Karen E. Daniels

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

Phone: (919) 513-7921
Fax: (919) 515-6538
Email: kdaniel@ncsu.edu
Web: 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 Electroglow in the Equatorial Region of Jupiter* Advisor: Dr. Mary Hudson

PROFESSIONAL APPOINTMENTS

Department of Physics, North Carolina State University, Raleigh, NC

2021 –	Distinguished Professor
2015 – 2021	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

2023–24	**Departments of Civil and Chemical Engineering** **Indian Institute of Science, Bengaluru, India** Visiting Faculty (Sept 2023–Jan 2024)
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
2018	Fellow, American Physical Society
2021	Fellow, American Association for the Advancement of Science
2023	Fulbright-Nehru Fellowship: Academic and Professional Excellence (Teaching & Research)

RESEARCH INTERESTS & EXPERTISE

- granular materials (rheology, dynamics near jamming, sound propagation, creep)
- mechanics of amorphous continuous materials (3d printed, origami)
- interaction of surface tension and elasticity at interfaces of soft materials
- network mechanics of granular and multi-scale materials
- applications of the above to natural systems (landslides, planetary science)
- optical techniques in soft matter physics (photoelasticity, fluorescence, shadowgraphy)

TEACHING

2006 – **North Carolina State University, Raleigh, NC**

PY 131, *Conceptual Physics*
for non-specialists (major redevelopment for studio format and new labs)
PY 201, *University Physics I*
introductory mechanics for physics majors
PY 203, *Modern Physics*
20th century survey course for sophomore physics majors (studio format)
PY 205/208, *Physics for Engineers and Scientists I/II* (calculus-based)
multiple curricula and formats, including studio
PY 251, *Introduction to Scientific Computing*
online or hybrid course in a studio format
PY 413, *Thermal Physics*
thermodynamics and statistical mechanics for physics majors, including two new labs
PY 59X, *Physics Granular and Particulate Materials*
topics in granular materials
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
Patterns vs. Pandemonium

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. Abrar Naseer, Karen E. Daniels, Tejas G Murthy. "Micromechanics of compressive and tensile forces in partially-bonded granular materials." arXiv:2507.19214 (under review)
2. Vrinda D. Desai, Alexander L. Handwerger, Karen E. Daniels. "Using network science to evaluate landslide hazards on Big Sur Coast, California, USA," *Natural Hazards and Earth System Sciences* 25: 4755 (2025)
3. Caitlyn Obrero, Mastawal Tirfe, Carmen Lee, Sourabh Saptarshi, Christopher Rock, Karen E. Daniels, Katherine A. Newhall. "Electrical transport in tunably disordered metamaterials." *Physical Review E* 112: 035505 (2025)
4. Carmen L. Lee, Ephraim Bililign, Emilien Azéma, Karen E. Daniels. "Particle scale anisotropy controls bulk properties in sheared granular materials. " *Physical Review Letters* 135: 108201 (2025)

5. Carmen L. Lee, Ephraim Bililign, Emilien Azéma, Karen E. Daniels. "Loading-dependent microscale measures control bulk properties in granular material: An experimental test of the stress-force-fabric relation." *Physical Review E* 112: 035401 (2025)

6. Gautam Vatsa, Farnaz Fazelpour, Ravi Gautam, Karen E. Daniels, Prabhu R. Nott. "Dilatancy and its coupling to the kinematics in sheared granular media." *Journal of Fluid Mechanics* 1003: A11 (2025)

7. Sahar Rashid-Nadimi, Valery Okatenko, Minyung Song, Yogi Shetty, Adam L. Bachmann, Nazgol Mehrabian, Keith Hillaire, Praneshnandan Nithyanandam, Karen Daniels, Abolfazl Kiani, Michael D. Dickey. "The Role of Electrochemical Oxidation on the Interfacial of Eutectic Gallium Indium" *ACS Electrochemistry* 1: 103-114 (2025)

8. Anne Voigtländer, Morgane Houssais, Karol A. Bacik, Ian C. Bourg, Justin C. Burton, Karen E. Daniels, Sujit S. Datta, Emanuela Del Gado, Nakul S. Deshpande, Olivier Devauchelle, Behrooz Ferdowsi, Rachel Glade, Lucas Goehring, Ian J. Hewitt, Douglas Jerolmack, Ruben Juanes, Arshad Kudrolli, Ching-Yao Lai, Wei Li, Claire Masteller, Kavinda Nissanka, Allan M. Rubin, Howard A. Stone, Jenny Suckale, Nathalie M. Vriend, John S. Wettlaufer, Judy Q. Yang. "Soft matter physics of the ground beneath our feet." *Soft Matter* 20: 5859-5888 (2024)

9. Stephen L. Strickland, Karen E. Daniels, Michael Shearer. "The role of higher-order viscous and interfacial effects on the onset of surfactant-covered faraday waves." *IMA Journal of Applied Mathematics* 89: 1006-1040 (2024)

10. Keith D. Hillaire, Praneshnandan Nithyanandam, Minyung Song, Sahar Rashid Nadimi, Abolfazl Kiani, Michael D. Dickey, Karen E. Daniels. "Interfacial Tension Hysteresis of Eutectic Gallium-Indium" *Advanced Functional Materials.* 34: 2311501 (2024)

11. Vrinda Desai, Farnaz Fazelpour, Alexander L. Handwerger, Karen E. Daniels. "Forecasting landslides using community detection on geophysical satellite data." *Physical Review E* 108: 014901 (2023) Data DOI: 10.5061/dryad.41ns1rnjf

12. Farnaz Fazelpour, Karen E. Daniels. "Controlling rheology via boundary conditions in dense granular flows." *Soft Matter* 19: 2168 (2023) Data DOI: 10.5061/dryad.866t1g1v8

13. Lars Kool, Patrick Charbonneau, Karen E. Daniels. "Gardner-like Crossover from Variable to Persistent Force Contacts in Granular Crystals." *Physical Review E* 106: 054901 (2022) Data DOI: 10.5061/dryad.kd51c5b97

14. Negin Amini, Josh Tuohey, John M. Long, Jun Zhang, David A. V. Morton, Karen E. Daniels, Farnaz Fazelpour, Karen P. Hapgood. "Photoelastic Stress Response of Complex 3D-Printed Particle Shapes." *Powder Technology* 409: 117852 (2022)

15. Ryan Kozlowski, Hu Zheng, Karen E. Daniels, Joshua E. S. Socolar. "Stick-slip in a granular material with varying grain angularity." *Frontiers in Physics* 10: 916190 (2022)

16. Théo Jules, Austin Reid, Karen E. Daniels, Muhittin Mungan, Frédéric Lechenault. "One Dimensional Mechanical Memory with Cylindrical Origami." *Physical Review Research* 4: 013128 (2022)

17. Farnaz Fazelpour, Zhu Tang, Karen E. Daniels. "The effect of grain shape and material on the nonlocal rheology of dense granular flows." *Soft Matter* 18: 1435-1442 (2022)

18. Jack Featherstone, Robert Bullard, Tristan Emm, Anna Jackson, Riley Reid, Sean Shefferman, Adrienne Dove, Joshua Colwell, Jonathan E. Kollmer, and Karen E. Daniels. "Stick-slip dynamics in penetration experiments on simulated regolith." *The Planetary Science Journal* **2**: 243 (2021)

19. Ryan Kozlowski, Hu Zheng, Karen E. Daniels, Joshua E. S. Socolar. "Stress propagation in locally loaded packings of disks and pentagons." *Soft Matter* **17**: 10120-10127 (2021)

20. Minyung Song, Karen E. Daniels, Abolfazl Kiani, Sahar Rashidnadimi, Michael D. Dickey. "Interfacial Tension Modulation of Liquid Metal via Electrochemical Oxidation." *Advanced Intelligent Systems* **3:** 2100024 (2021)

21. Kuang Liu, Jonathan E. Kollmer, Karen E. Daniels, J. M. Schwarz, Silke Henkes. "Sponge-like rigid structures in frictional granular packings." *Physical Review Letters* **126:** 088002 (2021) Data DOI: 10.5061/dryad.d51c5b01k

22. Minyung Song, Karin Kartawira, Keith D. Hillaire, Cheng Li, Collin B. Eaker, Abolfazl Kiani, Karen E. Daniels, and Michael D. Dickey. "Overcoming Rayleigh-Plateau Instabilities: Stabilizing and Destabilizing Liquid Metal Streams via Electrochemical Oxidation." *PNAS* **32**: 19026 (2020) Data DOI: 10.7910/DVN/2MNS3G

23. Christopher Rock, Rashmi Vadlakonda, Sullivan Figurskey, Christopher Ledford, Harvey West, Victoria Miller, Mark Pankow, Karen E. Daniels, and Tim Horn. "Analysis of Self-Organized Patterned Surface Oxide Spots on Ejected Spatter Produced during Laser Powder Bed Fusion." *Additive Manufacturing* **35**: 101320 (2020)

24. Aaron Bardall, Shih-Yuan Chen, Karen E. Daniels, Michael Shearer. "Gradient Induced Droplet Motion Over Soft Solids." *IMA Journal of Applied Mathematics* **85**: 495-512 (2020)

25. Agheal Abed-Zadeh, Jonathan Barés, Theodore A. Brzinski, Karen E. Daniels, Joshua Dijksman, Nicolas Docquier, Henry Everitt, Jonathan E. Kollmer, Olivier Lantsoght, Dong Wang, Marcel Workamp, Yiqiu Zhao, Hu Zheng. "Enlightening force chains: a review of photoelasticimetry in granular matter." *Granular Matter* **21:** 83 (2019)

26. Douglas J. Jerolmack and Karen E. Daniels. "Viewing Earth's surface as a soft matter landscape." *Nature Reviews Physics* **1:** 716 – 730 (2019)

27. Shih-Yuan Chen, Aaron Bardall, Michael Shearer, Karen E. Daniels. "Distinguishing deformation mechanisms in elastocapillary experiments." *Soft Matter* **15:** 9426 (2019)

28. A. L. Thomas, Zhu Tang, Karen E. Daniels, N. M. Vriend. "Force fluctuations at the transition from quasi-static to inertial granular flow." *Soft Matter* **15:** 8532 (2019)

29. Ryan Kozlowski, C. Manuel Carlevaro, Karen E. Daniels, Lou Kondic, Luis A. Pugnaloni, Joshua E. S. Socolar, Hu Zheng, Robert P. Behringer. "Dynamics of a Grain-Scale Intruder in a 2D Granular Medium with and without Basal Friction." *Physical Review E.* **100:** 032905 (2019)

30. Estelle Berthier, Mason A. Porter, Karen E. Daniels. "Forecasting failure locations in two-dimensional disordered lattices." *PNAS* **116:** 16742 (2019)

31. Sarah M Yannarell, Gabrielle M Grandchamp, Shih-Yuan Chen, Karen Daniels, Elizabeth A Shank. "A dual-species biofilm with emergent mechanical and protective properties." *Journal of Bacteriology.* **201:** e00670-18 (2019)

32. Estelle Berthier, Jonathan E. Kollmer, Silke E. Henkes, Kuang Liu, Jennifer M. Schwarz, Karen E. Daniels. "Rigidity percolation control of the brittle-ductile transition in disordered networks." *Physical Review Materials.* **3:** 075602 (2019) Data DOI: 10.5061/dryad.q1g5279

33. Jonathan E. Kollmer, Karen E. Daniels. "Betweenness Centrality as Predictor for Forces in Granular Packings." *Soft Matter.* **15:** 1793 (2019) Data DOI: 10.5061/dryad.fs8sb1g

34. Ephraim S. Bililign, Jonathan E. Kollmer, Karen E. Daniels. "Protocol-Dependence and State Variables in the Force-Moment Ensemble." *Physical Review Letters.* **122:** 038001 (2019). Data DOI: 10.5061/dryad.9jp26bk

35. Marcel Workamp, Gustavo Ramirez, Karen E. Daniels and Joshua A. Dijksman. "Symmetry-reversals in chiral active matter." *Soft Matter.* **14:** 5572-5580 (2018)

36. 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)

37. 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) Data DOI: 10.5061/dryad.693kt2j

38. 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)

39. Lia Papadopoulos, Mason A. Porter, Karen E. Daniels, Danielle S. Bassett. "Network Analysis of Particles and Grains." *Journal of Complex Networks.* **6:** 485-565 (2018)

40. 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)

41. 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)

42. 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)

43. Karen E. Daniels, Jonathan E. Kollmer and James G. Puckett. "Photoelastic force measurements in granular materials." *Review of Scientific Instruments.* **88:** 051808 (2017)

44. Marion Grzelka, Joshua B. Bostwick, and Karen E. Daniels. "Capillary fracture of ultrasoft gels: heterogeneity and delayed nucleation." *Soft Matter.* **13:** 2962 (2017)

45. Yuming Huang and Karen E. Daniels. "Friction and Pressure-Dependence of Force Chain Communities in Granular Materials" *Granular Matter.* **18:** 85 (2016)

46. 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)

47. 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)

48. 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)

49. 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)

50. 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)

51. 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)

52. 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) Data DOI: 10.5061/dryad.5v8m0

53. Dapeng Bi, Silke Henkes, Karen E. Daniels, Bulbul Chakraborty. "The Statistical Physics of Athermal Materials." *Annual Reviews of Condensed Matter Physics*, **6**: 63-83, 2015.

54. 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*, **6:** 485-565 (2015).

55. 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*, **94:** 63-79 (2015).

56. Carlos P. Ortiz, Karen E. Daniels, and Robert Riehn "Nonlinear Elasticity of Flow-Stabilized Solids." *Physical Review E*. **90**: 022304, 2014.

57. Joshua B. Bostwick, Michael Shearer, Karen E. Daniels. "Elastocapillary deformations on partially-wetting substrates: rival contact-line models." *Soft Matter*. **10**: 7361-7369, 2014.

58. 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.

59. Karen E. Daniels, Caroline Bauer, Troy Shinbrot. "Correlations between electrical and mechanical signals during granular stick-slip events." *Granular Matter.* **16**: 217-222, 2014.

60. 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.

61. Joshua B. Bostwick and Karen E. Daniels “Capillary fracture of soft gels.” *Physical Review E*. **88**: 042410, 2013.

62. Karen E. Daniels. “Rubble-Pile Near Earth Objects: Insights from Granular Physics.” in *Asteroids: Prospective Energy and Material Resources.* Viorel Badescu, editor. Springer, 2013.

63. James G. Puckett and Karen E. Daniels. “Equilibrating temperaturelike variables in jammed granular subsystems.” *Physical Review Letters.* **110**: 058001, 2013.

64. Eli T. Owens and Karen E. Daniels. “Acoustic measurement of a granular density of modes.” *Soft Matter*. **9:** 1214-1219, 2013.

65. Carlos P. Ortiz, Robert Riehn, and Karen E. Daniels. “Flow-Driven Formation of Solid-like Microsphere Heaps.” *Soft Matter*. **9:** 543-549, 2013.

66. 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.

67. James G. Puckett, Frédéric Lechenault, Karen E. Daniels, Jean-Luc Thiffeault. “Trajectory entanglement in dense granular materials.” *Journal of Statistical Mechanics*. P06008, 2012.

68. Kiri Nichol and Karen E. Daniels. “Equipartition of rotational and translational energy in a dense granular gas.” *Physical Review Letters*. **108**: 018001, 2012.

69. 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.

70. Eli T. Owens and Karen E. Daniels. “Sound propagation and force chains in granular materials.” *Europhysics Letters*, **94**: 54005, 2011.

71. 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.

72. Melissa L. Fender, Frédéric Lechenault, and Karen E. Daniels. “Universal shapes formed by two interacting cracks.” *Physical Review Letters,* **15**: 125505, 2010.

73. 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.

74. 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.

75. Frédéric Lechenault and Karen E. Daniels. “Equilibration of granular subsystems” *Soft Matter,* **6**: 3074, 2010.

76. 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.

77. Sally E. Thompson and Karen E. Daniels. “A porous convection model for small-scale grass patterns.” *The American Naturalist,* **175**: E10-E20 (2010) Data DOI: 10.5061/dryad.857

78. Laura A. Golick and Karen E. Daniels. “Mixing and segregation rates in sheared granular materials.” *Physical Review E*, **80**: 042301, 2009.

79. 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.

80. 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.

81. 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.

82. Karen E. Daniels, Shomeek Mukhopadhyay, Paul J. Houseworth, and Robert P. Behringer. "Instabilities in droplets spreading on gels." *Physical Review Letters*, **99**: 124501, 2007.

83. 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.

84. 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.

85. 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.

86. Karen E. Daniels, Christian Beck, and Eberhard Bodenschatz. "Defect turbulence and generalized statistical mechanics." *Physica D*, **193**: 208, 2004.

87. Karen E. Daniels, Richard J. Wiener, and Eberhard Bodenschatz. "Localized transverse bursts in inclined layer convection." *Physical Review Letters*, **91**: 114501, 2003.

88. Karen E. Daniels and Eberhard Bodenschatz. "Statistics of defect motion in spatiotemporal chaos in inclined layer convection." *Chaos*, **13**: 55, 2003.

89. Karen E. Daniels and Eberhard Bodenschatz. "Defect turbulence in inclined layer convection." *Physical Review Letters*, **88**: 034501, 2002.

90. Karen E. Daniels, Brendan B. Plapp, and Eberhard Bodenschatz. "Pattern formation in inclined layer convection." *Physical Review Letters*, **84**: 5320, 2000.

PROCEEDINGS

1. Carmen Lee, Émilien Azéma, Karen Daniels. "The Stress-Force-Fabric relation across shear bands." *Powders and Grains 2025.* EPJ Web of Conferences. 340: 02005 (2025)

2. Abrar Naseer, Karen E Daniels, Tejas G Murthy. "Extracting Contact Forces in Cohesive Granular Ensembles." *Powders and Grains 2025.* EPJ Web of Conferences. 340: 04013 (2025)

3. Carmen L Lee, Lori McCabe, Ben McMillan, Abrar Naseer, Dong Xie, Ted Brzinski, Karen E Daniels, Tejas Murthy, Kerstin Nordstrom. "Photoelastic Grain Solver v2. 0: An updated tool for analysis of force measurements in granular materials". *Powders and Grains 2025.* EPJ Web of Conferences. 340: 10004 (2025)

4. Jonathan E. Kollmer, Jack Featherstone, Robert Bullard, Tristan Emm, Anna Jackson, Riley Reid, Sean Shefferman, Adrienne Dove, Joshua Colwell, and Karen E. Daniels. "Probing Regolith-Covered Surfaces in Low Gravity." *Powders and Grains 2021*. EPJ Web of Conferences 249: 02005 (2021)

5. Farnaz Fazelpour and Karen E. Daniels. "The Effect of Boundary Roughness on Dense Granular Flows." *Powders and Grains 2021*. EPJ Web of Conferences **249**: 03014 (2021)

6. Ryan Kozlowski, Hu Zheng, Karen E. Daniels, and Joshua E. S. Socolar. "Particle Dynamics in Two-Dimensional Point-Loaded Granular Media Composed of Circular or Pentagonal Grains." *Powders and Grains 2021*. EPJ Web of Conferences 249: 06010 (2021)

7. 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)

8. 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)

9. Karen E. Daniels. "The role of force networks in granular materials." *Powders and Grains 2017*. EPJ Web of Conferences 140, 01006 (2017)
10. 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.)
11. James G. Puckett, Frédéric Lechenault, Karen E. Daniels. "Generating Ensembles of 2D Granular Configurations." Gallery of Nonlinear Images, *Chaos*, **19**: 041108, 2009.
12. 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.
13. 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.
14. 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.
15. 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.
16. 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.
17. 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.
18. Karen E. Daniels, Joyce E. Coppock, and Robert P. Behringer. "Dynamics of Meteor Impacts." Gallery of Nonlinear Images, *Chaos*, **14**: S4, 2004.
19. 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, OPINION, AND NON-TECHNICAL WRITING

1. Karen E. Daniels. "Viewpoint: Pushing on a Nonlinear Material." *Physics*, **7:** 113, 2014.
2. Kerstin Nordstrom, Jacinta Conrad, Karen Daniels, Jennifer Ross. "For SHE's a Jolly Good Fellow?" *APS News* April 2018.
3. Karen E. Daniels. "Q&A: Looking for Failure." *Physics.* 11: 47 (2018)
4. Karen E. Daniels and Mary Williard Elting. "Knitting Ripples." *Patterns*, **1**: 3 (2020)
5. Karen E. Daniels, Charles E. Maher, Katherine A. Newhall, Mason A. Porter, Christopher Rock. "Comparing dragonfly wings to jars of marbles through the lens of hyperuniformity." Under review at *Frontiers for Yound Minds* arXiv:2508.05919
6. Interviewed in: *The Walrus, Physics Today, Scientific American, Nature Reviews Physics, Nature, The New York Times, Science News for Students, Gizmodo, News and Observer*, WUNC's *The State of Things*

INVITED TALKS

1. "Designing disordered metamaterials for ultralight applications (with inspiration from dragonfly wings and jars of marbles)" NCA&T Physics Colloquium, Greensboro, NC. February 2026.
2. "Granular flow and rigidity: from the lab to the solar system." Hard Problems in Soft Earth Geophysics, Kavli Institute for Theoretical Physics, Santa Barbara, CA, January 2026.
3. "Granular flow and rigidity: from the lab to the Earth and beyond." **Plenary Lecture** Joint Meeting of the Argentinian and Uruguayan Physical Societies. La Plata, Argentina, September 2025.

4. “Granular flow and rigidity: from the lab to the solar system.” Soft Matter Gordon Conference. August 2025.
5. “Granular flow and rigidity: from the lab to the Earth and beyond.” (online) DKU Soft Matter International Symposium. Duke Kunshan, China. May 2025.
6. “Granular flow and rigidity: from the lab to the Earth and beyond.” Georgetown Physics Colloquium. Washington, DC. April 2025.
7. “Mechanical memory in 1D” APS Global Physics Summit. Anaheim, CA, March 2025.
8. “Rheology of granular matter on Earth and in our solar system.” **Plenary Lecture** Society of Rheology Annual Meeting, Austin, Texas, October 2024
9. “Rigidity, Failure, and Flow in Dense Granular Materials” School of Engineering, Brown University, September 2024
10. “Granular failure from micro- to meso- to macro-scale.” Workshop: Friction and Fracture and the Onset of Geohazards, Norwegian Academy of Sciences, Oslo, Norway, June 2024
11. “Rigidity and failure in granular materials: from the particle to the bulk scale” Northeast Granular Workshop, College of the Holy Cross, Worchester, MA, June 2024.
12. “The Dense Granular State.” (4 lectures) Summer School on Soft Solids and Complex Fluids, University of Massachusets, Amherst, June 2024
13. “Networks and Particulate/Amorphous Matter.” COMPASS Center (online) May 2024
14. “Fingers, fractals, and flow in liquid metals.” L’École Normale Supérieure, Paris, France, April 2024
15. “Rigidity and failure in granular materials: from the particle to the bulk scale” Department of Civil Engineering, University of Houston, March 2024
16. “Looking inside granular materials.” Department of Mechanical and Aerospace Engineering, University of Maryland, February 2024
17. “Granular Materials: From Quotidian to Astronomical.” Department of Physics, IISER Trivandrum, India, January 2024
18. “Looking inside granular materials .” Department of Civil Engineering. Indian Institute of Science, Bangalore, India. January 2024
19. “Rigidity and Nonlocality in Dense Granular Materials” Mexican Society of Physics, Winter Meeting on Statistical Physics, Guanajuato, Mexico. January 2023
20. “From grains to avalanches” Physics Department Colloquium, North Carolina A&T. February 2023
21. “Rigidity and failure in granular materials.” Scripps Institution of Oceanography. La Jolla, California. March 2023
22. “Gravity and Granular Materials” Soft Matter Seminar Series, NASA (online) March 2023
23. “Mechanical memory in 1D” CECAM WORKSHOP: Pathways, Memory, and Emergent Computation in Nonequilibrium Systems. Sede Boqer, Israel, May 2023
24. “Looking inside granular materials” Computational Infrastructure for Geodynamics (online). June 2023 `https://geodynamics.org/events/details/307`
25. “Nonlocal rheology in a sheared granular flow” (with Prabhu Nott), International Fine Powders Research Institute Annual Meeting, June 2023
26. “Rigidity and failure in amorphous and granular materials.” Frontiers in Physics of Soft and Biological Matter Conference. Raman Research Institute. Bangalore, India. September 2023
27. “From grains to landslides: rigidity in dense granular materials.” IISc Physics Colloquium. Bangalore, India. October 2023

28. “Fingers, fractals, and flow in liquid metals.” Raman Research Institute Colloquium. Bangalore, India. November 2023 https://www.youtube.com/watch?v=pKsI1-X-6ow
29. “Nonlocal rheology of granular materials” IISc Chemical Engineering Seminar. Bangalore, India. November 2023
30. “Fingers, fractals, and flow in liquid metals.” Soft Matter Group Seminar. IIT Hyderabad, India. November 2023
31. “Rigidity and Nonlocality in Dense Granular Materials.”’ Seminar, Tata Institute for Fundamental Research, Hyderabad, Inda. November 2023
32. “The Earth is Soft: taking granular materials out of the lab into the earth” Jawaharlal Nehru Centre For Advanced Scientific Research, Bangalore, India November 2023
33. “Granular Materials: From Quotidian to Astronomical” Young Scientists Forum. Arthur C Clarke Institute for Modern Technologies, Colombo, Sri Lanka. December 2023
34. “Granular Materials: From Quotidian to Astronomical” Department of Physics, University of Colombo. Colombo, Sri Lanka. December 2023
35. “Nonlocal rheology of dense granular flows.” Complex Fluids 2024, IIT Madras, Chennai, India. December 2023
36. “Granular Materials: From Quotidian to Astronomical” Department of Physics, SRM Institute of Science and Technology, Chennai, India. December 2023.
37. “Rigidity and failure in amorphous and granular materials.” ” National Centre for Biological Sciences, Bangalore, India. December 2023
38. “Nonlocal rheology of granular materials.” Gordon Research Conference on Granular Materials. Stonehill College, Easton, MA. June 2022.
39. “Rigidity, Nonlocality, and Acoustics in Dense Granular Materials.” Leiden University, Netherlands. June 2022
40. “Controlling Rheology via Boundary Conditions in Dense Granular Flows.” IFPRI (International Fine Powders Research Institute) Annual Meeting. Brussels, Belgium. June 2022.
41. “Laboratory studies of failure in granular materials.” Geo-Congress. Charlotte, NC. March 2022.
42. “Granular Materials: From Quotidian to Astronomical.” Physics Department Colloquium, Tufts University. February 2022.
43. “Granular Materials: From Quotidian to Astronomical.” Physics Department Online Colloquium, Michigan State University. January 2022.
44. “Rigidity, Nonlocality, and Acoustics in Dense Granular Materials.” Online Workshop: Physics of the Ground Beneath our Feet. Princeton University. January 2022.
45. “Granular Materials: From Quotidian to Astronomical.” University of Utrecht, Netherlands (online) October 2021.
46. “Lunar Research in Extraction, Processing, and Handling.” Lunar Surface Science Workshop, Fundamental and Applied Lunar Surface Research in Physical Sciences (online) August 2021.
47. “Granular Materials: From Quotidian to Astronomical.” University of Santiago, Chile (online) June 2021.
48. “The role of force networks in granular materials.” Granular Matter Webinar Series. (Springer-Nature). May 2021. Talk video
49. “Granular Materials: From Quotidian to Astronomical.” German Physical Society (online), March 2021.
50. “Granular Materials Research in Lunar Gravity.” National Academies, meeting of the Committee on Biological and Physical Sciences in Space. (online) March 2021.

51. “Nonlocal rheology of granular materials.” APS March Meeting (online), March 2021.
52. “Bend, slip, or break?” NYU Center for Soft Matter Research. March 2021. Talk video
53. “Fingers, fractals, and flow in liquid metals.” Brown University Fluids Seminar (online), February 2021.
54. “Fingers, fractals, and flow in liquid metals.” Leeds/DAMTP/Journal of Fluid Mechanics. Online. January 2021. (online) Talk video
55. “Fingers and fractals in liquid metals.” Physics Department Colloquium, Colorado School of Mines. Denver, CO. March 2020.
56. “Nonlocal rheology of granular materials”, APS March Meeting, Denver, CO. March 2020. [Canceled due to COVID-19]
57. “Granular Materials: From Quotidian to Astronomical.” **Keynote Speaker**, Soft Matter Canada Conference, Online. June 2020.
58. “Controlling Rheology via Boundary Conditions in Dense Granular Flows.” IFPRI (International Fine Powders Research Institute) Online Annual Meeting. June 2020.
59. “Granular Materials: From Quotidian to Astronomical.” Physics Department Online Colloquium, University of North Texas. Denton, TX. September, 2020.
60. “Fingers, fractals, and flow in liquid metals.” Complex Systems Online Seminar, Northwestern University, Evanston, IL. November, 2020.
61. “Grains in Space.” Invited talk, ASGSR Town Hall Talks for NASA Decadal Survey. November, 2020. `https://youtu.be/GTiqpwzFAI4`
62. “The role of force networks in static and flowing granular materials.” Colloquium, Dept. of Physics. U. of Rochester. Rochester, NY. December 2019.
63. “Fingers and fractals in liquid metals.” Seminar, Dept. of Physics. Syracuse University. Syracuse, NY. December 2019.
64. “Granular Materials: From Quotidian to Astronomical” **Inghram Lecture**, Dept. of Physics, U. Chicago, IL. November 2019.
65. “Granular Materials: From Quotidian to Astronomical” Colloquium, Department of Physics, Oregon State University, Corvalis, OR. November 2019.
66. 2-Day Short Course (with Jeff Morris) “Suspension & Granular Rheology.” *Society of Rheology* Annual Meeting. Raleigh, NC. October 2019.
67. “The role of force networks in static and flowing granular materials.” Applied Mathematics Seminar. UNC Chapel Hill. Chapel Hill, NC. September 2019.
68. “The role of force networks in static and flowing granular materials.” Seminar, Dept. of Mathematics, U. Manchester, Manchester, UK. July 2019.
69. “The role of force networks in granular materials.” **Keynote Speaker**, *Traffic and Granular Flow*. Pamplona, Spain. July 2019.
70. “Fractals and Fingering in Liquid Metals.” *From Pattern Formation to Turbulence* Symposium. Kloster Banz, Germany. June 2019.
71. “Controlling Rheology via Boundary Conditions in Dense Granular Flows.” IFPRI (International Fine Powders Research Institute) Annual Meeting. Burlington, VT. June 2019.
72. “Forces and History in Frictional Packings.” *4th International Conference on Packing Problems.* Yale University. New Haven, CT. June 2019.
73. “Starbursts and flowers: when spreading droplets break bad.” **Plenary Speaker**. *SIAM Conference on Applications of Dynamical Systems.* Snowbird, UT. May 2019.

74. “Starbursts and flowers: when spreading droplets break bad.” Seminar, Dept. of Mathematics, New York University. February 2019.
75. “The Role of Force Chains in Granular Materials.” Gordon Conference on Granular Materials. Stonehill College. Easton, MA. July 2018.
76. “Starbursts and Flowers: when spreading droplets break bad.” **Keynote Speaker**. 11th Southeast Meeting on Soft Materials, Emory University, Emory, GA. May 2018.
77. “Starbursts and flowers: when spreading droplets break bad.” Department of Applied Physical Sciences. Chapel Hill, NC. May 2018.
78. “Counting Network Configurations in Frictional Granular Materials.” *Cracking the Glass Transition* Collaboration Meeting. Simons Foundation. New York, NY. March 2018.
79. “Force-based ensembles in granular materials.” APS March Meeting. Los Angeles, CA. March 2018.
80. “Non-local Rheology.” Kavli Institute for Theoretical Physics. UCSB, Santa Barbara, CA. March 2018.
81. ”Asteroids as Laboratories for Granular Physics.” AAAS Annual Meeting. Austin, TX. February 2018.
82. ”Starbursts and flowers: when spreading droplets break bad.” Department of Physics. McMaster Univeristy. Hamilton, Ontario, Canada. January 2018.
83. “The role of force networks in granular materials.” MIT Mechanical Engineering. Cambridge, MA. October 2017.
84. “The role of force networks in granular materials.” Department of Physics, U. Massachusetts. Amherst, MA. October 2017.
85. Lecturer on Experiments in Granular Materials. 2017 Boulder Summer School for Condensed Matter Physics. July 2017.
86. “The role of force networks in granular materials.” **Plenary Speaker**, Powders and Grains 2017. Montpellier, France. July 2017.
87. “Acoustics in disordered granular materials: from the particle scale to force networks.” Acoustical Society of America Annual Meeting. Boston, MA. June 2017.
88. “Nonlocal Rheology” IFPRI (International Fine Powders Research Institute) Annual Meeting. Philadelphia, PA. June 2017.
89. “Shapes, Forces, and Nonlocality in the Flow of Powders and Grains.” **Plenary Speaker** at IFPRI/T-Mappp Powder Flow Workshop. Amsterdam. January 2017.
90. “Temperature-like variables in granular materials.” Condensed Matter Seminar. University of Michigan. Dec 2016.
91. “Oxide-Mediated Fingering of Liquid Metals”. Surface Activity Driven by Material Geometry and Elasticity workshop. UMass Amherst, Sept 2016.
92. “Configurational Temperatures in Granular Materials” StatPhys 26. Lyon, France. July 2016.
93. “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.
94. “Nonlocal rheology” IFPRI (International Fine Powders Research Institute) Annual Meeting. Guildford, UK. June 2016.
95. “Temperature-like variables in granular materials.” Department Colloquium. University of Oregon. May 2016.
96. “Photoelasticity for Contact Force Measurements” & “3D Contact Force Measurements using Rubies” tutorials at spring school Imaging Particles. Erlangen, Germany. April 2016.
97. Monitoring monolayers: the spatiotemporal dynamics of surfactants on fluid surfaces ” RPI Mechanical Engineering colloquium. Troy, NY. December 2015

98. “Playing with Sand: Complex Behaviors from a Simple Material” NCA&T Physics Colloquium, Greensboro, NC. October 2015.

99. “Temperature-like variables in granular materials .” Colloquium. Syracuse University Physics Department. Syracuse, NY. October, 2015

100. “Capillary Fracture ” Condensed Matter Seminar. Syracuse University Physics Department. Syracuse, NY. October, 2015

101. “The Geometry of Force Transmission in Granular Materials” Geometry and Physics of Spatial Random Systems. Bad Herrenalb, Germany. September 2015.

102. “Quantifying Force Transmission in Granular Materials Near the Rigidity Transition” European Solid Mechanics Conference, Madrid, Spain, July 2015.

103. “Labquakes: Faults & Earthquakes as Granular Phenomena ” Analog Modeling of Tectonic Processes Workshop, Amherst, Massachusetts, May 2015.

104. “The Physics of Granular Materials.” Mechanics and Materials Seminar, Department of Civil and Environmental Engineering, NCSU, February, 2015.

105. “Temperature-like Variables in Granular Materials.” *Unifying Concepts in Glass Physics VI*, Aspen, CO, February 2015.

106. “Capillary Fracture.” *Dynamics Days 2015*, Rice University, Houston, TX, January 2015.

107. “Shapes Formed by Interacting Cracks.” American Geophysical Union Fall Meeting, San Francisco, CA, December 2014.

108. “Playing with Sand: Complex Behaviors from a Simple Material.” Dept. of Physics, Harvey Mudd College, Claremont, CA, November 2014.

109. “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

110. “Playing with Sand: Complex Behaviors from a Simple Material.” Dept. of Physics, Eastern Carolina University, Davidson Greenville, NC, September 2014

111. “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

112. “Capillary fracture.” Annual Meeting, Society for Industrial and Applied Mathematics. Chicago, IL. July 2014.

113. “Temperature-like variables in granular materials.” Seminar, Process & Energy Department, Faculty of Mechanical, Maritime, and Material Engineering, TU Delft, Delft, Netherlands. May 2014.

114. “Ultrasoft Solids: Deformation & Fracture.” Triangle Soft Matter Day, Chapel Hill, NC. May 2014.

115. “Acoustics in granular materials: from the particle scale to force networks.” Condensed matter seminar, Department of Physics, U. Pennsylvania, Philadelphia, PA. October 2013.

116. “Tiny Sandpiles: Flow Stabilized Solids in Microfluidics.” Levich Institute Seminar, CCNY, New York, NY. September 2013.

117. “Solid-like microsphere heaps.” 7th International Discussion Meeting on Relaxations in Complex Systems, Barcelona, Spain. July 2013.

118. “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

119. "Tiny Sandpiles: Granular meets van der Waals." Seminar, Otto-von-Guericke-Univerity, Magdeburg, Germany. June 2013.

120. "Soft fracture: initiation and growth." Seminar, Okinawa Institute of Science and Technlogy, Okinawa, Japan. March 2013.

121. "Soft fracture: initiation and growth." Materials Deformation: Fluctuations, Scaling, Predictability, Workshop, École de Physique des Houches, France, February 2013

122. "Interrogating a granular material: force networks, state variables, and acoustics." Nonlinear Dynamics Seminar, Georgia Tech, Atlanta, GA, November 2012.

123. "Soft Fracture." Applied Mechanics Colloquium, Harvard, Cambridge, MA, October 2012.

124. "Stick-slip failure in sheared granular materials." International Workshop on Computational Mechanics of Materials, Baltimore, MD, September 2012.

125. "Ruby: A Valuable Granular Material." Physics Colloquium, NC State University. Raleigh, NC. August 2012.

126. "Interrogating a granular material: force networks, acoustics, and state variables." Dept. of Physics, U. Nice, Nice, France. April 2012.

127. "Fluctuations and State Variables in Driven Granular Materials." German March Meeting, Berlin, Germany, March 2012.

128. "Shapes formed by Interacting Cracks." Invited Symposium, APS March Meeting, March 2012.

129. "Shapes formed by Interacting Cracks." Industrial and Applied Mathematics Seminar, Oxford University. February 2012.

130. "Shapes formed by Interacting Cracks." Physics of Fluids Seminar, U. Twente, Eschede, Netherlands. February 2012.

131. "Interrogating a granular material: force networks, acoustics, and state variables." German Aerospace Center (DLR) Institute of Materials Physics in Space. Cologne, Germany. January 2012.

132. "Pattern formation in grasses." Environmental Fluid Dynamics Seminar, Dept. of Physics, Göttingen, Germany, January 2012.

133. "Fluctuations and State Variables in Driven Granular Materials." École Normale Supérieure, Paris, France. January 2012.

134. "Mixing and segregation in granular materials." Seminar, Institute for Multiscale Simulation, Friedrich-Alexander Universität Erlangen-Nürnberg, Erlangen, Germany, December 2011

135. "Granular Materials: Complex Behaviors from Simple Components." Seminar, Center for Glass and Time, University of Roskilde, Roskilde, Denmark, December 2011

136. "Fluctuations and State Variables in Driven Granular Materials." Colloquium, Department of Physics, Universität Göttingen, Göttingen, Germany, November 2011

137. "Shapes formed by Interacting Cracks." Seminar, Institut für Experimentelle Physik, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany, November 2011

138. "Crack-crack Interactions." Seminar, Leiden Institute of Physics, U. of Leiden, Leiden, Netherlands, October 2011.

139. "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

140. "Stick-slip failure in sheared granular materials." Workshop *Large Fluctuations and Collective Phenomena in Disordered Materials*, University of Illinois, Urbana-Champaign, IL, May 2011

141. “Faults & earthquakes as granular phenomena: controls on stick-slip dynamics.” 2011 Dynamics Days, Chapel Hill, NC, January 2011

142. Spreading droplets: fingers, fractures, and flows.” Physics Department Colloquium, James Madison University, Harrisonburg, VA, October 2010

143. “Local and global controls on granular dynamics.” Physics Department Colloquium, North Carolina State University, Raleigh, NC, August 2010

144. “Local and global controls on granular dynamics.” Center for Soft Matter Research, New York University, New York, NY, August 2010

145. “The effect of force chains on granular acoustics.” Laboratory of the Physics and Mechanics of Heterogeneous Materials, ESPCI, Paris, France, June 2010

146. “How do surfactants spread on fluids and gels?” Dynamics of Complex Fluids Department Seminar, MPI for Dynamics and Self-Organization, Göttingten, Germany, June 2010

147. “State variables in dense granular materials.” Dept. of Physics. Wake Forest University. Winston-Salem, NC, February 2010

148. “Playing with Sand: Complex Behaviors from a Simple Material.” Dept. of Physics, Davidson College, Davidson, NC, January 2010

149. “State variables in granular systems.” SESAPS Invited Session *Nonequilibrium materials science: theory, simulation, and experiment.* Atlanta, GA, November 2009

150. “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

151. “State variables in equilibrating granular systems” Workshop *Statistical mechanics of static granular media*. Lorentz Center, Leiden, Netherlands, July 2009

152. “Force Chains and State Variables in Granular Materials.” Department of Physics. University of Western Ontario, April 2009

153. “Dynamics of Cracking Gels” Soft Matter Seminar, Physics Department, Rochester Institute of Technology, Rochester, NY, April, 2009

154. “Force chains and state variables in granular materials.” Condensed Matter Seminar, Physics Department, University of Illinois at Champaign-Urbana. March, 2009

155. “Playing with Sand: Complex Behaviors from a Simple Material.” Physics Colloquium, Appalachian State University, Boone, NC, February 2009

156. “Force Chains in Granular Materials.” Acoustics Seminar, Naval Research Lab, January 2009

157. “Dynamics of Cracking Gels.” Applied Math Seminar, MIT, Cambridge, MA, October 2008

158. “Granular acoustics, force chains, and time-reverse mirrors.” Gordon Conference on Granular and Granular-Fluid Flows. Waterville, ME, June 2008

159. “Not-so-Continuum Behaviors in Granular Materials” NCSU Differential Equations Seminar, April 2008

160. “Faults & Earthquakes as Granular Phenomena: Controls on Stick-Slip Dynamics.” Invited Symposium, APS March Meeting, March 2008

161. “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

162. “Faults & Earthquakes as Granular Phenomena: Controls on Stick-Slip Dynamics.” Physics Colloquium, Duke University, Durham, NC, February 2008

163. “Sound Propagation and Force Chains in Granular Materials.” Opening Workshop for Program on Random Media, SAMSI, Research Triangle Park, NC, September 2007

164. “Faults & Earthquakes as Granular Phenomena: Controls on Stick-Slip Dynamics.” Leiden Institute of Physics, Leiden, Netherlands, June 2007

165. “Force chains in granular materials: failure and acoustics.” Dept. of Mechanical Engineering, Yale University, New Haven, CT, April 2007

166. “The Physics of Granular Materials: Complex Behavior from a Simple Material” Los Alamos National Lab, Los Alamos, NM, March 2007

167. “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

168. “Freezing, Melting, and Fluctuations in Granular Materials.” Molecular Theory and Simulation Seminar, NCSU Department of Chemical Engineering. September 2006

169. “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

170. “Earthquakes and Faults as Granular Processes.” (Joint with Peter Malin and Nicholas Hayman) Complex and Nonlinear Systems Seminar, Duke University, Durham, NC, April 1006.

171. “Freezing and Melting in Granular Materials.” Focus Session: Granular Materials Near Jamming, APS March Meeting, Baltimore, MD, March 2006

172. “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

173. “Freezing and melting in granular materials.” Department of Physics and Physical Oceanography, University of North Carolina – Wilmington, Wilmington, NC, November 2005

174. “Freezing and melting in granular materials.” Department of Mechanical Engineering and Materials Science, Duke University, Durham, NC, March 2005

175. “Freezing and melting in granular materials.” Solid State Seminar, Physics Department, Cornell University, Ithaca, NY, March 2005

176. “Fluids, Strange and Beautiful.” Physics Department, Occidental College, Los Angeles, CA, February 2005

177. “Freezing and melting in granular materials.” Colloquium, Physics Department, North Carolina State University, Raleigh, NC, February 2005

178. “Fluids, Strange and Beautiful.” Physics Department, Vassar College, Poughkeepsie, NY, February 2005

179. “Fluids, Strange and Beautiful.” Physics Department, Mount Holyoke College, South Hadley, MA, February 2005

180. “Freezing and melting in granular materials.” Colloquium, Physics Department, University of Utah, Salt Lake City, UT, January 2005

181. “Fluids, Strange and Beautiful.” Physics Department, Guilford College, Greensboro, NC, January 2005

182. “Freezing and melting in granular materials.” Special Colloquium, Physics Department, The Ohio State University, Columbus, OH, January 2005

183. “Freezing and melting in granular materials.” Condensed Matter Physics Seminar, Physics Department, University of California, San Diego, CA, January 2005

184. “Hysteresis and competition between disorder and crystallization in granular flow.” Southeastern Section of the American Physical Society Annual Meeting, Oak Ridge, TN, November 2004

185. “Freezing, melting, and novel dynamics in granular materials.” Condensed Matter Seminar. Physics Department. Duke University, Durham, NC, October 2004

186. "Freezing, melting, and novel dynamics in granular materials." Joint Applied Math/Condensed Matter Seminar. University of North Carolina, Chapel Hill, NC, September 2004

187. "Pattern Formation in Inclined Layer Convection." Physics Department Colloquium, Dartmouth College, Hanover, NH, February 2004

188. "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

189. "Pattern Formation in Inclined Layer Convection." Physics Department Colloquium, Dickinson College, Carlisle, PA, October 2003

190. "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

191. "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

192. "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

193. "Pattern formation in Inclined Layer Convection." Center for Nonlinear Dynamics, University of Texas at Austin, February 2002

194. "Pattern Formation and Defect Turbulence in Inclined Layer Convection." Condensed matter and statistical physics seminar, Department of Physics, Syracuse University, October 2001

195. "Pattern Formation in Inclined Layer Convection." Center for Nonlinear and Complex Systems, Duke University, March 2001

SELECT PROFESSIONAL SERVICE

Editorial Board (2023–2025), Associate Editor (2025–), *Annual Reviews of Condensed Matter Physics*

Chairline, Nominating Committee of the American Physical Society (2022–2025)

Member-at-Large, Program Committee, Program Chair (2017), Vice-Chair (2019), Chair-Elect (2020), Past Chair (2021). Division of Soft Matter (DSOFT), American Physical Society, 2014–2023.

Divisional Associate Editor, *Physical Review Letters* (2017–2023)

Advisory Committee, Caliper International Training Network (2019–2024)

Organizer of #DSOFTvirtual online response to the cancellation of the America Physical Society Annual March Meeting due to COVID-19 (March 2019)

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

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, Géotechnique, Geophysical Review 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, Science, Science Advances, Scientific Reports, Soft Matter.

Proposal panelist for NSF (CBET, DMR, MRSEC). Proposal reviewer for NSF, NASA, DOE, ARO, Petroleum Research Fund, Research Corporation, Fulbright-Cottrell Award, Civilian Research and Development Fund, CONICYT (Chile), Vienna Science and Technology Fund (Austria), Engineering and Physical Sciences Research Council (UK), Newton Trust (UK), Foundation for Fundamental Research on Matter (Netherlands), Netherlands Organisation for Scientific Research. External review board for NSF-MRSEC center.

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 (2007–2018)

MentorRings Mentor (2017–2018)

College of Sciences Faculty Advisory Committee (2017–2020). Co-Chair (2018–2019)

Chair, Dept. of Physics Social Media Committee (2018–2020)

Chair, Personnel Committee (2020-2021)

Faculty advisor to NCSU Women in Physics (founder, 2013–)

Member, Association of Women Faculty (2016–)

Faculty advisor to Student Chapter, National Society of Black Physicists (2019–2023)

Member, NCSU Physics Delegation, American Physical Society Inclusion, Diversity, and Equity Alliance (2020–2023)

Member, Professor of Distinction Review Committee, College of Education (2021)

Member, Introductory Laboratory Redesign Committee, Dept. of Physics (2021–2023)

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, 2015–2020

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–)

Workshop "Writing an Effective Research Proposal", developed for the American Center in the US Consulate in Chennai, India, for postdocs and graduate students graduate students and postdocs (2024)

Power Hour Session leader (Granular Gordon Conference, 2024, Soft Matter Gordon Conference, 2025)

RECENT FUNDING

ISS: Gravity-Dependence of Dense Granular Flows: Experiments and Digital Twins. (Aug 2025 to July 2029) CASIS/NSF 2532009, $275,000.

Iterative Design and Fabrication of Hyperuniform-Inspired Materials for Targeted Mechanical and Transport Properties (Dec 2023 to Nov 2027), NSF 2323341, $982,920.

Density of Modes: A New Way to Forecast Sediment Failure. (Mar 2023 to Feb 2027) NSF 2244615, $218,998.

Mechanics of Granular Materials: Rigidity, Nonlocality, and Activated Failure. (Aug 2021 to July 2026), NSF 2104986, $483,401.

PREEVENTS Track 2: Collaborative Research: Defining precursors of ground failure: a multiscale framework for early landslide prediction through geomechanics and remote sensing. (June 2019 to May 2023) NSF 1854977, $362,327.

SAMPLE PRESS COVERAGE

Cho, A. "In a Jumble of Grains, A Good Hard Shake Restores Order." *Science*, 31 March 2006, p. 1860.

Minkel, J. R. "Grain Freeze." *Scientific American* (News Scan item), July 2005, p. 26.

Svitil, K. A. "New Physics: Beads Clump When Shaken." *Discover*, October 2005, Vol 26, No. 10.

Press release on geophysics activities:
`http://www.jsg.utexas.edu/news/resspotlights/2009/tabletop_earthquakes.html`

Calla Colfield. "Finding New Physics Among Earthquake Lights." *APS News.* June 2014.

Charles Q. Choi. "Mysterious Flashing Earthquake Lights Maybe Explained." *Live Science.* February 26, 2014

Stephen Luntz. "Clue To Mysterious Lights That Appear Before Earthquakes." *IFSL*. March 7, 2014

Meeri Kim. "Experiments at Rutgers lend credence to existence of earthquake lights" *Washington Post.* March 6, 2014

John Wallace. "High-index immersion fluid enables 1.17 NA objective with 12 mm working distance." *Laser Focus World* Feb 1, 2016.

Katrina Krämer. "How do liquid metal snowflakes grow?" *Chemistry World.* (November 3 2017)

Ryan F. Mandelbaum. "Experiment Could Help Scientists Predict Avalanches Through Sound." *Gizmodo* (May 30, 2018)

Sam Jarman. "Granular materials emit characteristic sounds before slipping" *Physics World.* (12 Jun 2018)

Philip Ball. “Taking the temperature of a sand pile (News & Views)” *Nature Materials.* 18: 196 (2019)

Marric Stephens. “Synopsis: Hints of an Equation of State for Granular Materials” *APS Physics* (January 23 2019)

Paolo Moretti and Michael Zaiser, “Network analysis predicts failure of materials and structures.” *PNAS.* 34: 16666 (2019)

Abigail Klopper. “Network failure forecast.” *Nature Physics.* 15: 878 (2019)

Sam Jarman. “Liquid metal flows smoothly at room temperatures” *Physics World.* (30 July 2020)

Randall Munroe. “Good Question: What Makes Sand Soft?” *The New York Times.* (9 November 2020)

Michael Schirber. “Getting a Heads-Up on Landslides from Space.” *Physics.* 16: 119 (July 6, 2023)

Katrina Miller. “Videos of ‘Earthquake Lights’ Above Morocco Are an Unexplained Mystery.” *The New York Times.* (11 September 2023)

MEMBERSHIPS

American Physical Society; American Geophysical Union; American Association of Physics Teachers; Sigma Xi; American Association for the Advancement of Science