Curriculum Vitae

Fabian Kloosterman, Ph.D.

Leuven University
Tiensestraat 102 - box 3714, 3000 Leuven, Belgium
phone: +1 202 503 5343
kloosterman.fabian@gmail.com

In brief

As a neuroscientist who explores the link between brain, cognition, and behavior, I have a strong interest in the physiology of learning and memory.

I have more than two decades of experience in measuring and analyzing brain activity and building new tools to increase our understanding of brain function. With over 10 years of experience as a research team leader, I have supervised over 20 junior researchers, acquired research funding and published our work on decoding the brain systems that support spatial memory and navigation.

As an educator, I enjoy explaining complex topics to others in an understandable manner, whether this is as part of supervision of junior researchers, teaching courses about brain science or writing tutorials for data analysis methods.

In my work, I love to work on and solve challenging problems, and I take pride in building clear and eye-pleasing data visualizations.

Expertise: experimental and computational neuroscience, neurophysiology, neuroengineering, real-time signal analysis, data science, advanced coding in Python and C++.

Research experiences & positions

2020 – present Associate Professor, Faculty of Psychology and Educational Sciences, Leuven University, Belgium

2012 – 2020 Assistant Professor, Faculty of Psychology and Educational Sciences, Leuven University, Belgium

As Assistant/Associate Professor, I supervise PhD students and MSc students. Teaching master-level courses in neuroscience and created a new course with lectures on the fundamentals of neurobiology, and state-of-the-art techniques and contemporary research questions in the field of neural systems and circuits.

2013 – 2022 Member of Management Committee, Neuro-Electronics Research Flanders

Neuro-Electronics Research Flanders is a small research center that is part of Leuven University, the Flemish Institute for Biotechnology (VIB) and imec nanoelectronics research center. The management committee is responsible for the scientific, logistic, administrative, personnel and financial management of the institute. My specific responsibilities included: responsible for lab infrastructure, member of animal welfare body and organizing recruitment of new group leaders and PhD students.

2011 – 2022 Principal Investigator, Neuro-Electronics Research Flanders

Managing a lab of PhD and postdoctoral reseachers to study neural mechanisms of spatial learning in rodents. Designed experiments, analyzed behavioral data and electrophysiological signals, and published over 20 papers since 2011. Successfully acquired national and European research funding.

2003 – 2011 Post-Doctoral Fellow & Associate with Prof. Matthew Wilson, Massachusetts Institute of Technology, Cambridge MA, USA

Education and Training

1998 – 2003	Ph.D. Neurobiology, University of Amsterdam, The Netherlands Promotors: Fernando Lopes da Silva and Menno Witter Thesis: "Interactions between the hippocampal formation and the entorhinal cortex: evidence for reentrant circuits"
1994 – 1998	M.Sc. (cum laude) Medical Biology, University of Amsterdam, The Netherlands
1997 – 1998	Master research training with Stan Leung, University of Western Ontario, Canada
1997	Master research training with Ger Ramakers, Netherlands Institute for Brain Research

Grants and Trainee fellowships

2022 – 2025 (awarded)	FWO research project (promotor) Contributions of hippocampal-prefrontal networks to memory Funding: € 472k
2021 – 2024 (running)	FWO research project (promotor) Linking past to future: contributions of awake hippocampal replay to learning Funding: € 408k
2017 – 2021 (completed)	EU FET Open grant "STARDUST" (consortium member, led by prof. Farshad Moradi) In vivo optogeneticS, elecTrophysiology and phArmacology with an ultRasonically-powered DUST for Parkinson's Disease Funding: € 417k (total grant € 3787k)
2017 – 2021 (completed)	Leuven University intra-mural C1 research grant (co-promotor, together with prof. Rudi D'Hooge) FLEXIBRAIN: The study of telencephalic interactions at the basis of behavioral flexibility Funding: € 264k (total grant € 528k)
2016 – 2020 (completed)	FWO research project (co-promotor, together with prof. Alexander Bertrand) Distributed signal processing algorithms for spike sorting in next-generation high-density neuroprobes Funding: € 200k (total grant € 400k)
2014 (completed)	VIB Tech Watch (promotor, together with Profs. Carmen Bartic and Matthew Holt) Dual-colour implantable mini fluorescent microscope for imaging brain function in behaving rodents Funding: € 25k
2011 – present	Annual NERF grant Funding: € 220k/year
2020 – 2024	Leuven University – Taiwan PhD Fellowship for Yu-Ting Wei
2019 – 2023	Leuven University – Taiwan PhD Fellowship for Ta-Shun Su
2019 – 2023	Baekeland PhD mandate for Rik van Daal (with Atlas Neuroengineering and prof. Michael Kraft)
2018 – 2022	FWO PhD fellowship for Lies Deceuninck

Invited Talks

2019	3rd International Neuromodulation Workshop, Ghent University, Belgium
2019	Spring Hippocampal Research Conference, Taormina, Italy
2017	Workshop "Functional network dynamics of the hippocampus", Bernstein Conference, Göttingen, Germany
2016	Workshop "Internally-generated sequences in the hippocampus", Ariccia, Italy
2016	Bernstein Sparks Workshop, Munich, Germany
2016	NERF Neurotechnology symposium, Leuven, Belgium
2016	SNI Lecture series, Innsbruck, Austria
2015	Belgian Society for Neuroscience, Mons, Belgium
2014	GDR Multielectrode Annual Meeting, Gif sur Yvette, France
2014	Neuronus conference, Krakow, Poland
2013	Neurotechnology symposium, Nijmegen, Netherlands
2011	Neuroelectronics seminar, imec, Leuven, Belgium

Mentoring

2011 – present NERF and Leuven University

Currently lead group of 2 Postdoctoral Fellows, 6 Ph.D. students (promotor: 5, co-promotor: 1) and a software engineer. Four former Ph.D. students successfully defended their thesis. I mentored over 20 Bachelor/Master students (research thesis or internship).

2003 – 2011 Massachusetts Institute of Technology

Supervised and mentored undergraduate students through MIT's Undergraduate Research Opportunities Program. Mentored and advised graduate students and junior postdocs.

1998 – 2003 University of Amsterdam

Teaching Assistant for biology laboratory courses (Zoology, Neuroanatomy, Methods in Neurobiology). Supervised research project of Master Student, provided daily instruction and mentorship.

Teaching

2018 – present	Neural Systems and Circuits, Biophysics master course, Leuven University coordinator together with prof. Vincent Bonin
2014 – present	Hot Topics in System and Cognitive Neurosciences Biomedical Sciences master course, Leuven University
2016	State of the Art Lecture in Biomedicine, Antwerp University
2014	Nanotechnology in Health, PhD course lecture, imec
2014	Capita Selecta of Nanoscience and Nanotechnology, Leuven University
2013	Nanobiotechnology symposium, VIB
2012	Brain Circuits, PhD course lecture, Karolinska Institute

Doctoral dissertations

2016 – 2020 (completed)	Jasper Wouters, Leuven University (co-promotor) Design and validation of low-complexity methods for resolving spike overlap in neuronal spike sorting
2012 – 2019 (completed)	Frédéric Michon, Leuven University (promotor) Hippocampal replay of neuronal activity patterns promotes the retention of salient experiences
2012 – 2018 (completed)	Davide Ciliberti, Leuven University (promotor) Real-time detection of hippocampal replay patterns for closed-loop experiments
2013 – 2018 (completed)	Bogdan Raducanu, Leuven University (co-promotor) Massive Parallel Readout Circuits for In-Vivo Signal Acquisition
2017 – present (ongoing)	Hanna den Bakker, Leuven University (promotor) Hippocampal-prefrontal circuitry underlying cognitive flexibility
2018 – present (ongoing)	Rik van Daal, Leuven University (co-promotor) Active ultra-flexible, high-density electrode arrays for chronic deep brain neural interfacing
2018 – present (ongoing)	Katarzyna Bzymek, Leuven University (promotor) Application of distributed algorithms to neural signals from high-density neuroprobes for detailed study of the brain's memory system
2018 – present (ongoing)	Lies Deceuninck, Leuven University (promotor) The neurophysiological basis of recent event working memory
2019 – present (ongoing)	Ta-Shun Su, Leuven University (promotor) Decoding the neural circuits for spatial memory
2020 – present (ongoing)	Yu-Ting Wei, Leuven University (co-promotor) Role of the retrosplenial cortex in visually-guided navigation

Honors, Awards and Fellowships

2003	NWO Talent Fellowship for Postdoctoral Research
1998	M.Sc. conferred with honors (“cum laude”)
1997	Individual fellowships for Master research training: Stichting Dr. Hendrik Muller’s Vaderlandsch Fonds, Amsterdam University Society, Dutch National Epilepsy Fund, Dutch Brain Foundation, Stichting Bekker-La Bastide-Fonds

Technology transfer

2017	Patent application: Yassin YH, Catthoor F, Kjeldsberg PG, Kloosterman F, Sun JJ, Couto J. A method for processing sensor data in a neuroprobe. Patent Application Number: EP3415085. Filed on 14 June 2017.

Peer review

Nature Communications, eLife, Frontiers, Journal of Comparative Neurology, Journal of Computational Neuroscience, Journal of Neural Engineering, Journal of Neuroscience, Journal of Neuroscience Methods, Advances in Cognitive Psychology, Cell Reports, Neuron

Publications

Manuscripts in preparation

1. Bzymek K, **Kloosterman F**. Theta-cycle skipping in the lateral septum. (in preparation)

Preprints (under review)

2. Deceuninck L, **Kloosterman F.** (2022) Awake hippocampal replay is not required for short-term memory. **bioRxiv** 2022.11.03.514989; doi: https://doi.org/10.1101/2022.11.03.514989
3. Den Bakker H, Van Dijck M, Sun JJ, **Kloosterman F.** (2022) Sharp-wave ripple associated activity in the medial prefrontal cortex supports spatial rule switching. **bioRxiv** 2022.11.03.515023; doi: https://doi.org/10.1101/2022.11.03.515023

Journal articles, peer reviewed, published or in press

4. Kim CY, Kim SJ, **Kloosterman F** (2022) Simultaneous Cellular Imaging, Electrical Recording and Stimulation of Hippocampal Activity in Freely Behaving Mice. **Experimental Neurobiology** 31(3):208-220. doi: 10.5607/en22011. [IF: 3.8]
5. Michon F, Krul E, Sun JJ, **Kloosterman F** (2021) Single-trial dynamics of hippocampal spatial representations are modulated by reward value. **Current Biology** S0960-9822(21)01048-4. doi: 10.1016/j.cub.2021.07.058. [IF: 9.2].
6. Wouters J, **Kloosterman F**, Bertrand A (2021) A data-driven spike sorting feature map for resolving spike overlap in the feature space. **Journal of Neural Engineering** 18(4). doi: 10.1088/1741-2552/ac0f4a. [IF: 4.8]
7. Van Daal R[#], Çağatay A[#], Michon F[#], Aarts A, Kraft M, **Kloosterman F***, Haesler S* (2021) Chronic Neuropixels recordings in mice and rats. **Nature Protocols**. doi: 10.1038/s41596-021-00539-9. (# equal contribution, * co-senior authors). [IF: 10.4]
8. Steinmetz NA, Aydin C, Lebedeva A, Okun M, Pachitariu M, Bauza M, Beau M, Bhagat J, Böhm C, Broux M, Chen S, Colonell J, Gardner RJ, Karsh B, **Kloosterman F**, Kostadinov D, Mora-Lopez C, O'Callaghan J, Park J, Putzeys J, Sauerbrei B, van Daal RRJ, Vollan AZ, Wang S, Welkenhuysen M, Ye Z, Dudman JT, Dutta B, Hantman AW, Harris KD, Lee AK, Moser EI, O'Keefe J, Renart A, Svoboda K, Häusser M, Haesler S, Carandini M, Harris TD (2021) Neuropixels 2.0: A miniaturized high-density probe for stable, long-term brain recordings. **Science** 372(6539):eabf4588. doi: 10.1126/science.abf4588. [IF: 41.8]
9. Wouters J, Patrinos P, **Kloosterman F**, Bertrand A (2020) Multi-Pattern Recognition Through Maximization of Signal-to-Peak-Interference Ratio with Application to Neural Spike Sorting. **IEEE Transactions on Signal Processing** 68:6240-6254. doi: 10.1109/TSP.2020.3033973. [IF 5.0]
10. Wouters J, **Kloosterman F**, Bertrand A (2020) SHYBRID: A graphical tool for generating hybrid ground-truth spiking data for evaluating spike sorting performance. **Neuroinformatics**. doi: 10.1007/s12021-020-09474-8. [IF 3.3]
11. Michon F, Sun JJ, Kim CY, **Kloosterman F** (2020) A Dual Reward-Place Association Task to Study the Preferential Retention of Relevant Memories in Rats. **Frontiers in Behavioral Neuroscience** 14:69. [IF 2.5]
12. Van Daal R, Sun JJ, Ceyssens F, Michon F, Kraft M, Puers R, **Kloosterman F** (2020) System for recording from multiple flexible polyimide neural probes in freely behaving animals. **Journal of Neural Engineering** 17(1), 016046. doi: 10.1088/1741-2552/ab5e19. [IF: 4.8]

13. Michon F, Sun JJ, Kim CY, Ciliberti D, **Kloosterman F** (2019) Post-learning hippocampal replay selectively reinforces spatial memory for highly rewarded locations. **Current Biology** 29(9):1436-1444.e5. [IF: 9.2]

14. Hu S, Ciliberti D, Grosmark AD, Michon F, Ji D, Penagos H, Buzsáki G, Wilson MA, **Kloosterman F***, Chen Z* (2018) Real-Time Readout of Large-Scale Unsorted Neural Ensemble Place Codes. **Cell Reports** 25 (10), 2635-2642.e5 *(* equal contribution, co-senior author)* [IF: 8.1]

15. Ciliberti D, Michon F, **Kloosterman F** (2018) Real-time classification of experience-related ensemble spiking patterns for closed-loop applications. **Elife** 7, e36275. doi: 10.7554/eLife.36275 [IF: 7.1]

16. Wouters J, **Kloosterman F**, Bertrand A (2018) Towards online spike sorting for high-density neural probes using discriminative template matching with suppression of interfering spikes. **Journal of Neural Engineering** 15 (5), 056005. [IF: 4.8]

17. Yassin YH, Catthoor F, **Kloosterman F**, Couto J, Sun JJ, Kjeldsberg PG, Van Helleputte N (2018). Algorithm/Architecture Co-optimisation Technique for Automatic Data Reduction of Wireless Read-Out in High-Density Electrode Arrays. **ACM Transactions on Embedded Computing Systems** 17(3), 1-19. [IF: 2.6]

18. Tanila H, Ku S, **Kloosterman F**, Wilson MA (2018). Characteristics of CA1 place fields in a complex maze with multiple choice points. **Hippocampus** 28 (2), 81-96. [IF: 3.5]

19. Raducanu BC, Yazicioglu RF, Lopez CM, Ballini M, Putzeys J, Wang S, Andrei A, Rochus V, Welkenhuysen M, Van Helleputte N, Musa S, Puers R, **Kloosterman F**, Van Hoof C, Fiáth R, Ulbert I, Mitra S (2017). Time Multiplexed Active Neural Probe with 1356 Parallel Recording Sites. **Sensors** 17 (10), 2388. [IF: 3.3]

20. Neumann AR, Raedt R, Steenland HW, Sprengers M, Bzymek K, Navratilova Z, Mesina L, Xie J, Lapointe V, **Kloosterman F**, Vonck K, Boon PAJM, Soltesz I, McNaughton BL, Luczak A (2017). Involvement of fast-spiking cells in ictal sequences during spontaneous seizures in rats with chronic temporal lobe epilepsy. **Brain** 140 (9), 2355-2369. [IF: 11.3]

21. Ciliberti D, **Kloosterman F** (2017). Falcon: a highly flexible open-source software for closed-loop neuroscience. **Journal of Neural Engineering** 14 (4), 045004. [IF: 4.8]

22. Michon F, Aarts A, Holzhammer T, Ruther P, Borghs G, McNaughton B, **Kloosterman F** (2016). Integration of silicon-based neural probes and micro-drive arrays for chronic recordings of large populations of neurons in behaving animals. **Journal of Neural Engineering** 13(4):046018. [IF: 4.8]

23. Agarwal R, Chen Z, **Kloosterman F**, Sarma SV (2016). A Novel Nonparametric Approach for Neural Encoding and Decoding Models of Multimodal Receptive Fields. **Neural Computation** 28(7):1356-87. [IF: 2.5]

24. Sodkomkham D, Ciliberti D, Wilson MA, Fukui K, Moriyama K, Numao M, **Kloosterman F** (2016). Kernel density compression for real-time Bayesian encoding/decoding of unsorted hippocampal spikes. **Knowledge-Based Systems** 94:1-12. [IF: 5.1]

25. Gomperts SN, **Kloosterman F**, Wilson MA (2015). VTA neurons coordinate with the hippocampal reactivation of spatial experience. **eLife** doi:10.7554/eLife.05360. [IF: 7.1]

26. Zhang J, Mitra S, Suo S, Cheng A, Xiong T, Michon F, Welkenhuysen M, **Kloosterman F**, Chin PS, Hsiao S, Tran TD, Yazicioglu F, Etienne-Cummings R (2015). A closed-loop compressive-sensing-based neural recording system. **Journal of Neural Engineering** 12(3):036005. [IF: 4.8]

27. **Kloosterman F**, Layton S, Chen Z, Wilson MA (2014). Bayesian Decoding using Unsorted Spikes in the Rat Hippocampus. **Journal of Neurophysiology** 111(1):217-27. [IF: 2.2]

28. Chen Z, **Kloosterman F**, Brown EN, Wilson MA (2012). Uncovering spatial topology represented by rat hippocampal population neuronal codes. **Journal of Computational Neuroscience** 33(2):227-55. [IF: 1.7]

29. Nguyen DP, **Kloosterman F**, Barbieri R, Brown EN, Wilson MA (2009). Characterizing the dynamic frequency structure of fast oscillations in the rodent hippocampus. **Frontiers in Integrative Neuroscience** 3:11. [IF: 3.1]

30. Davidson TJ*, **Kloosterman F***, Wilson MA (2009). Hippocampal replay of extended experience. **Neuron** 63(4): 497-507. (**equal contribution, F. Kloosterman is corresponding author)* [IF: 14.4]

31. **Kloosterman F**, Davidson TJ, Gomperts SN, Layton SP, Hale G, Nguyen DP, Wilson MA (2009). Micro-drive array for chronic in vivo recording: drive fabrication. **Journal of Visualized Experiments** (26). pii: 1094. [IF: 1.2]

32. Nguyen DP, Layton SP, Hale G, Gomperts SN, Davidson TJ, **Kloosterman F**, Wilson MA (2009). Micro-drive array for chronic in vivo recording: tetrode assembly. **Journal of Visualized Experiments** (26). pii: 1098. [IF: 1.2]

33. Poon N, **Kloosterman F**, Wu C, Leung LS (2006). Presynaptic GABA(B) receptors on glutamatergic terminals of CA1 pyramidal cells decrease in efficacy after partial hippocampal kindling. **Synapse** 59(3): 125-134. [IF: 2.9]

34. Tolner EA, **Kloosterman F**, van Vliet EA, Witter MP, Lopes da Silva FH, Gorter JA (2005). Presubiculum stimulation in vivo evokes distinct oscillations in superficial and deep entorhinal cortex layers in chronic epileptic rats. **Journal of Neuroscience** 25 (38): 8755-8765. [IF: 5.6]

35. Tolner EA, **Kloosterman F**, Kalitzin SN, Lopes da Silva FH, Gorter JA (2005). Physiological changes in chronic epileptic rats are prominent in superficial layers of the medial entorhinal area. **Epilepsia** 46(suppl 5): 72-81. [IF: 6.5]

36. **Kloosterman F**, van Haeften T, Lopes da Silva FH (2004). Two reentrant pathways in the hippocampal-entorhinal system. **Hippocampus** 14(8): 1026-1039. [IF: 3.5]

37. **Kloosterman F**, van Haeften T, Witter MP, Lopes da Silva FH (2003). Electrophysiological characterization of interlaminar entorhinal connections: an essential link for reentrance in the hippocampal-entorhinal system. **European Journal of Neuroscience** 18(11): 3037-3052. [IF: 3.1]

38. **Kloosterman F**, Witter MP, van Haeften T (2003). Topographical and laminar organization of subicular projections to the parahippocampal region of the rat. **Journal of Comparative Neurology** 455(2): 156-171. [IF: 2.8]

39. Townsend G, Peloquin P, **Kloosterman F**, Hetke J, Leung LS (2002). Recording and marking with silicon multichannel electrodes. **Brain Research Protocols** 9(2): 122-129.

40. **Kloosterman F**, Peloquin P, Leung LS (2001). Apical and basal orthodromic population spikes in hippocampal CA1 in vivo show different origins and patterns of propagation. **Journal of Neurophysiology** 86(5): 2435-2444. [IF: 2.2]

Conference proceedings (peer reviewed)

41. Wouters J, **Kloosterman F**, Bertrand A (2020) A neural network-based spike sorting feature map that resolves spike overlap in the feature space. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP). doi: 10.1109/ICASSP40776.2020

42. Wouters J, **Kloosterman F**, Bertrand A (2019) A data-driven regularization approach for template matching in spike sorting with high-density neural probes. 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany, 2019, pp. 4376-4379.

43. Wouters J, **Kloosterman F**, Bertrand A (2019) Signal-to-peak-interference ratio maximization with automatic interference weighting for threshold-based spike sorting of high-density neural probe data. 9th International IEEE/EMBS Conference on Neural Engineering (NER), San Francisco, CA, USA. pp. 247-250. doi: 10.1109/NER.2019.8716953

44. Wouters J, **Kloosterman F**, Bertrand A (2018). Data-driven multi-channel filter design with peak-interference suppression for threshold-based spike sorting in high-density neural probes. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP). doi: 10.1109/ICASSP.2018.8462517

45. Raducanu BC, Yazicioglu RF, Lopez CM, Ballini M, Putzeys J, Wang S, Andrei A, Welkenhuysen M, Van Helleputte N, Musa S, Puers R, **Kloosterman F**, Van Hoof C, Mitra S (2016). Time multiplexed active neural probe with 678 parallel recording sites. Solid-State Device Research Conference (ESSDERC), 2016 46th European, 385-388.

46. Yazicioglu RF, Mora Lopez C, Mitra S, Raducanu B, Musa S, **Kloosterman F** (2014). Ultra-High Density In-Vivo Neural Probes. 36th Annual International IEEE EMBS Conference.

47. Chen Z, **Kloosterman F**, Wilson MA, Brown EN (2010). Variational Bayesian inference for point process generalized linear models in neural spike trains analysis. In 2010 IEEE International Conference on Acoustics, Speech and Signal Processing, pp 2086-2089.

Book chapters

48. Chen Z, **Kloosterman F**, Wilson MA (2015). Probabilistic approaches to uncover rat hippocampal population codes. In: Advanced State Space Methods for Neural and Clinical Data, Z. Chen (Ed.), Cambridge University Press.

49. **Kloosterman F** (2012). Analysis of hippocampal memory replay using neural population decoding. In: Neuromethods, Neuronal Network Analysis, T. Fellin and M. Halassa (Eds.), Springer.

1. Michon F[#], Sun JJ[#], Kim CY[#], Ciliberti D, **Kloosterman F**. Post-learning Hippocampal Replay Selectively Reinforces Spatial Memory for Highly Rewarded Locations. Curr Biol. 2019 May 6;29(9):1436-1444.e5. PubMed PMID: 31031113. ([#] equal contribution)

2. Michon F, Krul E, Sun JJ, **Kloosterman F**. Single-trial dynamics of hippocampal spatial representations are modulated by reward value. Curr Biol. 2021 Aug 13; PubMed PMID: 34416178.

   Hippocampal reactivation of experience-related neural activity patterns ("replay") has been hypothesized to contribute to the learning and consolidation of novel spatial representations and task rules. In these two papers we asked if and how hippocampal replay contributes to learning of new place-reward associations that vary in reward magnitude. For this we developed a new behavioral task to directly compare the memorization of high-value and low-value experiences (Michon et al., 2020). We discovered that during learning of the location of a reward, the brain's representation of space is updated. Importantly, higher reward value accelerates the updating process (Michon et al., 2021). We further found that subsequent memory for large (but not small) reward association was both correlated with trajectory replay in the hippocampus and negatively affected by non-specific disruption of replay events during a rest period between acquisition and memory test (Michon et al., 2019). These findings suggest that post-learning replay serves to protect the high-value memory traces from degradation or interference during sleep.

3. Davidson TJ[*], **Kloosterman F[*,#]**, Wilson MA. Hippocampal replay of extended experience. Neuron. 2009 Aug 27;63(4):497-507. PubMed Central PMCID: PMC4364032. (* equal contribution, # corresponding author)

   In this high-impact and often cited paper, we showed that while the rat brain is not actively engaged in a task, memory traces of long-duration experiences are reactivated at high speed. The neural reactivation process likely contributes to the long-term storage and stabilization of newly learned material. We found that reactivation unfolds in a chunked manner, which could allow for the flexible expression and rearrangement of memory traces for guiding future behavior. In a more recent study (Gomperts et al., 2015) we showed a link between memory reactivation and neurons that signal reward. This coordination between the reward system and spatial memory system in the brain indicates that a wider network of brain regions is involved in the reactivation process, which may contribute to the reinforcement of rewarded experiences.

4. Ciliberti D, Michon F, **Kloosterman F**. Real-time classification of experience-related ensemble spiking patterns for closed-loop applications. eLife. 2018 Oct 30;7 PubMed Central PMCID: PMC6207426.

   To reveal the causal role of short-lasting reactivated neural activity patterns in learning and memory consolidation, it is necessary to specifically manipulate the occurrence of these events at the millisecond timescale. In this paper we were the first to experimentally demonstrate the real-time detection and classification of hippocampal replay patterns. The system we developed can not only be used to address outstanding questions regarding the role of hippocampal replay events, but also be extended to other internally generated activity patterns.

5. Van Daal R[#], Çağatay A[#], Michon F[#], Aarts A, Kraft M, **Kloosterman F***, Haesler S* (2021) Chronic Neuropixels recordings in mice and rats. Nature Protocols. doi: 10.1038/s41596-021-00539-9. (# equal contribution, * co-senior authors).

   A major goal in neuroscience is to reveal how the brain's cellular networks perform computations that support cognition. To reach this goal, the ability to chronically measure the activity of large neuronal populations in behaving animals is crucial. The last decades have seen a gradual improvement and expansion of available neurotechnologies to record brain activity. In the past 12 years, I have contributed to this endeavor in multiple ways. Very recently, we designed 3D-printed implants for the new generation neuropixels probes that are easy to assemble, reusable and support multiple neuropixels probes. These developments promise to dramatically increase the number of cells that can be recorded simultaneously for extended periods of time in behaving rodents.