Prof. Jean-Pascal Pfister

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4 children, Swiss

Education

July 06:	**PhD in Computational Neuroscience**, EPFL, Switzerland. **Finalist for the best thesis award**.
March 02:	**M.Sc in Physics**, EPFL, Switzerland, **Annaheim award**. Third year at The University of Nottingham, UK.

Professional experiences in academia

Since Sept 14:	**SNF Professor** at the Institute for Neuroinformatics (ETHZ / University of Zürich), head of the Theoretical Neuroscience Group (1 Post-doc, 4 PhD students and 4 Master students).
April 13 - July 13:	**Sabbatical** at the Center for Brain Science (with Prof. H. Sompolinsky), Harvard.
Oct. 11 - Aug. 14:	**Group Leader** of the Theoretical Neuroscience Group, Bern.
Aug. 10- Sept. 11:	**Post-doc** on learning and memory (with Prof. W. Senn), Bern. **Visitor** at the Computation and Biological learning lab, Cambridge, UK.
April 08 - July 10:	**Post-doc** on auto-associative memory (with Dr. M. Lengyel and Prof. P. Dayan), Cambridge, UK.
Aug. 02 - Aug. 06:	**PhD** on Spike-Timing Dependent Plasticity at the Laboratory of Computational Neuroscience (Prof. W. Gerstner), EPFL.

Professional experiences outside academia

Since 2016:	**Founder and Chief Scientific Officer** of *QuantActions* - a start-up company which collects, analyses and value data on human behavior.
Since Jan 13:	**Board member** of Sonceboz SA (1000 employees).
Jan 11 - Dec 12:	**Advisory board member** of Sonceboz SA.
April 08 - Nov 09:	**Independent consultant** for Medtronic on Deep Brain Stimulation.
Sept 06 -March 08:	**Project manager** on Deep Brain Stimulation research at Helbling Technik Bern.

Grants and awards

Sept. 17:	Project Grant entitled *Bayesian synapses* from the SNF.	741'827 CHF
Feb. 16:	SystemsX Grant entitled *Baysian learning of quantal parameters at single synapse resolution* from the SNF shared with Prof. Martin Müller.	195'963 CHF
Sept. 14:	Professorship Grant entitled *Inference and Learning with Spiking Neurons* from the SNF.	1'437'698 CHF
Oct. 11:	Ambizione Grant entitled *Normative theory of synaptic plasticity across multiple time scales* from the SNF.	598'048 CHF
Jul. 06:	Finalist for the best PhD thesis award.	
Mar. 02:	Annaheim award for the Master thesis.	

Teaching experience

2017	**Lectures** on "Inference and learning at the level of single synapses and spiking neurons", BioComp Summer School, Roscoff, France.
2016-2017	**Lectures** in the course "Introduction to Neuroinformatics", University of Zürich/ETHZ.
2015-2016	**Course** on "Neurophysics", University of Zürich/ETHZ.
2016	**Lecture** in the "Introductory course in Neuroscience", University of Zürich/ETHZ.
2014	**Tutor** for the course "Zentralnervensystem, Sinnesorgane und Verhalten", Bern.
2013	**Course** on "Neural computation" (Master in Biomedical Sciences), Bern.
2012	**Lecture** on short-term and long-term plasticity, PhD Summer School, Freiburg, Germany.
2011	**Laboratory** on "Gehör und Somatosensorik". Bern.
2009-10	**Tutor** for the course "Introduction to Neuroscience". Cambridge, UK.
2005	**Lecture** on synaptic plasticity, Lemanic doctoral school, Geneva.
2005	**Assistant** for the the course "Bio-mathematical programming", EPFL.
2004	**Assistant** for the course "Neural Networks and Biological Modeling", EPFL.
2002-2006	**Teacher** of mathematics, physics and biology (>700 hours), at the "Collège Secondaire Intercommunal de la Planta" Renens, CH.
2003	**Teacher** of mathematics at the Haute Ecole d'Ingnierie et de Gestion du Canton de Vaud (HEIG-VD).

Reviewer

Journals:	Physical Review Letters, Nature Communications, Journal of Neuroscience, Plos Computation Biology, Plos One, Neural Computation, Neurocomputing, Biological Cybernetics, Frontiers in Computational Neuroscience, Journal of Neurophysiology, Progress in Neurobiology, International Journal of Neural Systems, Nature Scientific Reports
Conferences:	NIPS, Cosyne.
Grant Agency:	Binational science foundation (US-Israel), Wellcome Trust.

Languages

French:	mother tongue.
English:	fluent (lived 3 years in UK).
German:	good knowledge (lived 1.5 year in a German speaking region, teaching in German at the University of Bern).

Conference talks / invited talks

Sept 17:	Berstein conference - Neural sampling workshop. *Neural Particle Filters.*
April 17:	University of Geneva. *Bayesian regression and synaptic stochasticity.*
Dec. 16:	NIPS 2016 - Neurorobotics workshop, Barcelona. *The Neural Particle Filter.*
Nov. 16:	Bern University Hospital. *To tap or not to tap: a priority-based modelling approach to smartphone tapping data.*
April 16:	Inaugural lecture, Zurich. *How does the brain compute?*
Oct. 15:	Cambridge, UK. *Approximate nonlinear filtering with a neural network.*
Sept. 15:	ZNZ workshop, Zurich. *Can neural networks perform nonlinear filtering?*
June 15:	Berlin, *Matching recall and storage in spiking neural networks.*
June 15:	Kappel Kloster, CH. *Learning sequences with neural networks.*
June 15:	Paris. *Matching recall and storage in spiking neural networks.*
Mai. 15:	Capocaccia, Sardegna. *STDP and the triplet rule.*
Feb. 15:	Zurich, *Statistical learning with spiking neurons.*
Sept. 14:	Bernstein workshop, Göttingen. *Matching recall and storage for sequence learning with spiking neural networks.*
June 14:	University of Lausanne. *Short-term and long-term plasticity from a functional perspective.*
Sept. 13:	University of Sheffield. *Computational perspectives on synaptic dynamics and plasticity.*
Sept. 13:	University of Geneva. *Computational perspectives on synaptic dynamics and plasticity.*
Feb. 13:	University of Geneva. *Short-term and long-term synaptic plasticity from a normative perspective.*
Oct. 12:	iCoNeT PhD Conference, Freiburg, Germany. *Computational perspectives on short-term and long-term plasticity.*
Aug. 12:	ETH Zurich. *Synaptic plasticity from first principles.*
Nov. 11:	Marseille.*A triplet spike-timing-dependent plasticity model generalizes the Bienenstock-Cooper-Munro rule to higher-order spatiotemporal correlations.*
Sept. 11:	Riken, Japan. *Sequence learning with hidden units in spiking neural networks.*
Sept. 11:	Riken, Japan. *Towards a unifying normative theory of short-term and long-term plasticity.*
July 11:	CNS 2011 workshops, Stockholm, Sweden. *Theoretical conditions for long-lasting neuronal desynchronization in oscillatory recurrent networks with STDP.*
March 11:	Cosyne 2011 workshops, Salt-Lake-City. *Interactions between short-term and long-term plasticity: shooting for a moving target.*
Jan. 11:	ETH Zurich. *Synapses with short-term plasticity are optimal estimators of presynaptic membrane potentials.*
Nov 10:	The Clinical Neuroscience Day, Bern. *Functional consequences of a triplet model of Spike-Timing Dependent Plasticity.*
Jan. 10:	Sheffield University. *Synaptic plasticity from first principles.*
Dec. 09:	NIPS 2009 main conference, Vancouver. *Know Thy Neighbour: A Normative Theory of Synaptic Depression.*
Dec. 09:	NIPS 2009 workshop, Whistler. *Synaptic plasticity from first principles.*
Mai 09:	University of Bern. *Speed vs Accuracy in Spiking Attractor Networks.*
April 09:	Neuromodulation group (Head: prof. P.A. Tass), Jülich Research Center, Germany. *Synaptic Plasticity and Neuronal Synchrony Models in the Context of Deep Brain Stimulation*
Nov. 08:	Developmental Computational Neuroscience meeting, Edinburgh. *Triplets of Spikes in a Model of Spike-Timing-Dependent Plasticity and the Emergence of Input Selectivity.*
July 06:	CNS 2006, Edinburgh. *Why Triplets of Spikes are Necessary in Models of STDP.*
March 06:	Cosyne 2006, Salt-Lake City. *Beyond Pair-Based STDP: a Phenomenological Rule for Spike Triplet and Frequency Effects.*
July 03:	CCNS 2003, Alicante. *Optimal STDP for Precise Action Potential Firing.*
June 03:	ICANN/ICONIP 2003, Istanbul. *Optimal Hebbian Learning: a Probabilistic Point of View.*

November 20, 2017 **Jean-Pascal Pfister**

Publication List

Under Review/ArXiv

1. **Surace S.C., Kutschireiter A. and Pfister, J.P.** How to avoid the curse of dimensionality: scalability of particle filters with and without importance weights. *Accepted to SIAM Review after minor modifications*, *arXiv:1703.07879*, 2017.

2. **Ghosh A., Pfister, J.P. and Cook M.** Optimised information gathering in smartphone users. *Resubmitted to Nature Scientific Reports*, *arXiv:1701.02796*, 2017.

3. **Pfister J.P. and Ghosh A.** To tap or not to tap: a model-based quantification of the priority placed on smartphone actions. *Under revision*, *arXiv:1612.03196*, 2017.

Peer reviewed publications

1. **Kutschireiter A., Surace S.C., Sprekeler H., and Pfister, J.P.** Nonlinear Bayesian filtering and learning: a neuronal dynamics for perception. *Nature Scientific Reports*, , 7(1), 8722, 2017.

2. **Surace S.C. and Pfister J.P.** Online Maximum Likelihood Estimation of the Parameters of Partially Observed Diffusion Processes. *NIPS Time Series Workshop 2016*, 2016 [1].

3. **Surace S.C. and Pfister J.P.** A statistical model for in vivo neuronal dynamics. *PLoS ONE*, 10(11): e0142435, 2015.

4. **Senn W. and Pfister J.P.** Reinforcement Learning in Cortical Networks. *Encyclopedia of Computational Neuroscience*, 2611-2617, 2015.
citations: 4

5. **Senn W. and Pfister J.P.** Spike-Timing Dependent Plasticity, Learning Rules. *Encyclopedia of Computational Neuroscience*, 2825-2832, 2015.

6. **Blom S.M.*, Pfister J.P.*, Santello M., Senn W. and Nevian T.** Nerve Injury-Induced Neuropathic Pain Causes Disinhibition of the Anterior Cingulate Cortex. *Journal of Neuroscience*, 34(17), 5754-5764, April 2014.
citations: 36

[1] An extended version of this manuscript which contains a full proof of convergence is *Under Review in IEEE Transactions on Automatic Control*, *arXiv:1611.00170*, 2017.

7. **Brea J., Senn W. and Pfister J.P.** Matching Recall and Storage in Sequence Learning with Spiking Neural Networks. *The Journal of Neuroscience*, 33(23), 9565-9575, June 2013.
citations: 47

    - Press commentary:
      http://www.kommunikation.unibe.ch/content/medien/medienmitteilungen/news/2013/neuronen/index_ger.html

8. **Gjorgjieva J., Clopath C., Audet J. and Pfister J.P.** A triplet spike-timing-dependent plasticity model generalizes the Bienenstock-Cooper-Munro rule to higher-order spatiotemporal correlations. *Proceedings of the National Academy of Sciences USA*, 108 (48), 19383-19388, Nov. 2011.
citations: 81

    - Press commentary of B. Jakob in Uniaktuell:
      http://www.uniaktuell.unibe.ch/content/news/2011/neuronen/
    - Commentary of H. Z. Shouval: *What is the appropriate description level for synaptic plasticity?* Proceedings of the National Academy of Sciences, 108 (48), 19103 - 19104, 2011.

9. **Brea J., Senn W. and Pfister J.P.** Sequence learning with hidden units in spiking neural networks. *Advances in Neural Information Processing Systems 24*, edited by J. Shawe-Taylor, R.S. Zemel, P. Bartlett, F.C.N. Pereira and K.Q. Weinberger, 1422-1430, Dec. 2011.
citations: 29

10. **Hennequin G., Gerstner W. and Pfister J.P.** STDP in adaptive neurons gives close-to-optimal information transmission. *Frontiers in Computational Neuroscience*, 4 (143), 1-16, Dec. 2010.
citations: 34

11. **Pfister J.P., Dayan P. and Lengyel M.** Synapses with short-term plasticity are optimal estimators of presynaptic membrane potentials. *Nature Neuroscience*, 13 (10), 1271-1275, Sept. 2010.
citations: 60

    - F1000 factor: 8. (on http://f1000.com/5405967)

12. **Pfister J.P. and Tass P.A.** STDP in oscillatory recurrent networks: theoretical conditions for desynchronization and applications to deep brain stimulation. *Frontiers in Computational Neuroscience*, 4 (22), 1-10, Jul. 2010.
citations: 30

13. **Pfister J.P., Dayan P. and Lengyel M.** Know Thy Neighbour: A Normative Theory of Synaptic Depression. *Advances in Neural Information Processing Systems 22*, edited by Y. Bengio and D. Schuurmans and J. Lafferty and C. K. I. Williams and A. Culotta, MIT Press, Cambridge MA, 1464–1472, Dec. 2009.
citations: 10

14. **Toyoizumi T., Pfister J.P., Aihara K. and Gerstner W.** Optimality Model of Unsupervised Spike-Timing Dependent Plasticity: synaptic memory and weight distribution. *Neural Computation*, 19 (3), 639-671, Mar. 2007.
citations: 57

15. **Pfister J.P. and Gerstner W.** Triplets of Spikes in a Model of Spike-Timing-Dependent Plasticity. *The Journal of Neuroscience*, 26, 9673-9682, Sept. 2006.
citations: 358

16. **Pfister J.P., Toyoizumi T., Aihara K. and Gerstner W.** Optimal Spike-Timing Dependent Plasticity for Precise Action Potential Firing in Supervised Learning. *Neural Computation*, 18, 1309-1339, June 2006.
citations: 183

17. **Pfister J.P. and Gerstner W.** Beyond Pair-Based STDP: a Phenomenological Rule for Spike Triplet and Frequency Effects. *Advances in Neural Information Processing Systems 18*, edited by Y. Weiss and B. Schölkopf and J. Platt, MIT Press, Cambridge MA, 1083-1090, Jan. 2006.
citations: 14

18. **Toyoizumi T., Pfister J.P., Aihara K. and Gerstner W.** Spike-Timing Dependent Plasticity and Mutual Information Maximization for a Spiking Neuron Model. *Advances in Neural Information Processing Systems 17*, edited by L.K. Saul and Y. Weiss and L. Bottou, MIT Press, Cambridge MA, 1409-1416, Jan. 2005.
citations: 26

19. **Toyoizumi T., Pfister J.P., Aihara K. and Gerstner W.** Generalized Bienenstock-Cooper-Munro rule for spiking neurons that maximizes information transmission. *Proceedings of the National Academy of Sciences USA*, 102, 5239-5244, Jan. 2005.
citations: 104

20. **Pfister J.P., Barber D. and Gerstner W.** Optimal Hebbian Learning: A Probabilistic Point of View. *Artificial Neural Networks and Neural Information Processing - ICANN/ICONIP 2003*, edited by O. Kaynak, E. Alpaydin, E. Oja and L. Xu. Berlin: Springer-Verlag, 92-98, 2003.
citations: 29

PhD Thesis

1. **Pfister J.P.** Theory of Non-linear Spike-Time-Dependent Plasticity. PhD Thesis, EPFL, Lausanne, 2006.

Conference abstracts

1. **Kutschireiter A., Surace S.C. and Pfister J.-P.** Nonlinear filtering and learning for point emission processes. *Bernstein conference*, 2017.
2. **Ibrahimovic E. Müller M. and Pfister J.-P.** Learning Quantal Parameters through Expectation-Maximization. *Conference Abstract: Computational Neuroscience meeting CNS*2017*, 2017.
3. **Shen H.-A., Surace S.C. and Pfister J.P.** Optimal refractoriness from a rate-distortion perspective. *Conference Abstract: Computational Neuroscience meeting CNS*2017*, 2017.
4. **Kutschireiter A., Surace S.C. and Pfister J.P.** The Neural Particle Filter. *International Conference on Mathematical Neuroscience*, 2017.
5. **Jegminat J. and Pfister J.P.** Bayesian Spike-Timing Dependent Plasticity. *Conference Abstract: Computational and Systems Neuroscience 2017*, 2017.
6. **Mazara J., Pfister J.P. and Stoll S.** Modelling the acquisition rate of verb vocabulary in Russian children. *Societas Linguistica Europaea (SLE)*, 2016.
7. **Dziennik P. and Pfister J.P.** Suppression in a normative model of spike-timing dependent plasticity. *International Conference on Mathematical Neuroscience*, 2016.
8. **Kutschireiter A., Surace S.C. and Sprekeler, H, Pfister, J.P.** Approximate sampling-based Bayesian inference in a recurrent neuronal network. *International Conference on Mathematical Neuroscience*, 2016.
9. **Surace S.C. and Pfister J.P.** A Flexible and Tractable Statistical Model for In Vivo Neuronal Dynamics. *Conference Abstract: Computational and Systems Neuroscience 2015*, 2015.
10. **Kutschireiter A., Surace S.C. Sprekeler H* and Pfister J.P.*** Approximate nonlinear filtering with a recurrent neural network. *Conference Abstract: Computational Neuroscience meeting CNS*2015*, 2015.
11. **Surace S.C. and Pfister J.P.** Short-term facilitation as a normative consequence of presynaptic spike-rate adaptation. *Conference Abstract: Computational and Systems Neuroscience 2014*, 2014.
12. **Brea J., Senn W. and Pfister, J.P.** Learning Activity Patterns in Recurrent Networks of Visible and Hidden Spiking Neurons. *Conference Abstract: Computational and Systems Neuroscience 2013*, 2013.
13. **Surace S.C. and Pfister J.P.** Adaptive Gaussian Poisson process: a model for in vivo neuronal dynamics. *Conference Abstract: Computational and Systems Neuroscience 2013*, 2013.
14. **Pfister J.P., and Lengyel M.** Interactions between short-term and long-term plasticity: shooting for a moving target. *Conference Abstract: Computational and Systems Neuroscience 2011.* Available from Nature Precedings: http://dx.doi.org/10.1038/npre.2011.5857.1, 2011.

15. **Pfister J.P., Dayan P. and Lengyel M.** A normative theory of short-term synaptic plasticity. *Front. Neurosci. Conference Abstract: Computational and Systems Neuroscience 2010*, 2010.

16. **Hennequin G., Pfister J.P. and Gerstner W.** Spike timing-dependent plasticity interacts with neural dynamics to enhance information transmission. *Front. Neurosci. Conference Abstract: Computational and Systems Neuroscience 2010*, 2010.

17. **Pfister J.P. and Lengyel M.** Speed versus accuracy in spiking attractor networks. *Front. Syst. Neurosci. Conference Abstract: Computational and Systems Neuroscience 2009*, 2009

18. **Toyoizumi T., Pfister J.P., Aihara K. and Gerstner W.** Spike-timing dependent and homeostatic plasticity from an optimality viewpoint. *Neuroscience Research*, 55, S22, 2006.

19. **Pfister J.P., Gerstner W.** Beyond Pair-Based STDP: a Phenomenological Rule for Spike Triplet and Frequency Effects. *Conference Abstract: Computational and Systems Neuroscience 2006*, 2006.

20. **Pfister J.P., Toyoizumi T., Barber D. and Gerstner W.** Optimal Spike Pattern Detection Leads to STDP *Conference Abstract: Computational and Systems Neuroscience 2005*, 2005.

21. **Pfister J.P., Barber D. and Gerstner W.** Optimal Spike-Timing Dependent Plasticity for Precise Action Potential Firing *Conference Abstract: Computational Neuroscience meeting CNS*2004*, 2004.

22. **Pfister J.P., Barber D. and Gerstner W** A maximum likelihood approach to spike-timing-dependent plasticity. *Conference Abstract: Computational Neuroscience meeting CNS*2003*, 2003.

Citations

- Total number of citations: 1142 (from Google Scholar)
- H index: 14
- Note: * Equal contributions.