Nicole Ackerman, Associate Professor of Physics

Agnes Scott College
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Education

Stanford University, Stanford, CA

Ph.D., Physics, June 2013
Thesis: *Toward a Gold Standard for Dose Enhanced Radiotherapy: Physics Simulations and Biological Experiments to Better Understand the Mechanisms of a New Cancer Treatment*
Adviser: Professor Edward. E. Graves
Area of Study: Medical Physics

M.S., Physics, January 2011
Adviser: Professor Martin Breidenbach
Area of Study: Particle Physics

Massachusetts Institute of Technology, Cambridge, MA

S.B., Physics, June 2007
Thesis: *Study of Michel Spectrum of Tau Decay*
Adviser: Professor Peter Fisher

Research Interests

Using Geant4-based Monte Carlo simulations to better treat and image cancer
Comparison of track structure (nanodosimetry) simulations and cellular scale (microdosimetry) simulations
Experimental validation of Geant4 simulations at the micro- and nanodosimetry scales
Impact of non-equilibrium conditions in targeted alpha therapy on imaging and dosimetry

Teaching Interests

Integrating productive and supportive teamwork into all levels of the physics curriculum
Utilizing video-based delivery of content for flipped classrooms and blended learning
Sophisticated simplification and modeling in Introductory Physics
Development of experimental (laboratory) skills at the intermediate and advanced level
Reflection, metacognitive development, and portfolio thinking
Active learning with TBL (team based learning), peer-instruction, and whiteboarding in all physics courses

Service Interests

Curricular development and assessment around robust Student Learning Objectives
Creating inclusive classrooms and policies to support students from marginalized and under-represented identities

Selected Research Experience

Department of Physics, Agnes Scott College 2013 – Present

Cerenkov Imaging: Simulation and Experiment

- Spring 2019: Two directed research students
- 2015-2016: One directed research student
- Summer 2015: Two research students
- 2014-2015: Three directed research students, one senior seminar advisee
- Spring 2014: Two senior seminar project students
- One publication co-authored with a student

Microdosimetry of antibody-targeted ^{212}Pb in Vasculature Model May 2016 – Present

- Collaboration with Oxford University, University of Campinas (Brazil), and others
- Provided Geant4 expertise and mentored Masters student
- Two articles published based on this work

Applications of Cerenkov and Radioluminescence Jan 2017 – Summer 2017

- Collaboration with San Raffaele Scientific Institute and University of Verona
- Spent 3 months in Milan at San Raffaele
- Performed Geant4 simulations
- Two articles published based on this work

Department of Radiation Oncology, Stanford 2010 – 2013

Geant4 Microdosimetry

Physics simulations for Cerenkov Luminescence Imaging

SLAC National Accelerator Laboratory 2007 – 2010

EXO-200, a low-background neutrino experiment to measurement neutrinoless double beta decay

Grants, Fellowships, & Awards

Agnes Scott College

Center for Student Involvement, Advisor of the Year 2018-2019
Professional Development Grant: "Additional Experiments for Physics 311" 2018
Summit Faculty Travel Grant 2018
Gravatt Women in Science Faculty Innovation Fund 2017
Professional Development Grant: "Collaborating in Italy on Cherenkov Imaging" 2016-2017
Holder Fund for Faculty Innovation: "Equipment for Global Music and Physics Course" 2016
Summit Faculty Development Grant Award 2016
Mellon Digital Faculty Fellow Fall 2016
Professional Development Grant: "Improve Pedagogical Strategies for Introductory Physics" 2014
Professional Development Grant: "Develop Nuclear Lab and Experiments for Physics 311" 2014

External (since 2013)

Senior Faculty on Funded NSF IUSE Grant: "Testing a Theoretical Model of Social Influence and High-impact Pedagogical Practices for Sustaining Undergraduate STEM Student Success" 2019
Best Poster Finalist at 12th Congress of World Federation on Nuclear Medicine and Biology 2018

Grants, Fellowships, & Awards (continued)

Stanford University

Diversifying Academia Recruiting Excellence Fellowship	2011 – 2013
Paul Kirkpatrick Award for Graduate Teaching in Physics	2012
Stanford Bio-X Travel Grant	2011
Weiland Fellowship (Stanford Graduate Fellowship)	2008 – 2011
Stanford School of Humanities and Sciences Fellowship	2007 – 2008

External (2007-2013)

APS Forum on Graduate Student Affairs Travel Award for Excellence in Graduate Research	2012
Lindau Nobel Laureate Meeting US DOE Travel Award	2010
European Science Open Forum Robert Bosch Stiftung Lindau Fellowship	2010
National Science Foundation Graduate Research Fellowship Program (NSF GRFP) Honorable Mention	2007

Publications & Proceedings

** denotes ASC undergraduate student, bold denotes (co)primary or corresponding authorship*

N Ackerman, L de la Fuente Rosales, N Falzone, KA Vallis, MA Bernal *"Targeted Alpha Therapy with ^{212}Pb or ^{225}Ac: Change in RBE from daughter migration"*, Physica Medica 51; 91-98 (2018)

N Ackerman, T Atherton, AR Avalani, CA Berven, T Laskar, A Neunzert, DS Parno, M Ramsey-Musolf *"LGBT+ Inclusivity in Physics and Astronomy: A Best Practices Guide* arXiv:1804.08406 (2018)

N Falzone, **N Ackerman**, L de la Fuente Rosales, MA Bernal, X Liu, SGJA Peeters, M Sarmiento Soto, A Corroyer-Fulmont, M Bernaudin, E Grimoin, O Touzani, NR Sibson, KA Vallis *"Dosimetric Evaluation of Radionuclides for VCAM-1-targeted radionuclide therapy in an early brain metastasis model"*, Theranostics 8(1); 292-302 (2018)

N Ackerman, F Boschi, AE Spinelli *"Radioluminescence from Tc-99m in Glass Predicts Local Dose"*, Physica Medica 42; 112-115 (2017).

N Ackerman, F Boschi, AE Spinelli *"Monte Carlo Simulations Suppport Non-Cerenkov Radioluminescence production in Tissue"*, Journal of Biomedical Optics 22(8); 086002 (2017)

V Wood*, **N Ackerman** *"Cherenkov Light Production from the α-emitting Decay Chains of ^{223}Ra, ^{212}Pb, and ^{149}Tb for Cherenkov Luminescence Imaging"*, Applied Radiation and Isotopes 118; 354-360 (2016)

N Ackerman, A Lovell, M Franklin*, R Cupp*, Y Wan*, V Wood*, C Day*, E Whisnant* *"Integrating Commercial Solar Panels in the Physics Curriculum"*, Proceedings of the 2015 Conference on Laboratory Instruction Beyond the First Year of College (2015)

N Ackerman, T Atherton, W Deconinck, M Falk, S Garmon, E Henry, E Long *"Gender and Sexual Diversity Issues in Physics: The Audience Speaks"*, arXiv:1206.4112 (2012)

N Ackerman, EE Graves *"The Potential for Cerenkov luminescence imaging of alpha emitting radionuclides"*, Phys Med Biol. 57; 771-83 (2012)

N Ackerman *et al* *"Observation of Two-Neutrino Double-Beta Decay in Xe-136 with EXO-200"*, Phys Rev Lett. 107; 212501 (2011)

Publications & Proceedings (continued)

A Dobi *et al* *"A xenon gas purity monitor for EXO"*, Nucl. Inst. Meth. A 659, (2011)

M Montero Diez *et al.* *"A simple radionuclide-driven single-ion source"*, Rev.Sci.Instrum. 81 (2010) [physics.atom-ph/1008.3422]

N Ackerman *"Status of EXO-200"*, Proceedings of DPF-2009, Detroit, MI, July 2009, eConf C090726, (2009) [hep-ex/0909.1826].

R Neilson *et al.* *"Characterization of large area APDs for the EXO-200 detector"*, Nucl. Inst. Meth. A 608, 68-75 (2009).

Colloquia, Invited Talks, & Workshops

Oxford University, 9th International Symposium on Physical, Molecular, Cellular, and Medical Aspects of Auger Processes, Invited Presentation August 2019
"A Geant4 model for dosimetric evaluation of radionuclides for targeted radionuclide therapy of early brain metastases"

Stanford University, DARE10 Homecoming November 2018
"Geant4 Modeling of Targeted Radionuclide Therapy for Brain Metastasis"

Agnes Scott College, Center for Teaching and Learning (CTL) Workshop May 2018
"Inclusive Classroom Scenarios at Agnes"

Berry College, Physics and Astronomy Seminar March 2018
"Preventing Brain Tumors with Physics: Using Computer Simulations to Design a New Cancer Therapy"

Agnes Scott College, Physics Colloquium February 2018
"Designing a New Cancer Therapy Through Computer Simulations of Radiation Interactions"

Georgia State University (Decatur/Perimeter), Invited Seminar November 2017
"From Fundamental Physics to Cancer Cures: Computer Simulations in Medical Physics"

Monte Carlo Techniques for Medical Applications 2017, Invited Presentation October 2017
"Geant4 Modeling of Targeted Radionuclide Therapy for Brain Metastasis"

Oxford University, Special Interest External Seminar February 2017
"Cherenkov Radiation: New Applications in Oncology"

Agnes Scott College, Digital Pedagogy Series March 2016
"Active learning with the i>Clicker System"

University of Northern Alabama, Physics Talk March 2016
"Cancer in Collision: Particle Physics in Medicine"

Drexel University, Physics Colloquium March 2016
"Cherenkov radiation: New Applications in Oncology"

Agnes Scott College, Special Public Lecture December 2015
"The "nu"s of the 2015 Nobel Prize in Physics: Neutrinos"

Colloquia, Invited Talks, & Workshops (continued)

University of Michigan, Physics Seminar — November 2014
"Cerenkov Radiation: New Applications in Oncology"

Southern Methodist University, Physics Seminar — March 2014
"Cerenkov Applications in Oncology"

Agnes Scott College, Physics Seminar — December 2012
"Accelerating Drug Design with 'Faster-Than-Light' Particles: Biomedical Applications of the Cerenkov Effect"

Lafayette College, Physics Seminar — December 2012
"Accelerating Drug Design with 'Faster-Than-Light' Particles: Biomedical Applications of the Cerenkov Effect"

DePauw University, Physics Seminar — December 2012
"Accelerating Drug Design with 'Faster-Than-Light' Particles: Biomedical Applications of the Cerenkov Effect"

Fresno State University, Colloquium and Public Talk — November 2012
"Particle Physics in Medicine"

Sonoma State University — October 2011
"What Physicists Do" Series: Colloquium and Public Talk
"Cancer+Physics: Mice, Dice, and Faster than Light Particles"

Contributed Presentations & Posters

Meaningful Living and Learning in a Digital World 2019 Conference — February 2019
"Digital Identity Development in a Capstone Course at a Diverse Women's College

AAPT Summer Meeting 2018 (American Association of Physics Teachers) — July 2018
"Physics Innovation for Global Learning and Leadership Development Curriculum"

BFY III (Beyond the First Year of Physics Labs) — July 2018
Poster:"Videos in the Intermediate Laboratories"

SACS-AAPT Spring Meeting 2016 (Regional AAPT Meeting) — April 2016
"Physics and Astronomy in a new Leadership Development and Global Learning Curriculum"

AAPT Summer Meeting 2015 — July 2015
"Scratcher (IFAT) Forms for Conceptual Test Questions in Introductory Courses"

BFY II (Beyond the First Year of Physics Labs) — July 2015
Poster: "Integrating Commercial Solar Panels in the Physics Curriculum"

Southeastern Section of APS (American Physical Society) — November 2013
"Computer Simulations for Understanding Dose Enhancement Through Microdosimetry"

Radiation Research Society — September 2012
Poster: "Geant4 microdosimetry for dose enhancement and radiobiology"

Contributed Presentations & Posters (continued)

Radiation Chemistry Gordon Research Conference — August 2012
Poster: "Monte Carlo Simulations for Radiobiology"

Radiation Chemistry Gordon Research Seminar — July 2012
Poster: "'Monte Carlo Simulations for Radiobiology"

Center for Biomedical Imaging at Stanford Symposium — April 2012
Poster: "Physics Simulations for Cerenkov Imaging"

APS March Meeting — February 2012
"Monte Carlo Simulations for Radiobiology"

Stanford Radiation Oncology Physics Seminar — November 2011
"Simulations for Cerenkov Imaging"

APS California-Nevada Section meeting — November 2011
"Geant4 Microdosimetry for Simulation of Dose Enhancement in vivo at Orthovoltage energy"

Stanford Bio-X Interdisciplinary Initiatives Program Symposium — September 2011
Poster: "Physics Simulations for Cerenkov Imaging"

NSBP/NSHP Joint Conference — September 2011
"Physics Simulations for Cerenkov Imaging"

American Association of Physicists in Medicine and COMP Joint Meeting — July 2011
Poster: "GEANT4 Microdosimetry for Simulation of Dose Enhancement in Vivo at Orthovoltage Energy"

APS April Meeting: Press Conference — April 2011
"Illuminating Biology with Faster Than Light Particles"

APS April Meeting — April 2011
"Cerenkov Radiation as a New In Vivo Imaging Modality"

SLAC Association for Student Seminars — April 2011
"Cerenkov Imaging in Biomedicine"

International Workshop on the Interconnection between Particle Physics and Cosmology — July 2010
Poster: "Searching for double beta decay with the EXO experiment"

SLAC Association for Student Seminars — October 2009
"What You Didn't Know About Neutrinos"

APS Division of Particles and Fields Meeting — July 2009
"EXO-200"

SLAC Association for Student Seminars — December 2008
"Diversity in Physics"

APS April Meeting — April 2008
"EXO-200 Status"

Teaching

Agnes Scott College

Associate Professor of Physics	2019–present
Assistant Professor of Physics	2013–2019
Physics 202: Intro Physics I: Mechanics	F2019, F2018, F2017, F2016, F2015
Physics 203: Intro Physics II: Electricity and Magnetism	S2019, S2018, S2016
Physics 210: Modern Physics	F2018, F2016, F2015, F2014, F2013
Physics 240: Practical Electronics (with Lab)	F2019, F2017
Physics 311: Laboratory Physics	S2019, S2015
Physics 361: Quantum Physics	S2018, S2016
Physics 410: Sound, Vibration, and Acoustics (Independent Study)	Spring 2019
SUMMIT 400: Portfolio Capstone	F2019, F2018
Physics 450: Internship	S2018, F2016
Physics 150: Waves Around the World: Global Music and Physics	Fall 2016
Physics 410: Particle Physics (Independent Study)	Fall 2014
Physics 242: Analog Electronics	F2015, F2014, F2013
Physics 243: Digital Electronics	F2016, S2015, S2014
Physics 110: Introduction to Mechanics and Electricity (Lecture)	F2014, F2013
Physics 111: Magnetism, Heat, Sound, Light (Lecture)	S2015, S2014
Leadership 102: The Art of Communicating Science	Spring 2016
Peak Week Workshop: Electronics for Everyone	Spring 2016
Alumnae Winter Seminar: The Physics of Music	January 2016

Emory-Tibet Science Initiative

Physics Faculty Coordinator	2019-Present
Volunteer Instructor	2015-2019
Atomic Physics and Thermodynamics for Nuns (Karnataka, India)	Summer 2019
Mechanics for Nuns (Karnataka, India)	Summer 2018
Atomic & Thermal Physics at Drepung Monastery (Karnataka, India)	Summers 2019, 2018, 2017
Intro to Physics for Nuns (Karnataka, India)	Summer 2017
Mechanics at Drepung Monastery (Karnataka, India)	Summers 2016, 2015

Stanford University

Physics Department Teaching Mentor	2012-2013
Athletic Academic Resource Center Tutor	2019-2011
Physics Department Teaching Assistant	2009-2012
Electromagnetism (Phys 120), Prof. Steven Kahn	Winter 2012
Modern Physics (Phys 25), Prof. Lenny Susskind	Spring 2010
Introduction to Laboratory Physics (Phys 67), Dr. Rick Pam	Spring 2009

Other Meetings, Training, and Workshops Attended

Agnes Scott College

Conflict Management Workshop	May 2017
Team Teaching Workshop	December 2015
Scottie Safe Zone Training	October 2013

External (since 2013)

AAPT Workshop: Critical Thinking in Intro Labs Workshop	July 2018
AAPT Workshop: 3D Solid Modeling Workshop	July 2018
ALPhA Immersion: Cosmic Watch	July 2018
AAC&U Forum on Digital Learning and ePortfolios	January 2018
National Society of Black Physicists Conference	November 2017
Geant4 Tutorial	May 2016
Research Based Tools for Teaching Quantum Mechanics Workshop	July 2015
AAPT Workshop: Facilitating Student Self-Reflection Workshop	July 2015
AAPT Workshop: STEM Research Mentor Workshop	July 2015
AAC&U Conference on General Education	2015
oSTEM/NOGLSTP "Out to Innovate" Conference	November 2014
AARL Wireless Technology Teachers' Institute	July 2014
AAPT New Faculty Workshop	June 2014
Chautauqua Workshop: Active Learning Strategies in Intro Physics	June 2014
ALPhA Immersion: Nuclear Spectroscopy	June 2014
AAAS Webinar: "Be a Science Communicator"	July 2013

Service & Outreach

External - Research and Teaching

Board Member of ALPhA (Advanced Lab Physics Association)	April 2018 – Present
Reviewer for Medical Physics	2013 – Present
Reviewer for Physics in Medicine and Biology	2017 – Present
Reviewer for The Physics Teacher	2018
Reviewer for Journal of Biomedical Optics	2018
Reviewer for Molecular Imaging and Biology	2018
NSF Panelist	2018
Reviewer for Nature Nanotechnology	2016
Reviewer for Physica Scripta	2016
Reviewer for BFYII (Beyond the First Year of Physics Labs) Proceedings	August 2015
Panelist/Facilitator for CUWiP (Conferences for Undergraduate Women in Physics)	January 2015
Poster judge at oSTEM/NOGLSTP Meeting	November 2014
Session Chair for Gordon Research Seminar in Radiation Chemistry	July 2012

External - Diversity

LGBT+Physicists Organizing Committee	2011 – Present
LGBT+Physics Best Practices Guide (2nd Ed) Author	2016 – 2018
Co-organizer of LGBT+ Meet-up at Summer AAPT meeting	2015
Organizing Committee for APS March Meeting Session "Sexual and Gender Diversity Issues in Physics"	May 2011 – March 2012

Service & Outreach (continued)

Agnes Scott College

Safe Zone Committee	Fall 2018 – Present
Faculty Advisor for campus oSTEM (LGBT in STEM) chapter	Spring 2018 – Present
Faculty Summit Leadership Committee	August 2017 – Present
Director of the Center for Teaching and Learning (CTL)	January 2018 – December 2018
Digital Literacy Curriculum Design Team	January 2018 – May 2018
Curriculum Committee	September 2014 – December 2016
Core Team Member, Application to Howard Hughes Medical Institute (HHMI) Inclusive Excellence: 2017 Undergraduate Science Education Grants	2015
Co-organizer of Agnes Scott College Maker Faire Booth	2014, 2015
Judge for 'Global Takes' Photo Exhibit	2013
Judge for ASCEND Drag Show	2013

Stanford University

Diversity Advocacy Committee	August 2008 – June 2013
Student Hosted Colloquia Committee	June 2008 – June 2013
Organizing Committee for UGWP Conference	July 2011 – January 2012
SPLASH Teacher	November 2010

SLAC National Accelerator Laboratory

Tour Guide (paid)	June 2009 – September 2010
Kid's Day Opening Talk	August 2010
Representative on QuantumDiaries.org	March 2009 – March 2010
SLAC User's Congressional Outreach in DC	February 2010
SLAC Association for Student Seminars Czar	July 2008 – December 2008

Professional Memberships

AAPT Southeast Atlantic Coast Section	2016 – Present
Advanced Laboratory Physics Association (ALPhA)	2015 – Present
National Society of Black Physicists	2011 – Present
American Association of Physics Teachers	2009 – Present