

# THOMAS C. BLUM

## Curriculum Vitae

December 2015

### EDUCATION:

- B.S., Aeronautical and Astronautical Engineering, University of Washington, Seattle, Washington, August 1985
- M.S., Aeronautical and Astronautical Engineering, University of Washington, Seattle, Washington, August 1986
- Ph.D., Physics, University of Arizona, Tucson, Arizona, May 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 - Sept. 2003  
RIKEN Fellow, RIKEN BNL Research Center,  
Brookhaven National Laboratory, Upton, NY 11973
- Oct. 2003 - Dec. 2003  
Associate Physicist,  
Brookhaven National Laboratory, Upton, NY 11973
- Jan. 2004 – Aug. 2008  
Assistant Professor and RHIC Fellow  
Physics Department, University of Connecticut, Storrs, CT 06269-3406  
RIKEN BNL Research Center, Brookhaven National Laboratory, Upton, NY 11973
- Aug. 2008 – Dec. 2008  
Associate Professor and RHIC Fellow  
Physics Department, University of Connecticut, Storrs, CT 06269-3406  
RIKEN BNL Research Center, Brookhaven National Laboratory, Upton, NY 11973
- Jan. 2009 – Jul. 2014  
Associate Professor  
Physics Department, University of Connecticut, Storrs, CT 06269-3406
- Aug. 2014 –  
Professor  
Physics Department, University of Connecticut, Storrs, CT 06269-3406

Aug. 2015 –  
Associate Department Head for Undergraduate Education  
Physics Department, University of Connecticut, Storrs, CT 06269-3406

### **VISITING PROFESSORSHIPS**

April 2006 – June 2006  
KEK Visiting Professor, Institute for Particle and Nuclear Studies, KEK Particle Accelerator Laboratory, Tsukuba, Japan (by invitation)

April 26, 2007 - May 26, 2007  
Visitor, CERN Theory Group, CERN, Geneva (by invitation)

Mar 2010 -  
Visiting Scientist, RIKEN BNL Research Center, Brookhaven National Lab

### **ACADEMIC HONORS and AWARDS:**

GANN Fellowship, Department of Education (August 1990 – May 1993)

Outstanding Junior Investigator, Department of Energy, Office of High Energy Physics (2005- 2008)

Phi Kappa Phi National Honor Society (Inducted 2012)

Ken Wilson Lattice Award (2012)

American Physical Society Fellow (Division of Particles and Fields, 2015)

### **GRANTS:**

Department of Energy, Office of High Energy Physics, OJI (2005-2008)

Department of Energy, Office of High Energy Physics (2009-)

### **PROFESSIONAL SERVICES:**

Journal referee: Physical Review, Nuclear Physics, Journal of High Energy Physics, European Physical Journal C, IBM Research Journal

Grant proposal referee, DOE Divisions of High Energy and 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)

Elementary Particle Theory panelist (grant review), National Science Foundation (2005 and 2013)

Grant reviewer, Fundamental Onderzoek der Materie (FOM), Netherlands (2005, 2007)

Scientific Program Committee, USQCD Collaboration, (2005-2010)

Chair, Colloquium Committee, University of Connecticut Physics Department (2005-)

Preliminary Exam Committee, University of Connecticut Physics Department (2007-2008, 2012-)

PTR Committee, University of Connecticut Physics Department (2009-2011)

Graduate Affairs Committee, University of Connecticut Physics Department (2009-)

Advisory Committee, University of Connecticut Physics Department (2010-2013)

Advisor, Physics Club, University of Connecticut Physics Department (2009-2014)

CLAS Dean's Committee on Committees, University of Connecticut (2009-2012)

NSF TeraGrid Resource Allocations Committee (2010-2011)

NSF XSEDE Resource Allocations Committee (2012-2013)

Member, Flavianet Lattice Averaging Group (FLAG) (2012-)

NSF High Energy Theory Comparative Review Panel (2013)

DOE High Energy Theory Comparative Review Panel (2014)

Scientific Program Committee, USQCD Collaboration, (2015-)

#### **WORKSHOPS and MEETINGS 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

Organizer, RIKEN BNL Workshop, Lattice QCD at Finite Temperature and Density (Brookhaven National Lab) February 8-12, 2004

Convener, Session on Lattice QCD, Meeting of the Division of Particles and Fields

of the American Physical Society, (University of California, Riverside) August 28-31, 2004

Convener, Session on Lattice QCD, Meeting of the Division of Particles and Fields  
of the American Physical Society, (University of California, Riverside) August 28-31, 2004

Program Committee, XXIVth International Symposium on Lattice Field Theory (Lattice 2006),  
Tucson (July 2006)

Organizer, BaBar Physics and Lattice QCD Workshop, Stanford Linear Accelerator Center,  
September 16, 2006

Organizer, Domain Wall Fermions @ 10 Years, RIKEN BNL Workshop and Symposium,  
Brookhaven National Lab, March 12-15, 2007

Organizer, Graduate Fellowship Workshop, University of Connecticut, September 13, 2010

Organizer, INT Workshop on The Hadronic Light-by-Light Contribution to the Muon Anomaly,  
Institute of Nuclear Theory, University of Washington, February 28 - March 4, 2011

Organizer, RIKEN BNL Workshop, New Horizons for Lattice Gauge Theory Computations,  
RIKEN BNL Research Center, Brookhaven National Lab, May 14-18, 2012

Organizer, Galileo Galilei Institute Workshop, New Frontiers in Lattice Gauge Theory, Galileo  
Galilei Institute, Florence, Italy, August 27 - September 28, 2012

Convener, Project X Summer Study, Lattice QCD subgroup, Fermilab, Batavia, IL, June 14-23,  
2012

Convener, Community Planning Meeting, Lattice QCD subgroup, Fermilab, Batavia, IL  
October 11-13

Convener, Community Summer Study, Lattice QCD subgroup, University of Minnesota,  
Minneapolis, July 29- August 6, 2013

Organizer, Hadronic contributions to the muon anomalous magnetic moment Workshop, MITP,  
Waldthausen Castle, Mainz Germany, April 1-5, 2014

Local Organizing Committee, XXXII International Symposium on Lattice Field Theory (Lattice  
2014), New York, June 2014

#### **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  $\epsilon'/\epsilon$  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  $\epsilon'/\epsilon$ ”

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 Committee on Future Accelerators (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  $g-2$ ”

Invited Lectures, 1st Summer School on QCD Spin Physics, (Brookhaven National Lab), June 5-12, 2004  
“Introduction to Lattice QCD and Spin on the Lattice”

Invited talk, ILFT Network Tsukuba Workshop on Lattice QCD and Particle Phenomenology, December 6-17, 2004  
“Lattice calculation of nucleon moments”

Invited plenary talk, Lattice 2005 (XXIII<sup>rd</sup> International Symposium on Lattice Field Theory), Dublin, July 23<sup>rd</sup>- 30<sup>th</sup> 2005  
“Neutron Electric Dipole Moment with two flavors of domain wall fermions”.

Invitation only workshop on “Lattice QCD with Light Dynamical Fermions”, Ringberg Castle, Bavaria, Germany, April 23-28 2006.  
“2+1 Flavor Domain Wall Fermion Simulations”

Colloquium, Institute for Particle and Nuclear Studies, KEK Particle Accelerator Laboratory, Tsukuba, Japan, “Hadronic corrections to the anomalous magnetic moment of the muon”, June 2006.

Physics Department Colloquium, University of Connecticut, “Current topics in Lattice Gauge Theory”, January 19, 2007

CERN Theory Seminar, “Electromagnetic Effects in Hadrons”, CERN (Geneve), May 9, 2007

Invited plenary talk, *High Energy Physics from High Performance Computing*, SciDAC 2009, San Diego, June 14-18, 2009

Medium energy seminar, University of Illinois, Physics Department, “Hadronic contributions to the muon g-2”, April 7, 2010

Invited talk, Lattice Meets Experiment Workshop, Fermilab, “Hadronic contributions to the muon g-2”, April 24, 2010

Invited talk, P- and CP-odd Effects in Hot and Dense Matter, Brookhaven National Lab, “Chiral magnetic effect on the lattice”, April 26-30, 2010

RHIC and AGS Users meeting workshop on the chiral magnetic effect, Brookhaven National Lab, “Chiral magnetic effect from the lattice”, June 6, 2010

Invited Key participant, Lattice Gauge Theory Institute, CERN (Geneve), July 16-August 16, 2010

Invited talk, USQCD All Hands Meeting, “Pion and Kaon Physics from 2+1 Flavor DWF Lattices with  $m\pi = 250$  and 180 MeV, III”, Jefferson Lab, May 6, 2011

Invited talk, American Physical Society, Division of Nuclear Physics Meeting, “Fundamental symmetries on the lattice”, Sante Fe, November 1, 2010

Colloquium, University of Arizona, “The muon anomalous magnetic moment”, September 16, 2011.

Invited talk, Fundamental Physics at the Intensity Frontier Workshop, Muon g-2 parallel session, “Theory Overview”, Rockville, MD, November 30, 2011

Plenary Talk, Lattice 2012, Cairns, Australia, June 29, 2012, “The muon anomalous magnetic moment”

Plenary talk, “The muon anomalous magnetic moment from lattice QCD”, Tau 2012, Nagoya, Japan, September 19, 2012

Invited talk, “Lattice calculation of the hadronic light by light scattering contribution to the muon's magnetic moment”, New Frontiers in Lattice Gauge Theory, Florence, Italy, September 14, 2012

MIT Nuclear and Particle Theory Seminar, “Hadronic contributions to the muon anomalous magnetic moment from lattice QCD”, CTP, MIT, November 5, 2012

Invited talk, “Computing K to pi pi decays with lattice QCD”, APS April Meeting, Denver, April 13, 2013

Invited talk, "Lattice calculation of nucleon electric dipole moments", Nucleon Matrix Elements for New-Physics Searches, ECT\* Workshop, Trento, Italy, July 24, 2013

Invited talk, "The muon anomalous magnetic moment", Nucleon Matrix Elements for New-Physics Searches, ECT\* Workshop, Trento, Italy, July 26, 2013

High Energy Theory Seminar, University of Delaware Physics Department, February 20, 2014

Invited talk, "Lattice calculations of hadronic contributions to the muon  $g-2$ ", Lattice Meets Experiment 2013: Beyond the Standard Model, December 6, 2013

Invited talk, "Light by light scattering for muon  $g-2$ ", Lattice QCD Meets Experiment 2014, Fermilab, March 8, 2014

Invited talk, "Summary and Perspectives of Lattice QCD", Hadronic contributions to the muon anomalous magnetic moment: strategies for improvements of the accuracy of the theoretical prediction, MITP Workshop, Waldthausen Castle, Mainz Germany, April 5, 2014

Invited seminar, "Fundamental Parameters I: Quark Masses", FLAG-Mad, Instituto de Física Teórica UAM/CSIC, May 24, 2014

Plenary Talk, "Lattice calculation of hadronic light-by-light scattering contribution to the muon  $g-2$ ", Lepton Moments 2014, Cape Cod, July 21, 2014.

Invited talk, "Lattice calculation of hadronic light-by-light scattering contribution to the muon  $g-2$ ", Creutz Fest, BNL, September 5, 2014.

Invited talk, "Lattice calculation of hadronic light-by-light scattering contribution to the muon  $g-2$ ", Confinement XI, St. Petersburg, Russia, September 9, 2014.

Invited talk, "Calculation of  $D=4$  Operators for  $nEDM$  (lattice QCD)", Hadronic Matrix Elements for Probes of CP Violation, Amherst, January 21, 2015.

Invited talk, "Lattice calculation on the nucleon EDM", CCS-BNL Workshop on Lattice Gauge Theories 2015 (University of Tsukuba), Tsukuba, March 13, 2015.

Plenary talk, "Progress on the muon anomalous magnetic moment from lattice QCD", The 8th International Workshop on Chiral Dynamics 2015, Pisa, July 3, 2015.

Invited talk, "Progress on computing the muon anomalous magnetic moment from lattice QCD(+QED) (Lattice QCD: HLbL & HVP)", Muon  $g-2$  Physics Workshop (muon  $g-2$  collaboration Physics Week), Seattle, July 12, 2015.

Invited talk, "Muon  $g-2$ : New Advances for Hadronic Vacuum Polarization and Light-by-Light", KITP, Santa Barbara, August 14, 2015.

Invited talk, "Progress on computing the hadronic light-by-light scattering contribution to the muon anomalous magnetic moment from lattice QCD(+QED)", Intersections of BSM Phenomenology and QCD for New Physics Searches, INT, Seattle, September 29, 2015.

## PUBLICATIONS



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. D **48**, 4419, 1993 (16 pages).
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 pages).
3. T. Blum and L. Kärkkäinen, Adding gauge fields to Kaplan's fermions, Nucl. Phys. B (Proc. Suppl.) **34**, 575, 1994 (3 pages).
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  $\kappa$ , Phys. Rev. D **50**, 3377, 1994 (4 pages).
5. T. Blum and L. Kärkkäinen, Confining the gauge field to a lower dimensional subspace by an inhomogeneous Higgs mechanism, Phys. Rev. D **50**, 6978, 1995 (6 pages).
6. T. Blum, S. Gottlieb, L. Kärkkäinen, and D. Toussaint, The  $\beta$  function and equation of state for QCD with two flavors of quarks, Phys. Rev. D **51**, 5153, 1995 (13 pages).
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 (3 pages).
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 (3 pages).
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  $N_f = 8^+$  and  $12^+$ , Nucl. Phys. B (Proc. Suppl.) **42**, 448, 1995 (3 pages).
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  $N_f = 8$ , Nucl. Phys. B (Proc. Suppl.) **42**, 451, 1995 (3 pages).
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 (3 pages).
12. T. Blum, S. Gottlieb, L. Kärkkäinen, and D. Toussaint, The  $\beta$  function and equation of state for QCD with two flavors of quarks, Nucl. Phys. B (Proc. Suppl.) **42**, 460, 1995 (3 pages).
13. T. Blum, J. Hetrick, and D. Toussaint, High density QCD with static quarks, Phys. Rev. Lett. **76**, 1019, 1996 (4 pages).
14. T. Blum and Hans-Thomas Elze, Semi-quantum chaos in the double well, Phys. Rev. E **53**, 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  $N_f = 12$ , Phys. Rev. D **54**, 4585, 1996 (9 pages).
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 (3 pages).
  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  $N_f = 6$  equation of state for two flavor QCD, Nucl. Phys. (Proc. Suppl.) **47**, 503, 1996 (3 pages).
  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  $N_f = 6$ , Phys. Rev. D **55**, 6861, 1997 (8 pages).
  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 (4 pages).
  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. D **55**, 1133, 1997 (4 pages).
  22. T. Blum and A. Soni, QCD with domain wall quarks, Phys. Rev. D **56**, 174, 1997 (4 pages).
  23. T. Blum and A. Soni, Domain wall quarks and kaon weak matrix elements, Phys. Rev. Lett. **79**, 3595, 1997 (4 pages).
  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 (3 pages).
  25. C. W. Bernard, T. Blum, and A. Soni, SU(3) flavor breaking in hadronic matrix elements for  $B - \bar{B}$  oscillations, Phys. Rev. D **58**, 014501 (1998) (7 pages).
  26. Claude Bernard, Tom Blum, Thomas A. DeGrand, Carleton DeTar, Steven Gottlieb, Urs M. Heller, James Hetrick, Craig McNeile, K. Rummukäinen, Bob Sugar, and Doug Toussaint, Quenched hadron spectroscopy with improved staggered quark action, Phys. Rev. D **58**, 014503 (1998) (14 pages).
  27. Claude Bernard, Tom Blum, Carleton DeTar, Steven Gottlieb, Urs M. Heller, James E. Hetrick, Craig McNeile, K. Rummukäinen, 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) (4 pages)
  28. T. Blum, Domain wall fermions in vector gauge theories, Nucl. Phys. B (Proc. Suppl.) **73**, 167 (1999) (13 pages).
  29. T. Blum, A. Soni, and M. Wingate, Light quark masses using domain wall fermions, Nucl. Phys. B (Proc. Suppl.) **73**, 201 (1999) (3 pages).

30. T. Blum, A. Soni, and M. Wingate, Calculation of the strange quark mass using domain wall fermions, *Phys. Rev. D* **60**, 114507 (1999) (22 pages).
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 (15 pages).
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) (3 pages).
34. T. Blum,  $K \rightarrow \pi\pi$  Decays: lattice matrix elements, *Nucl. Phys. B (Proc. Suppl.)* **94**, 291 (2001) (3 pages).
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. D* **65** (2002) 014504 (10 pages).
37. S. Sasaki, T. Blum, and S. Ohta, A lattice study of nucleon excited states with domain wall fermions, *Phys. Rev. D* **65** (2002) 074503 (14 pages).
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. D* **66** (2002) 014504 (19 pages).
39. T. Blum,  $\text{Im}A_0$ ,  $\text{Im}A_2$  and  $\epsilon'/\epsilon$  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(4 pages).
42. Shoichi Sasaki, Shigemi Ohta, Kostas Orginos, and Tom Blum, *Nucleon axial charge from quenched lattice QCD with domain wall fermions and improved gauge action*, *Phys. Rev. D* **68**, 054509 (2003) (16 pages).
43. 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, *Phys. Rev. D* **68**, 114506 (2003) (70 pages).
44. 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*, *Phys. Rev. D* **69**, 074502, 2004 (39 pages).

45. T. Blum, *Lattice calculation of the lowest order hadronic contribution to the muon anomalous magnetic moment: an update with Kogut-Susskind fermions*. In the proceedings of The International Symposium on Color Confinement and Hadrons in Quantum Chromodynamics - Confinement 2003, Wako, Japan, 21-24 Jul 2003. Published in Nucl. Phys. (Proc. Suppl.) **129**, 904-906, 2004, and also in Color confinement and hadrons in quantum chromodynamics, 262-273, World-Scientific (2004), hep-lat/0310064 (12 pages).
46. Y. Aoki, T. Blum, N. Christ, C. Cristian, C. Dawson, T. Izubuchi, G. Liu, R. Mawhinney, S. Ohta, K. Orginos, A. Soni, L. Wu, Domain wall fermions with improved gauge actions, Phys. Rev. D **69**, 074504, 2004 (18 pages).
47. T. Blum, *Lattice calculation of the hadronic contributions to the muon anomalous magnetic moment*, proceedings of the XXII International Symposium on Lattice Field Theory, Fermilab, June 21-26, 2004, hep-lat/0411002, Nucl. Phys. (Proc. Suppl.) **140**, 311-313, 2004 (3 pages).
48. T. Blum and P. Petreczky, *Cutoff effects in meson spectral functions*, Proceedings of the XXII International Symposium on Lattice Field Theory, Fermilab, June 21-26, 2004, Nucl. Phys. (Proc. Suppl.) **140**, 2004 hep-lat/0408045 (3 pages).
49. F. Berruto, T. Blum, K. Orginos, A. Soni, Neutron electric dipole moment with domain wall quarks, Proceedings of the XXII International Symposium on Lattice Field Theory, Fermilab, June 21-26, 2004, Nucl. Phys. (Proc. Suppl.) **140**, 411-413, 2004 hep-lat/0411003 (3 pages).
50. F. Berruto, T. Blum, K. Orginos, and A. Soni, *Calculation of the neutron electric dipole moment with two dynamical flavors of domain wall fermions*, Phys. Rev. D **73** 054509 (2006) (16 pages)
51. Y. Aoki, T. Blum, N. Christ, C. Dawson, T. Izubuchi, K. Hashimoto, J.W. Laiho, L. Levkova, M. Lin, R. Mawhinney, J. Noaki, S. Ohta, *Lattice QCD with two dynamical flavors of domain wall fermions*, Phys. Rev. D **72** 114505 (2005) (33 pages).
52. K. Orginos, T. Blum, and S. Ohta, *Nucleon structure functions with domain wall fermions*, Phys. Rev. D **73** 094503 (2006) (14 pages)
53. Y. Aoki, T. Blum, N. Christ, C. Dawson, T. Izubuchi, R. Mawhinney, J. Noaki, S. Ohta, K. Orginos and A. Soni, *Kaon B-parameter from quenched domain-wall QCD*, Phys. Rev. D **73** 094507 (2006) (33 pages)
54. F. Berruto, T. Blum, K. Orginos, A. Soni, *Neutron electric dipole moment with two flavors of domain wall fermions*, 23<sup>rd</sup> International Symposium on Lattice Field Theory, PoS LAT2005:010, 2005 (12 pages)
55. N. Yamada, T. Blum, M. Hayakawa, and T. Izubuchi, *Electromagnetic properties of hadrons with two flavors of dynamical domain wall fermions*, 23<sup>rd</sup> International Symposium on Lattice Field Theory, PoS LAT2005:092, 2005 (6 pages)
56. C. Aubin and T. Blum, *Lowest order hadronic contribution to the muon g-2*, 23<sup>rd</sup> International Symposium on Lattice Field Theory, PoS LAT2005:089, 2005 (6 pages)
57. M. Hayakawa, T. Blum, T. Izubuchi, and N. Yamada, *Hadronic light-by-light scattering contribution to the muon g-2 from lattice QCD: Methodology*, 23<sup>rd</sup> International Symposium on Lattice Field Theory, PoS LAT2005:353, 2005 (6 pages)

58. C. Aubin and T. Blum, *Calculating the hadronic vacuum polarization and leading hadronic contribution to the muon anomalous magnetic moment with improved staggered quarks*, Phys. Rev D75 114502 (2007) (preprint 44 pages).
59. D.J. Antonio, *et al.*, *First results from 2+1 Flavor Domain Wall QCD: Mass Spectrum, Topology Change and Chiral Symmetry with  $L_s = 8$* , Physical Review D 114501 (2007) (preprint 82 pages).
60. C. Allton, *et al.*, *2+1 flavor domain wall QCD on a  $(2\text{ fm})^3$  lattice: Light meson spectroscopy with  $L_s = 16$* , Physical Review D76 014504 (2007) (preprint 17 pages).
61. Thomas Blum, Takumi Doi, Masashi Hayakawa, Taku Izubuchi, Norikazu Yamada, *“Determination of light quark masses from the electromagnetic splitting of pseudoscalar meson masses computed with two flavors of domain wall fermions”*, 38 pages, Phys. Rev. D76:114508, 2007. e-Print: arXiv:0708.0484.
62. T. Yamazaki, Y. Aoki, T. Blum, H. W. Lin, M. F. Lin, S. Ohta, S. Sasaki, R. J. Tweedie, and J. M. Zanotti, *“Nucleon Axial Charge in (2+1)-Flavor Dynamical-Lattice QCD with Domain-Wall Fermions”*, Phys. Rev. Lett. 100, 171602 (2008), 4 pages.
63. D. J. Antonio, P. A. Boyle, T. Blum, N. H. Christ, S. D. Cohen, C. Dawson, T. Izubuchi, R. D. Kenway, C. Jung, S. Li, M. F. Lin, R. D. Mawhinney, J. Noaki, S. Ohta, B. J. Pendleton, E. E. Scholz, A. Soni, R. J. Tweedie, A. Yamaguchi (RBC and UKQCD Collaborations), *“Neutral kaon mixing from 2+1 flavor Domain Wall QCD”*, Phys. Rev. Lett. 100, 032001, 2008, 4 pages.
64. Dwight Renfrew, Thomas Blum, Norman Christ, Robert Mawhinney, Pavlos Vranas, *Controlling Residual Chiral Symmetry Breaking in Domain Wall Fermion Simulations*, 8pages, e-Print: arXiv:0902.2587, proceedings of the XXVI International Symposium on Lattice Field Theory, Lattice 2008 (Williamsburg).
65. Ran Zhou, Thomas Blum, Takumi Doi, Masashi Hayakawa, Taku Izubuchi, Norikazu Yamada, *Isospin symmetry breaking effects in the pion and nucleon masses*, 7 pages, e-Print: arXiv:0810.1302, proceedings of the XXVI International Symposium on Lattice Field Theory, Proceedings of Science (Lattice 2008) (Williamsburg).
66. C. Allton, D. J. Antonio, Y. Aoki, P. A. Boyle, T. Blum, N. H. Christ, S. D. Cohen, M. Clark, C. Dawson, M.A. Donnellan, J.M. Flynn, T. Izubuchi, A. Juttner, A. Kennedy, R. D. Kenway, C. Jung, S. Li, M. F. Lin, R. D. Mawhinney, C. Maynard, S. Ohta, B. J. Pendleton, C.T. Sachrajda, S. Sasaki, E. E. Scholz, A. Soni, R. J. Tweedie, J. Wenckers, T. Yamazaki, J. Zanotti (RBC and UKQCD Collaborations), *Physical Results from 2+1 Flavor Domain Wall QCD and SU(2) Chiral Perturbation Theory*, Phys. Rev. D78:114509, 2008, e-Print: arXiv:0804.0473, 133 pages.
67. Huey-Wen Lin, Tom Blum, Shigemi Ohta, Shoichi Sasaki, Takeshi Yamazaki, *Nucleon structure with two flavors of dynamical domain-wall fermions*, Phys. Rev. D78:014505, 2008, e-Print: arXiv:0802.0863, 28 pages.
68. T. Blum and S. Chowdhury, *Hadronic contributions to  $g-2$  from the lattice*, Nucl. Phys. B 189 (Procl. Suppl.), 251-256, 2009, proceedings of the 10th International Workshop on Tau Lepton Physics (Novosibirsk).
69. S. Chowdhury, Thomas Blum, Masashi Hayakawa, Taku Izubuchi, Norikazu Yamada,

- Takeshi Yamazaki, *Calculating the light by light contribution to the muon anomalous magnetic moment using lattice QED*, 7 pages, proceedings of the XXVI International Symposium on Lattice Field Theory (Williamsburg), Proceedings of Science (Lattice 2008).
70. T. Blum (RBC Collaboration), *The light baryon spectrum calculated with 2+1 flavors of domain wall fermions*, 7 pages, proceedings of the XXVI International Symposium on Lattice Field Theory (Williamsburg), Proceedings of Science (Lattice 2008) 096.
  71. Takeshi Yamazaki, Yasumichi Aoki, Tom Blum, Huey-Wen Lin, Shigemi Ohta, Shoichi Sasaki, Robert Tweedie, James Zanotti, *Nucleon form factors with 2+1 flavor dynamical domain-wall fermions*, 47 pages, Phys. Rev. D79:114505, 2009, e-Print: arXiv:0904.2039.
  72. T. Blum, *High Energy Physics from High Performance Computing*, J. Phys. Conf. Ser. 180: 012066, 2009, e-Print: arXiv:0908.0937.
  73. M. Abramczyk, T. Blum, G. Petropoulos, and R. Zhou, *Chiral magnetic effect in 2+1 flavor QCD+QED*, 7 Pages, e-Print: proceedings of the XXVII International Symposium on Lattice Field Theory (Beijing), Proceedings of Science (Lattice 2009), arXiv:0911.1348.
  74. Yasumichi Aoki, Tom Blum, Huey-Wen Lin, Shigemi Ohta, Shoichi Sasaki, Robert Tweedie, Takeshi Yamazaki, James Zanotti, *Nucleon isovector structure functions in (2+1)-flavor QCD with domain wall fermions*, Phys. Rev. D82:014501, 2010, 14pp, e-Print: arXiv:1003.3387 [hep-lat].
  75. T. Blum, R. Zhou, T. Doi, M. Hayakawa, T. Izubuchi, S. Uno, N. Yamada, *Electromagnetic mass splittings of the low lying hadrons and quark masses from 2+1 flavor lattice QCD+QED*, Phys. Rev. D82:094508, 2010, 83pp, e-Print: arXiv:1006.1311 [hep-lat]
  76. Y. Aoki, R. Arthur, T. Blum, P.A. Boyle, D. Brommel, N.H. Christ, C. Dawson, J.M. Flynn, T. Izubuchi, X-Y. Jin, C. Jung, C. Kelly, M. Li, A. Lichtl, M. Lightman, M.F. Lin, R.D. Mawhinney, C.M. Maynard, S. Ohta, B.J. Pendleton, C.T. Sachrajda, E.E. Scholz, A. Soni, J. Wennekers, J.M. Zanotti, R. Zhou, (RBC/UKQCD Collaboration), *Continuum Limit Physics from 2+1 Flavor Domain Wall QCD*, Nov 2010. 125 pp. Phys. Rev. D83:074508, 2011, e-Print: arXiv:1011.0892 [hep-lat]
  77. Y. Aoki, R. Arthur, T. Blum, P.A. Boyle, D. Brommel, N.H. Christ, C. Dawson, T. Izubuchi, C. Jung, C. Kelly, et al., *Continuum Limit of  $B_K$  from 2+1 Flavor Domain Wall QCD*, Dec 2010, 65 pp., Phys. Rev. D84 (2011) 014503, e-Print: arXiv:1012.4178 [hep-lat]
  78. T. Blum, P.A. Boyle, N.H. Christ, N. Garron, E. Goode, T. Izubuchi, C. Lehner, Q. Liu, R.D. Mawhinney, C.T. Sachrajda, *K to  $\pi\pi$  Decay amplitudes from Lattice QCD*, Jun 2011, 40 pp, Phys. Rev. D84 (2011) 114503, e-Print: arXiv:1106.2714 [hep-lat]
  79. T. Blum, P.A. Boyle, N.H. Christ, N. Garron, E. Goode, T. Izubuchi, C. Jung, C. Kelly, C. Lehner, M. Lightman et al., *The  $K \rightarrow (\pi\pi)_{I=2}$  Decay Amplitude from Lattice QCD*, Phys. Rev. Lett., 108 (2012) 141601, Nov 2011, 5 pp, e-Print: arXiv:1111.1699 [hep-lat]
  80. Tomomi Ishikawa, Thomas Blum, Masashi Hayakawa, Taku Izubuchi, Chulwoo Jung, Ran Zhou, *Full QED+QCD low-energy constants through reweighting*, Phys. Rev. Lett. 109

- (2012) 072002, Feb. 2012, 5 pp., e-Print: arXiv:1202.6018.
81. DOE White Paper, *Fundamental Physics at the Intensity Frontier*, J.L. Hewett , et al., May 2012, 229 pp., e-Print: arXiv:1205.2671.
  82. Christopher Aubin, Thomas Blum, Maarten Golterman, Santiago Peris, *Model-independent parametrization of the hadronic vacuum polarization and  $g-2$  for the muon on the lattice*, May 2012, 17 pp, Phys. Rev. D86 (2012) 054509, e-Print: arXiv:1205.3695.
  83. T. Blum, P.A. Boyle, N.H. Christ, N. Garron, E. Goode, T. Izubuchi, C. Jung, C. Kelly, C. Lehner, M. Lightman, et al., *Lattice determination of the  $K \rightarrow (\pi\pi)_{I=2}$  Decay Amplitude  $A_2$* , Jun 2012, 59 pp., Phys. Rev. D86 (2012) 074513, e-Print: arXiv:1206.5142.
  84. Christopher Aubin, Thomas Blum, Maarten Golterman, Santiago Peris , *Pade approximants and  $g-2$  for the muon*, October 2012, 7 pp., PoS LATTICE2012 (2012)176, e-Print: arXiv:1210.7611.
  85. Thomas Blum, Taku Izubuchi, Eigo Shintani, *Error reduction technique using covariant approximation and application to nucleon form factor*, December 2012, 7 pp., PoS LATTICE2012 (2012) 262, e-Print: arXiv:1212.5542.
  86. T. Blum, M. Hayakawa and T. Izubuchi, *Hadronic corrections to the muon anomalous magnetic moment from lattice QCD*, December 2012, 15 pp, PoS (Lattice 2012) 022, e-print: arXiv:1301.2607.
  87. RBC and UKQCD Collaborations, *Domain Wall QCD with Near-Physical Pions*. Physical Review D87, 094514 (2013), 53 pp., e-Print: arXiv:1208.4412
  88. Thomas Blum, Taku Izubuchi, Eigo Shintani, *A new class of variance reduction techniques using lattice symmetries*, Physical Review D88 (2013) 9, 094503, e-Print: arXiv:1208.4349.
  89. *Project X: Physics Opportunities*, Andreas S. Kronfeld (ed.), Robert S. Tschirhart (ed.), et al.. Jun 20, 2013. 219 pp., FERMILAB-TM-2557, BNL-101116-2013-BC-81834, SLAC-R-1029, ANL-PHY-13-2, LBNL-6334E, e-Print: arXiv:1306.5009.
  90. *Hadronic vacuum polarization with twisted boundary conditions*, Christopher Aubin, Thomas Blum, Maarten Golterman, Santiago Peris, 7 pp., Physical Review D88 (2013) 7, 074505, e-Print: arXiv:1307.4701.
  91. *Review of lattice results concerning low energy particle physics*, Sinya Aoki (Kyoto U., Yukawa Inst., Kyoto & Tsukuba U., CCS & Tsukuba U., GSPAS), Yasumichi Aoki (KMI, Nagoya & RIKEN BNL), Claude Bernard (Washington U., St. Louis), Tom Blum (Connecticut U. & RIKEN BNL), Gilberto Colangelo (U. Bern, AEC & Bern U.), Michele Della Morte (Southern Denmark U., CP3-Origins), Stephan Dürr (Bergische U., Wuppertal (main) & Jülich, Forschungszentrum), Aida X. El Khadra (Illinois U., Urbana), Hidenori Fukaya (Osaka U.), Roger Horsley (Edinburgh U.) et al.. Oct 31, 2013. 323 pp., e-Print: arXiv:1310.8555.
  92. *Non-degenerate light quark masses from  $2+1f$  lattice QCD+QED*, Shane Drury

(Southampton U.), Thomas Blum (Connecticut U. & RIKEN BNL), Masashi Hayakawa (Nagoya U. (main)), Taku Izubuchi (Brookhaven & RIKEN BNL), Chris Sachrajda (Southampton U.), Ran Zhou (Fermilab & Indiana U.), Dec. 2, 2013, 7 pp., PoS LATTICE2013 (2013) 268

93. *Vacuum Polarization function in 2+1 domain wall fermion*, E. Shintani, Hyung-Jin Kim, T. Blum, and T. Izubuchi, PoS Lattice 2013 (2014) 487.
94. *Update on the hadronic light-by-light contribution to the muon  $g-2$  and inclusion of dynamically charged sea quarks*, T. Blum, M. Hayakawa, and T. Izubuchi, PoS Lattice 2013 (2014) 439.
95. *Weak Decay Measurements for 2+1 flavor DWF ensembles*, T. Blum, *et al.*, PoS Lattice 2013 (2014) 404.
96. *Vacuum Polarization function in 2+1 domain wall fermion*, E. Shintani, T. Blum, T. Izubuchi, and A. Soni, PoS Lattice 2013 (2014) 298.
97. *Progress towards an ab initio, standard model calculation of CP-violation in K-decays*, C. Kelly, *et al.*, PoS Lattice 2013 (2014) 401.
98. *Hadronic contributions to the muon anomalous magnetic moment Workshop.  $(g-2)\mu$ : Quo vadis? Workshop. Mini proceedings*, Maurice Benayoun, Johan Bijnens, Tom Blum, Irenel Caprini, Gilberto Colangelo, Henryk Czyż, Achim Denig, Cesareo A. Dominguez, Simon Eidelman, Christian S. Fischer *et al.*. Jul 14, 2014. 83 pp., MITP-14-045, e-Print: arXiv:1407.4021
99. *Hadronic light-by-light scattering contribution to the muon anomalous magnetic moment from lattice QCD*, Thomas Blum, Saumitra Chowdhury, Masashi, Taku Izubuchi, Phys. Rev. Lett. 114 (2015) 012001, e-Print: arXiv:1407.2923.
100. *Covariant approximation averaging*, Eigo Shintani, Rudy Arthur, Thomas Blum, Taku Izubuchi, Chulwoo Jung, Christoph Lehner, Phys.Rev. D91 (2015) 11, 114511, 46 pp., e-Print: arXiv:1402.0244.
101. *Standard Model Prediction for Direct CP Violation in  $K \rightarrow \pi\pi$  Decay*, RBC and UKQCD Collaborations (Z. Bai (Columbia U.) *et al.*). May 28, 2015. 6 pp., Published in Phys.Rev.Lett. 115 (2015) 21, 212001
102.  *$K \rightarrow \pi\pi$   $\Delta I=3/2$  decay amplitude in the continuum limit*, T. Blum, *et al.*, Feb 1, 2015., 23 pp., Published in Phys.Rev. D91 (2015) 7, 074502

#### Work in Progress

1. T. Blum *et al.* [RBC and UKQCD Collaborations], “Domain wall QCD with physical quark masses,” arXiv:1411.7017 [hep-lat]. Submitted to Physical Review D.



2. [Neutron and proton electric dipole moments from  \$N\_f=2+1\$  domain-wall fermion lattice QCD](#), [Eigo Shintani](#), [Thomas Blum](#), [Taku Izubuchi](#), [Amarjit Soni](#), Dec 1, 2015, 33 pp., e-Print: [arXiv:1512.00566](#)
3. Lattice Calculation of Hadronic Light-by-Light Contribution to the Muon Anomalous Magnetic Moment, Thomas Blum, Norman Christ, Masashi Hayakawa, Taku Izubuchi (Brookhaven & RIKEN BNL), Luchang Jin, Christoph Lehner, Oct 23, 2015, 52 pp., e-Print: arXiv:1510.07100