THOMAS C. BLUM

Curriculum Vitae

July 2003

EDUCATION:

B.S., Aeronautical and Astronautical Engineering, University of Washington, Seattle, Washington, 1985
M.S., Aeronautical and Astronautical Engineering, University of Washington, Seattle, Washington, 1986
Ph.D., Physics, University of Arizona, Tucson, Arizona, 1995
Thesis Advisor: Doug Toussaint
Thesis Title: "Nonperturbative quark mass and coupling renormalization in two flavor QCD"

EMPLOYMENT HISTORY:

Nov. 1986 - Jul. 1990
Senior Engineer, Boeing Company
Seattle, Washington
(performed computational fluid dynamics research)
Aug. 1990 - May 1991
Teaching Assistant, Department of Physics
University of Arizona, Tucson, Arizona 85721
Jun. 1993 - Sept. 1995
Research Assistant, Department of Physics
University of Arizona, Tucson, Arizona 85721
Oct. 1995 - Sept. 1998
Postdoctoral Associate, High Energy Theory Group,
Brookhaven National Laboratory, Upton, NY 11973
Oct. 1998 - present
RIKEN BNL Fellow, RIKEN BNL Research Center,
Brookhaven National Laboratory, Upton, NY 11973

ACADEMIC HONORS:

DOE-GANN Fellowship: August 1990 – May 1993

PROFESSIONAL SERVICES:

Journal referee, Physical Review, Nuclear Physics, and the Journal of High Energy Physics

Grant proposal referee for DOE Division of Nuclear Physics

Convener for RHIC Summer Study '97 (Brookhaven National Lab) July 1997

Weekly RIKEN Seminar organizer, Fall 1998-Fall 2000

High Energy Theory/RIKEN Seminar committee chairperson, Fall 1999-Fall 2000

Parallel session chairperson, XIXth International Symposium on Lattice Field Theory, Berlin (2001)

Grant proposal referee for NSF High Energy Physics Program

International Advisory Committee member, XXIst International Symposium on Lattice Field Theory, Tsukuba (2003)

WORKSHOPS ORGANIZED:

Organizer, RIKEN BNL Workshop, Numerical Algorithms at Non-Zero Chemical Potential (Brookhaven National Lab) April 27-May 1, 1999

Session organizer, Fifth Workshop on Quantum Chromodynamics (QCD2000), session: Chiral Quarks on the Lattice, (Villefranche-sur-Mer) January 3-7, 2000

Organizer, RIKEN BNL Workshop, Hadron Structure From Lattice QCD
(Brookhaven National Lab) March 18-22, 2002

SUMMER SCHOOLS ATTENDED:

Uehling Summer School, University of Washington
Phenomenology and Lattice QCD
June 21 - July 2, 1993

NATO Advanced Study Institute
Masses of the Fundamental Particles
Institut D'Etudes Scientifiques De Cargese
Aug. 4 - Aug. 17, 1996

INVITED TALKS, COLLOQUIA, and LECTURES:

Invited Talk, Joint Meeting of the American Physical Society/American Association of Physics Teachers (Indianapolis) 1996.
"The Equation of State for Two Flavor QCD from the Lattice"

Invited Talk, RHIC Summer Study '96 (Brookhaven National Lab) 1996.
"The Equation of State for QCD from the Lattice"

Invited Talk, RIKEN BNL workshop on Frontiers in Vector Lattice Gauge Theories (Brookhaven National Lab) 1998.
"Domain Wall Fermions in Lattice QCD"

Plenary review talk, Lattice '98, The XVI International Symposium on Lattice Field Theory (Boulder) 1998.

"Domain Wall Fermions in Vector Gauge Theories"

Review talk, Santa Fe Workshop on perturbative and non-perturbative aspects of the Standard Model (Santa Fe) 1998.
"Domain Wall Fermions"

Lecture, APCTP-RCNP Joint International School on Physics of Hadrons and QCD (Osaka) 1998.
"Domain wall fermion formalism in lattice QCD"

Parallel session talk, American Physical Society, DPF99 (UCLA) 1999.
"QCD with domain wall quarks"

Physics Department Colloquium, University of Arizona (Tucson), Winter 1999.
"Progress in Lattice QCD"

Plenary talk, KAON'99 (Chicago) 1999.
"Calculation of ϵ'/ϵ with domain wall fermions"

Lectures(4), Program on Lattice Gauge Theory, National Center for Theoretical Sciences (Taiwan) Summer 1999

Nuclear and Particle Physics Colloquium, Massachusetts Institute of Technology (Boston) Fall 1999
"Lattice calculation of ϵ'/ϵ"

Plenary talk, Circum-Pan-Pacific RIKEN Symposium on High Energy Spin Physics (Wako, Japan) November 3-7 1999
"Polarized structure functions from the lattice"

Invited talk, Workshop on Predictions and uncertainties for RHIC Spin Physics, (Brookhaven National Lab) March 2000.
"Spin on the Lattice"

Invited talk, Workshop on Future Transversity Measurements, (Brookhaven National Lab) September 2000.
"Tensor charge from the lattice"

Invited talk, European Comittee on Future Accelators (ECFA) Workshop on High Performance Computing in Lattice Field Theory, (DESY-Zeuthen) October 6-7 2000
"Lattice QCD using domain wall fermions"

Invited talk, Workshop on a New Computing Venue for Lattice Gauge Theory Calculations, (Brookhaven National Lab) October 12-14 2000
"The quenched chiral limit of QCD with domain wall fermions"

Special Seminar (Brookhaven National Lab), July 26, 2001
"CP violation in K decay from Lattice QCD"

Physics Department Colloquium (Washington University, St. Louis), January, 2002
"CP violation in Nature and the Standard Model"

Invited talk, April Meeting of the American Physical Society, (Albuquerque), 2002
"New results in lattice QCD (Lattice QCD in the chiral fermion era)"

Physics Department Colloquium (Brookhaven National Lab), October 1, 2002
"CP violation in Nature and the Standard Model"

Physics Department Colloquium, College of William and Mary (Williamsburg), Winter 2003.
"CP Violation in Nature"

Physics Department Colloquium, University of Arizona (Tucson), Winter 2003.
"CP Violation in Nature"

Plenary talk, International Symposium on Lepton Moments, (Cape Cod), June 2003
"Lattice Calculation of hadronic contributions to muon g-2"

Plenary talk, Confinement 2003, (Waco, Japan), July 2003
"Lattice Calculation of hadronic contributions to muon g-2"

PUBLICATIONS

Top cited papers according to SLAC-SPIRES-HEP database

1. 76 citations. T. Blum and A. Soni, QCD with domain wall quarks, Phys. Rev. **D56**, 174, 1997.
2. 76 citations. T. Blum and A. Soni, Domain wall quarks and kaon weak matrix elements, Phys. Rev. Lett. **79** 3595, 1997.
3. 71 citations. T. Blum, S. Gottlieb, L. Kärkkäinen, and D. Toussaint, The β function and equation of state for QCD with two flavors of quarks, Phys. Rev. **D51**, 5153, 1995.
4. 65 citations. C. Bernard, *et al.*, The equation of state for two flavor QCD at N(T) = 6. Phys. Rev. **D55**, 6861, 1997.
5. 63 citations. T. Blum, *et al.*, Quenched Lattice QCD with Domain Wall Fermions and the chiral limit, hep-lat/0007038, to be published in Phys. Rev. D.
6. 56 citations. T. Blum, *et al.*, Improving flavor symmetry in the Kogut- Susskind hadron spectrum. Phys. Rev. **D55**, 1133, 1997.

All Published Work

1. C. Bernard, T. Blum, T.A. DeGrand, C. DeTar, S. Gottlieb, A. Krasnitz, R.L. Sugar and D. Toussaint, Finite size and quark mass effects on the QCD spectrum with two flavors, Phys. Rev. **D48**, 4419, 1993.
2. T. Blum, L.Kärkkäinen, and D. Toussaint, Measuring the derivatives of couplings with respect to lattice spacing for dynamical Wilson fermions, Nuclear Physics B. (Proc. Suppl.), **34**, 320, 1994.
3. T. Blum and L. Kärkkäinen, Adding Gauge Fields to Kaplan's Fermions, Nucl. Phys. B (Proc. Suppl.) **34**, 575, 1994.
4. T. Blum, T. DeGrand, C. DeTar, S. Gottlieb, A. Hasenfratz, L. Kärkkäinen, R.L. Sugar, and D. Toussaint, QCD Thermodynamics with Wilson Quarks at Large κ, Phys. Rev. **D50**, 3377, 1994.
5. T. Blum and L. Kärkkäinen, Confining the Gauge Field to a Lower Dimensional Subspace by an Inhomogenous Higgs Mechanism, Phys. Rev. **D50**, 6978, 1995.
6. T. Blum, S. Gottlieb, L. Kärkkäinen, and D. Toussaint, The β function and equation of state for QCD with two flavors of quarks, Phys. Rev. **D51**, 5153, 1995.

7. T. Blum, C. DeTar, Urs M. Heller, Leo Kärkkäinen, K. Rummukäinen, and D. Toussaint, Thermal phase transition in mixed action SU(3) lattice gauge theory and Wilson fermion thermodynamics, Nucl. Phys. B **442**, 301, 1995.

8. C. Bernard, T. Blum, A. De, T. DeGrand, C. DeTar, S. Gottlieb, U. Heller, N. Ishisuka, L. Kärkkäinen, J. Labrenz, K. Rummukäinen, R. Sugar, and D. Toussaint, Preliminary heavy-light decay constants from the MILC collaboration, Nucl. Phys. B (Proc. Suppl.) **42**, 388, 1995.

9. C. Bernard, T. Blum, T. DeGrand, C. DeTar, S. Gottlieb, U. Heller, L. Kärkkäinen, A. Kennedy, S. Kim, J.B. Kogut, A. Krasnitz, R. Renken, D. Sinclair, R. Sugar, D. Toussaint, and K. Wang. QCD Thermodynamics at $N_t = 8^{\dagger}$ and $12^{\ddagger}$, Nucl. Phys. B (Proc. Suppl.) **42**, 448, 1995.

10. C. Bernard, T. Blum, T. DeGrand, C. DeTar, S. Gottlieb, U. Heller, L. Kärkkäinen, K. Rummukäinen, R. Sugar, and D. Toussaint, Wilson thermodynamics at $N_t = 8$, Nucl. Phys. B (Proc. Suppl.) **42**, 451, 1995.

11. T. Blum, C. DeTar, U. Heller, L. Kärkkäinen, and D. Toussaint, SU(3) Lattice Gauge Theory With Adjoint Action At Finite Temperature, Nucl. Phys. B (Proc. Suppl.) **42**, 457, 1995.

12. T. Blum, S. Gottlieb, L. Kärkkäinen, and D. Toussaint, The β function and equation of state for QCD with two flavors of quarks, Nucl. Phys. B (Proc. Suppl.) **42**, 460, 1995.

13. T. Blum, J. Hetrick, and D. Toussaint, High density QCD with static quarks, Phys. Rev. Lett. **76**, 1019, 1996.

14. T. Blum and Hans-Thomas Elze, Semi-Quantum Chaos in the Double Well, Phys. Rev. **E53**, 3123, 1996.

15. C. W. Bernard, T. Blum, Carleton DeTar, Steven Gottlieb, Kari Rummukäinen, Urs M. Heller, James Hetrick, D. Toussaint, R. L. Sugar, Two-Flavor Staggered Fermion Thermodynamics at $N_t = 12$, Phys. Rev. **D54**, 4585, 1996.

16. C. W. Bernard, T. Blum, and A. Soni, SU(3) Flavor Breaking in Hadronic Matrix Elements for $B - \bar{B}$ Oscillations, Nucl. Phys. (Proc. Suppl. 53), 382, 1997.

17. C. Bernard, T. Blum, C. DeTar, Steven Gottlieb, U.M. Heller, J.E. Hetrick, L. Kärkkäinen, C. McNeile, K. Rummukäinen, R. Sugar, D. Toussaint, M. Wingate, The Equation of State for QCD from the Lattice, in RHIC Summer Study '96: Theory Workshop on Relativistic Heavy Ion Collisions, 3, 1996.

18. C. Bernard, T. Blum, C. DeTar, Steven Gottlieb, U.M. Heller, J.E. Hetrick, L. Kärkkäinen, K. Rummukäinen, R. Sugar, D. Toussaint, M. Wingate, The $N_t = 6$ equation of state for two flavor QCD, Nucl. Phys. (Proc. Suppl. 47), 503, 1996.

19. C. W. Bernard, T. Blum, C. Detar, S. Gottlieb, U. M. Heller, J. E. Hetrick, L. Kärkkäinen, R. Rummukäinen, R. L. Sugar, D. Toussaint, M. Wingate, The equation of state for two flavor QCD at $N_t = 6$, Phys. Rev. **D55**, 6861, 1997.

20. Claude Bernard, T. Blum, Carleton DeTar, Steven Gottlieb, Urs M. Heller, James E. Hetrick, K. Rummukäinen, R. Sugar, D. Toussaint, Matthew Wingate, Which Chiral Symmetry is Restored in High Temperature QCD? Phys. Rev. Lett. **78**, 598, 1997.

21. T. Blum, Carleton DeTar, Steven Gottlieb, Urs M. Heller, James E. Hetrick, Kari Rummukäinen, R.L. Sugar, D. Toussaint, Matthew Wingate, Improving flavor symmetry in the Kogut-Susskind hadron spectrum, Phys. Rev. **D55**, 1133, 1997.

22. T. Blum and A. Soni, QCD with domain wall quarks, Phys. Rev. **D56**, 174, 1997.

23. T. Blum and A. Soni, Domain wall quarks and kaon weak matrix elements, Phys. Rev. Lett. **79** 3595, 1997.

24. T. Blum and A. Soni, Lattice QCD with domain wall quarks and applications to weak matrix elements, Nucl. Phys. (Proc. Suppl. 63), 287, 1998.

25. C. W. Bernard, T. Blum, and A. Soni, SU(3) Flavor Breaking in Hadronic Matrix Elements for $B - \bar{B}$ Oscillations, Phys. Rev. **D58**, 014501 (1998).

26. Claude Bernard, Tom Blum, Thomas A. DeGrand, Carleton DeTar, Steven Gottlieb, Urs M. Heller, James Hetrick, Craig McNeile, K. Rummukainen, Bob Sugar, and Doug Toussaint, Quenched hadron spectroscopy with improved staggered quark action, Phys. Rev. **D58**, 014503 (1998).

27. Claude Bernard, Tom Blum, Carleton DeTar, Steven Gottlieb, Urs M. Heller, James E. Hetrick, Craig McNeile, K. Rummukainen, R. Sugar, and D. Toussaint, Continuum limit of lattice QCD with staggered quarks in the quenched approximation - a critical role for the chiral extrapolation, Phys. Rev. Lett. 81, 3087 (1998)

28. T. Blum, Domain wall fermions in vector gauge theories, Nucl. Phys. B (Proc. Suppl.) 73, 167 (1999).

29. T. Blum, A. Soni, and M. Wingate, Light quark masses using domain wall fermions, Nucl. Phys. B (Proc. Suppl.) 73, 201 (1999).

30. T. Blum, A. Soni, and M. Wingate, Calculation of the strange quark mass using domain wall fermions, Phys. Rev. D., 017923 (1999).

31. T. Blum, QCD with domain wall quarks, Physics of Hadrons and QCD, Proceedings of the APCTP-RNP Joint International School and the 1998 YITP Workshop (Osaka-Kyoto), World Scientific, 1999.

32. T. Blum and S. Sasaki, Polarized structure functions from the lattice, Proceedings of the Circum-Pan Pacific RIKEN Symposium on High-Energy Spin Physics (Wako), 1999, hep-lat/0002019, RIKEN Review 28 (May 2000).

33. T. Blum, S. Ohta, and S. Sasaki, Domain wall fermion calculation of nucleon g_a/g_v, Nucl. Phys. B (Proc. Suppl.) 94, 295 (2001).

34. T. Blum, $K \to \pi\pi$ Decays: Lattice Matrix Elements, Nucl. Phys. B (Proc. Suppl.) 94, 291 (2001).

35. Thomas Blum and Robert Mawhinney, CP Violation in K Decay from Lattice QCD, RBRC Scientific Article, Vol. 4, BNL-52634 (2001).

36. T. Blum, N. Christ, C. Cristian, C. Dawson, G. Liu, R. Mawhinney, C. Sui, L. Wu, Y. Zhestkov, Chirality correlation within Dirac eigenvectors from domain wall fermions, Phys. Rev. D65 (2002) 014504.

37. S. Sasaki, T. Blum, and S. Ohta, A lattice study of nucleon excited states with domain wall fermions, Phys. Rev. D65 (2002) 074503.

38. T. Blum, N. Christ, C. Cristian, C. Dawson, G. Fleming, G. Liu, R. Mawhinney, A. Soni, P. Vranas, M. Wingate, L. Wu, Y. Zhestkov, Non-perturbative renormalization with domain wall fermions: quark bilinears, Phys.Rev. D66 (2002) 014504.

39. T. Blum, ImA_0, ImA_2 and ϵ'/ϵ from quenched lattice QCD, Nucl. Phys. (Proc. Suppl.) 106 (2002) 317-319.

40. Shoichi Sasaki, Tom Blum, Shigemi Ohta, and Kostas Orginos, Nucleon axial charge from quenched lattice QCD with domain wall fermions and improved gauge action, Nucl. Phys. (Proc. Suppl.) 106 (2002) 302-304.

41. T. Blum, Lattice calculation of the lowest order hadronic contribution to the muon anomalous magnetic moment, Phys. Rev. Lett. 91 (2003) 52001.

<u>Work in Progress</u>

T. Blum and A. Soni, Update on lattice QCD with domain wall quarks, to be published in the Proceedings of the International Europhysics Conference on High Energy Physics (Jerusalem, Aug. 1997).

T. Blum, P. Chen, N. Christ, C. Cristian, C. Dawson, G. Fleming, A. Kaehler, X. Liao, G. Liu, C. Malureanu, R. Mawhinney, S. Ohta, G. Siegert, A. Soni, C. Sui, P. Vranas, M. Wingate, L. Wu, Y. Zhestkov, Quenched Lattice QCD with Domain Wall Fermions and the Chiral Limit, hep-lat/0007038, to be published in Phys. Rev. D.

T. Blum, N. Christ, C. Cristian, C. Dawson, G. Fleming, G. Liu, R. Mawhinney, A. Soni, P. Vranas, M. Wingate, L. Wu, Y. Zhestkov, Kaon Matrix Elements and CP-violation from Quenched Lattice QCD: (I) the 3-flavor case, BNL-HET-01/30, CU-TP-1028, RBRC-194, hep-lat/0110075, submitted to Phys. Rev. D.

Y. Aoki, T. Blum, N. Christ, C. Cristian, C. Dawson, T. Izubuchi, R. Mawhinney, S. Ohta, K. Orginos, A. Soni, and L. Wu, Chiral properties of domain wall fermions with improved gauge actions, Submitted to Phys. Rev. D.

Shoichi Sasaki, Shigemi Ohta, Kostas Orginos, and Tom Blum, Nucleon axial charge from quenched lattice QCD with domain wall fermions and improved gauge action, hep-lat/0306007, to be published in Physical Review D.