Curriculum Vitae

Walter Freeman

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Education

University of Arizona

Doctor of Philosophy, Physics, under Prof. Doug Toussaint, August 2011
Dissertation: *Measuring the nucleon strangeness and related matrix elements using lattice QCD*

University of Alabama in Huntsville

Bachelor of Science, Physics, with emphasis in astrophysics, summa cum laude, May 2005
Undergraduate thesis: *Numerical simulations of elastic materials using a mesh model*

Selected Employment History

Syracuse University, Assistant Teaching Professor, 2017-present
Syracuse University, Lecturer, 2016-2017
Syracuse University, Visiting Assistant Professor, 2015-2016

George Washington University, Teaching Fellow, 2014
George Washington University, Postdoctoral Research Fellow, 2011-14

University of Arizona, Graduate Teaching Assistant, 2005-2007
University of Arizona, Graduate Teaching Associate, 2007-2011
University of Arizona, Graduate Research Associate, 2007-2011

Ed White Middle School (Huntsville, AL), Coordinator for Aerospace Science Program, 2005
University of Alabama in Huntsville, Undergraduate Teaching Assistant, 2004
Marshall Space Flight Center (Huntsville, AL), REU in Materials Science, 2004

Teaching Experience and Recognition

Syracuse University:

Nominated for the Teaching Recognition Award for Early Performance, fall 2019 (nomination in progress)

Instructor, Computational Physics I, each fall, 2015-2019.

Duties have included designing the curriculum from scratch, writing all course materials, and supervising 3-4 graduate teaching assistants and undergraduate learning assistants each year.

This course won the Best Small Course award in fall 2015. Its annual enrollment has grown from around 12 to over 20 since I have been teaching it.

Instructor, Astronomy 101, each fall, 2016-2019

Duties have included significant modification to the standard curriculum, developing course materials, designing labs, and supervising around 15 graduate teaching assistants and undergraduate learning assistants.

This course won the Best Large Course award in fall 2016. Its annual enrollment has been around 600, which is the enrollment cap.

Instructor, University Physics 1, each spring, 2015-2019

Duties included curriculum design, developing course and recitation materials, and coordinating a very large team of 35 graduate teaching assistants and undergraduate learning assistants. Its annual enrollment has been 450-500. In spring 2018 I co-taught this course with Prof. Britton Plourde.

Instructor, Physics of Music, spring 2018

Duties included designing an entirely new curriculum and developing course materials. This course had an enrollment of around 24 (the enrollment cap)

Instructor, Problems in Contemporary Physics, fall 2015

Duties included preparing graduating physics majors for job searches, graduate school, and the Physics GRE.

The George Washington University:

Co-instructor, Physics and Music, spring 2014
Co-designer of computational physics course introduced in spring 2014
Frequent substitute instructor for Scale-Up (large-format flipped classroom) introductory classical mechanics and electrodynamics courses, 2012-2014

University of Arizona:

Instructor for calculus-based introductory mechanics lab, 2010-11
Lead instructor and course designer for Introduction to Computational Physics, 2010
Teaching assistant for Computational Physics, 2008-2010
Lead instructor and course designer for Introductory Physics 1, summer 2007
Instructor for electromagnetism/optics lab, 2006-2008
Instructor for Natural Science 101 lab, 2005

Research Experience

PI on NSF grant "Collaborative Research: A Faculty Development Approach to Transforming Undergraduate Physics Education by Integrating and Assessing Computation", in preparation [computational physics pedagogy / physics education research]

Associate Editor for the PICUP Consortium, 2016-present
[computational physics pedagogy / physics education research]

Member of the χQCD Collaboration, 2011-2015 [lattice QCD]

Member of the MILC Collaboration, 2007-2013 [lattice QCD]

Postdoctoral research under Andrei Alexandru at George Washington University, 2011-2015, as part of the GWUQCD collaboration [lattice QCD]

Worked under Doug Toussaint at the University of Arizona in the course of PhD studies, 2007-2011 [lattice QCD]

Worked with the ATLAS Collaboration at the University of Arizona, 2005-2006
[experimental particle physics]

Worked on an independent project with Dr. William Bickel on spectroscopy of the human singing voice and vowel formation and differentiation, 2006 [acoustics]

Publications

W. Freeman, A. Alexandru, M. Lujan, F. X. Lee, *Update on the sea contributions to hadron polarizabilities via reweighting.* Proceedings of Lattice 2014; to be published in Proceedings of Science. [arXiv:1410.4826]

M. Lujan, A. Alexandru, W. Freeman, F. X. Lee, *Finite volume study of electric polarizabilities from lattice QCD.* Proceedings of Lattice 2014; to be published in Proceedings of Science.

W. Freeman, A. Alexandru, M. Lujan, F. X. Lee, *Deflated inversion using a Hermitian Dirac*

operator for Wilson-type quarks, in preparation

W. Freeman, A. Alexandru, M. Lujan, F. X. Lee, *Sea contributions to electric polarizabilities through reweighting*, Phys. Rev. D 90 (2014) 054507. [arXiv:1407.2687]

M. Lujan, A. Alexandru, W. Freeman, F. X. Lee, *Electric polarizability of neutral hadrons from dynamical lattice QCD ensembles*, Phys. Rev. D 89, 074506 (2014), [arXiv:1402.3025].

W. Freeman *et al.*, *Sea contributions to hadron electric polarizabilities through reweighting*, PoS(Lattice 2012)015, [arXiv:12115570]

M. Gong *et al.*, *Strangeness and charmness content of nucleon from overlap fermions on 2+1-flavor domain-wall fermion configurations*, Phys.Rev.D 88(2013) 014503 [arxiv:1304.1194].

M. Lujan *et al.*, *The* Δ_{mix} *parameter in the overlap on domain-wall mixed action*, Phys.Rev.D 86 (2012) 014501, [arXiv:1204.6256]

W. Freeman and D. Toussaint, *The intrinsic strangeness and charm of the nucleon using improved staggered fermions*, Phys. Rev. D 88, 054503 (2013), [arXiv:1204.3866]

W. Freeman and D. Toussaint, *Improved method for calculating nucleon strangeness*, PoS(Lattice 2010)138, [arXiv:1011.5271v1]

W. Freeman and D. Toussaint, *The strange quark content of the nucleon in 2+1 flavor lattice QCD*, PoS(LAT2009)137, [arXiv:0912.1144]

D. Toussaint and W. Freeman, *The strange quark condensate in the nucleon in 2+1 flavor QCD*, Phys. Rev. Lett. 103:122002,2009, [arXiv:0905.2432]

D. Toussaint and W. Freeman, *Sample size effects in multivariate fitting of correlated data*, [arXiv:0808.2211]

A. Bazazov *et al.* [MILC Collaboration], *Lattice QCD ensembles with four flavors of highly improved staggered quarks*, in preparation

S. Basak *et al.* [MILC Collaboration], *Status of the MILC calculation of electromagnetic contributions to pseudoscalar masses*, to be published in PoS(Lattice 2012), [arXiv:1210:8157]

A. Bazazov *et al.* [MILC Collaboration], *Properties of light pseudoscalars from lattice QCD with HISQ ensembles*, PoS(Lattice 2011)107, [arXiv:1111.4314]

A. Bazazov *et al.* [MILC Collaboration], *Simulations with dynamical HISQ quarks*, PoS(Lattice 2010)320, [arXiv:1012.1265]

A. Bazazov *et al.* [MILC Collaboration], *Results for light pseudoscalar mesons*, PoS(Lattice 2010)074, [arXiv:1012.0868]

A. Bazazov *et al.* [MILC Collaboration], *Staggered chiral perturbation theory in the two-flavor case and SU(2) analysis of the MILC data*, PoS(Lattice 2010)083, [arXiv:1011.1792]

A. Bazazov *et al.* [MILC Collaboration], *Scaling studies of QCD with the dynamical HISQ action*, Phys.Rev.D 82:074501 (2010) [arXiv:1004.0342v2]

J. Bailey *et al.* [MILC Collaboration], *Progress on charm semileptonic form factors from 2+1 flavor lattice QCD*, PoS(LAT2009)250, [arXiv:0912.0214]

A. Bazazov *et al.* [MILC Collaboration], *Progress on four flavor QCD with the HISQ action*,

PoS(LAT2009):123, [arXiv:0911.0869]

A. Bazazov *et al.* [MILC Collaboration], *SU(2) chiral fits to light pseudoscalar masses and decay constants*, PoS(LAT2009):077, [arXiv:0911.0472]

A. Bazazov *et al.* [MILC Collaboration], *Results from the MILC collaboration's SU(3) chiral perturbation theory analysis*, PoS(LAT2009)079, [arXiv:0910.3618]

A. Bazazov *et al.* [MILC Collaboration], *MILC results for light pseudoscalars*, PoS(CD09)007, [arXiv:0910.2966]

S. Basak *et al.* [MILC Collaboration], *QCD equation of state at non-zero chemical potential*, PoS(LATTICE2008):171, [arXiv:0910.0276]

A. Bazazov *et al.* [MILC Collaboration], *HISQ action in dynamical simulations*, PoS(LATTICE2008):033, [arXiv:0903.0874]

S. Basak *et al.* [MILC Collaboration], *Electromagnetic splittings of hadrons from improved staggered quarks in full QCD*, PoS(LATTICE2008):127, [arXiv:0812.4486]

Presentations, colloquia, seminars, etc.

"A modified Metropolis Monte Carlo algorithm for dynamical triangulations"
Departmental high-energy seminar, Syracuse University, 2019

Co-facilitator, PICUP Faculty Development Workshop, River Falls, Wisconsin, 2017-2019
This is a workshop attended by 60+ faculty every summer.

"Computational Integration at the Departmental Scale"
Session organized at AAPT Winter Meeting 2019

"Integrating Computational Physics into Advanced Courses"
Workshop leader, AAPT Winter Meeting 2019

"Writing About Numbers: A Project-Based Approach to Computational Physics"
Contributed talk at AAPT Summer Meeting 2018, Washington DC

"Computational Physics in Undergraduate Pedagogy, or Perturbation Theory for Sophomores"
Departmental colloquium at George Washington University, fall 2018

"Highlights of the PICUP Collection: the Nonlinear Vibrating String"
Invited talk at AAPT Winter Meeting 2018, San Diego

"Use of the rapid multipole method to model the early solar system"
Poster presentation to be given by students at the AAPT Summer Meeting, Cincinnati, 2017

"Computational physics as a tool for undergraduate exploration"
Syracuse University Undergraduate Research Day Keynote, 2016

“The sign problem in lattice QCD”
High-Energy Theory Seminar, Syracuse University, 2015

“Disconnected Diagrams and the Quark Sea from the Lattice: Nucleon Strangeness and Hadron Polarizabilities”
High-Energy Theory Seminar, Syracuse University, 2014

“Progress on the sea charge contribution to electric polarizabilities via perturbative reweighting”
International Symposium on Lattice Gauge Theory 2014, Columbia University

“Supercomputer Simulations of Quark Behavior”
JUMP Scholarship Presentation, 2014 (seminar for GWU undergraduate scholarship recipients)

“Diluted stochastic estimators on Colonial One”
Colonial One User Group Seminar, 2014

“A tale of two estimators: stochastic estimation the nucleon strangeness and the neutron polarizability”
Lawrence Livermore National Laboratory Lattice Seminar, 2014

“N-body gravitational simulations: challenges and approaches”
George Washington University Astrophysics Seminar, 2013

“Computational physics from Newton to quarks”
Arizona State University Sundial Seminar (presentation for physics undergrads), 2013

“Further work on sea contributions to the nucleon polarizability via reweighting”
International Symposium on Lattice Gauge Theory 2013, Mainz

“The strangeness and charm of the nucleon: from lattice QCD to dark matter”
Fermilab Theoretical Physics Seminar, 2012

“Sea contributions to hadron electric polarizabilities through reweighting”
International Symposium on Lattice Gauge Theory 2012, Cairns (plenary talk)

“Wading through the glue: solving QCD on supercomputers”
Physics Department Colloquium, Franklin and Marshall College, 2011

“The strangeness and charm of the nucleon from lattice gauge theory”
Physics Department Colloquium, George Washington University, 2011

“Improved method for calculating nucleon strangeness”
International Symposium on Lattice Gauge Theory 2010, Sardinia

“The strange quark content of the nucleon in 2+1 flavor lattice QCD”
International Symposium on Lattice Gauge Theory 2009, Beijing

“The strangeness of the nucleon from lattice QCD”
American Physical Society Four Corners Meeting, Colorado School of Mines, 2009

"The strange quark content of the nucleon"
Graduate Colloquium, University of Arizona, 2009

"Nucleonic strangeness on the lattice"
Nuclear Physics Seminar Series, University of Arizona, 2009

"How to weigh a proton: an introduction to lattice QCD"
Graduate Colloquium, University of Arizona, 2008

"Vowel Formation in the Singing Voice"
Graduate Colloquium, University of Arizona, 2006

Service Work

Developer of open-source software package *anim*, a flexible 2D/3D OpenGL animation utility designed to be usable by beginning students yet useful for working scientists

Served as faculty advocate in support of the complainaint in a sexual assault case at SUNY ESF
In this role I advised the complainaint about procedures, drafted and edited case documents, provided counseling and support, and worked to ensure the perpetrator was sanctioned. I then assisted the complainaint in organizing a meeting with the president of SUNY ESF to address procedural flaws that we perceived in the process.

Served on Academic Integrity hearing panels and as a faculty interviewer, 2018-present

Mentor at the Early-Career AAPT Speed Networking event, AAPT Winter and Summer Meeting 2018

Member of the Syracuse University Physics Department Curriculum Committee, 2017-present

Referee for Physical Review D, Physical Review Letters, and The Physics Teacher

Leader of Frontiers in Science astronomy session, spring 2019
This was an outreach event for high school students who traveled to Syracuse University for a hands-on experience studying spectroscopy and its applications to astronomy.

Member of the Syracuse University College of Arts and Sciences Curriculum Committee, 2016-present
Member of the Curriculum Committee Arts and Sciences Core Subcommittee, 2016
Member of the Curriculum Committee Arts and Sciences Courses Subcommittee, 2017-present

Member of the Syracuse University College of Arts and Sciences Academic Committee, 2016-present

Member of the Local Organizing Committee for the Extreme QCD Conference in Washington, DC, 2012

Member of the University of Arizona Physics Graduate Council, 2009-2010

Scholarships and Awards

Syracuse University Office of Disability Services “Above and Beyond” award for exceptional service to students with disabilities, 2016
Syracuse University Physics Department Teaching Excellence Award, 2015
Awarded for Computational Physics I class
Syracuse University Physics Department Teaching Excellence Award, 2016
Awarded for Astronomy 101
Cubic Corporation Award for Excellence in Graduate Teaching, 2011
University of Arizona Fan Fare Travel Award, 2010, for travel to Lattice 2010 in Sardinia, Italy
Graduate Registration Scholarship, 2006
University of Alabama in Huntsville President's Scholarship for Academics, 1999-2004
NASA Space Grant Fellowship, 2005-2006
UAH Choral Scholarship, 2005-2006
Scholarship for Creative Writing, 1999-2000