

CURRICULUM VITAE**GENERAL****Prof. Teuta Pilizota**

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CAREER:

- 2020-** Professor of Biophysics, School of Biological Sciences, University of Edinburgh
2019- Director of Research, School of Biological Sciences, University of Edinburgh
2018-2019 Visiting academic, Department of Physics, University of Oxford
2018-2020 Reader in biophysics, School of Biological Sciences, University of Edinburgh
2013-2018 Chancellor's Fellow at School of Biology, University of Edinburgh
2008-2012 Postdoctoral research fellow at Princeton University. Working with Prof Joshua W Shaevitz
2007-2008 Postdoctoral research fellow at the University of Oxford. Working together with Prof Richard M Berry and Prof. Judith P Armitage

UNIVERSITY EDUCATION:

- 2002 – 2007** Ph.D. in Biological Physics, University of Oxford, Department of Physics.
Under the supervision of Prof. Richard M. Berry
1997 – 2002 Diploma in Physics, University of Zagreb, Faculty of Science, Department of Physics. grade average 4.82 (on a scale from 1 to 5)

TEACHING

- 2016, 2017** Lecturer at Hands-on Research in Complex Systems School, International Centre for Theoretical Physics, Trieste, teaching included practical experiment and career development training sessions and lectures for researchers from developing countries
2016-2017 Lecturer, Microbial World II (2nd year), School of Biology, University of Edinburgh, UK
2014- Lecturer, Molecular Microbiology III (3rd year), School of Biology, University of Edinburgh, UK
2013-2020 Lecturer, Novel Approaches in Biotechnology and Membrane Biology (4th year), School of Biology, University of Edinburgh, UK
2012 Tutor, preparing adult learners (age 25-40) for GED exams, Princeton, New Jersey, USA.
2009 – 2010 Lecturer, Math 135, part of Mercer County Community College and The College of New Jersey AA degree, Edna Mahan Correctional Center for Women in Clinton, New Jersey, USA.
2006 – 2008 Marker, Biophysics course, Department of Physics, University of Oxford
2004 – 2005 Demonstrator, Biological Physics practicals, Department of Physics, University of Oxford

RESEARCH

EXTERNAL RESEARCH FUNDING (for translational work with industry underlined):

- 2024-2025** 'Edisense Biosensors', Scottish Enterprise Company Creation Program **PI, £200k**
2022-2023 'Edisense Biosensors', Scottish Enterprise High Growth Spinout, **PI, £75k**
2022 Spin-Out Feasibility Project Nanosensr, IBioIC, **PI, £18.8k**
2021 'Bacterial flagellar motor as a multimodal biosensing chip', iCURE, **PI, £51k**
2022-2025 'Infections in complex physical environments: Life and death in the sinuses', EPSRC Physics of Life award, **PI, £2.1M**
2021-2026 'A novel biohybrid electronic device architecture for environmental and physiological sensing', EPSRC Established Career Fellowship, **PI, £1.8M**
2020-2022 Bacterial flagellar motor as a multimodal biosensing chip, Office of Naval Research (ONR) Global X, **PI, \$540k**
2020 Extending the analytical capability of affordable micro bioreactors, IBioIC Feasibility Award, **PI, £22k**
2020-2025 BBSRC and IBioIC: Technology development for in situ imaging of microbial cultures, with OGI Bio Ltd, **PI, £136k**

- 2020 -2024** A Physiological Approach To Understanding Osmotically Induced Growth Modulation: Leverhulme Trust, **PI, £177k**
- 2019** BBSRC Pathfinder and iCURE, **PI, £70k**
- 2018-2021** ONR and Defense Advanced Research Projects Agency (DARPA), Bacterial flagellar motor as fast synthetic biosensor, **PI, \$390.6k**
- 2015-2016** Royal Society Brian Mercer Award, Microfluidic platform for monitoring product accumulation and 'health state' of bacterial hosts cells during bioproduction, **PI, £30k**
- 2015-2018** HFSP: Revealing bacterial free energy dynamics during loss of viability, **PI, \$1.05M**
- 2015-2020** BBSRC/EPSRC/MRC: Synth Mammalian: Edinburgh Mammalian Synthetic Biology Research Centre, **co-I, £13.2M**
- 2015-2019** BBSRC iCASE: Engineering bacterial hosts cells for robust growth at high external osmolarities, with INEOS as an industrial partner, **PI, £91k**
- 2015-2018** Cunningham Trust: Measuring phenotypical strategies bacteria employ to sustain viability under antibiotic treatment and identifying optimal strategies needed to combat them, **PI, £71k**
- 2015-2018** IBiolC: Preventing unwanted cytoplasmic leakage in downstream processing, with FujiFilm, **PI, £71k**
- 2014-2016** Crossing Biological Membrane BBSRC Network in Industrial Biotechnology and Bioenergy Proof of Concept Award and Business Interaction Voucher: Using E. coli turgor pressure regulation to optimize product excretion and prevent unwanted cytoplasmic leakage, with FujiFilm Diosynth Biotechnologies as the industrial partner, **PI, 30k**

RESEARCH STUDENT SUPERVISION:

Currently supervising 8 Ph.D. students
9 Ph.D. student successfully defended their thesis since 2013

KNOWLEDGE EXCHANGE AND IMPACT

FURTHER INTERNAL FUNDING RECEIVED FOR TRANSLATIONAL WORK:

- 2019-2023** EPSRC DTP CASE conversion scholarship with Chr. Hansen
- 2015** Microfluidic platform for monitoring product accumulation and 'health state' of bacterial hosts cells during bioproduction, EPSRC Impact Acceleration Award, **PI, £15.8k**
- 2015** Assessing growth of individual lactic acid bacterial cells in beer, EPSRC Impact Acceleration Award, **PI, £4.5k**

SPIN-OUT COMPANIES AND PATENTS:

- 2024** Patent covering a sensing device for obtaining rotational properties of one or more rotatable objects in a fluid, filed
- 2023** Patent covering an imaging assembly for collecting and imaging a liquid sample inside a vessel, filed
- 2023** ÖGI Bio Ltd receives investment from current shareholders, **£400k**
- 2022** ÖGI Bio Ltd receives investment from TRICAP and Apollo syndicates, **£1M**
- 2021** With ÖGI Bio Ltd awarded Unlocking Ambition fund, **£45k**
- 2020** ÖGI Bio Ltd receives pre-seed investment from Apollo syndicate, **£97.5k**
- 2020** With ÖGI Bio Ltd awarded: Scottish Edge award, **£45k**, IBiolC funding, **£90k**, RSE funding, **£90k** and Innovate UK grant, **£150k**
- 2019** UoE spin-out company formation documents submitted to Company Formation Advisory Group (company name: ÖGI Bio Ltd)

ACADEMIC LEADERSHIP, MANAGEMENT, AND CITIZENSHIP

- 2021-** Organizing committee: Material Research Society Fall Meeting 2022 and 2024, Symposia on Living Materials, and Bioelectricity and Microbial-Based Living Materials
- 2019-** Research Director, School of Biological Sciences
- 2019-2022** BBSRC Committee B Pool of experts member
- 2017-2018** Organizing committee member of Physics of Cells: From Biochemical to Mechanical
- 2017-2018** European Federation of Biotechnology meeting on Microbial stress, April 2018, International Scientific Advisory Board Member

- 2017** Global Challenges Research workshop with Mohammed V University in Rabat, Morocco, October 2017, organizer
- 2017-2018** School of Biological Sciences, UoE Internationalization Committee Member
- 2016-2017** Microbiology Society Annual Conference, April 2017, Synthetic and Systems Biology Session organizer
- 2016-2022** BBSRC Committee D Pool of experts member
- 2014-2018** School of Biological Sciences, UoE Research Committee Member
- 2014-** External Master and PhD Thesis Examiner: University of Zagreb (Department of Biotechnology), University of York (Department of Biology), University of Oxford (Department of Zoology), University of Cagliari (Faculty of Engineering), Université de Montpellier & Complex Systems and Non-Linear Phenomena L2C - UMR 5221 CNRS/UM
- 2013-** Peer-reviewer for grant proposals to Swiss National Science Foundation, EPSRC, BBSRC, Netherlands Organization for Scientific Research, French National Research Agency, Cunningham Trust and Carnegie Trust
- 2013-** Peer-reviewer for several international, interdisciplinary journals: PNAS, Science Advances, Nature Physics, Scientific Reports, Applied Physics, Biological Physics, etc.

EXTERNAL RECOGNITION/ESTEEM

- 2020, 2021** Chief of Naval Research USA, Rear Admiral Lorin C. Selby visit to Pilizota lab
- 2018** Chief of Naval Research USA, Rear Admiral David A. Hahn visit to Pilizota lab
- 2007** Merit Award for exceptional performance, Department of Physics, University of Oxford
- 2007** Daiwa Adrian Prize for UK-Japan joint collaboration in *Analysis of the Mechanism and Structural Dynamics of the Bacterial Flagellar motor*, UK scientific research team
- 2002 - 2005** PhD Scholarship, Bionanotechnology Interdisciplinary Research Collaboration Oxford, UK
- 1999 - 2002** City of Zagreb Scholarship, Department of Physics, University of Zagreb
- 1993-1997** 'The best student of the generation' award, awarded by the High School for Natural Sciences and Mathematics V. Gimnazija

KEYNOTE AND INVITED SPEAKER AT INTERNATIONAL MEETINGS (from 2017 only):

- 2023** Microbial Stress, September TU Vienna, Austria (Contributing Speaker)
- 2023** Physics of Life, April, Harrogate, UK (Invited Speaker)
- 2022** Quantitative Biology of Non-growing Microbes, October, KITP/UCB, USA (Invited Speaker)
- 2022** Adherent microbial communities: Quantitative approaches from single cell to ecosystems, October, Cargese, France (Invited Speaker)
- 2022** 87th Harden Conference: Single-Molecule Bacteriology II, July, Oxford, UK (Invited Speaker)
- 2022** Major ideas in quantitative microbial physiology: Past, Present, and Future, June, Copenhagen (Invited Speaker)
- 2022** NanoInBio 2022, May, Le Gosier, Guadeloupe, French Caribbean (Invited Speaker)
- 2021** Novel Approaches and Concepts in Microbiology, EMBL/EMBO, online (contributing speaker)
- 2021** MRS Fall Meeting, Photo/Electrical Phenomena at the Interface with Living Cells and Bacteria Symposium, online (Invited Speaker)
- 2020** EuroMicroPH COST action open meeting, February, Portugal (Invited Speaker)
- 2020** 'New Physical Models for Cell Growth', Aspen Centre for Physics, USA (Invited Speaker)
- 2019** SynBioUK, December, UK (Invited Speaker)
- 2019** 'Biophysics of Infection and Immunity: From Molecules to Cells to Tissues' symposium, University of York, November, UK (Invited Speaker)
- 2019** UK Biofluids Special Interest Group Meeting, September, University of Warwick (Invited Speaker)
- 2019** 13th Annual q-Bio Conference, August, San Francisco, USA (Invited Speaker)
- 2019** HFSP Annual Meeting, July, Tsukuba, Japan (Invited Speaker)
- 2019** UK/USA Synthetic Biology Showcase, Williams Formula 1 Conference Centre, Wantage, May UK (Invited Speaker)
- 2019** The physics of microorganisms II, Institute of Physics, London, UK (Invited Speaker)
- 2019** 2nd Electrical Cell Biology Workshop, Warwick University, UK (Invited Speaker)
- 2019** Quantitative Bacterial Cell Biology Symposium, Institute Pasteur, Paris (Invited Speaker)
- 2018** Biochemical Society Harden Conference on Single-Molecule Bacteriology, Oxford, UK (Invited Speaker)

- 2018** European Federation of Biotechnology meeting on Microbial stress, Ireland (Invited Speaker)
2017 Nanofluidics in Biological Systems Workshop, Durham University (Invited Speaker)
2017 19th IUPAB and 11th European Biophysical Society Meeting Annual Conference, HFSP session (Invited Speaker)
2017 Membrane Engineering Of Lipids And Proteins For Industrial Biotechnology And Bioenergy, Glasgow (Invited Speaker)

INVITED SPEAKER AT SUMMER SCHOOLS:

- 2023** Summer School of Theoretical Biological Physics, July, Les Houches, France (Seminar Speaker)
2017 CM-CDT and Higgs Summer school, University of St. Andrews, August, St. Andrews UK
2017 Hands-on Research in Complex Systems School, August, International Centre for Theoretical Physics, Trieste, Italy (Invited Lecturer)
2016 From Molecules to Systems 2016 Winter School, University of Oxford, St. Catherine's College, Oxford, UK (Invited Speaker)
2016 Hands-on Research in Complex Systems School, July, International Centre for Theoretical Physics, Trieste, Italy (Invited Lecturer)

LIST OF PUBLICATIONS: * These authors contributed equally **Corresponding author

++ 10 most significant publications

Schwarz-Linek J*, Negard LL*, Krasnopeeva E, Douarchec C, Arlt J, Martinez VA, Poon W**, **Pilizota T**** 'Motility turns sour: how a combination of environmental factors prevents swimming of *Escherichia coli*' (In preparation)

++Hegde S, Mirolì D, **Pilizota T****. 'Under high volumetric strain, *Escherichia coli*'s cell envelope behaves as a Maxwell viscoelastic liquid' (In preparation)

Tormena N, **Pilizota T**, Voitchovsky K. 'A minimalist model lipid system mimicking the biophysical properties *Escherichia coli*'s membrane' (Under review)

++Teraddot G, Krasnopeeva E, Swain S**, **Pilizota T****. The proton motive force determines *Escherichia coli*'s robustness to extracellular pH', (Under review, doi: <https://doi.org/10.1101/2021.11.19.469321>)

++Lo WC, Krasnopeeva E, **Pilizota T****. 'Bacterial electrophysiology' (Accepted, **Annual Review of Biophysics**)

++Mancini L, **Pilizota T**** 'Environmental conditions define the energetics of bacterial dormancy and its antibiotic susceptibility' **Biophys J** 2023; Jul 4:S0006-3495(23)00411-3. doi: 10.1016/j.bpj.2023.06.023

Schatz MF**, Cicuta P, Gordon VD, **Pilizota T**, Rodenborn B, Shattuck MD, Swinney HL 'Advancing Access to Cutting-Edge Tabletop Science' **Annu Rev Fluid Mechanics** 2023; 55:213-235

Honda T*, Cremer J*, Mancini L, Zhang Z, **Pilizota T**, Hwa T** 'Coordination of gene expression with cell size enables *Escherichia coli* to efficiently maintain motility across conditions' **PNAS** 2022; 119 (37) e2110342119

Voliotis M**, Rosko J, **Pilizota T****, Liverpool T**. 'Steady state running rate sets the speed and accuracy of accumulation of swimming bacteria' **Biophys J** 2022; 121(18):3435-3444

Jaramillo-Riveri S, Broughton J, McVey A, **Pilizota T**, Scott M, El Karoui M**. 'Growth-dependent heterogeneity in the DNA damage response in *Escherichia coli*' **Mol Syst Biol** 2022; 18(5):e10441

Wong F*, Wilson S*, Helbig R, Hegde S, Aftenieva O, Zheng H, Liu C, **Pilizota T**, Garner EC, Amir A**, Renner LD** 'Understanding Beta-Lactam-Induced Lysis at the Single-Cell Level' **Front Microbiol** 2021; 27;12:712007

++Le D, Krasnopeeva E*, Sinjab F*, **Pilizota T****, Kim M** 'Active Efflux Leads to Heterogeneous Dissipation of Proton Motive Force by Protonophores in Bacteria' **mBio** 2021;12(4):e0067621

Krasnopeeva E, Barboza-Perez U E, Rosko J, **Pilizota T****, Lo C J** 'Bacterial Flagellar Motor as a Multimodal Biosensor' **Methods** 2021; 193:5-15.

Schofiel Z*, Meloni G*, Tran P, Zeffass C, Sena G, Hayashi Y, Grant M, Contera SA, Minter SD, Kim M, Prindle A, Rocha P, Djamgoz MBA, **Pilizota T**, Unwin PR, Asally M**, Soyer OS** 'Bioelectrical understanding and engineering of cell biology' **J. R. Soc. Interface**, 2020;17: 20200013.

Paraschiv A, Hegde S, Ganti R, **Pilizota T**, Saric A** Dynamic clustering regulates activity of mechanosensitive membrane channels, **Physical Review Letters**, 2020; 124:048102

Wang YK*, Krasnopeeva E*, Bai F, **Pilizota T****, Lo CJ** Comparison of Escherichia coli surface attachment methods for single-cell, in vivo microscopy, **Scientific Reports**, 2019;9:19418

Mancini L, Tian T*, Terradot G*, Pu Y, Li Y, Lo CJ, Bai F, **Pilizota T**** A general work-flow for characterization of Nernstian dyes and their effects on bacterial physiology, **Biophys J**, 2020;118(1): 4-14

Arlt J, Martinez VA, Dawson A, **Pilizota T**, Poon WCK** 'Dynamics-dependent density distribution in active suspensions' **Nature Communications** 2019;10: 2321

++Krasnopeeva E, Lo CJ, **Pilizota T**** 'Single-cell bacterial electrophysiology reveals mechanisms of stress induced damage' **Biophys. J.** 2019;116(12): 2390-2399

Pilizota T and Ya-Tang Yang**. Flexible and affordable microbial cultivation techniques for synthetic and systems biology, **Frontiers in Microbiology**, 2018;9:1666 doi=10.3389/fmicb.2018.01666

Arlt J, Martinez V A, Dawson A, **Pilizota T** and Poon WCK**. Spatially-controlled activity of light-driven bacteria. **Nature Communications** 2018;9: 768

++Rosko J, Martinez V A, Poon WCK and **Pilizota T****. Osmotaxis in *Escherichia coli* through changes in motor speed **PNAS** September 2017; doi: 10.1073/pnas.1620945114

Stevenson K, McVey A F, Clark I B N, Swain P S and **Pilizota T****. General calibration of microbial growth in microplate readers. **Scientific Reports**. 2016; 6:38828

Swain P S**, Stevenson K, Leary A, Montano-Gutierrez L F, Clark I B N, Vogel J and **Pilizota T**. Inferring time-derivatives, including cell growth rates, using Gaussian processes. **Nature Communications**. 2016; 7:13766

++Buda R*, Liu Y*, Yang J*, Hegde S*, Stevenson K, Bai F** and **Pilizota T****. Dynamics of *Escherichia coli*'s passive response to sudden decreases in external osmolarity. **PNAS**. September 2016, doi:10.1073/pnas.1522185113

Fletcher KA, **Pilizota T**, Rhys-Davies P, French, CE. Characterization of the effects of n-butanol on the cell envelope of *E. coli*. **Applied Microbiology and Biotechnology**. September 2016, 1-7. doi:10.1007/s00253-016-7771-6

Schwarz-Linek J, Arlt J, Jepson A, Dawson A, Vissers T, Miroli D, **Pilizota T**, Martinez VA and Poon W. *Escherichia coli* as a model active colloid. **Colloids and Surfaces B: Biointerfaces**. 2016. 137:2-16

Pilizota T**, Shaevitz JW. Origins of cell shape and growth rate changes at high external osmolarity. **Biophys J** October 2014, 107(8):1962-1969

Pilizota T, Shaevitz JW. Plasmolysis and cell shape depend on solute outer membrane permeability during hyperosmotic shock in *Escherichia coli*. **Biophys J** 18 June 2013, 104(12):2733-2742

Lo CJ, Sowa Y, **Pilizota T**, Berry RM. The mechanism and kinetics of a sodium-driven bacterial flagellar motor. **PNAS**. July 2013.110(28):E2544-51

Bilyard T*, Nakanishi-Matsui* M, Steel B, **Pilizota T**, Nord A, Hosokawa H, Futai M, Berry RM. High-resolution single-molecule characterization of the enzymatic states in *Escherichia coli* F₁-ATPase. *Phil Trans R Soc. B* 24 December 2012. 368(1611):20120023.

Pilizota T, Shaevitz JW. Fast, multiphase volume adaptation to hyperosmotic shock by *Escherichia Coli*. *PLoS ONE* 2012 Apr; 7(4): e35205

++Fan B*, Branch RW*, Nicolau DV*, **Pilizota T**, Maini PK, Berry RM. Conformational spread as a mechanism for cooperativity in the bacterial flagellar switch. *Science*. 2010 Feb; 327(5966): 685-9. (Mentioned in Perspectives: An Ensemble View of Allostery, Vincent J. Hilser, *Science* 5 February 2010: 653-654).

++**Pilizota T***, Brown M*, Leake MC, Branch RW, Berry RM, Armitage JP. A molecular brake, not a clutch, stops the *Rhodobacter sphaeroides* flagellar motor. *PNAS*. 2009 Jul;106(28):11582-7. (Mentioned in 'In This Issue', PNAS 2009 106 (28) 11427-11428)

Inoue Y, Lo CJ, Fukuoka H, Takahashi H, Sowa Y, **Pilizota T**, Wadhams G, Homma M, Berry RM, Ishijima A. Torque-speed relationships of Na⁺-driven chimeric flagellar motors in *Escherichia coli*. *J Mol Biol*. 2008 Mar; 376(5):1251-9.

Lo CJ, Leake MC, **Pilizota T**, Berry RM. Non-equivalence of membrane voltage and ion-gradient as driving forces for the bacterial flagellar motor at low load. *Biophys J*. 2007 Jul; 93(1):294-302.

Pilizota T, Bilyard T, Bai F, Hosokawa H, Futai M, Berry RM. A programmable optical angle clamp for rotary molecular motors, *Biophys J*. 2007 Jul; 93(1):264-275

Pilizota T, Lucic B, Trinajstić N. Use of variable selection in modeling the secondary structural content of proteins from their composition of amino acid residues. *J Chem Inf Comput Sci*. 2004 Jan-Feb;44(1):113-21.

Book contributions:

Pilizota T, Sowa Y, Berry RM. Chapter: Single-Molecule Studies of Rotary Proteins in Handbook of Single-Molecule Biophysics, Springer. 2009. Editors: Peter Hinterdorfer and Antoine van Oijen