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## Curriculum Vitae

**Name:** Bernd KUHN  
**OIST Position Title:** Professor, tenured  
**Unit:** Optical Neuroimaging Unit  
**Web page:** <https://groups.oist.jp/onu>



### Education:

#### 1990 – 1996

University of Ulm, Ulm, Germany, **Diploma** (1996) **Physics**

Diploma project conducted at the Max Planck Institute of Biochemistry, Martinsried, Germany

Supervisor: Prof. Peter Fromherz

#### 1996 - 2001

Technical University Munich, Munich, Germany, **PhD** (2001) **Physics**

PhD project conducted at the Max Planck Institute of Biochemistry, Martinsried, Germany

Supervisor: Prof. Peter Fromherz

### Postdoctoral Training:

#### 2001 – 2002

Max Planck Institute of Biochemistry, Martinsried, Germany

Supervisor: Prof. Peter Fromherz

#### 2002 – 2004

Max Planck Institute for Medical Research, Heidelberg, Germany

Supervisor: Prof. Winfried Denk

#### 2004 – 2010

Princeton University, Princeton, NJ, USA

Supervisors: Prof. Samuel S.-H. Wang and Prof. S. Jane Flint

### **Academic Positions:**

#### **9.2010 – 10.2011**

Principal Investigator, OIST School Corporation, Okinawa, Japan

#### **11.2011 – 1.2016**

Assistant Professor, OIST Graduate University, Okinawa, Japan

#### **2.2016 – 6.2020**

Associate Professor, OIST Graduate University, Okinawa, Japan

#### **7.2020 – present**

Tenured Professor, OIST Graduate University, Okinawa, Japan

### **Other Positions and Employment:**

#### **Summer 2005**

Lecturer, Neurobiology Summer Course, Marine Biological Laboratory, Woods Hole, MA, USA

#### **Summer 2006**

Faculty, Neurobiology Summer Course, Marine Biological Laboratory, Woods Hole, MA, USA

### **Honors and Awards:**

#### **1996**

Poster Prize of the German Biophysical Society, Leipzig, Germany

#### **1996**

Physics diploma at the University of Ulm, Germany, with honours

#### **2001**

Doctoral degree, Technical University of Munich, Germany, “summa cum laude”

#### **2001**

Fellowship by the Ernst Rudolf Schloebmann Foundation of the Max Planck Society

#### **2009**

Participant of the PENS-Hertie Winter School “Structure and Function of Neuronal Circuits”, Obergurgl, Austria

#### **2009**

Participant of the International Talent Programme for Life Sciences & Health, Career Site for Bio, Chemistry, and Food, The Netherlands

#### **2018**

OIST Student’s Choice Teaching Award 2018

## Professional Memberships and Boards:

1990 – present	Member of the Bavarian Archeological Society
1995 – present	Member of the German Physics Society
1998 – present	Member of the German Biophysics Society
2000 – present	Member of the German Neuroscience Society
2011 – present	Member of the Japan Neuroscience Society
2013 – present	Member of the Society for Neuroscience
2016 – present	Member of the Japan Biophysics Society

## Publications:

### Peer-Reviewed Articles and Reviews

**B. Kuhn** and P. Fromherz\* (2003) *Anellated hemicyanine dyes in a neuron membrane: Molecular Stark effect and optical voltage recording*  
J. Phys. Chem. B 107:7903-7913

**B. Kuhn\***, P. Fromherz, and W. Denk (2004) *High sensitivity of Stark-shift voltage-sensing dyes by one- or two-photon excitation near the red spectral edge*  
Biophys. J. 87:631-639

P. Theer, **B. Kuhn**, D. Keusters, W. Denk (2006) *Two-photon microscopy and imaging* (review article, re-used book chapter)  
Reviews in Cell Biology and Molecular Medicine, Wiley-VCH Verlag GmbH & Co. KGaA

T.M. Hoogland, E.F. Civillico, and **B. Kuhn** (2007) *Molecular layer interneurons relay cerebellar cortical activity to Bergmann glial cells* (journal club)  
J. Neurosci. 27(42): 11167-11169

P. Fromherz\*, G. Hübener, **B. Kuhn**, and M.J. Hinner (2008) *ANNINE-6plus, a voltage-sensitive dye with good solubility, strong membrane binding and high sensitivity*  
Eur. Biophys. J. 37: 509-514

**B. Kuhn\***, W. Denk\*, and R.M. Bruno\* (2008) *In vivo two-photon voltage-sensitive dye imaging reveals top-down control of cortical layers 1 and 2 during wakefulness*  
PNAS 105(21): 7588-7593  
Selected for “Leading Edge” series in Cell (2008) 134(1): 5-6

T.M. Hoogland<sup>†\*</sup>, **B. Kuhn<sup>†\*</sup>**, W. Göbel, W. Huang, J. Nakai, F. Helmchen, S.J. Flint, and S.S.-H. Wang\* (2009) *Radially expanding transglial calcium waves in the intact cerebellum*  
PNAS 106(9): 3496-3501  
Selected for “In This Issue” in PNAS

A.E. Granstedt, M.L. Szpara, **B. Kuhn**, S.S.-H. Wang, and L.W. Enquist\* (2009) *Fluorescence-based monitoring of in vivo neural activity using a circuit-tracing pseudorabies virus*  
PLoS ONE 4(9): e6923

T.M. Hoogland\* and B. Kuhn (2010) *Recent developments in the understanding of astrocyte function in the cerebellum in vivo* (review article)  
Cerebellum 9(3): 264-71

A.E. Granstedt, B. Kuhn, S.S.-H. Wang, and L.W. Enquist\* (2010) *Calcium imaging of neuronal circuits in vivo using a circuit-tracing pseudorabies virus*  
CSH Protocols 2010(4):pdb.prot5410

B. Kuhn, T.M. Hoogland, and S.S.-H. Wang\* (2011) *Injection of Recombinant Adenovirus for Delivery of Genetically Encoded Calcium Indicators into Astrocytes of the Cerebellar Cortex*  
CSH Protocols 2011(10):pdb.prot065797

B. Kuhn, T.M. Hoogland, and S.S.-H. Wang\* (2011) *Cerebellar Craniotomy for In Vivo Calcium Imaging of Astrocytes*  
CSH Protocols 2011(10):pdb.prot065805

T.M. Hoogland, B. Kuhn, and S.S.-H. Wang\* (2011) *Preferential Loading of Bergmann Glia with Synthetic Acetoxymethyl Calcium Dyes*  
CSH Protocols 2011(10):pdb.prot065813

B. Kuhn<sup>+</sup>, I. Ozden<sup>+</sup>, Y. Lampi, M.T. Hasan, and S.S.-H. Wang (2012) *An amplified promoter system for targeted expression of calcium indicator proteins in the cerebellar cortex*  
Frontiers in Neuronal Circuits 6: article 49

K.M. Seemann\*, R. Kiefersauer, U. Jacob, and B. Kuhn\* (2012) *Optical pH Detection within a Protein Crystal*  
J. Phys. Chem. B 116(33): 9873-9881

H. Anwar\*, C.J. Roome, H. Nedelescu, W. Chen, B. Kuhn, and E. De Schutter (2014) *Dendritic diameters affect the spatial variability of intracellular calcium dynamics in computer models*  
Frontiers in Cellular Neuroscience 8: 168

K.M. Seemann<sup>+</sup> and B. Kuhn<sup>+</sup> (2014) *Multi-photon excited luminescence of magnetic FePt core-shell nanoparticles*  
Biomedical Optics Express 5(7): 2446-2457

S. Augustinaite\*, B. Kuhn, P.J. Helm, and P. Heggelund (2014) *NMDA spike/plateau potentials in dendrites of thalamocortical neurons*  
Cover article in Journal of Neuroscience 34(33): 10892-10905

C.J. Roome\* and B. Kuhn\* (2014) *Chronic cranial window with access port for repeated cellular manipulations, drug application, and electrophysiology*  
Frontiers in Cellular Neuroscience 8: 379

A. Funamizu, B. Kuhn, and K. Doya\* (2016) *Neural substrate of dynamic Bayesian inference in the cerebral cortex*  
Nature Neuroscience 19: 1682-1689

Lissek, T., ... B. Kuhn, ..., and Hasan, M.T.\* *Building Bridges through Science*  
NeuroView in Neuron 96(4), p.730-735 (2017)

C.J. Roome\* and B. Kuhn\* (2018) *Simultaneous dendritic voltage and calcium imaging and somatic recording from Purkinje neurons in awake mice*  
Nature communications, DOI: 10.1038/s41467-018-05900-3

K. Mori\* and B. Kuhn\* (2018) *Imaging Ca<sup>2+</sup> concentration and pH in nanopores/channels of protein crystals*  
J.Phys.Chem.B 122, 42, 9646-9653

B. Kuhn\* and C. Roome (2019) *Primer to voltage imaging with ANNINE dyes and two-photon microscopy* (review article)  
Frontiers in Cellular Neuroscience 13:321

C.J. Roome\* and B. Kuhn\* (2019) *Voltage imaging with ANNINE dyes and two-photon microscopy of Purkinje dendrites in awake mice* (review article)  
Neuroscience Research. <https://doi.org/10.1016/j.neures.2019.11.007>

N. Dalphin\*, K. Dorgans, E. Khaskin, and B. Kuhn\* (2020) *Voltage imaging of cortical oscillations in layer 1 with two-photon microscopy*  
eNeuro DOI: <https://doi.org/10.1523/ENEURO.0274-19.2020>

S. Augustinaite\* and B. Kuhn\* (2020) *Complementary Ca<sup>2+</sup> activity of sensory activated and suppressed layer 6 corticothalamic neurons reflects behavioral state.*  
Current Biology 30. DOI:<https://doi.org/10.1016/j.cub.2020.07.069>

B. Kuhn, F. Picollo, V. Carabelli, & G. Rispoli\* (2020) *Advanced real-time recordings of neuronal activity with tailored patch pipettes, diamond multi-electrode arrays, and electrochromic voltage-sensitive dyes.*  
Pflügers Archiv - European Journal of Physiology. <https://doi.org/10.1007/s00424-020-02472-4>

S. Nomura\*, L. Tricoire, I. Cohen, B. Kuhn, B. Lambolez\*, R. Hepp\* (2020) *Combined optogenetic approaches reveal quantitative dynamics of endogenous catecholaminergic transmission in the brain*  
iScience. <https://doi.org/10.1016/j.isci.2020.101710>

K. Dorgans\*, B. Kuhn, & M.Y. Uusisaari\* (2020) *Imaging subthreshold voltage oscillation with cellular resolution in the inferior olive in vitro.*  
Frontiers in Cellular Neuroscience. <https://doi.org/10.3389/fncel.2020.607843>

S. Augustinaite\* & B. Kuhn (2020) *Chronic cranial window for imaging cortical activity in head-fixed mice.*  
STAR Protocols. <https://doi.org/10.1016/j.xpro.2020.100194>

C.J. Roome\* and B. Kuhn\* (2020) *Coincidence detection in Purkinje neuron dendrites of awake mice.*  
eLife. DOI: [10.7554/eLife.59619](https://doi.org/10.7554/eLife.59619)

P. Flotho, P.\*, D. Thinnes, B. Kuhn, C.J. Roome, J.F. Vibell, & D.J. Strauss (2021) *Fast Variational Alignment of non-flat 1D Displacements for Applications in Neuroimaging.*  
The Journal of Neuroscience Methods. <https://doi.org/10.1016/j.jneumeth.2021.109076>.

S. Augustinaite\* & B. Kuhn (2021) *Intrinsic optical signal imaging and targeted injections through a chronic cranial window of a head-fixed mouse.*  
STAR Protocols. <https://doi.org/10.1016/j.xpro.2021.100779>

C. Cecchetto\*, S. Vassanelli, B. Kuhn\* (2021) *Simultaneous two-photon voltage or calcium imaging and multi-channel LFP recordings in barrel cortex of awake and anesthetized mice.*  
Front. Neuroscience. <https://doi.org/10.3389/fnins.2021.741279>

L. Georgiou\*, A. Echeverria, A. Georgiou, B. Kuhn\* (2022) *Ca<sup>2+</sup> activity maps of astrocytes tagged by axo-astrocytic AAV transfer.*  
Science Advances Vol.8, Issue 6.

P. Flotho\*, S. Nomura, **B. Kuhn**, D.J. Strauss (2022) *Software for non-parametric image registration of 2-photon imaging data*. Journal of Biophotonics

R.X. Lee\*, G.J. Stephens, and **B. Kuhn** (2022) *Social relationship as a factor for the development of stress incubation in adult mice*. Frontiers in Behavioral Neuroscience

M. Youssef, H. Hamada, E. Lai, Y. Kiyama, M. Eltabbal, **B. Kuhn**, T. Yamamoto\* (2022) *TOB is an effector of the hippocampus-mediated acute stress response*. *Translational Psychiatry*

H.-Y. Wang, H. Takagi, A. Echeverria, **B. Kuhn**, K.-S. Hsu, T. Takahashi\* (under review) Anoxia Induced Presynaptic LTP Regenerated by Neuronal and Glial Nitric Oxide. Frontiers in Behavioral Neuroscience

\* Corresponding author

+ Equal contribution

## Book Chapters

P. Theer, **B. Kuhn**, D. Keusters, and W. Denk (2005) *Two-photon microscopy and imaging*  
In: *Encyclopaedia of Molecular Cell Biology and Molecular Medicine*, Vol. 15  
2nd Edition. R. A. Meyers (Editor), Wiley, p. 61-88

**B. Kuhn**, T.M. Hoogland, and S.S.-H. Wang (2011) *In vivo monitoring of astrocytic signaling in the cerebellum with synthetic and genetically encodable fluorescent calcium indicators*  
In: *Imaging in Neuroscience*  
2nd Edition. F. Helmchen, A. Konnerth, and R. Yuste (Editors), CSHL Press, p. 707-720

H. Anwar\*, C.J. Roome, H. Nedeleescu, W. Chen, **B. Kuhn**, and E. De Schutter (2016) *Dendritic diameters affect the spatial variability of intracellular calcium dynamics in computer models*  
In: *Determinants of Synaptic Information Transfer: from Ca<sup>2+</sup> Binding Proteins to Ca<sup>2+</sup> Signaling Domains (re-used article)*  
P. Isope, C.D. Wilms, H. Schmidt (Editors), Frontiers Media SA, p. 112-125

C.J. Roome and **B. Kuhn**\* (2019) *Voltage imaging with ANNINE dyes and two-photon microscopy*  
In: *Multi-photon microscopy*  
1st Edition. E. Hartveit (Editor). Book series Springer-Nature Neuromethods, p. 297-334

**B. Kuhn**\* and C. Roome (2019) *Primer to voltage imaging with ANNINE dyes and two-photon microscopy*  
In: *New Insights on Neuron and Astrocyte Function from Cutting-Edge Optical Techniques*  
S.D.Antic, B.J. Baker, M. Canepari (Editors), Frontiers eBook

Dorgans, K., **Kuhn, B.**, & Uusisaari, M.Y. (2022) *In vitro voltage imaging of subthreshold activity in inferior olive neurons with ANNINE-6plus*. In: *Measuring Cerebellar Function. Neuromethods book series*.

## Commentary

T. Tominaga\* & B. Kuhn\* (2020) *Cutting-edge brain research from a biophysical perspective: symposium synopsis of Session ISCP at BSJ2019 in Miyazaki, Kyushu, Japan*.  
*Biophys Rev.* <https://doi.org/10.1007/s12551-020-00637-0>

## Patents

**B. Kuhn**, G. Hübener, P. Fromherz, and W. Denk (2004) *Optimized determination of voltage-changes using a voltage-sensitive dye*  
European Patent No. PCT/EP 2004/006916  
U.S. Patent No. 10/562,308

**B. Kuhn**, C.J. Roome (2013) *Chronic cranial window allowing drug application and electrophysiology*  
US61/918,193  
PCT/JP2014/006262