**RICHARD BRYANT MILES**

**Title:** Robert Porter Patterson Professor of Mechanical and Aerospace Engineering

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**Citizenship:** U.S.A.

**EDUCATION:**

1972 Ph.D. Stanford University, Electrical Engineering

1967 M.S. Stanford University, Electrical Engineering

1966 B.S. Stanford University, Electrical Engineering

**EMPLOYMENT**

2011 - Robert Porter Patterson Professor of Mechanical and Aerospace Engineering

1982-2011 Professor, Department of Mechanical & Aerospace Engineering, Princeton University

2002 Acting Chair, Department of Mechanical & Aerospace Engineering, Princeton University (Spring)

1980-1996 Chairman, Engineering Physics, Princeton University

1995 (Spring) Visiting Professor, University of Marseilles, Marseilles, France

1995 (Spring) Visiting Research Scientist, CNRS, France

1978-1982 Associate Professor, Department of Mechanical and Aerospace

Engineering, Princeton University

1972-1978 Assistant Professor, Department of Mechanical and Aerospace Engineering, Princeton University

Summer 1972 NSF Research Associate, Department of Electrical Engineering, Stanford University

1969-1972 Research Associate and Hertz Fellow, E.L. Ginzton Microwave Lab, Stanford University

1968-1969 Teaching Assistant, Department of Electrical Engineering, Stanford University

1966-1968 Research Associate, System Techniques Lab, Stanford University

**PROFESSIONAL AFFILIATIONS:**

**Current:**

Member, National Academy of Engineering

Member, Board of Directors, Fannie & John Hertz Foundation

Member, Board of Directors, Precision Optics Corporation, Inc.

Member, Board of Trustees, Pacific University, Forest Grove OR

Member, AIAA Plasma Dynamics and Lasers Technical Committee

Member, Commercial Spaceflight Federation Suborbital Applications Research Group

Chairman and Representative for the AIAA, Elmer A. Sperry Board of Award 2009 - 2012

US Representative, International Liaison Group on MHD Energy Conversion

Chairman 18th International Conference on MHD Energy Conversion, Hawaii, June 27-30, 2011

Princeton Representative of the NJ Space Grant Consortium

Advisor, Princeton Student Chapter of the AIAA

Founder. Plasma TEC, Inc.

**Past:**

Chair, Princeton/Hertz Joint Fellowship Program Committee 1993 - 2008

Director of Graduate Studies, Department of Mechanical & Aerospace Engineering, Princeton, New Jersey 1994-2000

Chairman, Optical Society of America Ellis R. Lippincott Award 2008 Selection Committee

National Judge, Siemens Westinghouse Competition Finalists(2004, 2005)

Member, Selection Committee for the Franklin Institutes’ Bower Award and Prize for Achievement in

Science, 2003

Chairman, AIAA Aerodynamic Measurement Technology Technical Committee, '92-'94

Chairman, DoE Basic Energy Sciences Combustion Diagnostics Program Review, Oct. '92

Chairman, 1986 Gordon Conference on Vibrational Spectroscopy

Member, numerous NSF, DOD and DOE review panels.

**EXPERTISE:**

The use of lasers, electron beams, microwaves, electric discharges and magnetic devices to control, accelerate, extract power and precondition air and other gas mixtures for subsonic, supersonic and hypersonic fluid dynamics, standoff molecular detection and propulsion applications. Research is facilitated by the development of advanced laser diagnostics, which include temperature, velocity and density imaging by spectrally filtered Rayleigh scattering, molecular flow tagging by nonlinear excitation, standoff detection of selected atoms and molecules by radar scattering from laser generated ionization, and molecular detection by UV laser excited backward lasing in air. Current research is examining: microwave control of flame propagation; laser localized microwave energy addition for ignition control and lean combustion operation; stand-off detection of explosives, hazardous gases and greenhouse gases by laser/microwave techniques; flow velocity measurement by laser ionization tagged radar anemometry; molecular tagging of air and nitrogen by femtosecond laser electronic excitation; the role of high-power microwaves, nanosecond high voltage pulses, surface dielectric barrier discharges, electron beams and lasers in driving and controlling aerodynamic phenomena; MHD boundary layer control and power extraction for supersonic and hypersonic vehicle applications; magnetic and laser interactions with high speed materials; shape morphing high temperature ceramic materials for hypersonic applications; and plasma energy deposition for flow control and drag reduction for high speed vehicles.

**PROFESSIONAL ASSOCIATION/SOCIETY MEMBERSHIPS:**

American Physical Society, Life Member

Institute of Electrical & Electronic Engineers, Sr Member

American Institute of Aeronautics & Astronautics, Fellow

Optical Society of America, Fellow

**AWARDS, HONORS:**

Fannie and John Hertz Fellow, 1969-1972

Fellow of the Optical Society of America (elected 1998)

Discover Magazine Awards for Technical Innovation, Finalist 1999: "Electron Beam Heated,

Hypersonic Wind Tunnel" Richard B. Miles, Lead Inventor.

AIAA Aerodynamic Measurement Technology Award and Medal, (2000).

Fellow of the AIAA (elected 2000)

Outstanding Paper Award from the AIAA Ground Testing Technical Committee, (2000) with P.J. Erbland, and D. Rizzetta, AIAA-2000-2379

Frontiers in Spectroscopy Lecturer (2005), Ohio State University

Best Paper Award, AIAA Plasmadynamics and Lasers Technical Committee, (2007) with D.F. Opiats, G. Neretti, A.V. Likhanskii,, S. Zaidi, M.N. Shneider, and S.O. Macheret, AIAA-2007-4532

Lasers in Aerospace Lecture, AFOSR Laser Fest Celebrating 50 Years of the Laser, (2010)

Malina Lecture, Texas A& M University, (2011)

National Academy of Engineering (elected 2011)

AIAA Plasmadynamics and Lasers Award and Medal, (2012)

**PATENTS:**

#4,277,170 Laser Beacon and Optical Detector System for Aircraft

Collision Hazard Determination, Issued July 7, 1981, Richard B. Miles

#4,988,190 Absorption Line Filter Window and Method for Velocity

Measurements by Light Scattering, Issued Jan. 29, 1991, Richard B. Miles

#5,110,204 Velocity Measurement by the Vibrational Tagging of Diatomic

Molecules," Issued May 5, 1992, Richard B. Miles and Walter R. Lempert

#6,191,386 Method and Apparatus for Initiating, Directing and Constricting Electrical Discharge Arcs, (with The Ohio State University) Issued Feb. 20, 2001, Charles E, Albright, Joseph W Rich, Richard B. Miles Walter R. [Lempert.](http://www.patentstorm.us/inventors-patents/Walter_R__Lempert/1593803/1.html) Sergey O. Macheret.

#6,307,626 Resonant Dispersion Raman Spectrometer, Issued October 23, 2001. Richard B. Miles, Walter R. Lempert, and Noah Finkelstein

#6,483,077 Method and Apparatus for Initiating, Directing and Constricting Electrical Discharge Arcs,(with The Ohio State University) Issued November 19, 2002, Charles E, Albright, Joseph W Rich, Richard B. Miles Walter R. [Lempert.](http://www.patentstorm.us/inventors-patents/Walter_R__Lempert/1593803/1.html) Sergey O. Macheret,

#7,560,869 Method and Apparatus for Remotely Monitoring Properties of Gases and Plasmas, Richard B. Miles and Mikhail Shneider (July 14, 2009)

#7,728,295 Method and Apparatus for Detecting Surface and Sub Surface Properties of Materials, Richard B. Miles, Arthur Dogariu, Alexandre Goltsov, Mikhail N. Shneider, and Zhili Zhang. (June 1, 2010)

#7,744,039 Method of Generating and Controlling Gas Flows by Weakly Ionizing the Gas and Electrostatically Charging a Dielectric Surface (with Boeing), Richard B. Miles, Sergey O. Macheret, Mikhail N. Shneider, Alexandre Likhanskii, Joseph Silkey. (June 29, 2010)

**Provisional and Pending Patents:**

* + - 1. Femtosecond Optimal Dynamic Discrimination Imaging of Atomic and Molecular Species
      2. Laser Initiated Combustion Driven Ignition
      3. Air Laser
      4. Ultra-lean combustion by pulsed microwave
      5. Femtosecond Laser Electronic Excitation Tagging (FLEET)
      6. Method for Coherent Microwave Radiation from a Laser Induced Plasma (with Lockheed Martin ATL)

**CONSULTING (2012):**

Princeton Scientific Instruments, Princeton, NJ

PlasmaTEC, Princeton, NJ

Boeing Research and Technology, Seattle WA

Spectral Energies, Dayton, OH

Richard B. Miles LLC, Princeton NJ

Teledyne Scientific and Imaging, LLC

MetroLaser, Inc.

**INVITED LECTURES (Since 2005)**

Jan. 6, 2005 “Spectral Methods for Imaging High-Speed Fluid Flow,” 35th Winter

Colloquium on the Physics of Quantum Electronics, Snowbird, Utah

Jan. 11, 2005 “Plasma Enhanced Hypersonic Performance Enabled by MHD Power Extraction”, AIAA Aerospace Sciences Meeting, Reno Nev.

Feb. 16, 2005 Frontiers in Spectroscopy “Using Atoms for Quantitative Imaging of Complex flows”, Spectroscopy Institute, Ohio State University

Feb. 18, 2005 Frontiers in Spectroscopy “Measurement of Gas Properties by Incoherent and Coherent Rayleigh Scattering”, Spectroscopy Institute, Ohio State University.

Mar. 8, 2005 “Standoff Detection” Texas A&M University, Institute for Quantum Studies

May 31, 2005 “Sharp Cutoff Filters for Imaging Spectroscopy”, International Laser Center, Moscow State University, Moscow

July 19, 2005 “New Technologies: Filtered Imaging and Laser Guided Welding”, NSF Workshop on Manufacturing Technologies for US Competitiveness, Lincoln, Nebraska

Aug. 29, 2005 “Shock Control and Power Extraction by MHD Processes in Hypersonic flows” AFOSR Contractors Meeting, Long Beach, CA

Sept. 15, 2005 “Plasma-MHD Modeling” AFOSR Workshop on Hypersonics, University of Minnesota

Jan. 6, 2006 “Plasma Aerodynamics, Hypersonics, and Diagnostics”, Sandia National Labs, Combustion Research Facility, Livermore Calif.

April 18, 2006 Morphing Structures for Hypersonics, Boeing Corporation, Huntington Beach, California

May 19, 2006 “RADAR REMPI in Argon and Air: A new approach to detection, spectroscopy, and the dynamics of laser induced plasmas”, Joint Princeton / Texas A&M Molecular Physics Symposium, Princeton, NJ

June 19, 2006 “RADAR REMPI: A new approach to detection, spectroscopy, and the dynamics of gases for combustion, fluid dynamics, and homeland defense” Air Force Research Lab, Dayton, Ohio

June 20, 2006 “Morphing Structures for Hypersonic Engines”, Air Force Research Labs, Dayton, Ohio.

July 11, 2006 “Morphing Structures for Hypersonic Engines”, Lockheed Skunk Works, Palmdale, California

August, 2006 “MARIAH Sponsored 1 Megawatt Experiments at Sandia”, MSE Technology Applications, Butte MT.

Sept 16, 2006 “Third Harmonic in Phase Matched Metal Vapors”, Harris Fest, Celebration in honor of Steve Harris, Stanford University

Oct 23, 2006 “Imaging Flow Structure, Temperature and Species with Atomic and Molecular Filters”, Tokyo Institute of Technology

Oct 24, 2006 “Radiatively Driven Hypersonic Wind Tunnel”, Japan Aerospace Exploration Agency

Oct 26, 2006 “MHD Power Extraction and Control for High Speed Vehicles”, Special Invited Lecture: Conference on Frontiers of Technology and Engineering, Nagaoka, Japan

Nov 7, 2006 “MHD Power Extraction and Control for High Speed Vehicles”, PPPL- SEAS Workshop

April 7, 2007 “Coherent Microwave Scattering from Resonant Multiphoton Laser Generated Micro Plasmas”, Symposium on "Quantum mechanics, informatics, control and quantum materials engineering" .Princeton University.

April 25, 2007 "Steering High Speed Projectiles with Plasmas", Picatinny Arsenal, NJ

May 10, 2007 “RADAR REMPI: A New Approach to Detection, Spectroscopy and the Dynamics of Gases for Combustion, Fluid Dynamics and Homeland Defense”, CLEO/QELS 2007, Baltimore, Maryland.

July 16, 2007 “RADAR REMPI for the Detection of Trace Species” TAMU/Princeton Summer School on Quantum Optics and Molecular Physics, Casper WY.

Aug 12-16, 2007 Radar REMPI for Combustion and Flow Diagnostics, 2007 Gordon Research Conference on Laser Diagnostics, Oxford, UK

Aug 19-21, 2007 “Applications of RADAR REMPI and Filtered Rayleigh Scattering for Combustion Diagnostics” 1st International SAOT (School in Advanced Optical Technologies) Workshop on Optical Metrology”, Erlangen, Germany

Nov 2, 2007 “RADAR REMPI” The Middleton Meeting on Classical, Semiclassical and Quantum Noise, Princeton NJ

Feb 8, 2008 “Radar REMPI for Gas Property Measurements and for Trace Molecule Detection,” Princeton Plasma Physics Laboratory

Mar 17, 2008 “Ultra High Sensitivity Detection of NO Photo-fragments by Radar REMPI,” LACSEA 2008 meeting, St. Petersburg, Fl

June 24, 2008 “Seedless Velocimetry in Air by Vibrational Excitation and by Laser Induced Ionization” AIAA-2008-3753, 38th Fluid Dynamics Conference and Exhibit, Seattle, Washington

June 30, 2008 “Microwave Radar and Radar-REMPI methods for a gas and gas flow diagnostics,” 14th International Conference on the Methods of Aerophysical Research (ICMAR), Novosikersk, Russia (Plenary paper -given by M. Shneider)

July 17, 2008 The Combination of Lasers and Radar for High Sensitivity Standoff Trace Gas Detection. Presented to the Defense Science Research Council, Santa Cruz, Calif.

Sept 7, 2008 Non Thermal Atmospheric Pressure Plasmas for Aeronautic Applications. Hakone XI Conference, Oleron Island, France.

February 10, 2009 Dielectric Barrier Discharge (DBD) Plasma Actuators for Aerodynamic Control, NASA Langley

April 20, 2009 Simultaneous Multiple Species Imaging by Femtosecond Multiphoton Laser Induced Fluorescence, SPIE Conference on Nonlinear Optics and its Applications, Invited paper 7354-05, Prague, Czech Republic.

June 16, 2009 Gas Phase Spectroscopy for Medical Diagnostics, Charles E. Flowers Society, Prince William sound, Alaska.

Sept. 16, 2009 Power Extraction and Flow Control with MHD in Cold Air, 17th International Conference on MHD Energy Conversion, 14-17 September 2009, Shonan Village Cente, Kanagawa, Japan

Oct 12, 2009 Current Needs and Challenges in Plasma-Assisted Combustion and Aerodynamic Flow Control, Aerospace Thematic Workshop: Fundamentals of Aerodynamic Flow and Combustion Control by Plasmas, Les Houches – Mont-Blanc, France October 11-16, 2009 Les Houches – Mont-Blanc, France

June 28, 2010 Hypersonic Inlet Optimization by Shape Morphing Woven Ceramic Surface, 2010 National Space and Missile Materials Symposium, Scottsdale, AZ. (June 28-July2, 2010)

July 18, 2010 Backward Propagating Atomic Oxygen Laser in Air, Texas – Wyoming Quantum Summer School (Casper, WY, July 18-31, 2010)

July 19, 2010 Direct Measurement of Electron Loss Rate in Air and Ppb Standoff Detection of Nitric Oxide and Other Species in Air Texas – Wyoming Quantum Summer School (Casper, WY, July 18-31, 2010)

Aug 6, 2010 Lasers in Aerospace, AFOSR LaserFest Celebrating 50 Years of the Laser, Washington DC

Sept 7, 2010 Performance of Shape Morphing, Woven Ceramic Hypersonic Inlet, Evans Memorial Conference (September 7-9, 2010) – University of California, Santa Barbara

Feb. 21, 2011 Plasma Flow Control, Fundamentals, Modeling, And Applications Keynote Lecture, Conference on Plasma Flow Control: Fundamentals, Modeling and Applications, von Karman Institute for Fluid Dynamics , Rhode Saint-Genese, Belgium

Feb. 21, 2011 Limitations and Potential of Flow Control with Dielectric Barrier Discharges, Conference on Plasma Flow Control: Fundamentals, Modeling and Applications, von Karman Institute for Fluid Dynamics , Rhode Saint-Genese, Belgium

April 21, 2011 Electron Beam Driven Hypersonic Wind Tunnel Melina Lecture, Texas A&M University

May 3, 2011 FLETA: Femtosecond Laser Excitation Tagged Anemometry, Workshop on Turbulence in High-Speed Flow, Princeton University

July 26, 2011 Femtosecond laser electronic excitation tagging (FLEET) and lasing in air, The 2011 TAMU-Princeton Summer School on Quantum Science and Engineering, Jackson, WY

Aug 23, 2011 Microwave Driven Ultra Lean Combustion and Flame Propagation Enhancement, DARPA Workshop on Atmospheric Pressure Weakly Ionized Plasmas for Energy Technologies, Flow Control and Materials Processing, Princeton, NJ

Nov 15, 2011 Air Laser and New Nonlinear Optics Methods for Diagnostics of Air Flows and for Trace Gas Detection, University of Illinois, Urbana Champaign

Feb 28, 2012 The Compelling Need for Low Cost Hypersonic Testing in the Atmosphere, Next Generation Suborbital Researchers Conference, Palo Alto, CA Feb 26-28, 2012

June 26, 2012 Overcoming the Limitations of Surface Dielectric Barrier Discharge Devices for Flow Control AIAA Plasma Dynamics and Lasers Award Talk, AIAA Plasma Dynamics and Lasers Meeting, New Orleans, LA.

July 13, 2012 Advanced Methods for Unseeded, Nonintrusive Flow Diagnostics of Velocity and Temperature in Air and in Combusting Environments. GE Global Research Workshop on Advanced Engine Diagnostics.

Sept 5, 2012 Opportunities for Future Investments in Fluid Dynamics, Presentation to Army Research Office Mechanical Sciences Coordinating Group Meeting

Sept 25, 2012 Velocity, Temperature and Species Imaging inAir and in Combustion Environments by Femtosecond Lasere Electronic Excitation Tagging (FLEET), Ecole Polytechnique, Paris

Sept 26, 2012 Pulsed Microwave Coupling to Flames and Laser Produced Plasmas for Hydrocarbon Ignition and Combustion Enhancement, Ecole Centrale, Paris

Jan 8, 2013 “Femtosecond Laser Electronic Excitation Tagging (FLEET)  for Imaging Flow Structure in Unseeded Hot or Cold Air or Nitrogen,” Invited talk, AIAA Aerospace Sciences Meeting, Dallas Texas.

Mar.19, 2013 “Phase Matched and Non-Phase Matched Nonlinear Optics,” Russian Quantum Canter Spring School, March 18-22, 2013, Moscow, Russia

**PUBLICATIONS**

**A. Books/Chapters in Books**

1. J. Gelfand, R.B. Miles, E. Rohlfing and H. Rabitz, "Time Resolved Photoacoustic Detection of Collisional Relaxation of Vibrationally Excited HD Molecules," Time Resolved Vibrational Spectroscopy, Ed. G.H. Atkinson, (Academic Press, 1982), p. 9.
2. R.B. Miles and D.M. Nosenchuck, "Three-Dimensional Quantitative Flow Diagnostics," Advances in Fluid Mechanics Measurements, Ed. M. Gad-el-Hak, Lecture Notes in Engineering, Springer-Verlag, New York, 1989.
3. Kenichi Iga, Fundamentals of Laser Optics, Richard B. Miles, Technical Editor, Plenum Publishing, NY, 1994.
4. Richard B. Miles, "Planar Laser Imaging," Chapter 5, pp. 93-122 in "Flow Visualization--Techniques and Examples," Edited by A.J. Smits and T.T. Lim, Imperial College Press, London, November 2000.
5. Richard B. Miles, "Flow Field Diagnostics," Chapter 7, in Applied Combustion Diagnostics, Edited by Katharina Kohse-Hoeinghaus and Jay Jeffries, Taylor & Francis, New York, 2002.

**B. Publications in Refereed Journals and Review Articles**

1. J.W. Goodman, R.B. Miles and R.B. Kimball, "Comparative Noise Performance of Photographic Emulsions in Holographic and Conventional Imagery," J. Opt. Soc. Amer. 58, May 1968, p. 609.
2. J.F. Young, R.B. Miles and S.E. Harris, "Pump Linewidth Requirement for Optical Parametric Oscillators," J. Appl. Phys. 42, January 1971, p. 497.
3. J.F. Young, J.E. Murray, R.B. Miles and S.E. Harris, "Q-Switched Laser with Controllable Pulse Length," Appl. Phys. Letts. 18, February 1971, p. 129.
4. R.B. Miles, R.B. Kimball and W.H. Frey, "The Engineer as a Radical?" IEEE Trans. on Aerospace and Electronic Systems AES-7, July 1971, p. 578.
5. S.E. Harris and R.B. Miles, "Proposed Third Harmonic Generation in Phase-Matched Metal Vapors," Appl. Phys. Letts. 19, November 1971, p. 385.
6. J.F. Young, G.C. Bjorklund, A.H. Kung, R.B. Miles and S.E. Harris, "Third Harmonic Generation in Phase Matched Rb Vapor," Phys. Rev. Letts. 27, December 1971, p. 1551.
7. R.B. Miles and S.E. Harris, "Optical Third Harmonic Generation in Alkali Metal Vapors," IEEE J. Quant. Electronics QE-9, Spring 1973, page 470.
8. R.B. Miles, "Resonant Doppler Velocimeter," Phys. of Fluids 18, June 1975, page 751.
9. R.B. Miles, G. Laufer and G. Bjorklund, "Coherent Anti-Stokes Raman Scattering in a Hollow Dielectric Waveguide," Appl. Phys. Letts. 30, April 1977, page 317.
10. E. Rey, M. Kamal, R.B. Miles and B.S.H. Royce, "Semiconductivity and Stability of PdO," J. of Mat. Sci. 13, 1978, page 812.
11. R.B. Miles, E. Udd and M. Zimmermann, "Quantitative Flow Visualization in Sodium Vapor Seeded Hypersonic Helium," Appl. Phys. Letts. 32, 1978, page 317.
12. G. Laufer and R.B. Miles, "Angularly Resolved Coherent Raman Spectroscopy (ARCS), Optics Communications 28, February 1979, page 250.
13. G. Laufer, R.B. Miles and D. Santavicca, "Angularly Resolved Coherent Raman Spectroscopy (ARCS) in Gases," Optics Communications 31, November 1979, page 242.
14. R.B. Miles, "Laser Beacon System for Aircraft Collision Hazard Determination," Applied Optics 19, July 1980, page 2098.
15. R.B. Miles, J. Gelfand and E. Wilczek, "Thin Filament Interferometric Microphone," J. of Appl. Phys. 51, August 1980, page 4543.
16. E. Rohlfing, J. Gelfand, R.B. Miles, H. Rabitz and A. DePristo, "Modelling of Relaxation Measurements on Highly Vibrationally Excited HD Using Direct Overtone Pumping and Photoacoustic Detection," Chem. Phys. 51, September 1980, page 121.
17. A. DePristo, H. Rabitz and R.B. Miles, "The Selective Preparation of Excited Vibrational States Using the Stimulated Resonance Raman Effect," J. of Chem. Phys. 73, November 1980, page 4798.
18. M. Zimmermann and R.B. Miles, "Hypersonic Helium Flow Field Measurements with the Resonant Doppler Velocimeter," Appl. Phys. Letts. 37, November 1980, page 885.
19. R. Miles, G. Laufer, C. Paddock and G. Faris, "Picosecond Double Pass Amplifier," Appl. Optics 19, November 1980, page 3595.
20. M. Zimmermann and R.B. Miles, "Low Temperature Helium-Sodium Collision Rate Measurements," J. of Physics B14, February 1981, page L85.
21. E.A. Rohlfing, J. Gelfand, R.B. Miles and H. Rabitz, "Observation of Collisional Relaxation from HD v=5 and v=6 by Direct Overtone Pumping and Photoacoustic Detection," J. Chem. Phys. 5, November 1981, page 4893.
22. R.B. Miles, S.G. Webb and E.L. Griffith, "Hemispherical Field of View, Nonimaging Narrow Band Spectral Filter," Optics Letters 6, December 1981, page 616.
23. J. Terner, D.F. Voss, C. Paddock, R.B. Miles, and T.G. Spiro, “Picosecond Time-Resolved Resonance Raman-Spectroscopy of the Photolysis of Oxy-Hemoglobin,” Biophysical Journal, Vol. 37, No. 2, 1982, p A92.
24. J. Terner, D.F. Voss, C. Paddock, R.B. Miles and T.G. Spiro, "Picosecond Resonance Raman Spectrum of the Oxyhemoglobin Photoproduct: Evidence for an Electrochemically Excited State," J. Phys. Chem. 86, 1982, page 859.
25. E.A. Rohlfing, J. Gelfand and R.B. Miles, "Time Domain Photoacoustic Relaxation Measurements: Vibrational Energy Transfer for HD in V-4, 5, and 6," J. Appl. Phys. 53, August 1982, page 5420.
26. D.F. Voss, C.A. Paddock and R.B. Miles, "Picosecond Surface Raman Spectroscopy Beyond the Damage Limit," Appl. Phys. Lett. 41, July 1982, page 51.
27. S. Cheng, M. Zimmermann and R.B. Miles, "Separation of Time-Averaged Turbulence Components by Laser-Induced Fluorescence," Physics of Fluids 26, 1983, p. 874.
28. S. Cheng, M. Zimmermann and R.B. Miles, "Supersonic-Nitrogen Flow Field Measurements with the Resonant Doppler Velocimeter," Appl. Phys. Lett. 43, 1983, page 143.
29. C.A. Paddock, G.F. Russell, D.F. Voss and R.B. Miles, "Multiple Pulse Injection of a Picosecond Regenerative Ring Amplifier," J. Appl. Phys. 55, 1984, page 1793.
30. E.A. Rohlfing, H. Rabitz, J. Gelfand and R.B. Miles, "Mechanisms and Rate Constants for the Vibrational Relaxation of HD (v=4,5, and 6) in Collisions with HD, 4He, and D2," J. Chem. Phys. 81, 1984, page 820.
31. C.A. Paddock, G.F. Russell, and R.B. Miles, "Angle Resolved Second Harmonic Generation from Silver and Copper Surfaces," Surface Science 172, 1986, page 578.
32. C.W. Clark, M.G. Littman, T.J. McIlrath, R. Miles, C.H. Skinner, S. Suckewer and E. Valeo, "Possibilities for Achieving X-Ray Lasing Action by Use of High-Order Multiphoton Processes," J. of the Opt. Soc. of America B 3, March 1986, page 371.
33. G. Russell and R.B. Miles, "Display and Perception of Three-Dimensional Space Filling Data," Applied Optics 26, March 1987, page 973.
34. R. Miles, C. Cohen, J. Connors, P. Howard, S. Huang, E. Markovitz, and G. Russell, "Velocity Measurements by Vibrational Tagging and Fluorescent Probing of Oxygen," Optics Letters 12, 1987, page 861.
35. R. Miles, J. Connors, P. Howard, E. Markovitz and G. Roth, "Proposed Single-Pulse Two-Dimensional Temperature and Density Measurements of Oxygen and Air," Optics Letters 13, 1988, page 195.
36. T.G. Kreutz, J. Gelfand, R.B. Miles, and H. Rabitz, "A Time Domain Photoacoustic Study of the Collisional Relaxation of Vibrationally Excited H2," Chemical Physics 124, 1988, page 359.
37. R. Miles, J. Connors, E. Markovitz, P. Howard and G. Roth, "Instantaneous Supersonic Velocity Profiles in an Underexpanded Jet by Oxygen Flow Tagging," Physics of Fluids A 1, 1989, p. 389.
38. R.B. Miles, J.J. Connors, E.C. Markovitz, P.J. Howard, and G.J. Roth, "Instantaneous Profiles and Turbulence Statistics of Supersonic Free Shear Layers by Raman Excitation + Laser-Induced Electronic Fluorescence (RELIEF) Velocity Tagging of Oxygen," Experiments in Fluids 8, 1989, p. 17.
39. M. Smith, A. Smits, and R. Miles, "Compressible Boundary Layer Density Cross Sections by UV Rayleigh Scattering," Optics Letters 14, 1989.
40. R. Miles and W. Lempert, "Two-Dimensional Measurement of Density, Velocity, and Temperature of Turbulent Air Flows from UV Rayleigh Scattering," Applied Physics B B51, July 1990, p. 1.
41. W.R. Lempert, B. Zhang, R.B. Miles, and J.P. Looney, "Stimulated Raman Scattering and CARS in High-Pressure Oxygen," JOSA B 7, May 1990, p. 715.
42. W.R. Lempert, G. Diskin, V. Kumar, I. Glesk, and R. Miles, "Two- Dimensional Imaging of Molecular Hydrogen in H2/Air Diffusion Flames Using Two-Photon Laser-Induced Fluorescence," Optics Letters 16, May 1, 1991, p. 660.
43. R. Miles, W. Lempert, and B. Zhang, "Turbulent Structure Measurements by RELIEF Flow Tagging," Fluid Dynamics Research 8, 1991, pp. 9-17.
44. F.K. Owen, R.B. Miles, and R. Menon, "Tracking a Particle's Progress," Aerospace America, November 1992.
45. R.B. Miles, D. Zhou, B. Zhang, Z-S She, and W.R. Lempert, "Fundamental Turbulence Measurements by RELIEF Flow Tagging," AIAA Journal 31, 1993, pp. 447-452.
46. B. Zhang, W.R.Lempert, R.B. Miles, and G. Diskin, "Efficient Vibrational Raman Conversion in O2 and N2 Cells by Use of Superfluorescence Seeding," Optics Letters 18, 1993, pp. 1132-1134.
47. R. Miles, J. Forkey, N. Finkelstein, and W. Lempert, "Precision Whole-Field Velocity Measurements with Frequency-Scanned Filtered Rayleigh Scattering," Proceedings of the 7th International Symposium on Applications of Laser Techniques to Fluid Mechanics, Lisbon, Portugal, July 11-14, 1994.
48. Richard B. Miles, Garry L. Brown, Walter R. Lempert, Richard Yetter, George J. Williams, Jr., Seymour M. Bogdonoff, Douglas Natelson, and Jeffrey R. Guest, "Radiatively Driven Hypersonic Wind Tunnel," AIAA Journal 33, No. 8, August 1995, pp. 1463-1470.
49. J.N. Forkey, N.D. Finkelstein, W.R. Lempert, and R.B. Miles, "Demonstration and Characterization of Filtered Rayleigh Scattering for Planar Velocity Measurements," AIAA Journal 34, March 1996, pp. 442-448.
50. Scott R. Harris, Walter R. Lempert, Leslie Hersch, C.L. Burcham, D.A. Saville, R.B. Miles, K. Gee and R.P. Haughland, "Quantitative Measurements of Internal Circulation in Droplets Using Flow Tagging Velocimetry," AIAA Journal 34, March 1996, pp. 449-454.
51. R.B. Miles and W.R. Lempert, "Quantitative Flow Visualization in Unseeded Flows," Annual Review of Fluid Mechanics 29, 1997, pp. 285-326 (Invited).
52. J.N. Forkey, W.R. Lempert, and R.B. Miles, "Observation of a 100 MHz Frequency Variation Across the Output of a Frequency-Doubled, Injection-Seeded, Unstable Resonator, Q-Switched Nd:YAG Laser," Optics Letters 22, February 15, 1997, pp. 230-232.
53. N.D. Finkelstein, W.R. Lempert, and R.B. Miles, "Narrow-Linewidth Passband Filter for Ultraviolet Rotational Raman Imaging," Optics Letters, 22, April 15, 1997, pp. 537-539.
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6. S.O. Macheret, M.N. Shneider, and R.B. Miles, “Energy Efficiency of Plasma-Assisted Combustion in Ram/Scramjet Engines,” Paper #AIAA-2005-5371, 36th AIAA Plasmadynamics and Lasers Conference, Toronto, Ontario, Canada, June 6-9, 2005.
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26. R. Miles, W. Lempert, J. Forkey, "Filtered Rayleigh Scattering for Turbulence Diagnostics," AFOSR Meeting on Turbulence Structure and Control," Ohio State University, April 1-3, 1991.
27. R. Miles, "Aeronautics Applications of Photonics," Lasers and Electro- Optics Society Meeting on Spaceborne Photonics," Newport Beach, CA, July 22-24, 1991 (Plenary).
28. R. Miles, L. Zhang, B. Zhang, C-S She, and W. Lempert, "Statistical Properties of Fully Developed Turbulence by RELIEF Line Tagging," 44th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Scottsdale, Arizona, November 24-26, 1991.
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42. W.R. Lempert, J. Grinstead, N. Finkelstein, and R.B. Miles, "Frequency Modulated-Filtered Rayleigh Scattering (FM-FRS): A New Velocimetry Technique," CLEO'95 Conference, Optical Society of America, Postdeadline Paper, May 22-26, 1995, Baltimore, MD.
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46. Richard B. Miles, "500,000 Frames/Second Digital Imaging of Shockwave/Boundary Layer Dynamics on a 14 Degree Angle Wedge," Gallery of Fluid Motion, 49th Annual Meeting Division of Fluid Dynamics of the American Physical Society, Syracuse University, Syracuse, NY, November 24-26, 1996.
47. R.B. Miles, S.O. Macheret, and P. Efthimion, "Mechanisms of Shock Propagation and Stability Control in Low Temperature Plasmas," Workshop on Weakly Ionized Gases, USAF Academy, Colorado, June 9-13, 1997.
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50. S. Macheret, L. Martinelli, and R. Miles, "Shock Wave Propagation in Nonuniform Plasmas and Gases, 2nd Weakly Ionized Gases Workshop, Norfolk, VA, April 24-25, 1998.
51. D.A. Akimov, A.B. Fedotov, N.I. Koroteev, R.B. Miles, A.N. Naumov, D.A. Sidorov-Biryukov, and A.M. Zheltikov, "Nonlinear Optical Imaging and Tagging of Atoms and Molecules in Plasmas and Gas Flows," CLEO/IQEC 1998, San Francisco, CA, May 3-8, 1998.
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54. P.C. Efthimion, S.O. Macheret, and R.B. Miles, "High Pressure Uniform Plasma Formation," 25th Anniversary IEEE International Conference on Plasma Science (ICOPS), Raleigh, NC, June 2, 1998.
55. S.O. Macheret, R.B. Miles, and K. Waichman, "Air Plasma Control and Guiding Using Laser Excitation of Molecular Metastable States," 25th Anniversary IEEE International Conference on Plasma Science (ICOPS), Raleigh, NC, June 2, 1998 (Invited).
56. R. Miles, Invited Talk, "Linear & Nonlinear Optical Processes for Imaging Complex Flows," 13th U.S. National Congress of Applied Mechanics, Gainesville, FL, June 21-26, 1998.
57. R. Miles, Keynote Lecture, "Linear and Nonlinear Optical Processes for Imaging Complex Flows," XVI International Conference on Coherent & Nonlinear Optics (ICONO'98), Moscow, Russia, June 29-July 3, 1998.
58. R. Miles, Short Course, "Advanced Optical Diagnostics for Quantitative Fluid Imaging," XVI International Conference on Coherent & Nonlinear Optics (ICONO'98), Moscow, Russia, June 29-July 3, 1998.
59. C. Honore, J.H. Grinstead, W.R. Lempert, and R.B. Miles, "L'application du Diagnostic RELIEF aux Grands Instruments," 6th Congres Francophone Velocimetrie Laser, Saint-Louis, France, Sept. 22-25, 1998.
60. S.R. Harris, W.R. Lempert, and R.B. Miles, "Flow Tagging Measurements of a Vortical, Turbulent Flow Inside A Cylindrical Cavity," APS Meeting, Philadelphia, PA, Nov. 22-24, 1998.
61. L. Martinelli, S. Macheret, and R.B. Miles, "Modeling of Shock Propagation in Nonuniform Gases and Plasmas," APS Meeting, Philadelphia, PA, Nov. 22-24, 1998.
62. R.W. Anderson, G.L. Brown, and R.B. Miles, "Prediction of the Fluid Mechanics for Laser or Electron Beam Energy Addition to the Supersonic Nozzle Flow of a hypersonic Wind Tunnel," APS Meeting, Philadelphia, PA, Nov. 22-24, 1998.
63. A. Morgan, P. Barker, G. Brown, and R. Miles, "Experiments on Laser and Electron Beam Energy Addition to a Supersonic Flow for a Hypersonic Wind Tunnel," APS Meeting, Philadelphia, PA, Nov. 22-24, 1998.
64. P. Barker and R. Miles, "Temperature Measurement in Supersonic Flows by Predissociative Transient Thermal Gratings," APS Meeting, Philadelphia, PA, Nov. 22-24, 1998.
65. M. Shneider, S. Macheret, R. Miles, "Near-Electrode Sheaths in Hypersonic MHD Flows," APS Meeting, Philadelphia, PA, Nov. 22-24, 1998.
66. R.B. Miles, A. Yalin, Z. Tang, "High Resolution and High Throughput Resonant Dispersion Filter for Rotational Raman Imaging," Poster Session, Gordon Research Conference on Laser Diagnostics in Combustion, II Ciocco, Italy, June 20-25, 1999.
67. P. Barker, J. Grinstead, R. Miles, "Temperature Measurement in Unseeded Supersonic Air Flows by Predissociated Laser-Induced Thermal Gratings," Poster Session, Gordon Research Conference on Laser Diagnostics in Combustion, II Ciocco, Italy, June 20-25, 1999.
68. A. Yalin, Y. Ionikh, R. Miles, "Temperature Measurements in Glow Discharges Using Ultraviolet Filtered Rayleigh Scattering," #DT1.08, APS 52nd Annual Gaseous Electronics Conference, Norfolk, VA, Oct. 5-8, 1999.
69. S.O. Macheret and R.B. Miles, "Laser-Induced Vibrational Excitation of Molecules as a Tool of Ionization Enhancement in Air Plasmas," IWP4.27, APS 52nd Annual Gaseous Electronics Conference, Norfolk, VA, Oct. 5-8, 1999.
70. R. Miles, P. Barker, J. Zou, and S. Macheret, "Laser Control of Microwave-Driven Filamentary Discharges," IWP13.89, APS 52nd Annual Gaseous Electronics Conference, Norfolk, VA, Oct. 5-8, 1999.
71. Z. Tang and R.B. Miles, "Multiphoton Resonant Enhanced Ionization of Neutral Argon," NR2.03, APS 52nd Annual Gaseous Electronics Conference, Norfolk, VA, Oct. 5-8, 1999.
72. S.O. Macheret, M.N. Shneider, and R.B. Miles, "Modeling of Air Plasmas Generated by Electron Beams: "Fountain" and Thunderstorm" Discharges," NR2.05, APS 52nd Annual Gaseous Electronics Conference, Norfolk, VA, Oct. 5-8, 1999.
73. P. Barker, R. Miles and J. Grinstead, "Coherent Rayleigh Scattering in Weakly Ionized Gases with Nearly-Degenerate Four-Wave Mixing," QF1.01, APS 52nd Annual Gaseous Electronics Conference, Norfolk, VA, Oct. 5-8, 1999.
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76. Pingfan Wu, Mark Huntley, Richard B. Miles and Alexander J. Smits, "MHz-Rate Imaging of Mach 8 Boundary Layer Transition Over 4:1 Elliptic Cone," Video Presentation, Gallery of Fluid Motion, 1999 APS/DFD Meeting, New Orleans, LA, November 21-23, 1999.
77. A.P. Yalin, Y. Ionikh, and R.B. Miles, "Temperature Fields in Glow Discharges Measured with Ultraviolet Filtered Rayleigh Scattering," IEEE International Conference on Plasma Science (ICOPS 2000), New Orleans, LA, June 4-7, 2000.
78. M.N. Shneider, S.O. Macheret, and R.B. Miles, "Kinetics of Air Plasmas Generated by Electron Beams," IEEE International Conference on Plasma Science (ICOPS 2000), New Orleans, LA, June 4-7, 2000.
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81. R.B. Miles, "Review of Princeton Air Plasma Ramparts MURI Program," AFOSR MURI Project Review, Columbus, OH., April 19, 2000.
82. R.B. Miles, "RDHWT/MARIAH II Program (An R&D Program for an Advanced M=8-15 Hypersonic Wind Tunnel)," Briefing to DDR&E, Washington, DC., July 18, 2000.
83. R.B. Miles, "MARIAH II--Solution, Technology Status, and Future Plans," Briefing to Senator Conrad Burns, Butte, MT, Aug. 19, 2000.
84. R.B. Miles, "Microwave-Driven Air Plasma Studies for Drag Reduction and Power Extraction in Supersonic Air," AFOSR 2000 Contractors' Meeting in Unsteady Aerodynamics & Hypersonics, Monterey, CA, Sept. 6-7, 2000.
85. R.B. Miles, "Novel Trends in Nonlinear Laser Spectroscopy and Optical Diagnostics," XVII International Conference on Coherent and Nonlinear Optics (ICONO), Belarus Cultural Center, Minsk, Belarus, June 26-July 1, 2001 (Invited Keynote Speaker).
86. R.B. Miles, “Gordon Research Conference—Laser Diagnostics in Combustion,” Queen’s College, London, England, Aug. 17-22, 2003.
87. R.B. Miles, “High Brightness, Ultra-Narrow Linewidth Hg Source for Diagnostics,” ICIASF’03, Gottingen, Germany, Aug. 25-28, 2003.
88. R.B. Miles “Coherent Rayleigh-Brillouin Scattering,” 12th International Laser Physics Workshop, LPHYS-03, Hamburg, Germany. Aug. 28-29, 2003
89. “Shock Control and Power Extraction by MHD Processes in Hypersonic Air Flows,” (with Sergey Macheret), Unsteady Aerodynamics and Hypersonics, AFOSR Contractors’ Meeting, Destin, Florida, Sept. 8-12, 2003.
90. R. B. Miles “MHD in Cold Air for SCRAMJET Inlet Control and Power Extraction: Experiments and Theory,” The International Liaison Group on Magnetohydrodynamics (ILG-MH) International Workshop on Applied Magnetohydrodynamics—State of the Art, University of Bologna, Bologna, Italy. Sept. 25, 2003

1. R. B. Miles “Neutral Gas Temperature Measurement by Incoherent and Coherent Rayleigh Scattering,” 56th Annual Gaseous Electronics Conference, San Francisco, CA. Oct. 21-24, 2003
2. R. B. Miles “Ultra-Narrow Pass-Band, High Resolution, Wide Field-of-View Imaging with Atomic Filters,” Laser Physics Workshop, Seminar 5: Nonlinear Optics & Spectroscopy (LPHYS’04), Trieste, Italy. July 15, 2004
3. R. B. Miles “Flow Visualization by Filtered Molecular and Particle Scattering,” 11th International Symposium on Flow Visualization, University of Notre Dame, Notre Dame, Indiana. August 9-12, 2004
4. R. B. Miles “Laser Detection of Biohazards and Cancer Tissue,” Charles E. Flowers Society, Yosemite, CA, Sept. 16, 2004
5. R.B. Miles “Spectral Methods for Imaging High-Speed Fluid Flow,” 35th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, Utah Jan. 6, 2005
6. C S Kalra, S H Zaidi, S O Macheret, R B Miles; Magnetically accelerated non-equilibrium surface discharge for boundary layer control, Poster: Gordon Conference on Plasma Processing Science, July 16-21, 2006
7. Dmitry F. Opaits, Alexander D. Critien, Mikhail N. Shneyder, Sergey O. Macheret, and Richard B. Miles Experimental investigation of boundary layer control by dielectric barrier discharge, poster: Gordon Conference on Plasma Processing Science, July 16-21, 2006
8. G. Simmons and R. B. Miles, editors, “U.S Army MARIAH Hypersonic Wind Tunnel Development Program: 2006 1 MW Energy Addition Experiments”. Contract # W31P4Q-04-C-R173. Contractor: MSE Technology Applications, Inc. Butte, MT, Program Manager, David Micheletti,. March 2007.
9. R. B. Miles, Z. Zhang, S. Zaidi, and M. Shneider, "Ultra High Sensitivity Detection of NO Photo-Fragments by Radar REMPI," in *Laser Applications to Chemical, Security and Environmental Analysis*, OSA Technical Digest (CD) (Optical Society of America, 2008), paper LWC4.
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11. Shneider, Mikhail; Zhang, Zhili; Miles, Richard, Optical Breakdown Based on Resonant Enhanced Multi-Photon Ionization and Electron Avalanche Ionization in Gas Mixtures, American Physical Society, 61st Annual Gaseous Electronics Conference, October 13-17, 2008, abstract #GW3.003
12. A. Dogariu, J. Michael, E. Stockman, and R. B. Miles, "Atomic Oxygen Detection Using Radar REMPI," in *Conference on Lasers and Electro-Optics/International Quantum Electronics Conference*, OSA Technical Digest (CD) (Optical Society of America, 2009), paper CFU4, May 31, 2009
13. Opaits, Dmitry; Shneider, Mikhail; Miles, Richard; Macheret, Sergey, V-I Characteristics and Power Measurements in Asymmetric Dielectric Barrier Discharges, American Physical Society, 62nd Annual Gaseous Electronics Conference, October 20-23, 2009, abstract #KTP.096
14. J. B. Michael, A. Dogariu, M. N. Shneider, and R. B. Miles, Laser-initiated, microwave driven ignition in methane/air mixtures, Eastern States Section of the Combustion Institute University of Maryland College Park, October 18-21, 2009
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