

Alexander P.P. Petroff
Raymond and Beverly Sackler Fellow
Laboratory of Experimental Condensed Matter Physics
Rockefeller University
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New York, New York
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degrees

B.A. Magna cum laude, Physics, Carleton College, Northfield, MN June 2006
B.A. Magna cum laude, Mathematics, Carleton College, Northfield, MN June 2006
Ph.D. Geophysics, Massachusetts Institute of Technology, Cambridge, MA June 2011

employment

Research scientist, Rockefeller University (current)
Visiting Assistant Professor of Biology, Bard College, 2016-current

other education

Microbial Diversity Summer School, Woods Hole Oceanographic Institution, Woods Hole, Ma
2009 (selected to present this work by the Moore Foundation at the ASM meeting 2010)
Summer Research Intern, Santa Fe Institute, June-August 2005

experience

Physiology Summer School Course Lecturer, Woods Hole Oceanographic Institution, 2016
Microbial Diversity Summer School Course Lecturer, Woods Hole Oceanographic Institution,
2014–2015
Teaching Assistant for Modeling Environmental Complexity, Massachusetts Institute of Tech-
nology, September-December 2008
Mathematics Tutor, Carleton College, 2004-2006

honors

Raymond and Beverly Sackler Fellow, Rockefeller University 2012-present
John C. Whitehead Presidential Fellow, Rockefeller University 2011-2012
Center for Studies in Physics and Biology Department Fellowship, Rockefeller University 2011-
2013
American Geophysical Union Outstanding Student Paper Award in Biogeoscience 2010
American Geophysical Union Outstanding Student Paper Award in Hydrology 2008
Department Student Teaching Award, Massachusetts Institute of Technology 2008
Linden Earth System Graduate Fellowship, Massachusetts Institute of Technology 2006-2007
Graduation with Distinction in Physics, Carleton College 2006
Dean's List, Carleton College 2006

press

Wogan, T., *Bacteria Stick Together as Living Crystals*
2015, Physics 8,35.

Petroff, A., *Radiolab, Super Cool*
2014, Radiolab Short.

Morrison, J., *Bacteria work together to gather food*
2014, PNAS First Look Blog.

Voss, D., *Eons of Diffusive Growth*
2013, Physics.

Smart, A., *Hidden order emerges in stream networks*
2013, Physics Today.

Chu, J., *A new 'branch' of math*
2012, MIT news.

Bosak, T and Petroff, A., *Photosynthesis on the early Earth*
2010, Science for the Public: Public Lecture Series.

Althausm J., *From Local to Global to Mars?!*
2010, The Nature Conservancy Florida Chapter News.

Bettex M., *Bacterial growths may offer clues about Earths distant past*
2010, MIT News Office. Published in: Astrobiology, Science Daily, Space Daily, Terra Daily, Red Orbit.

Unearthing the Flow
2009, Nature Geoscience.

Howard, A., *Forming Valleys From Below*
2009, Nature Geoscience.

thesis

Petroff, A.P., Streams, Stromatolites, and the Geometry of Growth.
<http://segovia.mit.edu/~petroffa/text/thesis.pdf>

papers

Petroff, AP, Pasulka, A, Soplop N, Wu, XL, & Libchaber, A, Biophysical basis for convergent evolution of two veil-forming microbes. *Royal Society Open Science* **2** 150437 (2015)

Petroff, AP, Wu, XL, & Libchaber, A, Fast-moving bacteria self organize into active two-dimensional crystals of rotating cells. *Physical Review Letters* **114** 158102 (2015)

Petroff, AP & Libchaber, A, Hydrodynamics and collective behavior of the tethered bacterium *Thiovulum majus*. *Proceedings of the National Academy of Sciences* E537 (2014)

Petroff, AP, Beukus, N, Rothman, DH, & Bosak, T. Biofilm growth and fossil form. *Physical Review X* **3** 041012 (2013)

Petroff, AP, Devauchelle, O, Seybold H, & Rothman DH, Bifurcation dynamics of natural drainage networks. *Philosophical Transactions of the Royal Society A* **371** 2004 (2013)

Bosak, T, Knoll, AH, & Petroff, AP, The Meaning of Stromatolites. *Annual Review of Earth and Planetary Sciences* **41** 21 (2013)

Sim, MS, Liang, B, Petroff, AP, Evans, A, Klepac-Ceraj, V, Flannery, D, Walter, MR, & Bosak, T, Oxygen-Dependent Morphogenesis of Modern Clumped Photosynthetic Mats and Implications for the Archean Stromatolite Record. *Geosciences* **2** 235 (2012)

Berhanu, M, Petroff, AP, Devauchelle, O, Kudrolli, A, & Rothman, DH, Shape and dynamics of seepage erosion in a horizontal granular bed. *Physical Review E* **86** 041304 (2012)

Devauchelle, O, Petroff, AP, Seybold H, & Rothman D.H., Ramification of Stream Networks. *Proceedings of the National Academy of Sciences* **109** 20832 (2012)

Petroff, AP, Devauchelle, O, Kudrolli A, & Rothman DH, Four bagatelles on channel growth. *Comptes Rendus Geoscience* **344** 33 (2012)

Petroff, AP, Wu, TD, Liang, B, Mui, J, Guerquin-Kern, JL, Vali, H, Rothman, DH, & Bosak, T, Reaction-diffusion model of nutrient uptake in a biofilm: Theory and experiment. *Journal of Theoretical Biology* **289**, 90 (2011).

Petroff, AP, Devauchelle, O, Abrams, DM, Lobkovsky, A, Kudrolli, A. & Rothman, DH Geometry of valley growth. *Journal of Fluid Mechanics*. **273**, 245 (2011)

Devauchelle, O, Petroff, AP, Lobkovsky, A & Rothman, DH, Longitudinal profile of channels cut by springs. *Journal of Fluid Mechanics*, **667**, 28 (2011)

Petroff, AP, Sim, MS, Maslov, A, Krupenin, M, Rothman, DH, & Bosak, T, Biophysical basis for the geometry of conical stromatolites. *Proceedings of the National Academy of Sciences*, **107**, 9956 (2010)

Bosak, T, Bush JWM, Flynn MR, Liang, B, Ono, S, Petroff, AP, & Sim, MS, Formation and stability of oxygen-rich bubbles that shape photosynthetic mats. *Geobiology*, **8**, 45–55 (2010).

Bosak, T, Liang, B, Sim, M & Petroff, AP, Morphological record of oxygenic photosynthesis in conical stromatolites. *Proceedings of the National Academy of Sciences* **106**, 10939 (2009)

Abrams, DM, Lobkovsky, A, Petroff, AP, Straub, K, McElroy, B, Mohrig, D, Kudrolli, A, & Rothman, D.H. Growth laws for channel networks incised by groundwater flow. *Nature Geoscience*, **28**, 193-196 (2009)

Koontz, T, Petroff, AP, West, G, & Brown, J, Scaling relations for a functionally two-dimensional plant: *Chamaesyce setiloba* (Euphorbiaceae). *American Journal of Botany*, **96**, 877 (2009)

Mewes, M & Petroff, AP, Cavity tests of parity-odd Lorentz violations in electrodynamics. *Phys. Rev. D*, **75**, 056002 (2007).