

Zoey S. Davidson

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EDUCATION

- Ph.D. Physics, University of Pennsylvania, Philadelphia, 2017
Dissertation: *Assembly, Elasticity, and Structure of Lyotropic Chromonic Liquid Crystals and Disordered Colloids*
Committee: T.C. Lubensky (chair), A.G. Yodh (advisor), P.J. Collings, D. Durian, J.S. Karp
- M.S. Physics, University of Pennsylvania, Philadelphia, 2013
- B.A. Physics, University of Pennsylvania, Philadelphia, 2010

ACADEMIC APPOINTMENTS

- 2019– Postdoctoral Fellow, John A. Paulson School of Engineering and Applied Science, Harvard University, Cambridge
- 2017–19 Postdoctoral Scholar & Alexander von Humboldt Visiting Scientist, Department of Physical Intelligence, Max Planck Institute for Intelligent Systems, Stuttgart
- 2012–17 Research Assistant, Yodh Soft Matter Lab, Department of Physics, University of Pennsylvania, Philadelphia
- 2010–11 Research Assistant, Physics and Instrumentation Group, Perelman School of Medicine, University of Pennsylvania, Philadelphia

RESEARCH INTERESTS

Soft matter physics, fundamentals and applications –
Materials science, polymers, artificial muscles, and sustainability.
Traditional and modern fabrication methods, machining and 3D printing.

FELLOWSHIPS AND AWARDS

- 2017 Postdoctoral Research Fellowship, A.v. Humboldt Foundation
- 2013 Chair's Teaching Award, Department of Physics & Astronomy University of Pennsylvania
- 2011 Valentin T. Jordanov Radiation Instrumentation Travel Grant, IEEE NSS-MIC

PUBLICATIONS (* indicates equal contribution, † indicates corresponding author)

Peer Reviewed Publications

- 2021 A. Kotikian, ... , **Z.S. Davidson**, J. W. Boley, J.A. Lewis, Innervated, Self-Sensing Liquid Crystal Elastomer Actuators with Closed Loop Control, *Adv. Mater.*, 33, 2101814

- 2021 J. Zhang, ... , **Z.S. Davidson**, M. Sitti, Liquid Crystal Elastomer-Based Magnetic Composite Films for Reconfigurable Shape-Morphing Soft Miniature Machines, *Adv. Mater.*, 33, 2006191
- 2020 **Z.S. Davidson**[†], *et al.*, Twisting and untwisting of twisted nematic elastomers, *Phys. Rev. Mater.* vol. 4, no. 10, p. 105601
- 2020 U. Culha, **Z.S. Davidson**, M. Mastrangeli, M. Sitti, Statistical reprogramming of macroscopic self-assembly with dynamic boundaries, *Proc. Natl. Acad. Sci. U. S. A.* 117, 21, p11306-11313.
- 2020 H. Shahsavan, ... , **Z.S. Davidson**, *et al.* Bioinspired underwater locomotion of light-driven liquid crystal gels, *Proc. Natl. Acad. Sci. U. S. A.* 117, 10, p5125-5133.
- 2019 Y. Guo, H. Shahsavan, **Z.S. Davidson**^{*}, M. Sitti, Precise Control of Lyotropic Chromonic Liquid Crystals Alignment through Surface Topography, *ACS Applied Materials & Interfaces*, vol. 11, no. 39, p. 36110
- 2019 **Z.S. Davidson**[†], *et al.*, Monolithic shape-programmable dielectric liquid crystal elastomer actuators, *Sci. Adv.*, 5, 11, eaay0855
- 2019 Xiaoguang Ma, **Z.S. Davidson**^{*}, *et al.*, Heterogeneous activation, local structure, and softness in supercooled colloidal liquids, *Phys. Rev. Lett.*, vol. 112, no. 2, p. 028001
- 2017 **Z.S. Davidson**, Y. Huang, A. Gross, *et al.*, Deposition and drying dynamics of liquid crystal droplets, *Nat. Commun.*, vol. 8, no. 15642
- 2017 E.D. Cubuk, R.J.S. Ivancic, S.S. Schoenholz, D.J. Strickland, A. Basu, **Z.S. Davidson**, *et al.*, Structure-property relationships from universal signatures of plasticity in disordered solids, *Science*, vol. 358, pp. 1033-1037
- 2016 M.D. Gratale, X. Ma, **Z.S. Davidson**, *et al.*, Vibrational properties of quasi-two-dimensional colloidal glasses with varying interparticle attraction, *Phys. Rev. E.*, vol. 94, no. 4, p. 042606
- 2016 M.D. Gratale, T. Still, C. Matyas, **Z.S. Davidson**, *et al.*, Tunable depletion potentials driven by shape variation of surfactant micelles, *Phys. Rev. E.*, vol. 93, no. 3, p. 050601
- 2015 T. Still, P.J. Yunker, K. Hanson, **Z.S. Davidson**, *et al.*, Temperature-Sensitive Hydrogel-Particle Films from Evaporating Drops, *Adv. Mater. Interfaces*, vol. 2, no. 1500371
- 2015 **Z.S. Davidson**^{*}, L. Kang, J. Jeong, *et al.*, Chiral structures and defects of lyotropic chromonic liquid crystals induced by saddle-splay elasticity, *Phys. Rev. E.*, vol. 91, p. 050501
- 2015 J. Jeong, L. Kang, **Z.S. Davidson**, *et al.*, Chiral structures from achiral liquid crystals in cylindrical capillaries, *PNAS*, vol. 112, pp. E1837-1844
- 2014 M.A. Lohr, T. Still, R. Ganti, M.D. Gratale, **Z.S. Davidson**, *et al.*, "Vibrational and structural signatures of the crossover between dense glassy and sparse gel-like attractive colloidal packings," *Phys. Rev. E.*, vol. 91, p. 050501
- 2014 J. Jeong, **Z.S. Davidson**, *et al.*, Chiral symmetry breaking and surface faceting in chromonic liquid crystal droplets with giant elastic anisotropy, *PNAS*, vol. 111, pp. 1742-1747
- 2012 W. Ashmanskas, **Z.S. Davidson**, *et al.*, Combined analog/digital approach to performance optimization for the LAPET whole-body TOF PET scanner, *2012 IEEE Nuclear Science Symposium and Medical Imaging Conference*, pp. 3496-3500
- 2011 **Z.S. Davidson**, R. Wiener, *et al.*, High voltage photodetector calibration for improved timing resolution with scintillation detectors for TOF-PET imaging, *2011 IEEE Nuclear Science Symposium and Medical Imaging Conference*, pp. 2338-2341

Press Coverage

- 2017 *Penn physicists discover why drying liquid crystal drops leave unusual 'coffee rings'*
https://www.eurekalert.org/pub_releases/2017-05/uop-ppd053017.php

CONFERENCE PRESENTATIONS

- 2019 **Z.S. Davidson**, Selected participant in *Lindau Nobel Laureate Meeting*
- 2019 **Z.S. Davidson, et al.**, "Electromechanical Actuation of Liquid Crystal Elastomer Muscles," *German Liquid Crystal Conference*
- 2019 **Z.S. Davidson, et al.**, "Electromechanical Actuation of Dielectric Liquid Crystal Elastomers of Complex Patterns," *Gordon Research Seminar - Complex Active and Adaptive Material Systems*
- 2016 **Z.S. Davidson, et al.**, "Rearrangement dynamics in colloidal particle packings identified through local structure and machine-learning," *APS March Meeting*
- 2015 **Z.S. Davidson, et al.**, "Experimental and theoretical studies of lyotropic chromonic liquid crystals confined in cylinders," *89th ACS Colloid and Surface Science Symposium*
- 2015 **Z.S. Davidson, et al.**, "Planar Anchoring of Achiral Nematic Liquid Crystals in Capillaries—with a Twist," *APS March Meeting*
- 2014 **Z.S. Davidson, et al.**, "Lyotropic Chromonic Liquid Crystal Droplets, Faceted and Squeezed," *APS March Meeting*
- 2013 **Z.S. Davidson, et al.**, "Phase and Topological Behavior of Lyotropic Chromonic Liquid Crystals in Double Emulsions," *APS March Meeting*
- 2013-16 Biannual short presentations in *Mid Atlantic Soft Matter* series.
- 2013-19 Biennial attendance at Liquid Crystal Gordon Research Conference.

SERVICE

- Reviewer: *Physical Review Letters, Langmuir, Soft Matter, MRS Communications, Physical Review Research, Science Advances*
- Chair, Liquid Crystals Gordon-Kennan Research Seminar 2015
- Exhibitor and Outreach at Philly Materials Day and Philadelphia Science Festival, 2012-2016
Organized demonstrations for public audiences from elementary school to adult.
- University of Puerto Rico Summer High School Lecture and Lab
NSF Partnership for Research and Education in Materials, 2016

TEACHING AND MENTORING EXPERIENCE

Mentored 9 students: 2 Ph.D., 2 M.S., 3 B.A. and 2 high school students.

Teaching at University of Pennsylvania:

- 2015 CTL Teaching Certificate, Center For Teaching & Learning, University of Pennsylvania, 2015
- 2015F Classical Mechanics
- 2014S Modern Physics, Lab TA
- 2012F Laboratory Electronics for Physicists, Lab TA (and 2014F)

2011-2 Physics for Architects (and 2013-4)
2011F Physics for Engineers, Lab TA
2009F Introduction to Computer Architecture