

PHILIPP WALK

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PARTICULARS

CURRENT POSITION

2018-present **University of California Irvine (UCI)**, Irvine, CA.
Postdoctoral Fellow, Laboratory of Prof. Hamid Jafarkhani in the Department of EE&CS.

EDUCATION

2007-2014 **Technische Universität München**, Munich, Germany
Ph.D. (Dr. rer. nat) with highest honors in Electrical and Computer Engineering
Dissertation: “Analysis of Convolutions with Support Restrictions”
Advisor: Prof. Holger Boche. Committee: Massimo Fornasier, Gerhard Kramer, Sandra Hirche.

1999-2006 **Technische Universität Berlin**, Berlin, Germany
M.S. (Dipl. Phys.) in Physics
Thesis: “The concept of algebraic states with application to simple quantum models as the XY-model”.

RESEARCH INTERESTS

My research interests span the areas of communication theory, signal processing, quantization, physical-layer security, compressed sensing, bilinear inverse problems, time-frequency analysis, and UAV deployment problems. I have a specific interest in deterministic blind deconvolution algorithms for a wide application in signal processing as wireless communication, imaging, phase retrieval, machine learning, and physical layer security.

ACADEMIC HONORS

2015-2017 DFG research grant for “Structured Signal Models in Compressed Sensing”, Caltech, Pasadena, CA.
2016 Research grant for the Hausdorff trimester program “Mathematics of Signal Processing”, Hausdorff Research Institute for Mathematics, Bonn, Germany.

ACADEMIC POSITIONS

2018-present Postdoctoral Researcher since March, group of H. Jafarkhani at **UCI**, CA. *Physical Layer Security in Wireless networks. Optimal UAV deployments and path plannings.*

2015-2018 Postdoctoral Researcher, group of B. Hassibi at **California Institute of Technology**, CA. *Invented a novel design for blind sporadic short-packet communications over frequency-selective fading channels.*

2015 Visiting Postdoctoral Researcher from June to August, group of G. Caire at **TU Berlin**, Germany.

2014-2015 Postdoctoral Researcher, group of H. Boche at **TU München**, Germany
Designed a Semi-Blind Signaling Scheme for Wireless Networks.

2010-2014 Research Assistant, group of H. Boche at TU München, Germany
Investigated bilinear inverse problems with emphasize on convolutions and sparse signals. Proved general stability results for linear time-discrete invariant systems which are prescribed by convolutions.

2007-2010 Research Assistant, group of H. Boche at TU Berlin, Germany
Developed spectral efficient modulation designs for Ultra-Wideband systems.

2005-2006 Teaching Assistant, Department of Mathematics, TU Berlin, Germany
Assistant in analysis classes for undergrad engineering students.

2001-2004 Student Research Assistant, group of Susanne Siebentritt at Hahn-Meitner Institute, Berlin, Germany
Measured and determined solar cell characteristics.

TEACHING EXPERIENCE

- 2017 **Mentor.** For Mattia Carrera “Summer SURF student program”, Caltech.
- 2016 **Instructor.** P. Walk & E. Tampubolon “Compressive Sampling”, *Guest Lecture*, [Summer 2016](#), TU Munich.
- 2015 **Mentor.** For Henning Becker, *Master Thesis*, “PAPR compensation for OFDM using Phaseless Pilots”, TU Munich.
- 2015 **Instructor.** P. Walk & H. Boche, “Compressive Sampling”, *Lecture*, [Winter 2014/2015](#), TU Munich.
- 2014 **Teaching Assistant.** H. Boche & P. Walk, “Compressive Sampling”, *Lecture*, [Summer 2014](#) and U. Mönich & P. Walk, “Fortgeschrittene Signaltheorie und Compressed Sensing (Advanced Signal Theory and Compressed Sensing)”, *Lecture*, [Summer 2014](#), TU Munich.
- 2013 **Teaching Assistant.** U. Mönich & P. Walk, “Fortgeschrittene Signaltheorie (Advanced Signal Theory)”, *Lecture*, [Summer 2013](#), TU Munich.
- 2012 **Teaching Assistant.** P. Jung & P. Walk, “Estimation Theory and Compressed Sensing”, *Lecture*, [Spring 2012](#), TU Munich.
- 2005-2006 **Teaching Assistant.** “[Analysis I for Engineers](#)” and “[Analysis II for Engineers](#)”, *Lecture*, TU Berlin.
- 2004-2006 **Teaching Assistant.** “[Vacuum Lab](#)”, *Physics School lab*, DESY Zeuthen.

PUBLICATIONS

JOURNAL PAPERS

- [J1] **P. Walk**, P. Jung, and G. E. Pfander. “On the Stability of Sparse Convolutions”. In: *Applied and Computational Harmonic Analysis* 42 (2017), pp. 117–134. arXiv: [1409.6874](#).
- [J2] **P. Walk** and P. Jung. “Approximation of Löwdin Orthogonalization to a Spectrally Efficient Orthogonal Overlapping PPM Design for UWB Impulse Radio”. In: *EURASIP Journal on Applied Signal Processing* 92.3 (Mar. 2012), pp. 649–666. arXiv: [1109.3102](#).
- [J3] J. Timmermann, **P. Walk**, A. A. Rashidi, W. Wiesbeck, and T. Zwick. “Compensation of a Non-ideal UWB Antenna Performance”. In: *Frequenz* 63.9-10 (2009), pp. 183–186.
- [J4] S. Siebentritt, **P. Walk**, U. Fiedeler, I. Lauermann, K. Rahne, M. C. Lux-Steiner, T. P. Niesen, and F. Karg. “MOCVD as a dry deposition method of ZnSe buffers for Cu(In,Ga)(S,Se)₂ solar cells”. In: *Progress in Photovoltaics* 12.5 (2004), pp. 333–338.
- [J5] S. Nishiwaki, S. Siebentritt, **P. Walk**, and M. C. Lux-Steiner. “A stacked chalcopyrite thin-film tandem solar cell with 1.2 V open-circuit voltage”. In: *Progress in Photovoltaics: Research and Applications* 11.4 (2003), pp. 243–248.

BOOKS & CHAPTERS

- [B1] P. Jung and **P. Walk**. “Compressed Sensing and its Applications”. In: ed. by H. Boche, A. R. Calderbank, G. Kutyniok., and J. Vybiral. *Applied and Numerical Harmonic Analysis*. Springer, 2014. Chap. Sparse Model Uncertainties in Compressed Sensing with Application to Convolutions and Sporadic Communication, pp. 283–313. arXiv: [1404.0218](#).
- [B2] J. Timmermann, E. Pancera, **P. Walk**, W. Wiesbeck, and T. Zwick. “Ultra-WideBand, Short Pulse Electromagnetics 9”. In: Springer, 2010. Chap. Bit Error Rate of a Non-ideal Impulse Radio System, pp. 457–464.
- [B3] P. Jung and **P. Walk**. *Compressed Sensing: Applications to Communication and Digital Signal Processing*. Ed. by H. Boche. Springer, in preparation.

SUBMITTED PAPERS

- [S1] **P. Walk**, P. Jung, and B. Hassibi. “MOCZ for Blind Short-Packet Communication: Basic Principles”. In: *submitted to IEEE Transaction on Wireless Communications* (2018).

CONFERENCE PAPERS

- [C1] **P. Walk** and U. Mitra. “Physical Layer Secure Communications over Wireless Channels via Common Zeros”. In: *IEEE International Symposium on Information Theory*. (Talisa Hotel). Vail, Colorado, USA., June 2018.
- [C2] **P. Walk**, P. Jung, and B. Hassibi. “Constrained Blind Deconvolution using Wirtinger Flow Methods”. In: *SampTA*. Tallin, Estontia, July 2017.
- [C3] **P. Walk**, P. Jung, and B. Hassibi. “Short-Message Communication and FIR System Identification using Huffman Sequences”. In: *IEEE International Symposium on Information Theory*. Aachen, Germany, June 2017. arXiv: [1702.00160](https://arxiv.org/abs/1702.00160).
- [C4] **P. Walk**, H. Becker, and P. Jung. “OFDM Channel Estimation via Phase Retrieval”. In: *49th Asilomar Conference on Signals, Systems and Computers*. Pacific Groove, USA, Nov. 2015, pp. 1161–1168. arXiv: [1512.04252](https://arxiv.org/abs/1512.04252).
- [C5] **P. Walk**, H. Becker, and P. Jung. “Phaseless Pilots for OFDM”. In: *ISWCS*. Brussels, Belgium, Apr. 2015.
- [C6] **P. Walk** and P. Jung. “Stable Recovery from the Magnitude of Symmetrized Fourier Measurements”. In: *IEEE International Conference on Acoustics, Speech, and Signal Processing*. Florence, Italy, May 2014, pp. 1813–1816.
- [C7] **P. Walk** and P. Jung. “On a Reverse ℓ_2 -inequality for Sparse Circular Convolutions”. In: *IEEE International Conference on Acoustics, Speech, and Signal Processing*. Vancouver, Canada, June 2013, pp. 4638–4642.
- [C8] **P. Walk** and P. Jung. “Compressed sensing on the image of bilinear maps”. In: *IEEE International Symposium on Information Theory*. Boston, USA, July 2012, pp. 1291–1295. arXiv: [1205.4933](https://arxiv.org/abs/1205.4933).
- [C9] **P. Walk**, P. Jung, and J. Timmermann. “Löwdin’s approach for orthogonal pulses for UWB impulse radio”. In: *IEEE Workshop on Signal Processing Advances in Wireless Communications*. Marrakech, Maroc, June 2010.
- [C10] **P. Walk**, P. Jung, and J. Timmermann. “Löwdin Transform on FCC Optimized UWB Pulses”. In: *IEEE WCNC*. Sydney, Australia, Mar. 2010.
- [C11] J. Timmermann, A. A. Rashidi, **P. Walk**, E. Pancera, and T. Zwick. “Application of Optimal Pulse Design in Non-ideal Ultra-wideband Transmission”. In: *German Microwave Conference*. Munich, Germany, Mar. 2009, pp. 1–4.
- [C12] J. Timmermann, E. Pancera, **P. Walk**, W. Wiesbeck, and T. Zwick. “Bit Error Rate of a Non-ideal Impulse Radio System”. In: *European Electromagnetics Conference*. Lousanne, Switzerland, July 2008.

INVITED PAPERS

- [I1] **P. Walk**, P. Jung, G. Pfander, and B. Hassibi. “Ambiguities of Convolutions with Application to Phase Retrieval Problems”. In: *50th Asilomar Conf.* Pacific Groove, USA, Nov. 2016, pp. 1228–1234.

OTHER PAPERS

- [O1] J. Guo, **P. Walk**, and H. Jafarkhani. “Quantizers with Parameterized Distortion Measures”. In: *arxiv* (Nov. 2018). arXiv: [1811.02554](https://arxiv.org/abs/1811.02554).
- [O2] **P. Walk**, P. Jung, and B. Hassibi. “Noncoherent Short Packet Communication via Modulation on Conjugated Zeros”. In: *Arxiv* (May 2018). arXiv: [1805.07876](https://arxiv.org/abs/1805.07876).
- [O3] **P. Walk** and B. Hassibi. “Stable Deconvolution over the Reals from Additional Autocorrelations”. In: *Arxiv* (2017). arXiv: [1710.07879](https://arxiv.org/abs/1710.07879).
- [O4] **P. Walk**, P. Jung, G. Pfander, and B. Hassibi. “Blind Deconvolution with Additional Autocorrelations via Convex Programs”. In: *Arxiv* (2017). arXiv: [1701.04890](https://arxiv.org/abs/1701.04890).

- [O5] **P. Walk**. “Analysis of Convolutions with Support Restrictions”. PhD thesis. TU München, Sept. 2014.

TALKS

- [T1] **P. Walk**, B. Hassibi, and P. Jung. “Noncoherent Short-Packet Communication via Modulation on Conjugated Zeros”. In: *Intel*. Santa Clara, CA, June 2018.
- [T2] **P. Walk**, U. Mitra, and B. Hassibi. “Physical layer secure communications over wireless channels via modulation on zeros”. In: *ITA*. San Diego, USA, Feb. 2018.
- [T3] **P. Walk**. “Blind Deconvolution for Short-Message Communications over Wireless Multipath Channels”. In: *Center for Pervasive Communications and Computing Seminar*. UCI, Irvine, Feb. 2018.
- [T4] **P. Walk**. “Blind Deconvolution Methods for Short Message Communications over Unknown Wireless Channels”. In: *BLISS Seminar*. (Department of Electrical Engineering and Computer Science, UC Berkeley). Berkeley, USA, Dec. 2017.
- [T5] **P. Walk**. “A Short-Message Communication over unknown FIR Systems”. In: *Workshop on Dependent Component Analysis and Compressed Sensing*. (TU Dresden). Dresden, Germany, July 2017.
- [T6] **P. Walk**. “Ambiguities of Discrete Convolutions”. In: *Mathematics of Signal Processing*. (Hausdorff Institute of Mathematics). Bonn, Germany, Apr. 2017.
- [T7] **P. Walk** and B. Hassibi. “Blind Signal Transmission using Huffman Sequences”. In: *ITA*. San Diego, USA, Feb. 2017.
- [T8] **P. Walk**. “On the (Non)-Stability of Sparse Convolutions”. In: *Seminar*. (Department of Electrical Engineering, USC). Los Angeles, USA, Dec. 2015.
- [T9] **P. Walk**. “Deconvolution: State of the Art”. In: *17th Joint Conference on Communications and Coding (JCCC)*. Stilfs, Italy, Mar. 2015.
- [T10] **P. Walk**. “Stable Embedding of Sparse Convolutions”. In: *Matheon Workshop on Compressed Sensing and its Applications*. Berlin, Germany, Dec. 2013.
- [T11] **P. Walk**. “Compressed Sensing on Sparse Multiplications”. In: *Group Seminar M. Lustig*. (Department Electrical Engineering and Computer Science, UC Berkeley). Berkeley, USA, June 2013.
- [T12] **P. Walk**. “Compressed Sensing on the Image of Bilinear Maps”. In: *Group Seminar V. H. Poor*. (Department of Electrical Engineering, Princeton University). Princeton, USA, July 2012.
- [T13] **P. Walk**. “A pulse stream model with sparsity in the input signal and in the channel matrix”. In: *15th Joint Conference on Communications and Coding (JCCC)*. Breuil, Italy, Mar. 2011.
- [T14] **P. Walk**, P. Jung, and H. Boche. “Orthogonal Overlapping Spectral Efficient PPM Designs for UWB Radios and Beyond”. In: *DFG UKoLoS Colloquium*. Karlsruhe, Germany, Mar. 2011.
- [T15] **P. Walk** and H. Boche. “Design and Implementation of Strategies for Ultra-efficient Impulse Radio Transmission -Part 2- New Orthogonalization Methods for UWB”. In: *DFG UKoLoS Colloquium*. Erlangen, Germany, Feb. 2009.
- [T16] **P. Walk** and H. Boche. “Capacity of the continuous AWGN channel under peak-power and bandlimited constraints”. In: *DFG UKoLoS Colloquium*. (TU Ilmenau). Ilmenau, Germany, May 2008.

POSTERS

- [P1] P. Jung, **P. Walk**, and B. Hassibi. “Blind Deconvolution and Polynomial Factorization”. In: *International Biomedical and Astronomical Signal Processing (BASP) Workshop*. Villars-sur-Ollon, Switzerland, Jan. 2017.
- [P2] P. Jung and **P. Walk**. “Semi-blind Channel Estimation Using DCT-like Phase Retrieval”. In: *Compressed Sensing and its Application*. Berlin, Germany, Dec. 2015.
- [P3] **P. Walk**, P. Jung, and G. E. Pfander. “Norm bounds for the Convolution of Sparse Signals”. In: *Workshop Modern Time-Frequency Analysis*. Strobl, Austria, June 2014.

SERVICE

- Reviewer (Journals) - *IEEE Transaction of Network Science and Engineering 2014*, *IEEE Transactions on Wireless Communications 2014*, *IEEE Signal Processing Letters 2014*, *IEEE Transactions on Signal Processing 2015–2017*, and *Electronic Letters 2017*.
- Reviewer (Conferences) - *IZS 2008*, *IEEE ICASP 2010*, *IEEE SPAWC 2013*, *IEEE GlobCom 2015*, *IEEE GlobalSIP 2015*, *SampTA 2015*, *IEEE ICC 2017*, and *IEEE WCNC 2018*.

MEMBERSHIP

- Member of IEEE since 2009
- Member of IEEE ComSoc since 2010

PERSONAL

- Citizen of Germany.
- Proficient in German and English. Working knowledge of French.
- Proficient in MATLAB & Simulink, Wolfram Mathematica, Python, C++, and Unix.