

# BRIAN PATRICK ENGLISH



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## EDUCATION

<b>PhD</b>	<b>Harvard University</b>	11/2007	<i>Single Molecule Studies of Enzymatic Dynamic Fluctuations</i> Advisor: <b>Xiaoliang Sunney Xie</b>
<b>MA</b>	<b>Harvard University</b>	11/2003	Chemistry and Chemical Biology
<b>BA</b>	<b>Cornell University</b>	01/2001	<b>Bachelor of Arts with Distinction in all Fields</b>

## PROFESSIONAL EXPERIENCE

<b>Howard Hughes Medical Institute</b> Janelia Research Campus Ashburn VA	<b>Senior Scientist</b> Research Scientist (01/2015 – 12/2015) Research Specialist (01/2013 – 12/2014)	01/2013– Present
<b>Albert Einstein College of Medicine</b> Bronx NY	<b>Postdoctoral Fellow</b> Anatomy and Structural Biology	09/2010 – 12/2012
<b>Uppsala University</b> Uppsala Sweden	<b>Postdoctoral Fellow</b> Cell and Molecular Biology	09/2007 – 08/2010
<b>Harvard University</b> Cambridge MA	<b>Graduate Research Fellow</b> Chemistry and Chemical Biology	09/2001 – 08/2007
<b>Cornell University</b> Ithaca NY	<b>Research Technician</b> Laboratory of Harold A. Scheraga	01/2001 – 08/2001
<b>Cornell University</b> Ithaca NY	<b>Undergraduate Research Fellow</b> Chemistry and Chemical Biology	09/1997 – 12/2000

## HONORS

<b>2015 AAAS Newcomb Cleveland Prize</b> ( <i>Lattice light-sheet microscopy</i> )	02/2016
<b>Postdoctoral Representative to the Einstein Senate</b>	10/2010 – 12/2012
<b>Young Researcher Participant of the 59th Meeting of Nobel Laureates in Lindau</b>	06/2009
<b>Student-nominated Fieser Speaker</b> Harvard Chemistry and Chemical Biology	04/2007
<b>Eli Lilly Poster Presentation Award</b> 19th Annual Symposium of the Protein Society	08/2005
<b>George C. Caldwell Prize</b> Cornell Chemistry and Chemical Biology	10/2001
<b>Phi Beta Kappa Honors Society</b>	05/2001
<b>2000 Undergraduate Award in Analytical Chemistry</b> American Chemical Society	10/2000

## COMPLETED RESEARCH SUPPORT

Estonian Science Foundation ( <b>ETF</b> )	<b>PUT37</b> (co-applicant, PI: Vasili Haurlyliuk) <i>ppGpp-mediated activation of RSH proteins: from the mechanism of allosteric regulation to computational properties of the stringent response system</i>	01/2013 – 12/2015
Human Frontier Science Program ( <b>HFSP</b> )	<b>Cross Disciplinary Fellow</b> (LT00829/2008, PI: Brian English) <i>Transcription factor dynamics in living bacterial cells at the single cell level</i>	06/2008 – 08/2011
Swedish Research Council ( <b>VR</b> )	<b>International Postdoctoral Fellowship</b> (623-2007-8116, PI: Brian English) <i>The Dynamics of Gene Regulation – The Study of Individual Transcription Factor Molecules in Living Cells</i>	01/2008 – 05/2008
National Institutes of Health ( <b>NIH</b> )	<b>Molecular, Cellular and Chemical Biology Training Grant</b> (5 T32 GM07598) Graduate Research Training Fellowship – Harvard University	01/2002 – 08/2005

## PUBLICATIONS

 MY GOOGLE SCHOLAR PROFILE:

- 30.** A Ranjan *et al.* Live-cell single particle imaging reveals the role of RNA polymerase II in histone H2A.Z eviction. *eLife*. doi: [10.7554/eLife.55667](https://doi.org/10.7554/eLife.55667) (2020)
- 29.** L Xie, P Dong *et al.* 3D ATAC-PALM: Super-resolution Imaging of the Accessible Genome. *Nature Methods* **17**, 430-436 (2020)
- 28.** A Ranjan *et al.* Live-cell single particle imaging reveals the role of RNA polymerase II in histone H2A.Z eviction. *bioRxiv*. doi: [10.1101/2020.02.13.947119](https://doi.org/10.1101/2020.02.13.947119) (2020)
- 27.** L Xie, P Dong *et al.* Super-resolution Imaging Reveals 3D Structure and Organizing Mechanism of Accessible Chromatin. *bioRxiv*. doi: [10.1101/678649](https://doi.org/10.1101/678649) (2019)

26. JB Grimm, TA Brown, [BP English et al.](#) Synthesis of Janelia Fluor HaloTag and SNAP-tag ligands and their use in cellular imaging experiments. In: Erfle H. (eds) **Super-Resolution Microscopy**. *Methods in Molecular Biology*, Vol. 1663, Humana Press, New York, NY; doi: [10.1007/978-1-4939-7265-4\\_15](https://doi.org/10.1007/978-1-4939-7265-4_15) (2017)
25. JB Grimm\*, [BP English\\* et al.](#) Bright photoactivatable fluorophores for single-molecule imaging. **Nature Methods** 13(12), 985-988 (2016)
24. YJ Yoon, B Wu *et al.* Glutamate-induced RNA localization and translation in neurons. **PNAS** 113(44), E6877-86 (2016) ([open access](#))
23. Z Zhang, [BP English et al.](#) Rapid Dynamics of General Transcription Factor TFIIIB Binding During Preinitiation Complex Assembly Revealed by Single-Molecule Analysis. **Genes and Development** 30, 2106-2118 (2016) ([open access](#))
22. LD Lavis\*, JB Grimm, [BP English et al.](#) Bright photoactivatable fluorophores for single-molecule imaging. **bioRxiv**. doi:[10.1101/066779](https://doi.org/10.1101/066779) (2016)
21. PW Tillberg, F Chen *et al.* Expansion Microscopy of Biological Specimens with Protein Retention. **Nature Biotechnology** 34, 987-992 (2016) ([cover art](#))
20. T Morisaki *et al.* Real-time quantification of single RNA translation dynamics in living cells. **Science** 352(6292), 1425-1429 (2016) ([F1000Prime](#))
19. WK Cho, N Jayanth, [BP English et al.](#) RNA Polymerase II cluster dynamics predict mRNA output in living cells. **eLife** 2016;10.7554/eLife.13617 (2016) ([open access](#))
18. ZB Katz\*, [BP English\\* et al.](#) Mapping translation 'hot-spots' in live cells by tracking single molecules of mRNA and ribosomes. **eLife** 2016;5:e10415 (2016) ([open access](#), [F1000Prime](#))
17. [BP English](#), RH Singer. Tracking multiple single molecules in living cells. **SPIE Newsroom**. doi: 10.1117/2.1201509.006125 (November 2, 2015) ([pdf](#))
16. [BP English\\*](#), RH Singer. A three-camera imaging microscope for high-speed single-molecule tracking and super-resolution imaging in living cells. **Proc. SPIE 9550, Biosensing and Nanomedicine VIII**, 955008 ([invited paper](#)); doi:10.1117/12.2190246 (2015) ([PMC article](#))
15. N Monnier *et al.* Inferring transient particle transport dynamics in live cells. **Nature Methods** 12(9), 838-840 (2015) ([PMC article](#))
14. S Viswanathan *et al.* High-performance probes for light and electron microscopy. **Nature Methods** 12(6), 568-576 (2015) ([PMC article](#), [F1000Prime](#))
13. JB Grimm, [BP English et al.](#) A general method to improve fluorophores for live-cell and single-molecule microscopy. **Nature Methods** 12(3), 244 - 250 (2015) ([PMC article](#), featured in: [1](#), [cover art](#))
12. H Jiang\*, [BP English\\* et al.](#) Tracking surface glycans on live cancer cells with single molecule sensitivity. **Angewandte Chemie International Edition** 54(6), 1765-1769 (2015) ([PMC article](#), [C&EN News](#))
11. BC Chen, WR Legant, K Wang *et al.* Lattice Light Sheet Microscopy: Imaging Molecules to Embryos at High Spatiotemporal Resolution. **Science** 346(6208), 1257998 (2014) ([PMC article](#), [F1000Prime](#), [cover art](#))
10. KD Piatkevich, [BP English et al.](#) Photoswitchable Red Fluorescent Protein with a Large Stokes Shift. **Chemistry & Biology** 21, 1402-1414 (2014) ([open access](#))
9. V Shyp *et al.* Positive allosteric feedback regulation of the stringent response enzyme RelA by its product. **EMBO Reports** 13, 835-839 (2012) ([open access](#), featured in: [1](#))
8. A Kuzemenko\*, S Tankov\*, [BP English\\* et al.](#) Single molecule tracking fluorescence microscopy in mitochondria reveals highly dynamic but confined movement of Tom40. **Scientific Reports** 1, 195; doi:10.1038/srep00195 (2011) ([open access](#), [SGD curated paper](#))
7. [BP English et al.](#) Single Molecule Investigations of the Stringent Response Machinery in Living Bacterial Cells. **PNAS** 108(31), E365-373 (2011) ([open access](#), [F1000Prime](#), featured in: [1](#), [2](#), [3](#), [4](#))
6. [BP English\\*](#), A Sanamrad\* *et al.* Tracking of individual freely diffusing fluorescent protein molecules in the bacterial cytoplasm. **arXiv 1003.2110v1** [q-bio.QM] (2010)
5. [BP English et al.](#) Ever-fluctuating single enzyme molecules: Michaelis-Menten equation revisited. **Nature Chemical Biology** 2, 87-94 (2006) ([F1000Prime](#), featured in: [1](#), [2](#), [3](#), [cover art](#))
4. W Min *et al.* When Does the Michaelis-Menten Equation Hold for Fluctuating Enzymes? **Journal of Physical Chemistry B** 110, 20093-20097 (2006)
3. SC Kou *et al.* Single-Molecule Michaelis-Menten Equations. **Journal of Physical Chemistry B** 109, 19068-19081 (2005) ([cover art](#))
2. W Min, [BP English et al.](#) Fluctuating Enzymes: Lessons from Single-Molecule Studies. **Accounts of Chemical Research** 38, 923-931 (2005)
1. [BP English et al.](#) Development of a Novel Method To Populate Native Disulfide-Bonded Intermediates for Structural Characterization of Proteins: Implications for the Mechanism of Oxidative Folding of RNase A. **Journal of the American Chemical Society** 124, 4995-4999 (2002)

## RESEARCH INTERESTS

My aim at Janelia is to develop quantitative single cell and multi-color single molecule tracking assays with high spatial and temporal resolution to study when and where molecules are interacting inside living cells and where enzymes are active. At Harvard I developed turnover assays to study activity fluctuations of individual enzyme molecules *in vitro*. The microscope at Uppsala facilitated the *in vivo* tracking of even fast freely diffusing protein molecules. At Einstein we extended this approach to mapping translation by simultaneous tracking thousands of mRNA and ribosome molecules.

## AD HOC REVIEWER

*Biomicrofluidics*   *Biophysical Journal*   *J of Nanobiotechnology*   *Philosophical Transactions B*   *Protein Expression and Purification*   *Scientific Reports*

## TEACHING FELLOW AT HARVARD CHEMISTRY

*Honors Introductory Chemistry*   *Principles of Chemistry*   *Frontiers in Molecular Biophysics*

## INVITED SEMINARS

<b>UT Southwestern &amp; Systems Biology Seminar Series</b>	<i>Multiplexed Single-molecule Live-cell Imaging Reveals the Dynamic Nature of Complex Biological Reactions</i>	11/2017
<b>Massachusetts Institute of Technology Biophysics Seminar</b>	<i>Insights into translation by simultaneous single particle tracking of ribosomes and mRNAs</i>	11/2013
<b>Umeå University International Seminar Series</b>	<i>Insights into mRNA translation by simultaneous tracking of ribosomes and mRNAs, and by imaging of cytoskeletal structures in live cells</i>	10/2013
<b>Duke University Joint Biology and Chemistry Seminar</b>	<i>Mechanistic insights from single molecule tracking of individual enzymes, ribosomes and mRNAs in bacteria and mammalian cells</i>	04/2013
<b>University of Tartu Biomedical Technology Seminar</b>	<i>Simultaneous single molecule tracking of <math>\beta</math>-actin mRNA and the ribosome</i>	11/2012
<b>University of Munich (LMU) Gene Center Seminar</b>	<i>Single molecule investigations into <math>\beta</math>-actin mRNA localization and compartmentalization</i>	10/2012
<b>University of Munich (LMU) Invited SFB 594 Seminar</b>	<i>Live-cell imaging and single molecule tracking in bacteria and mammalian cells with laser feedback interference and fluorescence microscopy</i>	11/2011
<b>Delft University Applied Physics Seminar</b>	<i>Stringent Response – From the Test-Tube to Living Cell</i>	04/2009
<b>University of Tartu Biomedical Technology Seminar</b>	<i>A Single Molecule Approach to Enzymology – From the Test-Tube to Living Bacterial Cells</i>	12/2008
<b>Harvard University Student-nominated Fieser Lecture</b>	<i>Fluctuating Single Molecules – Zooming in on Enzyme Kinetics</i>	04/2007
<b>Georgia Institute of Technology Molecular Biophysics Seminar</b>	<i>Fluctuating Single Enzyme Molecules</i>	04/2007
<b>Dickinson College Invited Physics Colloquium</b>	<i>Biophysics of Single Molecules – Zooming in on Enzyme Kinetics</i>	10/2006

## SELECTED CONFERENCE LECTURES

<b>4D-Nucleome Annual Meeting</b> North Bethesda	<i>Imaging of Multiple Single-Molecules Reveals the Dynamic Nature of Complex Biological Reactions</i>	09/2017
<b>10th Berlin Summer Meeting</b> Berlin	<i>Simultaneous Live-Cell Imaging of Multiple Single-Molecules Reveals the Dynamic Nature of Complex Biological Reactions</i>	06/2017
<b>60th Annual Meeting of the Biophysical Society</b> Los Angeles	<i>Simultaneous High-Speed Tracking of Multiple Single-Molecules Reveals Functional Interactions in Living Cells (<a href="#">abstract</a>)</i>	02/2016
<b>SPIE Optics + Photonics</b> San Diego	<i>A three-camera imaging microscope for high-speed single-molecule tracking and super-resolution imaging in living cells (<a href="#">invited talk</a>)</i>	08/2015
<b>8th Berlin Summer Meeting</b> Berlin	<i>Insights into translation by co-movement analysis of ribosomes and mRNAs</i>	06/2015
<b>EMBO   EMBL Symposium: Seeing is Believing 2013</b> Heidelberg	<i>Insights into mRNA compartmentalization and translation by simultaneous single particle tracking of ribosomes and mRNAs, and by super-resolution imaging of cytoskeletal structures in live cells (<a href="#">meeting booklet</a>)</i>	10/2013
<b>Focus on Microscopy 2011</b> Konstanz	<i>Live-cell imaging of invadopodia formation with simultaneous phase-shifted laser feedback interference and fluorescence microscopy (<a href="#">abstract</a>)</i>	04/2011
<b>9th HFSP Meeting and 20th Anniversary Celebration</b> Tokyo	<i>Single Molecule Approach to Stringent Response in Individual Living Bacterial Cells</i>	06/2009
<b>232nd American Chemical Society Meeting</b> San Francisco	<i>Ever-fluctuating single enzyme molecules: Michaelis-Menten equation revisited (<a href="#">abstract</a>)</i>	09/2006
<b>40th IUPAC World Chemistry Congress</b> Beijing	<i>From Single Molecule Enzymology to Imaging Gene Expression in Live Cells, One Molecule at a Time</i>	08/2005

**SELECTED CONFERENCE PRESENTATIONS**

<b>EMBO   EMBL Symposium: Seeing is Believing 2019</b> Heidelberg	<i>Initiation of cap-dependent translation monitored by fluorescence auto- and cross-correlation spectroscopy and single particle tracking in living cells</i>	10/2019
<b>Focus on Microscopy 2015</b> Göttingen	<i>A three-camera imaging setup and novel cell-permeable dyes for multiplexed single-molecule live cell experiments (<a href="#">abstract</a>)</i>	04/2015
<b>Focus on Microscopy 2011</b> Konstanz	<i>Single Molecule Investigations of the Stringent Response Machinery in Living Bacterial Cells (<a href="#">abstract</a>)</i>	04/2011
<b>4th Mechanobiology Workshop - Biophysical Society</b> Singapore	<i>Imaging Adhesions with Phase-Shifted Laser Feedback Interference Microscopy</i>	11/2010
<b>54th Biophysical Society Meeting</b> San Francisco	<i>Single Molecule Tracking Inside Individual Living Bacterial Cells (<a href="#">abstract</a>)</i>	02/2010
<b>9th International Conference on Systems Biology</b> Gothenburg	<i>A Single Molecule Approach to Stringent Response in Individual Living Bacterial Cells</i>	08/2008
<b>19th Symposium of the Protein Society</b> Boston	<i>A Michaelis-Menten Study of Individual Beta-Galactosidases</i>	07/2005
<b>228th American Chemical Society Meeting</b> Philadelphia	<i>Enzymatic dynamics of individual Beta-Galactosidases (<a href="#">abstract</a>)</i>	08/2004

**PROCEDURAL EXPERTISE**

Development of biophysical assays, data analysis routines, and simulation algorithms. Live cell multi-color super-resolution imaging and single-molecule tracking.

- **microscopy** – design and construction of custom microscopes for single-particle tracking, PALM and STORM super resolution imaging, and light-sheet illumination with code written in Labview (hardware timing) and micro-manager. Construction of a diSPIM microscope. Operation and alignment of the multifocus microscope (MFM). PALM-imaging in combination with expansion microscopy. Phase-shifted laser feedback interference microscopy. Hosting of two commercial STED and STED-FCS microscopes for extended demonstrations for which I was responsible for the independent operation of the instruments, as well as for preparing suitable sample preparations for the entire Janelia community.
- **data analysis** – development of co-movement algorithms, and custom-analysis scripts for the Janelia transcription imaging consortium. Bayesian trajectory analysis. Igor Pro, Matlab, Micro-Manager and LabView programming.

**PROFESSIONAL MEMBERSHIPS**

Biophysical Society	American Chemical Society
The International Society for Optics and Photonics	<a href="#">The 4D nucleome project</a> : <i>Imaging Tools Initiative Consortium Member</i>

**NATIONALITY**

Dual German/ American citizen, fluent in both German and English.