Cacey Stevens Bester

Department of Physics and Astronomy
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RESEARCH INTERESTS

Experimental soft matter and granular physics

- Transitions of granular systems via photoelasticity
- Applications of granular physics to geomorphology

ACADEMIC APPOINTMENTS

Swarthmore College, Swarthmore, PA 2019-present
Assistant Professor
Department of Physics and Astronomy
- Visitor, School of Mathematics and Higgs Centre for Theoretical Physics, University of Edinburgh, Edinburgh, UK, July 2025
- Visiting Scientist, Kavli Institute of Theoretical Physics, Fall 2022
- Maternity leave Spring 2023 – Summer 2023

University of Pennsylvania, Philadelphia, PA 2018-2019
Postdoctoral Fellow, Department of Earth and Environmental Science
Advisor: Professor Douglas Jerolmack
Area of study: Granular physics of fluid-driven cohesive sediment

Duke University, Durham, NC 2015-2018
Postdoctoral Fellow, Department of Physics
Advisor: Professor Robert Behringer
Areas of study: Granular impact and jamming studies using photoelasticity

Center for Math and Science Education Summer 2013
Quantitative Methodologist Intern
Advisor: Dr. Amy Cassata
Area of study: Project in data visualization of student performance in STEM schools

EDUCATION

University of Chicago, Chicago, IL 2015
Ph.D., Physics
Thesis: *Scaling of the splash threshold of low-viscosity fluids*
Advisor: Professor Sidney R. Nagel
Areas of study: fluid dynamics, soft matter physics, and education research

M.S., Physics 2010

Southern University and A&M College, Baton Rouge, LA 2008
B.S., Physics
Chief Student Marshall, Summa Cum Laude

RESEARCH GRANTS

External

1. Co-PI, ACS PRF (PI: Ryan Kozlowski, College of Holy Cross) – "Effects of Particle-scale Mixtures on Intermittent Dense Granular Flow: Clogging and Grain Shape" (Swarthmore: $24,500, Total: $70,000) – 09/2025 to 08/2028
2. PI, RCSA Cottrell Scholars Award – "Creep Across Scales: The Role of Disturbances on Creep in Disordered Media" ($100,000) – 07/2023 to 06/2026
3. PI, APS- Simons Foundation Travel Award – Travel support for research visit to University of Edinburgh, UK and participation in Soft Matter Gordon Research Conference ($8,400) – 02/2025 to 12/2025
4. Co-PI, NSF DMR (PI: Amy Graves, Swarthmore College) - "Collaborative Research: RUI: Jammed granular matter within networks of pins: Structure, elasticity, plasticity and rheology under shear" ($310,235) – 12/2019 to 11/2024

Internal

1. Faculty Research Grant ($3,600) – 11/2022 to 06/2024
2. Eugene M. Lang Faculty Sabbatical Fellowship for the 2022-2023 academic year.

AWARDS AND FELLOWSHIPS

Swarthmore College, Swarthmore, PA
Cottrell Scholars Award 2023
Honorable Mention, Joseph A. Johnson AIP/NSBP Award 2022
PI, Mellon Tri-College Brainstorming Grant – "SMART (Soft MAtteR at the TriCo) Faculty Working Group" ($600) 2020

University of Pennsylvania, Philadelphia, PA
Postdoctoral Fellowship for Academic Diversity 2018-2019

Duke University, Durham, NC
Provost's Postdoctoral Fellowship 2015-2018
APS Postdoctoral Speaker Finalist 2017

University of Chicago, Chicago, IL
Second Place, JFI Symposium Presentation Award 2015
MRSEC Director's Award for Research, Teaching, and Outreach 2015
Department Chairman's Award for Distinguished Service 2014
First Place, Emory STEM Symposium Presentation Award 2014
NSF Graduate Research Fellowship (awarded in 2008) 2010-2013

Robert A. Millikan Fellowship for Research and Teaching	2008-2010
National Society of Black Physicists Graduate Scholarship	2008

Southern University and A&M College, Baton Rouge, LA

Chancellor's Award for Academic Achievement	2008
Beta Kappa Chi National Scientific Honor Society Presentation Award	2008
American Physical Society Minority Scholar	2005 and 2006
Science and Engineering Alliance Scholarship Recipient	2006
Timbuktu Academy Scholar	2004-2008
Louisiana TOPS Honors Scholarship	2004-2008
National Achievement Scholarship Finalist	2004

PUBLICATIONS

* Denotes Swarthmore undergraduate author

13. "Force and geometric signatures of the creep-to-failure transition in a granular pile"
Q. Hao*, L. Montoya*, E. Lee*, L. K. Davis, and **C. S. Bester**, *arXiv* (2025) [link]
    - Under review at *Physical Review Letters*

12. "Using physics simulations to find targeting strategies in competitive tenpin bowling"
S. Ji*, S. Yang*, W. Dominguez*, C. G. Hooper, and **C. S. Bester**, American Institute of Physics Advances 15,4 (2025).
    - *Highlighted by several media outlets, including APS Research News*

11. "Development of a biaxial apparatus for jamming profiles of photoelastic granular media"
H. Zheng, G. Dai, **C.S. Bester**, M. Wang, and D. Wang, Review of Scientific Instruments 94, 035110 (2023).

10. "Jammed solids with pins: thresholds, force networks and elasticity"
A. L. Zhang*, S. A. Ridout, C. Parts*, A. Sachdeva*, **C. S. Bester**, K. Vollmayr-Lee, B. C. Utter, T. Brzinski, and A. L. Graves, Physical Review E **106**, 034902 (2022).

9. "Dynamics of oblique impact in a quasi-two-dimensional granular medium"
C. S. Bester, N. Cox, H. Zheng, and R. Behringer, Granular Matter **22** (51), (2020).

8. "Jamming transition in non-spherical particle systems: pentagons versus disks"
Y. Zhao, J. Barés, H. Zheng, **C.S. Bester**, Y. Xu, J.E. Socolar, and R.P. Behringer, Granular Matter, **21**(4), (2019).

7. "Collisional model of energy dissipation in three-dimensional granular impact"
C. S. Bester and R. Behringer, Physical Review E **95**, 032906 (2017).
    - *PRE Editors' Suggestion*

6. "Collisional model of drag force of granular impact"
C. S. Bester and R. Behringer, EPJ Web of Conferences **140**, 03017 (2017).

5. "Patterns in Illinois educational school data"
C. S. Stevens, M. Marder, and S. R. Nagel, Physical Review Special Topics **11**, 010113 (2015).
    - *Highlighted in American Physical Society (APS) Press Release*

4. "Comparison of splashing in high and low viscosity liquids"
C. S. Stevens, A. Latka, and S. R. Nagel, Phys. Rev. E **89**, 063006 (2014).

3. "Scaling of the splash threshold for low-viscosity fluids"
C. S. Stevens, EPL **106**, 24001 (2014).

2. "Creation of prompt and thin-sheet splashing by varying surface roughness or increasing air pressure"
A. Latka, A. Strandburg-Peshkin, M. M. Driscoll, **C. S. Stevens**, and S. R. Nagel, Phys. Rev. Lett. **109**, 054501 (2012).

1. "Thin film formation during splashing of viscous liquids"
M. M. Driscoll, **C. S. Stevens**, and S. R. Nagel, Phys. Rev. E 82, 036302 (2010).

Manuscript in Preparation
Uniaxial Compression of Photoelastic Granular Systems Around a Fixed Pin
A. Kahn*, A. Zhang*, B. C. Utter, K. Vollmayr-Lee, A. L. Graves, and **C. S. Bester**

SWARTHMORE RESEARCH SUPERVISION

Student	**Dates**	**Project**
Edna Olvera '21	Summer 2019	Gravity-driven creep using photoelasticity
Celia Parts '22	06/2020 – 04/2021	Simulation data analysis, jamming with pins
Simon Moore '22	06/2021 – 12/2021	Experiment, jamming with pins
Andy Zhang '22	06/2020 – 05/2022	Simulation data analysis; experiments, jamming
* *NSF GRFP Recipient*		
Elena Lee '23	06/2022 – 05/2023	Gravity-driven creep using photoelasticity
Aaron Khan '27	Summer 2024	Experiment, jamming with pins
Luca Montoya '27	Summer 2024	Gravity-driven creep using photoelasticity
Qing Hao '25	06/2024 – 05/2025	Gravity-driven creep using photoelasticity
Leilani Fleming '28	Current	Gravity-driven creep using photoelasticity
Nox Tan '28	Current	Gravity-driven creep using photoelasticity

PRESENTATIONS

Invited Talks
Long-form talks about current lab research
Gordon Research Conference on Soft Condensed Matter, Colby-Sawyer College 2025

Seminar, Higgs Centre for Theoretical Physics, University of Edinburgh, UK	2025
APS Global Physics Summit, Anaheim, CA	2025
Physics and Astronomy Department Seminar, Swarthmore College	2025
Frontiers in Soft Matter and Macromolecular Networks, University of San Diego	2024
Gordon Research Conference on Granular Matter, Stonehill College	2024
Physics Department Seminar, Widener University	2023
Faculty Lecture, Swarthmore College	2023
KITP Conference on Multiphase Flows, University of California, Santa Barbara	2022
Physics and Astronomy Colloquium, Ithaca College	2022
Women in Science Course, Seattle Pacific University	2022
Pennsylvania Young Women in Physics Conference	2022
Physics Department Seminar, College of the Holy Cross	2022
Physics Colloquium, Hamilton College	2022
Women in Astronomy and Physics Lecture, University of Minnesota	2021
Physics and Astronomy Colloquium, Bucknell University	2021
Amgen Seminar in Chemical Engineering, University of Rhode Island	2021
APS Annual March Meeting, virtual	2021
Physics Department Colloquium, University of Oregon	2020
Undergraduate Physics Colloquium, Syracuse University	2019
Mid-Atlantic Soft Matter Workshop, Johns Hopkins University	2019
Levich Institute Seminar, City College of New York	2019
Women in Physics Seminar, Georgia Institute of Technology	2019
Condensed Matter Seminar, University of Massachusetts – Amherst	2018
Timbuktu Academy LS-LAMP Seminar, Southern University and A&M College	2018
Physics Department Seminar, Davidson College	2018
Physics Department Seminar, University of Louisiana – Lafayette	2018
Physics Department Seminar, Swarthmore College	2018
Physics Department Seminar, James Madison University	2018
SIAM Conference on Applications of Dynamical Systems, Snowbird, UT	2017
Complex Matter and Biophysics Seminar, North Carolina State University	2017
Physics Department Colloquium, Amherst College	2017
Gordon Research Conference on Granular Matter, Stonehill College	2016
Soft Matter Day, Mount Holyoke College	2016
STEM Seminar Series, Chicago State University	2015
Physics Department Colloquium, DePaul University	2013
Timbuktu Academy Seminar, Southern University and A&M College	2012
APS Conference for Undergraduate Women in Physics, Case Western Reserve University	2012

Contributed Talks

APS Annual March Meeting, Minneapolis, MN	2024
Photoelastimetry Workshop, Washington, DC	2023
AGU Fall Meeting, Virtual	2020
APS Annual March Meeting, Los Angeles, CA	2018
APS Annual March Meeting, New Orleans, LA	2017
APS Division of Fluid Dynamics Annual Meeting, Portland, OR	2016

(*poster*) Gordon Research Conference on Granular Matter, Stonehill College 2016
(*poster*) Triangle Soft Matter Workshop, Duke University 2016
APS Annual March Meeting, Baltimore, MD 2016
JFI Graduate Student Symposium, University of Chicago 2015
(*poster*) APS Annual March Meeting, San Antonio, TX 2015
APS Annual March Meeting, San Antonio, TX 2015
Annual Conference of the National Society of Black Physicists, Baltimore, MD 2015
Emory STEM Research and Career Symposium, Emory University 2014
APS Division of Fluid Dynamics Annual Meeting, San Diego, CA 2012
APS Annual March Meeting, Dallas, TX 2011
Annual Conference of the National Society of Black Physicists, Austin, TX 2010
APS Division of Fluid Dynamics Annual Meeting, Minneapolis, Minnesota 2009
Annual Beta Kappa Chi National Scientific Honor Society Meeting, Dallas, TX 2008
Annual Conference of the National Society of Black Physicists, Washington, D.C. 2008
APS Division of Fluid Dynamics Annual Meeting, Salt Lake City, Utah 2007
16th Annual Science and Engineering Alliance Conference, Washington, D.C. 2006

Student Presentations at Professional Meetings

(poster) Qing Hao ’25, Conference for Undergraduate Women in Physics 2025
(*poster*) Elena Lee ’23, APS Annual March Meeting, Virtual 2023
Andy Zhang ’22 and Celia Parts ’22, APS Annual March Meeting, Virtual 2021
(*poster*) Edna Olvera ’21, APS Annual March Meeting, Virtual 2020

TEACHING EXPERIENCE

Swarthmore College, Swarthmore, PA

1. PHYS 097: Senior Conference F21, F24
   - Required course for graduating physics majors
2. PHYS 111: Analytical Dynamics F19, F20, F21, S24, S25
   - Upper-level Classical Mechanics course
3. PHYS 81: Advanced Laboratory S20, F21, S25
   - Upper-level laboratory course
   - Developed Brownian motion lab
4. PHYS 13: Thermodynamics and Statistical Physics S20, S21, S22
   - Freshman-level course
5. PHYS 15: Optics S20, S21, S22
   - Freshman-level course on geometric and physical optics
6. PHYS 132: Nonlinear Dynamics and Chaos F24
   - Upper-level Physics seminar

Duke University, Durham, NC

1. Teaching Assistant, Thermal Physics S18
   - Assisted with recitation sessions using team-based learning
   - Graded homework assignments and exam
2. Co-Instructor, Calculus-based Introductory Mechanics F17

- Taught 7 lectures
- Led recitation sessions using team-based learning

3. Teaching Assistant, Introductory Mechanics for pre-med students S17
    - Substitute lecturer – taught 2 lectures on gravitation
    - Led recitation sessions using team-based learning
    - Helped to develop and grade exams
4. Advising 2015-2017
    A. High school students, summer research at Duke U
        - Advised two students studying impact on dry granular media. Work presented at APS DFD 2016 and APS March Meeting 2018.
        - Advised one student who researched jamming transition of hexagonally shaped granular media

    B. Undergraduate students, academic year research at Duke U
        - Advised two students studying granular impact

University of Chicago, Chicago, IL

1. Physics Pedagogy Course S14
    - Learned skills for course development and improving classroom atmosphere
2. Graduate Student Advisor, NSF REU 2010
    - Supervised an undergraduate student working on summer research project about low-velocity liquid drop impact
3. Teaching Assistant
    A. Introductory Mechanics F09
        - Graded laboratory reports and homework assignments
        - Taught laboratory and recitation sessions

    B. Introductory Waves, Optics, and Heat S09
        - Graded laboratory reports and homework assignments
        - Taught laboratory and recitation sessions

Southern University and A&M College, Baton Rouge, LA

1. Math and Physics Tutor, Student Services Center 2007-2008

OUTREACH

Swarthmore College, Swarthmore, PA

1. Invited Speaker, APS GSNP klogW: Young Scientists Day Summer 2021
    - Presentation to graduate students and postdocs in soft matter research about physics careers at liberal arts colleges
2. Guest Lecturer, Physics Wonder Girl Camp, USciences Summer 2021
    - Presentation to middle school girls as part of a physics summer school
3. Invited Speaker, Illinois URM Physics Workshop Fall 2020

- Presentation to URM graduate students about graduate school experiences and advice

Duke University, Durham, NC

1. Guest Lecturer, Science Day, North Carolina School of Science and Math Fall 2017
   - Presentation to high school students
2. Guest Lecturer, Step up to STEM Summer 2017
   - Invited talk about granular materials given to rising 9th graders

Museum of Science and Industry, Chicago, IL

1. Guest Lecturer**,** Junior Science Cafés 2013-2015
   - Gave invited lectures about fluids to the public
2. Ask A Scientist Panelist 2013
   - Presented a booth with demos about Nagel lab research

University of Chicago, Chicago, IL

1. Director of Education, NSF Research Experience for Undergraduates 2012-2013
   - Coordinated educational and professional activities for visiting undergraduates of the summer 2012 and 2013 REU programs
2. Facilitator, MRSEC Science Club, Andrew Carnegie Elementary 2009-2013
   - Developed curricula for after-school science program
   - Led many sessions on chemistry and physics topics
3. "Physics with a BANG!", presentation and lab open house for community 2010-2014
   - Lab guide, designed and led lab demos about current research
   - High-speed camera operator

ACADEMIC SERVICE

Research and Scholarship

1. Grant reviewer, NSF 2025-present
2. Elected as Member-at-Large, American Physical Society 2021-2024
   Topical Group on Statistical and Nonlinear Physics
3. Chair, Gordon Research Seminar on Granular Matter 2018
4. Session chair, APS March Meeting 2018
5. Journal Referee: Soft Matter, Physical Review Fluids, 2016-present
   Journal of the Mechanics and Physics of Solids, Granular Matter
6. APS Midwest Conference for Undergraduate Women in Physics 2013-2014
   Member, organizing committee
   Panelist, Pursuing Research Opportunities

Department of Physics and Astronomy, Swarthmore College

1. Chair, Diversity Equity and Inclusion committee 2020-22, 2024-25

College

1. Member, Fellowships and Prizes Committee 2024-present
2. Member, Off-Campus Study Committee 2020-2022

3. Student Diversity Recruiter, Office of the Provost, University of Chicago 2011-2014
Worked with Assistant to the Provost and gave presentations aimed at recruitment of graduate students of underrepresented backgrounds

PRESS

The Physics of Everyday Things: Two Swarthmore College Scientists Awarded NSF Grant
The Swarthmorean, January, 30, 2020