John Terrel Clarke

Present Position: Professor, Director of CSP
Dept. of Astronomy and Center for Space Physics
Boston University
725 Commonwealth Ave Boston MA 02115
(617)-353-0247 email: jclarke@bu.edu

Education:

Ph.D (Physics)	the Johns Hopkins University	1980
M.A. (Physics)	the Johns Hopkins University	1978
B.S. (Physics)	Denison University	1974

Previous Positions:
1987 - 2001: Research Scientist, University of Michigan
1985-1987: Advanced Instruments Scientist, Hubble Space Telescope Project, NASA Goddard Space Flight Center
1984-1985: Associate Project Scientist, Hubble Space Telescope Project, NASA Marshall Space Flight Center
1980-1984: Assistant Research Physicist, Space Sciences Laboratory, University of California, Berkeley

Awards/ Honors:
2016 American Geophysical Union Fellow
2005 Alumni Merit Citation, Denison University
1998 University of Michigan Research Achievement Award
1996 NASA Group Achievement Award for Comet S/L-9 Jupiter Impact Observations Team
1994 University of Michigan Research Excellence Award
1994 NASA Group Achievement Awards (3) for WFPC 2: First Servicing Mission, WFPC 2 Science, WFPC 2 Calibration
1987 NASA Scientific Research Award
1980 Forbush Fellow, Department of Physics, Johns Hopkins U.
1974 Sigma Pi Sigma - Physics Honorary – Denison Univ.

Professional Memberships:
American Astronomical Society; International Astronomical Union
American Geophysical Union; American Assoc. Adv. Science

Committees:
NAS Committee on Astrobiology and Planetary Science (CAPS)
MAVEN mission Project Science Group
Consulting Editor - *Icarus*
Steering Committee, International Outer Planet Watch
Mars Express SPICAM Instrument Science Team
Member JWST Solar System Observations Advisory Panel

Research Interests:
Planetary atmospheres, UV astrophysics, and
FUV instruments for remote observations

Refereed Publications: *(Web of Science Citation H-index = 52)*

1. "Detection of Acetylene in the Saturnian Atmosphere, Using the IUE Satellite", H.W. Moos and J.T. Clarke, *Astrophys. J. Lett., 229*, L107 (1979).

2. "Identification of the UV Nightglow from Venus", P.D. Feldman, H.W. Moos, J.T. Clarke, and A.L. Lane, *Nature, 279*, 221 (1979).

3. "Spatial Imaging of Hydrogen Ly α Emission from Jupiter", J.T. Clarke, H.A. Weaver, P.D. Feldman, H.W. Moos, W.G. Fastie, and C.B. Opal, *Astrophys. J., 240*, 696 (1980).

4. "Observations from Earth Orbit and Variability of the Polar Aurora on Jupiter", J.T. Clarke, H.W. Moos, S.K. Atreya, and A.L. Lane, *Astrophys. J. Lett., 241*, L179 (1980).

5. "IUE Detection of Bursts of H Ly α Emission from Saturn", J.T. Clarke, H.W. Moos, S.K. Atreya, and A.L. Lane, *Nature, 290*, 226 (1981).

6. "IUE Monitoring of the Spatial Distribution of the H Ly α Emission from Jupiter", J.T. Clarke, H.W. Moos, and P.D. Feldman, *Astrophys. J. Lett., 245*, L127 (1981).

7. "Ultraviolet Observations of the Io Torus from Earth Orbit Using the IUE Observatory", H.W. Moos and J.T. Clarke, *Astrophys. J., 247*, 354 (1981).

8. "4U1915-05", S. Bowyer, J. Clarke, and P. Henry, *IAU Circular No*. 3632 (1982).

9. "The Far-Ultraviolet Spectra and Geometric Albedos of Jupiter and Saturn", J.T. Clarke, H.W. Moos, and P.D. Feldman, *Astrophys. J., 255*, 806 (1982).

10. "Discovery of a 50 Minute Binary Period and a Likely 22nd Magnitude Optical Counterpart for the X-ray Burster 4U1915-05", F. Walter, S. Bowyer, K. Mason, J. Clarke, J. Halpern, and J. Grindlay, *Astrophys. J. Lett., 253*, l67 (1982).

11. "Detection of Auroral H Ly α Emission from Uranus", J.T. Clarke, *Astrophys. J. Lett., 263*, L105 (1982).

12. "Time Resolved Spectrophotometry of the Galactic X-ray Source H2252-035", J.T. Clarke, K.O. Mason, and S. Bowyer, *Astrophys. J., 267*, 726 (1983).

13. "X-ray, Optical, and Radio Observations of a Blue Galaxy in the 3C295 Cluster", J.P. Henry, J.T. Clarke, S. Bowyer, and R.J. Lavery, *Astrophys. J., 272*, 434 (1983).

14. "Optical Observations of the BL Lac Object PKS2155-304 and Implications Regarding the X-ray Absorption Feature at 600-700 eV", S. Bowyer, J. Brodie, J.T. Clarke, and J.P. Henry, *Astrophys. J. Lett., 278*, L103 (1984).

15. "IUE High Resolution Spectrophotometry of H Ly α Emission from the Local Interstellar Medium", J.T. Clarke, S. Bowyer, H.J. Fahr, and G. Lay, *Astr. Astrph., 139*, 389 (1984).

16. "Spectrophotometry of the Outburst and Quiescent States of the Dwarf Novae RX And and KT Per", J.T. Clarke and S. Bowyer, *Astr. Astrph., 140*, 345 (1984).

17. "The Evolution of the Optical Spectrum of the Dwarf Nova SS Cygni over One Complete Outburst Cycle", J.T. Clarke, D. Capel, and S. Bowyer, *Astrophys. J., 287*, 845 (1984).

18. "Periodic Comet Giacobini-Zinner (1984e)", J.T. Clarke, J. Brodie, and P. McCarthy, *IAU Circ. No*. 3979 (1984).

19. "An Analysis of Scattered Light in Low Dispersion IUE Spectra", G. Basri, J.T. Clarke, and B. Haisch, *Astr. Astrph., 144*, 161 (1985).

20. "Characterization of X-ray Sources Detected in a Deep Einstein Exposure of the Field around 3C295", J.P. Henry, J.T. Clarke, S. Bowyer, and R.J. Lavery, *Astr. J., 90*, 1425 (1985).

21. "An Assessment of the Impact of Spacecraft Glow on the Hubble Space Telescope", J. Clarke, in Second Conference on Spacecraft Glow, *NASA CP-2391*, p.229 (1985).

22. "FUV and Optical Spectrophotometry of X-ray Selected Seyfert Galaxies", J.T. Clarke, S. Bowyer, and M. Grewing, *Astrophys. J., 305*, 167 (1986).

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26. "Line Formation in the Hot Spot Region of Cataclysmic Variable Accretion Disks", M. Elitzur, J.T. Clarke, and T.R. Kallman, *Astrophys. J., 324*, 405 (1987).

27. "The Excitation of the Far UV Electroglow Emissions from Uranus, Saturn, and Jupiter", J.T. Clarke, M.K. Hudson, and Y.L. Yung, *J.Geophys.Res., 92*, 15139 (1987).

28. "The Jovian Aurora: Electron or Ion Precipitation?", J.H. Waite, J.T. Clarke, and T.E. Cravens, *J.Geophys.Res., 93*, 7244 (1988).

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33. "Doppler-shifted H Ly α Emission from Jupiter's Aurora", J.T. Clarke, J. Trauger, and J.H. Waite, *Geophys. Res. Lett., 16*, 587 (1989).

34. "Detection of H_3^+ on Jupiter", P. Drossart, and 9 co-authors incl. J.T. Clarke, *Nature, 340*, 539 (1989).

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36. "The Center to Limb Variation in Jupiter's H Ly α Emission", J.T. Clarke and G.R. Gladstone, *J. Geophys. Res., 95*, 21281, (1990).

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41. "HI Ly-α emission from Saturn (1980-1990)", M.A. McGrath and J.T. Clarke, *J. Geophys. Res.*, *97*, 13691 (1992).

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51. “The On-orbit Performance of WFPC 2”, J. Trauger, and 16 co-authors, incl. J.T. Clarke *Astrophys. J. Lett., 435*, L3 (1994).

52. “Far Ultraviolet Imaging of the Globular Cluster NGC 6681 with WFPC 2”, A.M. Watson and 14 co-authors incl. J.T. Clarke, *Astrophys. J. Lett., 435*, L55 (1994).

53. “First HST Observations of the Brightest Stars in the Virgo Galaxy M100 = NGC 4321”, W.L. Freedman, and 25 co-authors incl. J.T. Clarke, *Astrophys.J. Lett.*, *435*, L31 (1994).

54. “The Performance and Calibration of the WFPC 2”, J.A. Holtzman, and 15 co-authors incl. J.T. Clarke, *Pub. Astr. Soc. Pac., 107*, 156 (1995).

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56. "HST Imaging of Jupiter: Atmospheric Phenomena Created by the Impact of Comet S-L 9", H.B. Hammel, and 16 co-authors incl. J.T. Clarke, *Science, 267*, 1288 (1995).

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65. "The Line Profile of H Lyman-α from Dissociative Excitation of H_2", J.M. Ajello, I. Kanik, S. Ahmed, and J.T. Clarke, *J. Geophys. Res., Planets, 100*, 26411 (1995).

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68. "Detection of the Tip of the Red Giant Branch in NGC 5128", R. Soria, and 16 co-authors incl. J.T. Clarke, *Astrophys. J., 465*, 79 (1996).

69. "Main Sequence Stars and the Star Formation History of the Outer Disk in the LMC", J. Gallagher and 19 co-authors incl. J.T. Clarke, *Astrophys. J., 466*, 732 (1996).

70. "Visible and Far Ultraviolet WFPC2 Imaging of the Nucleus of the Galaxy NGC 205", D. Heath-Jones, and 17 co-authors incl. J.T. Clarke, *Astrophys. J., 466*, 742 (1996).

71. "Evidence for Supersonic Turbulence in the Upper Atmosphere of Jupiter", C. Emerich, L. Ben Jaffel, J.T. Clarke, R. Prangé, R. Gladstone, J. Sommeria, and G. Ballester, *Science, 273*, 1085 (1996).

72. "WFPC 2 Observations of the Cooling Flow Elliptical in Abell 1795", J. Pinkney, and 18 co-authors incl. J.T. Clarke, *Astrophys. J. Lett., 468*, L13 (1996).

73. "Star Clusters in Interacting and Cooling Flow Galaxies", J. Holtzman and 19 co-authors incl. J.T. Clarke, *Astr.J., 112*, 416 (1996).

74. "Discovery of a Young, Luminous, Compact Stellar Cluster in the Starburst Galaxy NGC 253", A.M. Watson and 20 co-authors incl. J.T. Clarke, *Astr.J., 112*, 534 (1996).

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76. "Time-Resolved Observations of Jupiter's Far-UV Aurora: Comparison of WFPC2 and IUE", G.E. Ballester, J.T. Clarke, and 20 co-authors, *Science, 274*, 409 (1996).

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78. "HST Observations of the Disk and Jet of HH30", C.J. Burrows and 15 co-authors incl. J.T. Clarke, *Astrophys. J., 473*, 437 (1996).

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80. "Simultaneous Spectroscopy and Imaging of the Jovian Aurora with the Hopkins Ultraviolet Telescope and the Hubble Space Telescope", P.F. Morrissey, P.D. Feldman, J.T. Clarke, B.C. Wolfven, D.F. Strobel, S.T. Durrance, and J.T. Trauger, *Astrophys. J. Lett., 476*, 918 (1997).

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112. "Observations and Implications of the Star Formation History of the LMC", J. Holtzman and 16 co-authors incl. J.T. Clarke, *Astron. J., 118*, 2262 (1999).

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230. "Retrieval of CO_2 and N_2 in the Martian Thermosphere Using Dayglow Observations", J.S. Evans, and 20 co-authors incl. J.T. Clarke, *Geophys. Res. Lett*., *42*, doi: 10.1002/2015/GL065489 (2015).

231. "Saturn's Northern Auroras as Observed Using the Hubble Space Telescope", J.D. Nichols, S. Badman, E. Bunce, J.T. Clarke, S. Cowley, G. Hunt, and G. Provan, *Icarus*, *263*, 17-31, doi: 10.1016/j.icarus.2015.09.008 (2016).

232. "Stability Within Jupiter's 'Swirl Region' over Moderate Timescales", T.S. Stallard, and 10 co-authors incl. J.T. Clarke, *Icarus, 268*, 145-155, doi: 10.1016/j.icarus.2015.12.044 (2016).

233. "Analysis and Modeling of Remote Observations of the Martian Hydrogen Exosphere", D. Bhattacharyya, J.T. Clarke, J.-L. Bertaux, J.-Y. Chaufray, and M. Mayyasi, *Icarus, 281*, 264-280, doi: 10.1016/j.icarus.2016.08.034 (2017).

234. "Effect of the Planet Shine on the Corona : Application to the Martian Hot Oxygen", J.-Y. Chaufray, J. Deighan, I. Stewart, N. Schneider, J.T. Clarke, and F. Leblanc, *J. Geophys. Res.*, in press (2017).

235. "Nitric Oxide Nightglow and Martian Mesospheric Circulation from MAVEN/IUVS Observations and LMD-MGCM Predictions", A. Stiepen, and 19 co-authors incl. J.T. Clarke, submitted to *J. Geophys. Res.* (2016).

236. "Variability of D and H in the Martian Upper Atmosphere Observed with the MAVEN IUVS Echelle Channel", J.T. Clarke and 14 co-authors, submitted to *J. Geophys. Res.* (2016).

237. "IUVS Echelle-mode Observations of Interplanetary Hydrogen: Standard for Calibration and Reference for Cavity Variations between Earth and Mars during MAVEN Cruise", M. Mayyasi, and 12 co-authors incl. J.T. Clarke, submitted to *J. Geophys. Res.* (2016).

238. "An Isolated, Bright Cusp Aurora at Saturn", J. Kinrade and 18 co-authors incl. J.T. Clarke, submitted to *J. Geophys. Res.* (2016).

239. "A Persistent Meteoric Metal Layer in the Martian Atmosphere", M. Crismani and 15 co-authors incl. J.T. Clarke, submitted to *Nature* (2017).

240. "Martian Mesospheric Cloud Observations by IUVS on MAVEN", M.H. Stevens and 16 co-authors incl. J.T. Clarke, submitted to *Geophys. Res. Lett.* (2017).

Abstracts: (<u>invited talks</u> are underlined)

1. "Ultraviolet Studies of Saturn, Jupiter, and Venus Using IUE", H.W. Moos, J.T. Clarke, P.D. Feldman, H.A. Weaver, S.K. Atreya, and A.L. Lane, *B.A.A.S., 11*, 555 (1979).

2. "IUE Observations of the Ultraviolet Nightglow from Venus", H.W. Moos, P.D. Feldman, J.T. Clarke, and A.L. Lane, *EOS, 60*, 304 (1979).

3. "Spatial Imaging of the Jupiter Lyman α Emission from Rocket and IUE Observations", J.T. Clarke, W. Fastie, P. Feldman, W. Moos, H. Weaver, and C. Opal, *EOS, 60*, 307 (1979).

4. "IUE Spectra of Jovian Polar Auroral Emission", J.T. Clarke, *Conference on the Jovian Magnetosphere*, Rice University (1980).

5. "Spatial Imaging of the UV Emission from Jupiter and Saturn", J.T. Clarke and W. Moos, in *The Universe in Ultraviolet Wavelengths: First Two Years of IUE, NASA CP-2171*, p. 39 (1980).

6. "Observations of Polar Aurora on Jupiter", J.T. Clarke, H.W. Moos, S.K. Atreya, and A.L. Lane, *NASA CP-2171*, p.45 (1980)

7. "Observations of the Io Plasma Torus", H.W. Moos, J.T. Clarke, S.K. Atreya, and A.L. Lane, *NASA CP-2171*, p. 49 (1980).

8. "Extracting Spatial Information from Large Aperture Exposures of Diffuse Sources", J.T. Clarke and H.W. Moos, *NASA CP-2171*, p. 787 (1980).

9. "IUE Observations of Saturn", J.T. Clarke, H.W. Moos, and P.D. Feldman, *B.A.A.S., 12*, 667 (1980).

10. "Ultraviolet Observations of the Io Torus", H. W. Moos, S.T. Durrance, P.D. Feldman, and J.T. Clarke, *B.A.A.S., 13*, 729 (1981).

11. "Optical Spectroscopy of the X-ray Source H2252-035", J.T. Clarke, K.O. Mason, and S. Bowyer, *B.A.A.S., 13*, 834 (1981).

12. "Discovery of a 50 Minute Binary Period and a Likely 22 mag. Optical Counterpart for the X-ray Burster 4U1915-05", S. Bowyer, F.M. Walter, K.O. Mason, J.T. Clarke, J.P. Henry, J. Halpern, and J. Grindlay, *B.A.A.S., 13*, 901 (1981).

13. "Observational Evidence for the Binary Model of X-ray Bursters", S. Bowyer, J. Clarke, K. Mason, F. Walter, J. Henry, J. Halpern, and J. Grindlay, at the *24th COSPAR Meeting*, Ottawa, Canada (1982).

14. "IUE Observations of Auroral H Ly α Emission from Uranus", J. T. Clarke, *B.A.A.S., 14*, 761 (1982).

15. "IUE Detection of Auroral H Ly α Emission from Uranus", J. T. Clarke, *EOS, 63*, 1019 (1982).

16. "X-ray, Optical, and Radio Observations of the Blue Galaxy Butcher-Oemler 6 in the 3C295 Cluster", J.P. Henry, R.J. Lavery, J.T. Clarke, and S. Bowyer, *B.A.A.S., 14*, 907 (1983).

17. "An Optical Comparative Study of the Outburst and Quiescent Spectra of RX And and KT Per", J.T. Clarke and S. Bowyer, *B.A.A.S., 14*, 981 (1983).

18. "The New Astronomy in Space", J.T. Clarke, an invited seminar talk to the Center for the Interdisciplinary Study of Science and Technology, Northwestern University (1983).

19. "IUE Observations of Aurora on Jupiter, Saturn, and Uranus", J.T. Clarke, *5th Conference on Outer Planet Magnetospheres*, M.I.T. (1983).

20. "Scattered Light Contamination of the IUE SWP Spectrum", B. M. Haisch, G.S. Basri, and J.T. Clarke, *IUE Conference: Observing at the Limit*, Univ. of Colorado (1983).

21. "High Resolution Spectrophotometry of H Ly α Emission from the Local Interstellar Medium", J.T. Clarke, S. Bowyer, H. Fahr, and G. Lay, *IUE: Observing at the Limit*, U. of Colorado (1983).

22. "Far Ultraviolet Imaging of the Outer Planet Magnetospheres", invited colloquium at the Space Science Laboratory, NASA Marshall Space Flight Center (1983).

23. "High Resolution Spectrophotometry of H Ly α Emission from the Local Interstellar Medium", J.T. Clarke, S. Bowyer, H.J Fahr, and G. Lay, *B.A.A.S., 15*, 911 (1984).

24. "The Redshift of the BL Lac Object PKS2155-304 and it's Implications", J.P. Brodie, S. Bowyer, J.T. Clarke, and P. Henry, *B.A.A.S., 15*, 956 (1984).

25. "Far Ultraviolet Imaging of the Outer Planet Aurora", J.T. Clarke, in proc. of the 1984 Yosemite Conference: *The Planetary Plasma Environment: A Comparative Analysis* (1984).

26. "Observations of Planetary Aurorae", J.T. Clarke, invited colloquium, Astronomy Dept. Univ. of California, Berkeley (1984).

27. "Lyman α Aurora on Uranus and Neptune", S.T. Durrance and J.T. Clarke, in *Uranus and Neptune, NASA CP-2330*, 559 (1984).

28. "Evolution of the Spectral Lines in Dwarf Novae Over the Outburst Cycle", J.T. Clarke, invited talk at *8th No.American Workshop on Cataclysmic Variables*, Louisiana State U. (1984).

29. "Mapping Changes in Dwarf Novae Accretion Disks During Outburst", J.T. Clarke, invited seminar at Cerro Tololo Interamerican Observatory, La Serena, Chile (1984).

30. "Coordinated Observations of a Local Solar Wind Disturbance and Auroral H Ly α Emission from Uranus", J.T. Clarke, S. Durrance, A. Barnes, J. Mihalov, and J. Belcher, *B.A.A.S., 16*, 659 (1984).

31. "The Evolution of the Optical Spectrum of the Dwarf Nova SS Cygni Over One Complete Outburst Cycle", J.T. Clarke, D. Capel, and S. Bowyer, *B.A.A.S., 16*, 733 (1984).

32. "IUE and Optical Spectrophotometry of X-ray Selected Active Galactic Nuclei", J.T. Clarke, S. Bowyer, and M. Grewing, *COSPAR Symposium on "X-ray Astronomy '84*", Bologna (1984).

33. "Emission Line Imaging of Dwarf Novae Accretion Disks", J.T. Clarke, invited Seminar at Univ. of Kentucky (1985).

34. "The Hubble Space Telescope", J.T. Clarke, invited seminar at U. California, Berkeley (1985).

35. "Emission Line Mapping of the Outbursts of SS Cyg and GK Per", J.T. Clarke, Proc. of the *Ninth North American Workshop on Cataclysmic Variables*, U. Washington, p. 24 (1985).

36. "Aurora on Uranus", J.T. Clarke, invited colloquium at Dept. of Physics, Dartmouth College (1985).

37. "An Overview of Four Years of Observations of the H Ly α Emission from Uranus and Tests for Correlations with the Solar Wind Density", J. Clarke, S. Durrance, J. Murthy, W. Moos, J. Belcher, A. Pradhan, T. Skinner, S. Atreya, *B.A.A.S., 17*, 917 (1985).

38. "Far UV and Optical Spectrophotometry of X-ray Seyferts", J.T. Clarke, S. Bowyer, and M. Grewing, *Proc. of IAU Symposium 119* (1986).

39. "Moving Target Advisory Group Recommendations to the NASA Hubble Space Telescope Project", J. Clarke (chair), M. Belton, E. Danielson, J. Elliot, and L. Lane (1986)

40. "Opportunities in Future Instrumentation with the Space Telescope", J.T. Clarke, invited talk at the *Workshop on Solar System Astronomy from Earth Orbit*, Jet Propulsion Lab. (1986).

41. "Far UV Observations of Outer Planet Magnetospheres" and "Astronomy from Space: the Hubble Space Telescope", J.T. Clarke, invited seminars as alumni scholar at Dept. of Physics, Denison University (1986).

42. "IUE Monitoring of the Jovian FUV Emissions", J.T. Clarke, *Jupiter Watch Workshop*, U.C.L.A. (1986).

43. "Electric Field Excitation of the Electroglow on Uranus, Saturn, and Jupiter", J.T. Clarke, M.K. Hudson, and Y.L. Yung, *B.A.A.S., 18*, 766 (1986).

44. "Jovian Aurorae: Ion or Electron Precipitation?" J.H. Waite, T.E. Cravens, J.T. Clarke, and M. Horanyi, *B.A.A.S., 18*, 773 (1986).

45. "Atmospheric Dynamo Excitation of the Electroglow Emissions on Uranus, Saturn, and Jupiter", J.T. Clarke, M.K. Hudson, and Y.L. Yung, *EOS, 67*, 1174 (1986).

46. "The Hubble Space Telescope", J.T. Clarke, invited talk at the AIAA 25th Aerospace Science Meeting, January (1987).

47. "The Excitation of the Far Ultraviolet Electroglow Emissions on Uranus, Saturn, and Jupiter", J. Clarke, invited colloquium at the Univ. of Michigan, Dept. of Atmospheric Science (1987).

48. "The FUV Airglow on the Outer Planets", J.T. Clarke, invited colloquium at Cal Tech, Div. of Geologic and Planetary Sciences (1987).

49. "Advanced Scientific Instruments for the Hubble Space Telescope", J.T. Clarke, *B.A.A.S., 19*, 758 (1987).

50. "Near-IR Advanced Scientific Instruments for the Hubble Space Telescope", J.T. Clarke, *3rd International IRAS Conference* "Comets to Cosmology", Queen Mary College, London (1987).

51. "The Aurora and Airglow of Jupiter", J. Clarke, J. Caldwell, T. Skinner, and R. Yelle, invited review at *Time Variable Phenomena in the Jovian System*, Flagstaff AZ (1987).

52. "Modeling the Emission Lines from Accretion Disks in Cataclysmic Variables", J. Clarke, invited seminar talk, Laboratory for Astronomy and Solar Physics, NASA/Goddard, Oct. (1987).

53. "Charged Particle Excitation of Planetary Atmospheres", J. Clarke, invited talk at DPS meeting, *B.A.A.S., 19*, 836 (1987).

54. "IUE Observations of Neptune for H Ly α Emission", J.T. Clarke, *B.A.A.S., 19*, 864 (1987).

55. "Why is Neptune so much Darker than Uranus in H Ly α Emission?", J.T. Clarke, *Uranus Conference*, JPL (1988).

56. "Current Ideas about the Electroglow from Uranus", J.T. Clarke, invited review at *COSPAR TMC.2.1.2,* Helsinki (1988).

57. "Doppler-shifted H Ly α Emission from Jupiter's Aurora", J.T. Clarke, J. Trauger, and H. Waite, *B.A.A.S., 20*, 868 (1988).

58. "Observations of Jupiter's Aurora", J.T. Clarke, Dept. Seminar in Atmospheric, Oceanic, and Space Sciences, University of Michigan (1988).

59. "Hubble Space Telescope", J.T. Clarke, speaking to the students for the Exploration and Development of Space, University of Michigan (1988).

60. "Modeled EUVE Spectra of Jupiter's Aurora", J. Clarke, W. Harris, R. Gladstone, H. Waite, and S. Chakrabarti, *Berkeley Conference on EUV Astronomy*, Berkeley (1989).

61. "Outer Planet Aurora and Airglow: Recent Developments", J.T. Clarke and F. Bagenal, invited talk at *IAGA Meeting*, Exeter UK, July (1989).

62. "Jupiter's Atmospheric Spatial Variations Determined from H Ly α Emission", J.T. Clarke and G.R. Gladstone, *B.A.A.S., 21*, 942 (1989).

63. "Near-UV Reflectivity of Two Hemispheres of the Pluto-Charon System", E. Barker, A. Stern, N. Brosch, J. van Santvoort, J.T. Clarke, R. Gladstone, and L. Trafton, *B.A.A.S., 21*, 986 (1989).

64. "Observations of Aurora on the Giant Planets", J.T. Clarke, invited review at Fall AGU meeting, *EOS, 70*, 1172 (1989).

65. "Physical Underpinnings of Jupiter's Aurora", J.T. Clarke, colloquium at NASA Goddard Space Flight Center, January (1990).

66. "The Hubble Space Telescope", J.T. Clarke, keynote address to the *Michigan Society of Professional Engineers*, May (1990).

67. "Variability in the Outer Planet Aurora", J.T. Clarke, invited review at *COSPAR Symp. S.5*, the Hague June (1990).

68. "Jupiter's Equatorial H Ly α Emission Line Profile", J.T. Clarke and G.R. Gladstone, *B.A.A.S., 22*, 1069 (1990).

69. "HI Ly α Emission from Saturn (1980-1990)", M.A. McGrath and J.T. Clarke, *B.A.A.S., 22*, 1072 (1990).

70. "H Ly α Emission from Saturn: Variations over 1980-1990", J.T. Clarke and M.A. McGrath, *EOS, 71*, 1483 (1990).

71. "Proton Precipitation at Jupiter", J.H. Waite, D. Curran, and J.T. Clarke, *EOS, 72*, 184 (1991).

72. "UV and IR Observations of Jupiter's Aurora", J.T. Clarke, invited talk at spring AGU, *EOS, 72*, 185 (1991).

73. "High resolution, two-dimensional imaging, microchannel plate detector for use on a sounding rocket experiment", B. Bush, D. Cotton, O.H. Siegmund, S. Chakrabarti, W. Harris, and J.T. Clarke, *Proc. of the S.P.I.E., vol. 1549*, 291 (1991).

74. "The Hubble Space Telescope", J.T. Clarke, invited colloquium, Dept. of Physics, Wayne State University, October (1991).

75. "Ultraviolet Observations of Planetary Atmospheres", J.T. Clarke, invited colloquium, Dept. of Physics and Astronomy, University of Toledo, October (1991).

76. "The Lyman Alpha Bulge of Jupiter: Effects of Non-Thermal Velocity Field", L. Ben Jaffel, J.T. Clarke, G.R. Gladstone, R. Prange, B.R. Sandel, A. Vidal-Madjar, and R.V. Yelle, *B.A.A.S.*, *23*, 1135 (1991).

77. "Jupiter's H Ly α Emission Line Profiles", J.T. Clarke, G.R. Gladstone, and L. Ben Jaffel, *B.A.A.S.*, *23*, 1145 (1991).

78. "HST Observations of Io's Atmosphere Passing into Eclipse", J. Clarke, Proc. of *Science with the Hubble Space Telescope*, Sardinia (1992).

79. "HST Observations of Io's Atmosphere: SO_2 Column and FUV Airglow", J. Clarke, invited review at *Intl. Workshop on Variable Phenomena in Jovian Planetary Systems*, Annapolis (1992).

80. "A High Resolution UV Spectrograph for Sounding Rocket Measurements of Planetary Emission Line Profiles", W. Harris, J. Clarke, J. Caldwell, P. Feldman, B. Bush, D. Cotton, and S. Chakrabarti, *Proc. of SPIE*, July (1992).

81. "HST/FOS Spectra of Io Passing into Eclipse", J.T. Clarke, J. Ajello, J. Luhmann, N. Schneider, *B.A.A.S., 24*, 936 (1992).

82. "HST UV Spectra of Io: Cycle 1 and 2 Observations", J. Clarke, J. Ajello, J. Luhmann, N. Schneider, M. McGrath, and G. Ballester, at *Io: an International Conference*, San Juan Capistrano Institute, July (1993).

83. "Observing Pluto's Extended Atmosphere", J. Clarke, A. Stern, and L. Trafton, at *Pluto and Charon*, Flagstaff AZ, July (1993).

84. "EUVE Observations of Jupiter's Plasmasphere", R. Gladstone, H. Waite, D. Hall, W. Moos, P .Feldman, D. Strobel, M. McGrath, J. Clarke, F. Bagenal, N. Schneider, and D. Shemansky, *B.A.A.S., 25*, 1052 (1993).

85. "Analysis of Jovian Auroral Ly-α Emission Variability with the IUE Satellite Archives", W.M. Harris, J.T. Clarke, M.A. McGrath, *B.A.A.S., 25*, 1054 (1993).

86. "Earth Orbital UV Jovian Observer: A Discovery Mission", P. Feldman, F. Bagenal, M. Belton, L. Broadfoot, J. Clarke, A. Delamere, L. Lane, and D. Skillman, *B.A.A.S.,, 25*, 1054 (1993).

87. "HST UV Spectra of Io: Spatially Resolved Regions and New Eclipse Spectra", J. Clarke, J. Ajello, G. Ballester, J. Luhmann, M. McGrath, and N. Schneider, *B.A.A.S., 25*, 1074 (1993).

88. "EUVE Observations of the Io Plasma Torus", D. Hall, W. Moos, P. Feldman, D. Strobel, M. McGrath, J. Clarke, H. Waite, R. Gladstone, F. Bagenal, N. Schneider, D. Shemansky, *B.A.A.S.,* 25, 1082 (1993).

89. "FUV Performance of the WFPC 2 in Orbit", J. Clarke, invited talk at *Washington AAS Meeting*, January (1994).

90. "Hubble Space Telescope UV Spectra of Jupiter and Io", J.T. Clarke, *EOS*, (1994).

91. "Imaging of Io with the Faint Object Camera", P. Sartoretti, M.A. McGrath, F. Paresce, J.R. Spencer, J.T. Clarke, A.S. McEwen, *EOS*, (1994).

92. "HST WFPC 2 Imaging of Jupiter in the Far-UV", J.T. Clarke, G. Ballester, J. Trauger, D. Crisp, K Stapelfeldt, R. Evans, and the WFPC 2 science team, invited talk at the *Outer Planet Magnetospheres Conference*, Graz Austria, August (1994).

93. "HST Far-UV Imaging of Jupiter during Comet Shoemaker/Levy 1993e Impacts", J. Clarke, R. Prangé, J. Trauger, G. Ballester, K. Stapelfeldt, R. Evans, and 14 co-investigators, invited talk at the *Outer Planet Magnetospheres Conference*, Graz Austria, August (1994).

94. "HST Far-UV Imaging of Jupiter's Upper Atmosphere Around the Time of the Comet Impacts", J.T. Clarke, invited talk at *IAU*, the Hague, August (1994).

95. "Early Results from the IUE Shoemaker-Levy Observing Campaign: Temporal Evolution of the FUV/NUV Albedo in the Impact Regions", W.M. Harris, and 17 co-authors incl. J. T. Clarke, *B.A.A.S., 26*, 1591, (1994).

96. "HST UV Imaging of Jupiter's Upper Atmosphere around the Time of the Comet Impacts". K. Stapelfeldt, and 12 co-authors incl. J.T. Clarke, *B.A.A.S., 26*, 1592, (1994).

97. "Far-UV Imaging of Jupiter's Aurora with the HST/WFPC 2 Before and After the Impacts of Comet Shoemaker-Levy 9", J.T. Clarke and 20 co-authors, *B.A.A.S., 26*, 1592, (1994).

98. "X-ray Emissions Produced as a Result of the Impact of Comet Shoemaker-Levy 9 with Jupiter", J.H. Waite, Jr., and 8 co-authors incl. J.T. Clarke, *B.A.A.S., 26*, 1593, (1994).

100. "Auroral Signature of the Interaction of Comet Shoemaker-Levy 9 with the Jovian Magnetosphere", R. Prangé, and 22 co-authors incl. J.T. Clarke, *B.A.A.S., 26*, 1596, (1994).

101. "Observing the Impact of Comet Shoemaker-Levy with Jupiter using the IUE Satellite", W.M. Harris, and 27 co-authors incl. J.T. Clarke, *B.A.A.S., 26*, 1597, (1994).

102. "Hubble Space Telescope WFPC 2 Observations of Neptune", D. Crisp, J. Trauger, K. Stapelfeldt, T. Brooke, J. Clarke, G. Ballester, R. Evans, and the WFPC 2 science team, *B.A.A.S., 26*, 1093, (1994).

103. "High Resolution Measurements of the H-Lyman alpha Jovian line", C. Emerich, R. Prangé, L. Ben Jaffel, J. Clarke, G. Ballester, R. Gladstone, and J. Sommeria, *B.A.A.S., 26*, 1100, (1994).

104. "Ultraviolet Observations of Io with HST: WFPC 2 Imaging and GHRS & FOS Spectroscopy", G.E. Ballester, J. Clarke, J. Trauger, K. Stapelfeldt, D. Crisp, the WFPC 2 science team, D. Strobel, M. McGrath, N. Schneider, J. Ajello, and M. Combi, *B.A.A.S., 26*, 1136, (1994).

105. "An HST View of Io's Corona", J.T. Trauger, K. Stapelfeldt, R. Evans, D. Crisp, J. Clarke, G. Ballester, and the WFPC 2 science team, *B.A.A.S., 26*, 1136, (1994).

106. "HST-GHRS Detection of the Deuterium Lyman alpha Emission at the Limb of Jupiter", L. Ben Jaffel, A. Vidal-Madjar, J. Clarke, C. Emerich, R. Prangé, R. Gladstone, J. McConnell, and K. Noll, *B.A.A.S., 26*, 1100, (1994).

107. "Far-UV Imaging of Jupiter's Aurora with the HST/WFPC 2 Before and After the Impacts of Comet Shoemaker-Levy 9", J.T. Clarke and 20 co-authors, poster at *fall AGU meeting* (1994).

108. "Far-UV Imaging of Jupiter's Aurora with the HST/WFPC 2 and the Impacts of Comet Shoemaker-Levy 9", J.T. Clarke, invited colloquium as Alumni Scholar, *Dept. of Physics and Astronomy*, Denison University (1995).

109. "The Spectacular Swan Song of Comet Shoemaker-Levy 9 at Jupiter", J.T. Clarke, invited colloquium as Alumni Scholar, *Dept. of Physics and Astronomy*, Denison University, (1995).

110. "Imaging Jupiter's UV Aurora with the HST/WFPC 2", Invited colloquium in *Dept. of Astrophysical, Planetary and Atmospheric Science*, University of Colorado Boulder, May (1995).

111. “HST Far-UV Imaging of Jupiter During the Impacts of Comet Shoemaker-Levy 9”, J.T. Clarke, R. Prangé, G. Ballester, J. Trauger, R. Evans, K. Stapelfeldt, and W. Ip, *IAU Colloq. 156*, Baltimore (1995).

112. “Far-UV emissions from the Imact Sites of comet Shoemaker/Levy 9 with Jupiter”, G.E. Ballester and 22 co-authors incl. J. Clarke, *IAU Colloq. 156,* Baltimore (1995).

113. “On the Ballistic Nature of the Shoemaker-Levy 9 Impact Plumes A, E, and G”, K.L. Jessup, J. Clarke, H. Hammel, *IAU Colloq. 156,* Baltimore (1995).

114. “Magnetic Mapping and Interpretation of Auroral Signatures of Comet SL9 in the Jovian Magnetosphere”, R. Prangé, I. Engle, M. Dunlop, M. Dougherty, S. Maurice, W. Ip, J. Clarke, and G. Ballester, *IAU Colloq. 156,* Baltimore (1995).

115. “Far-Ultraviolet Imaging with the Hubble Space Telescope Wide Field Planetary Camera 2”, J.T. Clarke, J. Trauger, J. Holtzman, and the WFPC 2 Science team, in *“Calibrating Hubble Space Telescope: Post Servicing Mission”*, Workshop Proceedings at Space Telescope Science Institute, p. 322 (1995).

116. “HST/WFPC 2 Imaging of Jupiter’s Aurora in the Far Ultraviolet”, J.T. Clarke, G. Ballester, J. Trauger, D. Crisp, K. Stapelfeldt, R. Evans, and the WFPC 2 Science Team, *IAGA Symposium 2.09/3.08*, IUGG XXI General Assembly, p. A71, July (1995).

117. “HST/GHRS Line Profiles of H Ly α Emission from the Interplanetary Medium”, J.T. Clarke, R. Lallement, J.-L. Bertaux, E. Quemerais, F. Paresce, and H. Fahr, *IAGA Symposium 4.08*, IUGG XXI General Assembly, p. B143, July (1995).

118. “WFPC 2 Observations of 11 New Asteroids”, R.W. Evans, K. Stapelfeldt, J. Trauger, D. Padgett, G. Ballester, J. Clarke, D. Crisp, and the WFPC 2 Science Team, *B.A.A.S., 27*, 1058 (1995).

119. “Vertical Sructure of Neptune’s Atmosphere from WFPC 2 Observations”, D. Crisp, J. Trauger, K. Stapelfeldt, R. Evans, P. Mills, G. Ballester, J. Clarke, and the WFPC 2 Science Team, *B.A.A.S., 27*, 1087 (1995).

120. “Impact Debris Partles from SL-9: Evolution and Transport after One Year in Jupiter’s Stratosphere”, R.A. West, and 9 co-authors incl. J.T. Clarke, *B.A.A.S., 27*, 1119 (1995).

121. “Far-UV Studies of the Comet SL-9 Debris Clouds in the Jovian Upper Atmosphere as Imaged with WFPC 2”, M.B. Vincent, J. Clarke, G. Ballester, W. Harris, J. Trauger, and R. Evans, *B.A.A.S., 27*, 1121 (1995).

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