

# William de Almeida Gilpin

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## Education

Stanford University, PhD in Applied Physics, 2019  
Stanford University, MS in Applied Physics, 2016  
Princeton University, AB in Physics with High Honors, 2014

## Positions

The University of Texas at Austin, Assistant Professor of Physics 2022—  
Affiliated Faculty, The Oden Institute for Computational Engineering & Sciences.  
Harvard University, NSF-Simons Independent Fellow, Quantitative Biology Initiative. 2019–2022.  
Osmosis Medical, content developer, 2018–2020  
The University of Tokyo, Visiting scholar in applied mathematics. 2016.  
Khan Academy, content developer, 2014 – 2016.

## Honors & Awards

Complex Systems Society Emerging Researcher Award, 2022  
Texas Rising STARs Grant, 2022  
APS Prize for Outstanding Doctoral Thesis Research in Biological Physics, 2020.  
National Geographic Young Explorers Grant, 2017.  
Miller Fellowship at UC Berkeley, 2019–2021 (*declined*).  
Visualization Prizes: Nikon Small World Grand prize (2016) [\[vid\]](#), NSF “Vizzies” Grand prize (2017),  
Milton van Dyke Award, APS Gallery of Fluid Motion (2016) [\[vid\]](#), Physics Today (2017) [\[url\]](#),  
Graduate Fellowships: National Science Foundation Graduate Research Fellowship, NDSEG Fellowship,  
EDGE-STEM and H&S Fellowships, 2014–2019  
NSF REU Fellowships: Harvard SEAS/NNIN, 2012, 2013; Mote Marine Laboratory, 2011  
Undergraduate: Class of 1930 Scholarship, Shenstone Prize in Physics 2013, Sigma Xi 2014,  
Kusaka Memorial Prize in Physics 2014.

## Upcoming

**W. Gilpin.** “Large-scale statistical forecasting models reassess the unpredictability of chaotic systems”, 2023. [\[arXiv\]](#)

**W. Gilpin.** “Recurrences reveal shared causal drivers of complex time series”, 2023. [\[arXiv\]](#)

M. J. Falk, F. Roach, **W. Gilpin**, A. Murugan. “Curiosity-driven search for novel non-equilibrium behaviors.”, 2022. [\[arXiv\]](#)

## Selected Publications

**W. Gilpin.** “Chaos as an interpretable benchmark for forecasting and data-driven modelling” *Neural Information Processing Systems (NeurIPS)*, 2021. 25% acceptance rate, 9122 submissions. [\[pdf\]](#)

**W. Gilpin.** “Deep reconstruction of strange attractors from time series” *Neural Information Processing Systems (NeurIPS)*, 2020. 20% acceptance rate, 9467 submissions. [\[pdf\]](#)

**W. Gilpin.** “Cryptographic hashing using chaotic hydrodynamics” *The Proceedings of the National Academy of Sciences*, 2018. [\[pdf\]](#)

[kcbs radio interview](#) | [stanford homepage](#) | [phys.org](#) | [futuraity](#) | [scishow](#)

**W. Gilpin**, M. S. Bull, M. Prakash. “The multiscale physics of cilia and flagella” *Nature Reviews Physics*, 2020. [\[pdf\]](#) [\[cover\]](#)

**W. Gilpin**, V. N. Prakash, M. Prakash “Vortex arrays and ciliary tangles underlie the feeding-swimming tradeoff in starfish larvae” *Nature Physics*, 2017. [\[pdf\]](#)

[nature physics news & views](#) | [new york times](#) | [nature](#) | [cbs](#) | [pop sci](#) | [business insider](#) | [scientific american](#)

**W. Gilpin**, M. W. Feldman, K. Aoki “An ecocultural model predicts Neanderthal extinction through competition with modern humans.” *The Proceedings of the National Academy of Sciences*, 2016. [\[pdf\]](#)

[newsweek](#) | [science](#) | [daily mail](#) | [ars technica](#) | [huffington post](#) | [international business times](#)

## Additional Publications

- W. Gilpin.** “Desynchronization of jammed oscillators by avalanches” *Physical Review Research*, 2021. [\[pdf\]](#)
- W. Gilpin**, Y. Huang, D. Forger. “Learning dynamics from large biological datasets: Machine learning meets systems biology” *Current Opinion in Systems Biology*, 2020. [\[pdf\]](#)
- W. Gilpin.** “Cellular automata as convolutional neural networks” *Physical Review E*, 2019. [\[pdf\]](#)
- W. Gilpin**, M. W. Feldman. “Cryptic selection forces and dynamic heritability in generalized phenotypic evolution” *Theoretical Population Biology*, 2018. [\[pdf\]](#)
- W. Gilpin**, M. W. Feldman. “A phase transition induces chaos in a predator-prey ecosystem with a dynamic fitness landscape” *PLOS Computational Biology*, 2017. [\[pdf\]](#)
- W. Gilpin**, V. N. Prakash, M. Prakash. “Flowtrace: simple visualization of coherent structures in biological fluid flows” *Journal of Experimental Biology*, 2017. [\[pdf\]](#) [\[code\]](#) [\[cover\]](#)
- J. Y. Wakano\***, **W. Gilpin\*** (\*co-first), S. Kadowaki, M. W. Feldman, K. Aoki. “Ecocultural range-expansion scenarios for the replacement or assimilation of Neanderthals by modern humans” *Theoretical Population Biology*, 2017. [\[pdf\]](#)
- W. Gilpin**, V. N. Prakash, M. Prakash. “Rapid behavioral transitions produce chaotic mixing by a planktonic microswimmer”, 2018. [\[arXiv\]](#)
- W. Gilpin**, V. N. Prakash, M. Prakash. “Dynamic vortex arrays created by starfish larvae” *Physical Review Fluids*, 2017. [\[pdf\]](#) [\[aps feature\]](#)
- W. Gilpin**, V. N. Prakash, M. Prakash “Boundary effects on currents around ciliated larvae” *Nature Physics*, 2017. [\[pdf\]](#)
- W. Gilpin**, “PyPDB: A Python API for the Protein Data Bank.” *Bioinformatics*, 2015. [\[pdf\]](#) [\[code\]](#)
- W. Gilpin**, S. Uppaluri, C. P. Brangwynne “Worms under pressure: bulk mechanical properties of *C. elegans* are independent of the cuticle” *Biophysical Journal*, 2015. [\[pdf\]](#) [\[video\]](#)
- K. Bayat, W. K. C. Sun, **W. Gilpin**, M. Baroughi, & M. Lončar. “Nitrogen vacancy center ensembles in Diamond Nanowires.” *CLEO: Science and Innovations*, 2014. [\[pdf\]](#)

## Invited Talks

- SIAM Applied Dynamical Systems, Minisymposium, 2023
- Emory-NSF Multiscale Complex Systems Workshop, 2023
- University of Amsterdam, soft matter seminar, 2023
- Kungfu AI Inc. machine learning seminar, 2023
- U Chicago, Computations in Science seminar, 2022
- Pitt-Berkeley-KTH, joint seminar on scientific machine learning, 2022
- Ecole Normale Supérieure de Paris, biophysics seminar, 2022
- Mila Quebec AI Institute, Université de Montréal, dynamical systems seminar, 2022
- Johns Hopkins Physics, research seminar, 2021
- Flatiron Institute, research seminar, 2021
- APS March Meeting, Biological physics Dissertation Prize Talk, 2021
- UC Santa Cruz Applied Mathematics, research seminar, 2021
- UT Austin Physics, Center for Nonlinear Dynamics and Biophysics Seminar, 2021
- Emory Biology, research seminar, 2021
- University of British Columbia Mechanical Engineering, research seminar, 2021
- Brandeis Mathematics, research seminar, 2021
- Caltech Computing & Mathematical Sciences, CMS Frontiers Colloquium, 2021
- UC Berkeley Physics, research seminar, 2021
- University of Waterloo Applied Mathematics, research seminar, 2021
- UC Berkeley Chemical and Biomolecular Engineering, research seminar, 2021
- University of Chicago Physics, research seminar, 2021
- UC Irvine Mathematics, research seminar, 2021

UCLA Mathematics, Applied Math Colloquium, 2021  
 Princeton University Bioengineering, “Rising Stars” Colloquium, 2020  
 Microsoft Research New England, 2020  
 Vrije Universiteit, Stephens group meeting, 2020  
 MIT Physics, seminar, 2018  
 Princeton University Physics, PCTS & CPBF Symposium, 2018  
 Harvard University Quantitative Biology, symposium, 2018  
 Meiji University, mathematical biology seminar, 2016  
 Tokyo University of Agriculture and Technology, 2016  
 National Nanotechnology Infrastructure Network Symposium, 2012  
 Mote Marine Laboratory, 2011.

## Service & Advising

**Research supervisor** for two graduate students and one undergraduate. Previous advisor to one undergraduate student (Duke University, Harvard QBio REU 2020-2022); next position: Marshall Scholar at Cambridge

**Search Committee Member.** UT Theoretical Plasma Physics Faculty Search (2022-2023), UT Graduate Admissions (2022-2023).

**Grant Referee** for National Geographic Society (2019-2023), European Research Council (2020).

**Peer review** for *Nature Physics*, *The Proceedings of the National Academy of Sciences*, *Nature Communications*, *eLife*, *NeurIPS*, *PLOS Computational Biology*, *Bioinformatics*, *IEEE Transactions on Artificial Intelligence*, *Journal of Experimental Biology*, *Journal of Theoretical Biology*, *Theoretical Population Biology*, *Chaos*, *International Journal of Bifurcation and Chaos*, and *Journal of Archaeological Science*

**Dissertation Committees:** Jonas Smucker and James Clarke (UT Physics, Alvarado Lab); Luke Pharr (UT Physics, Marder Group).

## Outreach

**Open source.** Sole developer for one open-source tool for bioinformatics, PyPDB, with 70,000 downloads and an active user community. All of our group’s other research code is available on GitHub [\[url\]](#).

**Invited contributor** of scientific visualizations to the 2021–2022 Neal visualization shows in Shenzhen and Hangzhou.

**Educational content developer.** Developed educational videos for the non-profit education startups Khan Academy (2014–2016), and Osmosis (2018–2020).

**Invited judge** for the 2018 American Physical Society “Gallery of Fluid Motion” competition

**EDGE-STEM mentor.** Mentor and advise early-career doctoral students at Stanford (2015–2019).

## Teaching

**Computational Physics.** A fully open-source graduate course developed in Python, focusing on connections between classical numerical recipes and physical systems (newly developed for Fall 2022). [\[url\]](#)

Guest lecturer for Modern Physics (UT Austin, Spring 2023)