

**Jörn Simon Wiegert, Ph. D.****Curriculum Vitae**

**Name:** Jörn Simon Wiegert  
**Date of birth:** 18.08.1979  
**Nationality:** German  
**Marital status:** married, three children  
**Contact details:** Chair of Neurophysiology, co-director of the Mannheim Center for Translational Neuroscience  
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**ACADEMIC POSITIONS**

**since 10/2022** **Chair of Neurophysiology (W3)** at the Medical Faculty Mannheim of the University Heidelberg  
 Co-director of the Mannheim Center for Translational Neuroscience (MCTN)

**09/2018-09/2022** **Professor (W2) for Neurophysiology and Optogenetics** at the University Medical Center Hamburg Eppendorf, ZMNH Hamburg, Germany  
 RG Synaptic Wiring and Information Processing  
 Tenured: 02/2022

**04/2017-08/2018** **Independent group leader** at the ZMNH Hamburg, Germany  
 RG Synaptic Wiring and Information Processing

**03/2012-03/2017** **Senior postdoctoral fellow** at the ZMNH Hamburg, Germany  
 Institute for Synaptic Physiology, laboratory of Prof. Thomas Oertner

**09/2009-02/2012** **Marie-Curie postdoctoral fellow** at the Friedrich-Miescher Institute Basel, Switzerland  
 Department of Neurobiology, laboratory of Dr. Thomas Oertner

**04/2009-08/2009** **Postdoctoral fellow** at the University Heidelberg, Germany  
 Interdisciplinary Center for Neurosciences, laboratory of Prof. Hilmar Bading

**EDUCATION**

**11/2005-03/2009** **PhD thesis** at the University of Heidelberg, Germany  
 Interdisciplinary Center for Neurosciences, laboratory of Prof. Hilmar Bading  
 Grade: 1.0 (magna cum laude)

**08/2003-02/2004** **Internship** at the Monash University, Melbourne, Australia  
 Monash Institute for Medical Research, laboratory of Prof. Ban-Hock Toh

**2001-2005**            **Research assistant** at MPI for Medical Research, Heidelberg, Germany, laboratory of Prof. Bert Sakmann

**10/2000-11/2005**   **Diploma in Biology** at the University of Heidelberg, Germany  
Grade: 1.0 (with distinction)

## **GRANTS / FELLOWSHIPS / AWARDS**

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- 2024**            DFG-funded major research equipment: holographic 2-photon intravital microscope (No. INST 35/1809-1 FUGG)
- 2024**            ERC PoC Grant: “HyFiPhotometry”
- 2022**            Hamburg Innovations, Calls for Transfer „Glasfaserbasiertes Auslesen und Steuerung der Aktivität erregbarer Organsysteme“ (No. C4T734)
- 2019**            DFG grant: “Dopaminergic control of dorsal hippocampal networks during behavior” (part of SFB 936)
- 2019**            DFG grant: “Optogenetic silencing tools for precise, all-optical analysis of synaptic circuits” (No. WI 4485/3-2, part of SPP1926)
- 2018**            DFG grant: “Synaptic plasticity and stability in the context of hippocampal information processing” (No. WI 4485/2-2, part of research unit FOR2419)
- 2017**            ERC starting grant: “LIFE synapses” (No. 714762)
- 2016**            DFG grant: “Development of next-generation light-gated inhibitory ion channels to probe somatosensory integration in the Drosophila nociceptive circuit in vivo” (No. WI 4485/3-1, part of SPP1926)
- 2015**            DFG grant: “Dynamic rewiring of hippocampal circuits following synaptic plasticity” (No. WI 4485/2-1, part of research unit FOR2419)
- 2013, 2014**    2x ‘Paper of the month’ selected by the University Medical Center Hamburg-Eppendorf
- 2010 - 2012**   Marie-Curie Postdoctoral Fellowship (within EU/FP7 framework)
- 2008 - 2014**   Travel grants awarded by the German Academic Exchange Service (DAAD), German Neuroscience Society (NWG) & “Deutsche Forschungsgemeinschaft” (DFG)
- 2005**            Diploma in Biology with distinction

## PUBLICATIONS

### Peer reviewed publications:

- 1) Wietek, J., Nozownik, A., Pulin, M., Saraf-Sinik, I., Matosevich, N., Malan, D., Brown, B. J., Dine, J., Levy, R., Litvin, A., Regev, N., Subramaniam, S., Bitton, E., Benjamin, A., Copits, B. A., Sasse, P., Rost, B. R., Schmitz, D., Soba, P., Nir, Y., **Wiegert, J.S.**, Yizhar, O. (2024). A bistable inhibitory OptoGPCR for multiplexed optogenetic control of neural circuits. **Nat Meth** *in press*
- 2) Schwarzova, B., Studemann, T., Sonmez, M., Rossinger, J., Pan, B., Eschenhagen, T., Stenzig, J., **Wiegert, J.S.**, Christ, T., and Weinberger, F. (2023). Modulating cardiac physiology in engineered heart tissue with the bidirectional optogenetic tool BiPOLES. **Pflugers Arch**. DOI: 10.1007/s00424-023-02869-x
- 3) Nicolas, C., Ju, A., Wu, Y., Delcasso, S., Eldirdiri, H., Supiot, L., Fornari, C., Jacky, D., Vérité, A., Masson, M., Rodriguez-Rozada, S., **Wiegert, J.S.**, Beyeler, A. (2023). Linking valence and anxiety in a mouse insula-amygdala circuit. **Nat Commun** 14(1): 5073. DOI: 10.1038/s41467-023-40517-1
- 4) Kagiampaki, Z., Rohner, V., Kiss, C., Curreli, S., Dieter, A., Wilhelm, M., Harada, M., Duss S.N., Dernic, J., Bhat, M.A., Zhou, X., Ravotto, L., Ziebarth, T., Wasielewski, L.M., Sönmez, L., Benke, D., Weber, B., Bohacek, J., Reiner, A., **Wiegert, J.S.**, Fellin, T., Patriarchi, T. (2023). Sensitive multicolor indicators for monitoring norepinephrine in vivo. **Nat Meth** 20(9), 1426-1436, DOI: 10.1038/s41592-023-01959-z
- 5) Formozov, A., Dieter, A., & **Wiegert, J.S.** (2023). A flexible and versatile system for multicolor fiber photometry and optogenetic manipulation. **Cell Rep Meth** 3 (3), DOI: 10.1016/j.crmeth.2023.100418
- 6) Bergs, A. C. F., Liewald, J. F., Rodriguez-Rozada, S., Liu, Q., Wirt, C., Bessel, A., Zeitzschel, N., Durmaz, H., Nozownik, A., Dill, H., Jospin, M., Vierock, J., Bargmann, C. I., Hegemann, P., Wiegert, J. S., & Gottschalk, A. (2023). All-optical closed-loop voltage clamp for precise control of muscles and neurons in live animals. *Nat Commun*, 14(1), 1939. DOI:10.1038/s41467-023-37622-6
- 7) Kubitschke, M., Mueller, M., Wallhorn, L., Pulin, M., Mittag, M., Pollok, S., Ziebarth, T., Bremshey, S., Gerdey, J., Claussen, K.C., Renken, K., Gross, J., Meyer, N., **Wiegert, J.S.**, Reiner, A., Fuhrmann, M., Masseck, O.A. (2022). Next generation genetically encoded fluorescent sensors for serotonin. **Nat Commun** 13(1):7525. DOI: 10.1038/s41467-022-35200-w.
- 8) Duerst, C., **Wiegert, J.S.**, Schulze, C., Helassa, N., Török, K., Oertner, T.G. (2020). The vesicular release probability sets the strength of individual Schaffer collateral synapses. **Nat Commun** 13(1):6126. DOI: 10.1038/s41467-022-33565-6.
- 9) Studemann, T., Roessinger, J., Manthey, C., Geertz, B., Srikantharajah, R., von Bibra, C.C., Shibamiya, A., Koehne, M., Wiehler, A., **Wiegert, J.S.**, Eschenhagen, T., Weinberger, F. (2022). Contractile force of transplanted cardiomyocytes contributes to heart function after injury. **Circulation** 146, 1159-1169. DOI: 0.1161/CIRCULATIONAHA.122.060124.
- 10) Rodriguez-Rozada, S., Wietek, J., Tenedini, F. M., Sauter, K., Hegemann, P., Soba, P., & **Wiegert, J.S.** (2022). Aion is a bistable anion-conducting channelrhodopsin that

- provides temporally extended and reversible neuronal silencing. **Commun Biol**, 5: 687. DOI: 10.1038/s42003-022-03636-x.
- 11) Wagdi, A., Malan, D., Sathyanarayanan, U., Beauchamp, J., Vogt, M., Zipf, D., Beiert, T., Mansuroglu, B., Dusend, V., Meininghaus, M., Schneider, L., Kalthof, B., **Wiegert, J.S.**, König, G.M., Kostenis, E., Patejdl, R., Sasse, P. (2022). Selective optogenetic control of G(q) signaling using human Neuropsin. **Nat Commun** 13, 1765. DOI: 10.1038/s41467-022-29265-w.
  - 12) Formozov, A., Chini, M., Dieter, A., Yang, W., Pöpplau, J., Hanganu-Opatz, I.L., **Wiegert, J.S.** (2022). Calcium imaging and electrophysiology of hippocampal activity under anesthesia and natural sleep in mice. **Scientific Data** 9. DOI: 113. 10.1038/s41597-022-01244-2.
  - 13) Anisimova M., van Bommel B., **Wiegert J.S.**, Mikhaylova M., Oertner T.G., Gee C.E. (2022). Spike-timing-dependent plasticity rewards synchrony rather than causality. **Cerebral Cortex** 33, 23-34. DOI: 10.1093/cercor/bhac050.
  - 14) Pulin, M., Stockhausen, K.E., Masseck, O.A., Kubitschke, M., Busse, B., **Wiegert, J.S.**, and Oertner, T.G. (2022). Orthogonally-polarized excitation for improved two-photon and second-harmonic-generation microscopy, applied to neurotransmitter imaging with GPCR-based sensors. **Biomed Opt Express** 13(2): 777-790. DOI: 10.1364/BOE.448760
  - 15) Imambocus, B.N., Zhou, F., Formozov, A., Wittich, A., Tenedini, F.M., Hu, C., Sauter, K., Varela, E.M., Herédia, F., Casimiro, A.P., Schlegel, P., Yang, C.H., Miguel-Aliaga, I., **Wiegert, J.S.**, Pankratz, M.J., Gontijo, A.M., Cardona, A., Soba, P. (2022) Discrete escape responses are generated by neuropeptide-mediated circuit logic. **Curr Biol** 32 (1), 149-163.e148. DOI: 10.1016/j.cub.2021.10.069.
  - 16) \*Vierock, J., \*Rodriguez-Rozada, S., Dieter, A., Pieper, F., Sims, R., Tenedini, F., Bergs, A.C.F., Bendifallah, I., Zhou, F., Zeitzschel, N., Ahlbeck, J., Augustin S., Sauter, K., Papagiakoumou, E., Gottschalk, A., Soba, P., Emiliani, V., Engel, A.K., Hegemann, P., **Wiegert, J.S.** (2021). BiPOLES is an optogenetic tool developed for bidirectional dual-color control of neurons. **Nat Commun**, 12, 4527. DOI: 10.1038/s41467-021-24759-5. \* equal contributions
  - 17) \*Yang, W., \*Chini, M., Poeplau, J.A., Formozov, A., Piechocinski, P., Rais, C., Morellini, F., Sporns, O., Hanganu-Opatz, I.L., **Wiegert, J.S.** (2021). Anesthetics fragment hippocampal network activity, alter spine dynamics, and affect memory consolidation. **PLOS Biol** 19(4): e3001146. DOI: 10.1371/journal.pbio.3001146, \* equal contributions
  - 18) \*Mahn, M., \*Saraf-Sinik, I., \*Patil, P., \*Pulin, M., Bitton, E., Karalis, N., Bruentgens, F., Palgi, S., Gat, A., Dine, J., Wietek, J., Davidi, I., Levy, R., Litvin, A., Zhou, F., Sauter, K., Soba, P., Schmitz, D., Lüthi, A., Rost, B.R., **Wiegert, J.S.**, Yizhar, O. (2021). Optogenetic silencing of neurotransmitter release with a naturally occurring invertebrate rhodopsin. **Neuron** 109 (10). DOI: 10.1016/j.neuron.2021.03.013 \* equal contributions
  - 19) Westermann, L. M., Fleischhauer, L., Vogel, J., Jenei-Lanzl, Z., Floriano Ludwig, N., Schau, L., Morellini, F., Baranowsky, A., Yorgan, T. A., Di Lorenzo, G., Schweizer, M., de Souza Pinheiro, B., Guarany, N. R., Sperb-Ludwig, F., Visioli, F., Oliveira Silva, T., Soul, J., Hendrickx, G., **Wiegert, J. S.**, Schwartz, I. V. D., Clausen-Schaumann, H., Zaucke, F., Schinke, T., Pohl, S. and Danyukova, T., (2020). Imbalanced cellular metabolism compromises cartilage homeostasis and joint function in a mouse model of mucopolidosis type III gamma. **Dis Model Mech**, DOI: 10.1242/dmm.04642

- 20) Perez-Alvarez, A., Fearey, B., Schulze, C., O'Toole, R.J., Moeyaert, B., Mohr, M.A., Arganda-Carreras, I., Yang, W., **Wiegert, J.S.**, Schreiter, E.R., Gee, C.E., Hoppa, M.B., Oertner, T.G., (2020). Freeze-frame imaging of synaptic activity using SynTagMA. **Nat Commun**, 11(1): 2464, DOI: 10.1038/s41467-020-16315-4
- 21) Oppermann, J., Fischer, P., Silapetere, A., Liepe, B., Rodriguez-Rozada, S., Flores-Urbe, J., Peter, E., Keidel, A., Vierock, J., Kaufmann, J., Broser, M., Luck, M., Bartl, F., Hildebrandt, P., **Wiegert, J. S.**, Béjà, O., Hegemann, P., and Wietek, J., (2019). MerMAIDs: A novel family of metagenomically discovered, marine, anion-conducting and intensely desensitizing Channelrhodopsins. **Nat Commun** 10(1):3315, DOI: 10.1038/s41467-019-11322-6
- 22) Binder, S., Molle, M., Lippert, M., Bruder, R., Aksamaz, S., Ohl, F., **Wiegert, J.S.**, and Marshall, L. (2019). Monosynaptic hippocampal-prefrontal projections contribute to spatial memory consolidation in mice. **J Neurosci** DOI:10.1523/JNEUROSCI.2158-18.2019
- 23) Dürst, C., **Wiegert, J.S.**, Helassa, N. Kerruth, S., Coates, C., Schulze, C., Geeves, M., Török, K., Oertner, T. G. (2019). High-speed imaging of glutamate release with genetically encoded sensors. **Nat Prot** 14(5):1401-1424 DOI:10.1038/s41596-019-0143-9
- 24) **Wiegert, J.S.**, Pulin, M., Gee, C.E., Oertner, T. G. (2018). The fate of hippocampal synapses depends on the sequence of plasticity-inducing events. **eLife** e39151 DOI: 10.7554/eLife.39151
- 25) Oda, K., Vierock, J., Oishi, S., Rodriguez-Rozada, S., Taniguchi, R., Yamashita, K., **Wiegert, J.S.**, Nishizawa, T., Hegemann, P., Nureki, O. (2018). Crystal structure of the red light-activated channelrhodopsin Chrimson. **Nat Commun** 9(1):3949 DOI: 10.1038/s41467-018-06421-9
- 26) Helassa, N., Dürst, C.D., Coates, C., Arif, U., Schulze, C., **Wiegert, J.S.**, Geeves, M., Oertner, T.G., Török, K. (2018). Ultrafast glutamate sensors resolve high-frequency release at Schaffer collateral synapses, **Proc Natl Acad Sci USA** 115(21), 5594-5599 DOI: 10.1073/pnas.1720648115
- 27) **Wiegert, J. S.**, Mahn, M., Prigge, M. Prinz, Y., Yizhar, O. (2017). Silencing Neurons: Tools, Applications, and Experimental Constraints. **Neuron** 95 (3), 504-529 DOI: 10.1016/j.neuron.2017.06.050
- 28) Wietek, J., Rodriguez-Rozada, S., Tutas, J., Tenedini, F., Grimm, C., Oertner, T.G., Soba, P., Hegemann, P., **Wiegert, J.S.** (2017). Anion-conducting channelrhodopsins with tuned spectra and modified kinetics engineered for optogenetic manipulation of behavior. **Sci Rep** 7:14957 DOI: 10.1038/s41598-017-14330-y
- 29) Bitzenhofer, S.H., Ahlbeck, J., Wolff, A. **Wiegert, J.S.**, Gee, C.E., Oertner, T.G., Hanganu-Opatz, I.L. (2017). Layer-specific optogenetic activation of pyramidal neurons causes beta-gamma entrainment of neonatal networks. **Nat Commun** 8:14563 DOI: 10.1038/ncomms14563
- 30) Wietek, J., Beltramo, R., Scanziani, M., Hegemann, P., Oertner, T.G., **Wiegert, J.S.** (2015). An improved chloride-conducting channelrhodopsin for light-induced inhibition of neuronal activity in vivo. **Sci Rep** 5:14807 DOI: 10.1038/srep14807
- 31) Blumer, C., Vivien, C., Genoud, C., Perez-Alvarez, A., **Wiegert, J.S.**, Vetter, T., Oertner, T.G. (2015). Automated analysis of spine dynamics on live CA1 pyramidal cells. **Med Image Anal** 19(1), 87-97 DOI: 10.1016/j.media.2014.09.004
- 32) Wietek, J.\*, **Wiegert, J.S.\***, Adeishvili, N., Schneider, F., Watanabe, H., Tsunoda, S., Vogt, A., Elstner, M., Oertner, T.G., Hegemann, P. (2014). Conversion of

- Channelrhodopsin into a light-gated chloride channel. **Science** 344 (6182): 409-412, **\*first 2 authors equally contributing** DOI: 10.1126/science.1249375, *Highlighted in Science, Science Signaling & Nature Methods*
- 33) Biermann, B., Sokoll, S., Klyueva, J., Missler, M., **Wiegert, J.S.**, Sibarita, J.-B., Heine, M. (2014). Imaging of molecular surface dynamic in brain slices using single particle tracking. **Nat Commun** 5:3024 DOI: 10.1038/ncomms4024
- 34) **Wiegert, J.S.** and Oertner, T. G. (2013). Long-term depression selectively eliminates weakly integrated synapses. **Proc Natl Acad Sci USA** 110(47), E4510-E4519. DOI: 10.1073/pnas.1315926110
- 35) Huber, D., Gutnisky, D.A., Peron, S., O'Connor, D.H., **Wiegert, J.S.**, Tian, L., Oertner, T.G., Looger, L.L., and Svoboda, K. (2012). Multiple dynamic representations in the motor cortex during sensorimotor learning. **Nature** 484, 473-478. DOI: 10.1038/nature11039
- 36) Queisser, G., **Wiegert, J.S.**, Bading, H. (2011). Structural dynamics of the cell nucleus: basis for morphology modulation of nuclear calcium signaling and gene transcription. **Nucleus** 2(2), 1-7. DOI: 10.4161/nucl.2.2.15116
- 37) **Wiegert, J.S.** and Bading, H. (2011). Activity-dependent calcium signaling and ERK-MAP kinases in neurons: a link to structural plasticity of the nucleus and gene transcription regulation. **Cell Calcium** 49, 296-305. DOI: 10.1016/j.ceca.2010.11.009
- 38) Holbro, N., Grunditz, A., **Wiegert, J.S.**, and Oertner, T.G. (2010). AMPA receptors gate spine Ca<sup>2+</sup> transients and spike-timing-dependent potentiation. **Proc Natl Acad Sci USA** 107(36), 15975-15980. DOI: 10.1073/pnas.1004562107
- 39) Wittmann, M. \*, Queisser, G. \*, Eder, A. \*, **Wiegert, J.S.** \*, Bengtson, C.P. \*, Hellwig, A. \*, Wittum, G., and Bading, H. (2009). Synaptic activity induces dramatic changes in the geometry of the cell nucleus: interplay between nuclear structure, histone H3 phosphorylation, and nuclear calcium signaling. **J Neurosci** 29, 14687-14700. **\*first 6 authors equally contributing** DOI: 10.1523/jneurosci.1160-09.2009
- 40) **Wiegert, J.S.**, Hofmann, F., Bading, H., and Bengtson, C.P. (2009). A transcription-dependent increase in miniature EPSC frequency accompanies late-phase plasticity in cultured hippocampal neurons. **BMC Neurosci** 10, 124. DOI: 10.1186/1471-2202-10-124
- 41) **Wiegert, J.S.**, Bengtson, C.P., and Bading, H. (2007). Diffusion and not active transport underlies and limits ERK1/2 synapse-to-nucleus signaling in hippocampal neurons. **J Biol Chem** 282, 29621-29633. DOI: 10.1074/jbc.m701448200y

### **Other publications:**

- 42) **Wiegert, J. S.**, Spehr, M., & Hanganu-Opatz, I. L. (2023). Systems neuroscience: A box full of tools to illuminate the black box of the brain. **PLoS biology**, 21(7), e3002221. DOI: 10.1371/journal.pbio.3002221
- 43) Yizhar, O. & **Wiegert, J. S.** Designer Drugs for Designer Receptors: Unlocking the Translational Potential of Chemogenetics. (2019). **Trends Pharmacol Sci** 40(6):362-364 DOI:10.1016/j.tips.2019.04.010
- 44) **Wiegert, J.S.**, Gee, C.E., and Oertner, T. G. (2017). Stimulating Neurons with Heterologously Expressed Light-Gated Ion Channels. **Cold Spring Harb Protoc** 2017 (2) DOI: 10.1101/pdb.top089714

- 45) Gee, C.E., Ohmert, I., **Wiegert, J. S.**, and Oertner, T. G. (2017). Preparation of Slice Cultures from Rodent Hippocampus. **Cold Spring Harb Protoc** 2017 (2) DOI: 10.1101/pdb.prot094888
- 46) **Wiegert, J.S.**, Gee, C.E., and Oertner, T. G. (2017). Single-Cell Electroporation of Neurons. **Cold Spring Harb Protoc** 2017 (2) DOI: 10.1101/pdb.prot094904
- 47) **Wiegert, J.S.**, Gee, C.E., and Oertner, T. G. (2017). Viral Vector-Based Transduction of Slice Cultures. **Cold Spring Harb Protoc** 2017 (2) DOI: 10.1101/pdb.prot094896
- 48) **Wiegert, J.S.** and Oertner, T.G. (2016). How (not) to silence long-range projections with light. **Nat Neurosci** 19, 527-528. DOI: 10.1038/nn.4270
- 49) **Wiegert, J.S.** and Oertner, T.G. (2015). Neighborly synapses help each other out. **Nat Neurosci** 18, 326-327. DOI: 10.1038/nn.3955
- 50) **Wiegert, J.S.** and Oertner, T. G. (2011). Shapeshifting for memory. **e-Neuroforum** 2(1), 6-12. [REVIEW ARTICLE] DOI: 10.1007/s13295-011-0014-5

### **Preprints:**

- 51) Wissing, C., Maheu, M., **Wiegert, J.S.**, and Dieter, A. (2022). Targeting Noradrenergic Neurons of the Locus Coeruleus: A Comparison of Model Systems and Strategies. **bioRxiv**: <https://doi.org/10.1101/2022.01.22.477348>
- 52) Quintana, D., Bounds, H. A., Brown, J., Wang, M., Bhatla, N., **Wiegert, J. S.**, & Adesnik, H. (2023). Dissociating instructive from permissive roles of brain circuits with reversible neural activity manipulations. **bioRxiv**. <https://doi.org/10.1101/2023.05.11.540397>
- 53) Stüdemann, T., Schwarzova, B., Schneidewind, T., Geertz, B., Bibra, C.v., Nehring, M., Rössinger, J., **Wiegert, J.S.**, Eschenhagen, T., and Weinberger, F. (2023). Impulse initiation in engrafted pluripotent stem cell-derived cardiomyocytes can stimulate the recipient heart. **bioRxiv**, 2023.2011.2012.566756. <https://doi.org/10.1101/2023.11.12.566756>

### **PATENTS**

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**2023** EP4245212A1 <https://patents.google.com/patent/EP4245212A1/>