

## Dr. Lawrence G. Piper — Selected Conference Presentations

1. Craig, N.C., Piper, L.G., Wheeler, J.C., and Lo, G.Y.-S., "Vibrational Assignment for cis- and trans-1-Chloro-2-fluoroethylenes and their Deuterated Modifications," presented at the 22nd Symposium of Molecular Structure and Spectroscopy, The Ohio State University, Columbus, OH, 5-9 September 1967.
2. Piper, L.G. and Setser, D.W., "Quenching Reactions of Argon Metastable Atoms in Collisions with Noble Gases and Simple Molecules," presented at the 164th ACS National Meeting, New York, NY, 28 August-1 September 1972.
3. Setser, D.W., Piper, L.G., and Velazco, J.E., "Quenching Rate Constants for the Ar ( $^3P_0$ ), Ar( $^3P_2$ ) States," Symposium on the Jesse Effect and Related Phenomena, Gatlinburg, TN, 9, 10 November 1973.
4. Piper, L.G., "Electronic Energy Transfer from Metastable Argon Atoms to Other Atoms and Small Molecules," Chemical Society Gas Phase Kinetics Discussion Group, Birmingham, England, 2 April 1974.
5. Piper, L.G., "Quenching of Argon Metastables," invited paper to Radiation Research Division, CEN Saclay, France, 21 June 1974.
6. Piper, L.G. and Clyne, M.A.A., "Measurement of the Oscillator-Strengths of the 3s, 4s, and 5s  $^3S$  to 2p $^4$   $^3P_2$  Transitions in Atomic Oxygen," presented at the 168th ACS National Meeting, Atlantic City, NJ, 8-13 September 1974.
7. Piper, L.G., Caledonia, G.E., and Kennealy, J.P., "Rate Constants for Quenching N $_2$ (A $^3\Sigma_u^+$ , v=0,1) by O $_2$  and O," presented at 180th ACS National Meeting, Las Vegas, NV (August 1980).
8. Piper, L.G., Krech, R.H., and Taylor, R.L., "The UV Photolysis of Hydrazoic Acid," presented at 180th ACS National Meeting, Las Vegas, NV, August 1980.
9. Piper, L.G., Caledonia, G.E., and Kennealy, J.P., "Absolute Rate Constants for the Destruction of N $_2$ (A $^3\Sigma_u^+$  v'=0,1) by O and for the Excitation of O( $^1S$ ) in the Reaction Between N $_2$ (A) and O," 28th IUPAC Congress, Vancouver, B. C., Canada, August 1981.
10. Rawlins, W.T. and Piper, L.G., "Effect of Excitation Mechanism on Line-width Parameters of Conventional VUV Discharge Line Sources," Technical Symposium East '81 of the Society of Photo-Optical Instrumentation Engineers, Washington, DC (April 1981).
11. Piper, L.G. and Rawlins, W.T., "Effects of Excitation Mechanism on Linewidth Parameters of Conventional VUV Discharge Line Sources," Presented at 34th Annual Gaseous Electronics Conference, Boston, MA, October 1981, Bull. Am. Phys. Soc. 27, 98 (1982).
12. Piper, L.G., Clyne, M.A.A., and Monkhouse, P.B., "Electronic Energy Transfer Between Metastable Argon Atoms and Ground-state Oxygen Atoms," Presented at 34th Annual Gaseous Electronics Conference, Boston, MA, October 1981, Bull. Am. Phys. Soc. 27, 111 (1982).
13. Piper, L.G. and Rawlins, W.T., "O-Atom Yields from Microwave Discharges in N $_2$ O/Ar Mixtures," presented at the 184th ACS National Meeting, Kansas City, MO, September 1982.

14. Green, B.D., Piper, L.G., Pugh, E.R., and Blumberg W., "Laboratory Studies of Beam Plasma Discharges," 36th Gaseous Electronics Conference, October 1983. Bull. APS. 29, 154 (1984).
15. Rawlins, W.T., Gelb, A., Piper, L.G., and Armstrong R.A., "Infrared Spectra (2-16  $\mu\text{m}$  of Ar I Rydberg Emission from a Microwave Discharge Plasma," 36th Gaseous Electronics Conference, October 1983. Bull. APS 29, 155 (1984).
16. Piper, L.G. and Rawlins, W.T., Products from Microwave Discharges in  $\text{N}_2\text{O}/\text{Ar}$ ," 36th Gaseous Electronics Conference, October 1983. Bull. APS 29, 155 (1984).
17. Piper, L.G., Green, B.D. Blumberg, W.A.M., and Wolnik, S.J., "Quenching of  $\text{N}_2^+$  ( $\text{A}^2\Pi_u$ )  $v'=2,3$  and 4 by Air and  $v'=2$  by Nitrogen and Oxygen," 36th Gaseous Electronics Conference, October, 1983. Bull. APS 29, 155 (1984).
18. Piper, L.G., Green, B.D., Pugh, E.R., and Blumberg, W.A.M., "Laboratory Studies of Beam Plasma Discharges," 1983 AGU Fall Meeting, December 1983. EOS 64, XXX (1983).
19. Piper, L.G., Green, B.D., Blumberg, W.A.M., and Wolnik, S.J., " $\text{N}_2^+$  Meinel Band Excitation and Quenching," Int'l. Conf. Atom. Phys., Seattle, July 1984.
20. Piper, L.G., Marinelli, W.J., Green, B.D., and Rawlins, W.T., "The Excitation of  $\text{IF}(\text{B}^3_{\text{O}+})$  State by Electronic Energy Transfer from  $\text{N}_2(\text{A}^3\Sigma_u^+)$ ," 188th ACS National Meeting, Philadelphia, PA (August 1984).
21. Piper, L.G., Marinelli, W.J., Green, B.D., and Rawlins, W.T., "The Excitation of  $\text{IF}(\text{B}^3\Pi_{\text{O}+})$  by the Effluents of Microwave Discharges in Argon-Nitrogen Mixtures," 188th ACS National Meeting, Philadelphia, PA (August 1984).
22. Piper, L.G. and Rawlins, W.T., "Quenching and Reaction of Electronically Excited Metastable Nitrogen Atoms,  $\text{N}(^2\text{D}, ^2\text{P})$ ," 188th ACS National Meeting Philadelphia, PA (August 1984).
23. Piper, L.G., Marinelli, W.J., Green, B.D., and Rawlins, W.T., "The Excitation of  $\text{IF}(\text{B}^3\Pi_{\text{O}+})$  State by Electronic Energy Transfer from  $\text{N}_2(\text{A}^3\Sigma_u^+)$ ," Invited paper to the Short Wavelength Chemical Laser Workshop, Charleston, SC, November 1984.
24. Piper, L.G., " $\text{N}_2$ -IF Transfer," Invited paper to 15th Winter Colloquium on Quantum Electronics, Snowbird, UT, January 1985.
25. Piper, L.G., Cowles, L.M., and Rawlins, W.T., "Electronic Energy Transfer from  $\text{N}_2(\text{A}^3\Sigma_u^+, v'=0,1)$  to NO," American Geophysical Union Spring Meeting, Baltimore, MD, May 1985, EOS 66, 321 (1985).
26. Piper, L.G., and Caledonia, G.E., "Long-Lived States in Nitrogen Afterglows," 38th Annual Gaseous Electronics Conference, Monterey, CA (October 1985), Bull. APS 31, 157 (1986).
27. Piper, L.G., DeFaccio, M.A., and Rawlins, W.T., "Rate Coefficients for  $\text{N}(^2\text{D})$  and  $\text{N}_2(\text{a}^1\Sigma_u^-)$  Reactions," American Geophysical Union Spring Meeting, Baltimore, MD (May 1986), EOS 67, 322 (1986).
28. Piper, L.G. and Marinelli, W.J., "Determination of  $\text{N}_2(\text{V})$  Distributions Produced in  $\text{He}/\text{N}_2$  Microwave Discharges," 39th Annual Gaseous Electronics Conference, Madison, WI (October 1986), Bull. APS 32, 1144 (1987).

29. Piper, L.G. and Caledonia, G.E., "Rate Coefficients for Reactions of Nitrogen Metastables with Silane," 39th Annual Gaseous Electronics Conference, Madison, WI (October 1986), Bull. APS 32, 1147 (1987).
30. Piper, L.G. and Davis, S.J., "Chemical Production and Reaction of  $N_2(A)$ ," AFOSR Molecular Dynamics Conference, Air Force Geophysics Laboratory (October 1986).
31. Marinelli, W.J. and Piper, L.G., "Vibronic Exchange Visible Laser," AFOSR Molecular Dynamics Conference, Air Force Geophysics Laboratory (October 1986).
32. Piper, L.G. and Cairns, K.D., "The Excitation of  $N(^2P)$  by  $N_2(A^3\Sigma_u^+)$ ," American Geophysical Union Spring Meeting, Baltimore, MD, May 1987, EOS 68, 373 (1987).
33. Piper, L.G., Spencer, M.N., Woodward, A.M., and Green, B.D., "CROSS: Contaminant Removal Off Optical Surfaces in Space," SPIE 1987 Technical Symposium Southeast, Orlando, FL (May 1987).
34. Piper, L.G. and Cummings, W.P., "Characterization of Metastable Nitrogen in the Effluents of Ozonizer-Type Discharges," 40th Annual Gaseous Electronics Conference, Atlanta, GA, October 1987, Bull. APS 33, 123 (1988).
35. Piper, L.G., Holtzclaw, K.W., Green, B.D., and Blumberg, W.A.M., "Experimental Determination of the Einstein Coefficients for the  $N_2(B-A)$  Transition," 40th Annual Gaseous Electronics Conference, Atlanta, GA, October 1987, Bull. APS 33, 155 (1988).
36. Fraser, M.E. and Piper, L.G., " $N_2O$  Production from the  $N_2(A^3\Sigma_u^+) + O_2$  Interaction," American Geophysical Union Fall Meeting, San Francisco, CA, December 1987, EOS 68, 1390 (1987).
37. Tucker, T.R., Fraser, M.E., Piper, L.G., and Rawlins, W.T., "Mechanisms of  $N_2O$  Formation," American Geophysical Union Fall Meeting, San Francisco, CA, December 1987, EOS 68, 1391 (1987).
38. Miller, S.M., Rawlins, W.T., Fraser, M.E., Tucker, T.R., and Piper, L.G., "COCHISE Investigations of upper atmospheric infrared background," Proc. IRIS Specialty Group on Targets, Backgrounds and Discrimination, U.S. Naval Post Graduate School, Monterey, CA (9-11 February 1988).
39. Piper, L.G., Holtzclaw, K.W., and Green, B.D., "Re-evaluation of the radiative lifetimes for  $N_2(B^3\Pi_g)$  and  $N_2(A^3\Sigma_u^+)$ ," American Geophysical Union Spring Meeting, Baltimore, MD, May 1988, EOS 69, 419 (1988).
40. Green, B.D., Marinelli, W.J., Piper, L.G. and Blumberg, W.A.M., "Pressure Dependence of  $N_2B(v=0-12)$  Populations," American Geophysical Union Spring Meeting, Baltimore, MD, May 1988, EOS 69, 419 (1988).
41. Green, B.D., Frish, M.B., Piper, L.G., Gauthier, V., and Lynch M.K., "Contaminant Removal off Optical Surfaces in Space," AIAA Thermophysics Conference, San Antonio, TX, 27-29 June 1988.
42. Allen, M.G. and Piper, L.G., "High-Resolution Laser-Induced Fluorescence Measurements of Schumann-Runge Transitions in Room Temperature  $O_2$ ," Conference on Lasers and Electro-Optics (1989).

43. Allen, Mark G., Davis, Steven J., and Piper, L.G., "Wind Tunnel Diagnostics Based on Laser-Induced Fluorescence," Instrumentation Society of America Meeting, May (1989).
44. Piper, L.G., "Rate Coefficients for Quenching  $N(^2P)$  by  $O(^3P)$  and  $O_2$ ," American Geophysical Union Spring Meeting, Baltimore, MD, May 1989. EOS 70, 414 (1989).
45. Cummings, W.P. and Piper, L.G., "The Rate Coefficient for Quenching  $N(^2D)$  by  $O(^3P)$ ," American Geophysical Union Spring Meeting, Baltimore, MD, May 1989. EOS 70, 414 (1989).
46. Green, B.D., Piper, L.G., and Murphy, R.E., "Diurnal Variability of Infrared Atmo-spheric Emissions as Observed from the Delta 181 Mission," to be submitted to J. Geophys. Res. (1992).
47. Murphy, R.E., Piper, L.G., and Green, B.D., "Observations of Diurnally Varying Infrared Atmospheric Emissions," American Geophysical Spring Meeting, Baltimore, MD, 29 May - 1 June 1990. EOS 71, 577 (1990).
48. Piper, L.G., "The Ratio  $A_{00}/A_{01}$  for the Infrared Atmospheric Bands of Molecular Oxygen," American Geophysical Union Spring Meeting, Baltimore, MD, 29 May - 1 June 1990. EOS 71, 577 (1990).
49. Green, B.D., Piper, L.G., and Murphy, R.E., "Infrared Orbital Interaction Spacecraft Glow," American Geophysical Union Spring Meeting, Baltimore, MD, 29 May - 1 June 1990. EOS 71, 578 (1990).
50. Piper, L.G., Frish, M.B., Pierce, V.G., and Green, B.D., "Laser Cleaning of Cryogenic Optics," Paper No. 1329-09, SPIE International Symposium on Optical and Optoelectronic Applied Science and Engineering, San Diego, CA, 8-13 July 1990.
51. Pierce, V.G., Frish, M.B., Green, B.D., Piper, L.G., Guregian, J., and Anapol, M., "Laser-Mirror Cleaning in a Simulated Space Environment," Paper No. 1329-36, SPIE International Symposium on Optical and Optoelectronic Applied Science and Engineering, San Diego, CA, 8-13 July 1990.
52. Piper, L.G., "The Excitation of  $N_2(B)$  in the Reaction Between  $N_2(A)$  and  $N_2(X, v)$ ," 43rd Annual Gaseous Electronics Conference, Champaign, IL, October 1990, Bull APS 36, 186 (1991).
53. Green, B.D., Piper, L.G., and Murphy, R.E., "Observations of Diurnally Varying Infrared Emissions from  $O_3$ , OH, and  $O_2(a)$ ," American Geophysical Union Spring Meeting, Baltimore, MD, 28-31 May 1991, EOS 72, 205 (1991).
54. Piper, L.G., "Experimental Determination of the Einstein Coefficient for the  $N(^2P-^4S)$  Transition," American Geophysical Union Spring Meeting, Baltimore, MD, 28-31 May 1991, EOS 72, 206 (1991).
55. Piper, L.G., "Energy Transfer Kinetics Between  $N_2(X, v)$  and  $SiH_4$ ," 45th Annual Gaseous Electronics Conference, Boston, MA, 27-30 October 1992. Bull APS 38, XXXX (1993).
56. Rawlins, W.T., Fraser, M.E., Piper, L.G., Blumberg, W.A.M., and Miller, S.M., "The Aeronomy of Aurorally Excited Infrared Fluorescence from Rovibrationally Excited Nitric Oxide," American Geophysical Union Fall Meeting, San Francisco, CA, 7-11 December 1992, EOS 73, 403 (1992).

57. Piper, L.G., "Re-evaluation of the Transition-Moment Function and Einstein Coefficients for the  $N_2(A^3\Sigma_u^+ - X^1\Sigma_g^+)$  Transition," American Geophysical Union Spring Meeting, Baltimore, MD, 24-28 May 1993, EOS 74, 222 (1993).
58. Piper, L.G., Du, H., Fraser, M.E., and Davis, S.J., "Measurement of Mercury and Other Trace Metals in Combustion Gases Using Active Nitrogen Energy Transfer (ANET)," Tenth Annual Coal Preparation, Utilization, and Environmental Control Contractor's Conference, Pittsburgh, PA, 18-21 July 1994.
59. Piper, L.G., Du, H., Fraser, M.E., and Davis, S.J., "The Application of Active Nitrogen Energy Transfer (ANET) to the Detection of Hazardous Wastes," ASC, I&EC Division, Special Symposium on Emerging Technologies in Hazardous Waste Management VI, Atlanta, GA, 19-21 September 1994.
60. Piper, L.G., Du, H., Fraser, M.E., and Davis, S.J., "Portable Sensor for Hazardous Waste," Opportunity '95 - Environmental Technology through Small Business, Morgantown Energy Technology Center, Morgantown, WV, 16-17 November 1994.
61. Piper, L.G., Du, H., Fraser, M.E., and Davis, S.J., "Measurement of Mercury and Other Trace Metals in Combustion Gases Using Active Nitrogen Energy Transfer (ANET)," Proc. Tenth Ann. Coal Prep. Utilization, and Environm. Control Contractors Conf., Vol. I, 329 (1994).
62. Piper, L.G., Du, H., Fraser, M.E., and Davis, S.J., "The Application of Active Nitrogen Energy Transfer (ANET) to the Detection of Hazardous Wastes," Proceedings of the Conference on Emerging Technologies in Hazardous Waste Management VI, Atlanta, GA (1994).
63. Piper, L.G., Hunter, A.J.R., Fraser, M.E., and Davis, S.J., "Portable Sensor for Hazardous Waste," METC Review Meetings, Environmental Technology Development Through Industry Partnership, October 3-5, 1995.
64. Piper, L.G., Hinds, M.F., McManus, K.R., Malonson, M.R., Murphy, H.C., Thomas, J.A., Rossi, D.C., Fraser, M.E., and Davis, S.J., "Development of a Real-Time Monitor of Mercury in Combustor Flues Based on Active Nitrogen Energy Transfer (ANET)," Proceedings First Joint Power and Fuel Systems Contractors Conference, Pittsburgh, PA, 9-11 July 1996.