Curriculum Vitæ

Evan Berkowitz

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Education

2008-2013 *University of Maryland, College Park.*
Ph.D. in Physics. Defended 8 April 2013.

2004-2008 *Massachusetts Institute of Technology.*
SB in Physics, GPA of 4.8/5.0.

1998-2004 *Hunter College High School*, New York City, New York.
Graduated with honors in mathematics and physics.

Current Position

Postdoctoral Researcher, Institut für Kernphysik & Institute for Advanced Simulation, Forschungszentrum Jülich

- Working on few-nucleon systems, neutrinoless double beta decay, hadronic parity violation, nucleon structure, nuclear effective field theory, gauge/gravity duality, and other topics in lattice gauge theory and computational physics.

Positions Held

2013-2016 *Postdoctoral Researcher* — Lattice Group, Nuclear and Chemical Sciences Division, Physical and Life Sciences Directorate, Lawrence Livermore National Laboratory, Livermore CA.

- Developed new techniques for studying few-nucleon systems via lattice QCD, including parity-odd scattering channels.
- Pioneered the application of lattice QCD to axion cosmology.
- Executed precision tests of gague/gravity duality.

2008-2013 *Graduate Research Assistant* — Theoretical Quarks, Hadrons, and Nuclei, Maryland Center for Fundamental Physics.

- Studied topological solitons in color-flavor-locked high-density quark matter.
- Characterized a phase of condensed nuclei with applications for helium white dwarfs.
- Pointed out certain constraining aspects of finite-volume simulations.

2007 *Undergraduate Researcher* — Waves and Beams, MIT Plasma Science and Fusion Center.

- Modeled and simulated an image-free cavity for a 20:1 elliptical beam to determine eigenfrequencies.
- Developed and experimented with a photonic band gap cavity solid model.
- Modeled and simulated TESLA accelerator cavities to find field features and dispersion relations of TM modes, including beam-breakup modes.

2006 *Undergraduate Researcher* — Applied Mathematics Fluids Laboratory, MIT.
- ◇ Quantified the nibbling frequency in the tears of wine phenomenon for a variety of geometrical arrangements and chemical compositions.
- ◇ Designed and built an experiment to investigate natural frequencies in two-dimensional fluids.
- ◇ Developed software for video analysis of fluid motion experiments.

Grants, Honors & Awards

2017 *11.3M core-hours* as PI for Hypernuclei and the Three-Neutron System from Lattice QCD, Jülich Supercomputing Center

2017 *3M core-hours* as co-PI for Scaling Lattice QCD Calculations for Leadership Computing Facilities, OLCF Director's Discretionary Time

2017 *6.5M Hours* as co-PI for Implementing Improved Operators for Lattice QCD Calculations of Two-Nucleon Elastic Scattering, NERSC 2017 ERCAP Allocation

2016 *Honorable Mention* in the 2016 Gravity Research Foundation Awards for Essays on Gravitation for *A Microscopic Description of Black Hole Evaporation via Holography*

2016 *64M core-hours* as co-PI for First Lattice QCD calculation of the I=2 Two-Nucleon Parity Violating Amplitude, INCITE 2016

2015 *17.46M CPU-Hours* as co-PI for First Lattice QCD Calculation of the I=2 Two-Nucleon Parity Violating Amplitude, NERSC 2015 ERCAP Allocation

Fall 2014 *10M CPU-Hours* as co-PI for Lattice QCD Investigation of Hadronic Parity Violation, NERSC 2014 Allocation

Spring 2013 *Ann G. Wylie Dissertation Fellowship*, University of Maryland

2011-2012 *JSA/Jefferson Lab Graduate Fellow*

2009-2013 *Research Assistanship*, Theoretical Quarks, Hadrons, and Nuclei Research Group

2008-2010 *Departmental Fellowship*, Physics Department, University of Maryland

2008 ΣΠΣ, Massachusetts Institute of Technology

Publications

[25] Christopher Körber, Evan Berkowitz, and Thomas Luu. Sampling General N-Body Interactions with Auxiliary Fields. 2017, nucl-th/1706.06494.

[24] Evan Berkowitz, David Brantley, Chris Bouchard, Chia Cheng Chang, M. A. Clark, Nicholas Garron, Bálint Joó, Thorsten Kurth, Chris Monahan, Henry Monge-Camacho, Amy Nicholson, Kostas Orginos, Enrico Rinaldi, Pavlos Vranas, and André Walker-Loud. An Accurate Calculation of the Nucleon Axial Charge with Lattice QCD. 2017, hep-lat/1704.01114.

[23] Evan Berkowitz. METAQ: Bundle Supercomputing Tasks. 2017, physics.comp-ph/1702.06122.

[22] Evan Berkowitz, Chris Bouchard, Chia Cheng Chang, M. A. Clark, Bálint Joó, Thorsten Kurth, Christopher Monahan, Amy Nicholson, Kostas Orginos, Enrico Rinaldi, Pavlos Vranas, and André Walker-Loud. Möbius Domain-Wall fermions on gradient-flowed dynamical HISQ ensembles. 2017, hep-lat/1701.07559.

[21] Amy Nicholson, Evan Berkowitz, Chia Cheng Chang, M. A. Clark, Balint Joo, Thorsten Kurth, Enrico Rinaldi, Brian Tiburzi, Pavlos Vranas, Andre Walker-Loud. Neutrinoless double beta decay from lattice QCD. *PoS(LATTICE 2016)017*, 2016, hep-lat/1608.04793.

[20] Evan Berkowitz. Supergravity from Gauge Theory. *PoS(LATTICE 2016)238*, 2016, hep-lat/1608.01951.

[19] Evan Berkowitz, Enrico Rinaldi, Masanori Hanada, Goro Ishiki, Shinji Shimasaki, and Pavlos Vranas. Precision lattice test of the gauge/gravity duality at large N. *Phys. Rev. D*, 94:094501, Nov 2016, hep-lat/1606.04951.

[18] Evan Berkowitz, Enrico Rinaldi, Masanori Hanada, Goro Ishiki, Shinji Shimasaki, Pavlos Vranas. Supergravity from D0-brane Quantum Mechanics. Submitted to *PRL*, 2016, hep-th/1606.04948.

[17] Evan Berkowitz, Masanori Hanada, and Jonathan Maltz. A Microscopic Description of Black Hole Evaporation via Holography. *International Journal of Modern Physics D*, 2016, hep-th/1603.03055. Honorable Mention in Gravity Research Foundation 2016 Essay Competition.

[16] Evan Berkowitz, Masanori Hanada, and Jonathan Maltz. Chaos in Matrix Models and Black Hole Evaporation. *Phys. Rev. D*, 94:126009, Dec 2016, hep-th/1602.10473.

[15] Amy Nicholson, Evan Berkowitz, Enrico Rinaldi, Pavlos Vranas, Thorsten Kurth, Bálint Joó. Two-nucleon scattering in multiple partial waves. *PoS(LATTICE 2015)083*, 2015, hep-lat/1511.02262.

[14] Thorsten Kurth, Evan Berkowitz, Enrico Rinaldi, Pavlos Vranas, Amy Nicholson, Mark Strother, and André Walker-Loud. Nuclear Parity Violation from Lattice QCD. *PoS(LATTICE 2015)329*, 2015, hep-lat/1511.02260.

[13] Evan Berkowitz. Lattice QCD and Axion Cosmology. *PoS(LATTICE 2015)236*, 2015, hep-lat/1509.02976.

[12] Evan Berkowitz, Thorsten Kurth, Amy Nicholson, Bálint Joó, Enrico Rinaldi, Mark Strother, Pavlos M. Vranas, and André Walker-Loud. Two-Nucleon Higher Partial-Wave Scattering from Lattice QCD. *Physics Letters B*, 765:285 – 292, 2017, hep-lat/1508.00886.

[11] Evan Berkowitz, Michael I. Buchoff, and Enrico Rinaldi. Lattice QCD Input for Axion Cosmology. *Phys. Rev.*, D92:034507, 2015, hep-ph/1505.07455.

[10] Appelquist *et al.* (The Lattice Strong Dynamics Collaboration). Detecting Stealth Dark Matter Directly through Electromagnetic Polarizability. *Phys. Rev. Lett.*, 115:171803, Oct 2015, hep-ph/1503.04205. PRL Editor's Suggestion.

[9] Appelquist *et al.* (The Lattice Strong Dynamics Collaboration). Composite Bosonic Baryon Dark Matter on the Lattice: SU(4) Baryon Spectrum and the Effective Higgs Interaction. *Phys. Rev.*, D89:094508, 2014, hep-lat/1402.6656.

[8] Evan Berkowitz. *Some Novel Phenomena at High Density*. PhD thesis, University of Maryland, College Park, April 2013. http://drum.lib.umd.edu/handle/1903/14096.

[7] Evan Berkowitz, Thomas D. Cohen, and Patrick Jefferson. Multi-channel S-Matrices From Energy Levels In Finite Boxes. *Submitted to Phys.Rev.C*, 2012, hep-lat/1211.2261.

[6] Paulo F. Bedaque, Evan Berkowitz, and Srimoyee Sen. Thermodynamics of Nuclear Condensates and Phase Transitions in White Dwarfs. *Submitted to JHEP*, 2012, astro-ph/1206.1059.

[5] Paulo F. Bedaque, Evan Berkowitz, and Aleksey Cherman. Neutrino Emission from Helium White Dwarfs with Condensed Cores. *Submitted to JCAP*, 2012, nucl-th/1203.0969.

[4] Paulo F. Bedaque, Evan Berkowitz, Geoffrey Ji, and Nathan Ng. Electron Shielding of Vortons in High-Density Quark Matter. *Phys. Rev. D*, 85:043008, Feb 2012, nucl-th/1112.1386.

[3] Paulo F. Bedaque, Evan Berkowitz, and Srimoyee Sen. Stable Vortex Loops in Two-Species BECs. *Journal of Physics B: Atomic, Molecular and Optical Physics*, 45(22):225301, 2012, cond-mat.quant-gas/1111.4507.

[2] Paulo F. Bedaque, Evan Berkowitz, and Aleksey Cherman. Nuclear Condensate and Helium White Dwarfs. *The Astrophysical Journal*, 749(1):5, 2012, nucl-th/1111.1343.

[1] Paulo F. Bedaque, Evan Berkowitz, and Aleksey Cherman. Vortons in Dense Quark Matter. *Phys. Rev. D*, 84(2):023006, Jul 2011, nucl-th/1102.4795.

Talks

Calm Multi-Baryon Operators

1. LATTICE 2017, Grenada, Spain.

Job Management and Task Bundling

1. LATTICE 2017, Grenada, Spain.

The Nucleon Axial Charge from Lattice QCD

3. Seminare Institut für Theoretische Physik II, 29 June 2017, Ruhr-Universität Bochum, Bochum, Germany
2. Invited Talk, OLCF Users Meeting, 23 May 2017, Oak Ridge National Laboratory, Oak Ridge, Tennessee
1. Low Energy Probes of New Physics, 15 May 2017, Mainz Institute for Theoretical Physics, Johannes Gutenberg Universität Mainz, Mainz, Germany

Neutrinoless Double Beta Decay from Lattice QCD

4. Seminare Helmholtz-Institut für Strahlen- und Kernphysik, 27 June 2017, Universität Bonn, Bonn, Germany
3. Matter over Antimatter: The Sakharov Conditions after 50 Years, 9 May 2017, Lorentz Center, Universiteit Leiden, Leiden, The Netherlands
2. ACFI Seminar, 2 February 2017, Amherst Center for Fundamental Interactions, UMass Amherst, Amherst, MA
1. NUCLEAR16, 9 September 2016, Kavli Institute for Theoretical Physics, Santa Barbara, CA

Supergravity from Gauge Theory

1. LATTICE 2016, 29 July 2016, Southampton, England

Nucleon-Nucleon Scattering at 800 MeV

1. INT-16-1, 6 May 2016, Institute for Nuclear Theory, Seattle, WA

Black Holes and Matrix Models

2. Particle Theory Seminar, 10 May 2016, University of Washington, Seattle, WA
1. Nuclear Theory Seminar, 21 April 2016, Lawrence Berkeley National Laboratory, Berkeley, CA

Lattice QCD Input to Axion Cosmology

10. Axion Meeting, 7 January 2016, Lawrence Berkeley National Laboratory, Berkeley, CA
9. ITS/HEP Seminar, 20 October 2015, University of Oregon, Eugene, OR
8. Intersections of BSM Phenomenology and QCD for New Physics Searches INT-15-3, 13 October 2015, Institute for Nuclear Theory, Seattle, WA
7. Postdoc Seminar Series, 22 September 2015, Lawrence Livermore National Laboratory, Livermore, CA
6. Workshop on Microwave Cavity Design for Axion Detection, 27 August 2015, Lawrence Livermore National Laboratory, Livermore, CA
5. Quantum Hadron Physics Seminar, 27 July 2015, RIKEN, Wako, Japan
4. Lattice 2015, 16 July 2015, Kobe, Japan
3. Nuclear Theory Seminar, 25 July 2015, MIT, Cambridge, MA
2. Nuclear Physics Seminar, 17 June 2015, University of Maryland, College Park, MD
1. Lattice for Beyond the Standard Model Physics Workshop, 23 April 2015, Lawrence Livermore National Laboratory, Livermore, CA

Nuclear Physics from First Principles

2. Nuclear & High Energy Physics Seminar, 13 August 2015, Lawrence Livermore National Laboratory, Livermore, CA
1. 2014 SciDAC PI Meeting, 31 July 2015, Office of Advanced Scientific Computing Research, Washington, DC, with Thorsten Kurth

Nuclear Condensation of Dense Helium

6. Triangle Nuclear Theory (TNT) Colloquium, 23 April 2013, NC State, Raleigh, NC
5. Nuclear physics seminar *&* thesis defense, 8 April 2013, University of Maryland, College Park, MD
4. Nuclear physics seminar, 24 December 2012, Stony Brook University, Stony Brook, NY
3. Nuclear physics seminar, 7 December 2012, Institute for Nuclear Theory, Seattle, WA
2. Nuclear & High Energy Physics Seminar, 5 December 2012, Lawrence Livermore National Laboratory, Livermore, CA
1. Nuclear Theory Seminar, 4 December 2012, Lawrence Berkeley National Laboratory, Berkeley, CA

Vortons: Stable Vortex Loops

1. High Energy Physics Seminar, 7 February 2012, Tel Aviv University, Tel Aviv, Israel

Vortons at High Density

1. Nuclear Physics Seminar, 26 January 2011, University of Maryland, College Park, MD

Teaching

Winter 2017 — *Substitute Lecturer* — for Theoretical Hadron Physics at the University of Bonn, covering spontaneous symmetry breaking, Goldstone's theorem and chiral symmetry in QCD.

2009-2013 — *Substitute Lecturer* — prepare and deliver lectures to graduate classes in electrodynamics and quantum mechanics.

Summer 2011 — *Research Mentor* — provided daily guidance, technical and conceptual assistance for two high school students in the Montgomery Blair Magnet Summer Research Program, ultimately leading to a publication.

Spring 2009 — *Mechanics and Particle Dynamics* — Teaching Assistant for one section of introductory physics for engineers.

Spring 2009 — *Inquiry into Physics* — In-class teaching assistant for introductory physics for elementary educators, focusing on qualitative physical understanding via lab-based learning.

Fall 2008 — *Fundamentals of Physics I* — Teaching assistant in for two peer-discussion, tutorial-style sections of introductory physics primarily for pre-med students.

Summer 2005 — *PADI Open Water Diver Course* — Instructor and certifier of record for 31 Open Water and Junior Open Water Divers, teaching academic and practical SCUBA diving knowledge.

Conferences, Programs, Meetings & Workshops

July 2017 — *Neutrinoless Double Beta Decay INT-17-2a and INT-17-67W*
Institute for Nuclear Theory, Seattle, Washington

June 2017 — *LATTICE 2017*
Grenada, Spain

Spring 2017 — *OLCF Users Meeting*
Oak Ridge National Laboratory, Oak Ridge, Tennessee

Spring 2017 — *Matter over Antimatter: The Sakharov Conditions After 50 Years*
Lorentz Center, Universiteit Leiden, Leiden, The Netherlands

Summer 2016 — *Frontiers in Nuclear Physics*
Kavli Institute for Theoretical Physics, Santa Barbara, California

July 2016 — *LATTICE 2016*
University of Southampton, Southampton, United Kingdom

Spring 2016 — *Nuclear Physics from Lattice QCD INT-16-1*
Institute for Nuclear Theory, Seattle, Washington

October 2015 — *Intersections of BSM Phenomenology and QCD for New Physics Searches INT-15-3*
Institute for Nuclear Theory, Seattle, Washington

July 2015 — *Numerical Approaches to the Holographic Principle, Quantum Gravity and Cosmology*
Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto, Japan

July 2015 — *LATTICE 2015*
Kobe, Japan

April 2015 — *Lattice for Beyond the Standard Model Physics*
Lawrence Livermore National Laboratory, Livermore, California

December 2014 — *USQCD QUDA Workshop*
Fermilab, Batavia IL.

July 2014 — *2014 SciDAC PI Meeting*
Office of Advanced Scientific Computing Research, Washington, DC

♢ *Wick Contractions for Nucleon-Nucleon Scattering and Matrix Elements*. E. Berkowitz, T. Kurth, M. Strother.

♢ *Nuclear Parity Violation from Lattice QCD*. E. Berkowitz, T. Kurth, A. Walker-Loud.

♢ *Bootstrap Algebraic Multigrid and Lattice QCD*. E. Berkowitz, R. Falgout, C. Schroeder.

June 2014 — *LATTICE 2014*
Columbia University, New York NY

December 2013 *Lattice Meets Experiment 2013: Beyond the Standard Model*
Brookhaven National Laboratory, Brookhaven, New York

March 2013 *Nuclear Reactions From Lattice QCD INT-13-53W*
Institute for Nuclear Theory, Seattle, Washington.

July 2010 *International Nuclear Physics Conference*
University of British Columbia, Vancouver, Canada.

June 2010 *National Nuclear Physics Summer School and TRIUMF Summer Institute*
TRIUMF, Vancouver, Canada.

May 2010 *Workshop on Large N Gauge Theories*
University of Maryland, College Park, Maryland.

Service

Ongoing *Referee* — Journal of Physics B: AMO Physics, Physical Review D.

Spring 2017 *Organizer, March for Science, Bonn* — helped with logistics, volunteers, speakers, etc.

April 2015 *Organizer, Lattice for Beyond the Standard Model Physics Workshop, LLNL* — ran a three-day workshop for high-energy theorists, string theorists, and lattice QCD practitioners.

November 2014 *Volunteer, Bay Area Science Festival* — helping attendees navigate and otherwise enjoy the festival.

March 2014 *Judge and Team Leader, Contra Costa County Science and Engineering Fair* — judging awards for 7th and 8th grade student projects regarding the physical sciences.

Spring 2013 *Judge, Northern Virginia Regional Science and Engineering Fair* — deciding awards for 11^{th} and 12^{th} grade students on behalf of the MIT Club of DC.

Fall 2010 *Seminar Organizer* — planning and organizing the joint seminar for the nuclear theory and experimental groups.

Spring 2010 *Judge, Montgomery County Science Fair* — deciding awards on behalf of the MIT Alumni Association.

2008-2009 *Volunteer, Physics is Phun* — setting up and guiding hands-on demos before the main program of the UMD outreach program targeted at middle- and high-school students.

2006-2007 *Volunteer, Harvard-MIT Mathematics Tournament* — preparing classrooms, directing participants to rooms, and providing other logistical support for the joint Harvard-MIT Math Tournament for high school students.

Skills & Interests

Computer Languages — C, C++, Mathematica, Python, Scheme, MATLAB, LaTeX, bash, HTML/PHP. Familiar with Java, Python, Perl, Fortran. Capable in domain specific software: QDP++, Chroma, hypre.

Language — Hablo un poco español, und ich spreche ein bisschen Deutsch.

PADI Open Water Scuba Instructor — #192443.

Diversions — skiing, cycling, hiking, rock climbing, billiards, puzzles and games, and sailing.