

# Avi M. Mandell

NASA/Goddard Space Flight Center  
Sol. Syst. Explor. Div. / Goddard Cen. for Astrobiology  
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<b>Research Interests</b>	The study of planet formation and extra-solar planets utilizing NIR spectroscopy of circumstellar disks and exo-planets complemented by N-body simulations of planetary formation and evolution.	
<b>Education</b>	<b>Ph.D., The Pennsylvania State University,</b> <b>Astronomy and Astrophysics, Dual Title in Astrobiology</b> - Thesis: "Effects Of Circumstellar Gas On Terrestrial Planet Formation: Theory And Observation" Advisors: Prof. Steinn Sigurðsson, Dr. Michael Mumma	2007
	<b>B.A., Vassar College, Physics and Astronomy</b> - Senior thesis advisor: Prof. Debra Elmegreen	1999
<b>Awards and Distinctions</b>	NASA Post-Doctoral Fellowship	2007
	Pennsylvania Space Grant Fellowships	2004, 2006
	Brumbach Fellowship, Eberly College of Science	2002
	Braddock Fellowship, Eberly College of Science	2001
	Zaccheus Daniel Foundation for Astronomical Science, Travel Grant	2001
	Connecticut Space Grant Selection for the NASA Ames Academy	2000
	Departmental Honors, Physics & Astronomy Dept., Vassar College	1999
<b>Professional Appointments</b>	<b>Research Scientist</b> NASA Goddard Space Flight Center Research on the formation of planetary systems and the characterization of extrasolar planets from both an observational and theoretical perspective. Planning and operations for current and future instrumentation for space and ground-based telescopes.	2010 – Present
	<b>NASA Post-doctoral Fellow</b> NASA Goddard Space Flight Center Near-IR spectroscopy of gas in circumstellar disks; NIR spectroscopic observations of exo-planet atmospheres; simulations of terrestrial planet formation in diverse system architectures	2007 – 2010
	<b>Graduate Assistant</b> Pennsylvania State University / NASA Goddard Space Flight Center Near-IR spectroscopy of gas in circumstellar disks; simulations of planet formation in planetary systems with migrating giant planets; high-resolution spectroscopic searches for signatures of planet infall in exo-planet host stars	2001 – 2007
	<b>Pre-Doctoral Research/Teaching Fellow</b> Yale University Wide-field photometric search for transiting planets in old metal-rich open clusters	1999 – 2001

Mandell - CV

**Observing &  
Instrumentation  
Experience**

- SOFIA Observatory**, California  
Deputy P.I. on GSFC proposal for 2<sup>nd</sup> generation exoplanet imager (NIMBUS)
- Palomar Observatory**, California  
Co-I. on search for exoplanet atmospheric signatures (Caltech Time Alloc.)
- Very Large Telescope Observatory**, Paranal, Chile  
P.I. on survey for organics in circumstellar disks (ESO Time Alloc.)
- W.M. Keck Observatory**, Mauna Kea, Hawaii  
P.I. on survey for OH in circumstellar disks (NASA Time Alloc.)  
Co-I. on survey for organics in circumstellar disks (Caltech Time Alloc.)  
Co-I. on search for exoplanet atmospheric signatures (Caltech Time Alloc.)
- Infrared Telescope Facility**, Mauna Kea, Hawaii  
Co-I. on survey for methane on Mars (NASA Time Alloc.)
- Hobby-Eberly Telescope**, McDonald Observatory, Texas  
P.I. on spectroscopic search for signatures of exo-planets (PSU Time Alloc.)

- Teaching Experience**
- Guest Lecturer** Aug. 2009 – Present  
Catholic University Education and Physics Depts.  
Series of lectures on planet formation as guest lecturer for course titled "Comets, Origins, and Life: Interdisciplinary Science in the Secondary Classroom"
- Research Mentor** Summer 2008 – Present  
- A. Martin, Ph.D. student, Penn State University  
- J. Bast, Ph.D. student, Leiden Observatory, The Netherlands  
- S. Po, undergraduate summer intern, Harvard University
- Instructor, Science U. Summer Camp** 2006  
Pennsylvania State University  
Developed and taught a week-long course for advanced 8<sup>th</sup>-graders on astrobiology, including lectures, demonstrations, and research projects
- Graduate Certificate on College Teaching, Penn State University** 2005
- Co-Instructor, Introductory Astronomy** 2003  
Pennsylvania State University Astronomy Dept.  
Cooperated on lectures, test construction, and active learning initiatives for a large lecture class of 150 students
- Laboratory Instructor** 2002, 2004  
Pennsylvania State University Astronomy Dept.  
Taught several sections of a hands-on laboratory class in introductory astronomy
- Teaching Fellow** 1999 – 2001  
Yale University Astronomy Dept.  
Organized and oversaw work of teaching assistants, taught several separate class sections

## Mandell - CV

<b>Invited Talks</b>	NASA Goddard Science Jamboree NASA Goddard Space Flight Center	June 2011
	GSFC-UMD Space Sciences Interaction Day University of Maryland	Dec. 2010
	Director's Seminar, Sciences and Exploration Directorate NASA Goddard Space Flight Center	Mar. 2010
	Capitol Area Circumstellar Disk Workshop Carnegie Institution of Washington, DTM	Dec. 2007
	Bash Symposium 2007: New Horizons in Astronomy University of Texas Austin	Oct. 2007
	Naval Research Lab Colloquium Naval Research Lab	Mar. 2007
	NAI Director's Seminar NASA Astrobiology Institute	Nov. 2006
	<b>Professional Activities</b>	Local Organizing Committee Member, GSFC Signposts of Planets Conference
Contributing Author, Encyclopedia of Astrobiology		2010
Panel Member, GSFC Internal Research & Development Review Panel		2010
Panel Member, NASA Astrophysics Theory Program Review Panel		2010
Panel Member, NASA Planetary Astronomy Program Review Panel		2010
Co-Organizer, GSFC Planetary Science and Astrobiology Journal Club		2009
Member, SOC, NASA Astrobiology Inst. FAR Seminar Series		2008
Session Chair, Astrobiology Science Conference 2008		Apr. 2008
Member, Astrobiology Society Founding & Early Career Committees		2007 – Pres.
Chair, Organizing Committee, Astrobiology Graduate Conference		Summer 2007
NSF Undergraduate Research Selection Committee Member	Dec. 2005	
<b>Outreach Activities</b>	Exhibitor, NASA GSFC Astrobiology Exhibit, Cherokee Nation Pow-Wow	Oct. 2009
	Exhibitor, NASA GSFC Astrobiology Exhibit, National Air & Space Museum	Dec. 2006
	Speaker & Panelist, Penn State Friedman Lectures	Nov. 2006
	Space Day Exhibitor, Penn State University	2005 – 2006
	Assistant for Outreach Activities, PSU Astronomy & Astrophysics Dept	2004 – 2005
	Project ASTRO Instructor, Connecticut Space Grant	2001
<b>Selected Press Coverage</b>	Science Mag., "Planetary Two-Step Reshaped Solar System, Saved Earth?"	June 2011
	Astronomy.com News, "Jupiter may have robbed Mars of mass"	June 2011
	BBC News, "Earth-like planets may be Common"	Sept. 2006
	Nature Research Highlights, "Astronomy: When the giant has passed"	Sept. 2006
	New Scientist, "Hot Jupiters do not rule out alien Earths"	Mar. 2006

**Refereed  
Publications**

- Mandell, A. M.**, Bast, J., van Dishoeck, E. F., Blake, G. A., Salyk, C., Mumma M. J., & Villanueva, G. "First Detection of Near-infrared Line Emission from Organics in Young Circumstellar Disks". 2012, *ApJ*, 747, 92
- Walsh, K. J., Morbidelli, A., Raymond, S. N., O'Brien, D. P., & **Mandell, A. M.** "A low mass for Mars from Jupiter's early gas-driven migration". *Nature*, 475, 206
- Raymond, S. N., Armitage, P. J., Moro-Martín, A., Booth, M., Wyatt, M. C., Armstrong, J. C., **Mandell, A. M.**, Selsis, F., & West, A. A. "Debris disks as signposts of terrestrial planet formation". 2011, *A&A*, 530, 62
- Mandell, A. M.**, Deming, L. Drake, Blake, G. A., Knutson, H. A., Mumma, M. J., Villanueva, G. L., & Salyk, C. "Non-Detection of L-band Line Emission from the Exo-Planet HD189733b". 2011, *ApJ*, 728, 18
- Mumma, M. J., Villanueva, G. L., Novak, R. E., Hewagama, T., Bonev, B. P., DiSanti, M. A., **Mandell, A. M.**, & Smith, M. D. "Strong Release of Methane on Mars in Northern Summer 2003". 2009, *Science*, 323, 1041
- Mandell, A. M.**, Mumma, M. J., Blake, G. A., Bonev, B. P., Villanueva, G. L., & Salyk, C. "Discovery of OH in Circumstellar Disks around Young Intermediate-Mass Stars". 2008, *ApJL*, 681, L25.
- Raymond, S. N., Barnes, R., & **Mandell, A. M.** "Observable consequences of planet formation models in systems with close-in terrestrial planets". 2008, *MNRAS*, 384, 663.
- Mandell, A. M.**, Raymond, S. N., & Sigurðsson, S. "Formation of Earth-like Planets During and After Giant Planet Migration". 2007, *ApJ*, 660, 823.
- Raymond, S. N. & **Mandell, A. M. (co-primary author)**, & Sigurðsson, S. "Exotic Earths: Forming Habitable Worlds with Giant Planet Migration". 2006, *Science*, 313, 1413
- Jenniskens, P. & **Mandell, A. M.** "Hydrogen Emission in Meteors as a Potential Marker for the Exogenous Delivery of Organics and Water". 2004, *Astrobiology*, 4, 123.
- Mendelowitz, C., Ge., J., **Mandell, A. M.**, & Li, A. "A Search for Sodium Absorption from Comets Around HD209458". 2004, *ApJ*, 601, 1120.
- Mandell, A. M.**, Ge, J., & Murray, N. "A Search for  ${}^6\text{Li}$  in Lithium-poor Stars With Planets". 2004, *AJ*, 127, 1147.
- Mandell, A. M.** & Sigurðsson, S. "Survival of Terrestrial Planets in the Habitable Zone in the Presence of Giant Planet Migration". 2003, *ApJL*, 599, L111.
- Chromey, F. R., Elmegreen, D. M., **Mandell, A. M.**, & McDermott, J. "Star Formation in the Tidal Tail of the Leo Triplet Galaxy NGC 3628". 1998, *AJ*, 115, 233

**Selected  
Non-Refereed  
Publications**

**Mandell, A. M.** “Planetary Migration”. In Encyclopedia of Astrobiology, edited by Gargaud, M.; Cernicharo, J.; Viso, M.; Cleaves II, H.J.; Pinti, D.; Amils, R.; Kobayashi, K.; Irvine, W.M. 2011, Springer

**Mandell, A. M.** “Worlds Collide: How New Theories and Ground-breaking Discoveries Are Changing our View of Where to Find Earth-like Planets”. 2010, *Ad Astra Magazine*.

**Mandell, A. M.** “Expanding and Improving the Search for Habitable Worlds”. 2008, Astronomical Society of the Pacific Conference Series, 393, 19

Mix, L. J., Armstrong, J. C., **Mandell, A. M.**, Moiser, A., Raymond, J., Raymond, S. N., Steward, F. J., von Braun, K., and Zhaxybayeva, O. (eds.) “The Astrobiology Primer: An Outline of General Knowledge.” 2006, *Astrobiology*, 6, 735