroids, Comets, Meteors conference, Cornell (internet room)

### **Reviewing**

- 2015 Article review, *Astronomy & Astrophysics*
- 2014 Review Panelist, NASA Astrophysics (\$0.5M proposals)
- 2014 5 application reviews, NASA Postdoctoral Program
- 2013 Article review, *Nature*

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- 2013 Review Panelist, NSF Astronomy and Astrophysics (\$0.5M proposals)
- 2012 2 proposal reviews, NASA Planetary Science (\$0.5M proposals)
- 2012 Review Panelist, NASA institutes (\$6M proposals)
- 2011 Review Panelist, NASA missions (\$1M proposals)
- 2011 Application review, NASA Postdoctoral Program
- 2011 DPS E/PO slide set review
- 2010 Review Panelist, Spitzer Space Telescope Allocation Committee
- 2010 DPS E/PO slide set review
- 2010 Article review, *Icarus*
- 2010 3 article reviews, *The Astrophysical Journal Letters*
- 2009 Review Panelist, National Optical Astronomy Observatories Time Allocation Committee
- 2009 Article review, *Nature*
- 2008 Review Panelist, Hubble Space Telescope Allocation Committee
- 2008 Article review, *The Astrophysical Journal*
- 2008 3 proposal reviews, NASA Planetary Science
- 2007 Article review, *The Astrophysical Journal*
- 2007 2 proposal reviews, NASA Astrobiology Institute Director's Discretionary Fund
- 2007 Review panelist, NSF Stellar Astronomy and Astrophysics
- 2006 Article review, *Publications of the Astronomical Society of the Pacific*
- 2006 Proposal review, NASA Postdoctoral Fellowship Program
- 2005 Article review, *Icarus*
- 2004 Proposal review, NASA Planetary Atmospheres Program
- 2004 Review Panelist, NASA Outer Planets Research Program
- 2004 Review Panelist, NSF Planetary Astronomy, Outer Planets and Satellites Program
- 2000 Textbook Review, McGraw-Hill Publishing Company Astronomy
- 1999 Review panelist, NASA Planetary Astronomy Program

### Public Education and Outreach

- 2015 K-12 presentation, 27 May, Jackson Heights Middle School, Oviedo, Florida
- 2014 Student shadow for a day, 20 Feb, Orange County Public Schools, Orlando, Florida
- 2013 K-12 presentation, 30 Oct, Lawton Elementary School, Oviedo, Florida
- 2011 Public lecture, *Measuring Exoplanets from Space*, 11 May, Central Florida Astronomical Society, Seminole State College Planetarium, Lake Mary, Florida
- 2011 Extension lecture, *Measuring Exoplanets from Space*, 11 Jan, LIFE@UCF senior alumni lecture series
- 2009 Public lecture, *Measuring Exoplanets from Space*, 6 May, Barcamp, Orlando, FL
- 2009 Public lecture, *Measuring Exoplanets from Space*, 18 Apr, Café Scientifique, Orlando, FL
- 2006 Extension lecture, *Planetary Systems*, 24 Oct, LIFE@UCF senior alumni lecture series
- 2004 K-12 lecture, *Measuring Extrasolar Planets*, 1 Sep, Granada Hills Charter High School, CA
- 2003 Public lecture, *Measuring Extrasolar Planets*, 23 Aug, Syracuse Astronomical Society
- 2002–7 Southern Cayuga Central Schools Observatory Advisory Committee  
Advised public school district on design and program for an observatory.  
PI on NASA Education/Public Outreach grant that extended program to 900 regional students/year.
- 1998 K-12 lecture, *Planetary Occultations*, 16 Nov, Granada Hills High School, CA

### Institutional Service

At UCF:

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- 2017– Chair, Atmospheric Theorist Search Committee, UCF Physics
- 2017– Steering Liason, UCF Faculty Senate Information Technology Committee
- 2017– College of Sciences Liason Committee to UCF Information Technologies
- 2016– UCF Compliance Committee (Office of Research and Commercialization)
- 2016– UCF Faculty Senate Steering Committee
- 2016 UCF COACHE Survey Nature of Work Subcommittee
- 2015–16 UCF Academic Leadership Academy
- 2015–16 UCF Faculty Senate Ad-Hoc Bylaws Review Committee
- 2014–16 Chair, Budget and Administrative Procedures Committee, UCF Faculty Senate
- 2014– UCF Faculty Senator, UCF Physics
- 2014–16 Chair, Ad-Hoc Committee on Computational Skills, UCF Physics
- 2014–16 Strategic Planning Committee, UCF Physics
- 2013– Chair, Computers and Information Technology Committee, UCF Physics  
Supervised system manager, web team, ran IT services; high-level liason to university IT entities.
- 2011–12 UCF Information Technology Resource Advisory Committee, email subcommittee
- 2011–12 Budget and Administrative Procedures Committee, UCF Faculty Senate
- 2011–12 Ad-Hoc ADA Compliance and IT Committee, UCF Faculty Senate
- 2011–12 UCF Faculty Senator, UCF Physics
- 2011–12 Chair, Strategic Planning Committee, UCF Physics
- 2011–12 Convenor, Ad-Hoc Soft-Money Career Track Committee, UCF Physics
- 2011 UCF College of Sciences Dean Search Committee
- 2008–12 Chair, Computers and Information Technology Committee, Department of Physics  
Supervised departmental system manager and IT services; high-level liason to university IT entities.
- 2008–11 Colloquium Committee, UCF Physics
- 2007–8 Chair, Networking and Infrastructure Committee, Department of Physics  
Collected data for, proposed, and oversaw upgrade of building network to gigabit ethernet. Identified and had fixed two severe network bottlenecks that had persisted many years.
- 2007–8 Graduate Recruiting Committee, UCF Physics  
Held recruiting events at 2007 DPS conference and at UCF, resulting in 12 planetary PhD applicants, including 2 from MIT, 2 from Cornell, 1 from Caltech.
- 2007–8 Computers and Information Technology Committee, Department of Physics  
Successfully proposed departmental computing policy, defining roles of system manager, committee, chair, and faculty meeting; scope of services run by department; and principles of implementation.
- 2007–8 Outreach Committee, UCF Physics
- 2006–7 Web Committee, UCF Physics  
Evaluated departmental website needs, estimated costs, and proposed implementation plan.
- 2006–7 Computers and Information Technology Committee, Department of Physics
- At Cornell (service not a formal job component):
- 2003–4 Computer Committee, Department of Astronomy
- 2003–4 System manager, Hewitt Undergraduate Computing Lab, Department of Astronomy
- 2001 Improvements to Astro 105/107 course structure and catalog descriptions
- 2001–6 Atacama Telescope Project: planetary issues advocate, exoplanet key project presentation
- 1998 Atacama Telescope Project site survey expedition
- 1997–9 Computer Committee, Department of Astronomy
- At NASA GSFC (service not a formal job component):

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1996-7 Computer Security Committee, Laboratory for Extraterrestrial Physics