

Karen E. Daniels

Department of Physics
Box 8202
North Carolina State University
Raleigh, NC 27695

Phone: (919) 513-7921
Fax: (919) 515-6538
Email: kdaniel@ncsu.edu
Web: <http://danielslab.physics.ncsu.edu>

EDUCATION

- 1997 – 2002 **Cornell University, Ithaca, NY**
MS in Physics
PhD in Experimental Condensed Matter Physics
Thesis title: *Pattern Formation and Dynamics in Inclined Layer Convection*
Advisor: Dr. Eberhard Bodenschatz
- 1990 – 1994 **Dartmouth College, Hanover, NH**
AB in Physics with high honors; minor in Mathematics
Thesis title: *Atmospheric Electrogrow in the Equatorial Region of Jupiter*
Advisor: Dr. Mary Hudson

PROFESSIONAL APPOINTMENTS

- 2015 – **Department of Physics, North Carolina State University, Raleigh, NC**
Professor, University Faculty Scholar
- 2011 – 2015 Associate Professor
- 2005 – 2011 Assistant Professor
- 2002 – 2005 **Department of Physics, Duke University, Durham, NC**
Postdoctoral Research Associate
Advisor: Dr. Robert Behringer

VISITING APPOINTMENTS

- 2011–12, 2013 **Department of Complex Fluids**
MPI for Dynamics and Self-Organization, Göttingen, Germany
Visiting Scientist (Sept 2011–May 2012, Summer 2013)
- Aug-Sept 2005 **Newton Institute, Cambridge, UK**
Visitor, Program on *Pattern Formation in Large Domains*

AWARDS

- 2007 NSF Faculty Early Career Development Program (CAREER) Award
- 2011 Alexander von Humboldt Fellowship for Experienced Researchers
- 2013 LeRoy and Elva Martin Award for Teaching Excellence
- 2013–2018 North Carolina State University Faculty Scholar
- 2015 Equity for Women Award, North Carolina State University
- 2017 Outstanding Referee, Physical Review Letters

RESEARCH INTERESTS

- granular materials (rheology, dynamics near jamming, sound propagation, segregation)
- interaction of surface tension and elasticity at interfaces of soft materials
- network mechanics of granular and multi-scale materials
- flow-stabilized solids in microfluidic devices
- applications of the above to natural systems (earthquakes, arid ecosystems, rubble pile asteroids)
- optical techniques in soft matter physics (photoelasticity, fluorescence, shadowgraphy)

TEACHING

- 2006 – **North Carolina State University, Raleigh, NC**
 PY 203, *Modern Physics*
 20th century survey course for sophomore physics majors
 taught in the SCALE-UP format
 PY 205/208, *Physics for Engineers and Scientists I/II* (calculus-based)
 multiple curricula and formats (traditional, Matter & Interactions, SCALE-UP)
 PY 413, *Thermal Physics*
 thermodynamics and statistical mechanics (undergraduate majors), including two labs
 PY 722, *Statistical Physics II: Fluctuations and Phase Transitions*
 topics in graduate statistical physics, including computational skills
 HON 29x, *Honors Seminar*
 interdisciplinary courses with emphasis on reading, writing, and critical thinking
Entropy and Chaos: Order and Disorder in the Universe (twice)
Patterns vs. Pandemonium (once)
- Fall 2004 **Duke University, Durham, NC**
 Recitation instructor, Physics 53, *General Physics I*
- 1997 – 1999 **Department of Physics, Cornell University, Ithaca, NY**
 Teaching Assistant, Physics 201, *Why the Sky is Blue*
 Instructor (1998) and chair (1999), teaching assistant training program
- 1994 – 1997 **Saint Ann's School, Brooklyn, NY**
 Science teacher

PUBLICATIONS

Links to all papers/preprints available at <http://danielslab.physics.ncsu.edu>

1. Marcel Workamp, Gustavo Ramirez, Karen E. Daniels and Joshua A. Dijksman. "Symmetry-reversals in chiral active matter." *Soft Matter*. 14: 5572-5580 (2018)
2. Theodore A. Brzinski and Karen E. Daniels. "The sounds of failure: forecasting granular slip events with passive acoustic measurements." *Physical Review Letters*. 120: 218003 (2018)
3. Zhu Tang, Theodore A. Brzinski, Michael Shearer, and Karen E. Daniels. "Nonlocal rheology of dense granular flow in annular shear experiments." *Soft Matter*. 14: 3040-3048 (2018)
4. Aaron Bardall, Karen E. Daniels, Michael Shearer. "Deformation of an Elastic Substrate Due to a Resting Sessile Droplet." *European Journal of Applied Mathematics*. 29: 281-300 (2018)
5. Lia Papadopoulos, Mason A. Porter, Karen E. Daniels, Danielle S. Bassett. "Network Analysis of Particles and Grains." *Journal of Complex Networks*. (2018) DOI: 10.1093/comnet/cny005
6. Dina Sinclair, Rachel Levy, Karen E. Daniels. "Simulating Surfactant Spreading: Impact of a Physically Motivated Equation of State." *European Journal of Applied Mathematics*. 29: 30-54 (2018)
7. Collin B. Eaker, David C. Hight, John D. O'Regan, Michael D. Dickey, Karen E. Daniels. "Oxidation-Mediated Fingering in Liquid Metals." *Physical Review Letters*. 119: 174502 (2017)

8. Axelle Amon, Philip Born, Karen E. Daniels, Joshua A. Dijksman, Kai Huang, David Parker, Matthias Schröter, Ralf Stannarius, Andreas Wierschem. "Focus on Imaging Methods in Granular Physics." *Review of Scientific Instruments*. 88: 051701 (2017)
9. Karen E. Daniels, Jonathan E. Kollmer and James G. Puckett. "Photoelastic force measurements in granular materials." *Review of Scientific Instruments*. 88: 051808 (2017)
10. Marion Grzelka, Joshua B. Bostwick, and Karen E. Daniels. "Capillary fracture of ultrasoft gels: heterogeneity and delayed nucleation." *Soft Matter*. 13: 2962 (2017)
11. Yuming Huang and Karen E. Daniels. "Friction and Pressure-Dependence of Force Chain Communities in Granular Materials" *Granular Matter*. 18: 85 (2016)
12. Chad Giusti, Lia Papadopoulos, Eli T. Owens, Karen E. Daniels, Danielle S. Bassett. "Topological and geometric measurements of force chain structure." *Physical Review E*. 94: 032909 (2016)
13. Lia Papadopoulos, James Puckett, Karen E. Daniels, Danielle S. Bassett. "Evolution of network architecture in a granular material under compression." *Physical Review E*. 94: 032908 (2016)
14. Carlos P. Ortiz, Robert Riehn, Karen E. Daniels. "Nonaffine deformation under compression and decompression of a flow-stabilized solid." *Journal of Statistical Mechanics*. 084003 (2016)
15. Junaid M. Laskar, P. Shravan Kumar, Stephan Herminghaus, Karen E. Daniels, Matthias Schroeter. "High refractive index immersion liquid for super-resolution 3D imaging using sapphire-based aNAIL optics." *Applied Optics*. 55: 3165-3169 (2016)
16. Priya Subramanian, Werner Pesch, Oliver Brausch, Karen E. Daniels, Eberhard Bodenschatz, and Tobias Schneider. "Spatio-temporal Patterns in Inclined Layer Convection." *Journal of Fluid Mechanics*. 794: 719-745 (2016)
17. Bruno Andreotti, Oliver Baeumchen, Francois Boulogne, Karen E. Daniels, Eric R. Dufresne, Hugo Perrin, Thomas Salez, Jacco H. Snoeijer, Robert W. Style. "Solid Capillarity: When and How does Surface Tension Deform Soft Solids?" *Soft Matter*. 12: 2993-2996 (2016)
18. Stephen L. Strickland, Michael Shearer, Karen E. Daniels. "Spatiotemporal measurement of surfactant distribution on gravity-capillary waves." *Journal of Fluid Mechanics*. 777: 523-543 (2015)
19. Dapeng Bi, Silke Henkes, Karen E. Daniels, Bulbul Chakraborty. "The Statistical Physics of Athermal Materials." *Annual Reviews of Condensed Matter Physics*, 6: 6383, 2015.
20. Danielle S. Bassett, Eli T. Owens, Mason A. Porter, M. Lisa Manning, Karen E. Daniels. "Extraction of Force-Chain Network Architecture in Granular Materials Using Community Detection." *Soft Matter*, DOI: 10.1039/c4sm01821d (2015).
21. Ellen R. Swanson, Stephen L. Strickland, Michael Shearer, Karen E. Daniels. "Surfactant Spreading on a Thin Liquid Film: Reconciling Models and Experiments." *Journal of Engineering Mathematics*, DOI: 10.1007/s10665-014-9735-0 (2015).
22. Carlos P. Ortiz, Karen E. Daniels, and Robert Riehn "Nonlinear Elasticity of Flow-Stabilized Solids." *Physical Review E*. 90: 022304, 2014.
23. Joshua B. Bostwick, Michael Shearer, Karen E. Daniels. "Elastocapillary deformations on partially-wetting substrates: rival contact-line models." *Soft Matter*. 10: 7361-7369, 2014.
24. Stephen L. Strickland, Matthew Hin, M. Richard Sayanagi, Cameron Gaebler, Karen E. Daniels, Rachel Levy. Self-healing Dynamics of Surfactant Coatings on Thin Viscous Films. *Physics of Fluids*. 26: 042109, 2014.
25. Karen E. Daniels, Caroline Bauer, Troy Shinbrot. "Correlations between electrical and mechanical signals during granular stick-slip events." *Granular Matter*. 16: 217-222, 2014.
26. Gopal G. Penny, Karen E. Daniels, and Sally E. Thompson. "Local properties of patterned vegetation: quantifying endogenous and exogenous effects." *Philosophical Transactions of the Royal Society A*. 371: 20120359, 2013.

27. Joshua B. Bostwick and Karen E. Daniels “Capillary fracture of soft gels.” *Physical Review E*. **88**: 042410, 2013.
28. Karen E. Daniels. “Rubble-Pile Near Earth Objects: Insights from Granular Physics.” in *Asteroids: Prospective Energy and Material Resources*. Viorel Badescu, editor. Springer, 2013.
29. James G. Puckett and Karen E. Daniels. “Equilibrating temperaturelike variables in jammed granular subsystems.” *Physical Review Letters*. **110**: 058001, 2013.
30. Eli T. Owens and Karen E. Daniels. “Acoustic measurement of a granular density of modes.” *Soft Matter*. **9**: 1214-1219, 2013.
31. Carlos P. Ortiz, Robert Riehn, and Karen E. Daniels. “Flow-Driven Formation of Solid-like Microsphere Heaps.” *Soft Matter*. **9**: 543-549, 2013.
32. Danielle S. Bassett, Eli T. Owens, Karen E. Daniels, Mason A. Porter. “The Influence of Topology on Signal Propagation in Granular Force Networks.” *Physical Review E*. **86**: 041306, 2012.
33. James G. Puckett, Frédéric Lechenault, Karen E. Daniels, Jean-Luc Thiffeault. “Trajectory entanglement in dense granular materials.” *Journal of Statistical Mechanics*. P06008, 2012.
34. Kiri Nichol and Karen E. Daniels. “Equipartition of rotational and translational energy in a dense granular gas.” *Physical Review Letters*. **108**: 018001, 2012.
35. Nicholas W. Hayman, Lucie Ducloué, Kate L. Foco, Karen E. Daniels. “Granular controls on periodicity of stick-slip events: kinematics and force-chains in an experimental fault.” *Pure and Applied Geophysics*. **168**: 2239-2257, 2011.
36. Eli T. Owens and Karen E. Daniels. “Sound propagation and force chains in granular materials.” *Europhysics Letters*, **94**: 54005, 2011.
37. James G. Puckett, Frédéric Lechenault, and Karen E. Daniels. “Local origins of volume fraction fluctuations in dense granular materials.” *Physical Review E*, **83**: 041301, 2011.
38. Melissa L. Fender, Frédéric Lechenault, and Karen E. Daniels. “Universal shapes formed by two interacting cracks.” *Physical Review Letters*, **15**: 125505, 2010.
39. David W. Fallest, Adele M. Lichtenberger, Christopher J. Fox, and Karen E. Daniels. “Fluorescent visualization of a spreading surfactant.” *New Journal of Physics*, **12**: 73029, 2010.
40. Lindsay B. H. May, Michael Shearer, and Karen E. Daniels. “Scalar conservation laws with nonconstant coefficients with application to particle size segregation in granular flow.” *Journal of Nonlinear Science*, **20**: 689, 2010.
41. Frédéric Lechenault and Karen E. Daniels. “Equilibration of granular subsystems” *Soft Matter*, **6**: 3074, 2010.
42. Lindsay B. H. May, Laura A. Golick, Katherine C. Phillips, Michael Shearer, and Karen E. Daniels. “Shear-driven size segregation of granular materials: modeling and experiment.” *Physical Review E*, **81**: 051301, 2010.
43. Sally E. Thompson and Karen E. Daniels. “A porous convection model for small-scale grass patterns.” *The American Naturalist*, **175**: E10-E20, 2010.
44. Laura A. Golick and Karen E. Daniels. “Mixing and segregation rates in sheared granular materials.” *Physical Review E*, **80**: 042301, 2009.
45. Karen E. Daniels and Nicholas W. Hayman. “Force chains in seismogenic faults visualized with photoelastic granular shear experiments.” *Journal of Geophysical Research*, **113**: B11411, 2008.
46. Karen E. Daniels, Oliver Brausch, Werner Pesch, and Eberhard Bodenschatz. “Competition and bistability of ordered undulations and undulation chaos in inclined layer convection.” *Journal of Fluid Mechanics*, **597**: 261–282, 2008.

47. Robert P. Behringer, Karen E. Daniels, Trushant S. Majmudar, and Matthias Sperl. "Fluctuations, correlations and transitions in granular materials: statistical mechanics for a non-conventional system." *Philosophical Transactions of the Royal Society A*, **366**: 493–504, 2008.
48. Karen E. Daniels, Shomeek Mukhopadhyay, Paul J. Houseworth, and Robert P. Behringer. "Instabilities in droplets spreading on gels." *Physical Review Letters*, **99**: 124501, 2007.
49. Karen E. Daniels and Robert P. Behringer. "Characterization of a freezing/melting transition in a vibrated and sheared granular medium." *Journal of Statistical Mechanics*, P07018, July 2006.
50. Karen E. Daniels and Robert P. Behringer. "Hysteresis and competition between disorder and crystallization in sheared and vibrated granular flow." *Physical Review Letters*, **94**: 168001, 2005.
51. Christian Huepe, Hermann Riecke, Karen E. Daniels, and Eberhard Bodenschatz. "Statistics of defect trajectories in spatio-temporal chaos in inclined layer convection and the complex Ginzburg-Landau equation." *Chaos*, **14**: 864, 2004.
52. Karen E. Daniels, Christian Beck, and Eberhard Bodenschatz. "Defect turbulence and generalized statistical mechanics." *Physica D*, **193**: 208, 2004.
53. Karen E. Daniels, Richard J. Wiener, and Eberhard Bodenschatz. "Localized transverse bursts in inclined layer convection." *Physical Review Letters*, **91**: 114501, 2003.
54. Karen E. Daniels and Eberhard Bodenschatz. "Statistics of defect motion in spatiotemporal chaos in inclined layer convection." *Chaos*, **13**: 55, 2003.
55. Karen E. Daniels and Eberhard Bodenschatz. "Defect turbulence in inclined layer convection." *Physical Review Letters*, **88**: 034501, 2002.
56. Karen E. Daniels, Brendan B. Plapp, and Eberhard Bodenschatz. "Pattern formation in inclined layer convection." *Physical Review Letters*, **84**: 5320, 2000.

PROCEEDINGS

1. Jonathan E. Kollmer and Karen E. Daniels. "An experimental investigation of the force network ensemble." *Powders and Grains 2017*. EPJ Web of Conferences 140, 02024 (2017)
2. Zhu Tang, Theodore A. Brzinski, and Karen E. Daniels. "Granular rheology: measuring boundary forces with laser-cut leaf springs." *Powders and Grains 2017*. EPJ Web of Conferences 140, 03035 (2017)
3. Karen E. Daniels. "The role of force networks in granular materials." *Powders and Grains 2017*. EPJ Web of Conferences 140, 01006 (2017)
4. Michael Shearer, Lindsay B. H. May, Nicholas Giffen, and Karen E. Daniels. "The Gray-Thornton Model of Granular Segregation." Proceedings of Joint IUTAM-ISIMM Symposium on Mathematical Modeling and Physical Instances of Granular Flows, AIP Conference Proceedings (2010) J. D. Goddard (ed.)
5. James G. Puckett, Frédéric Lechenault, Karen E. Daniels. "Generating Ensembles of 2D Granular Configurations." Gallery of Nonlinear Images, *Chaos*, **19**: 041108, 2009.
6. Eli T. Owens, Stéphanie Couvreur, Karen E. Daniels. "Spatiotemporally Resolved Acoustics in a Photoelastic Granular Material." *Powders and Grains 2009*. **1145**: 447–450, AIP Conference Proceedings, 2009.
7. James G. Puckett, Frédéric Lechenault, Karen E. Daniels. "Generating ensembles and measuring mixing in a model granular system." *Powders and Grains 2009*. **1145**: 675–678, AIP Conference Proceedings, 2009.
8. Karen E. Daniels and N. W. Hayman. "Boundary conditions and event scaling of granular stick-slip events." *Powders and Grains 2009*. **1145**: 567–570, AIP Conference Proceedings, 2009.
9. Karen E. Daniels, Shomeek Mukhopadhyay, and Robert P. Behringer. "Starbursts and Wispy Drops: Surfactants Spreading on Gels." Gallery of Nonlinear Images, *Chaos*, **15**: 041107, 2005.

10. Karen E. Daniels, Melissa Eblen-Zayas, Ariel Michelman-Ribeiro, and Jami M. Valentine. "Research Funding and Women in Physics." *Women in Physics: Second IUPAP International Conference on Women in Physics*. (B. K. Hartline and A. Michelman-Ribeiro, eds.) AIP Conference Proceedings **795**: 41, 2005.
11. Karen E. Daniels and Robert P. Behringer. "Characterization of a Freezing/Melting Transition in a Vibrated and Sheared Granular Medium." *Powders and Grains 2005*. **1**: 357–360, Balkema, 2005.
12. Karen E. Daniels, Joyce E. Coppock, and Robert P. Behringer. "Dynamics of Meteor Impacts." *Gallery of Nonlinear Images, Chaos*, **14**: S4, 2004.
13. Karen E. Daniels, Brendan B. Plapp, and Eberhard Bodenschatz. "Inclined layer convection." *Proceedings of the International Congress of Theoretical and Applied Mechanics, Chicago, IL, 27 August – 1 September 2000*. Kluwer Academic Publishers, 2000.

COMMENTARY

1. Karen E. Daniels. "Viewpoint: Pushing on a Nonlinear Material." *Physics*, **7**: 113, 2014.

INVITED TALKS

1. "The Role of Force Chains in Granular Materials." Gordon Conference on Granular Materials. Stonehill College. Easton, MA. July 2018.
2. "Starbursts and flowers: when spreading droplets break bad." Department of Applied Physical Sciences. Chapel Hill, NC. May 2018.
3. "Counting Network Configurations in Frictional Granular Materials." *Cracking the Glass Transition* Collaboration Meeting. Simons Foundation. New York, NY. March 2018.
4. "Force-based ensembles in granular materials." APS March Meeting. Los Angeles, CA. March 2018.
5. "Non-local Rheology." Kavli Institute for Theoretical Physics. UCSB, Santa Barbara, CA. March 2018.
6. "Asteroids as Laboratories for Granular Physics." AAAS Annual Meeting. Austin, TX. February 2018.
7. "Starbursts and flowers: when spreading droplets break bad." Department of Physics. McMaster University. Hamilton, Ontario, Canada. January 2018.
8. "The role of force networks in granular materials." MIT Mechanical Engineering. Cambridge, MA. October 2017.
9. "The role of force networks in granular materials." Department of Physics, U. Massachusetts. Amherst, MA. October 2017.
10. Lecturer on Experiments in Granular Materials. 2017 Boulder Summer School for Condensed Matter Physics. July 2017.
11. "The role of force networks in granular materials." Plenary talk, *Powders and Grains 2017*. Montpellier, France. July 2017.
12. "Acoustics in disordered granular materials: from the particle scale to force networks." Acoustical Society of America Annual Meeting. Boston, MA. June 2017.
13. "Nonlocal Rheology" IFPRI (International Fine Powders Research Institute) Annual Meeting. Philadelphia, PA. June 2017.
14. "Shapes, Forces, and Nonlocality in the Flow of Powders and Grains." Plenary Talk at IFPRI/T-Mapp Powder Flow Workshop. Amsterdam. January 2017.
15. "Temperature-like variables in granular materials." Condensed Matter Seminar. University of Michigan. Dec 2016.
16. "Oxide-Mediated Fingering of Liquid Metals". Surface Activity Driven by Material Geometry and Elasticity workshop. UMass Amherst, Sept 2016.

17. "Configurational Temperatures in Granular Materials" StatPhys 26. Lyon, France. July 2016.
18. "Acoustics in disordered granular materials: from the particle scale to force networks." Euromech Colloquium 580 Strongly Nonlinear Dynamics and Acoustics of Granular Metamaterials. Grenoble, France. July 2016.
19. "Nonlocal rheology" IFPRI (International Fine Powders Research Institute) Annual Meeting. Guildford, UK. June 2016.
20. "Temperature-like variables in granular materials." Department Colloquium. University of Oregon. May 2016.
21. "Photoelasticity for Contact Force Measurements" & "3D Contact Force Measurements using Rubies" tutorials at spring school Imaging Particles. Erlangen, Germany. April 2016.
22. Monitoring monolayers: the spatiotemporal dynamics of surfactants on fluid surfaces " RPI Mechanical Engineering colloquium. Troy, NY. December 2015
23. "Playing with Sand: Complex Behaviors from a Simple Material" NCA&T Physics Colloquium, Greensboro, NC. October 2015.
24. "Temperature-like variables in granular materials ." Colloquium. Syracuse University Physics Department. Syracuse, NY. October, 2015
25. "Capillary Fracture " Condensed Matter Seminar. Syracuse University Physics Department. Syracuse, NY. October, 2015
26. "The Geometry of Force Transmission in Granular Materials" Geometry and Physics of Spatial Random Systems. Bad Herrenalb, Germany. September 2015.
27. "Quantifying Force Transmission in Granular Materials Near the Rigidity Transition" European Solid Mechanics Conference, Madrid, Spain, July 2015.
28. "Labquakes: Faults & Earthquakes as Granular Phenomena " Analog Modeling of Tectonic Processes Workshop, Amherst, Massachusetts, May 2015.
29. "The Physics of Granular Materials." Mechanics and Materials Seminar, Department of Civil and Environmental Engineering, NCSU, February, 2015.
30. "Temperature-like Variables in Granular Materials." *Unifying Concepts in Glass Physics VI*, Aspen, CO, February 2015.
31. "Capillary Fracture." *Dynamics Days 2015*, Rice University, Houston, TX, January 2015.
32. "Shapes Formed by Interacting Cracks." American Geophysical Union Fall Meeting, San Francisco, CA, December 2014.
33. "Playing with Sand: Complex Behaviors from a Simple Material." Dept. of Physics, Harvey Mudd College, Claremont, CA, November 2014.
34. "Vibrational modes: effects of particle shape and loading history" Conference *Complexity in Mechanics: Intermittency and collective phenomena in disordered solids Conference*. Kavli Institute of Theoretical Physics, Santa Barbara, CA. October 2014
35. "Playing with Sand: Complex Behaviors from a Simple Material." Dept. of Physics, Eastern Carolina University, Davidson Greenville, NC, September 2014
36. "Acoustic Probes of Granular Packings: Pressure, Disorder & Particle Shape." *Grand Challenges in Particulate Media: From Granular Media to Colloids and Active Matter*. Centro Científico Tecnológico, La Plata, Argentina, August 2014
"Key Techniques for Granular Experiments." & "The Statistical Physics of Athermal Particles: The Edwards Ensemble at 25" (Summer School Lectures) Pan-American Advanced Studies Institute on *Frontiers in Particulate Media: From Fundamentals to Applications*, Centro Científico Tecnológico, La Plata, Argentina, August 2014
37. "Capillary fracture." Annual Meeting, Society for Industrial and Applied Mathematics. Chicago, IL. July 2014.

38. "Temperature-like variables in granular materials." Seminar, Process & Energy Department, Faculty of Mechanical, Maritime, and Material Engineering, TU Delft, Delft, Netherlands. May 2014.
39. "Ultrasoft Solids: Deformation & Fracture." Triangle Soft Matter Day, Chapel Hill, NC. May 2014.
40. "Acoustics in granular materials: from the particle scale to force networks." Condensed matter seminar, Department of Physics, U. Pennsylvania, Philadelphia, PA. October 2013.
41. "Tiny Sandpiles: Flow Stabilized Solids in Microfluidics." Levich Institute Seminar, CCNY, New York, NY. September 2013.
42. "Solid-like microsphere heaps." 7th International Discussion Meeting on Relaxations in Complex Systems, Barcelona, Spain. July 2013.
43. "Acoustics in granular materials: from the particle scale to force networks." Soft Matter Colloquium, Van der Waals-Zeeman Institute, University of Amsterdam, Netherlands. July 2013
44. "Tiny Sandpiles: Granular meets van der Waals." Seminar, Otto-von-Guericke-University, Magdeburg, Germany. June 2013.
45. "Soft fracture: initiation and growth." Seminar, Okinawa Institute of Science and Technology, Okinawa, Japan. March 2013.
46. "Soft fracture: initiation and growth." Materials Deformation: Fluctuations, Scaling, Predictability, Workshop, École de Physique des Houches, France, February 2013
47. "Interrogating a granular material: force networks, state variables, and acoustics." Nonlinear Dynamics Seminar, Georgia Tech, Atlanta, GA, November 2012.
48. "Soft Fracture." Applied Mechanics Colloquium, Harvard, Cambridge, MA, October 2012.
49. "Stick-slip failure in sheared granular materials." International Workshop on Computational Mechanics of Materials, Baltimore, MD, September 2012.
50. "Ruby: A Valuable Granular Material." Physics Colloquium, NC State University. Raleigh, NC. August 2012.
51. "Interrogating a granular material: force networks, acoustics, and state variables." Dept. of Physics, U. Nice, Nice, France. April 2012.
52. "Fluctuations and State Variables in Driven Granular Materials." German March Meeting, Berlin, Germany, March 2012.
53. "Shapes formed by Interacting Cracks." Invited Symposium, APS March Meeting, March 2012.
54. "Shapes formed by Interacting Cracks." Industrial and Applied Mathematics Seminar, Oxford University. February 2012.
55. "Shapes formed by Interacting Cracks." Physics of Fluids Seminar, U. Twente, Enschede, Netherlands. February 2012.
56. "Interrogating a granular material: force networks, acoustics, and state variables." German Aerospace Center (DLR) Institute of Materials Physics in Space. Cologne, Germany. January 2012.
57. "Pattern formation in grasses." Environmental Fluid Dynamics Seminar, Dept. of Physics, Göttingen, Germany, January 2012.
58. "Fluctuations and State Variables in Driven Granular Materials." École Normale Supérieure, Paris, France. January 2012.
59. "Mixing and segregation in granular materials." Seminar, Institute for Multiscale Simulation, Friedrich-Alexander Universität Erlangen-Nürnberg, Erlangen, Germany, December 2011
60. "Granular Materials: Complex Behaviors from Simple Components." Seminar, Center for Glass and Time, University of Roskilde, Roskilde, Denmark, December 2011

61. "Fluctuations and State Variables in Driven Granular Materials." Colloquium, Department of Physics, Universität Göttingen, Göttingen, Germany, November 2011
62. "Shapes formed by Interacting Cracks." Seminar, Institut für Experimentelle Physik, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany, November 2011
63. "Crack-crack Interactions." Seminar, Leiden Institute of Physics, U. of Leiden, Leiden, Netherlands, October 2011.
64. "State Variables and Fluctuations in Dense Granular Systems" Workshop *Fluctuations and Response in Active Materials: From Driven Granular Systems to Swarming Bacteria*, Lorentz Center, Leiden, Netherlands, June 2011
65. "Stick-slip failure in sheared granular materials." Workshop *Large Fluctuations and Collective Phenomena in Disordered Materials*, University of Illinois, Urbana-Champaign, IL, May 2011
66. "Faults & earthquakes as granular phenomena: controls on stick-slip dynamics." 2011 Dynamics Days, Chapel Hill, NC, January 2011
67. "Spreading droplets: fingers, fractures, and flows." Physics Department Colloquium, James Madison University, Harrisonburg, VA, October 2010
68. "Local and global controls on granular dynamics." Physics Department Colloquium, North Carolina State University, Raleigh, NC, August 2010
69. "Local and global controls on granular dynamics." Center for Soft Matter Research, New York University, New York, NY, August 2010
70. "The effect of force chains on granular acoustics." Laboratory of the Physics and Mechanics of Heterogeneous Materials, ESPCI, Paris, France, June 2010
71. "How do surfactants spread on fluids and gels?" Dynamics of Complex Fluids Department Seminar, MPI for Dynamics and Self-Organization, Göttingen, Germany, June 2010
72. "State variables in dense granular materials." Dept. of Physics. Wake Forest University. Winston-Salem, NC, February 2010
73. "Playing with Sand: Complex Behaviors from a Simple Material." Dept. of Physics, Davidson College, Davidson, NC, January 2010
74. "State variables in granular systems." SESAPS Invited Session *Nonequilibrium materials science: theory, simulation, and experiment*. Atlanta, GA, November 2009
75. "State variables in equilibrating granular systems." 7th EuroMech Solid Mechanics conference. Minisymposium *Force chain fluctuations and jamming in dense granular flows*. Lisbon, Portugal, September 2009
76. "State variables in equilibrating granular systems" Workshop *Statistical mechanics of static granular media*. Lorentz Center, Leiden, Netherlands, July 2009
77. "Force Chains and State Variables in Granular Materials." Department of Physics. University of Western Ontario, April 2009
78. "Dynamics of Cracking Gels" Soft Matter Seminar, Physics Department, Rochester Institute of Technology, Rochester, NY, April, 2009
79. "Force chains and state variables in granular materials." Condensed Matter Seminar, Physics Department, University of Illinois at Champaign-Urbana. March, 2009
80. "Playing with Sand: Complex Behaviors from a Simple Material." Physics Colloquium, Appalachian State University, Boone, NC, February 2009
81. "Force Chains in Granular Materials." Acoustics Seminar, Naval Research Lab, January 2009
82. "Dynamics of Cracking Gels." Applied Math Seminar, MIT, Cambridge, MA, October 2008

83. "Granular acoustics, force chains, and time-reverse mirrors." Gordon Conference on Granular and Granular-Fluid Flows. Waterville, ME, June 2008
84. "Not-so-Continuum Behaviors in Granular Materials" NCSU Differential Equations Seminar, April 2008
85. "Faults & Earthquakes as Granular Phenomena: Controls on Stick-Slip Dynamics." Invited Symposium, APS March Meeting, March 2008
86. "What state variables control a crystallization/disorder transition in a driven granular material?" Crystallization and Jamming in Soft Matter under Driving Workshop, Lorenz Center, Leiden, Netherlands, February 2008
87. "Faults & Earthquakes as Granular Phenomena: Controls on Stick-Slip Dynamics." Physics Colloquium, Duke University, Durham, NC, February 2008
88. "Sound Propagation and Force Chains in Granular Materials." Opening Workshop for Program on Random Media, SAMSI, Research Triangle Park, NC, September 2007
89. "Faults & Earthquakes as Granular Phenomena: Controls on Stick-Slip Dynamics." Leiden Institute of Physics, Leiden, Netherlands, June 2007
90. "Force chains in granular materials: failure and acoustics." Dept. of Mechanical Engineering, Yale University, New Haven, CT, April 2007
91. "The Physics of Granular Materials: Complex Behavior from a Simple Material" Los Alamos National Lab, Los Alamos, NM, March 2007
92. "What can we learn about granular materials from the geometry and topology of force chain networks?" Computational Homology and Fluid Dynamics Workshop, Georgia Tech, Atlanta, GA, March 2007
93. "Freezing, Melting, and Fluctuations in Granular Materials." Molecular Theory and Simulation Seminar, NCSU Department of Chemical Engineering. September 2006
94. "Mixing and Segregation in Sheared Granular Materials." Opening Workshop for Program on Development, Assessment and Utilization of Complex Computer Models, SAMSI, Research Triangle Park, NC, September 2006
95. "Earthquakes and Faults as Granular Processes." (Joint with Peter Malin and Nicholas Hayman) Complex and Nonlinear Systems Seminar, Duke University, Durham, NC, April 1006.
96. "Freezing and Melting in Granular Materials." Focus Session: Granular Materials Near Jamming, APS March Meeting, Baltimore, MD, March 2006
97. "Starbursts and Wispy Drops: Surfactants Spreading on Gels." UCLA-IPAM-NSF workshop on Thin Films and Fluid Interfaces, IPAM, UCLA, Los Angeles, CA, January 2006
98. "Freezing and melting in granular materials." Department of Physics and Physical Oceanography, University of North Carolina – Wilmington, Wilmington, NC, November 2005
99. "Freezing and melting in granular materials." Department of Mechanical Engineering and Materials Science, Duke University, Durham, NC, March 2005
100. "Freezing and melting in granular materials." Solid State Seminar, Physics Department, Cornell University, Ithaca, NY, March 2005
101. "Fluids, Strange and Beautiful." Physics Department, Occidental College, Los Angeles, CA, February 2005
102. "Freezing and melting in granular materials." Colloquium, Physics Department, North Carolina State University, Raleigh, NC, February 2005
103. "Fluids, Strange and Beautiful." Physics Department, Vassar College, Poughkeepsie, NY, February 2005
104. "Fluids, Strange and Beautiful." Physics Department, Mount Holyoke College, South Hadley, MA, February 2005

105. "Freezing and melting in granular materials." Colloquium, Physics Department, University of Utah, Salt Lake City, UT, January 2005
106. "Fluids, Strange and Beautiful." Physics Department, Guilford College, Greensboro, NC, January 2005
107. "Freezing and melting in granular materials." Special Colloquium, Physics Department, The Ohio State University, Columbus, OH, January 2005
108. "Freezing and melting in granular materials." Condensed Matter Physics Seminar, Physics Department, University of California, San Diego, CA, January 2005
109. "Hysteresis and competition between disorder and crystallization in granular flow." Southeastern Section of the American Physical Society Annual Meeting, Oak Ridge, TN, November 2004
110. "Freezing, melting, and novel dynamics in granular materials." Condensed Matter Seminar. Physics Department. Duke University, Durham, NC, October 2004
111. "Freezing, melting, and novel dynamics in granular materials." Joint Applied Math/Condensed Matter Seminar. University of North Carolina, Chapel Hill, NC, September 2004
112. "Pattern Formation in Inclined Layer Convection." Physics Department Colloquium, Dartmouth College, Hanover, NH, February 2004
113. "Shearing and Disorder in a Vibrationally Fluidized 3D Granular Flow." Workshop on Multi-scale Challenges in Soft Matter Materials, Statistical and Applied Mathematical Sciences Institute, Research Triangle Park, NC, February 2004
114. "Pattern Formation in Inclined Layer Convection." Physics Department Colloquium, Dickinson College, Carlisle, PA, October 2003
115. "Shearing and Order in Vibrationally Fluidized 3D Granular Media." Flow Regimes, Transitions, and Segregation in Granular and Particle-Laden Flows Conference. Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, September 2003
116. "Order, Chaos, and Defect Statistics in Inclined Layer Convection." Trends in Pattern Formation: From Amplitude Equations to Applications Conference, Max-Planck-Institut für Physik komplexer Systeme, Dresden, Germany, August 2003
117. "Order, Chaos, and Defects in Inclined Layer Convection." Pattern Formation in Physics and Biology Conference. Kavli Institute for Theoretical Physics, Santa Barbara, CA, August 2003
118. "Pattern formation in Inclined Layer Convection." Center for Nonlinear Dynamics, University of Texas at Austin, February 2002
119. "Pattern Formation and Defect Turbulence in Inclined Layer Convection." Condensed matter and statistical physics seminar, Department of Physics, Syracuse University, October 2001
120. "Pattern Formation in Inclined Layer Convection." Center for Nonlinear and Complex Systems, Duke University, March 2001

SELECT PROFESSIONAL SERVICE

Workshop Co-Organizer, *Granular and Particulate Networks*. Max Planck Institute for Complex Systems. Dresden, Germany, July 2019.

Divisional Associate Editor, *Physical Review Letters* (2017–)

Member-at-Large, Program Committee, Program Chair (2017), Topical Group on Soft Matter (GSOFT), American Physical Society, 2014–2017.

Workshop Co-Organizer, *Capillarity of Soft Interfaces*. Lorentz Center, Leiden, Netherlands, November 2015.

Workshop Co-Organizer, *Dynamics at Interfaces*. Okinawa Institute of Science and Technology, Okinawa, Japan, June 2014.

Workshop Co-Organizer, *Thin Liquid Films and Fluid Interfaces: Models, Experiments and Applications*. Banff International Research Station, Banff, Canada, December 2012.

Elected Chair, Gordon Research Conference on *Granular and Granular-Fluid Flow*, July 2012

Co-editor, Focus issue on “Granular Segregation,” *New Journal of Physics*. May, 2011.

Workshop Co-Organizer, *Particulate Matter: Does Dimensionality Matter?* at Max Planck Institute for Complex Systems in Dresden, Germany, June 2010.

Member-at-Large, Topical Group on Statistical and Nonlinear Physics (GSNP), American Physical Society, 2008 – 2011.

Reviewer for *Agronomy Journal*, *Europhysics Letters*, *Granular Matter*, *Interface Focus*, *International Journal of Biometrology*, *Journal of Fluid Mechanics*, *Journal of Geophysical Research*, *Journal of Physics*, *Journal of Rheology*, *New Journal of Physics*, *Philosophical Transactions of the Royal Society A*, *Physical Review Letters*, *Physical Review E*, *Physical Review Fluids*, *Physical Review X*, *Physics of Fluids*, *Proceedings of the Royal Society A*, *Proceedings of the National Academy of Sciences*, *Pure and Applied Geophysics*, *Reviews of Modern Physics*, *Review of Scientific Instruments*, *Scientific Reports*, *Soft Matter*, *Scientific Reports*.

Proposal panelist for NSF (CBET, DMR, MRSEC). Proposal reviewer for NSF, NASA, DOE, ARO, Petroleum Research Fund, Research Corporation, Civilian Research and Development Fund, Vienna Science and Technology Fund (Austria), Foundation for Fundamental Research on Matter (Netherlands), Netherlands Organisation for Scientific Research. External review board for NSF-MRSEC center, U. Chicago, 2012 and 2016

SELECT UNIVERSITY SERVICE

Member, Advisory Committee on Development of Women and Faculty of Color as Emerging Leaders for the ADVANCE Developing Diverse Departments NSF Grant. NCSU. (2009–2012)

Member, PAMS Leadership Survey Committee (2010)

Member, 5-year review committee, Physics Department Head (2010)

Co-founder and co-organizer, *Complex Matter and Biophysics Seminar*, Dept. of Physics (2007–2016)

NCSU Sigma Xi Membership Committee (2010 – 2011), Executive Committee Member-at-Large (2012–2013)

Departmental Coordinator for Undergraduate Research (2013–2017)

Search Committee, Dean of College of Sciences (2015)

Member, Department Advisory Committee (2014–2017)

Undergraduate Advisor (2007–)

Departmental Coordinator of Women in Physics (founder, 2013–)

Member, Association of Women Faculty (2016–)

MentorRings Mentor (2017–)

Co-Chair, College of Sciences Faculty Advisory Committee (2017–)

SELECT OUTREACH AND PIPELINE DEVELOPMENT ACTIVITIES

Organizing committee (including as co-chair, Southeast Conference for Undergraduate Women in Physics (2009, 2010, 2014).

Trainer, “Communication and Negotiation Skills Seminar for Women, American Physical Society, 2015–

Founder and organizer LEAP! (Launch your Excellent Adventures with Physics), for high school girls (2017–)

E-mentor for graduate student and undergraduate students through MentorNet (2007–2012)

Public-science and career presentations: lab tours for visiting school groups, middle/high school teachers, etc. Expanding Your Horizons workshop and Girls' Day "Squish! (Not-So-Solid Science)". Science Barbecue presenter, Aspen Center for Physics. Job-shadowing host for high school students. High school Science Night presentation. Physics career talk at NC Governor's School (2006–)

Panelist/speaker on career-development: New faculty orientation workshops, post-doctoral office workshops, women in science programs (2005–)

TRAINING

POSTDOCS: Estelle Berthier (2017–); Jonathan Kollmer (2016–2018, now U. Duisberg-Essen); Frédéric Lechenault (2007–2008, now CNRS at École Normale Supérieure, Paris); Joshua Bostwick (2011–2013, now Assistant Professor of Mechanical Engineering, Clemson University); Ted Brzinski (2013–2016, now Assistant Professor of Physics, Haverford College)

GRADUATE STUDENTS: Lindsay May (2007–2010, PhD, joint with Michael Shearer, NCSU Mathematics, now at Northrop Grumman); Keith Hillaire (2018–); James Puckett (2008–2012, PhD, PostDoc at Yale University, now Assistant Professor of Physics at Gettysburg College); Eli Owens (2008–2012, PhD, now Assistant Professor, Presbyterian College); Carlos Ortiz (2008–2013, joint with Robert Riehn, NSF Graduate Student Fellowship, now at Deloitte Consulting); Stephen Strickland (2011–2016, now Assistant Professor, Samford University); Yuming Huang (2014–2015, master's student), Scott Lindauer (2014–); Zhu Tang (2015–2018); Shih-Yuan Chen (2017–)

VISITING GRADUATE STUDENTS: Kirsten Harth (2012, U. Magdeburg, Germany), Antoine Le Bouil (2010, U. Rennes, France), Kiri Nichol (2011, U. Leiden, Netherlands), Giorgio Olivieri (2015, U. Twente, NL) Ward Holleman (2016, U. Twente, NL) Workamp, Marcel (2016, U. Wageningen, NL) Arne te Nuijenhaus (2016, U. Twente, NL) Amalia Thomas (2016, U. Cambridge, UK)

GRADUATE COMMITTEE: Wor Thongthai (MS, NCSU Physics, 2008), Derrick Stevens (PhD, NCSU Physics, 2009), Diana Streng (MS, NCSU Physics, 2009), Mahmoud Moradi (PhD, NCSU Physics, 2010), Ellen Peterson (PhD, NCSU Math, 2010), Nick Lowman (PhD, NCSU Math 2014), Zubair Azad (PhD, NCSU Physics, 2016), Collin Eaker (PhD, Chemical Engineering, 2016), Junan Zu (PhD, NCSU Electrical and Computer Engineering, 2016) Ben Hoffman (PhD, NCSU Physics, 2017), Matthew Melillo (PhD, NCSU Chemical Engineering, 2017), Austin Reid (PhD, NCSU Physics, current), Will Sams (PhD, NCSU Physics, current), Mingyung Song (PhD, NCSU Chemical Engineering, current), Aaron Bardall (PhD, NCSU Math, current)

EXTERNAL GRADUATE COMMITTEE/EXAM: Simon de Vet (PhD, Physics, University of Western Ontario, Canada, 2009), Sally Thompson (PhD, Nicholas School for the Environment, Duke, 2010), Kiri Nichol (PhD, Physics, U. Leiden, Netherlands, 2011), Constantinos Spandagos (PhD, Chemical Engineering, Imperial College, London, 2011), Ceyda Sanli (PhD, Physics, U. Twente, Netherlands, 2012).

UNDERGRADUATE STUDENTS: Kenneth Ball (2006–2007, → PhD NCSU Mathematics), Oindree Banerjee (2011, → PhD student, Ohio State Physics), Sara Berry (2012–2015, → PhD student, U. Washington Atmospheric Sciences), Ephraim Billign (2015–2017, → PhD student U. Chicago Physics), Philip Boyne (2007–2009, → high school physics teacher, Raleigh, NC), Emily Brown (2017–2018, → Aberdeen Proving Ground), Robert Bullard (2017–), John Chavez (2012–2013), Mia de los Reyes (2013–2014, Goldwater Scholar, NSF Graduate Student Fellowship, Churchill Scholar, MS Astronomy Cambridge, → PhD student CalTech Astrophysics), Garrett Early (2014–2015), Tristan Emm (2017–), Melissa Fender (2008–2011, → MS, U. Chicago Physics → PhD student, Wake Forest Physics), Kate Foco (2009–2011, → PhD student, Scripps Institute of Oceanography), Laura Golick Gray (2007–2009, → PhD Emory Physics → postdoc Princeton Engineering), Greg Gibson (2006), Paul Houseworth (2006–2007, → Progress Energy), Anna Jackson (2017–), Adam Keith (2010–2011, → PhD student, U. Colorado Physics, NSF Graduate Student Fellowship → SAS), Melia Kendall (2018–), Michael Kerley (2013–2014), Clayton Kirberger (2017–), Rebekah Lee (2014–2015, → MS student Boise State Geophysics), Adele Lichtenberger Igel (2008–2010, → PhD student, Colorado State Atmospheric Science), Erik Lutz (2015), Michael Mann (2014–2016, → PhD student, Cornell Geophysics), Alex Mauney (2013–2014, NSF Graduate Student Fellowship, → PhD student, Cornell Physics), Robert McMillion (2007–2008), José Medrano (2015, → high school physics teacher, New York, NY), Hannahmirian Mekbib (2015–2016), Josh Miller (2018–), Mika Murphy (2017), Dhruvil Patel (2006), Kyle Payton (2014), Katherine Phillips (2006–2007, → Harvard Applied Physics PhD, NSF Graduate Student Fellowship), Riley Reid (2017–), Luis Royo Romero (2015), Luke Sargent (2006), Mark Schillaci (2011–2013, → PhD student, Ohio State Physics), Bjorn Sumner (2017 → PhD student, U. Colorado Physics), Megan Szakasits (2012–2013, → PhD student, Michigan Chemical Engineering) Keith Vandergrift (2015–2016)

VISITING UNDERGRADUATE STUDENTS: Kali Allison (2010, Harvey Mudd College, → PhD student Stanford Geophysics), Caroline Bauer (2013, U. Magdeburg, Germany), Stéphanie Couvreur (2008, École Normale Supérieure, Paris), Georgi Dinolov (2009, Harvey Mudd College, → PhD student Santa Cruz Applied Mathematics), Sydney Dorman (2017, Haverford College) Lucie Ducloué (2009, École Normale Supérieure, Paris),

Chris Fox (2008, Harvey Mudd College, → PhD student U. Chicago Statistics), Marion Grzelka (2014, École Normale Supérieure, Cachan → PhD student U. Paris-Sud), Matt Hin (2012, Harvey Mudd College, → PhD student Cornell Applied Mathematics), Chad Province (2017, U. Southern California), Gustavo Ramirez (2016, Hunter College), Richard Sayanagi (2012, Harvey Mudd College, → PhD student U. Wisconsin Physics), Wynn Vonnegut (2010, Harvey Mudd College, → software engineer),

MEMBERSHIPS

American Physical Society: Division of Fluid Dynamics, Division of Condensed Matter Physics, Group on Statistical and Nonlinear Physics, Group on Soft Matter, Forum on Physics Education, Forum on Physics and Society.

American Geophysical Union

American Association of Physics Teachers

Sigma Xi

American Association for the Advancement of Science