

## Function



## PD Dr. phil Lars Michels, PhD Neurobiologist (Oberassistent)

### Address

Center for MR-Research  
University  
Children's Hospital Zurich  
Eleonore Foundation  
Steinwiesstrasse 75  
CH-8032 Zürich

phone +41 44 255 49 65

fax +41 44 266 71 53

[lars.michels@kispi.uzh.ch](mailto:lars.michels@kispi.uzh.ch)

[www.kispi.uzh.ch](http://www.kispi.uzh.ch)

## Research

- Short-term working memory
- Multimodal attention
- Form- and motion perception
- Brain maturation
- Alzheimer's disease, pain, ADHD, migraine, stroke, neuropharmacological intervention
- Methods: EEG, fMRI, EEG-fMRI, spectroscopy, DTI, ASL-MRI, tDCS

## Curriculum Vitae

### Education

2015 **Habilitation** (Venia Legendi), University of Zurich, Switzerland  
2008 **PhD (Dr. Phil)**, University of Münster, Germany  
2002 **Master** (Diploma), University of Bochum, Germany

### Professional Training

2012-2014 Visiting Scholar, Stanford University, Medical School (USA)  
2014 Good Clinical Practice Course (Modul 2 and 3)  
2012 Debut – Einstieg in die Lehre (Teaching Course)

### Employment

since 2014 **Senior Scientist (Oberassistent)**, Center for MR-Research, University Children's Hospital Zurich  
since 2010 **Senior Scientist (Oberassistent)**, Institute for Neuroradiology, University Hospital Zurich  
2006-2010 **Postdoctoral-fellow**, University of Zurich, Switzerland

## Publications

- [1] **L. Michels**, L., M. Lappe (2004). Contrast dependency of saccadic compression and suppression. *Vision Res.* 2004;44(20):2327-36. Impact factor (IF): 2.1  
[2] **L. Michels**, M. Lappe, L.M. Vaina (2005). Visual areas involved in the perception of human movement



- from dynamic form analysis. *Neuroreport*. 2005 Jul 13;16(10):1037-41. IF: 1.9
- [3] de Lussanet M, Fadiga L, **Michels L**, Seitz R, Kleiser R, Lappe M. (2008). Interaction of visual hemifield and body view in biological motion perception. *European Journal of Neuroscience*. 2008 Jan; 27(2): 514-522. IF: 3.7
- [4] **Michels L**, Moazami-Goudazi M, Jeanmonod D, Sarnthein J. (2008). EEG alpha distinguishes between cuneal and precuneal activation in working memory. *NeuroImage*. 2008 Apr 15; 40(3): 1296-1310. IF: 5.7
- [5] Moazami-Goudazi M, Sarnthein J, **Michels L**, Moukhtieva R, Jeanmonod D. (2008). Enhanced frontal low and high frequency power and synchronization in the resting EEG of parkinsonian patients. *NeuroImage*. 2008 Jul 1; 41(3): 985-997. IF: 5.7
- [6] Mehnert U, Boy S, Svensson J, **Michels L**, Reitz A, Candi V, Kleiser R, Kollias S, Schurch B. (2008). Brain activation in response to bladder filling and simultaneous stimulation of the dorsal clitoral nerve - An fMRI study in healthy woman. *NeuroImage*. 2008 Jul 1; 41(3): 682-689. Processing and statistical analysis of the fMRI data. IF: 5.7
- [7] **Michels L**, de Lussanet M, Fadiga L, Seitz R, Kleiser R, Lappe M. (2009). Brain activity for peripheral biological motion in the posterior superior temporal gyrus and the fusiform gyrus: Dependence on visual hemifield and view orientation. *NeuroImage*. 2009 Mar; 45(1): 151-159. IF: 5.7
- [8] **Michels L**, Mehnert U, Boy S, Schurch B, Kollias S. (2010). The somatosensory representation of the human clitoris: an fMRI study. *NeuroImage*. 2010 Jan 1; 49(1): 177-184. IF: 5.7
- [9] Zemleni MZ, **Michels L**, Mehnert U, Schurch B, Kollias S. (2010). Cortical substrate of urinary bladder in spinal cord injury and the effect of pudendal stimulation. *NeuroImage*. 2010 Feb 15; 49(4): 2983-2994. IF: 5.7
- [10] Moazami-Goudazi M, **Michels L**, Weisz N, Jeanmonod D. (2010). Tempero-insulo-frontal enhancement of EEG slow wave activity in patients with chronic tinnitus. *BMC Neuroscience*. 2010 Mar 24;11:40. IF: 2.9
- [11] **Michels L**, Bucher K, Martin E, Jeanmonod D, Brandeis D. (2010). Simultaneous EEG-fMRI during a working memory task: Modulations in low and high frequency bands. *PLoS One*. 2010 Apr 22;5(4):e10298. IF: 4.4
- [12] Mehnert U, **Michels L**, Zemleni MZ, Schurch B, Kollias S. (2010). The supraspinal neural correlate of bladder cold sensation - An fMRI study. *Human Brain Mapping*. 2011 Jun;32(6):835-45. doi: 10.1002/hbm.21070. IF: 5.4
- [13] **Michels L**, Bucher K, Brem S, Halder P, Lüchinger R, Liechti M, Martin E, Jeanmonod D, Kroell J, Brandeis D. (2010). Does greater low frequency EEG activity in normal immaturity and in children with epilepsy arise in the same neuronal network? *Brain Topography*. 2011 Mar;24(1):78-89. IF: 3.4
- [14] O'Gorman R, **Michels L**, Edden, RA, Martin E. (2011). In vivo detection of GABA and glutamate with MEGA-PRESS: reproducibility and gender effects. *J of Magnetic Resonance Imaging*. 2011 May;33(5):1262-7. doi: 10.1002/jmri.22520. IF: 2.8
- [15] Lüchinger R\*, **Michels L\***, Martin E, Brandeis D. (2011). EEG-BOLD coupling during late brain maturation. *NeuroImage*. 2011 Jun 1;56(3):1493-505. Epub 2011 Feb 22. IF: 5.9. \*Both authors equally contributed to this work.
- [16] **Michels L**, Moazami-Goudazi M, Jeanmonod D. (2011). Correlations between EEG and clinical outcome in chronic neuropathic pain: surgical effects and treatment resistance. *Brain Imaging and Behavior*. 2011 Dec;5(4):329-48. IF: 2.7
- [17] Lüchinger R, **Michels L**, Martin E, Brandeis D. (2011). Brain state regulation during normal development: intrinsic activity fluctuations in simultaneous EEG-fMRI. *NeuroImage*. 2012 Apr 2;60(2):1426-39. Epub 2012 Jan 10. IF: 5.9
- [18] Jeanmonod D, Werner B, Morel A, **Michels L**, Zadicario E, Schi\_ G, Martin E. (2011). Transcranial MR-guided Focused Ultrasound: Non-invasive Central Lateral Thalamotomy against Chronic Neuropathic Pain. *Neurosurgical Focus*. 2012 Jan;32(1):E1. IF: 2.3
- [19] **Michels L**, Martin E, Klaver P, Edden R, Zelaya F, Lythgoe DJ, Lüchinger R, Brandeis D, O'Gorman R. (2012). Frontal GABA levels change during working memory. *PLoS ONE*. 7(4):e31933. IF: 4.2
- [20] **Michels L**, Lüchinger R, Koenig T, Martin E, Brandeis D (2012). Similar development of opposite correlation between human EEG power and synchronization with the BOLD signal during short-term memory. *PLoS ONE*. 7(7):e39447. Epub 2012 Jul 6. IF: 4.2



- [21] O'Gorman R, Poil SS, D. Brandeis, Klaver P, Bollmann S, Ghisleni C, Lüchinger R, Martin E, Shankaranarayanan A, Alsop DC, **Michels L** (2012). Coupling between resting cerebral perfusion and EEG. *Brain Topography*. doi: 10.1007/s10548-012-0265-7. IF: 3.4
- [22] **Michels L**, Muthumuran M, Lüchinger R, Martin E, Anwar AR, Raethjen J, Brandeis D, Siniatchkin M (2013). Developmental changes of functional and directed connectivity associated with neuronal oscillations in EEG. *NeuroImage*. 81:231-42. IF: 6.8
- [23] Mueller-Pfeiffer C, Zeffiro T, O'Gorman R, **Michels L**, Baumann P, Woods N, Spring J, Rufer M, Pitman R, Orr S (2013). Cortical and Cerebellar Modulation of Autonomic Responses to Salient Sounds. *Psychophysiology*. doi: 10.1111/psyp.12142. IF: 3.3
- [24] Mueller-Pfeiffer C, Schick T, Schulte-Vels M, O'Gorman R, **Michels L**, Martin-Soelch C, Blair JR, Rufer M, Schnyder U, Zeffiro T, Hasler G (2013). Atypical Visual Processing in Posttraumatic Stress Disorder. *NeuroImage: Clinical*. Aug 29;3:531-8. doi: 10.1016/j.nicl.2013.08.009.
- [25] Dietz V, Macaуда G, Kloter E, Bürer S, Wirz M, **Michels L** (2013). Opening a bottle: Neural control of cooperative hand movements. *Cerebral Cortex*. PMID:24122137. Oct 11. [Epub ahead of print]. IF: 6.8
- [26] Wotruba D, **Michels L**, Buechler R, Metzler S, Theodoridou A, Gerstenberg M, Walitza S, Kollias S, Rössler W, Heekeren K. (2013). Aberrant coupling within and across the default-mode, task-positive, and salience network in subjects at risk for psychosis. *Schizophrenia Bulletin*. PMID:24243441. Nov 16. [Epub ahead of print]. IF: 8.5
- [27] Poil SS, Bollmann S, Ghisleni C, O'Gorman RL, Klaver P, Ball J, Eich-Höchli D, Brandeis D\*, **Michels L\*** (2013). Age dependent electroencephalographic changes in Attention Deficit/Hyperactivity Disorder (ADHD). *Clinical Neurophysiology*. 2014 Feb 2. IF: 3.1. \*Shared senior authors
- [28] Maurer U, Brem S, Liechti M, Maurizio S, **Michels L**, Brandeis D (2014). Frontal midline theta reflects experienced task difficulty in a working memory task. *Brain Topography*. 2014 Apr 1. [Epub ahead of print]. IF: 3.7
- [29] M. Walter, **L. Michels**, S. Kollias, P.E. van Kerrebroeck, T. Kessler, U. Mehnert (2014). Protocol for a prospective neuro-imaging study investigating the supraspinal control of lower urinary tract function in healthy controls and patients with non-neurogenic lower urinary tract symptoms. *BMJ Open*. in Press. IF: 1.6
- [30] **L. Michels**, J. Woellner, F. Gregorini, M. Kurz, B. Schurch, T. Kessler, S. Kollias, U. Mehnert (2014). Supraspinal control of urine storage and micturition in men- an fMRI study. *Cerebral Cortex*. In press. IF: 6.8
- [31] F. Riese, A. Gietl, N. Zoelch, A. Henning, R. O'Gorman, A.M. Kaelin, S.E. Leh, A. Buck, G. Warnock, R.A. Edden, R. Luechinger, C. Hock, S. Kollias, **L. Michels** (2014). Posterior cingulate GABA and glutamate+ glutamine are reduced in amnesic mild cognitive impairment and are unrelated to amyloid deposition and APOE genotype. *Neurobiol Aging*. In press. IF: 6.2
- [32] **L. Michels**, T. Schulte-Vels, M. Schick, R. O'Gorman, G. Hassler, C. Mueller-Pfeiffer. (2014). Prefrontal GABA and glutathione imbalance in posttraumatic stress disorder: Preliminary findings. *Psychiatry Research: Neuroimaging*. In press. IF: 3.4
- [33] T. Chen\*, **L. Michels\***, S. Ryali, V. Menon (2014). Dynamic causal interactions in selective unimodal and multimodal auditory-visual attention. *European Journal of Neuroscience*. In press. IF: 3.8. \*Shared first authors.
- [34] L. Jäger, L. Marchal-Crespo, P. Wolf, R. Riener, **L. Michels\***, S, Kollias\* (2014). Brain activation associated with active and passive lower limb stepping. *Frontiers in Human Neuroscience*. Oct 28;8:828.. IF: 2.9. \*Shared senior authors.
- [35] D. Wotruba, K. Heekeren, **L. Michels**, R. Büchler, J.J. Simon, A. Theodoridou, S. Kollias, W. Rössler, S. Kaiser (2014). Symptom dimensions are associated with reward processing in un-medicated persons at risk for psychosis. *Frontiers in Behavioral Neuroscience*. Nov 18;8:382. doi: 10.3389/fnbeh.2014.00382. eCollection 2014. IF: 4.2.
- [36] C. Ghisleni, S. Bollmann, S.S. Poil, D. Brandeis, E. Martin, **L. Michels**, R.L. O'Gorman, P. Klaver (2015). Subcortical glutamate mediates the reduction of short-range functional connectivity with age in a developmental cohort. *The Journal of Neuroscience*. Jun 3;35(22):8433-41. IF: 6.7.
- [37] M. Kottlow, A. Schlaepfer, A. Baenninger, **L. Michels**, D. Brandeis, T. Koenig (2015). Pre-stimulus BOLD-network activation modulates EEG spectral activity during working memory retention. *Frontiers in Behavioral Neuroscience*. May 6;9:111. doi: 10.3389/fnbeh.2015.00111. eCollection 2015. IF: 4.2.



- [38] S. Bollmann, C. Ghisleni, S.S. Poil, E. Martin, J. Ball, D. Eich-Höchli, R.A. Edden, P. Klaver, **L. Michels**, D. Brandeis, R.L. O'Gorman (2015). Developmental changes in gamma-aminobutyric acid levels in attention-deficit/hyperactivity disorder (ADHD). *Translational Psychiatry*. Jun 23;5:e589. doi: 10.1038/tp.2015.79. IF: 4.3.
- [39] L. Jaeger, L. Marchal-Crespo, P. Wolf, A.R. Luft, R. Riener, **L. Michels\***, S. Kollias\* (2015). On the modulation of brain activation during simulated weight bearing in supine gait-like stepping. *Brain Topography*. Online, DOI 10.1007/s10548-015-0441-7. IF: 2.5. \*Shared senior authors.
- [40] **L. Michels\***, G. Warnock\*, A. Buck, G. Macaуда, S.E. Leh, A.M. Kaelin, F. Riese, R. Meyer, R.L. O'Gorman, C. Hock, S. Kollias, A. F. Gietl (2015). Arterial spin labeling imaging reveals widespread and A-independent reductions in cerebral blood flow in elderly apolipoprotein epsilon-4 carriers. *Journal of Cerebral Blood Flow and Metabolism*. In Press. IF: 5.3. \* shared first authors.
- [41] C. Ghisleni, S. Bollmann, A. BIASON-Laubert S.S. Poil, D. Brandeis, E. Martin, **L. Michels**, M. Herberger, P. Klaver, R. O'Gorman (2015). Effects of Steroid Hormones on Sex Differences in Cerebral Perfusion. 10(9):e0135827. doi: 10.1371/journal.pone.0135827. Accepted. IF: 3.5
- [42] B. Jarrahi, D. Mantini, J.H. Balsters, **L. Michels**, T. Kessler, U. Mehnert, S. Kollias (2015). Differential functional brain network connectivity during visceral interoception as revealed by independent component analysis of fMRI time-series. *Hum Brain Mapping*. 36(11):4438-68. IF: 5.9
- [43] S.E. Leh, A.M Kaelin, C. Schroeder, M.M. Park, M. Chakravarty, P. Freund, A.F. Gietl, F. Riese, S. Kollias, C. Hock, **L. Michels** (2015). Volumetric and shape analysis of the thalamus and striatum in amnesic mild cognitive impairment. *Journal Alzheimer's Disease*. 49(1):237-49. IF: 4.2
- [44] L. Jaeger, L. Marchal-Crespo, P. Wolf, R. Riener, S. Kollias\*, **L. Michels\*** (2015). Test-retest reliability of fMRI experiments during robot-assisted active and passive stepping. *Journal of Neuro Engineering and Rehabilitation*. 12(1):102. IF: 2.6. \*Shared senior authors.
- [45] S. Bollmann, C. Ghisleni, S.S. Poil, E. Martin, J. Ball, D. Eich-Hoechli, P. Klaver, R.L. O'Gorman, **L. Michels\***, D. Brandeis (2015). Age-dependent and independent changes in attention deficit/hyperactivity disorder (ADHD) during spatial working memory performance. *World J Biol Psychiatry*. Oct 29:1-28. IF: 4.2. \*Shared senior authors.

## Book Chapters

- [1] Lappe M, **Michels L**, Awater H. Visual factors in perisaccadic compression of space (chapter 12). In: *Problems of space and time in perception and action* (Cambridge University Press).

## Awards

- 2012 Winner of the Eugen-Rehfishch-Price (3'000 Euro), Best oral presentation, Zurich, Switzerland  
2011 Poster price, bronze medal, ESMRN conference, Amsterdam, Netherlands  
2010 Poster price (300 CHF), Children's University Hospital, Zurich, Switzerland

## Grants

- [1] Linking the major system markers for typical and atypical brain development: a multimodal imaging and spectroscopy study (2011-2013). Zurich Center for Integrative Human Physiology. 475'000 CHF (co-applicant)
- [2] Spectroscopy, voxel-based morphometry, and perfusion in migraine patients with aura. Forschungsstipendium (2013), Schweizerische Kopfwehgesellschaft. 5'000 CHF (main applicant)
- [3] Anatomical alterations in vestibular migraine patients. Forschungsstipendium (2014), Schweizerische Kopfwehgesellschaft. 5'000 CHF (Tarnutzer, Riederer, Michels, Kollias, Palla)
- [4] Anatomical alterations in vestibular migraine patients. Kötser Foundation (2015). 10'000 CHF (Tarnutzer, Riederer, Michels, Kollias, Palla)

## Supervision

- 5 PhD students
- 2 MSc students