

LARRY W. ESPOSITO

BORN: 15 April 1951

EDUCATION

Massachusetts Institute of Technology, S.B. in Mathematics, 1973
University of Massachusetts at Amherst, Ph.D. in Astronomy, 1977

EMPLOYMENT

University of Colorado, Boulder,

Laboratory for Atmospheric and Space Physics
Research Associate 1977–present;

Department of Astrophysical and Planetary Sciences
Lecturer 1979–1984, Associate Professor 1984–1995, Professor 1995–present

RESEARCH ACTIVITIES

Co-Investigator

Pioneer Venus UVS, 1978–1993
Pioneer Saturn IPP, 1979–1981
Voyager PPS, 1980–1991
Galileo UVS 1984–2002
NASA VIMS Spectrometer Development Team, 1984–1988
Mars Observer VIMS, 1986–1988
USSR PHOBOS KRFM, 1986–1992
USSR MARS 94 Omega-VIMS, 1989–1990
USSR MARS 96 METEOPACKAGE, SVET, and TOROMETER, 1991–1996
Pluto Fast Flyby UVS Technical Development, 1993–1995
Pluto UVS PIDDP, 1993–1996
ESA Venus Express Venus Monitoring Camera, 2003–2016

Principal Investigator

Cassini UV Imaging Spectrometer, 1990–present
Venus Discovery Mission Study, 1993–1998
Hubble Space Telescope High Resolution Spectroscopy of Venus, 1993–1997
Pluto and Outer Solar System Explorer (POSSE) Phase A Concept Study, 2001
Surface and Atmosphere Geochemical Explorer (SAGE) Phase A Concept Study, 2010–2011
Venus Atmosphere and Surface Explorer (VASE) Study, 2013–2014
Venus In-Situ Atmospheric and Geophysical Explorer (VISAGE) Study, 2015–2018
Hyperspectral Observer for Venus Reconnaissance (HOVER) Study, 2018–

SERVICE ACTIVITIES

NASA

Chair, Voyager Rings Science Working Group, 1984–1989
Chair, US Evaluation Panel for Cassini Titan Probe, 1990
Cassini Project Redesign Study Team, 1992
Chair, Cassini Ground System Working Group, 1993–1996
Chair, Cassini Remote Science Working Group, 1995–1996
Office of Space Science Peer Review Process Team, 1995
Hubble second decade advisory committee, 1998–1999

Cassini TAMWG Working Group, 2003–2017, EPWG Working Group, 2006–2017
VEXAG Steering Group, 2005–2012
Chair, CDAP Rings Review Panel, 2006, 2007, 2008
Chair, CDAP Atmospheres Panel, 2012
Chair, Cassini Public Relations Working Group, 2006–2012
Discovery Program Concept Study Phase A Review Panel, 2007
Venera-D Joint US-Russia Science Definition Team, 2015-present
Europa Enhancement Independent Review Team, 2015

National Academy of Sciences

Space Studies Board, 1986–1992
Committee on Planetary and Lunar Exploration, 1982–1986; Chairman, 1989–1992
Study on “Space Science in the 21st Century,” Deputy Chair, Planetary, 1984–1986,
SSB Steering Group, 1987–1988
Future of Space Sciences, 1994–1995
Panel to Review Explorer Program, 1996–1997
Chair, Task Group on the Forward Contamination of Europa, 1999–2002
Committee to Assess Solar System Exploration, 2006–2008
Committee on Cost Growth in Earth and Space Science Missions, 2009-2010
Workshop on Decadal Surveys, 2012
Committee to Review NASA Planetary R&A, 2016 - 2018

University of Colorado

Educational coordinator, Fiske Planetarium, 1984–1986
LASP Executive Committee, 1990-2008
Chair, LASP Program Review Self Study, 1991–1992
Chancellor’s Task Force on Communications, 1993–1994
Head, Division of Planetary and Atmospheric Sciences, 1993–1996
APS Executive Committee, 1996–1998
Freshman Experience Seminar Faculty Mentor, 1994–1997
Norlin Scholars Advisory Board, 1997–1999
LASP self-study, 1998–1999, 2005-2006
Arts and Sciences Reallocation Advisory Committee, 1998–2002
Chair, BFA Benefits and Compensation Committee, 2005–2006, Member 2007-2010
Chair, APS Exam Committee, 2006–2007

PROFESSIONAL ORGANIZATIONS

Division for Planetary Sciences AAS (Committee, 1983–1986)
American Geophysical Union, European Geophysical Union, International Astronomical Union
COSPAR Commissions B and C
Main Scientific Organizer, COSPAR Symposium “Planetary Atmospheres”, 2002, 2004, 2006, 2008, 2010, 2012, 2014
Convenor, AGU Chapman Conference on “Exploring Venus as a terrestrial planet”, 2004-2006
Convenor, “Planetary Rings” AGU Fall Meeting, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015
Co-Convenor, International Saturn Symposium, Saturn after Cassini-Huygens, 2006–2009
Convenor, IUGG Symposium on Planetary and Heliospheric Geophysics, 2007
Editor, “Exploring Venus as a Terrestrial Planet” AGU monograph, 2007
Organizer, Workshop on climate change on Venus and Earth, 2007
Guest Editor, Icarus Special Issue “Cassini at Saturn”, 2008 – 2010, “Planetary Rings”, 2013 - 2016
Scientific Advisory Committee (Fachbeirat) Max Planck Institut for Solar System Research, 2009-present

HONORS AND AWARDS

NASA Group Achievement Awards: Pioneer Venus Orbiter Science Team 1980; Voyager PPS Team 1982, 1986;
Galileo UVS Development 1991, Galileo Asteroid Encounters 1993, 1995; Cassini UVIS Development and

Operations 1998, Cassini UVIS Science Investigation 2009, Cassini Ultraviolet Imaging Spectrograph Science Team 2018.

ESA Award for Outstanding Contribution to Venus Express 2016

Division for Planetary Sciences, Harold C. Urey Prize, 1985

NASA Medal for Exceptional Scientific Achievement, 1986

AAPT Richtmyer Memorial Lecture Award, 1991

National Academy of Sciences National Associate, 2002–

JPL Distinguished Visiting Scientist 2004–

American Geophysical Union, Fellow, 2006–

BIOGRAPHICAL LISTINGS

Continental Who's Who

Who's Who in Frontiers of Science and Technology

Who's Who in Science and Engineering

Who's Who of Emerging Leaders in America

Who's Who in the West

Who's Who in America

Who's Who in the World

RESEARCH INTERESTS

Observational and theoretical studies of planetary atmospheres and rings

PUBLICATIONS

Esposito, L. W., and E. R. Harrison. 1975. Properties of the Hulse-Taylor binary pulsar system. *Astrophys. J. (Letters)* 196, L1–L2. LASP reprint 901.

Esposito, L. W. 1976. Computation of the polarization of light scattered by the solar corona in Balmer Alpha, in *Fellowship Program in Scientific Computing; Internship Program for Minority Students*, ed. J. C. Adams and R. K. Rew, pp. 49–59. National Center for Atmospheric Research Technical Note. NCAR/TN/114 + PROC. LASP reprint 902.

Esposito, L. W. 1977. The two-stream approximation (or Shuster-Schwarzschild method), in *Standard Procedures to Compute Atmospheric Radiative Transfer in a Scattering Atmosphere*, ed. J. Lenoble, pp. 52–54. Boulder, Colorado: NCAR, Radiation Commission of the International Association of Meteorology and Atmospheric Physics (IAMAP). LASP reprint 903.

Esposito, L. W., and K. Lumme. 1977. The tilt effect for Saturn's rings. *Icarus* 31, 157–167. LASP reprint 407.

Lumme, K., L. W. Esposito, W. M. Irvine, and W. A. Baum. 1977. Azimuthal brightness variations of Saturn's rings, II: Observations at an intermediate tilt angle. *Astrophys. J. (Letters)* 216, L123–L126. LASP reprint 904.

Esposito, L. W. 1978. Light scattering from Saturn's rings calculated by a Markov chain formalism, Ph.D. diss., Astronomy Department, University of Massachusetts, Amherst. *Contribution from the Five College Observatories*, Number 261.

Esposito, L. W., and L. L. House. 1978. Radiative transfer calculated by a Markov chain formalism. *Astrophys. J.* 219, 1058–1067. LASP reprint 905.

Esposito, L. W., W. M. Irvine, K. Lumme, and W. A. Baum. 1978. Azimuthal brightness variations of Saturn's rings, in *Proceedings of the Symposium on Planetary Atmospheres*, ed. A. Vallance-Jones, pp. 89–91. Ottawa, Ontario: National Research Council of Canada. LASP reprint 906.

Harding, A. K., E. Tademaru, and L. W. Esposito. 1978. A curvature-radiation-pair-production model for gamma-ray pulsars. *Astrophys. J.* 225, 226–236. LASP reprint 907.

Esposito, L. W. 1979. An “adding” algorithm for the Markov chain formalism for radiation transfer. *Astrophys. J.* 233, 661–663. LASP reprint 69.

Esposito, L. W. 1979. Extensions to the classical calculation of the effect of mutual shadowing in diffuse reflection. *Icarus* 39, 69–80. LASP reprint 71.

- Esposito, L. W., K. Lumme, W. D. Benton, L. J. Martin, H. M. Ferguson, D. T. Thompson, and S. E. Jones. 1979. International planetary patrol observations of Saturn's rings, II: Four color phase curves and their analysis. *Astron. J.* 84, 1408–1415. LASP reprint 68.
- Esposito, L. W., J. R. Winick, and A. I. Stewart. 1979. Sulfur dioxide in the Venus atmosphere: Distribution and implications. *Geophys. Res. Lett.* 6, 601–604. LASP reprint 70.
- Lumme, K., L. W. Esposito, W. D. Benton, and W. A. Baum. 1979. International planetary patrol observations of Saturn's rings, I: Observations and data reduction. *Astron. J.* 84, 1402–1407. LASP reprint 908.
- Pollack, J. B., B. Ragent, R. Boese, M. G. Tomasko, J. Blamont, R. G. Knollenberg, L. W. Esposito, A. I. Stewart, and L. Travis. 1979. Nature of the Ultraviolet absorber in the Venus clouds: Inferences based on Pioneer Venus data. *Science* 205, 76–79. LASP reprint 909.
- Stewart, A. I., D. E. Anderson, L. W. Esposito, and C. A. Barth. 1979. Ultraviolet spectroscopy of Venus: Initial results from the Pioneer Venus orbiter. *Science* 203, 777–779. LASP reprint 336.
- Esposito, L. W. 1980. Ultraviolet contrasts and the absorbers near the Venus cloud tops. *J. Geophys. Res.* 85, 8151–8157. LASP reprint 324.
- Esposito, L. W., J. P. Dilley, and J. W. Fountain. 1980. Photometry and polarimetry of Saturn's rings from Pioneer Saturn. *J. Geophys. Res.* 85, 5948–5956. LASP reprint 72.
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- Knollenberg, R., L. Travis, M. Tomasko, P. Smith, B. Ragent, L. Esposito, D. McCleese, J. Martonchik, and R. Beer. 1980. The clouds of Venus: A synthesis report. *J. Geophys. Res.* 85, 8059–8081. LASP reprint 911.
- Pollack, J. B., O. B. Toon, R. C. Whitten, R. Boese, B. Ragent, M. Tomasko, L. Esposito, L. Travis, and D. Wiedman. 1980. Distribution and source of the UV absorption in Venus' atmosphere. *J. Geophys. Res.* 85, No. A13, 8141–8150. LASP reprint 912.
- Esposito, L. W. 1981. Absorbers seen near the Venus cloud tops from Pioneer Venus. *Adv. Space Res.* 1, 163–166. LASP reprint 340.
- Gehrels, T., and L. Esposito. 1981. Pioneer fly-by of Saturn and its rings. *Adv. Space Res.* 1, 67–71. LASP reprint 913.
- Thompson, W. T., K. Lumme, W. M. Irvine, W. A. Baum, and L. W. Esposito. 1981. Saturn's rings: Azimuthal variations, phase curves, and radial profiles in four colors. *Icarus* 46, 187–200. LASP reprint 319.
- Esposito, L. W., and L. D. Travis. 1982. Polarization studies of the Venus UV contrasts: Cloud height and haze variability. *Icarus* 51, 374–390. LASP reprint 332.
- Lane, A. L., C. W. Hord, R. A. West, L. W. Esposito, D. L. Coffeen, M. Sato, K. E. Simmons, R. B. Pomphrey, and R. B. Morris. 1982. Photopolarimetry from Voyager 2: Preliminary results on Saturn, Titan, and the rings. *Science* 215, 537–543. LASP reprint 914.
- Lane, A. L., R. B. Pomphrey, and L. W. Esposito. 1982. Probing the fine structure of Saturn's rings. *Planetary Report* 2, 7.
- Esposito, L. W., N. Borderies, P. Goldreich, J. N. Cuzzi, J. B. Holdberg, A. L. Lane, R. B. Pomphrey, R. J. Terrile, J. J. Lissauer, E. A. Marouf, and G. L. Tyler. 1983. Eccentric ringlet in the Maxwell gap at 1.45 Saturn radii: Multi-instrument Voyager observations. *Science* 222, 57–60. LASP reprint 278.
- Esposito, L. W., R. G. Knollenberg, M. Y. Marov, O. B. Toon, and R. P. Turco. 1983. The clouds and hazes of Venus. In *Venus*, ed. D. M. Hunten, L. Colin, T. M. Donahue, and V. I. Moroz, pp. 484–564. Tucson: Univ. of Arizona Press.
- Esposito, L. W., M. O'Callaghan, and R. A. West. 1983. The structure of Saturn's rings: Implications from the Voyager stellar occultation. *Icarus* 56, 439. LASP reprint 205.
- Esposito, L. W., M. O'Callaghan, K. E. Simmons, C. W. Hord, R. A. West, A. L. Lane, R. B. Pomphrey, D. L. Coffeen, and M. Sato. 1983. Voyager photopolarimeter stellar occultation of Saturn's rings. *J. Geophys. Res.* 88, 8643–8649. LASP reprint 208.
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- West, R. A., C. W. Hord, K. E. Simmons, H. Hart, L. W. Esposito, A. L. Lane, R. B. Pomphrey, R. B. Morris, M. Sato, and D. Coffeen. 1983. Voyager photopolarimeter observations of Saturn and Titan. *Adv. Space Res.* 3, 45–48. LASP reprint 56.

- West, R. A., A. L. Lane, H. Hart, K. E. Simmons, C. W. Hord, D. L. Coffeen, L. W. Esposito, M. Sato, and R. B. Pumphrey. 1983. Voyager 2 photopolarimeter observations of Titan. *J. Geophys. Res.* 88, 8699–8708. LASP reprint 239.
- West, R. A., M. Sato, H. Hart, A. L. Lane, C. W. Hord, K. E. Simmons, L. W. Esposito, D. L. Coffeen, and R. B. Pumphrey. 1983. Photometry and polarimetry of Saturn at 2640 Å and 7500 Å. *J. Geophys. Res.* 88, 8679–8697. LASP reprint 279.
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- Esposito, L. W. 1984. Structure and dynamics of Saturn's rings as seen by the Voyager stellar occultation. Proceedings of IAU Colloquium 75. Toulouse, France: CNES.
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- Esposito, L. W., J. N. Cuzzi, J. B. Holberg, E. A. Marouf, G. L. Tyler, and C. C. Porco. 1984. Saturn's rings: Structure, dynamics, and particle properties. In *Saturn*, ed. T. Gehrels and M. S. Matthews, pp. 463–545. Tucson: Univ. of Arizona Press.
- Esposito, L. W. 1985. Long term changes in Venus sulfur dioxide. *Adv. Space Res.* 5, 85–90. LASP reprint 61.
- Esposito, L. W. 1986. Structure and evolution of Saturn's rings. *Icarus* 67, 345–357. LASP reprint 387.
- Lane, A. L., C. W. Hord, L. W. Esposito, K. E. Simmons, A. L. Graps, W. R. Pryor, R. A. West, R. M. Nelson, B. D. Wallis, B. J. Buratti, and L. J. Horn. 1986. Photometry from Voyager 2: Initial results from the Uranian atmosphere, satellites, and rings. *Science* 233, 65–70. LASP reprint 377.
- Ragent, B., L. W. Esposito, M. G. Tomasko, M. Y. Marov, V. P. Shari, and V. N. Lebedev. 1986. Particulate matter in the Venus atmosphere. In *Venus International Reference Atmosphere*, ed. G. M. Keating. Elsevier Science.
- Showalter, M. R., J. N. Cuzzi, E. A. Marouf, and L. W. Esposito. 1986. Satellite “wakes” and the orbit of the Encke gap moonlet. *Icarus* 66, 297–323. LASP reprint 366.
- Cuzzi, J. N., and L. W. Esposito. 1987. The rings of Uranus. *Sci. Amer.* 255, 52–54, 63–66. LASP reprint 398.
- Esposito, L. W. 1987. The changing shape of planetary rings. *Astronomy* 15, 6–17. LASP reprint 915.
- Esposito, L. W. 1987. Venus. In *McGraw-Hill 1987 Yearbook of Science and Technology*, pp. 495–497. New York: McGraw-Hill. LASP reprint 916.
- Esposito, L. W., C. C. Harris, and K. E. Simmons. 1987. Features in Saturn's rings. *Astrophys. J. Supp.* 63, 749–770. LASP reprint 396.
- Miner, E. D., A. P. Ingersoll, W. Kurth, L. W. Esposito, and T. V. Johnson. 1987. Science objectives and preliminary sequence designs for the Voyager Neptune encounter. Jet Propulsion Laboratory, JPL TM D–4607.
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- West, R. A., A. L. Lane, C. W. Hord, L. W. Esposito, K. E. Simmons, R. M. Nelson, and B. D. Wallis. 1987. Temperature and aerosol structure of the nightside Uranian stratosphere from Voyager 2 photopolarimeter stellar occultation measurements. *J. Geophys. Res.* 92, No. A13, 15030–15036. LASP reprint 918.
- Esposito, L. W., M. Copley, R. Eckert, L. Gates, A. I. F. Stewart, and H. Worden. 1988. Sulfur dioxide at the Venus cloud tops, 1978–1986. *J. Geophys. Res.* 93, 5267–5276. LASP reprint 435.
- Horn, L. J., P. A. Yanamandra-Fisher, L. W. Esposito, and A. L. Lane. 1988. Physical properties of the Uranian delta ring from a possible density wave. *Icarus* 76, 485–492. LASP reprint 444.
- Stern, S. A., L. W. Esposito, and E. S. Barker. 1988. Ground-based CCD observations of Venus SO₂: 1986–87. Laboratory for Atmospheric and Space Physics, LASP Technical Report and reprint 425.
- Brophy, T. G., and L. W. Esposito. 1989. Simulation of collisional transport processes and the stability of planetary rings. *Icarus* 78, 181–205. LASP reprint 446.
- Esposito, L. W., and J. E. Colwell. 1989. Creation of the Uranus rings and dust bands, *Nature* 339, 605–607. LASP reprint 455.
- Lane, A. L., R. A. West, C. W. Hord, R. M. Nelson, K. E. Simmons, W. R. Pryor, L. W. Esposito, L. J. Horn, B. D. Wallis, B. J. Buratti, T. G. Brophy, P. Yanamandra-Fisher, J. E. Colwell, D. A. Bliss, M. J. Mayo, and W. D. Smythe. 1989. Photometry from Voyager 2: Initial results from the Neptunian atmosphere, satellites, and rings. *Science* 246, 1450–1454. LASP reprint 919.

- Brophy, T. G., G. R. Stewart, and L. W. Esposito. 1990. A phase-space fluid simulation of a two-component narrow planetary ring: Particle size segregation, edge formation, and spreading rates. *Icarus* 83, 133–155. LASP reprint 467.
- Colwell, J. E., and L. W. Esposito. 1990. A model of dust production in the Neptune ring system. *Geophys. Res. Lett.* 17, 1741–1744. LASP reprint 503.
- Colwell, J. E., and L. W. Esposito. 1990. A numerical model of the Uranian dust rings. *Icarus* 86, 530–560. LASP reprint 494.
- Colwell, J. E., L. J. Horn, A. L. Lane, L. W. Esposito, P. A. Yanamandra-Fisher, S. H. Pilorz, K. E. Simmons, M. D. Morrison, C. W. Hord, R. M. Nelson, B. D. Wallis, R. A. West, and B. J. Buratti. 1990. Voyager photopolarimeter observations of Uranian ring occultations. *Icarus* 83, 102–125. LASP reprint 473.
- Esposito, L. W. 1990. Does Venus have active volcanos? *Astronomy* 18, 42–47. LASP reprint 921.
- Esposito, L. W. 1990. Sulfur dioxide and its variations. In *Middle Atmosphere of Venus*. Akademie der Wissenschaften der DDR. LASP reprint 514.
- Esposito, L. W. 1990. Variation of the sulfur dioxide concentration in the atmosphere of Venus and the concept of active volcanism. Translated from *Astronomicheskii Vestnik* 24, 57–58. LASP reprint 920.
- Na, C. Y., L. W. Esposito, and T. E. Skinner. 1990. International Ultraviolet Explorer observation of Venus SO₂ and SO. *J. Geophys. Res.* 95, 7485–7491. LASP reprint 485.
- Esposito, L. W. 1991. Planetary rings: Ever decreasing circles. *Nature* 354, 107. LASP reprint 574.
- Esposito, L. W., A. Brahic, J. Burns, and E. A. Marouf. 1991. Particle properties and processes in Uranus' rings. In *Uranus*, ed. J. Bergstrahl, E. D. Miner, and M. Matthews, pp. 410–465. Tucson: Univ. of Arizona Press.
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- Moroz, V. I., E. V. Petrova, L. V. Ksanfomalit, O. F. Ganpantzerova, N. V. Goroshkova, A. V. Zharkov, G. E. Nikitin, L. Esposito, J.-P. Bibring, M. Combes, and A. Soufflot. 1991. Characteristics of aerosol phenomena in the Martian atmosphere from KRFM experiment data. *Plan. Space Sci.* 39, 199–207. LASP reprint 523.
- Brophy, T. G., L. W. Esposito, G. R. Stewart, and P. A. Rosen. 1992. Numerical simulation of satellite-ring interactions: Resonances and satellite-ring torques. *Icarus* 100, 412–433. LASP reprint 554.
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- Esposito, L. W. 1992. Planetary rings: Running rings around modellers. *Nature* 360, 531–532. LASP reprint 922.
- Hord, C. W., W. E. McClintock, A. I. F. Stewart, C. A. Barth, L. W. Esposito, G. E. Thomas, B. R. Sandel, D. M. Hunten, A. L. Broadfoot, D. E. Shemansky, J. M. Ajello, A. L. Lane, and R. A. West. 1992. Galileo Ultraviolet Spectrometer experiment. *Space Sci. Rev.* 60, 503–530. LASP reprint 544.
- McClintock, W. E., G. M. Lawrence, R. A. Kohnert, and L. W. Esposito. 1992. Optical design of the ultraviolet imaging spectrograph for the Cassini mission to Saturn, from *Instrumentation for Planetary and Terrestrial Atmospheric Remote Sensing*. SPIE 1745, 26–38. LASP reprint 568.
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- Esposito, L. W. 1993. Understanding planetary rings. *Ann. Rev. Earth Planet. Sci.* 21, 487–523. LASP reprint 566.
- McClintock, W. E., G. M. Lawrence, R. A. Kohnert, and L. W. Esposito. 1993. Optical design of the ultraviolet imaging spectrograph for the Cassini mission to Saturn. *Opt. Eng.* 32, 3038–3046. LASP reprint 612.
- Zasova, L. V., V. I. Moroz, L. W. Esposito, and C. Y. Na. 1993. SO₂ in the middle atmosphere of Venus: IR measurements from Venera-15 and comparison to UV data. *Icarus* 105, 92–109. LASP reprint 584.
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- Canup, R. M., and L. W. Esposito. 1995. Accretion in the Roche zone: Coexistence of rings and ringmoons. *Icarus* 113, 331–352. LASP reprint 640.
- Hord, C. W., W. R. Pryor, A. I. F. Stewart, K. E. Simmons, J. J. Gebben, C. A. Barth, W. E. McClintock, L. W. Esposito, W. K. Tobiska, R. A. West, S. J. Edberg, J. M. Ajello, and K. L. Naviaux. 1995. Direct observations of the Comet Shoemaker-Levy 9 fragment G impact by Galileo UVS. *Geophys. Res. Lett.* 22, 1565–1568. LASP reprint 651.

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- Thiessenhusen, K. U., L. W. Esposito, J. Kurths, and F. Spahn. 1995. Detection of hidden resonances in Saturn's B-ring. *Icarus* 113, 206–212. LASP reprint 923.
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