William C. Gilpin

Education

Stanford University, PhD candidate in Applied Physics
Stanford University, MS in Applied Physics, 2016
Coursework in accelerator physics, data mining and simulation, theoretical population genetics, continuum mechanics, nuclear physics, computational biology, marine embryology.

Princeton University, AB in Physics with High Honors, 2014
Certificate in Biophysics, 2014. Graduate courses in theoretical cosmology, statistical mechanics, theoretical astrophysics, and molecular biology. Departmental courses in electrodynamics, nonlinear dynamics, relativity, quantum mechanics, complex analysis, plasma physics, biophysics, and optics.

Pine View High (Sarasota, FL), 2008-2010, Cascia Hall High (Tulsa, OK), 2006-2008

Awards

APS Milton van Dyke Award (best Gallery of Fluid Motion videos), 2016. [video]
National Science Foundation visualization competition finalist, 2017
NDSEG Graduate Research Fellowship, 2016-2019.
Nikon Small World in Motion video finalist, 2016
Nikon Small World photograph finalist, 2016 [image]
American Physical Society Travel Award, 2016.
National Science Foundation Graduate Research Fellowship, 2014-2017.
Stanford H&S Fellowship, 2014-2019
Stanford EDGE-STEM Fellowship, 2014-2019
Kusaka Memorial Prize, top graduating seniors in Princeton physics, 2014.
Allen G. Shenstone Prize, top juniors in Princeton physics, 2013.
Induction to Sigma Xi, the scientific research society, 2014.
ODOC Princeton Senior Thesis Funding Award, 2013.
Princeton Class of 1984 Memorial Fund Fellowship, 2013.
The Fred Fox Fellowship, 2013.
"Art of Science" acceptee, Princeton (2013) and Stanford (2015) [image]
A+ with special faculty commendation: Graduate Statistical Mechanics (Torquato and Car, Fall 2013), Honor and Normative Ethics (Appiah, Fall 2011).
Princeton Class of 1930 full tuition grant, 2010 - 2014.
Sarasota Area Ivy League Scholarship, 2010 - 2014.
National AP Scholar, 2010.

Publications

W. Gilpin, V. N. Prakash, M. Prakash "Vortex arrays and ciliary tangles underlie the feeding-swimming tradeoff in starfish larvae" *accepted by Nature Physics, 2016*

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*, NAS, 2016. [pdf]
newsweek | science | daily mail | stanford homepage | ars technica | huffington post | national geographic | phys.org | yahoo | international business times | ifl

W. Gilpin, "PyPDB: A Python API for the Protein Data Bank." *Bioinformatics*, Oxford University Press, 2015. [pdf] [code]

W. Gilpin, S. Uppaluri, C. Brangwynne "Worms under pressure: bulk mechanical properties of *C. elegans* are independent of the cuticle" *Biophysical Journal*, Biophysical Society, 2015.

[pdf] [video]

K. Bayat, W. K. C. Sun, **W. Gilpin**, M. Farrokh Baroughi, M & Lončar. "Formation of Nitrogen vacancy center ensembles in Diamond Nanowires." *CLEO: Science and Innovations*, Optical Society of America, 2014. [pdf]

W. Gilpin "Engineering the Charge Occupancy of Nitrogen Vacancies in Diamond." NNIN REU Convocation, 2012. [pdf] [cover image]

Research

Stanford University, Prakash Lab. 2014–present: 1. Studying the fluid mechanics of marine organisms. 2. Mechanical characterization and modeling of collective cell behaviors in an epithelial sheet (2014).

Stanford University, Feldman Group. 2015–present: 1. Using bifurcation theory to model the sudden exclusion of Neanderthals by early modern humans. 2. Understanding chaotic cycles in ecosystem dynamics.

Meiji University (Tokyo), Visiting Scholar. October 2016: Development of reaction-diffusion models of human migration. Guest of Profs. Joe Yuichiro Wakano and Kenichi Aoki.

Stanford University, Spakowitz Group. Spring 2015 (rotation): Modeling epigenetic regulation as anomalous diffusion of polymers. [code]

Stanford University, Pande Lab. Winter 2015 (rotation) A renormalization group approach to modeling protein folding kinetics. [code]

Princeton University, Brangwynne Lab. 2011-2014 (junior+senior thesis): 1. Characterizing and modelling the mechanical properties of *C. elegans* using a novel microfluidic approach. 2. Development of a Fokker-Planck model for growth in a population of *C. elegans*

Harvard University, Lončar Group. Summers 2012, 2013 (NSF/NNIN REU): 1. Characterizing the electrical properties of diamond NV centers using an on-chip Hall probe. 2. Engineering the charge occupancy of nitrogen vacancies in diamond nanowires. 3. Design and characterization of a diamond MOSFET.

Princeton University, Callan Group. Spring 2013 (junior thesis): Using nonequilibrium thermodynamics to model computation in biological sensing networks. [thesis]

Mote Marine Laboratory, Kirkpatrick Group. Summer 2011 (NSF REU): Machine learning methods for optical discrimination of phytoplankton taxa.

Talks

2016 American Physical Society, Division of Fluid Dynamics Meeting: "Vortex arrays and ciliary tangles underlie the feeding-swimming tradeoff in starfish larvae"

2016 Meiji University (Tokyo): Mathematical biology seminar, invited by Prof. Joe Yuichiro Wakano and Prof. Kenichi Aoki.

2016 Tokyo University of Agriculture and Technology: "Dynamic vortex arrays and topological defects created by starfish larvae" Invited by Prof. Yoshiyuki Tagawa.

2013 Harvard REU Convocation: "Manipulating the charge state of nitrogen vacancy centers in diamond." [image]

2012 NNIN Convocation: "Controlling the charge occupancy of nitrogen vacancy centers in diamond" [video]

2012 Harvard REU Convocation: "Controlling the charge occupancy of nitrogen vacancy centers in diamond."

2011 Mote Laboratory REU Convocation: "Improving taxal resolution in the Optical Phytoplankton Discriminator"

Professional Employment

Khan Academy Content Specialist. Write and illustrate physics passages and questions for an AAMC/Khan Academy program to create free online MCAT preparation materials. Confer with professional educators and physicists in order to improve content and structure of passages and questions. July 2014, ongoing. [example passage]

Venice Theatre Technical Apprentice Program. A 3 Year (1,500 hour) Apprenticeship, nationally certified as a Stage Technician by the U. S. Department of Labor, Bureau of Apprenticeship and Training. Completed three professional technical courses certified by the Florida Department of Education. Travelled to Ontario, Canada for a one week work-study at the Stratford Shakespeare Festival. Worked as lighting director various theatre productions and student films at Princeton. Tools: DMX programming for robotic lights, ETC Console programming and patching, hardware support for standard ETC fixtures. March 2008 – April 2013.

Freelance digital illustration work. Produced illustrations for Khan Academy, Voices of Change, and various groups. Tools: Adobe Illustrator, Photoshop, InDesign, AutoCAD, HTML/CSS. [gallery]

Outreach

Peer review for *Bioinformatics*
Maintain a personal science blog with tutorials on home-built science projects like Tesla coils, 50,000 unique visitors. Summer 2010, ongoing. [url]
NanoDays science demonstrator and educator for Brangwynne Group (March 2012, 2013) and Harvard SEAS (June 2012, 2013). [url]
Princeton peer tutor. Meet weekly with students in introductory math, science, and Latin courses. 2010-2014

Interests

Fossil and mineral collecting since elementary school; currently catalogue of ∼8000 fossil shark teeth, 400 other fossils, and 200 unique rocks and fluorescent minerals. Former member of Tulsa Rock Mineral Society, Sarasota Area Rockhound club. [collection]
Hobby photography. Several photographs have been used as backgrounds in the Yahoo! Weather mobile app. Also appeared in *plain china* and the Nassau Literary Review. [images]
Five years of Latin, two in college, three in high school.
Certified HAM radio operator, call sign KJ4NLQ.

Contact

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wgilpin@[university in palo alto].edu

References

Professor Manu Prakash, Stanford University

Professor Cliff Brangwynne, Princeton University

Professor Marko Lončar, Harvard University