

Biographical Sketch

Michael P. Marder

Office Phone: (512) 471-3612; 471-4839

Birthdate: December 4, 1960

Citizenship: U.S.

Department of Physics

University of Texas at Austin

Austin, Texas, 78712

email:marder@chaos.ph.utexas.edu

Education:

1986 Ph.D. (physics), University of California, Santa Barbara

1982 A.B., Summa cum Laude (physics and mathematics), Cornell University

Experience:

2000- Professor of Physics, University of Texas, Austin

1994–2000 Associate Professor of Physics, University of Texas, Austin

1988–1994 Assistant Professor of Physics, University of Texas, Austin

1986–1988 Research Associate, James Franck Institute, University of Chicago

1983–1986 Research Assistant, UC Santa Barbara

University of Texas Affiliations:

UTeach

Center for Nonlinear Dynamics

Department of Physics

Computational and Applied Mathematics Graduate Program

STEM Education Graduate Program

Awards:

2013 Cozzarelli Award for T. Patzek, F. Male, and M. Marder,
"Gas production in the Barnett Shale obeys a simple scaling theory,"
PNAS, vol. 110, pp. 19731–19736, 2013.

2011 Rostow Leadership Award

2010 Joe and Bettie Branson Ward Excellence Award

2008 Elizabeth Shatto Massey Award for Excellence in Teacher Education

2008 APS Outstanding Referee

2005 Fellow of the American Physical Society

2002 Special Creativity Extension, National Science Foundation

2000 Friends of Alec Teaching Award, College of Engineering, UT Austin

1995–1996 Exxon Education Foundation

1993–1994 Special investigator award, ALCOA foundation

1989 Sloan Fellow

Administrative Assignments at UT Austin:

2018– Director, Center for Nonlinear Dynamics

2016– Chair, Dept. Physics Teaching Excellence Committee

2013– National Replication Director, UTeach Institute

2013– Executive Director, UTeach Science Program

2007–2013 Associate Dean for Science and Mathematics Education

- 1999–2007 Director of Special Projects
- 1999– Director of Young Scientists Program
- 1999– Director of Discovery Learning Project
- 1999 Member of high performance computation task force
- 1998– Co-Director of UTeach
- 1998–2003 Member of Instructional Technology and Computation committee
- 1998–2012 Member of steering committee, Texas Materials Institute
- 1998 Chair of *ad hoc* faculty committee on high performance computation.
- 1997-1998 Chair of the Natural Sciences Computer Committee
- 1997– Member of Computational and Applied Mathematics Graduate Studies Subcommittee
- 1994–1997 Graduate Adviser, Computational and Applied Mathematics

Additional Assignments:

- 2019– Chair, Ethics Committee of the American Physical Society
- 2013–2019 Panel on Public Affairs , American Physical Society (Chair, 2018)
- 2014–2019 Divisional Editor, Physical Review E
- 2006–2010 Doubling Committee, American Physical Society
- 2007,2008 Chair, Committee on Education, American Physical Society
- 2006–2009 Committee on Education, American Physical Society
- 2004–2008 Director, Texas Science Careers Consortium
- 2003– Divisional editor, International Journal of Fracture
- 2001–2006 Co-editor, Europhysics Letters

Recent Grant Support as Principal Investigator:

- 2020-2023 National Science Foundation, Studies of Fracture and Transport\$350,000
- 2019-2022 King Abdullah University of Science and Technology\$180,000
- 2017-2019 King Abdullah University of Science and Technology\$150,000
- 2016-2019 National Science Foundation, Noyce Scholarships, \$800,000
- 2016-2019 (Co-PI) National Science Foundation, UTeach Computer Science, \$2,000,000
- 2016-2019 National Math and Science Initiative, \$250,000
- 2016-2018 (Co-PI) National Science Foundation, Noyce Grant, Track IV, \$50,000
- 2012-2016 Shell Corporation, Shell-UT Unconventional Research \$500,000
- 2012 Bill and Melinda Gates Foundation, Measures of Effective Teaching \$30,000
- 2010-2013 National Science Foundation, Physics of Nonlinear Mechanics, \$170,000
- 2007-2010 National Science Foundation, Nonlinear Dynamics of Solids and Networks, \$170,000
- 2006-2009 National Science Foundation, Noyce Scholarships, \$400,000
- 2004-2007 National Science Foundation, Nonlinear Dynamics and Elasticity, \$240,000
- 2003-2006 National Science Foundation, Noyce Scholarships, \$500,000
- 2002-2004 National Science Foundation, Atomic Effects in Brittle Fracture, \$180,000
- 2001-2004 National Science Foundation, Dynamics of Brittle Fracture, \$350,000
- 2000–2003 National Science Foundation, UTeach , \$1,500,000
- 2000–2002 Sid Richardson Foundation, UTeach, \$225,000

- 2001–2003 Houston Endowment, UTeach and Young Scientists, \$300,000
- 2001–2002 Educational Advancement Fnd., Discovery Learning \$70,000
- 2000–2002 Hewlett Foundation, Faculty Mentoring, \$100,000
- 2000–2001 Kodosky Foundation, UTeach, \$100,000

Conferences and Conference Sessions Organized:

- 2012 American Association of Physics Teachers SPIN-UP Workshop, Austin TX
- 2011 Physics Teacher Educator Coalition, Austin TX
- 2008 Physics Teacher Educator Coalition, Austin TX
- 2005 Session on Physical Aspects of Fracture at International Conference on Fracture, Torino
- 2001 Fracture and Failure session at APS March Meeting
- 2000 When Materials Matter session at spring MRS meeting
- 2000 Nonlinear Dynamics and Pattern Formation Conference in Austin
- 1993 Fracture and Avalanches session at APS March Meeting

Professional Specialties:

Michael Marder is a member and currently Director of the Center for Nonlinear Dynamics, internationally known for its experiments on chaos and pattern formation, and for many years ranked #1 in the nation by US News and World Report. He is involved in a wide variety of theoretical, numerical, and experimental investigations, ranging from studies of plasticity and phase transformations to experiments on sand ripples at the sea bottom.

He specializes in the mechanics of solids, particularly the fracture of brittle materials. He has developed numerical methods allowing fracture computations on the atomic scale to be compared directly with laboratory experiments on a macroscopic scale. His experimental and numerical efforts focused upon single crystal silicon, which is a nearly ideal brittle material, but also of considerable industrial interest.

He has recently begun applying fundamental theories of fracture to the use of hydrofracturing in the extraction of natural gas and oil.

He has published a graduate textbook on condensed matter physics which is now in its second edition, and an undergraduate textbook on research methods for science. Each of them features an instructor's manual and other supporting materials, and has been adopted by instructors at dozens of universities in the US and around the world.

As Executive Director of the UTeach Science Program, Marder oversees secondary mathematics and science teacher preparation in partnership with UT Austin's College of Education. He also oversees the expansion of the UTeach model to 43 other universities across the US through the UTeach Institute, oversees service learning, afterschool science clubs and summer science and mathematics camps with UTeach Outreach, promotion of college-level inquiry instruction through Discovery Learning, and science instruction for elementary teachers through UTeach Primary.

Books

- [1] Committee on Undergraduate Physics Education Research and Implementation, *Adapting to a Changing World: Challenges and Opportunities in Undergraduate Physics Education*. The National Academies Press, 2013.
- [2] M. Marder, *Research Methods for Science*. Cambridge University Press, 2011.
- [3] M. Marder, *Condensed Matter Physics*. John Wiley & Sons, Hoboken, NJ, second ed., 2010.

Journal Articles and Book Chapters

- [1] M. Marder, B. David, and C. Hamrock, "Investigation of student outcomes for graduates of UTeach and other teacher preparation programs," 2020.
- [2] M. Marder, B. David, and C. Hamrock, "Math and science outcomes for students of teachers from standard and alternative pathways in texas," *Education Policy Analysis Archives*, vol. 28, no. 27, pp. 1–39, 2020.
- [3] T. W. Patzek, W. Saputra, W. Kirati, and M. Marder, "Generalized extreme value statistics, physical scaling, and forecasts of gas production in the barnett shale," *Energy & Fuels*, 2019.
- [4] S. Laubach, R. Lander, L. Criscenti, L. Anovitz, J. Urai, R. Pollyea, J. Hooker, W. Narr, M. Evans, S. Kerisit, J. Olson, T. Dewers, D. Fisher, R. Bodnar, B. Evans, P. Dove, L. Bonnell, M. Marder, and L. Pyrak-Nolte, "The role of chemistry in fracture pattern development and opportunities to advance interpretations of geological materials," *Reviews of Geophysics*, 2019.
- [5] S. Stephens and M. Marder, "Longitudinal predictions using regression-corrected grouping to reduce regression to the mean," *Physical Review Physics Education Research*, vol. 15, pp. 020109/1–15, 2019.
- [6] M. Marder, "Slepyan's dynamic contribution to fracture," *Philosophical Transactions A*, 2019.
- [7] M. Marder, "Investigation of STEM course-taking patterns and college readiness as a result of HB5 of 2013," 2019.
- [8] M. Marder, B. Eftekhari, and T. W. Patzek, "Solvable model for dynamic mass transport in disordered geophysical media," *Phys. Rev. Lett.*, vol. 120, p. 138302, Mar 2018.
- [9] B. Eftekhari, M. Marder, and T. W. Patzek, "Field data provide estimates of effective permeability, fracture spacing, well drainage area and incremental production in gas shales," *Journal of Natural Gas Science and Engineering*, vol. 56, pp. 141–151, 2018.
- [10] C. Walkington and M. Marder, "Using the UTeach Observation Protocol (UTOP) to understand the quality of mathematics instruction," *ZDM - Mathematics Education*, 2018.
- [11] B. Ghanbarian, C. Torres-Verdín, L. W. Lake, and M. Marder, "Gas permeability in unconventional tight sandstones: Scaling up from pore to core," *Journal of Petroleum Science and Engineering*, vol. 173, pp. 1163–1172, 2018.
- [12] M. Marder, M. Plisch, and R. C. Brown, "Recruiting teachers in high needs STEM fields: A survey of current majors and recent STEM graduates." American Physical Society, 2017.
- [13] M. Marder, M. Plisch, and R. C. Brown, "We need more STEM teachers. Higher Ed. can help." Education Week, 2017.
- [14] M. Marder, "College readiness drops back ten years in texas." Texas Tribune TribTalk, 2017.

- [15] M. Marder and C. Villaneuva, "Consequences of the Texas public school funding hole of 2011-2016," 2017.
- [16] M. Marder, "Is stem education in permanent crisis?," *Education Week*, 2016.
- [17] M. Marder, T. Patzek, and S. W. Tinker, "Physics, fracking, fuel, and the future," *Physics Today*, vol. 69, pp. 46–52, 2016.
- [18] M. Marder, "Particle methods in the study of fracture," *International Journal of Fracture*, vol. 196, pp. 169–188, 2016.
- [19] C. Behn and M. Marder, "The transition from subsonic to supersonic cracks," *Philosophical Transactions A*, vol. 373, pp. 10.1098/rsta.2014.0122/1–15, 2015.
- [20] C. S. Stevens, M. Marder, and S. R. Nagel, "Patterns in Illinois educational school data," *Physical Review Special Topics– Physics Education Research*, vol. 11, pp. 010113/1–10, 2015.
- [21] F. Male, A. W. Islam, T. W. Patzek, S. Ikonnikova, J. Browning, and M. P. Marder, "Analysis of gas production from hydraulically fractured wells in the Haynesville shale using scaling methods," *Journal of Unconventional Oil and Gas Resources*, vol. 10, pp. 11–17, 2015.
- [22] M. Marder, "High school mathematics in Texas: Freedom and shackles," in *Policy Perils in Education: Tackling Tough Issues* (C. H. Tienken, ed.), ch. 6, p. In press, Kappa Delta Pi, 2015.
- [23] T. Patzek, F. Male, and M. Marder, "A simple model of gas production from hydrofractured horizontal wells in shales," *AAPG Bulletin*, vol. 98, pp. 2507–2529, 2014.
- [24] M. Fellet, M. Marder, and T. Patzek, "Science of hydraulic fracturing contains materials questions," *MRS Bulletin*, vol. 39, pp. 484–485, 2014.
- [25] C. Walkington and M. Marder, "Classroom observation and value-added models give complementary information about quality of mathematics teaching," in *Designing Teacher Evaluation Systems* (T. Kane, K. Kerr, and R. Pianta, eds.), Jossey-Bass, 2014. Retrieved Oct 2013.
- [26] T. Patzek, F. Male, and M. Marder, "Gas production in the barnett shale obeys a simple scaling theory," *Proceedings of the National Academy of Sciences*, vol. 110, pp. 19731–19736, 2013.
- [27] M. Marder, "A problem with STEM," *CBE Life Sciences Education*, vol. 12, pp. 148–150, 2013.
- [28] M. J. B. Moura and M. Marder, "Tearing of free-standing graphene," *Physical Review E*, vol. 88, pp. 032405/1–10, 2013.
- [29] J. Chovan, M. Marder, and N. Papanicolaou, "Field induced phase transitions in the helimagnet $\text{Ba}_2\text{CuGe}_2\text{O}_7$," *Physical Review B*, vol. 88, pp. 064421/1–15, 2013.
- [30] B. King, M. Stone, H. P. Zhang, T. Gerkema, M. Marder, R. B. Scott, and H. L. Swinney, "Buoyancy frequency profiles and internal semidiurnal tide turning depths in the oceans," *Journal of Geophysical Research*, vol. 117, pp. CO4008/1–15, 2012.
- [31] M. Marder, "Failure of U.S. public secondary schools in mathematics," *AASA Journal of Scholarship and Practice*, vol. 9, pp. 8–25, 2012.
- [32] A. Bendinelli and M. Marder, "Visualization of longitudinal student data," *Physical Review Special Topics - Physics Education Research*, vol. 8, pp. 020119/1–15, 2012.
- [33] M. Marder, "Measuring teacher quality with value-added modeling," *Kappa Delta Pi Record*, vol. 48, pp. 156–161, 2012.
- [34] C. H. Chen, H. P. Zhang, J. Niemczura, K. Ravi-Chandar, and M. Marder, "Scaling of crack propagation in rubber sheets," *Europhysics Letters*, vol. 96, pp. 36009/1–6, 2011.
- [35] E. Bouchbinder, J. Fineberg, and M. Marder, "Dynamics of simple cracks," *Annual Reviews of Condensed Matter Physics*, vol. 1, pp. 371–395, 2010.

- [36] T. M. Guozden, E. A. Jagla, and M. Marder, "Supersonic cracks in lattice models," *International Journal of Fracture*, vol. 162, pp. 107–126, 2010.
- [37] M. Marder and D. Bansal, "Flow and diffusion of high-stakes test scores," *Proceedings of the National Academy of Sciences*, vol. 10.1073/pnas.0812221106, pp. 1–4, 2009.
- [38] R. C. Thompson-Flagg, M. J. B. Moura, and M. Marder, "Rippling of graphene," *Europhysics Letters*, vol. 85, pp. 46002/1–4, 2009.
- [39] Z. Yang, H. P. Zhang, and M. Marder, "Dynamics of static friction between steel and silicon," *Proceedings of the National Academy of Sciences*, vol. 105, pp. 13264–13268, 2008.
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- [41] M. Marder, "Dynamics of epidemics on random networks," *Physical Review E*, vol. 75, pp. 066103/1–5, 2007.
- [42] M. Marder and N. Papanicolaou, "Elasticity and geometry of leaves and flowers," *Journal of Statistical Physics*, vol. 125, pp. 1065–1092, 2006.
- [43] M. Marder, "Supersonic rupture of rubber," *Journal of the Mechanics and Physics of Solids*, vol. 54, pp. 491–532, 2006.
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- [45] M. Marder, "Supersonic rupture of rubber." cond-mat/0504613, 2005.
- [46] M. Marder, "Review of "rubber and rubber balloons"," *Physics Today*, vol. August, p. 54, 2005.
- [47] R. D. Deegan, Z. P. Yang, M. Marder, and H. L. Swinney, "Velocity gap in silicon." In preparation, 2005.
- [48] M. Marder, "Shock-wave theory of rupture of rubber," *Physical Review Letters*, vol. 94, pp. 048001/1–4, 2005.
- [49] A. M. Dudarev, M. Marder, Q. Niu, N. J. Fisch, and M. G. Raizen, "Statistical mechanics of an optical phase space compressor," *Europhysics Letters*, vol. 70, pp. 761–767, 2005.
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- [51] M. Marder, "Cracks cleave crystals," *Europhysics Letters*, vol. 63, pp. 364–370, 2004.
- [52] M. Marder, "House testimony on UTeach." [https://uteach.utexas.edu/sites/default/files/Appropriations Testimony Marder.pdf](https://uteach.utexas.edu/sites/default/files/Appropriations%20Testimony%20Marder.pdf), 2004. Last accessed September 2013.
- [53] M. Marder, "Shock wave theory of rupture of rubber." cond-mat/0407236, 2004.
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- [55] E. Sharon, M. Marder, and H. L. Swinney, "Leaves, flowers and garbage bags: Making waves," *American Scientist*, vol. 92, pp. 254–261, 2004.
- [56] M. Marder, "Terms of detachment," *Nature Materials*, vol. 3, pp. 583–584, 2004.
- [57] M. Marder, "Effect of atoms on brittle fracture," *International Journal of Fracture*, vol. 130, pp. 517–555, 2004.
- [58] R. D. Deegan, S. Chheda, L. Patel, M. Marder, H. L. Swinney, J. Kim, and A. de Lozanne, "Wavy and rough cracks in silicon," *Physical Review E*, vol. 67, p. 66209, 2003.
- [59] M. Marder, "The shape of the edge of a leaf," *Foundations of Physics*, vol. 33, pp. 1743–1768, 2003.

- [60] M. Marder, E. Sharon, S. Smith, and B. Roman, "Theory of edges of leaves," *Europhysics Letters*, vol. 62, pp. 498–504, 2003.
- [61] E. Sharon, B. Roman, M. Marder, G.-S. Shin, and H. L. Swinney, "Buckling cascades in free sheets," *Nature*, vol. 419, p. 579, 2002.
- [62] S. V. Franklin, F. Mertens, and M. Marder, "Reply to 'comment on 'the Portevin–Lechatelier effect'''," *Physical Review E*, vol. 65, p. 053502, 2002.
- [63] R. D. Deegan, P. Petersan, M. Marder, and H. L. Swinney, "Oscillating fracture paths in rubber," *Physical Review Letters*, vol. 88, p. 14304, 2002.
- [64] M. Marder, *Solutions Manual for Condensed Matter Physics*. 2001.
- [65] E. Gerde and M. Marder, "Friction and fracture," *Nature*, vol. 413, pp. 285–288, 2001.
- [66] S. V. Franklin, F. Mertens, and M. Marder, "The Portevin–Lechatelier effect," *Physical Review E*, vol. 62, pp. 8195–8206, 2000.
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- [69] J. Hauch, D. Holland, M. Marder, and H. L. Swinney, "Dynamic fracture in single-crystal silicon," *Physical Review Letters*, vol. 82, pp. 3823–3826, 1999.
- [70] J. Fineberg and M. Marder, "Instability in dynamic fracture," *Physics Reports*, vol. 313, pp. 1–108, 1999.
- [71] M. A. Scherer, F. Melo, and M. Marder, "Sand ripples in an oscillating annular sand-water cell," *Physics of Fluids*, vol. 11, pp. 58–67, 1999.
- [72] M. Marder, "Adiabatic equation for cracks," *Philosophical Magazine B*, vol. 78, pp. 203–214, 1998.
- [73] J. Hauch and M. Marder, "Energy balance in dynamic fracture, investigated by a potential drop technique," *International Journal of Fracture*, vol. 90, pp. 133–151, 1998.
- [74] D. Brydon, J. Pearson, and M. Marder, "Solving stiff differential equations with the method of patches," *Journal of Computational Physics*, vol. 144, pp. 280–298, 1998.
- [75] D. Holland and M. Marder, "Ideal brittle fracture of silicon studied with molecular dynamics," *Physical Review Letters*, vol. 80, pp. 746–749, 1998.
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- [81] M. Marder, "Small-scale simulations of fracture," in *Fracture – Instability Dynamics, Scaling, and Ductile/Brittle Behavior* (R. L. B. Selinger, J. J. Mecholsky, A. E. Carlsson, and E. R. Fuller, eds.), (Pittsburgh), pp. 289–296, Materials Research Society, 1996.
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- [83] M. Marder and S. Gross, "Origin of crack tip instabilities," *Journal of the Mechanics and Physics of Solids*, vol. 43, pp. 1–48, 1995.
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- [85] M. Marder, "Atomic effects in brittle fracture," in *Plastic and Fracture Instabilities in Materials* (N. Ghoniem, ed.), pp. 31–44, American Society for Mechanical Engineering, 1995.
- [86] M. Marder, "Instability of a crack in a heated strip," *Physical Review E*, vol. 49, pp. R51–R54, 1994.
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- [94] S. Kramer and M. Marder, "Evolution of river networks," *Physical Review Letters*, vol. 68, pp. 205–208, 1992.
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- [100] M. Marder, N. Papanicolaou, and G. C. Psaltakis, "Phase separation in a t - J model," *Physical Review B*, vol. 41, pp. 6920–32, 1990.
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- [104] M. Marder, "Correlations and ostwald ripening," *Physical Review A*, vol. 36, no. 2, p. 858, 1987.
- [105] M. Marder and J. S. Langer, "The growth of precipitates in a supersaturated melt," in *Coherence, Cooperation, and Fluctuations*, (Cambridge), Cambridge University Press, 1986.
- [106] M. Marder, "Correlations and droplet growth," *Physical Review Letters*, vol. 55, pp. 2953–6, 1985.
- [107] M. Marder, H. L. Frisch, J. S. Langer, and H. M. McConnell, "Theory of the intermediate rippled phase of phospholipid bilayers," *Proceedings of the National Academy of Sciences, USA*, vol. 81, pp. 6559–6563, 1984.

1. October 23, 1991, University of Arizona, "Instabilities of Dynamic Cracks"
2. November 14, 1991, Texas A&M, "How Things Break"
3. January 16, 1992, Hans Mark Seminar, Tsukuba Japan, "An Instability in Dynamic Fracture"
4. March 18, 1992, APS Meeting, Indianapolis, "Evolution of River Networks"
5. March 18, 1992, APS Meeting, Indianapolis, Respondent to talk on graduate solid state physics education.
6. May 21, 1992, CNLS meeting, Los Alamos, "An Instability in Dynamic Fracture"
7. July 29, 1992, ITP workshop, Santa Barbara, "An Instability in Dynamic Fracture"
8. August 3-5, 1992, California summer school on Slips, Cracks and Tears, 5 lectures.
9. November 5, 1992, "Evolution of River Networks," seminar, University of California, Santa Barbara,
10. November 1-10, 1992, Participant in "Spatially Extended Nonequilibrium Systems" workshop at ITP in Santa Barbara.
11. December 2, 1992, "An Instability in Dynamic Fracture," Materials Research Society, Boston,
12. December 3, 1992, "How Things Break," seminar, Northeastern University,
13. December 4, 1992, "Evolution of River Networks," seminar, Department of Hydrology, MIT
14. January 21, 1993, "An Instability in Dynamic Fracture," seminar, Aerospace Engineering, University of Minnesota, Minneapolis,
15. March 11, 1993, "An Instability in Dynamic Fracture," seminar, Aerospace Engineering, UT Austin,
16. March 16, 1993, "How Things Break," Physics Department Colloquium, University of Houston.
17. March 17, 1993, "An Instability in Dynamic Fracture," seminar, Mechanical Engineering, University of Illinois, Urbana.
18. March 22-26, 1993, organizer for the Focused Session on "Fracture, Earthquakes, and Avalanches" Materials Physics Division, American Physical Society meeting in Seattle, Washington,
19. April 30, 1993, "Waves from Peculiar Crystals and Cracks," Mathematics Group, Brooks AFB, San Antonio.
20. August 24 - 27, 1993, Three lectures on fracture at ICTP, Trieste, Italy.
21. October 27, 1993 Geological Society of America, "River Formation."
22. January 6, 1994 Workshop on Natural Hazards, Santa Fe Inst, "Dynamic Fracture"
23. February 16, 1994 Dept. Colloquium, Washington U., "How things break: dynamics of brittle fracture."
24. March 2, 1994 Overview of research program, Motorola in Austin.
25. March 10, 1994 Colloquium, Texas Tech, "How things break"
26. May 25- June 1, 1994 Lectures at Hebrew University, Jerusalem; Weizmann Inst, Rehovet; Technion, Haifa on dynamic fracture.
27. June 20-25, 1994 3 lectures on nonlinear dynamics for Santa Fe summer school
28. June 25-27 1994 San Diego, Workshop on nonlinear materials, "Atomistics of Fracture"
29. October 21, 1994 "Why cracks go slow," American Ceramic Society meeting, Los Angeles
30. November 11, 1994 "Atomic effects in brittle fracture," ASME fall meeting, Chicago

31. November 23, 1994 "Nonlinear problems in materials," Alcoa research center, Pittsburgh
32. January 5, 1995 "Fracture and the Arrow of Time," Technion, Israel
33. February 9, 1995 "Atomic Effects in Brittle Fracture," Arlington
34. February 23, 1995 "Why do cracks go so slow?," Sandia
35. March 2, 1995 "Atomic effects in brittle fracture," UT Mechanics Group
36. March 6, 1995 "Fracture and the Arrow of Time," Nonlinear Dynamics seminar, UT
37. March 18, 1995 "Fracture: From Meters to Angstroms and Back Again," meeting celebrating Jim Langer's 60'th birthday in Santa Barbara
38. March 21, 1995 "Nonlinear Dynamics and Fracture," ASME meeting on nonlinearities in manufacturing, San Diego
39. March 22, 1995 "Solutions to problems in fracture," APS March meeting, San Jose
40. April 25, 1995 "Atomic effects in brittle fracture," Conference at Los Alamos on fractals
41. June 29, 1995 "Atomic Effects in Brittle Fracture," ASME summer meeting in UCLA
42. June 30, 1995 "Theories of the PLC Effect," ASME summer meeting in UCLA
43. July 26, 1995 "How Things Break," University of Crete
44. September 27-29, Notre Dame, Colloquium on "How Things Break"
45. October 26-28, Texas Section APS Meeting, "Computational Mathematics at the University of Texas"
46. November 9-11, 1995, APS Southeast Section, Tallahassee, "Atomic Effects in Brittle Fracture"
47. November 27, 1995, Materials Research Society, Tutorial Sessions on Fracture; November 30, Invited talk on "Small-Scale Simulations of Brittle Fracture"
48. February 15 -17, 1996, Mardi Gras Meeting, Baton Rouge, Invited talk on "Atomic Effects in Brittle Fracture."
49. March 12, 1996, Presentation at ALCOA Technical Center on Portevin-LeChatelier effect
50. March 19, 1996, APS March meeting, Invited talk on atomistics of fracture,
51. March 25-27, 1996 California Statistical Mechanics meeting, Invited talk on "Statistical Mechanics of Cracks"
52. October 2, 1996, Physics Department Colloquium, University of Minnesota, "How Things Break"
53. October 28, 1996, Solid State Seminar, Ohio State, "Atomic effects in brittle fracture."
54. November 1, 1996, Plenary lecture, American Ceramics Society, San Antonio "Atomic effects in brittle fracture."
55. December 13, 1996, Lecture at Exxon Laboratories, "Atomic effects in brittle fracture."
56. December 16, 1996, Statistical Mechanics Conference, Rutgers, "Statistical Mechanics of Fracture"
57. December 18, 1996, seminar Lucent Laboratories, "Atomic effects in brittle fracture."
58. January 9 1997, Applied mathematics colloquium, Northwestern University, "Atomic effects in brittle fracture."
59. January 10,1997, Lunch seminar at University of Chicago, "How things break."
60. January 24, 1997, Physics colloquium at Clemson University, "How things break."
61. February 7, 1997, Mardi Gras meeting, Baton Rouge LA, "Simulations of brittle fracture"

62. May 12-16, 1997, Ten hours of lectures on dynamic fracture spread over five days at Louisiana State University
63. May 30, 1997, SELA corporation, Haifa, Israel, "Brittle fracture of silicon"
64. July 17-18, 1997, Two lectures on dynamic fracture at Cargese summer school, Corsica.
65. August 21, 1997, International conference on fundamentals of fracture, Gaithersburg MD, "Atomic effects in brittle fracture"
66. September 15, 1997 Metals and Materials conference, Indianapolis, "Cleavage fracture at the atomic level"
67. December 19, 1997 presentation at Alcoa Technical Center on dynamics shear bands
68. January 8, 1998, seminar, Santa Barbara CA, "Atomic effects in brittle fracture"
69. February 23, 1998, seminar, mechanical engineering, MIT, "Atomic effects in brittle fracture"
70. March 9, 1998, presentation at SWRI, San Antonio, "Atomic effects in brittle fracture"
71. March 30, 1998 Materials Science colloquium, Rice University, "How Things Break"
72. April 9, 1998 seminar, University of Maryland, "Statistical Mechanics of Fracture"
73. May 15, 1998, conference on predictability at Los Alamos, "Statistical Mechanics of Fracture"
74. June 10, 1998, seminar at Hebrew University, Jerusalem, "Atomic effects in brittle fracture"
75. June 23, 1998, mechanics conference in Gainesville FL, "Atomic effects in brittle fracture"
76. October 6, 1998, Physics Colloquium, University of Houston, "How Things Break"
77. October 8, 1998, NSF Workshop on Frontiers of Materials Science, "Atomic Effects in Brittle Fracture"
78. October 23, 1998, Solid state seminar, Indiana University, "Atomic effects in brittle fracture"
79. October 26, 1998, Mechanical engineering seminar, University of Illinois, "Atomic effects in brittle fracture"
80. December 15, 1998, Army research office workshop, Nashville, "Brittle fracture of silicon"
81. February 23, 1999, Physics Colloquium, University of Maryland "How Things Break"
82. March 22, 1999 APS March meeting display talk, "Exotic consequences of esoteric studies."
83. March 23 1999 APS March meeting invited talk, "Atomic effects in brittle fracture."
84. April 10, 1999 presentation on brittle fracture of silicon for SiGen corporation.
85. April 21, 1999 Mechanics colloquium at Cornell on "Atomic effects in brittle fracture."
86. April 22, 1999 Physics Colloquium, University of Chicago, "How Things Break"
87. May 18, 1999 Materials Science Colloquium, University of Minnesota, "Atomic effects in brittle fracture"
88. Sept 16 1999, Special Colloquium, UT Austin, "How Things Break"
89. Oct. 26, 1999, SES Barenblatt symposium, "Atomic Effects in Brittle Fracture"
90. Nov. 4, 1999, Physics Colloquium, University of Toronto, "How Things Break"
91. Dec 1, 1999, MRS meeting, "Atomic Effects in Brittle Fracture"
92. Dec 11, 1999, Rutgers Statistical Mechanics meeting, "Statistical Mechanics of Fracture"
93. Feb 25, 2000, Florida Quantum Chemistry gathering, "Molecular Dynamics of Fracture"
94. Apr 5, 2000, Physics Colloquium, University of Arizona, "How Things Break"

95. May 23, 2000 Plenary talk at SIAM Materials meeting, "Atomic Effects in Brittle Fracture"
96. June 6, 2000, Austin Nonlinear Dynamics Conference, "Nonlinear Dynamics of Fracture"
97. July 6, 2000, Madrid Polytechnic, "Recent Trends in US Science and Mathematics Education"
98. July 7, 2000, Madrid Polytechnic, "Atomic Effects in Brittle Fracture"
99. Aug. 18, 2000 Argonne National Labs Colloquium, "Atomic Effects in Brittle Fracture"
100. Aug 28, 2000, Leiden Summer School, "Atomic Effects in Brittle Fracture"
101. October 6, 2000, Colloquium, Goddard Space Flight Center, "How Things Break"
102. October 24, 2000, Society for Engineering Science, "Friction and Fracture"
103. March 14-15, 2001 Seattle, Session organizer and Chair for Fracture and Deformation session at APS March Meeting
104. March 26, 2001 International Conference on Fundamentals of Fracture, Oxford, "Atomic Effects in Brittle Fracture"
105. April 2, 2001 CETP PI meeting, NSF headquarters, Washington, "Attracting and Retaining Students in UTeach"
106. April 3, 2001 CETP PI meeting, NSF headquarters, Washington, "Research Methods for UTeach"
107. April 25, 2001 American Ceramic Society, Indianapolis, "Atomic Effects in Brittle Fracture"
108. July 20, 2001 Hellenic Congress on Mechanics, Thessaloniki, "Atomic Effects in Brittle Fracture"
109. Sept. 6, 2001, Los Alamos National Lab, "Atomistic Effects in Brittle Fracture"
110. Oct. 4, 2001, Dana Center Preservice Conference, Austin, "UTeach"
111. Oct. 27, 2001, Saturday Morning Math Group, UT Austin, "Exponential Growth Laws"
112. Nov. 6, 2001, VIGRE seminar, UT Austin, "Groups of Atoms"
113. Nov. 12, 2001, Biology Colloquium, Southwest Texas State, "UTeach – A Secondary Science Teacher Program"
114. Dec 3, 2001, International Conference on Fracture, Honolulu HI, "Atomistic Approaches to Fracture"
115. March 2, 2002, American Mathematics Association, Natchitoches, LA, "UTeach"
116. March 11, 2002, US-Japan Complexity Workshop, UT Austin, "Atomic Effects in Brittle Fracture"
117. March 14, 2002, Sandia National Lab, Livermore CA, "Atomic Effects in Brittle Fracture"
118. March 28, 2002, TACC seminar, UT Austin "Materials Modeling at .01 bps"
119. April 18, 2002, Pathways to Change Conference, Washington DC, Panelist for "Education in a time of Reform."
120. April 25, 2002, Lamar University, Beaumont, TX, "UTeach"
121. July 19, 2002, Santa Barbara, Keck Workshop, "Friction and Fracture"
122. August 21, 2002, Boston, American Chemical Society, "Preliminary Models of the Fracture of Rubber"
123. September 30, 2002, Center for Nonlinear Dynamics, UT Austin, "The Shape of the Edge of a Leaf"
124. October 2, 2002, Physics Colloquium, UT Austin, "Membranes and Metrics"
125. October 15, 2002, Society for Engineering Science, Penn State, "Velocity gap in silicon"

126. October 16, 2002, Harvard University, "Friction and Fracture"
127. November 8, 2002, University of Colorado, "UTeach"
128. November 18, 2002, Governor's Education Conference, Austin, "UTeach"
129. February 3–February 7, 2003, Winter School, Les Houches, "Introduction to Fracture"
130. February 26, 2003 Sanibel Conference, Saint Augustine FL, Keynote Lecture "Molecular Dynamics of Fracture"
131. March 3, 2003, APS Meeting, Invited Talk, "Fracture of Silicon"
132. April 3, 2003, Physics Colloquium, University of Houston, "How Things Break"
133. May 9, 2003, UT El Paso, day-long workshop on UTeach
134. May 14, 2003, Physics Colloquim, Cal State Northridge, "How Things Break"
135. July 14, 2003, Ringberg Fracture Workshop, Germany, "Velocity Gap in Silicon"
136. July 28, 2003, ICCES, Corfu, "Velocity Gap in Silicon," Keynote lecture
137. September 26, 2003, Physics Colloquium, Emory University, "How Things Break"
138. October 10 and 11, 2003, Presentations on Discovery Learning at meeting convened by Ohio Board of Regents
139. February 3, 2004, Physics Colloquium, Duke University, "How Things Break"
140. March 9, 2004, Testimony about UTeach for education subcommittee of U.S. House of Representatives Appropriations Committee
141. March 15, 2004, Annual PI Conference for Collaboratives for Excellence in Teacher Preparation, Washington DC, "UTeach"
142. March 16, 2004, Several hours of presentations to National Science Foundation program officers about education, outreach, and UTeach.
143. April 16, 2004, NSF Workshop on US/EU cooperation for materials problems, San Francisco, "Atomic effects in brittle fracture"
144. April 29, 2004, Colloquium, NYU, "How Things Break"
145. May 12, 2004, All-day workshop at University of Houston on UTeach.
146. August 21, 2004, Conference on computational challenges in materials and biology, USC, "Leaves Flowers and Balloons"
147. September 1, 2004, University of Chicago, "Leaves Flowers and Balloons"
148. October 1, 2004, University of Texas Institute for Geophysics "Friction and Fracture"
149. October 25, 2004, California Summit on Teacher Preparation, Sacramento CA, "UTeach"
150. October 28, 2004, Corporate and Foundation Alliance, National Science Foundation, Washington, "UTeach"
151. October 29, 2004, Du Pont Research Labs, New Jersey, "Supersonic Rupture of Rubber"
152. October 31, 2004, National Research Council workshop on teacher preparation, "The Practice of Science and the Science of Teaching: The Role of Scientists in Improving Teacher Education" (with Mary Ann Rankin)
153. Dec 6, 2004, National Research Council workshop on teacher preparation, "The Critical Roles of STEM faculty in Teacher Education (Pre-Service and Ongoing Professional Development) (with Mary Ann Rankin)
154. January 29, Saturday Morning Math, UT Austin, "Leaves, Flowers, and Garbage Bags"

155. February 9, 2005, NRC Workshop, Irvine CA, "Teaching as a professional continuum"
156. March 22, 2005 International Conference on Fracture, Turin, "Effect of Atoms on Brittle Fracture"
157. March 24, 2005 International Conference on Fracture, Turin, "Shock Wave Theory for Rupture of Rubber"
158. April 18, 2005, APS Meeting, Tampa, UTeach: Teacher preparation at The University of Texas at Austin
159. April 29, 2005 Workshop on Multiscale Modeling, Montreal "Supersonic Rupture of Rubber"
160. May 19 2005, Colloquium, UC Davis, "How Things Break"
161. July 5 2005, Mechanics of Materials Conference, Sympi, Greece "Supersonic Rupture of Rubber"
162. August 25, 2005, Workshop on Fracture, Friction, and Earthquakes, KITP, "Atoms Matter for Fracture"
163. September 30, 2005, Shock-wave theory for rupture of rubber,, MATNON 2005, Kyoto, Japan
164. October 13, 2005, UTeach, University of Florida
165. October 19, 2005, How Things Break, Condensed Matter Seminar, Texas AM&
166. October 25, 2005, Supersonic Theory of Rubber Rupture, KITP, Santa Barbara
167. October 27, 2005, Propagating Slip Pulses, KITP Santa Barbara
168. February 9, 2006, How Things Break, Physics Colloquium, West Virginia University
169. March 15, 2006, UTeach, Invited talk, American Physical Society Meeting, Baltimore
170. March 16, 2006, Supersonic Rupture of Rubber, Invited talk, American Physical Society Meeting, Baltimore
171. March 25, 2006, UTeach, Plenary talk, PTEC conference, University of Arkansas
172. April 27, 2006, Equity and Excellence, LBJ Colloquium, Austin
173. May 6, 2006, UTeach, Alternative Certification Conference, Washington
174. May 24, 2006, Nonlinear Dynamics of Fracture, Tamura conference, Tokyo Japan
175. May 26, 2006, Shock wave theory of rubber, Technical University, Berlin
176. July 13, 2006, Shock wave theory for rupture of rubber, University of Crete
177. September 8, 2006, Presentation on UTeach before Congressional Black Caucus, Washington DC
178. September 29, 2006, Physics Colloquium, How Things Break, Georgia Tech, Atlanta GA.
179. October 16, 2006 3.5 hours of lectures on fundamentals of fracture, workshop on fracture, Center for Condensed Matter Physics, Brasilia, Brazil
180. February 16, 2007, UTeach, North Carolina State, Raleigh NC
181. February 19, 2007, Physics Colloquium, How Things Break, North Carolina State, Raleigh NC
182. March 3, 2007, Just Can't Be Done... PTEC Conference, Boulder CO
183. April 19, 2007, UTeach Renaissance Group Conference, Kennesaw State, GA
184. April 25, 2007, UTeach, White House Conference on Hispanic access to higher education, UT El Paso, El Paso TX
185. May 21, 2007, Student Achievement Data, UT Gathering on state of Texas schools I helped organize at UT.

186. September 20, 2007. Atomic Effects in Brittle Fracture, American Ceramics Society, Detroit.
187. September 21, 2007, Geometry and Elasticity of Leaves and Flowers, Workshop on Singularities in Mechanics, Tucson AZ
188. October 2, 2007, UTeach, National Science Resource Center, Washington DC
189. October 13, 2007 K-12 to College, TAMEST gathering in Houston TX
190. November 1, 2007, Best Practices in Science Education, National Science Resource Center, Washington DC
191. February 13, 2008, UTeach, Physics Colloquium, U Minnesota.
192. February 29, 2008, Several presentations on UTeach and UTeach replication at PTEC 2008, Austin TX
193. March 10-14, 10 hours of lectures on physics of fracture at school on singularities at Institut Henri Poincare in Paris, France
194. March 19, 2008 Supersonic Rupture of Rubber, Conference on singularities in mechanics, Institut Henri Poincare in Paris, France.
195. April 2, 2008, Failure of Brittle Solids and Educational Systems, University of Maryland.
196. May 12, 2008, Nonlinear Dynamics Effects in Fracture of Materials, SIAM, Philadelphia, PA
197. May 13, 2008, Geometry and Elasticity of Leaves and Flowers, SIAM, Philadelphia, PA
198. May 21 and 22, 2008, Several presentations at UTeach replication conference, Austin TX
199. July 17, 2008, Geometry and Elasticity of Leaves and Flowers, Cargese, Corsica, France.

Invited Presentations in 2012-2013

1. September 28, 2012, Measures of Effective Teaching Leaders workshop Washington DC
2. October 7, 2012, Physics and Education Reform, University of Chicago, Chicago IL
3. October 17 2012, Several presentations at UTeach Open House, Austin
4. October 27, 2012, How Things Break, Texas Section APS Meeting, Lubbock
5. October 29-30, 2012 Research Methods Workshop, Austin
6. November 8, 2012 UTOP, MET Volume Conference, Chicago IL
7. November 9, 2012, UTeach presentations, Georgia Tech, Atlanta GA.
8. December 8, 2012, Role of History of Science in Science Teacher Preparation, Workshop on History of Science, BU, Boston
9. January 29, 2013 American STEM Alliance, TACHE, Austin
10. March 3, 2013 Poverty and Public Education, given remotely to group at Seton Hall University, NJ
11. March 17, 2013, Poverty and Physics Education, keynote address, PhysTEC, Baltimore MD.
12. April 16, 2013 Discrete Model of Hydrofracture, SUTUR workshop, Austin
13. May 21-22, 2013, Several presentations at UTeach annual conference, Austin

Invited Presentations in 2013-2014

1. October 30, 2013, American Vacuum Society, Burbank CA, Condensed Matter in an age of computation
2. December 12, 2013, Austin Independent School District, Data on district as part of State of the District presentation

3. January 5, 2014, Association of Physics Teachers, Orlando FA, Sustaining UTeach Programs
4. January 8, 2014, University of Central Florida, Poverty and Public Education
5. January 22, 2014, UTeach Institute, UT Austin, UTeach Implementation Kick-Off Meeting — Cohort 5 (multiple presentations)
6. February 26, 2014, University of Chicago, Scaling Function for Shale Gas Production
7. March 27, 2014, Mathematical Sciences Research Institute (Berkeley), Critical Issues in Mathematics Ed. UTeach: Preparing 6500 students to teach secondary mathematics and science
8. April 24, 2014, US News and World Report STEM solutions, EXECUTIVE WORKSHOP: The Holy Grail: Scaling Effective Programs
9. May 5, 2014, Texas Tribune Education Summit at UT Dallas Debate on Algebra II
10. May 7, 2014, Invitational Summit on Educational Visualization, UT Austin Visualizing Effects of Poverty on Education
11. May 20-22, 2014 UTeach Institute Conference (Austin) 4 presentations of an hour or more
12. May 20, 2014, PhysTEC, Austin, Politics of Teacher Preparation

Invited Presentations in 2014-2015

1. September 22, 2014, OSTP Panel at U Colorado, Experiential Learning at UT Austin
2. October 9, 2014, Physics Colloquium, Arizona State University, Education Adventures of a Physicist
3. October 28, 2014, Welch Chemical Education Conference, Houston, UTeach
4. October 31, 2014, Physics Colloquium, UTSA, Physics of Hydrofracture
5. November 5, 2015, Dionysium Debate on Algebra II, Austin
6. December 15, 2014, AGU Meeting, San Francisco, Scaling Theory of Hydrofracture
7. January 9, 2015, Dynamics Days, Houston, Scaling Theory of Hydrofracture
8. March 5, 2015, APS March Meeting, San Antonio, Growing the Physics Major
9. March 25, 2015, UT Pan Am, Broken Airplanes, Broken Schools
10. May 19, 2015, UTeach Conference, Austin, Research Methods Retreat
11. May 20, 2015, UTeach Conference, Austin, Broken Airplanes, Broken schools
12. May 20, 2015, UTeach Conference, Austin, UTeach Money Matters
13. May 20, 2015, UTeach Conference, Austin, Course Overview, Research Methods
14. May 30, 2015, Remote Presentation, Seattle Pacific University, UTeach Replication
15. June 11, 2015, University of Thessaloniki, Physics of Hydrofracture (in Greek!)

Invited Presentations in 2015-2016

1. September 19, 2015, University of Chicago, Mathematics in UTeach, TPSE meeting
2. October 27, 2015, National Academies, DC, Simple Solutions to Complex Problems of Gas and Oil Production,
3. October 28, 2015, College Station, SES Meeting, Fracture Mechanics of Hydrofracture
4. January 10, 2016, AAPT Meeting, New Orleans, UTeach and the 5+ Club
5. February 8, 2016, Hydrofracturing: Optimism, Pessimism, and Scaling Functions, CNLD Seminar, UT Austin

6. February 10, 2016, Co-Organizer and Presenter, Ready Texas Stakeholder Convening, UT Austin
7. February 15, 2016, Fracture Mechanics of Hydrofracture, UT Energy Day, UT Austin
8. February 18, 2016, Algebra II and HB5, Texas Association of Chicanos in Higher Education, San Antonio
9. February 25, 2016, Hydrofracturing: Optimism, Pessimism, and Scaling Functions, Physics Colloquium, Florida State
10. March 2-3, 2016, Research Methods Workshop, UT Austin
11. March 8, 2016, CS in UTeach, Panel at SXSW.edu, Austin
12. April 5, 2016, Scaling ideas for transport, Conference on Physics of Flow, KAUST, Saudi Arabia
13. May 8, 2016, Scaling features of fracture networks, Basic Energy Sciences Conference on deep fractures, Washington DC
14. May 24, 2016, Money Matters, UTeach Conference, Austin
15. May 25, 2016 Dinner keynote speech on Energy and Education, UTeach Conference, Austin
16. May 25, 2016 Evaluating Teacher Pathways from Test Scores, UTeach Conference, Austin
17. May 26, 2016 Broken Airplanes, Broken Schools , UTeach Conference, Austin
18. June 2, 2016, Data on UTeach, Howard Hughes Medical Institute Scientific Advisory Board, DC
19. June 7, 2016, Fracture Mechanics of Hydrofracture, ECCOMAS congress, Crete

Invited Presentations in 2015-2016

1. 2016-10-20, State University of New York and New York Department of Education, UTeach and UTeach Expansion
2. 2016-11-10 American Chemical Society, Southwest Regional Meeting, Dynamic fracture of brittle solids at the atomic scale
3. 2016-11-12 American Chemical Society, Southwest Regional Meeting, Scaling theories for hydrofracturing
4. 2017-01-25 UT Austin Physics Colloquium, Teaching and the Future of Physics
5. 2017-02-18 PhysTEC Recruiting teachers in high needs STEM fields (plenary)
6. 2017-02-20 American Association of Physics Teachers Student Learning in Classes of UTeach Graduates
7. 2017-03-21, Florida International University, Teaching has to improve if we want to survive
8. 2017-04-11, LAMP, Diversity and STEM Education
9. 2017-05-23, UTeach Annual Conference, Research Methods Workshop
10. 2017-05-24 UTeach Annual Conference, Is UTeach a good investment?
11. 2017-05-24 UTeach Annual Conference Research Methods Course Overview
12. 2017-05-24 UTeach Annual Conference Research Methods

Invited Presentations in 2017-2018

1. 2017-10-17 Hebrew University of Jerusalem, Fracture, Friction, Physics, and Fineberg
2. 2017-10-30 UT Austin, OnRamps Professional Learning Institute for Physics
3. 2017-11-06, Texas A&M Materials Science Colloquium, Hydrofracture as a Materials Problem
4. 2017-11-11 Querencia Barton Creek, Rise and Fall of Texas Public Education

5. 2018-02-13 KAUST-Recovery of Difficult Hydrocarbons, Diffusion Imaging of Complex Fractured Networks
6. 2018-02-27 Trinity University Physics Colloquium, Physics, Fracking, Fuel, and the Future
7. 2018-03-06–2018- 03-07, UTeach Institute, Research Methods Course Workshop
8. 2018-04-05, University of Wisconsin System, UTeach Replication
9. 2018-04-14 American Physical Society April Meeting Recruiting teachers in high-needs STEM fields
10. 2018-04-16, Center for Nonlinear Dynamics Seminar, Solvable Model for Dynamic Mass Transport in Disordered Geophysical Media
11. 2018-05-22, UTeach Institute, Research Methods Preconference Workshop
12. 2018-05-23, UTeach Annual Conference, Is UTeach a good investment?
13. 2018-05-23, UTeach Annual Conference, Research Methods