# KORY STIFFLER

*Curriculum Vitae*

Brown Theoretical Physics Center and Department of Physics
Brown University, Barus Building 211
Providence, RI 02912-1843, USA

kory_stiffler@brown.edu
https://vivo.brown.edu/display/kstiffle
https://hepthools.github.io/Adinkra/
https://hepthools.github.io/Data/

## EDUCATION

**The University of Iowa**, Department of Physics and Astronomy — Iowa City, IA
Ph. D. in Theoretical Physics — July 2010
Dissertation: *A Walk Through Superstring Theory With an Application to Yang-Mills Theory: k-strings and D-branes as Gauge/Gravity Dual Objects*
Adviser: Vincent Rodgers, Ph.D.
Synopsis: Examines dualities between superstring theory and gauge theories. Shows examples of how D-branes can be seen as dual objects to non-Abelian gauge theory configurations of strongly coupled color flux tubes called k-strings.

**The University of Iowa**, Department of Physics and Astronomy — Iowa City, IA
M.S. in Theoretical Physics — December 2007

**The University of Iowa**, College of Engineering — Iowa City, IA
B.S.E. with Honors, in Biomedical Engineering with a minor in Physics — December 2003
Honors Project: *Design and Implementation of a Cell Volume Measurement System*
Advisor: Michael A. Mackey, Ph.D.
Synopsis: wrote C code for streaming analog to digital signal conversion for future use in real-time cancer cell stream measurements.

## PROFESSIONAL HISTORY

**Assistant Professor of Physics (Research)**, Department of Physics, Brown University — Providence, RI, August 2018 - present
Conduct primary research and mentor graduate and undergraduate research students in supersymmetry, mathematical physics, particle physics, gravitation, and cosmology. Perform regular informal teaching duties in support of Prof. S.J. Gates Jr.'s teaching load.

**Assistant Professor**, Department of Natural Sciences, Northwest Missouri State University — Maryville, MO, August 2016 – August 2018
Teach undergraduate physics and astronomy courses. Conduct primary research and mentor undergraduate research students in black hole physics, cosmology, supersymmetry, and particle physics. Lead outreach activities relating to physics education.

**Visiting Assistant Professor**, Department of Chemistry, Physics, and Astronomy, Indiana University Northwest — Gary, IN, August 2013–August 2016
Teach undergraduate physics and astronomy courses. Conduct primary research and mentor undergraduate research students in string theory, supersymmetry, and particle physics. Lead students in outreach activities relating to physics education.

**Postdoctoral Research Associate**, Center for String and Particle Theory Department of Physics, The University of Maryland — College Park, MD, August 2010–August 2013
Perform regular informal teaching duties in support of Prof. S.J. Gates Jr.'s teaching load such as: substitute lecture, provide regular classroom support, help write tests. Conduct primary research in string theory, supersymmetry and particle physics, including mentoring undergraduate and graduate students in these research areas.

## SCHOLARSHIP

**Interests:** Theoretical Particle Physics; Supersymmetric Representation Theory and Adinkras; Theoretical Cosmology; Theoretical Black Hole Physics; String Theory;

### Papers (student co-authors in bold)*

1) E. Goins, K. Iga, J. Kostiuk, and K. Stiffler, *The Signed Monodromy Group of an Adinkra*, arXiv: 1909.02609 [math.CO]

2) **S. Brensinger**, **K. Heitritter,** V. G. J. Rodgers, K. Stiffler, and C. Whiting, *Dark Energy from Dynamical Projective Connections,* accepted for publication in Class. Quant. Grav., arXiv: 1907.05334[hep-th].

3) S. James Gates, Jr., **Daniel Lay, S.-N. Hazel Mak, Brock Peters, Aravind Ramakrishnan,** Kory Stiffler, **Zachary Wimpee, Xiao Xiao, Yifan Yuan, Jinjie Zhang, and Peter Zhou,** *On the Ubiquity Of Electromagnetic-Duality Rotations in 4D, $\mathcal{N}$= 1 Holoraumy Tensors for On-Shell 4D Supermultiplets,* accepted for publication in Int. J. Mod. Phys. A, arXiv: 1906.02971[hep-th].

4) S. James Gates, Jr., **Yangrui Hu**, and Kory Stiffler, *Adinkra Height Yielding Matrix Numbers: Eigenvalue Equivalence Classes for Minimal Four-Color Adinkras*, Int.J.Mod.Phys. A34 (2019) 18, 1950085, arXiv: 1904.01738 [hep-th].

5) S. J. Gates, Jr. and K. Stiffler, *Exploring the Abelian 4D, $\mathcal{N}$= 4 Vector-Tensor Supermultiplet and Its Off-Shell Central Charge Structure*, JHEP 1903 (2019) 129, arXiv:1812.04236 [hep-th].

6) **S.-N. Hazel Mak** and K. Stiffler, *4D, $\mathcal{N}$= 1 Matter Gravitino Genomics*, Symmetry 11 (2019) 2, 217, arXiv:1812.07680 [hep-th].

7) S. J. Gates, Jr., K. Iga, **L. Kang**, V. Korotkikh, and K. Stiffler, *Generating all 36,864 Four-Color Adinkras via Signed Permutations and Organizing into $\ell$- and $\ell$-tilde-Equivalence Classes*, Symmetry 11 (2019) 1, 120, arXiv:1712.07826 [hep-th].

8) **D. E. A. Gates,** S. J. Gates, Jr., and K. Stiffler, *A Proposal on Culling & Filtering a Coxeter Group for 4D, $\mathcal{N}$= 1 Spacetime SUSY Representations: Revised,* JHEP 1608 (2016) 076, arXiv: 1601.00725 [hep-th].

9) S. J. Gates, Jr., **J. Parker,** V. G. J. Rodgers, L. Rodriguez**,** and K. Stiffler, *An Extended Detailed Investigation of First and Second Order Supersymmetries for Off-Shell $\mathcal{N}$ = 2 and $\mathcal{N}$ = 4 Supermultiplets*, Symmetry 7 (2015) 2, 1080-1121, arXiv:1106.5475 [hep-th].

10) **M. Calkins, D.E.A. Gates**, S. J. Gates, Jr., and K. Stiffler, *Adinkras, 0-branes, Holoraumy and the SUSY QFT/QM Correspondence*, Int. J. Mod. Phys. A30 (2015) 11, 1550050, arXiv: 1501.00101[hep-th].

11) S. J. Gates, Jr., T. Hübsch, and K. Stiffler, *On Clifford-Algebraic `Holoraumy', Dimensional Extension, and SUSY Holography,* Int. J. Mod. Phys. A30 (2015) 09, 1550042, arXiv: 1409.4445 [hep-th].

12) S. J. Gates, Jr. and K. Stiffler, *Adinkra Color Confinement in Exemplary Off-Shell Constructions of 4D, $\mathcal{N}$=2 Supersymmetry Representations*, JHEP 1407 (2014) 051, arXiv: 1405.0048 [hep-th].

13) S. J. Gates, Jr., **S. Randall**, and K. Stiffler, *Reduction Redux of Adinkras*, Int.J.Mod.Phys. A29 (2014) 13, 1450070, arXiv: 1312.2000 [hep-th].

14) **I. Chappell,** S. J. Gates, Jr., W. D. Linch III, **J. Parker, S. Randall, A. Ridgway,** and K. Stiffler, *4D, $\mathcal{N}$=1 Supergravity Genomics,* JHEP 1310 (2013) 004, arXiv: 1211.3318 [hep-th].

15) **B. Button, S. J. Lee**, L. Pando Zayas, V. G. J. Rodgers, and K. Stiffler, *Holographic k-string Tensions in Higher Representations and Lüscher Term Universality*, Phys. Rev. D 87, 126005 (2013), arXiv:1209.5149 [hep-th].

16) S. J. Gates, Jr., T. Hübsch, and K. Stiffler, *Adinkras and SUSY Holography*, Int. J. Mod. Phys. A29 (2014) 1450041, arXiv:1208.5999 [hep-th].

17) S. J. Gates, Jr., **J. Hallett,** T. Hübsch, and K. Stiffler, *The Real Anatomy of Complex Linear Superfields*, Int. J. Mod. Phys. A27 (2012) 1250143**,** arXiv: 1202.4418[hep-th].

18) S. J. Gates, Jr., **J. Hallett, J. Parker,** V. G. J. Rodgers, and K. Stiffler, *4D, $\mathcal{N}$= 1 Supersymmetry Genomics (II),* JHEP 06 (2012) 071, arXiv: 1112.2147[hep-th].

19) K. Stiffler, *A Walk Through Superstring Theory With an Application to Yang-Mills Theory: K-strings and D-branes as Gauge/Gravity Dual Objects*, University of Iowa Ph.D. Thesis, Proquest (2010) 3422196, arXiv:1012.0021 [hep-th].

20) K. Stiffler, *Mesons from String Theory*, Proceedings of the 2009 Meeting of the Division of Particles and Fields of the American Physics Society: http://www.slac.stanford.edu/econf/C090726/, arXiv:0909.5681 [hep-th].

21) C. A. Doran, L. A. Pando Zayas, V. G. J. Rodgers, and K. Stiffler, *Tensions and Lüscher Terms for (2+1)-dimensional k-strings from Holographic Models*, JHEP 11 (2009) 064, arXiv:0907.1331 [hep-th].

22) L. A. Pando Zayas, V. G. J. Rodgers, and K. Stiffler, *Lüscher Term for k-string Potential from Holographic One Loop Corrections*, JHEP 12 (2008) 036, arXiv:0809.4119 [hep-th].

**Authors listed alphabetically*

## Open-Source Software (student co-authors in bold)*

1) **D. Choi, L. Kang, A. Ramakrishnan**, V.G.J. Rodgers, K. Stiffler, and **B. Wade**, *Adinkra* repository published on GitHub. *Mathematica* package containing tools to work with 4D, N=1 supersymmetry in a Majorana representation, tools to reduce to 1D adinkras and tools to work with adinkras. *Adinkra* repository published on 12/16/2018

2) **S.-N. Hazel Mak**, **A. Ramakrishnan**, and K. Stiffler, *Data* repository published on GitHub. *Mathematica* data files associated with ArXiv: 1812.04236, 1812.07680, 1904.01738, and 1906.02971 [hep-th]. *Data* repository files first published on 12/16/2018.

**Authors listed alphabetically*

## Honors, Grants, and Awards

| | |
|---|---|
| External Travel Funds, Brown University, $1631.96 | June 2018 |
| External Travel Funds, Brown University, $669.72 | December 2017 |
| External Travel Funds, Pepperdine University, $188.95 | July 2017 |
| External Travel Funds, Brown University, $618.70 | December 2016 |
| External Travel Funds, University of Maryland, $1,089.70 | July 2016 |
| External Travel Funds, Dartmouth University, $62 | June 2016 |
| Nominee, 2012 D. C. Spriestersbach Dissertation Prize, University of Iowa | August 2012 |
| Travel Grant, Department of Physics and Astronomy, University of Iowa, $2000 | July 2010 |
| Graduate College Summer Fellowship, University of Iowa, $3000 | June 2010 |
| Nominee, Teaching Assistant Award, Council on Teaching, University of Iowa | Spring 2010 |
| Perlmutter Award, Miami 2007 Conference, University of Miami, software prize | December 2007 |
| Travel Grant, Graduate Student Senate Travel Fund, University of Iowa, $300 | August 2007 |
| Research Fellowship, Theoretical Advanced Study Institute in Elementary Particle Physics (TASI), $1100 | June 2007 |
| Nominee, Teaching Assistant Award, Council on Teaching, University of Iowa | Spring 2007 |

## Research Student Mentees

Zachary Wimpee, Angelo State University, Undergraduate Student — San Angelo, TX
Supersymmetric Representation Theory and Adinkras — June 2018 – present

Bohang Hu, Rensselaer Polytechnic Institute, Undergraduate Student — Troy, NY
Supersymmetric Representation Theory and Adinkras — Fall 2019 – present

Gabriel Hannon, Brown University, Undergraduate Student — Providence, RI
Supersymmetric Representation Theory and Adinkras — Spring 2018 – present

Yangrui Hu, Brown University, Ph. D. Student — Providence, RI
Supersymmetric Representation Theory and Adinkras — Fall 2018 – present

Sze Ning (Hazel) Mak, Brown University, Ph. D. Student — Providence, RI
Supersymmetric Representation Theory and Adinkras — Fall 2018 – present

Yiyu Yang, Brown University, Masters Student
Supersymmetric Representation Theory and Adinkras
Providence, RI
Fall 2018 – Spring 2019

Louis Hamaide, Brown University, Masters Student
Supersymmetric Representation Theory and Adinkras
Providence, RI
Fall 2018 – Spring 2019

Duo Wen, Brown University, Masters Student
Supersymmetric Representation Theory and Adinkras
Providence, RI
Fall 2017 – Spring 2019

Derrick Choi, University of Maryland, Undergraduate Student
Open source software development
College Park, MD
June 2018 – Spring 2019

Daniel Lay, University of Maryland, Undergraduate Student
Supersymmetric Representation Theory and Adinkras
College Park, MD
June 2018 – Spring 2019

Brock Peters, University of Maryland, Undergraduate Student
Supersymmetric Representation Theory and Adinkras
College Park, MD
June 2018 – Spring 2019

Aravind Ramakrishnan, University of Maryland, Undergraduate Student
Supersymmetric Representation Theory and Adinkras, open source software development
College Park, MD
June 2018 – Spring 2019

Benjamin Wade, University of Maryland, Undergraduate Student
Open source software development
College Park, MD
June 2018 – Spring 2019

Yifan Yuan, University of Maryland, Undergraduate Student
Supersymmetric Representation Theory and Adinkras
College Park, MD
June 2018 – Spring 2019

Peter Zhou, University of Maryland, Undergraduate Student
Supersymmetric Representation Theory and Adinkras
College Park, MD
June 2018 – Spring 2019

Jinjie Zhang, University of Maryland, Undergraduate Student
Supersymmetric Representation Theory and Adinkras
College Park, MD
June 2018 – Spring 2019

Xiao, The Chinese University of Honk Kong, Undergraduate Student
Supersymmetric Representation Theory and Adinkras
Honk Kong, China
June 2018 – Spring 2019

Lucas Kang, Brown University, Undergraduate Student
Supersymmetric Representation Theory and Adinkras
Providence, RI
Spring 2017 - Spring 2018

Andrew Dennis, Northwest Missouri State University, Undergraduate Student
Theoretical Black Hole Physics
Maryville, MO
Spring 2018

Dakota Shields, Northwest Missouri State University, Undergraduate Student
Theoretical Cosmology
Maryville, MO
Spring 2018

Jie Qiu, Northwest Missouri State University, Undergraduate Student
Supersymmetric Representation Theory and Adinkras
Maryville, MO
Summer 2017 – Spring 2018

Salman Iqbal, Indiana University Northwest, Undergraduate Student
Black Hole Physics
Gary, IN
Spring 2016

Saad Aftab, Indiana University Northwest, Undergraduate Student
Mathematical Physics Research Group, Supersymmetric Representation Theory and Adinkras
Gary, IN
Spring 2015

Jacob Bartos, Indiana University Northwest, Undergraduate Student — Gary, IN
Mathematical Physics Research Group, Supersymmetric Representation Theory and Adinkras — Spring 2015

Hiral Bharatia, Indiana University Northwest, Undergraduate Student — Gary, IN
Mathematical Physics Research Group, Supersymmetric Representation Theory and Adinkras — Fall 2014 - Spring 2015

Mathew Calkins, University of Maryland, Undergraduate Student — College Park, MD
SSTPRS 2012 -2015, Supersymmetric Representation Theory and Adinkras — Summer 2012 – Spring 2015

Delilah Gates, University of Maryland, Undergraduate Student — College Park, MD
SSTPRS 2013 -2014, Supersymmetric Representation Theory and Adinkras — Summer 2013 – Spring 2015

Anthony Partacz, Indiana University Northwest, Undergraduate Student — Gary, IN
Mathematical Physics Research Group, Supersymmetric Representation Theory and Adinkras — Fall 2014

Kyle Prisby, Indiana University Northwest, Undergraduate Student — Gary, IN
Mathematical Physics Research Group, Supersymmetric Representation Theory and Adinkras — Fall 2014

Kyle Tomczak, Indiana University Northwest, Undergraduate Student — Gary, IN
Mathematical Physics Research Group, Supersymmetric Representation Theory and Adinkras — Fall 2014

Valerie Keehn, Indiana University Northwest, Undergraduate Student — Gary, IN
Mathematical Physics Research Group, Supersymmetric Representation Theory and Adinkras — Fall 2014

John Ziebec, Indiana University Northwest, Undergraduate Student — Gary, IN
Mathematical Physics Research Group, Supersymmetric Representation Theory and Adinkras — Spring 2014 –Fall 2014

Katelyn DePena, University of Iowa, Undergraduate Student — Iowa City, IA
Black Hole Physics — Summer 2014

Danielle Kovacic, Indiana University Northwest, Undergraduate Student — Gary, IN
Supersymmetric Representation Theory and Adinkras, Physics Education and Outreach — Fall 2013 – Spring 2014

Carlos Gutierrez, Indiana University Northwest, Undergraduate Student — Gary, IN
Physics Education and Outreach — Fall 2013 – Spring 2014

Stephen Randall, University of Maryland, Undergraduate Student — College Park, MD
SSTPRS 2012 -2013, Supersymmetric Representation Theory and Adinkras — Summer 2012 – Spring 2014

Alexandra Deboer, Indiana University Northwest, Undergraduate Student — Gary, IN
Physics Education and Outreach — Fall 2013

Keith Burghardt, University of Maryland, Undergraduate and Graduate Student, — College Park, MD
SSTPRS 2012, Supersymmetric Representation Theory and Adinkras — Spring 2011 – Fall 2013

Alexander Ridgway, University of Maryland, Undergraduate Student — College Park, MD
SSTPRS 2012 -2013, Supersymmetric Representation Theory and Adinkras — Summer 2012 – Summer 2013

Uchenna Chukwu, University of Maryland, Undergraduate Student — College Park, MD
SSTPRS 2013, Supersymmetric Representation Theory and Adinkras — Summer 2013

Hoyoung Kang, University of Maryland, Undergraduate Student — College Park, MD
SSTPRS 2013, Supersymmetric Representation Theory and Adinkras — Summer 2013

Brian McPeak, University of Maryland, Undergraduate Student — College Park, MD
SSTPRS 2013, Supersymmetric Representation Theory and Adinkras — Summer 2013

Konstantinos Koutrolikos, University of Maryland, Graduate Student — College Park, MD
Supersymmetric Representation Theory and Adinkras — Fall 2011- Spring 2013

Abdul Khan, George Mason University, Graduate Student — Fairfax, VA
Supersymmetric Representation Theory & Adinkras — Fall 2010-Spring 2013

James Parker, University of Maryland, Undergraduate Student, High School Student — College Park, MD
SSTPRS 2009, 2012, Supersymmetric Representation Theory and Adinkras — Summer 2009 – Spring 2013

Brad Button, University of Iowa, Graduate Student, — Iowa City, IA
Superstring Theory, k-strings — Spring 2010 - Spring 2013

Chris Doran, University of Iowa, Graduate Student, — Iowa City, IA
Superstring Theory, k-strings — Fall 2008 - Spring 2013

Isaac Chappell, University of Maryland, Graduate Student, — College Park, MD
Supersymmetric Representation Theory and Adinkras — 2012

Matthew Mondragon, University of Maryland, Undergraduate Student — College Park, MD
Supersymmetric Representation Theory and Adinkras — Spring 2011

Quentin Collier, University of Iowa, Undergraduate Student — Iowa City, IA
Theoretical Cosmology — Fall 2007

## Presentations, Conference and Workshop Participation

Invited Talk, *From Wess-Zumino-Witten and Polyakov to Dark Matter and Dark Energy*, — Iowa City, IA
Particle Physics Seminar, Department of Physics and Astronomy, University of Iowa — March 25, 2019

Invited Talk, *Thomas-Whitehead Gravity*, Particle Physics Seminar, Department of — Iowa City, IA
Physics and Astronomy, University of Iowa — October 15, 2018

Conference Presentation, *Generating all 36,864 Four-Color Adinkras via Signed Permutations and Organizing into ℓ- and ℓ-tilde-Equivalence Classes,* Adinkra Mini-Meeting, Physics Department, Brown University — Providence, RI
December 2017

Conference participant, *Adinkra Mini-Meeting* — Providence, RI
Physics Department, Brown University — December 2016

Conference Presentation: *Updates on K-strings from the Supersymmetric D-brane Perspective,* Miami 2015 Conference, University of Miami — Fort Lauderdale, FL
December 2015

Workshop participant, *Student Summer Theoretical Physics Research Session (SSTPRS)* — College Park, MD
Center for String and Particle Theory, Physics Department, University of Maryland — Summer 2014

Invited Talk: *Game of Particles,* OSCAR Seminar, Optical Science Center for Applied Research, — Dover, DE
Delaware State University — April 24, 2014

Conference Presentation: *Holographic k-string Tensions in Higher Representations and Lüscher Term Universality,* Miami 2013 Conference, University of Miami — Fort Lauderdale, FL
December 2013

Conference Presentation: *Updates for Off-Shell SUSY Representation Theory Using Adinkras* — Fort Lauderdale, FL, December 2012
Miami 2012 Conference, University of Miami

Vendor, Iowa Doppler Products (acousto-optics physics laboratory education equipment), *Philadelphia 2012: The Experimental Core*, Summer meeting of the American Association of Physics Teachers (AAPT), The University of Pennsylvania — Philadelphia, PA, July 28 - August 1, 2012

Conference Participant, *Beyond the First Year*, Conference on Laboratory Instruction organized by the Advanced Laboratory Physics Association (ALPhA), The University of Pennsylvania and Drexel University — Philadelphia, PA, July 25 - July 27, 2012

Poster Presentation: *Adinkras: A Colorful Way to Study Particle Physics and Supersymmetry* — College Park, MD, March 2012
Postdoc Poster Symposium, University of Maryland, College of Computer, Mathematical, and Natural Sciences (CMNS)

Conference Presentation: *Mathematical Surprises from off-shell SUSY Representation Theory* — Fort Lauderdale, FL, December 2011
Miami 2011 Conference, University of Miami

Conference participant, *Confining Flux Tubes and Strings* — Trento, Italy, July 2010
European Center for Theoretical Studies in Nuclear Physics & Related Areas (ECT)

Seminar Presentation: *A Walk Through Superstring Theory with an Application to Yang-Mills Theory: k-strings and D-branes as Gauge/Gravity Dual Objects*, Particle Physics Seminar, University of Iowa — Iowa City, IA, May 2010

Seminar Presentation: *Superstrings, Supergravity, and Quark Representations* — Iowa City, IA, March 2010
Particle Physics Seminar, University of Iowa

Conference Presentation: *Mesons From String Theory* — Iowa City, IA, November 2009
Inaugural Meeting of the Prairie Section of the American Physical Society, The University of Iowa

Seminar Presentation: *Mesons From String Theory* — Iowa City, IA, September 2009
Particle Physics Seminar, University of Iowa

Conference Presentation: *Mesons From String Theory*, arXiv:0909.5681 [hep-th] — Detroit, MI, July 2009
Division of Particles and Fields of the American Physical Society, Wayne State University

Seminar Presentation: *Black Holes in String Theory* — Iowa City, IA, February 2009
Particle Physics Seminar, University of Iowa

Invited Speaker: *K-strings, D-branes, and the Gauge/Gravity Correspondence* — Ann Arbor, MI, March 2008
Brown Bag Seminar, Department of Physics, The University of Michigan

Conference participant, *Miami 2008* — Fort Lauderdale, FL, December 2008
Physics Department, The University of Miami

Conference Presentation: *K-strings, D-branes, and the Gauge/Gravity Correspondence* — Fort Lauderdale, FL, December 2007
Miami 2007 Conference, University of Miami

Summer School Participant, *Theoretical Advanced Study Institute in Elementary Particle Physics (TASI)*, 4-week session of classes, *String Universe,* Physics Department, The University of Colorado — Boulder, CO, June 2007

Seminar Presentation: *K-strings, D-branes, and the Gauge/Gravity Correspondence* — Boulder, CO, June 2007
Theoretical Advanced Study Institute in Elementary Particle Physics (TASI), University of Colorado

## Other Research Experience

**Student Summer Theoretical Physics Research Session (SSTPRS)** College Park, MD
Center for String and Particle Theory, Physics Department, University of Maryland June 2009
Develop supersymmetric representation theory utilizing graph theoretic Adinkra pictures, working with undergraduate and graduate students. Workshop led by S.J. Gates, Jr. (University of Maryland) and V.G.J. Rodgers (University of Iowa).

**Student Summer Theoretical Physics Research Session (SSTPRS)** Iowa City, IA
Department of Physics and Astronomy, University of Iowa June 2006
Participate in theoretical physics workshop for graduate and undergraduate students, attend lectures. Workshop led by S.J. Gates, Jr. (University of Maryland) and V.G.J. Rodgers (University of Iowa).

**Research Assistant in Experimental Particle Physics** Iowa City, IA
Department of Physics and Astronomy, University of Iowa January 2004–December 2005
Principal Investigator: Usha Mallik, Ph.D.

**Undergraduate Research Assistant in Experimental Particle Physics** Iowa City, IA
Department of Physics and Astronomy, University of Iowa June 2003–December 2003
Principal Investigator: Usha Mallik, Ph.D.

**Undergraduate Research Assistant in Biomedical Engineering** Iowa City, IA
Department of Neurology, UI Hospitals and Clinics, University of Iowa June 2002–March 2003
Principal Investigator: Dr. Ralph Adolphs.

# TEACHING

## Assistant Professor of Physics (Research)

Department of Physics, Brown University Providence, RI
Occasional instructor of record. Frequent substitute lecturer for Prof. S.J. Gates Jr. Provide regular classroom support, lead Conferences (problem solving sessions), help grade tests. Conduct primary research in string theory, supersymmetry and particle physics, including mentoring undergraduate and graduate students in these research areas. August 2018 - present

**Courses Taught:**

**PHYS0050: Foundations of Mechanics,** instructor of record for conferences. Calculus based, introductory classical mechanics. Fall 2019

**PHYS 0100: Flat Earth to Quantum Uncertainty: On the Nature and Meaning of Scientific Explanation,** occasional substitute. Algebra based, astronomy, history and philosophy of science, classical mechanics, electromagnetism, modern physics.

**PHYS0060: Foundations of Electromagnetism and Modern Physics,** frequent substitute. Calculus based, electromagnetism, light, and relativity. Spring 2019

**PHYS 0100: Flat Earth to Quantum Uncertainty: On the Nature and Meaning of Scientific Explanation,** frequent substitute. Algebra based, astronomy, history and philosophy of science, classical mechanics, electromagnetism, modern physics. Fall 2018

**Extra-Curricular:**

**Student Summer Theoretical Physics Research Session (SSTPRS)** — Providence, RI
Department of Physics, Brown University — June 2019
Develop supersymmetric representation theory utilizing graph theoretic Adinkra pictures, working with undergraduate and graduate students. Workshop led by S.J. Gates, Jr. (Brown University).

## Assistant Professor

Department of Natural Sciences, Northwest Missouri State University — Maryville, MO
Teach undergraduate physics and astronomy courses. Conduct primary research and mentor undergraduate research students in string theory, supersymmetry, and particle physics. — August 2016 – August 2018

**Courses Taught:**

Spring 2018

**PHYS 25110: General Physics II**, 3 credit lecture, algebra based electromagnetism
**PHYS 25112: General Physics II Lab**, 1 credit, algebra based electromagnetism
**PHYS 25230: Fundamentals of Classical Physics II**, 4 credit lecture, calculus based electromagnetism
**PHYS 25231: Fundamentals of Classical Physics II Lab**, 1 credit, calculus based electromagnetism
**PHYS 25352: Modern Physics II,** 3 credits, atomic, solid state, nuclear, and particle physics, general relativity and cosmology, introduction to undergraduate research

Fall 2017

**PHSC 40122: Descriptive Astronomy,** 3 credit lecture, introductory general astronomy
**PHSC 40123: Descriptive Astronomy Lab,** 1 credit, introductory general astronomy
**PHYS 25110: General Physics I**, 3 credit lecture, algebra based classical mechanics
**PHYS 25120: Fundamentals of Classical Physics I**, 4 credit lecture, calculus based classical mechanics
**PHYS 25121: Fundamentals of Classical Physics I Lab**, 1 credit lab, calculus based classical mechanics

Spring 2017

**PHYS 25110: General Physics I**, 3 credit lecture, algebra based classical mechanics
**PHYS 25111: General Physics I Lab**, 1 credit, algebra based classical mechanics
**PHYS 25112: General Physics II Lab**, 1 credit, algebra based electromagnetism
**PHYS 25230: Fundamentals of Classical Physics II**, 4 credit lecture, calculus based electromagnetism
**PHYS 25231: Fundamentals of Classical Physics II Lab**, 1 credit, calculus based electromagnetism

Fall 2016

**PHYS 25111: General Physics I Lab**, 1 credit, algebra based classical mechanics
**PHYS 25120: Fundamentals of Classical Physics I**, 2 lecture sections, 4 credits each, calculus based classical mechanics
**PHYS 25121: Fundamentals of Classical Physics I Lab**, 2 sections, 1 credit each, calculus based classical mechanics

**Extra-curricular:**

**Student Summer Theoretical Physics Research Session (SSTPRS)** — Providence, RI
Department of Physics, Brown University — June 2018
Develop supersymmetric representation theory utilizing graph theoretic Adinkra pictures, working with undergraduate and graduate students. Workshop led by S.J. Gates, Jr. (Brown University).

Professional Development, Peer Observation — Maryville, MO
Observed other instructors classrooms, discuss strategies for improvement, Northwest Missouri State University — Spring 2018

Professional Development, Attendee, *Bad Habits and the Assumptions we Make of Our Students,* Maryville, MO
Presentation and discussion on improving faculty understanding of students, Northwest Missouri State University November 16, 2017

Professional Development, Peer Observation Maryville, MO
Observed other instructors classrooms, observed by other instructors, discuss strategies for improvement, Northwest Missouri State University Fall 2017

Professional Development, Peer Observation Maryville, MO
Observed other instructors classrooms, observed by other instructors, discuss strategies for improvement, Northwest Missouri State University Spring 2017

Attendee, *Building Outcomes in Northwest Online* Maryville, MO
Presentation and discussion on course outcomes, Northwest Missouri State University Fall 2016

Professional Development, Peer Observation Maryville, MO
Observed other instructors classrooms, observed by other instructors, discuss strategies for improvement, Northwest Missouri State University Fall 2016

Professional Development, Attendee, *Transgender Students 101* Maryville, MO
Presentation and discussion on issues facing transgender individuals, Northwest Missouri State University September 8, 2016

## Visiting Assistant Professor

Department of Chemistry, Physics, and Astronomy, Indiana University Northwest Gary, IN
Teach undergraduate physics and astronomy courses. Conduct primary research and mentor undergraduate research students in string theory, supersymmetry, and particle physics. Lead students in outreach activities relating to physics education. August 2013–August 2016

**Courses Taught:**

**Phys P101: Physics in the Modern World,** 4 credit lecture and lab, conceptual course Spring 2016
**Phys P222: Physics II**, 3 credit lecture and discussion, calculus based, electricity, magnetism
**Phys P301: Physics III,** 3 credit lecture and discussion, calculus based, modern physics
**Phys P406: Physics Research,** 1 credit, 1 student, black hole formation research

**Ast A200: Introduction to Cosmology**, 3 credit lecture Fall 2015
**Phys P101: Physics in the Modern World,** 4 credit lecture and lab, conceptual course
**Phys P221: Physics I**, 3 credit lecture and discussion, calculus based, classical mechanics

**Phys P101: Physics in the Modern World,** 4 credit lecture and lab, conceptual course Spring 2015
**Phys P222: Physics II**, 3 credit lecture and discussion, calculus based, electricity, magnetism
**Phys P331: Theory of Electricity and Magnetism I**, 3 credits, Maxwell's equations
**Phys P406: Physics Research,** 2 credits, 2 students, mathematical physics research

**Ast A200: Introduction to Cosmology**, 3 credit lecture Fall 2014
**Phys P101: Physics in the Modern World,** 4 credit lecture and lab, conceptual course
**Phys P221: Physics I**, 3 credit lecture and discussion, calculus based, classical mechanics
**Phys P406: Physics Research,** 1 credit, 2 students, mathematical physics research

**Phys P101: Physics in the Modern World,** 4 credit lecture and lab, conceptual course Spring 2014
**Phys P222: Physics II**, 3 credit lecture and discussion, calculus based, electricity, magnetism
**Phys P301: Physics III,** 3 credit lecture and discussion, calculus based, modern physics
**Chem C409: Chemical Research,** 2 credits, 2 students, supersymmetry and particle physics

**Ast A200: Introduction to Cosmology**, 3 credit lecture — Fall 2013
**Phys P221: Physics I**, 3 credit lecture and discussion, calculus based, classical mechanics
**Phys P101: Physics in the Modern World,** 4 credit lecture and lab, conceptual course
**Chem C409: Chemical Research,** 1 credit, 3 students, physics education and outreach

**Extra-curricular:**

**Course and Degree Development** — Gary, IN
Discuss with colleagues, primarily Prof. Tia Walker, plans to establish BS/BA program in Biochemistry and outline course curriculum including physical biochemistry. — 2014-Spring 2016
Department of Chemistry, Physics, and Astronomy, Indiana University Northwest

**Mathematical Physics Research Group Organizer/Lecturer** — Gary, IN
Lecture and provide individual instruction for a group of undergraduate students in weekly sessions. Design lectures and problems that introduce physics minors to extra-curricular mathematical physics topics. Train students to work on an original research project on supersymmetry. Students may receive academic credit through course Phys P406: Physics Research. — October 2014-May 2015
Department of Chemistry, Physics, and Astronomy, Indiana University Northwest

## Postdoctoral Research Associate

Center for String and Particle Theory, Department of Physics, The University of Maryland — College Park, MD
Perform regular informal teaching duties in support of Prof. S.J. Gates Jr.'s teaching load such as: substitute lecture, provide regular classroom support, help write tests. Conduct primary research in string theory, supersymmetry and particle physics, including mentoring undergraduate and graduate students in these research areas. — August 2010–August 2013

Substitute lectured for
**Physics 411: Intermediate Electricity and Magnetism**, upper level undergraduate — Spring 2013
**Physics 401: Quantum Physics I,** upper level undergraduate — Fall 2012
**Physics 411: Intermediate Electricity and Magnetism**, upper level undergraduate — Spring 2012
**Physics 711: Symmetry Problems in Physics,** group theory, graduate level — Fall 2011

**Student Summer Theoretical Physics Research Session (SSTPRS) Organizer/Lecturer** — College Park, MD
Lecture and provide individual instruction for a group of undergraduate students in daily supersymmetric representation theory research. Collaborate with S.J. Gates, Jr. and Dr. William D. Linch III on teaching and research strategies with undergraduates. — June 2013
Center for String and Particle Theory, Physics Department, University of Maryland

**Student Summer Theoretical Physics Research Session (SSTPRS) Organizer/Lecturer** — College Park, MD
Lecture and provide individual instruction for a group of undergraduate students in daily supersymmetric representation theory research, culminating in a paper. Collaborate with S.J. Gates, Jr. and Dr. William D. Linch III on teaching and research strategies with undergraduates. — Summer 2012
Center for String and Particle Theory, Physics Department, University of Maryland

## Teaching Assistant

University of Iowa, Department of Physics and Astronomy — Iowa City, IA
Instructor of record for discussion and lab sections. Engaged in laboratory development — Spring 2006 - August 2010

**Laboratory Development** — Iowa City, IA
Basic Physics (029:008), College Physics I (029:011), Physics I (029:027), Introductory Physics I (029:081), College Physics II (029:012), Physics II (029:028), Introductory Physics II(029:082), Physics III(029:029), With Lab Coordinator Ron Vogel, wrote, designed, and/or edited forty-three experiments for four Physics Lab Manuals. — June 2009–August 2010

**Lab Instructor and Discussion Lecturer** — Iowa City, IA
Introductory Physics I (029:081) — Spring 2010
Taught three lab sections and one discussion section/lecture, held office hours.

**Lab Instructor and Discussion Lecturer** — Iowa City, IA
Introductory Physics II(029:082) — Fall 2009
Taught three lab sections and one discussion section/lecture, held office hours.

**Lab Instructor and Discussion Lecturer** — Iowa City, IA
Introductory Physics I (029:081) — Spring 2009
Taught three lab sections and one discussion section/lecture, held office hours.

**Lab Instructor and Discussion Lecturer** — Iowa City, IA
Introductory Physics II(029:082) — Fall 2008
Taught three lab sections and one discussion section/lecture, held office hours.

**Lab Instructor** — Iowa City, IA
College Physics I (029:011) — Summer 2008
Taught 1½ lab sections, led tutorial for all Undergraduate Physics courses (12 hours/week), held office hours.

**Lead Teaching Assistant, Lab Instructor, Discussion Lecturer, & Grader** — Iowa City, IA
Introductory Physics I (029:081) — Spring 2008
Supervised and instructed all teaching assistants for 300+ student course. Taught five lab sections and one discussion section/lecture, oversaw twenty-two lab sections, led weekly teaching assistant meetings. Observed and provided feedback for Teaching Assistant's labs and discussion sections, held weekly office hours. Utilized student and teaching assistant feedback to design and modify lab procedures and manuals. Grader for Graduate level course: Non-Linear Dynamics (029:206).

**Lead Teaching Assistant, Lab Instructor, & Discussion Lecturer** — Iowa City, IA
College Physics I (029:011) — Fall 2007
Supervised and instructed all teaching assistants for 300+ student course. Taught three lab sections and one discussion section/lecture, oversaw seventeen lab sections, led weekly teaching assistant meetings. Observed and provided feedback for Teaching Assistant's labs and discussion sections, held weekly office hours. Utilized student and teaching assistant feedback to design and modify lab procedures and manuals.

**Lab Instructor and Discussion Lecturer** — Iowa City, IA
College Physics I (029:011) — Summer 2007
Taught lab section, tutor for all Undergraduate Physics courses (8 hours/week), held office hours.

**Lead Teaching Assistant and Lab Instructor** — Iowa City, IA
Introductory Physics I (029:081) — Spring 2007
Supervised and instructed all teaching assistants for 300+ student course. Taught three lab sections, oversaw twenty lab sections, led weekly teaching assistant meetings. Observed and provided feedback for Teaching Assistant's labs and discussion sections, held weekly office hours. Utilized student and teaching assistant feedback to design and modify lab procedures and manuals.

**Lab Instructor & Grader** — Iowa City, IA
Introductory Physics I (029:081) — Fall 2006
Taught two lab sections, held office hours; grader for Graduate level course: Quantum Mechanics (029:245).

**Lab Instructor** — Iowa City, IA
College Physics I (029:011) — Summer 2006
Taught two lab sections, tutor for all Undergraduate Physics courses (6 hours/week).

**Lab Instructor & Discussion Lecturer** — Iowa City, IA
Introductory Physics I (029:081) — Spring 2006
Taught three lab sections and one discussion section/lecture, tutor for all Undergraduate Physics courses (10 hours/week), held office hours.

### Teaching Assistant

University of Iowa, College of Engineering — Iowa City, IA
Instructor of record for laboratories and discussions. — Fall 2002- Fall 2003

**Lab Instructor** — Iowa City, IA
Biological Systems Analysis (051:040) — Fall 2003
Taught lab section; grader.

**Discussion Lecturer** — Iowa City, IA
Engineering Problem Solving II (059:006) — Spring 2003
Taught discussion section/lecture, wrote exam questions, wrote discussion section lesson plans, participated in weekly curriculum review & planning meetings, held office hours, grader.

**Lab Instructor** — Iowa City, IA
Biological Systems Analysis (051:040) — Fall 2002
Taught lab section; grader.

### Undergraduate Tutor

University of Iowa, College of Engineering — Iowa City, IA
Introductory engineering courses and mathematics courses — October 2001–May 2002

## SERVICE

Diversity Advisory Board — Providence, RI
Campus level committee that considers matters that concern the campus community especially with regards to diversity, Brown University — Fall 2018-present

Faculty Participant, College of Arts and Sciences Commencement. Represent the Physics discipline by walking with faculty at commencement, Northwest Missouri State University — Maryville, MO April 28, 2018

Student Recruitment and Public Science Education, *I'm Going to Northwest,* Design, build, and give demonstrations of electromagnetism for middle school students on college visits to Northwest. Missouri State University. — Maryville, MO April 16, 2018

Judge, *Celebration of Quality* — Maryville, MO
Undergraduate research presentations, Northwest Missouri State University — March 30, 2018

Judge, Science Olympiad, Event: *Hovercraft* — Maryville, MO
Write, proctor, and grade written and hands-on exams for middle school students for regional competition, Northwest Missouri State University — March 3, 2018

Volunteer, Missouri Hope — Maryville, MO
Transportation support for role players during an emergency and disaster management training exercise, Mozingo Outdoor Education and Recreation Area — October 14 -15 2017

Student Support, *Exploring Majors and Minors*, — Maryville, MO
Walk-in session for students to seek academic advice, Northwest Missouri State University — October 11, 2017

*TA Training*, held session to train new physics tutor, Ujjawal Kumar, Northwest Missouri State University — Maryville, MO September 22, 2017

Society of Physics Students Chapter Advisor — Maryville, MO
Advise physics students in research and scholarship opportunities. Advise students in professional development, Northwest Missouri State University — Fall 2017

Faculty Welfare Committee — Maryville, MO
Campus level committee to examine and make recommendations about administrative proposals that affect faculty in areas such as benefits, workload, and pay, Northwest Missouri State University — Fall 2017

Faculty Participant, College of Arts and Sciences Commencement. Represent the Physics discipline by walking with faculty at commencement, Northwest Missouri State University — Maryville, MO April 29, 2017

Physics Curriculum Outcomes Committee — Maryville, MO
Discipline level committee to decide outcomes for physics classes, Northwest Missouri State University — Spring 2017

Role Player, *Active Shooter Training* — Maryville, MO
Campus activity to practice survival strategies in the event of a campus shooter, Northwest Missouri State University — April 8, 2017

Academic Dishonesty Committee — Maryville, MO
Department level committee to review a case of a student charged with cheating, Northwest Missouri State University — March 10, 2017

Judge, Science Olympiad, Event: *Hovercraft* — Maryville, MO
Write, proctor, and grade written and hands-on exams for middle school students for regional competition, Northwest Missouri State University — February 4, 2017

Interviewee, TRAPPIST-1 Exoplanets — Maryville, MO
Interviewed by a student for a class project for a film class about planets recently discovered outside the solar system, Northwest Missouri State University — February 22, 2017

Attendee, *Chapter 2 Revision Forum* — Maryville, MO
Presentation and discussion on the changes to the part of the faculty handbook dealing with tenure and promotion, Northwest Missouri State University — January 12, 2017

Student Support, *General Registration* — Maryville, MO
Help students register for classes — January 6, 2017

Student Support, *First Year Connections: Spotlight on Careers* — Maryville, MO
Event to explain careers to first year undergraduate students, Northwest Missouri State University — December 4, 2016

Discussion Leader, Philosophy Club, *The Physics of Interstellar* — Maryville, MO
Watched *Interstellar* with student group and explained the physics demonstrated in the movie, Northwest Missouri State University — November 8-9, 2016

Outreach, *Pie in the Face*, — Maryville, MO
Got pied in the face by students for local fundraiser, United Methodist Church — October 20, 2016

Student Support, career-fair style event in student union — Maryville, MO
Discuss nanoscience degree with prospective nanoscience majors. — September 26, 2016

Student Support, career-fair style event in student union — Maryville, MO
Discuss nanoscience degree with prospective nanoscience majors. — September 19, 2016

Attendee, *Transgender Students 101* — Maryville, MO
Presentation and discussion on issues facing transgender individuals, Northwest Missouri State University — September 8, 2016

Student Support, *First Year Connections: Trivia Night* — Maryville, MO
Compose and deliver science trivia questions to first year students, Northwest Missouri State University — September 7, 2016

Judge, Purdue University Calumet Science Olympiad, Event: *Crave the Wave* — Calumet, IN
Write, proctor, and grade written and hands-on exams for middle school and high school students for regional competition. — March 5, 2016

Public Speaker, Regional Science Olympiad, Talk Title: *How do we Know the Earth is There?* — Gary, IN
Talk celebrating 100 years of general relativity, Indiana University Northwest — February 27, 2016

Judge, Northwest Indiana Science Olympiad, Events: *Crave the Wave* and *It's About Time* — Gary, IN
Write, proctor, and grade written and hands-on exams for middle school and high school students for regional competition. — February 27, 2016

Student Recruitment: *Fall Preview Night,* — Gary, IN
Design, build, and give demonstrations of electromagnetism for prospective students. Discuss curriculum with prospective students, Indiana University Northwest — October 22, 2015

Student Recruitment: *Spring Preview Night,* — Gary, IN
Design, build, and give demonstrations of electromagnetism for prospective students. Discuss curriculum with prospective students, Indiana University Northwest — March 31, 2015

Public Speaker, Library Science Cafe, Talk title: *The Hulk at the Beginning of Time* — Highland, IN
Use analogies between supersymmetric particles and the characters in the movie *The Avengers* to explain to middle school students a possibly solution to the hierarchy problem of the lightness of the Higgs boson, Highland Public Library. — March 9, 2015

Judge, Northwest Indiana Science Olympiad, Events: *Crave the Wave* and *It's About Time* — Gary, IN
Write, proctor, and grade written and hands-on exams for middle school and high school students for regional competition. — February 21, 2015

Student Recruitment: *Fall Preview Night,* — Gary, IN
Design, build, and give demonstrations of electromagnetism for prospective students. Discuss curriculum with prospective students, Indiana University Northwest — October 23, 2014

Physics Presentations for Elementary School Students: Design and create hands-on activities and demonstrations of electromagnetism. Perform demonstrations and lead activities for students from Thea Bowman Leadership Academy on college visit to Indiana University Northwest. — Gary, IN, September 26 2014

Student Recruitment: *Spring Preview Night,* — Gary, IN
Design, build, and give demonstrations of electromagnetism for prospective students. Discuss curriculum with prospective students, Indiana University Northwest — March 11, 2014

Judge for Indiana First Tech Challenge Northwest Regional Qualifying Tournament: Robot Building Competition for student grades 7-12, Indiana University Northwest — Gary, IN, January 19, 2014

Physics Presentations for Middle School Students: Design, build, and give demonstrations of electromagnetism for middle school students on college visits to Indiana University Northwest. Instruct undergraduate students on how to demonstrate and explain electromagnetic phenomena to middle school students, Indiana University Northwest — Gary, IN, Fall 2013

Student Recruitment: *Fall Preview Night,* — Gary, IN
Design, build, and give demonstrations of electromagnetism for prospective students. Discuss curriculum with prospective students, Indiana University Northwest — October 13, 2013

*Safe Zone Advocate* training, completed an official training session through the Office of Diversity, Equity, and Multicultural Affairs to become part of *The Safe Zone Project* which seeks to create a safer, more inclusive environment for Lesbian, Gay, Bisexual, Transgendered, Queer/Questioning, and Intersexed (LGBTQI) people by providing identifiable safe spaces for LGBTQI people who need support and understanding from trained faculty, staff, and student Advocates, Indiana University Northwest. — Gary, IN, October 4, 2013

Instructor for Project HOPE (Healthcare Occupations, Preparation, and Exploration), laboratory instruction for groups of eighth graders focusing on soldering and making mechanical and electrical measurements of the human body, University of Iowa — Iowa City, IA, January 2013

Attendee, *Women in Science: Why so Few*
Presentation and discussion led by Dr. C. Megan Urry of the Yale Center for Astronomy & Astrophysics examining the gender statistics in different STEM fields — Iowa City, IA, January 2013

Volunteer Tutor: Multi-Ethnic Engineering and Scientific Activities (mesa), University of Iowa and Iowa City Community School District — Iowa City, IA, 2008–2010

Demonstration Assistant, travel to give demonstrations in Iowa schools and at public events
Hawkeyes on Science, Department of Physics, University of Iowa — Iowa, 2006–2010

Community Demonstration: Signal Transmission with Light
Physics and Astronomy Demonstration Show, University of Iowa — Iowa City, IA, February 2010

Co-designer & presenter of demonstration, performance, & video: *Star Wars: Episode 0: Stellar Evolution,* Physics and Astronomy Demonstration Show, Department of Physics and Astronomy, University of Iowa — Iowa City, IA, February 2009

Web Page Designer, Demonstration Assistant
Family Adventures in Science, University of Iowa — Iowa City, IA, 2004–2005

Science Fair Judge
Solon High School — Solon, IA, 2005