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, consulting content specialist, 2018–2020
The University of Tokyo, Visiting scholar in applied mathematics. 2016.
Khan Academy, consulting content specialist, 2014 – 2016.

Honors & Awards

Forbes Magazine 30 under 30 in Science, 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)*.
NDSEG Graduate Research Fellowship, 2016-2019.
National Science Foundation Graduate Research Fellowship, 2014-2017.
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],
Stanford EDGE-STEM and H&S Fellowships, 2014-2019
NSF REU Fellowships: Harvard SEAS/NNIN, 2012, 2013; Mote Marine Laboratory, 2011
Travel Awards: American Physical Society Travel Award 2016, APS US-India Travel Grant 2018, Bio-X Travel Award 2018.
Princeton: Class of 1930 Scholarship, Shenstone Prize in Physics 2013, Sigma Xi 2014, Kusaka Memorial Prize in Physics 2014.

Selected Publications

W. Gilpin. "Chaos as an interpretable benchmark for forecasting and data-driven modelling" ***Neural Information Processing Systems (NeurIPS)***, 2021. [pdf]

W. Gilpin. "Deep reconstruction of strange attractors from time series" ***Neural Information Processing Systems (NeurIPS)***, 2020. [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 | futurity | 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 | stanford homepage | popular science | cbs | smithsonian | reuters | yahoo | vox | phys.org | 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 | stanford homepage | ars technica | huffington post | national geographic | phys.org | yahoo | international business times | ifl

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 art]

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" [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. Farrokh Baroughi, M & Lončar. "Nitrogen vacancy center ensembles in Diamond Nanowires." ***CLEO: Science and Innovations***, 2014. [pdf]

Invited Talks

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
Stephens group, Vrije Universiteit & Okinawa Institute of Science & Technology, 2020
MIT Physics, Pappalardo Interview 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

Contributed Talks

2019 PhD thesis defense: "Swimming and hashing using chaotic fluids" [video]
2018 American Physical Society March Meeting: "Low-dimensional behavior and chaotic mixing by swimming starfish larvae" [video]
2016 American Physical Society, Division of Fluid Dynamics Meeting: "Vortex arrays and ciliary tangles underlie the feeding-swimming tradeoff in starfish larvae" [video]
2013 Harvard REU Convocation: "Manipulating the charge state of nitrogen vacancy centers in diamond."
2012 Harvard REU Convocation: "Controlling the charge occupancy of nitrogen vacancy centers in diamond."
2011 Mote Laboratory Research Meeting: "Improving taxal resolution in the Optical Phytoplankton Discriminator"

Community

Research supervisor for one undergraduate student (Duke University, Harvard QBio REU)
Grant Referee for National Geographic Society (2019-present), European Research Council (2020).
Peer review for *Nature Physics*, *The Proceedings of the National Academy of Sciences*, *Nature Communications*, *eLife*, *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*
Invited contributor of scientific visualizations to the 2021 Neal Gallery art exhibition in Shenzhen.
Educational content developer. Write and develop widely-distributed educational videos for the nonprofit 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 (2016–2019).