# EXHIBIT 7

# Curriculum Vitae

July 19, 2014

**Personal:**

Boyd F. Edwards
Dean and Executive Director, USU Uintah Basin
Professor of Physics
Utah State University
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**Experience:**

Dean and Executive Director and Professor of Physics, Utah State University Uintah Basin (11/10 – present).
Russell and Ruth Bolton WVU Professor, West Virginia University, Morgantown, WV (8/05 – 11/10).
Professor of Physics, West Virginia University (8/97 – 11/10).
Associate Professor of Physics, West Virginia University (8/91-8/97)
Assistant Professor of Physics, West Virginia University (9/86-8/91).
Postdoctoral Research Associate, Sandia National Laboratories, Livermore, California, with A. R. Kerstein (2/85-9/86).

**Education:**

Ph.D., Department of Applied Physics, Stanford University, Stanford, California. Dissertation: "Nonlinear convection of dilute superfluid $^3$He-$^4$He mixtures in a small-aspect-ratio box," with A. L. Fetter (3/85).

M.S., Department of Physics, Utah State University, Logan, Utah. Thesis: "Magnetic flux ropes of Venus: evidence for restrictions on the electromagnetic theory of collisionless plasmas," with W. F. Edwards (essentially completed 8/81, received 6/83).

B.S., Dept. of Physics, Utah State University, magna cum laude (6/80).

**Funding:**

17. "Tunable On-Demand Microfluidic Separations Using Traveling-Wave Electrophoresis," R. L. Carroll, B. F. Edwards, A. T. Timperman, $300,000 for 7/15/2011 – 7/15/2014 from NSF (Award Number 1066730).

16. Science Faculty Equipment Grant, $90,681 for 8/15/11 – 4/15/12, from Uintah Impact Mitigation Special Services District, including support for laboratory development for three new science faculty members at USU Uintah Basin.

15. "Bionanotechnology for Public Security and Environmental Safety," $15 million for 7/1/10 – 7/1/15 from NSF EPSCoR RII and $8 million

in state matching, including support for one graduate student in theoretical microfluidics.

14. "US-Israel DDEP: Asymptotic Methods at Nano-Microfluidic Interfaces in Electrokinetically Driven Systems," B. Edwards, $5,075 from NSF DDEP – Doctoral Dissertation Enhancement Projects, for 5/29/2009 – 12/31/2009.

13. "IRES: Supramolecular Structure and Materials in Nanoscience at Jilin University" (OISE-0824860), James Lewis, Xiaodong Shi, David Lederman, Peter Cannett, Boyd Edwards, $149,940 from NSF OISE IRES – International Research Experiences for Students, for 08/01/08 – 08/01/11.

12. "NUE: Infusion of Authentic Interdisciplinary Research Experiences in Nanoscale Science and Engineering into Undergraduate Education" (EEC-0741399), E. Korakakis, P. Barnhart, B. Edwards, R. Hensel, and K. Jackson, $179,204 from NSF EEC NUE – Nanotechnology Undergraduate Education, for 1/1/08 – 12/31/10.

11. "Next Generation Biometrics: Achieving Strength in Molecular Recognition and Transport," (EPS-0554328) $8,999,903 for 7/1/05 – 7/1/08 from NSF EPSCoR RII and $4.5 million in WV EPSCoR matching, $150,000 annual allocation for micro/nanofluidics research with Aaron Timperman.

10. "Microfluidic/Nanocapillary Membrane Concentrators," Boyd Edwards and Aaron Timperman, WVNano Exploratory Grant, WVNano Initiative, $25,288 (2005-2006).

9. "Neutron Generation by Thermonuclear Fusion," Farrell Edwards, Eric Held, Boyd Edwards, and Charles Torre, United States Department of Homeland Security, $1,100,000 (2005-2006).

8. "Summer Integrative Mathematics & Science Project," Eric Pyle, Mike Long, and Boyd Edwards; West Virginia Improving Teacher Quality State Grants Program $50,676 (2003-2004).

7. "Convective stability of advected chemical waves: model development," Boyd Edwards, NASA West Virginia Space Grant Consortium, $24,228 (2003).

6. "Magnetothermal Convection in Nonconducting Diamagnetic and Paramagnetic Fluids," NASA Microgravity Science and Applications Division grant number NAG3-1921, $250,000 with D. Gray and B. Edwards (1996-98).

5. "Buoyancy-Driven Convection for Propagating Reaction Fronts," NSF EPSCoR phase III grant number OSR-9255224 with state matching; $154,536 Edwards share of WVU Nonlinear Dynamics Research Group funding (1993-96).

4. "Mineral Transformations and Fragmentation in Coal Combustion," B. Edwards, cofunded by the U. S. Department of Energy grant number DE-FG22-89PC89791, $199,979, and the National Research Center for Coal and Energy, $64,263 (1989-95).

3. "Buoyancy-Driven Convection for Propagating Reaction Fronts", NSF EPSCoR phase II grant number RII-8922106 with state matching; $115,072 Edwards share (1991-93).

2. "Convection in Autocatalytic Systems", West Virginia University Energy and Water Research Center (EWRC) project number CB-3-91(1,2,3), $48,000, B. Edwards and J. Wilder (1990-93).

1. "Ash mass distributions during coal char oxidation and fragmentation," B. Edwards, cofunded by the EWRC ($55,000) and the NSF Pittsburgh Supercomputing Center (110 service units approximately equivalent to 110 CPU hours) (1987-89).

**Publications:** Square brackets enclose citation numbers, with 18 publications cited at least 18 times each (*h*-index = 18), and 831 citations total.

53. "Angry Birds Realized: water balloon launcher for teaching projectile motion with drag," B. F. Edwards, D. D. Sam, M. A. Christiansen, W. A. Booth, and L. O. Jessup, Eur. J. Phys. **35**, 035009 (2014).

52. "Velocity plateaus in traveling-wave electrophoresis," R. Correll and B. F. Edwards, Phys. Rev. E **86**, 041916 (2012).

51. "Fabrication and Performance of a Microfluidic Traveling-Wave Electrophoresis System," K. D. Jo, J. E. Schiffbauer, B. F. Edwards, R. L. Carroll, A. T. Timperman, Analyst **137**, 875-883 (2012) [1].

50. "When Are Chiasms Admissible as Evidence?," B. F. Edwards and W. F. Edwards, BYU Studies **49**, no. 4, 131 (2010); http://byustudies.byu.edu/chiasmus/.

49. "Simultaneous separation and detection of cations and anions ion a microfluidic device with suppressed electroosmotic flow and a single injection point," B. R. Reschke, J. Schiffbauer, B. F. Edwards, and A. T.

Timperman, Analyst **135**, 1351 (2010) [4].

48. "Self-similar nested sequences on a chaotic attractor for traveling-wave electrophoresis," B. F. Edwards, Phys. Rev. E **80**, 036205 (2009) [1].

47. "A theoretical and experimental study of the electrophoretic extraction of ions from a pressure driven flow in a microfluidic device," B. R. Reschke, H. Luo, J. Schiffbauer, B. F. Edwards, and A. T. Timperman, Lab on a Chip, **9**, 2203 (2009) [4].

46. "Traveling-Wave Electrophoresis for Microfluidic Separations," B. F. Edwards, A. T. Timperman, R. Lloyd Carroll, K. Jo, J. M. Mease, and J. E. Schiffbauer, Phys. Rev. Lett. **102**, 076103 (2009) [5].

45. "Propagation velocities of chemical reaction fronts advected by Poiseuille flow," B. F. Edwards, Chaos **16**, 043106 (2006) [2].

44. "Does Joseph's letter to Emma of 4 November 1838 show that he knew about chiasmus?," B. F. Edwards and W. F. Edwards, Dialogue Paperless, http://www.dialoguejournal.com, E-paper #4 (2006).

43. "Response to Earl Wunderli's critique of Alma 36 as an extended chiasm," B. F. Edwards and W. F. Edwards, Dialogue: A Journal of Mormon Thought **39**, no. 3, 164 (2006); full account at Dialogue Paperless, http://www.dialoguejournal.com, E-paper #1 (2006).

42. "Does chiasmus appear in the Book of Mormon by chance?," B. F. Edwards and W. F. Edwards, BYU Studies **43**, no. 2, 103 (2004); http://byustudies.byu.edu/chiasmus/ [4].

41. "Poiseuille advection of chemical reaction fronts: Eikonal approximation," R. S. Spangler and B. F. Edwards, J. Chem. Phys. **118**, 5911 (2003) [6].

40. "Influence of terrain on scaling laws for river networks," D. A. Vasquez, D. H. Smith, and B. F. Edwards, Water Resources Research **38** No. 11, 10.1029/2000WR000152 (2002) [1].

39. "Poiseuille advection of chemical reaction fronts," B. F. Edwards, Phys. Rev. Lett. **89**, 104501 (2002) [27].

38. "River meandering dynamics," B. F. Edwards and D. H. Smith, Phys. Rev. E **65**, 046303 (2002) [14].

37. "Two-dimensional magnetothermal plumes," D. D. Gray, J. Huang, and B. F. Edwards, Int. J. Engr. Sci. **39**, 1837 (2001) [9].

36. "Critical wavelength for river meandering," B. F. Edwards and D. H. Smith, Phys. Rev. E Rapid Comm. **63**, 045304 (2001) [1].

35. "Dynamics of falling raindrops," B. F. Edwards, J. W. Wilder, and E. E. Scime, Euro. J. Phys. **22**, 113 (2001) [7].

34. "Magnetic control of convection in nonconducting diamagnetic fluids," J. Huang, D. D. Gray, and B. F. Edwards, Phys. Rev. E **58**, 5164 (1998) [9].

33. "Thermoconvective instability of paramagnetic fluids in a nonuniform magnetic field," J. Huang, D. D. Gray, and B. F. Edwards, Phys. Rev. E **57**, 5564 (1998) [18].

32. "Magnetic control of convection in nonconducting paramagnetic fluids," J. Huang, B. F. Edwards, and D. D. Gray, Phys. Rev. E Rapid Communication, **57**, R29 (1998) [10].

31. "Nonlinear front evolution of hydrodynamic chemical waves in vertical cylinders," J. W. Wilder, D. A. Vasquez, and B. F. Edwards, Phys. Rev. E **56**, 3016 (1997) [2].

30. "Thermoconvective instability of paramagnetic fluids in a uniform magnetic field," J. Huang, B. F. Edwards, and D. D. Gray, Phys. Fluids **9**, 1819 (1997) [12].

29. "Cutoff model and exact general solutions for fragmentation with mass loss," J. Huang, X. Guo, B. F. Edwards, and A. D. Levine, J. Phys. A: Math. Gen. **29**, 7377 (1996) [4].

28. "Pattern formation and evolution near autocatalytic reaction fronts in a narrow vertical slab," J. Huang and B. F. Edwards, Phys. Rev. E. **54**, 2620 (1996) [32].

27. "Chemical wave propagation in Hele-Shaw cells and porous media," D. A. Vasquez, J. W. Wilder, and B. F. Edwards, J. Chem. Phys. **104**, 9926 (1996) [25].

26. "Simulation of nonlinear front evolution equations for two dimensional chemical waves involving convection," J. W. Wilder, D. A. Vasquez, and B. F. Edwards, Physica D **90**, 170 (1996) [3].

25. "Transitions between convective patterns in chemical fronts," Y. Wu, D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Phys. Rev. E **52**, 6175 (1995) [17].

24. "Finite thermal diffusivity at onset of convection in autocatalytic systems: Discontinuous fluid density," D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Phys. Fluids **7**, 2513 (1995) [8].

23. "Mass distribution on clusters at the percolation threshold," M. F. Gyure, M. V. Ferer, B. F. Edwards, and G. Huber, Phys. Rev. E Brief Reports **51**, 2632 (1995) [8].

22. "Convective Chemical-wave Propagation in the Belousov-Zhabotinsky Reaction," Y. Wu, D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Phys. Rev. E, **51**, 1119 (1995) [31].

21. "Convection in Chemical Waves," D. A. Vasquez, J. M. Littley, J. W. Wilder, and B. F. Edwards, Phys. Rev. E **50**, 280 (1994) [40].

20. "Nonaxisymmetric and axisymmetric convection in propagating reaction-diffusion fronts," J. Masere, D. A. Vasquez, B. F. Edwards, J. W. Wilder, and K. Showalter, J. Phys. Chem. **98**, 6505 (1994) [60].

19. "Derivation of a nonlinear front evolution equation for chemical waves involving convection," J. W. Wilder, B. F. Edwards, D. A. Vasquez, and G. I. Sivashinsky, Physica D **73**, 217 (1994) [14].

18. "Onset of convection for autocatalytic reaction fronts in a vertical slab," J. Huang, D. A. Vasquez, B. F. Edwards, and P. Kolodner, Phys. Rev. E **48**, 4378 (1993) [28].

17. "Convective Turing Patterns," D. A. Vasquez, J. W. Wilder, and B. F. Edwards, Phys. Rev. Lett. **71**, 1538 (1993) [4].

16. "Modification of the eikonal relation for chemical waves to include fluid flow," J. W. Wilder, D. A. Vasquez, and B. F. Edwards, Phys. Rev. E Brief Reports **47**, 3761 (1993) [12].

15. "Hydrodynamic instability of chemical waves," D. A. Vasquez, J. W. Wilder, and B. F. Edwards, J. Chem. Phys. **98**, 2138 (1993) [34].

14. "Exact Enumeration and Scaling for Fragmentation of Percolation Clusters," B. F. Edwards, M. F. Gyure, and M. V. Ferer, Phys. Rev. A, **46**, 6252 (1992) [15].

13. "Convective Instability of Autocatalytic Reaction Fronts in Vertical Cylinders," D. A. Vasquez, J. W. Wilder, and B. F. Edwards, Phys. Fluids A **4**, 2410 (1992) [28].

12. "Fragmentation of Percolation Clusters at the Percolation Threshold," M. F. Gyure and B. F. Edwards, Phys. Rev. Lett., **68**, 2692 (1992) [20].

11. "Finite Thermal Diffusivity at Onset of Convection in Autocatalytic Systems: Continuous Fluid Density," J. W. Wilder, B. F. Edwards, and D. A. Vasquez, Phys. Rev. A **45**, 2320 (1992) [26].

10. "General Solutions and Scaling Violation for Fragmentation with Mass Loss," J. Huang, B. F. Edwards, and A. D. Levine, J. Phys. A. **24**, 3967 (1991) [23].

9. "Onset of Convection for Autocatalytic Reaction Fronts: Laterally Bounded Systems," D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Phys. Rev. A **43**, 6594 (1991) [41].

8. "Exact and Asymptotic Scaling Solutions for Fragmentation with Mass Loss," M. Cai, B. F. Edwards, and H. Han, Phys. Rev. A **43**, 656 (1991) [27].

7. "Onset of Convection for Autocatalytic Reaction Fronts: Laterally Unbounded System," B. F. Edwards, J. W. Wilder, and K. Showalter, Phys. Rev. A **43**, 749 (1991) [60].

6. "Rate Equation and Scaling for Fragmentation with Mass Loss," B. F. Edwards, M. Cai, and H. Han, Phys. Rev. A Rapid Communications **41**, 5755 (1990) [53].

5. "Crossed Rolls at Onset of Convection in a Rigid Box," B. F. Edwards, J. Fluid Mech., **191**, 583 (1988) [11].

4. "Percolation Model for Simulation of Char Oxidation and Fragmentation Time-Histories," A. R. Kerstein and B. F. Edwards, Chem. Engr. Sci., **42**, 1629 (1987) [46].

3. "Crossover from Contact Propagation to Chemical Propagation in First-Passage Percolation," A. R. Kerstein and B. F. Edwards, Phys. Rev. B **33**, 3353 (1986) [16].

2. "Is There a Lower Critical Dimension for Chemical Distance?," B. F. Edwards & A. R. Kerstein, J. Phys. A.: Math. Gen. **18**, L1081 (1985) [16].

1. "Onset of Oscillations in Rayleigh-Benard Convection: Horizontally Unbounded Slab," B. F. Edwards and A. L. Fetter, Phys. Fluids **27**, 2795 (1984) [8].

**Invited Presentations:**

30. "The fall of determinism and the rise of traveling-wave electrophoresis," B. F. Edwards, presented at the Uintah Basin Research Conference, Utah State University, Vernal, Utah, April 15, 2011.

29. "Traveling-wave electrophoresis for microfluidic separations," B. F. Edwards, presented at Electrokinetic Phenomena in Nano-Colloids and Nano-Fluidics, at Technion Israel Institute of Technology, Haifa, Israel, December 19-23, 2010.

28. "Traveling-wave electrophoresis for microfluidic separations," B. Edwards, A. Timperman, L. Carroll, K. Jo, J. Mease, J. Schiffbauer, WVNano brown bag lunch series, West Virginia University, Morgantown, West Virginia on March 6, 2009.

27. "A new method for synchronization and control of the Chan chaotic system," A. Izadian, B. Edwards, and P. Famouri, presented via real-time web conferencing at the online International Joint Conference on Computer, Information, and Systems Sciences, and Engineering, December 3-12, 2007 (http://www.cisse2007.org/).

26. "Mass transport at nano/microfluidic interfaces in electrokinetically driven systems," B. Edwards, J. Schiffbauer, A. Timperman, S. Miller, and K. Kelly, presented at the Jilin University – West Virginia University Bilateral Symposium on Nanoscience and Supramolecular Materials, Chanchun, China, September 1-2, 2007.

25. "Wave Electrophoresis," J. Mease, Joel Hirsch, J. Schiffbauer, B. Edwards, selected for presentation and as a finalist in the undergraduate poster competition at the STaR (Science, Technology and Research) Symposium, Morgantown, West Virginia, September 17-18, 2007.

24. "Traveling wave fluidic device for separations," B. F. Edwards, R. L. Carroll, and A. T. Timperman, oral presentation at the STaR (Science, Technology and Research) Symposium, Morgantown, West Virginia, September 17-18, 2007.

23. "Long-period orbits for ions in a periodic spatiotemporal potential," J. Vopal and B. F. Edwards, graduate poster selected for presentation at the STaR (Science, Technology and Research) Symposium, Morgantown, West Virginia, September 17-18, 2007.

22. "Did chiasms appear in the Book of Mormon by chance?" Symposium of the Book of Mormon Archaeological Foundation, Lehi, Utah, March 21, 2003.

21. "River Meandering Dynamics," Civil and Environmental Engineering Seminar, West Virginia University, April 6, 2000.

20. "Fragmentation of Percolation Clusters: Implications for Ising Cluster Kinetics," Physics Department Colloquium, West Virginia University, December 3, 1998.

19. "Convection near Propagating Autocatalytic Reaction Fronts," Physics Department Colloquium, Indiana University of Pennsylvania, Indiana, Pennsylvania, February 6, 1998.

18. "Fragmentation of Percolation Clusters at the Percolation Threshold," Physics Department Colloquium, Brigham Young University, Provo, Utah, March 23, 1995.

17. "Bifurcation to Axisymmetric Convection for an Autocatalytic Reaction Front," Physics Department Colloquium, University of Pittsburgh, Pittsburgh, Pennsylvania, January 19, 1995.

16. "Structure of Percolation Clusters for Fragmentation," poster presentation, Gordon Research Conference on Fractals, San Miniato, Italy, May 1-6, 1994.

15. "Exact Results and Scaling for Fragmentation," Physics Department Colloquium, West Virginia University, Morgantown, West Virginia, November 4, 1993.

14. "Física de la Música" (Physics of Music), Campus-wide Lecture, Pontificia Universidad Catolica, Lima, Peru, May 27, 1993 (in Spanish).

13. "Cáos en Fluidos - El Modelo de Lorenz" (Chaos in Fluids - the Lorenz Model), Physics Department Colloquium, Pontificia Universidad Catolica, Lima, Peru, May 25, 1993 (in Spanish).

12. "Fragmentation of Percolation Clusters," Physics Dept. Master's Seminar, Pontificia Universidad Catolica, Lima, Peru, May 24, 1993.

11. "Exact Enumeration and Scaling for Fragmentation of Percolation Clusters," poster presentation, Gordon Research Conference on Fractals, Plymouth, New Hampshire, June 8-12, 1992.

10. "Onset of Convection for Autocatalytic Reaction Fronts," Physics Department Colloquium, West Virginia University, Morgantown, West Virginia, February 28, 1991.

9. "Onset of Convection in Autocatalytic Systems," Physics Department Colloquium, Indiana University of Pennsylvania, Indiana, Pennsylvania, October 12, 1990.

8. "Onset of Convection in Autocatalytic Systems: Laterally Unbounded Slab," Physical Chemistry Seminar, West Virginia University, Morgantown, West Virginia, February 12, 1990.

7. "Rayleigh-Bénard Convection in Laterally Bounded Geometries," Nonlinear Dynamics Seminar, Duke University, Durham, North Carolina, November 10, 1986.

6. "Rayleigh-Bénard Convection in Laterally Bounded Geometries," Physics Department Colloquium, Emory University, Atlanta, Georgia, October 1986.

5. "Rayleigh-Bénard Convection in a Small-Aspect-Ratio Box," Physics Department Colloquium, West Virginia University, Morgantown, West Virginia, April 1986.

4. "Percolation Theory, Phase Transitions, and Critical Phenomena," Physics Department Colloquium, Brigham Young University, Provo, Utah, February 1986.

3. "Rayleigh-Bénard Convection in a Small-Aspect-Ratio Box," Physics Department Seminar, Brigham Young University, Provo, Utah, February 1986.

2. "Buoyancy-Driven (Rayleigh-Bénard) Convection in Boxes," Combustion Research Facility Seminar, Sandia National Laboratories, Livermore, California, October 3, 1984.

1. "Rayleigh-Bénard Convection in a Small-Aspect-Ratio Box," Theoretical Physics Seminar, Los Alamos National Laboratories, March 30, 1984.

**Contributed Presentations:**

59. "1D Stationary-Electrode Model of Traveling Wave Electrophoresis," E. Correll and B. Edwards, presented at the 2011 Nanoelectronic Devices for Defense & Security (NANO-DDS), New York, NY, Aug. 29-Sept. 1, 2011.

58. "Ion Flows in Quasi Equilibrium Magnetized Plasmas," W. Edwards, E. Held, A. Singh, and B. Edwards, presented at a meeting of the Division of Plasma Physics Meeting of the American Physical Society, Chicago, IL, Nov. 8-12, 2010.

57. "Developing Microfluidic Systems for Proteome Analysis," K. Jo, B. R. Reschke, X. Mao, R. L. Carroll, B. Edwards, and A. Timperman, Midwestern Universities Analytical Chemistry Conference," East Lansing, Michigan, December 4, 2009.

56. "Investigations of Molecular Motion and Separation in a Traveling Wave Electrophoresis System," R. L. Carroll, B. Edwards, K. Jo, and A. Timperman, WVNano Research Symposium, Morgantown, West Virginia on May 11, 2009.

55. "Steady-state Non-equilibrium Simulations of a Symmetric Electrolyte Solution at a Micro-Nano-Micro Fluidic Interface," W. Booth, J. Schiffbauer, K. Kelly, B. Edwards, and A. Timperman, WVNano Research Symposium, Morgantown, West Virginia on May 11, 2009.

54. "Slow Analyte, Fast Buffer Asymptotics," J. Schiffbauer, K. Kelly, B. Edwards, and A. Timperman, WVNano Research Symposium, Morgantown, West Virginia on May 11, 2009.

53. "Investigations of Molecular Motion and Separation in a Traveling Wave Electrophoresis System," R. L. Carroll, B. Edwards, K. Jo, A. Timperman, STAR symposium presentation in Charleston, West Virginia on April 15, 2009.

52. "A New Fourier Model of Traveling Wave Electrophoresis," R. Correll, J. Eakins, J. Vopal, B. Edwards, presented at the APS General Meeting in Pittsburgh, Pennsylvania on March 16-20, 2009.

51. "Anomalous analyte dispersion at microchannel-nanocapillary membrane interfaces," J. Schiffbauer, K. Kelly, W. Booth, J. Fernandez, A. Timperman, B. Edwards, presented at the APS General Meeting in Pittsburgh, Pennsylvania on March 16-20, 2009.

50. "Simulation of Steady-State Non-Equilibrium Ion Distributions Within a Finite-length Nanofluidic Channel," W. Booth, J. Schiffbauer, J. Fernandez, K. Kelly, A. Timperman, B. Edwards, presented at the APS General Meeting in Pittsburgh, Pennsylvania on March 16-20, 2009.

49. "Traveling-wave electrophoresis for microfluidic separations," B. Edwards, A. Timperman, L. Carroll, K. Jo, J. Mease, J. Schiffbauer, presented at the APS General Meeting in Pittsburgh, Pennsylvania on March 16-20, 2009.

48. "Trigonometric Model for Traveling Wave Electrophoresis," J.

Vopal, B. Edwards, presented at the APS General Meeting in Pittsburgh, Pennsylvania on March 16-20, 2009.

47. "Traveling Wave Electrophoresis and Improved Microchip ESI/MS Interfaces for Proteome Analysis," K. Jo, X. Mao, R. L. Carroll, B. Edwards, and A. Timperman, Microscale Bioseparations, Boston, Massachusetts, February 2, 2009.

46. "Dependence of Potential and Ion Distribution on Electrokinetic Radius in Infinite and Finite-length Nano-channels, J. Schiffbauer, J. Fernandez, W. Booth, K. Kelly, A. Timperman, and B. Edwards, presented at COMSOL Conference Oct. 9-11, 2008, Boston, MA.

45. "Steady-state simulation of mono-valent ion distributions within a nanofluidic channel," W. Booth, J. Schiffbauer, J. Fernandez, K. Kelly, A. Timperman, and B. Edwards, presented at COMSOL Conference Oct. 9-11, 2008, Boston, MA.

44. "Wave electrophoretic trapping and chaos," B. Edwards, L. Carroll, A. Timperman, J. Schiffbauer, and J. Mease, presented at the APS General Meeting in New Orleans, Louisiana on March 10-14, 2008.

43. "Electrokinetic transport at a nanocapillary/microchannel interface," J. Schiffbauer, K. Kelly, B. Edwards, and A. Timperman, presented at the APS General Meeting in New Orleans, Louisiana on March 10-14, 2008.

42. "Introduction to Nanotechnology Design Course for Freshmen and Sophomores," R. Hensel, B. Edwards, M. Shremshock, L. Carroll, L. Hornak, K. Jackson, P. Gannett, A. Cullison, P. Barnhart, presented at the 2007 conference of North Central Section of the American Society for Engineering Education, held in Charleston, WV on March 30-31, 2007. http://www.wvutech.edu/faculty/RMunasinghe/asee-program.htm

41. "Electrophoretic extraction of ions from a pressure-driven flow," H. Luo, B. F. Edwards, S. Miller, B. Reschke, and A. Timperman, presented at the March 2006 APS General Meeting in Baltimore, Maryland (2006).

40. "Propagation velocities of chemical reaction fronts advected by Poiseuille flow," B. F. Edwards, presented at the March 2005 APS General Meeting in Los Angeles, California, Bull. Am. Phys. Soc. **50**, 443 (2005).

39. "Stability of an iodate arsenous-acid reaction front in the presence of Poiseuille flow," R. S. Spangler and B. F. Edwards, presented at the

March 2005 APS General Meeting in Los Angeles, California, Bull. Am. Phys. Soc. **50**, 252 (2005).

38. "Effective Gravity in Magnetothermal Convection," D. D. Gray, J. Huang, and B. F. Edwards, Engineering Mechanics: A Force for the 21st Century, H. Murakami and J. E. Luco, eds. Proceedings of the 12th Engineering Mechanics Conference, American Society of Civil Engineers, Reston, Virginia, 1661-1664 (1998).

37. "Magnetic Control of Convection in Electrically Nonconducting Fluids," J. Huang, D. D. Gray, and B. F. Edwards, Proceedings of the Fourth Microgravity Fluid Physics and Transport Phenomena Conference, August 12-14, Cleveland, Ohio, 42-44 (1998).

36. "Magnetothermal Plumes in Electrically Insulating Fluids," D. D. Gray, J. Huang, and B. F. Edwards, presented at the 12 Engineering Mechanics Conference in La Jolla, California in May 1997, and published in the proceedings.

35. "Magnetic Control of Rayleigh-Benard Convection," J. Huang, D. D. Gray, and B. F. Edwards, presented at the November APS Division of Fluid Dynamics Meeting, Bull. Am. Phys. Soc. **42**, 2181 (1997).

34. "Steady Two-Dimensional Eccentric Couette Flow," B. F. Edwards, presented at the November APS Division of Fluid Dynamics Meeting, Bull. Am. Phys. Soc. **41**, 1792 (1996).

33. "Thermal Convective Instability of Paramagnetic Fluids in a Uniform Magnetic Field," J. Huang, B. F. Edwards, and D. Gray, to be presented at the November APS Division of Fluid Dynamics Meeting, Bull. Am. Phys. Soc. **41**, 1699 (1996).

32. "Convection in Autocatalytic Reaction Fronts," D. A. Vasquez, J. M. Littley, B. F. Edwards, and J. W. Wilder, Bull. Am. Phys. Soc. **39**, 299 (1994).

31. "Convective Turing Patterns," D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Bull. Am. Phys. Soc. **38**, 2310 (1993).

30. "Convective Wave Propagation in the Belousov-Zhabotinskii Reaction," Y. Wu, D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Bull. Am. Phys. Soc. **38**, 2310 (1993).

29. "Onset of Convection for Autocatalytic Reaction Fronts in a Vertical Slab," J. Huang, D. A. Vasquez, B. F. Edwards, P. Kolodner, Bull. Am. Phys. Soc. **38**, 2276 (1993).

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25. "Chemical Wave Velocity Near the Onset of Convection," J. M. Littley, D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Bull. Am. Phys. Soc. **37**, 1710 (1992).

24. "Convection in Turing Patterns," D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Bull. Am. Phys. Soc. **37**, 1710 (1992).

23. "Exact Enumeration and Scaling for Fragmentation of Percolation Clusters," B. F. Edwards, M. F. Gyure, and M. V. Ferer, poster presentation, Proc. 18th IUPAP International Conference of Thermodynamics and Statistical Mechanics - STATPHYS 18, Berlin, Germany, August 3-7 (1992).

22. "Numerical Simulation of Fragmentation with Mass Loss," D. Yao and B. F. Edwards, Bull. Am. Phys. Soc. **37**, 92 (1992).

21. "Cutoff Model for Runaway Fragmentation," J. Huang, B. F. Edwards, and A. D. Levine, Bull. Am. Phys. Soc. **37**, 92 (1992).

20. "Exact Enumeration and Scaling for Fragmentation of Percolation Clusters," B. F. Edwards, M. F. Gyure, and M. V. Ferer, Bull. Am. Phys. Soc. **37**, 687 (1992).

19. "Blob Size Distribution on Finite Clusters," M. Gyure, G. Huber, B. F. Edwards, and M. Ferer, Bull. Am. Phys. Soc. **37**, 687 (1992).

18. "Convection in Autocatalytic Reaction Fronts of Finite Thickness," D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Bull. Am. Phys. Soc. **37**, 788 (1992).

17. "Onset of Convection for Autocatalytic Reaction Fronts: Finite Thermal Diffusivity," B. F. Edwards, J. W. Wilder, and D. A. Vasquez, Bull. Am. Phys. Soc. **36**, 2688 (1991).

16. "Onset of Convection for Autocatalytic Reaction Fronts: Bounded Systems," D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Bull. Am. Phys. Soc. **36**, 2689 (1991).

15. "Fragmentation of Percolation Clusters - Criticality and Scaling," M. F. Gyure and B. F. Edwards, Bull. Am. Phys. Soc. **36**, 769 (1991).

14. "Dynamic Behavior of Fragmentation with Mass Loss," X. Guo and B. F. Edwards, Bull. Am. Phys. Soc. **36**, 769 (1991).

13. "Onset of Convection for Autocatalytic Reaction Fronts: Unbounded Systems," B. F. Edwards, J. W. Wilder, and K. Showalter, Bull. Am. Phys. Soc. **36**, 655 (1991).

12. "Onset of Convection for Autocatalytic Reaction Fronts: Bounded Systems," D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Bull. Am. Phys. Soc. **36**, 655 (1991).

11. "Onset of Convection for Autocatalytic Reaction Fronts: Laterally Unbounded Systems," B. F. Edwards, J. W. Wilder, and K. Showalter, Bull. Am. Phys. Soc. **35**, 2273 (1990).

10. "Onset of Convection for Autocatalytic Reaction Fronts: Laterally Bounded Systems," D. A. Vasquez, B. F. Edwards, and J. W. Wilder, Bull. Am. Phys. Soc. **35**, 2272 (1990).

9. "General Solution and Simulations of Linear Fragmentation with Mass Loss," B. F. Edwards, J. Huang, and D. Yao, Bull. Am. Phys. Soc. **35**, 201 (1990).

8. "Rate Equation and Scaling for Fragmentation with Mass Loss," B. F. Edwards, M. Cai, and H. Han, Proc. 17th IUPAP International Conference of Thermodynamics and Statistical Mechanics - STATPHYS 17, Rio de Janeiro, Brazil, 4 August (1989).

7. "Rate Equation and Scaling for Fragmentation with Mass Loss," B. F. Edwards, M. Cai, and H. Han, Bull. Am. Phys. Soc. **34**, 729 (1989).

6. "Model of Ash Size Distributions from Coal Char Oxidation," B. F. Edwards and A. K. Ghosal, Proc. Symp. on Math. Sim. of Coal Conversion Processes at the American Chemical Society meeting, June 5-10 in Toronto, Canada (1988).

5. "Stability of Steady Three-Dimensional Rayleigh-Benard Convection in Small-Aspect-Ratio Boxes," B. F. Edwards, Bull. Amer. Phys. Soc.

**32**, 2101 (1987).

4. "Rayleigh-Benard Convection in a Small-Aspect-Ratio Box," B. F. Edwards and A. L. Fetter, Bull. Amer. Phys. Soc. **31**, 1679 (1986).

3. "Crossed Rolls at Onset of Convection in a Rigid Box," B. F. Edwards, poster presentation, Conf. Amer. Phys. Soc. Fluid Dynamics Division, November (1985).

2. "Contact Propagation Processes in Heterogeneous Media," A. R. Kerstein and B. F. Edwards, in Proc. Third Symp. Energy Eng. Sci., Thermofluids & Solid Mech., Pennsylvania State University, University Park, Pennsylvania (1985), page 9.

1. "An Explanation of the Venus Flux Ropes in Terms of Superconductor Fluxoids," B. F. Edwards and W. F. Edwards, Bull. Amer. Phys. Soc. **27**, 35 (1982).

**Distinctions:**

John R. Williams Outstanding Teacher Award (2006).
June Harless Award for Exceptional Teaching (1998).
U. S. Patent #5823533 issued for "Puzzle in Two and Three Dimensions" (October 20, 1998).
WVU Foundation (University-level) Outstanding Teacher Award (1992).
WVU College of Arts and Sciences Outstanding Teacher Award (1992).
Physics Nominee for WVU College of Arts and Sciences Outstanding Researcher Award (1992).
Coauthor of ConcertWare software, winner of MacWorld magazine World Class Award (1987), A+ magazine Reader's Choice Award (1987), and MacUser magazine Editor's Choice Award (1985) for best music software for Macintosh; 22,000 copies sold.
Co-concertmaster, Stanford Summer Orchestra (1982).
Concertmaster, Utah State University Symphony Orchestra (1979-81).
Utah State University graduate fellow (1981).
Phi Kappa Phi academic honor society (1980).
Sigma Pi Sigma physics honor society (1979).
USU College of Science recognition of excellence (1978, 1979).

**Postdocs:**

Jie Huang, Magnetothermal Convection (1996-1998)
Jie Huang, Convection near Reaction Fronts (1994-96).
Siegfried Bleher, Hard-disk models of Propagating Fronts (1993-1995).
Eugenia Kuo, Convection near Reaction Fronts (1994).
Desiderio Vasquez, Convection near Reaction Fronts (1990-93).
Mark Gyure, Fragmentation of Percolation Clusters (1990-91).
Mao Cai, Rate Equations for Fragmentation (1987-89).

**Students:** Ph. D. thesis advisor: Jarrod Schiffbauer (2007-present), Robert Correll (2007-present), James Vopal (2006-present), Will Booth (2008-present), Andrew Seymour (2010-present), Piyapong Sitthison (2009-present), Hao Luo (2005-2006), Robert Spangler (2001-2005), Yunqing Wu (1992-97), and Jie Huang (1991-94).
Master's thesis advisor: Joe Littley (1991-92), Dan Yao (1989-91), Jie Huang (1989-90), Xiaopei Guo (1988-90), and Anjan Ghosal (1987-88).

**Language:** Fluent in Spanish.

**Teaching:** Physics of Music (Physics 107)
Descriptive Astronomy (Astronomy 106, by telecourse and on campus)
Introduction to Nanotechnology Design (Physics 293)
Sophomore Nanotechnology Seminar (Engr 493)
Calculus-based introductory physics (Physics 111, 112)
Classical Mechanics (Physics 231)
Honors calculus-based introductory physics (Physics 293H)
Modern Physics (Physics 314)
Graduate classical mechanics (Physics 331)
Graduate electricity and magnetism (Physics 333)
Graduate continuum mechanics - special topics (Physics 401A)
Graduate statistical mechanics (Physics 383)
Graduate nonlinear dynamics - (Physics 710)

**Service:** Member, Faculty Senate Executive Committee (2010).
Member, Faculty Senate (2009-present).
Member, Review Committee for Tom Kammer, ECAS Centennial Professor (2007).
Member, Selection Committee for Carroll and Eberly Professorships in Physics (2009).
Member, Faculty Senate Student Instruction Committee (2007).
Member, Faculty Senate Curriculum Committee (2006-2007).
Member, WVU Physics Department Classical Mechanics Examination Committee (2006-2007).
Member, WVU Foundations of Excellence Committee (2006-2007).
Editor, WVU Physics Department Newsletter (2003-2008).
Member, WVU Goldwater Scholar Selection Committee (2005).
WVU Commencement and Inauguration Marshal (2005-2008).
Chair, Search Committee for the Eberly Professor of Chemistry (2008).
Member, ECAS Curriculum and Academic Quality Committee (2003-2005).
Member, WVU Faculty Focus Group (2005).
Member, Selection Committee for June Harless Award for Exceptional Teaching (2000-2005).
Invited lecturer on "The Physics of Music", presented at: WVU Legacy

Day (1997, 1996, 1995, 1994, 1992, and 1991), WVU Orientation as a Faculty Showcase Lecture (1992, 1991, 1990, 1989, 1988), WVU Class of '52 and '67 reunion (1992), WVU Parent's Day (1990), National Youth Sports Program (1989, 1987), WVU Day at University High School and at the Eastern Panhandle (1989), and Monongahela Valley Macintosh User's Group (1987, 1986).

Chair and Member, Physics Department Recruitment Committee (1998-2000)

Member, Biometric Systems Curriculum Committee (1997-1998).

Member, WVU College of Arts and Sciences Dean's Advisory Committee (1994-1995).

Member, WVU Foundation Outstanding Teacher Selection Committee (1993-94, 1994-95).

Member, WVU College of Arts and Sciences Outstanding Teacher Selection Committee (1992-93).

Member, WVU Physics Department Promotion and Tenure Committee (1991- ).

Coordinator of Physics Department Teaching Schedule, (1991-1999).

Member, WVU College of Arts and Sciences Selection Committee for Eberly Professor of Physics, 1991.

Member, West Virginia Research Computing Users Committee (1990-1992).

Member, Physics Undergraduate Curriculum Committee (1990-1992).

Chair and Member, Physics Computer Committee (1986-1996).

Advisor, Society of Physics Students, WVU chapter (1987-90).

Advisor, Sigma Pi Sigma Physics Honorary, WVU chapter (1987-90).

Member, Graduate Examination Committees: Richard Solomon (2007), Steven Knudsen (2007), Aaron Steele (2007), Saikat Thakur (2007), Fang Wang (2007), Chunchuan Xu (2007), Robert Spangler (2005), Tabitha Chigwada (2005), Chunchuan Xu (2005), Florin Chirila (2003), Todd Jefferys (2002), Dorel Moldovan (1998- ), Yunqing Wu (1997), Anatoliq Peredera (1996), Deszo Horvath (1994), Bill Amatucci (1994), Randy Bohmer (1994), Bruce Dean (1993), Mike Roberts (1993), Jonathan Masere (1993), Dan Yao (1991), Ed Winant (1991), Mike Roberts (1991), Bo Peng (1991, 1989), Mary Li (1990), Mukesh Arora (1990), Terence McManus (1989), Zunjun Mo (1989), Eric Metz (1989), Aziz Jahja (1988).

Graduate recruiting talk entitled "Numerical Simulation of Nonequilibrium Physical Processes," given at Franklin and Marshall University (October 8, 1987), Millersville University (October 7, 1987), and Towson State University (October 25, 1988).