Systems Biology T. Shimizu (2017-2022)

Biography

Thomas S. Shimizu received his Ph.D. from the University of Cambridge in 2003, working on biophysical problems of intracellular signaling using stochastic methods. He subsequently held a postdoctoral fellowship at Harvard University, where he developed Förster resonance energy transfer (FRET) experiments in live bacteria. In 2009, he joined the faculty of AMOLF as a Group Leader, and since 2015 also holds a joint appointment as Professor in the Department of Physics and Astronomy, Vrij Universiteit Amsterdam. His research group develops biophysical experiments, theoretical models, and data analysis methods to bridge dynamics at the scale of molecules, cells and whole organisms.

Group output

Peer reviewed Publications 2017-2022

2017

1. J.M. Keegstra, K. Kamino, F. Anquez, M.D. Lazova, T. Emonet and T.S. Shimizu, *Phenotypic Diversity and Temporal Variability in a Bacterial Signaling Network Revealed by single-cell FRET*, eLife **6** e27455 (2017). **Gold OA**

2018

1. M. Koler, E. Peretz, C. Aditya, T. S. Shimizu and A. Vaknin, *Long-term positioning and polar preference of chemoreceptor clusters in E. coli*, Nature Commun. **9**, 4444: 1-10 (2018). **Gold OA**
2. K. Aleklett, E. Toby Kiers, Pelle Ohlsson, T. S. Shimizu, Victor E. A. Caldas and Edith C. Hammer, *Build your own soil : exploring microfluidics to create microbial habitat structures*, ISME J. **12**, 2: 312-319 (2018). **Gold OA**

2019

1. S.J. Helms, M.W. Rozemuller, A.C. Costa, L. Avery, G.J. Stephens and T.S. Shimizu, *Modelling the ballistic-to-diffusive transition in nematode motility reveals variation in exploratory behaviour across species,* J. R. Soc. Interface **16**, 157 (2019). **Green OA**
2. F. Wu, P. Swain, L. Kuijpers, X. Zheng, K. Felter, M. Guurink, J. Solari, S. Jun, T.S. Shimizu, D. Chaudhuri, B.M. Mulder and C. Dekker, *Cell boundary confinement sets the size and position of the E. coli chromosome, Current Biol.* **29**, 13: 2131-2144.e1-e4 (2019). **Green OA**
3. M.D. Whiteside, G.D.A. Werner, V.E.A. Caldas, A. Padje, S.E. Dupin, B. Elbers, M. Bakker, M. Klein, G.A.K. Wyatt, M.A. Hink, M. Postma, B. Vaitla, R. Noë, T.S. Shimizu, S.A. West and E.T. Kiers, *Mycorrhizal Fungi Respond to Resource Inequalityby Moving Phosphorus from Rich to PoorPatches across Networks,* Current Biol. **29**, 12: 1-8 (2019). **Hybrid OA**
4. M. Ivankovic*, R. Haneckova*, A. Thommen*, M. Grohme*, M. Vila-Farré*, S. Werner*, J. Rink (2019), *Model systems for regeneration: planarians,* Development **146** (17), dev167684. **Green OA**
5. A. Thommen*, S. Werner*, O. Frank*, J. Philipp, O. Knittelfelder, Y. Quek, K. Fahmy, A. Shevchenko, B.M. Friedrich, F. Jülicher, J.C. Rink (2019). *Body size-dependent energy*

storagecauses Kleiber's law scaling of themetabolic rate in planarians, Elife **8**, e38187. **Gold OA** (* denotes equal contribution)

2020

1. K. Kamino, J.M. Keegstra, J. Long, T. Emonet and T.S. Shimizu, *Adaptive tuning of cell sensory diversity without changes in gene expression*, Sci. Adv. **6**, (46), eabc1087: 1-11, (2020) **Gold OA**.
2. A. van't Padje, L. Oyarte Galvez, M. Klein, M.A. Hink, M. Postma, T.S. Shimizu and E.T. Kiers, Temporal tracking of quantum-dot apatite across in vitro mycorrhizal networks shows how host demand can influence fungal nutrient transfer strategies, ISME J. **15**, 435- 449*,* (2020) **Gold OA.**
3. S. Gude, E. Pince, K.M. Taute, A.B. Seinen, T.S. Shimizu and S.J. Tans, Bacterial coexistence driven by motility and spatial competition, Nature **578**, 588-592 (2020).

2021

1. A. van't Padje, M. Klein, V.E.A. Caldas, L. Oyarte Galvez, C. Broersma, N. Hoebe, I.R. Sanders, T.S. Shimizu and E.T. Kiers, *Decreasing relatedness among mycorrhizal fungi in a shared plant network increases fungal network size but not plant benefit*, Ecology Letters **25**, (2), 509-520 (2021) **Hybrid OA**
2. F.-Z. M. Rashid, E. Mahland, M. van der Vaart, D.E. C. Boer, M. Varela Alvarez, B. Henneman, D.J.W. Brocken, P. Voskamp, A.J. Blok, T.S. Shimizu, A.H. Meijer, M.S. Luijsterburg, J. Goedhart, F.G.E. Crémazy and R.T. Dame, *HI-NESS: a family of genetically encoded DNA labels based on a bacterial nucleoid-associated protein*, Nucleic Acids Res. **50**, (2), e10: 1-17 (2021) **Gold OA**

2022

1. A. van't Padje, M. Klein, V.E.A. Caldas, L. Oyarte Galvez, C. Broersma, N. Hoebe, I.R. Sanders, T.S. Shimizu and E.T. Kiers*, Decreasing relatedness among mycorrhizal fungi in a shared plant network increases fungal network size but not plant benefit*, Ecology Letters **25**, (2), 509-520 (2022) **Hybrid OA**
2. F.-Z. M. Rashid, E. Mahland, M. van der Vaart, D.E. C. Boer, M. Varela Alvarez, B. Henneman, D.J.W. Brocken, P. Voskamp, A.J. Blok, T.S. Shimizu, A.H. Meijer, M.S. Luijsterburg, J. Goedhart, F.G.E. Crémazy and R.T. Dame, HI-NESS: *a family of genetically encoded DNA labels based on a bacterial nucleoid-associated protein*, Nucleic Acids Res. **gkab993**, 1-17 (2021) **Gold OA**

Contributions to scientific books (chapters or entire book) 2017-2022

2018

1. Solari, J., Anquez, F., Scherer, K. & Shimizu, T.S. (2018). Bacterial chemoreceptor imaging at high spatio-temporal resolution using photoconvertible fluorescent proteins. Meth. Mol. Biol. 1729, 203-231.

PhD theses 2017-2022

2018

1. J. M. Keegstra, *Variation and fluctuations in a bacterial signaling network*, (promotor, VU University Amsterdam, 2018-05-17).

2019

1. J. Solari, *Spatial organization of the bacterial cell: in vivo imaging across scales,* VU University Amsterdam, January 29, 2019

2021

1. J.J.H. Traets, *Developmental timing and cell fate maintenance in Caenorhabditis elegans*, VU University Amsterdam, 02/10/2021, Open Access

Masters and Bachelors theses 2017-2022

2019

1. B. van der Hoeven, *Whole brain calcium imaging of Caenorhabditis elegans*. Masters thesis, TU Delft,Dept. of Bionanoscience

2020

1. Paul van Lent, *Percolation-based gene clustering of single-cell RNA sequencing data*. Masters thesis, VU Amsterdam.

Invited lectures at international conferences and meetings

2017

1. T.S. Shimizu, *Generation and attenuation of variability in a bacterial signaling network,* Invited Seminar, Biozentrum, Basel, Switzerland, 10 April, 2017.
2. T.S. Shimizu, *Generation and attenuation of variability in a bacterial signaling network*, EMBO BacNet Conference, San Feliu de Guixols, Spain, September 9-14, 2017.
3. V. Caldas. *Nutrient tracking with Quantum Dots.* (Talk). ICOM 2017, Prague, Czech Republic, July 30 – August 4, 2017.

2018

1. T. S. Shimizu, *Adaptation and amplification in a protein circuit: optimized for what?* Workshop on Principles of Microbial Adaptation, Lorentz Center, Leiden, 5-9 March 2018,
2. T. S. Shimizu, *Exploring protein-signaling stochasticity by FRET in single cells*. PhysCell2018 Conference, Harrogate, UK, 3-7 September, 2018.

2020

1. T.S. Shimizu, *Balancing sensory navigation and random exploration in uncertain environments.* Janelia Conference on Navigational Algorithms and Neural Circuit Computations, HHMI Janelia Research Campus, USA, March 8-11, 2020. (Postponed due to COVID-19).

2021

1. T. Shimizu, **"***Dissecting the simplest minds across scales*", Nanobiology Symposium 2021, TU Delft, Delft, The Netherlands, 12/10/2021.
2. T. Shimizu, "*Near-critical tuning of conformational spread revealed by single-cell FRET in bacterial chemoreceptor Arrays*", Biophysical Society of Japan Annual Meeting (online), 25/11/2021.

Academic teaching 2017-2022

2018

1. T.S. Shimizu, *How bacteria do their Math*, an invited lecture for Molecular Biophysics Course, Leiden University, Leiden, the Netherlands, December 4, 2018.
2. T.S. Shimizu, *Chemotaxis in bacteria*, An invited lecture for Molecular Biology of the Cell Course, Institut Pasteur, Paris, 23 Jan 2018.

2019

1. T.S. Shimizu, *How bacteria do their Math*, an invited lecture for Molecular Biophysics Course, Leiden University, Leiden, the Netherlands, November 21, 2019.

2021

1. T. Shimizu: "*How bacteria do their math*", invited lecture at Quantitative Biology Course (hybrid), Gulbenkian Institute of Science (IGC), Oeiras, Portugal, 29/09/2021.

Selected awards & recognitions 2017-2022

2017

1. V.E.A. Caldas , Best poster. ESPCA – FAPESP. São Paulo, Brazil, 2017
2. V.E.A. Caldas, Best poster. Brazilian Biophysical Society Meeting, 2017
3. V.E.A. Caldas , Travel Grant. NEUBIAS – Network of European BioImage Analysists. University of Oxford, Oxford, UK. July 26-30. 2017
4. V.E.A. Caldas , Travel Grant. NEUBIAS – Network of European BioImage Analysists. Gothenburg, SE, September 11-14. 2017
5. V.E.A. Caldas , Travel Grant. ESPCA – FAPESP. São Paulo, Brazil. October 10-31, 2017

Valorization 2017-2022

N/A