Benjamin Paul Bratton
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Education and work experience:

Nov 2011 – present: Postdoctoral research associate, Princeton University, Princeton, NJ
Mentors: Joshua W. Shaevitz and Zemer Gitai

Aug 2006 – Oct 2011: Ph.D. in Chemistry, University of Wisconsin – Madison, Madison, WI
Advisor: Professor James C. Weisshaar

Aug 2003 – Aug 2006: B.S. in Chemistry, Minor in Mathematics, Wheaton College, Wheaton, IL
Undergraduate research with Dr. Greta Bryson and ACS Certification in Biochemistry

Honors, Awards, and Affiliations:

2019	Outstanding Postdoc Award, Princeton University, Department of Molecular Biology
2019	Artwork selected as part of "States of Health: Visualizing Illness and Healing", Princeton University Art Museum
2018	Finalist, Art of Science, 62nd Annual Biophysical Society.
2012 - 2013	Quantitative and computational biology training fellowship award, P50- GM071508
2011	Charles & Martha Casey Excellence in Research Award. UW-Madison
2007 - 2009	Molecular biophysics training fellowship award, T32-GM08293
2006	Paul M. Wright Award for Excellence in Physical and Analytical Chemistry, Wheaton College
2003 - 2006	President's Scholarship, Wheaton College
2018 - Present	Member, North Atlantic Microscopy Society
2017 - Present	Member, American Physical Society
2011 - Present	Member, American Postdoc Association
2011 - Present	Member, American Society for Microbiology
2006 - Present	Member, American Scientific Affiliation
2006 - Present	Member, Biophysical Society
2004 - Present	Member, American Chemical Society

Publications (* denotes equal contribution, § denotes undergraduate co-author):

Publications from postdoc work

1. Martin, J.K.*, Sheehan, J.P.*, **Bratton, B.P.*,** Moore, G.M., Mateus, A., Li, S.H., Kim, H., Rabinowitz, J.D., Typas, A., Savitski, M.M., Wilson, M.Z., Gitai, Z. 2020. A dual-mechanism antibiotic kills Gram-negative bacteria and avoids drug resistance. ***Cell***. 10.1016/j.cell.2020.05.005
2. Taylor, J.A., **Bratton, B.P.,** Sichel, S.R., Blair, K.M., Jacobs, H.M., DeMeester, K.E., Kuru, E., Gray, J., Biboy, J.S., VanNieuwenhze, M.S., Vollmer, W., Grimes, C.L., Shaevitz, J.W., Salama, N.R. 2020. Distinct cytoskeletal proteins define zones of enhanced cell wall synthesis in *Helicobacter pylori*. ***eLife.*** 10.7554/eLife.52482
3. **Bratton, B.P.,** Barton, B., Morgenstein, R.M. 2019. Three-dimensional imaging of bacterial cells for accurate cellular representations and precise protein localization. ***Journal of Visualized Experiments***. 10.3791/60350.
4. Sanfilippo, J.E., Lorestani, A., Koch, M.D., **Bratton, B.P.**, Siryaporn, A., Stone, H.A., Gitai, Z. 2019.

Microfluidic-based transcriptomics reveal force-independent bacterial rheosensing. ***Nature Microbiology***. 10.1038/s41564-019-0455-0

5. **Bratton, B.P.,** Shaevitz, J.W., Gitai, Z. Morgenstein, R.M., 2018. MreB polymers and curvature localization are enhanced by RodZ and predict E. coli's cylindrical uniformity. ***Nature Communications***. 10.1038/s41467-018-05186-5
6. Guzzo, M., Murray, S.M., Martineau, E., Lhospice, S., Baronian, G. My, L., Zhang, Y., Espinosa, L., Vincentelli, R., **Bratton, B.P.,** Shaevitz, J.W., Molle, V., Howard, M., Mignot, T. 2018. A gated relaxation oscillator controls morphogenetic movements in bacteria. ***Nature Microbiology.*** 10.1101/137695
7. Shi, H.*, **Bratton, B.P.*,** Gitai, Z., Huang, K.C. 2018. How to build a bacterial cell: MreB as the foreman of *E. coli* construction. ***Cell***. 10.1016/j.cell.2018.02.050
8. Liu, G.S§. **Bratton, B.P.,** Gitai, Z. Shaevitz, J.W. 2017. The effect of antibiotics on protein diffusion in the *Escherichia coli* cytoplasmic membrane. ***PLoS ONE***. 10.1371/journal.pone.0185810
9. Bartlett, T.M., **Bratton, B.P.,** Duvshani, A., Miguel, A., Sheng, Y., Martin, N.R., Nguyen, J.P., Persat, A., Desmarais, S.M., VanNieuwenhze, M.S., Huang, K.C., Zhu, J., Shaevitz, J.W., Gitai. Z. 2017. A quorum-regulated periplasmic polymer determines *Vibrio cholerae* cell shape. ***Cell.*** 10.1016/j.cell.2016.12.019
10. Ouzounov, N. Nguyen, J.P., **Bratton, B.P.,** Jacobowitz, D.J§. Gitai, Z., Shaevitz, J.W. 2016. MreB Orientation Correlates with Cell Diameter in *Escherichia coli*. ***Biophysical Journal***. 10.1016/j.bpj.2016.07.017
11. Morgenstein, R.M., **Bratton, B.P.,** Nguyen, J.P., Ouzounov, N., Shaevitz, J.W., Gitai, Z. 2015. RodZ links MreB to cell wall synthesis to mediate MreB rotation and robust morphogenesis. ***Proceedings of the National Academy of Sciences.*** 10.1073/pnas.1509610112
12. **Bratton, B.P.,** Shaevitz, J.W. 2015. Simple empirical method for measuring apparent focal shift in a microscope system. ***PLoS ONE***. 10.1371/journal.pone.0134616

Publications from graduate work

13. Gaal, T., **Bratton, B.P.,** Sanchez-Vazquez, P., Sliwicki, A., Sliwicki, K., Vegel, A., Pannu, R., Gourse, R.L. 2016. Co-localization of distant chromosome loci in space in *E. coli*: A bacterial nucleolus. ***Genes and Development***. 10.1101/gad.290312.116
14. Bakshi, S., Choi, H., Rangarajan, N., Barns, K.J., **Bratton, B.P.,** Weisshaar, J.C. 2014. Non-perturbative fluorescence imaging of nucleoid morphology in live bacterial cells. ***Applied and Environmental Microbiology.*** 10.1128/AEM.00989-14
15. Bakshi, S., **Bratton, B.P.,** Weisshaar, J.C. 2011. Sub-diffraction-limit study of Kaede diffusion and spatial distribution in the cytoplasm of live *E. coli* cells. ***Biophysical Journal.*** 10.1016/j.bpj.2011.10.013
16. **Bratton, B.P.,** Mooney, R.A., Weisshaar, J.C. 2011. Spatial distribution and diffusive motion of RNA polymerase in live *Escherichia coli*. ***Journal of Bacteriology***. 10.1128/JB.00198-11
17. Mondal, J.*, **Bratton, B.P.*,** Li, Y., Yethiraj, A., Weisshaar, J.C. 2011. Entropy-based mechanism of ribosome-nucleoid segregation in *E. coli* cells. ***Biophysical Journal***. 10.1016/j.bpj.2011.04.030
18. Konopka M.C., Sochacki K.A., **Bratton B.P.,** Shkel I.A., Record M.T., Weisshaar J.C. 2009. Cytoplasmic protein mobility in osmotically stressed *Escherichia coli*. ***Journal of Bacteriology***. 10.1128/JB.00536-08

Pre-prints and working drafts

19. **Bratton, B.P.,** Morgenstein, R.M., Shaevitz, J.W., Gitai, Z. MreB localizes based on geometric cues to pattern uniform rod-like growth in bacteria. *In preparation*
20. Pratt, S.E., **Bratton, B.P.,** Hinrichsen, M., Shaevitz, J.W., Reagan, L.J., Mochrie, S.G.J. Elucidation of

binding kinetics of a TRAP-peptide pair for live-cell imaging through FRAP. *In preparation*

21. **Bratton, B.P.,** Morgenstein, R.M., Gitai, Z., Shaevitz, J.W. SPACECRAFT: from plants to bacteria, a quantitative method to compare cell shapes. *In preparation*
22. Islam, S.T., Belgrave, A.M., Fleuchot, B., Jolivet, N.Y., My, L., Faure, L.M., Sharma, G., Lemon, D.J., Fiche, J., **Bratton, B.P.,** Singer, M., Garza, A.G., Shaevitz, J.W., Mignot, T. Integrin-Like Tethering of Motility Complexes at Bacterial Focal Adhesions. *In preparation*
23. Martin, N.R., Blackman, E.S., **Bratton, B.P.,** Bartlett, T.M., Gitai, Z. The evolution of bacterial shape complexity by a curvature-inducing module. *2020 bioRxiv* 10.1101/2020.02.20.954503
24. Scheffler, R.J., Sugimoto, Y., **Bratton, B.P.,** Ellison, C.K., Koch, M.D., Donia, M.S., Gitai, Z. *Psuedomonas aeruginosa* detachment from surfaces via a self-made small molecule. *In preparation*.

Peer-reviewed teaching activities

1. **Bratton, B.P.** 2018 "Introduction to strings and DNA/protein sequence alignments." https://serc.carleton.edu/teaching_computation/workshop_2018/activities/211068.html
   Exemplary: *Teaching Computation in the Sciences Using MATLAB Teaching Collection.*
2. **Bratton, B.P.** 2016 **"**Using MATLAB to understand distributions: Pokémon GO." https://serc.carleton.edu/matlab_computation2016/activities/159836.html
   Exemplary: *Teaching Computation in the Sciences Using MATLAB Teaching Collection.*
   Positive reviews. *On the Cutting Edge Reviewed Teaching Collection*

Book chapters

1. Nguyen, J.P., **Bratton, B.P.,** Shaevitz, J.W. 2016. Methods in Molecular Biology: Bacterial Cell Wall Homeostasis. Biophysical Measurements of Bacterial Cell Shape

Software

1. **Bratton, B.P.,** Nguyen, J.P., Shaevitz, J.W. 3D cell shape reconstruction software. Latest version available at https://github.com/PrincetonUniversity/shae-cellshape-public and archived at DOI:10.5281/zenodo.1248978.
2. **Bratton, B.P.,** Bartlett, T.M., Gitai, Z., Shaevitz, J.W. Quantitative Analysis of Sacculus Architectural Remodeling (QuASAR). Latest version available at https://github.com/PrincetonUniversity/quasar and archived at DOI: 10.5281/zenodo.1248974.

Presentations:

2020 64th Biophysical Society Annual Meeting
2019 (Oral presentation) APS March Meeting 2019
2019 (Oral presentation) 63rd Biophysical Society Annual Meeting
2018 (Oral presentation) APS March Meeting 2018
2018 62nd Biophysical Society Annual Meeting
2017 (Oral presentation) 11th Annual q-bio Conference
2017 (Oral presentation) APS March Meeting 2017
2016 60th Biophysical Society Annual Meeting
2015 2015 ASM Conference on Prokaryotic Cell Biology and Development
2015 59th Biophysical Society Annual Meeting
2014 2014 Molecular Genetics of Bacteria and Phages Meeting
2013 Zing Conference on Bacterial Cell Biology
2011 55th Biophysical Society Annual Meeting.
2010 (Oral presentation) Midwest Single Molecule Workshop
2009 53rd Biophysical Society Annual Meeting.

2009	(Oral presentation) 2009 Molecular Genetics of Bacteria and Phages Meeting
2008	52nd Biophysical Society Annual Meeting.
2007	2007 Molecular Genetics of Bacteria and Phages Meeting.
2005	(Oral presentation) Argonne Undergraduate Research Symposium
2005	Wheaton College Homecoming Summer Research Poster Session

Mentoring and Teaching:

Courses taught

Spring 2020	Lecturer/Preceptor, ISC/CHM/MOL/PHY/COS 233 & 234 An Integrated, Quantitative Introduction to the Natural Sciences II, Princeton University
Fall 2019	Lecturer/Preceptor, ISC/CHM/MOL/PHY/COS 231 & 232 An Integrated, Quantitative Introduction to the Natural Sciences I, Princeton University
Summer 2019	Assistant instructor, Physics of Life Summer School, Princeton University
Spring 2019	Lecturer/Preceptor, ISC/CHM/MOL/PHY/COS 233 & 234 An Integrated, Quantitative Introduction to the Natural Sciences II, Princeton University
Fall 2018	Lecturer/Preceptor, ISC/CHM/MOL/PHY/COS 231 & 232 An Integrated, Quantitative Introduction to the Natural Sciences I, Princeton University
Summer 2018	Assistant instructor, Physics of Life Summer School, Princeton University
Spring 2018	Lecturer/Preceptor, ISC/CHM/MOL/PHY/COS 233 & 234 An Integrated, Quantitative Introduction to the Natural Sciences II, Princeton University
Fall 2017	Lecturer/Preceptor, ISC/CHM/MOL/PHY/COS 231 & 232 An Integrated, Quantitative Introduction to the Natural Sciences I, Princeton University
Fall 2016	Instructor, MolBio Junior Independent Tutorial, Princeton University
Fall 2015	Instructor, MolBio Junior Independent Tutorial, Princeton University
Summer 2015	Assistant instructor, Biomath Bootcamp, Princeton University
Summer 2014	Assistant instructor, Biomath Bootcamp, Princeton University
Summer 2013	Assistant instructor, Biomath Bootcamp, Princeton University
Summer 2012	Assistant instructor, Biomath Bootcamp, Princeton University
Fall 2007	Teaching assistant, CHEM 665, Biophysical Chemistry, UW-Madison
Fall 2006	Teaching assistant, CHEM 109, General and Analytical Chemistry I, UW-Madison
Spring 2006	Teaching assistant, CHEM 372, Physical Chemistry II, Wheaton College
Spring 2006	Teaching assistant, CHEM 461, Biochemistry, Wheaton College
Fall 2005	Teaching assistant, CHEM 371, Physical Chemistry I, Wheaton College
Fall 2004	Teaching assistant, CHEM 236, Honors General Chemistry, Wheaton College

Mentoring experience

2012 – present	Mentor of 11 PhD students (8 MOL, 2 PHY, 1 QCB), Princeton University
2012 – present	Mentor of 3 junior postdocs (1 MOL, 1 MOL/LSI, 1 LSI), Princeton University
2018	Discussion group leader for MolBio SURP program, Princeton University.
2017	Discussion group leader for MolBio SURP program, Princeton University.
2013 - 2017	Mentor of 4 undergraduate researchers (3 PHY, 1 MOL), Princeton University
2016	Mentor of visiting PhD student (Micro), Princeton University
2016	Mentor of summer REU student (Biophysics), Princeton University
2006 – 2011	Mentor of three junior PhD students (2 ACHEM, 1 PCHEM), UW-Madison
2008	Mentor of summer REU student (CHEM), UW-Madison
2005 - 2006	Mentor of undergraduate researcher (CHEM), Wheaton College

Workshops and training

2018	Participant in the "Teaching Computation in the Sciences Using MATLAB" Workshop, Science Education Resource Center, Carleton College.
2017	Invited webinar presenter for "Developing Computational Skills in the Sciences with MATLAB", hosted by the Science Education Resource Center, Carleton College. http://serc.carleton.edu/teaching_computation/webinar/index.html
2016	Participant in the "Teaching Computation in the Sciences Using MATLAB" Workshop, Science Education Resource Center, Carleton College.
2008	Delta Mentoring Workshop, UW-Madison

Service and Outreach:

2017 - Present	Member of Molecular Biology Outreach Program (GMOP)
2016 - Present	Founding member, Princeton MATLAB users group
2017	Co-hosted a "Reddit Science: Ask Me Anything" about *Vibrio cholerae* cell shape. https://www.reddit.com/r/science/comments/5oamu3/.
2017	"Getting a Spark out of Phantastic Physics", Littlebrook Elementary School ScienceExpo
2017, 2018	"Building beautiful bacterial". Guest speaker at Wilberforce Upper School, West Windsor, NJ
2017	"Beautiful bacteria: microbial shapes and their significance to pathogenesis". Guest speaker at Windrows Retirement Community Science Club, Princeton, NJ
2015	"Keep on Spinning", Littlebrook Elementary School ScienceExpo
2008 – 2011	Safety Committee, UW-Madison Department of Chemistry
2010 – 2011	Webmaster, Younger Chemists Committee, Wisconsin Local Section, American Chemical Society
2007 – 2010	Library Committee, UW-Madison Department of Chemistry
2008 – 2009	Organizing Committee Chair, McElvain Student Invited Seminar Series, Chemistry Department, UW-Madison
2005 – 2006	Founding member, Student Affiliates Chapter of the American Chemical Society, Wheaton College

Find me online at

https://www.researchgate.net/profile/Benjamin_Bratton
https://www.linkedin.com/pub/benjamin-bratton/b9/182/954
http://scholar.princeton.edu/bratton