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Education

Ph.D. (summa cum laude), Geophysics and Space Physics UCLA (1992)
M.S. Physics, California State University, Los Angeles (1983)
B.A. Physics, California State University, Fullerton (1977)

Principal Positions held at JPL/Caltech (Current in bold):

2010–present **Cassini Project Scientist, JPL**
2014 – 2018 Enceladus Life Finder Proposal Project Scientist, Discovery and New Frontiers proposals
1997–2010 Cassini Deputy Project Scientist, JPL
1990–present **Cassini Composite Infrared Co-I, JPL**, leads CIRS ring team
1990–1997 Cassini Mission Scientist, JPL
1984–1990 Voyager Photopolarimeter Science Associate, JPL
1977–1990 Voyager Infrared Radiometer & Spectrometer (IRIS), Experiment Rep., JPL
1975–1977 Research Assistant, Geology Department, California Institute of Technology

Scientific Research and Activities

2019 – 2020 Division of Planetary Science (DPS) Outgoing Chair
2019 – present NASA Postdoctoral Program (NPP) Advisor for Alena Probst
2018 – 2019 Division of Planetary Science (DPS) Chair
2017 – present Outer Planets Assessment Group (OPAG) Vice-chair
2008–present Outer Planets Assessment Group (OPAG) Steering Committee
2004–2012 NASA Postdoctoral Program (NPP) advisor for six young scientists
1993–2012 PI for NASA research programs including Cassini Data Analysis Program (CDAP), Planetary Geology and Geophysics (PG&G) and Outer Planets Research (OPR)
2001, 2010, 2018 Visiting Scientist, University of Paris 7
Member of organizations including AGU, DPS, EGU, EPSC, AOGS and PDS Ring Node

Mentor/Advisor Experience

NASA Postdoctoral Program (NPP) Advisor: Alena Probst, 2019 - present
Research Advisor: 2012 - 2018
NASA Postdoctoral Program (NPP) Advisor: Estelle Deau, 2010 - 2012
Research Advisor for Dr. Ryuji Morishima, 2009 – 2018
NPP Advisor for Dr. Jose Alberto Flandes, 2008 – 2010 (now professor at University of Mexico)
NPP Advisor for Dr. Cedric Leyrat, 2006 – 2007 (now researcher at Meudon Observatory in France)
NRC/NPP Advisor to Dr. Nicolas Altobelli, 2005 – 2007 (Huygens Project scientist, Rosetta Deputy PS)
NRC/NPP Advisor to Dr. Shawn Brooks, 2004–2006 (investigation scientist with Cassini and Juno missions)

Undergraduate Student Research Program (USRP) advisor for Coleman Dobson, summer 2009, 2010
Space Grant/SURF Advisor to Ben Pollard, summers of 2003, 2005, 2006
Graduate student advisor: PhD student Carrie Nugent (UCLA), 2007 - 2009

Selected Honors and Awards

2018 NASA Outstanding Public Leadership Medal, Cassini Project Scientist
2018 California State University Fullerton Alumna of the Year Award
2018 JPL Magellan Award

- 2017 The Women's International Film and Television Showcase (The WIFTS) Foundation - Visionary Award
- 2016 JPL Voyager Award
- 2014 JPL Magellan Award
- 2013 NASA Exceptional Service Medal, Cassini Project Scientist and Deputy Project Scientist
- 2005 Distinguished Alumna Award from California State University, Fullerton
- 2002 – 2018 Fifteen (15) NASA Group Achievement Awards, Cassini Project Science, Cassini CIRS Team, Cassini Education and Public Outreach, Cassini Ring Target Working Team, Cassini Saturn Target Working Team, Cassini Magnetospheres Target Working Team, Cassini Solstice Pre-Integration Team, Cassini Saturn Tour Flight Team, Cassini Flight Team, Cassini Jupiter Flyby Team, Cassini Wave at Saturn Social Media Campaign Team, Cassini Proximal Science team
- 1999 Hall of Fame Award, Placentia-Yorba Linda Unified School District
- 1997 ESA Award for contribution to Huygens Probe
- 1996 Fellow, Distinguished Alumna Award for Natural & Social Sciences, Cal State LA
- 1990 NASA Exceptional Service Medal, Voyager Neptune
- 1982 NASA Scientific Achievement Award, Voyager
- 1982 – 1989 Seven (7) NASA Group Achievement Awards for Voyager Mission
- 1977 California State University Fullerton Dept. of Physics Faculty Prize for Scholarship

Invited Talks (Last five years)

2019

1. Allison Levick Lecture Sydney, Australia, The Wonders of Saturn: Cassini's Intriguing Discoveries
2. Macquarie University Dep. of Earth and Planetary Sciences, Sydney, Australia, Cassini's Intriguing Discoveries: Potential for Life Beyond Earth
3. Questacon Lecture, Canberra, Australia: The Wonders of Saturn: Cassini's Intriguing Discoveries
4. Royal Astronomical Society of Canada, Vancouver, Canada, Cassini's Intriguing New Discoveries
5. Royal Astronomical Society of Canada, Victoria, Canada, Cassini's Intriguing New Discoveries
6. Royal Astronomical Society of Canada, Sechelt, Canada, Cassini's Intriguing New Discoveries.
7. COSMOS 2019 invited speaker, Athleone, Ireland, The Wonders of Saturn: Cassini's Intriguing Discoveries,
8. LPI Cosmic Explorations Speaker Series: Surprises in the Saturn System: Cassini Mission Highlights, Houston, TX
9. Vaden Miles Memorial Lecture: Surprises in the Saturn System: Cassini Mission Highlights, Wayne State University, Detroit, MI

2018

1. Betazone: Postcards from Saturn, invited speaker. Davos World Economic Forum, Davos, Switzerland
2. Cosmic Sublime: invited dinner speaker. Davos World Economic Forum, Davos, Switzerland
3. Space Studies Board invited dinner speaker: Cassini Science Highlights and Future Exploration, Irvine, CA
4. Sagan Symposium: Keynote speaker, Surprises in the Saturn System: Cassini Mission Highlights, Caltech, Pasadena
5. Starlight Festival: invited speaker, The Secrets of Saturn
6. Into the Unknown: invited dinner speaker. Davos World Economic Forum, Davos, Switzerland
7. CSULA Distinguished Alumni Speaker, CSULA Physics and Astronomy dinner, Surprises in the Saturn system
8. Lunar and Planetary Science Masursky Lecture: Cassini's Amazing Discoveries
9. Lunar and Planetary Science Union session: A Voyage into unique territory: Cassini's Grand Finale
10. MAXXI, the Museo Nazionale delle Arti del XXI Secolo (National Museum of 21st Century Arts) Evening public lecture, Cassini at Saturn: Science Highlights, Rome, Italy
11. European Geosciences Union session: Cassini's Grand Finale: Highlights from a Voyager into Unique Territory, Vienna, Austria
12. Cité de l'Espace Evening Public Lecture, Cassini, la grande finale, Toulouse, France
13. California Science Center Keynote address, Cassini's Amazing Discoveries

2017

1. Paul Sykes Memorial Lecture, Royal Astronomical Society, Canada: Going out in a Blaze of glory: Cassini Science Highlights and the Grand Finale
2. Division of Dynamical Astronomy invited speaker: Cassini's Grand Finale and Recent Science Highlights
3. Wing Ip Symposium invited speaker, Taipei, Taiwan, The Scientific Achievements of the Cassini Orbiter Mission

4. NASA Science Mission Directorate Brown Bag Lecturer: Going out in a Blaze of glory: Cassini Science Highlights and the Grand Finale
5. Center for Space Technology and Research (CSTAR) Distinguished Lecturer, Georgia Tech: Going out in a Blaze of glory: Cassini Science Highlights and the Grand Finale
6. Von Karman Lecture Series, Von Karman, Going out in a Blaze of glory: Cassini Science Highlights and the Grand Finale
7. Von Karman Lecture Series, Pasadena City College, Going out in a Blaze of glory: Cassini Science Highlights and the Grand Finale
8. Griffith Observatory Friends of the Observatory (FOTO) Lecture: Cassini Science Highlights and the Grand Finale
9. UCLA Distinguished Alumni Speaker: Results of Cassini's Grand Finale
10. DPS Invited Speaker, Cassini's Grand Finale Results
11. Caltech Watson Lecturer: Cassini's Final Mission Results
12. AGU Union invited speaker: Cassini's Grand Finale Results

2016

1. COSMOS 25, Athleone, Ireland, Surprises at Saturn: Cassini Mission Highlights
2. Kepler Scholarship Lecture, Mt. San Antonio College, Surprises at Saturn: Cassini Mission Highlights
3. Science Day on the Hill, Washington, DC, invited to talk to congressional staffers
4. Night Sky Network, Surprises at Saturn: Cassini Mission Highlights
5. National Academies CAPS meeting, Cassini's Science, Past and Future
6. Sydney AIAA: Revealing Saturn: Cassini Science Highlights and the Grand Finale
7. Canberra AIAA: Revealing Saturn: Cassini Science Highlights and the Grand Finale
8. Canberra Deep Space Network: Revealing Saturn: Cassini Science Highlights and the Grand Finale
9. National Academy of Engineering and Science, Irvine, Cassini: NASA's Outer Planet Strategic Mission

2015

1. Huygens 10th Anniversary event, European Space Operations Center, Darmstadt, Germany, Cassini Science and Prospects for the Future
2. Caltech Board of Trustees: Cassini's Greatest Hits
3. AAAS invited speaker, San Jose, Cassini Science Highlights, Surprises in the Saturn System
4. Japan Geoscience Union Invited Talk, Tokyo, Japan, Cassini-Huygens Mission Highlights
5. Galileo's World, Oklahoma University, Revealing Saturn: Cassini Mission Highlights
6. Galileo's World, Oklahoma University, Ocean Worlds Enceladus and Titan

Professional Activities

- Division for Planetary Sciences Outgoing Chair (2019-2020)
- Division for Planetary Sciences Chair (2018-2019)
- Division for Planetary Sciences Vice-Chair, then Chair, (2017-2018)
- Outer Planets Assessment Group Deputy Chair (2017 – present)
- Guest Editor, Planetary and Space Science Special Issues: Outer Planets, Satellites and Rings (2002 – present)
- Guest editor, *Icarus*, for special Cassini issue (2018-2020)
- Guest editor, *Geophysical Research Letters* (2018-2019)
- NASA Cassini Senior Review Science Lead, (2014)
- NASA Cassini Senior Review Science Lead, (2012)
- Articles written for *Astronomy* magazine, *Sky and Telescope*, 2010
- Manuscript Reviewer, *Icarus*, *JGR*, *ApJ*, *Nature*, *PSS*, and other journals (1990 – present)
- Convener for Outer Planets: Satellites and Rings Sessions for European Geophysical Union Meetings (2002 – 2011)
- Convener for Fall AGU Ring Session (2007 – present)
- Outer Planets Assessment Group (OPAG) Steering Committee (2008 – present)
- Guest Editor, Planetary and Space Science Special Issues: Outer Planet Satellites and Rings (2002 – present)
- Scientific Organizing Committee, Division of Planetary Science, Pasadena, CA (2006, 2016)

Guest Editor, COSPAR (2006, 2007)
NASA Vision Mission Science Team, Neptune Orbiter with Probes (2003 – 2005)
Committee member for Cecile Ferrari's "Habilitation à diriger des Recherches". in Saclay, in France (2002)
JPL Advisory Council for Women (2001 – 2004)
NASA Decadal Survey: Planetary Rings Panel (2001)
NASA Planetary Geology and Geophysics Review Panel (2000)
Editor, Passage to a Ringed World. NASA SP-533, (1977)
Planetary Road Map Formulation Team (1996)
Editor, Cassini/Huygens: A Mission to the Saturnian System. SPIE Vol. 2803. (1996)
Convener and SPIE Conference Chair, Cassini/Huygens: A Mission to the Saturn System (1995 – 1996)
Cassini Rings Working Group (1991 – present)
Planetary Science Data Steering Group (1991 – 1994)
Advisory Council for Planetary Data System Ring Node (1990 – present)
American Association of University Women (1985 – present)
JPL Speaker's Bureau (1980 – present)

Publications

Spilker, L. 2019. Cassini-Huygens Exploration of the Saturn system: thirteen years of discovery. *Science*, Vol. 364, Issue 6445, 1046-1051, DOI: 10.1126/science.aat3760.

Spilker, L. J., 2019. Cassini's Final Year at Saturn: Science Highlights and Discoveries. *Geophysical Research Letters*, 46, 11, 5754-5758. <https://dx.doi.org/10.1029/2018gl080848>.

Déau, E., Dones, L., Spilker, L., Flandes, A., Baillie, K., Pilorz, S., Showalter, M., El Moutamid, M., and Colwell, J. E., 2019. Cassini CIRS and ISS opposition effects of Saturn's rings - I. C ring narrow or broad surge?, *Monthly Notices of the Royal Astronomical Society*, 489, 2, 2775-2791. <https://dx.doi.org/10.1093/mnras/sty2587>.

Tiscareno, M., Nicholson, P., Cuzzi, J., Spilker, L., Murray, C., Hedman, M., Colwell, J., Burns, J., Brooks, S., Clark, R., Cooper, N., Deau, E., Ferrari, C., Filacchione, G., Jerousek, R., LeMouelic, S., Showalter, M., Badman, S., Baker, E., Burratti, B., Baines, K., Sotin, C. 2019. Remote sensing of Saturn's rings during Cassini's ring-grazing orbits and Grand Finale. *Science*, 364, Issue 6445, DOI: 10.1126/science.aau1017

Ciarniello, M.; Filacchione, G.; D'Aversa, E.; Capaccioni, F.; Nicholson, P. D.; Cuzzi, J. N.; Clark, R. N.; Hedman, M. M.; Dalle Ore, C. M.; Cerroni, P.; Plainaki, C.; Spilker, L. J., 2019. Cassini-VIMS observations of Saturn's main rings: II. A spectrophotometric study by means of Monte Carlo ray-tracing and Hapke's theory. *Icarus*, Vol. 317, 242-265. [10.1016/j.icarus.2018.07.010](https://doi.org/10.1016/j.icarus.2018.07.010)

Flandes, A., Garcia, A., Spilker, L., Deau, E. 2018. Ray-tracing thermal modeling of Saturn's main rings. *Icarus*, 312, 157-171, (2018). <http://dx.doi.org/10.1016/j.icarus.2018.04.023>.

Spilker, L. The Scientific Achievements of the Cassini-Huygens mission. 2018. Serendipities in the Solar System and Beyond. ASP Conference Series, Vol. 513, proceedings of a conference held 10-13 July 2017 at National Central University, Taiwan. Edited by Chung-Ming Ko, Chan-Kao Chang, and Po-Chieh Yu. San Francisco: Astronomical Society of the Pacific, 2018, 131- 150.

Dougherty, M. and Spilker, L. 2018. Review of Saturn's icy moons following the Cassini mission. *Reports on Progress in Physics*, Vol. 81, No. 6, 1-20. DOI: [10.1088/1361-6633/aabdfb](https://doi.org/10.1088/1361-6633/aabdfb)

Spilker, L., Ferrari, C., Altobelli, N., Pilorz, S. & Morishima, R. 2018. Thermal Properties of Rings and Ring Particles. In M. Tiscareno & C. Murray (Eds.), *Planetary Ring Systems: Properties, Structure, and Evolution* (Cambridge Planetary Science, pp. 399-433). Cambridge: Cambridge University Press.
doi:10.1017/9781316286791.015.

Spilker, L. J. 2017. Shadows of Saturn's B ring. *Nature Astronomy*, Volume 1, 577.

Altobelli, N., Spilker, L., Edgington, S. 2017. *Nature Astronomy*, Volume 1, 560.

Morishima, R., Turner, N., Spilker, L. 2017. Surface roughness of Saturn's rings and ring particles inferred from thermal phase curves. *Icarus*, Volume 295, 74-88. [10.1016/j.icarus.2017.05.008](https://doi.org/10.1016/j.icarus.2017.05.008)

Jennings, D.E., Flasar, F.M., Kunde V.G., Nixon, C.A.,... Spilker, L.J., ..., 2017. Composite infrared spectrometer (CIRS) on Cassini. *Applied Optics*, Vol. 56, No. 18, June 2017, 5274 – 5294.

Déau, E., Spilker, L.; Flandes, A. 2016. Re-analysis of previous laboratory phase curves: 2. Connections between opposition effect morphology and spectral features of stony meteorites. *Icarus*, Volume 272, 149-164.

Coustenis, A.; Atreya, S.; Castillo, J.; Mueller-Wodarg, I.; Spilker, L.; Strazzulla, G. 2016. Preface to the special issue of PSS on "Surfaces, atmospheres and magnetospheres of the outer planets and their satellites and ring systems: Part XI" *Planetary and Space Science*, Volume 130, 1-2.

Edgington, S., Spilker, L. 2016. Cassini's Grand Finale. *Nature Geoscience*, Volume 9, Issue 7, 472-473.

Morishima, R.; Spilker, L.; Brooks, S.; Deau, E.; Pilorz, S.. 2016. Incomplete cooling down of Saturn's A ring at solar equinox: Implication for seasonal thermal inertia and internal structure of ring particles. *Icarus*, Volume 279, 2-19. doi:10.1016/j.icarus.2015.06.025.

Edgington, S., L. Spilker, 2016. Cassini's Grand Finale, *Nature Geoscience*, Volume 9, Issue 7, 472-473.

Altobelli, N.; Lopez-Paz, D.; Pilorz, S.; Spilker, L.; Morishima, R.; Brooks, S.; Leyrat, C.; Deau, E.; Edgington, S.; Flandes, A. 2015. Two numerical models designed to reproduce Saturn ring temperatures as measured by Cassini-CIRS. 2014. *Icarus*, Volume 238, p. 205-220.

Filacchione, G.; Ciarniello, M.; Capaccioni, F.; Clark, R. N.; Nicholson, P. D.; Hedman, M. M.; Cuzzi, J. N.; Cruikshank, D. P.; Dalle Ore, C. M.; Brown, R. H.; Cerroni, P.; Altobelli, N.; Spilker, L. J. 2014. Cassini-VIMS observations of Saturn's main rings: I. Spectral properties and temperature radial profiles variability with phase angle and elevation. 2014. *Icarus*, Volume 241, p. 45-65.

Morishima, R., Spilker, L., Turner, N., 2014. Azimuthal temperature modulations of Saturn's A ring caused by self-gravity wakes. *Icarus* 228, 247-229.

Coustenis, A.; Atreya, S.; Castillo, J.; Coll, P.; Mueller-Wodarg, I.; Spilker, L. Surfaces, atmospheres and magnetospheres of the outer planets and their satellites and ring systems: Part X. 2014. *Planetary and Space Science*, Volume 104, p. 1-2.

Spilker, L., C. Ferrari, R. Morishima. Saturn's ring temperatures at equinox. 2013, *Icarus* 226, 316-322.

Déau, Estelle; Flandes, Alberto; Spilker, Linda J.; Petazzoni, Jérôme. 2013. Re-analysis of previous laboratory phase curves: 1. Variations of the opposition effect morphology with the textural properties, and an application to planetary surfaces. *Icarus*, Volume 226, Issue 2, p. 1465-1488.

Coustenis, A.; Atreya, S.; Castillo, J.; Coll, P.; Mueller-Wodarg, I.; Spilker, L. 2013. Surfaces, atmospheres and magnetospheres of the outer planets and their satellites and ring systems: Part IX. *Planetary and Space Science*, Volume 88, p. 1-2.

Coustenis, A.; Atreya, S.; Castillo, J.; Coll, P.; Mueller-Wodarg, I.; Spilker, L. Surfaces, atmospheres and magnetospheres of the outer planets and their satellites and ring systems: Part VIII. *Planetary and Space Science*, Volume 77, p. 1-2.

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Morishima, R., Spilker, L., Ohtsuki, Keiji. A multilayer model for thermal infrared emission of Saturn's rings III: Thermal inertia inferred from Cassini CIRS. 2011, *Icarus*, Volume 215, Issue 1, 107-127.

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Flandes, A., L. Spilker, R. Morishima, S. Piorz, C. Leyrat, N. Altobelli, S. Brooks, S. Edgington. 2010. Brightness properties of Saturn's rings with decreasing solar elevation. *Planetary and Space Science*, Volume 58, Issue 13, 1758 – 1765.

Cuzzi, J.N., J. A. Burns, S. Charnoz, R. N. Clark, J. E. Colwell, L. Dones, L. W. Esposito, G. Filacchione, R. G. French, M. M. Hedman, S. Kempf, E. A. Marouf, C. D. Murray, P. D. Nicholson, C. C. Porco, J. Schmidt, M. R. Showalter, L. J. Spilker, J. N. Spitale, R. Srama, M. Sremčević, M. S. Tiscareno, J. Weiss. An Evolving View of Saturn's Dynamic Rings. 2010. *Science*, Volume 327, 1470 -

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Altobelli, N., L. J. Spilker, C. Leyrat, S. Piorz, 2008. Thermal observations of Saturn's main rings by Cassini CIRS: Phase, emission and solar elevation dependence, *Planetary and Space Science*, 56, 134–146.

Leyrat, C., L. J. Spilker, N. Altobelli, S. Piorz, C. Ferrari, 2008. Infrared observations of Saturn's rings by Cassini CIRS : Phase angle and local time dependence, *Planetary and Space Science*, 56 (2008) 117–133.

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Altobelli, N., L. Spilker, S. Piorz, S. Brooks, S. Edgington, B. Wallis, M. Flasar, 2007. C ring fine structures revealed in the thermal infrared, *Icarus*, 191, 691-701.

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Spilker, L.J. 2006. Close Encounters with Saturn. 2006 Science Year, World Book, Inc., 12-27. Lead Article.

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Spencer, J. R.; J. C. Pearl, M. Segura, F. M. Flasar, A. Mamoutkine, P. Romani, B. J. Buratti, A. R. Hendrix, L. J. Spilker, R. M. Lopes, 2006. Cassini Encounters Enceladus: Background and the Discovery of a South Polar Hot Spot. *Science*, Vol. 311, Issue 5766, 1401-1405.

Spilker, L., S. Piorz, B. Wallis, S. Edgington, S. Brooks, J. Pearl, J., F. Flasar, 2005. Cassini CIRS Observations of a Roll-off in Saturn Ring Spectra at Submillimeter Wavelengths. *Earth, Moon and Planets*, Volume 96, Issue 3-4, 149-163.

Coustenis, A., C. Ferrari, S. K. Atreya, L. J. Spilker, 2005. Special issue on the "Surfaces and atmospheres of the outer planets, their satellites and ring systems". *Planetary and Space Science*, Vol. 53, Issue 5, 459-460.

Flasar, F. M., ..., L. J. Spilker, ..., 2005. Titan's Atmospheric Temperatures, Winds, and Composition. *Science*, Vol. 308, Issue 5724, 975-978.

Flasar, F. M. ... L. J. Spilker, ... 2005. Temperatures, Winds, and Composition in the Saturnian System. *Science*, Vol. 307, Issue 5713, 1247-1251.

Spilker, L.J., S. Piorz, A.L. Lane, R.M. Nelson B. Pollard, and C. T. Russell. 2004. Saturn A ring surface mass densities from spiral density wave dispersion behavior. *Icarus* **171**, 372 - 390.

Hansen, C. J., S. J. Bolton, D. L. Matson, L. J. Spilker, J.-P. Lebreton, 2004. The Cassini-Huygens flyby of Jupiter. *Icarus*, Vol. 172, Issue 1, 1-8.

Bolton, S. J., C. J. Hansen, D. L. Matson, L. J. Spilker, J.-P. Lebreton, 2004. Cassini/Huygens flyby of the Jovian system. *Journal of Geophysical Research*, Vol. 109, Issue A9.

Coustenis, A., L. J. Spilker, S. Atreya, C. Ferrari, 2004. Surfaces and atmospheres of the outer planets, their satellites and ring systems. *Planetary and Space Science*, Volume 51, Issue 14-15, 1-2.

Flasar, F.M. ..., L.J. Spilker... and Cassini CIRS team. 2004. An intense stratospheric jet on Jupiter. *Nature*, Vol. 427, 132-135.

Kunde, V. G. ..., L.J. Spilker... and Cassini CIRS team. 2004. Jupiter's atmospheric composition from the Cassini thermal infrared spectroscopy experiment.. *Science*, Vol. 305, Issue 5690, 1582-1587.

Flasar, F.M., ... L.J. Spilker, and Cassini CIRS team. 2004. Exploring the Saturn System in the thermal infrared: The Composite Infrared Spectrometer. *Space Science Rev.*, Vol. 114, Nos. 1-4, Kluwer Academic Publishers, 169-297.

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Spilker, L.J., C. Ferrari, J. Cuzzi, M. Showalter, J. Pearl and B. Wallis. 2003. Saturn's Rings in the Thermal Infrared. *Planetary and Space Science* (Special Issue: Surfaces and Atmospheres of the Outer Planets, their Satellites and Ring Systems), Vol. 51, Issues 14-15, 929-935.

Cuzzi, J. N., J. E. Colwell, L. W. Esposito, C. C. Porco, C. D. Murray, P. D. Nicholson, L. Spilker, E. A. Marouf, R. C. French, N. Rappaport, and D. Muhleman 2003. Saturn's Rings: Pre-Cassini Status and Mission Goals. *The Cassini-Huygens Mission*, Vol. 1, *Space Sci. Rev.*, Vol. 104, Nos. 1-4, Kluwer Academic Publishers, 191-208.

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