CURRICULUM VITAE

CHARLES A. STAFFORD

Born: November 3, 1963, Los Angeles, California

Professional Preparation

University of California, San Diego, Physics, B.A. Summa Cum Laude, 1985
Princeton University, Physics, M.A., 1989
AT&T Bell Laboratories, Theoretical Physics, Member of Technical Staff, Summers 1989–1991
Princeton University, Physics, Ph.D., 1992
University of Maryland, Physics, Postdoc, 1992–1994
University of Geneva, Theoretical Physics, Maître-Assistant, 1994–1996
University of Fribourg, Switzerland, Theoretical Physics, Maître-Assistant, 1996–1997
Albert-Ludwigs-University, Freiburg, Germany, Physics, Postdoc, 1997–1998
Institute for Theoretical Physics, U.C. Santa Barbara, Visitor, Fall 1998
Institute for Nuclear Theory, University of Washington, Visitor, Summer 2002
Department of Applied Physics, Yale University, Visiting Professor, Fall 2004
Aspen Center for Physics, participant, Summer 2006

Appointments

Assistant Professor of Physics, University of Arizona, 1998 to 2004
Associate Professor of Physics, University of Arizona, 2004 to present

Honors and Awards

Phi Beta Kappa, U.C. San Diego, 1985
Shang Ma Award, U.C. San Diego, 1985
National Science Foundation Fellowship, Princeton University, 1986–1989
AT&T Bell Labs Fellowship, Princeton University, 1989–1991
ABB Prize of the Swiss Physical Society, 2000

Graduate and Postdoctoral Advisors

Ph.D. Thesis Advisor: Philip W. Anderson, Princeton University
Postdoctoral Sponsors: Sankar Das Sarma, University of Maryland; Markus Büttiker, University of Geneva; Dionys Baeriswyl, University of Fribourg, Switzerland; Hermann Grabert, Albert-Ludwigs-University, Freiburg, Germany

Postdocs Supervised

Jérôme Bürki, University of Arizona

Graduate Students Supervised

Chang-hua Zhang, University of Arizona, Ph.D. August 2004
David Cardamone, University of Arizona, Ph.D. August 2005 (with Bruce Barrett)
Dennis Conner, University of Arizona, M.S. December 2005

1 Publications

Available electronically at http://www.physics.arizona.edu/∼stafford/publications.html

1.1 Refereed journal articles

1. C. Stafford, S. Schmitt-Rink, and W. Schaefer, *Nonlinear optical response of two-dimensional magnetoexcitons*, Physical Review B **41**, 10000–10011 (1990).

2. J. B. Stark, W. H. Knox, D. S. Chemla, W. Schäfer, S. Schmitt-Rink, and C. Stafford, *Femtosecond dynamics of excitons under extreme magnetic confinement*, Physical Review Letters **65**, 3033–3036 (1990).

3. C. A. Stafford, A. J. Millis, and B. S. Shastry, *Finite-size effects on the optical conductivity of a half-filled Hubbard ring*, Physical Review B **43**, 13660–13663 (1991).

4. C. A. Stafford and A. J. Millis, *Scaling theory of the Mott-Hubbard metal-insulator transition in one dimension*, Physical Review B **48**, 1409–1425 (1993).

5. C. A. Stafford, *Unusual low-temperature thermopower in the one-dimensional Hubbard model*, Physical Review B **48**, 8430–8433 (1993).

6. C. A. Stafford and S. Das Sarma, *Collective Coulomb Blockade in an Array of Quantum Dots: A Mott-Hubbard Approach*, Physical Review Letters **72**, 3590–3593 (1994).

7. D. Z. Liu, Ben Yu-Kuang Hu, C. A. Stafford, and S. Das Sarma, *Dynamic Magneto-Conductance Fluctuations and Oscillations in Mesoscopic Wires and Rings*, Physical Review B **50**, R5799–R5802 (1994).

8. M. Büttiker and C. A. Stafford, *Charge Transfer Induced Persistent Current and Capacitance Oscillations*, Physical Review Letters **76**, 495–498 (1996).

9. C. A. Stafford and Ned S. Wingreen, *Resonant Photon-Assisted Tunneling Through a Double Quantum Dot: An Electron Pump From Spatial Rabi Oscillations*, Physical Review Letters **76**, 1916–1919 (1996).

10. C. A. Stafford, *Nonlinear Conductance in Resonant Tunneling*, Physical Review Letters **77**, 2770–2773 (1996).

11. C. A. Stafford and S. Das Sarma, *Coherent Magnetotransport Through an Artificial Molecule*, Physics Letters A **230**, 73–78 (1997).

12. Ned S. Wingreen and C. A. Stafford, *Quantum-Dot Cascade Laser: Proposal for an Ultra-Low-Threshold Semiconductor Laser*, IEEE Journal of Quantum Electronics **33**, 1170–1173 (1997).

13. C. A. Stafford and D. F. Wang, *Parity-locking effect in a strongly-correlated ring*, Zeitschrift für Physik B **103**, 323–325 (1997).

14. C. A. Stafford and D. F. Wang, *Interaction-Induced Enhancement and Oscillations of the Persistent Current*, Physical Review B **56**, R4383–R4386 (1997).

15. C. A. Stafford, D. Baeriswyl, and J. Bürki, *Jellium model of metallic nanocohesion*, Physical Review Letters **79**, 2863–2866 (1997).

16. C. A. Stafford, *Quantum theory of metallic nanocohesion*, Physica E **1**, 310–312 (1997).

17. F. Mila, C. A. Stafford, and S. Capponi, *Persistent currents in a Moebius ladder: A new twist on the problem of interchain coherence of interacting electrons*, Physical Review B **57**, 1457–1460 (1998).

18. R. Kotlyar, C. A. Stafford, and S. Das Sarma, *Correlated charge polarization in a chain of coupled quantum dots*, Physical Review B **58**, R1746–R1749 (1998).

19. R. Kotlyar, C. A. Stafford, and S. Das Sarma, *Addition spectrum, persistent current, and spin polarization in coupled quantum-dot arrays: Coherence, correlation, and disorder*, Physical Review B **58**, 3989–4013 (1998).

20. C. A. Stafford, R. Kotlyar, and S. Das Sarma, *Coherent resonant tunneling through an artificial molecule*, Physical Review B **58**, 7091–7102 (1998).

21. F. Kassubek, C. A. Stafford, and H. Grabert, *Force, Charge, and conductance of an ideal metallic nanowire*, Physical Review B **59**, 7560–7574 (1999).

22. J. Bürki, C. A. Stafford, X. Zotos, and D. Baeriswyl, *Cohesion and conductance of disordered metallic point contacts*, Physical Review B **60**, 5000–5008 (1999); *ibid.,* **62**, 2956 (2000).

23. J. Bürki and C. A. Stafford, *Comment on "Quantum Suppression of Shot Noise in Atom-Size Metallic Contacts,"* Physical Review Letters **83**, 3342 (1999).

24. C. A. Stafford and B. R. Barrett, *Simple model for decay of superdeformed nuclei*, Physical Review C **60**, 051305(R) (1999).

25. C. A. Stafford, F. Kassubek, J. Bürki, and H. Grabert, *Universality in metallic nanocohesion: a quantum chaos approach*, Physical Review Letters **83**, 4836–4839 (1999).

26. C. A. Stafford, J. Bürki, and D. Baeriswyl, *Comment on "Density Functional Simulation of a Breaking Nanowire,"* Physical Review Letters **84**, 2548 (2000).

27. F. Kassubek, C. A. Stafford, and H. Grabert, *On universality in metallic nanocohesion*, Physica B **280**, 438–439 (2000).

28. H.-P. Eckle, H. Johannesson, and C. A. Stafford, *Kondo Impurity in a Mesoscopic Ring: Charge Persistent Current*, Journal of Low Temperature Physics **118**, 475–483 (2000).

29. H.-P. Eckle, H. Johannesson, and C. A. Stafford, *Aharonov-Bohm/Casher Effect in a Kondo Ring*, Physica B **284**, 1872–1873 (2000).

30. F. Kassubek, C. A. Stafford, H. Grabert, and R. E. Goldstein, *Quantum Suppression of the Rayleigh Instability in Nanowires*, Nonlinearity **14**, 167–177 (2001).

31. H.-P. Eckle, H. Johannesson, and C. A. Stafford, *Kondo Resonance in a Mesoscopic Ring Coupled to a Quantum Dot: Exact Results for the Aharonov-Bohm/Casher Effects*, Physical Review Letters **87**, 016602 (2001).

32. H.-P. Eckle, H. Johannesson, and C. A. Stafford, *Eckle et al. Reply (to the Comment of Affleck and Simon)*, Physical Review Letters **88**, 139702 (2002).

33. D. M. Cardamone, C. A. Stafford, and B. R. Barrett, *Coherence and Decoherence in Tunneling between Quantum Dots*, Physica Status Solidi (b) **230**, 419-423 (2002).

34. C. A. Stafford, *Metal Nanowires: Quantum Transport, Cohesion, and Stability*, Physica Status Solidi (b) **230**, 481-489 (2002).

35. D. M. Cardamone, C. A. Stafford, and B. R. Barrett, *How to measure the spreading width for decay of superdeformed nuclei*, Physical Review Letters **91**, 102502 (2003).

36. C.-H. Zhang, F. Kassubek, and C. A. Stafford, *Surface Fluctuations and the Stability of Metal Nanowires*, Physical Review B **68**, 165414 (2003).

37. J. Bürki, R. E. Goldstein, and C. A. Stafford, *Quantum Necking in Stressed Metallic Nanowires*, Physical Review Letters **91**, 254501 (2003).

38. D. F. Urban, J. Bürki, A. I. Yanson, I. K. Yanson, C. A. Stafford, J. M. van Ruitenbeek, and H. Grabert, *Electronic shell effects and the stability of alkali nanowires*, Solid-State Communications **131**, 609-614 (2004).

39. D. F. Urban, J. Bürki, C.-H. Zhang, C. A. Stafford, and H. Grabert, *Jahn-Teller Distortions and the Supershell Effect in Metal Nanowires*, Physical Review Letters **93**, 186403 (2004).

40. B. R. Barrett, D. M. Cardamone, and C. A. Stafford, *Exactly solvable model for the decay of superdeformed nuclei*, International Journal of Modern Physics E **14**, 157-164 (2005).

41. C.-H. Zhang, J. Bürki, and C. A. Stafford, *Stability of Metal Nanowires at Ultrahigh Current Densities*, Physical Review B **71**, 235404 (2005).

42. J. Bürki, C. A. Stafford, and D. L. Stein, *Theory of metastability in simple metal nanowires*, Physical Review Letters **95**, 090601 (2005).

43. J. Bürki and C. A. Stafford, *On the Stability and Structural Dynamics of Metal Nanowires*, Applied Physics A **81**, 1519-1525 (2005).

44. J. Bürki, C. A. Stafford, and D. L. Stein, *Comment on "Nonlinear current-voltage curves of gold quantum point contacts"*, Applied Physics Letters **88**, 166101 (2006).

45. D. M. Cardamone, C. A. Stafford, and S. Mazumdar, *Controlling quantum transport through a single molecule*, Nano Letters **6**, 2422 (2006).

46. D. F. Urban, J. Bürki, C. A. Stafford, and H. Grabert, *Stability and Symmetry Breaking in Metal Nanowires: The Nanoscale Free-Electron Model*, Physical Review B **74**, 245414 (2006).

47. B. Dietz, T. Friedrich, J. Metz, M. Miski-Oglu, A. Richter, F. Schäfer, and C. A. Stafford, *Rabi oscillations at exceptional points in microwave billiards*, Physical Review E **75**, 027201 (2007).

48. D. F. Urban, C. A. Stafford, and H. Grabert, *Scaling Theory of the Peierls-CDW in Metal Nanowires*, Physical Review B (in press); cond-mat/0610787.

1.2 Papers Submitted

49. D. M. Cardamone, B. R. Barrett, and C. A. Stafford, *Universality of Decay out of Superdeformed Bands in the 190 Mass Region*, submitted to Physical Review C; nucl-th/0702072.

50. A. I. Mares, D. F. Urban, J. Bürki, H. Grabert, C. A. Stafford, J. M. van Ruitenbeek, *Electronic and atomic shell structure in aluminum nanowires*, submitted to Nanotechnology; cond-mat/0703589.

1.3 Patents and Inventions

51. N. S. Wingreen and C. A. Stafford, *Quantum-Dot Cascade Laser*, U.S. Patent No. 5,692,003, Issued November 25, 1997.

52. D. M. Cardamone, C. A. Stafford, and S. Mazumdar, *The Quantum Interference Effect Transistor*, U.S. utility patent application filed; cond-mat/0503540.

1.4 Conference Proceedings

53. W. Schaefer, S. Schmitt-Rink, and C. Stafford, *Nonlinear Optical Response of Two-Dimensional Magneto-Excitons*, in **High-Speed Phenomena in Photonic Materials and Optical Bistability**, D. Jaeger ed., SPIE Proc. **1280**, 24 (1990).

54. W. Schaefer, S. Schmitt-Rink, and C. Stafford, *Nonlinear Optical Response of 2D Magneto-Excitons*, Proc. 17th Int. Quantum Electron. Conf., OSA Technical Digest Series **8**, 98 (1990).

55. C. A. Stafford and S. Das Sarma, *Transport and Optical Spectroscopy of an Array of Quantum Dots with Strong Coulomb Correlations*, in **Quantum Transport in Ultrasmall Devices**, D. K. Ferry, H. L. Grubin, C. Jacoboni, and Antti-Pekka Jauho eds. (Plenum, New York, 1995), pp. 445–448.

56. M. Büttiker and C. A. Stafford, *Coherent Charge Transfer Resonances and Fluctuations in a Mesoscopic Ring Coupled to a Quantum Dot*, in **Correlated Fermions and Transport in Mesoscopic Systems**, T. Martin, G. Montambaux, and J. Tran Thanh Van eds. (Editions Frontières, Gif-sur-Yvette, France, 1996), pp. 491–500.

57. C. A. Stafford, *Multi-Terminal Conductance Formula for an Interacting Mesoscopic System*, in **Correlated Fermions and Transport in Mesoscopic Systems**, T. Martin, G. Montambaux, and J. Tran Thanh Van eds. (Editions Frontières, Gif-sur-Yvette, France, 1996), pp. 501–502.

58. C. A. Stafford, F. Kassubek, J. Bürki, H. Grabert, and D. Baeriswyl, *Cohesion, Conductance, and Charging Effects in a Metallic Nanocontact*, in **Quantum Physics at Mesoscopic Scale**, D. C. Glattli, M. Sanquer, and J. Trân Thanh Vân eds. (EDP Sciences, Les Ulis, France, 2000), pp. 49–53.

59. H.-P. Eckle, H. Johannesson, and C. A. Stafford, *Persistent Currents in a Kondo Ring*, in **Quantum Physics at Mesoscopic Scale**, D. C. Glattli, M. Sanquer, and J. Trân Thanh Vân eds. (EDP Sciences, Les Ulis, France, 2000), pp. 445–449.

60. B. R. Barrett and C. A. Stafford, *Two-Level Model for Decay Out of a Superdeformed Band*, in **Capture Gamma-Ray Spectroscopy and Related Topics**, S. Wender ed., AIP Conf. Proc. **529**, 512–517 (2000).

61. C. A. Stafford, *Stability and symmetry breaking in metal nanowires*, in **The Universality of Physics: a Festschrift in Honor of Deng Feng Wang**, R. R. Khuri, J. T. Liu, F. Chen, and W. Gan eds. (Kluwer Academic/Plenum Publishers, New York, 2001), pp. 41–51.

62. J. Bürki and C. A. Stafford, *Statistics of quantum transport in metal nanowires with surface disorder*, in **Electronic Correlations: from meso- to nano-physics**, T. Martin, G. Montambaux, and J. Tran Thanh Van eds. (EDP Sciences, Les Ulis, France, 2001), pp. 27–30.

63. C. A. Stafford, F. Kassubek, and H. Grabert, *Cohesion and Stability of Metal Nanowires: A Quantum Chaos Approach*, in **Advances in Solid State Physics, Volume 41**, B. Kramer ed. (Springer-Verlag, Berlin Heidelberg, 2001), pp. 497–511.

64. J. Bürki, C. A. Stafford, and D. L. Stein, *Fluctuational Instabilities of Alkali and Noble Metal Nanowires*, in **Noise in Complex Systems and Stochastic Dynamics II**, edited by Z. Gingl et al. (SPIE Proceedings, 2004), vol. 5471, pp. 367-379.

65. D. M. Cardamone, C. A. Stafford, and B. R. Barrett, *How to measure the spreading width of superdeformed nuclei*, in **Nuclear Physics, Large and Small: International Conference on Microscopic Studies of Collective Phenomena**, R. Bijker et al. eds., AIP Conf. Proc. **726**, 217 (2004).

2 External Funding

Note: An effort of 50% indicates that the grant is shared equally by two researchers.

2.1 Completed Projects

Towards a quantum theory of atomic-scale cohesion and friction in metals, Research Innovation Award, Research Corporation, PI (100%), $35,000 (2000–2002).

Quantum Transport and Metallic Nanocohesion, National Science Foundation grant DMR0072703, PI (100%), $192,000 (2000–2003).

NER: Dynamics of Quantum Control with Dissipation, National Science Foundation grant PHY0210750, PI (50%), total amount $58,000 (2002–2004). Co-PI on this proposal was Professor Bruce Barrett.

Quantum Transport and Metallic Nanocohesion, National Science Foundation grant DMR0312028, PI (100%), $303,000 (2003–2006).