

Peter Jung

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Personal details

Nationality: German

Date of birth: July 6, 1973

Languages: Native German, English

Family: Married to Sibylle Schmidt,
one son (born October 1996),
one daughter (born March 2003)

Research Topics

I am working interdisciplinary in signal processing, sensing, information and communication theory, data science and machine learning. My research profile is the interface between data science and its mathematical treatment. The current research topics are:

- Inverse problems, computational and compressed sensing (CS), low-rank and artificial intelligence aided recovery
- 6G related research: new air interface, THz/mmWave, massive MIMO & random access
- Sensor fusion, communication and data science aspects for the internet of things
- Noncoherent/blind low-latency communication, waveform design, joint sensing and communication
- Time-frequency & Gabor analysis, dispersive communication channels
- Computational and compressive imaging, neurally-augmented recovery algorithms
- Artificial intelligence based methods in earth observation
- Artificial intelligence based methods in non-destructive testing

Selected Publications

I have more than 150 peer-reviewed journal and conference articles. The full list can be found on the websites given below.

Low-rank&CS P. Jung and P. Walk, "Sparse Model Uncertainties in Compressed Sensing with Application to Convolutions and Sporadic Communication", book chapter, *Compressed Sensing and its Applications*, H. Boche, R. Calderbank, G. Kutyniok and J. Vybiral, Springer, 2015

P. Jung, F. Kraemer and D. Stoeger, "Blind Demixing and Deconvolution at Near-Optimal Rate" *IEEE Trans. on Information Theory*, 64(2), 704-727, 2017

R. Kueng and P. Jung, "Robust Nonnegative Sparse Recovery and the Nullspace Property of 0/1 Measurements", *IEEE Trans. on Information Theory*, 64(2), 689-703, 2017

- M. Genzel and P. Jung, "Recovering Structured Data From Superimposed Non-Linear Measurements", *IEEE Trans. on Information Theory*, 1-1, 2019
- P. Jung, R. Kueng and D. Mixon, "Derandomizing Compressed Sensing With Combinatorial Design", *Frontiers in Applied Mathematics and Statistics*, 5, 2019
- M. Kliesch, S.J. Szarek and P. Jung, "Simultaneous Structures in Convex Signal Recovery - Revisiting the Convex Combination of Norms", *Frontiers in Applied Mathematics and Statistics*, 5, 2019
- T. Fuchs, D. Gross, P. Jung, F. Kraemer, R. Kueng and D. Stoeger, "Proof Methods for Robust Low-Rank Matrix Recovery", book chapter, *Applied and Numerical Harmonic Analysis*, G. Kutyniok, H. Rauhut, R.J. Kunsch, Springer, 2022
- Wireless Communication P. Jung and G. Wunder, "The WSSUS Pulse Design Problem in Multicarrier Transmission", *IEEE Trans. on Communications*, 55(10):1918–1928, 2007.
- G. Wunder, J. Schreck and P. Jung, "Nearly Doubling the Throughput of Multiuser MIMO Systems Using Codebook Tailored Limited Feedback Protocol", *IEEE Transactions on Wireless Communications*, 11(11):3921–3931, 2012.
- J. Schreck, G. Wunder and P. Jung, "Robust Iterative Interference Alignment for Cellular Networks with Limited Feedback", *IEEE Transactions on Wireless Communications*, 14(2):882–894, 2014
- G. Wunder, H. Boche, T. Strohmer and P. Jung, "Sparse Signal Processing Concepts for Efficient 5G System Design", *IEEE Access*, 3, 2015
- A. Fengler, S. Haghighatshoar, P. Jung and G. Caire, "Non-Bayesian Activity Detection, Large-Scale Fading Coefficient Estimation, and Unsourced Random Access With a Massive MIMO Receiver", *IEEE Transactions on Information Theory*, 67(5), 2021
- Computational Imaging S. Augustin, J. Hieronymus, P. Jung and W.H. Hübers, "Compressed Sensing in a Fully Non-Mechanical 350 GHz Imaging Setting", *Journal of Infrared, Millimeter, and Terahertz Waves*, 2015
- S. Augustin, S. Frohmann, P. Jung and W.H. Hübers, "Mask Responses for Single-Pixel Terahertz Imaging", *Scientific Reports* 8(1), 2018
- M. Burger, J. Föcke, L. Nickel, P. Jung, and S. Augustin, "Reconstruction Methods in THz Single-pixel Imaging", *Compressed Sensing and Applications 2017*, eds H. Boche, Springer
- S. Augustin, P. Jung, S. Frohmann and H.W. Hübers, "Terahertz Dynamic Aperture Imaging at Standoff Distances Using a Compressed Sensing Protocol". *IEEE Transactions on Terahertz Science and Technology*, 9(4), 2019
- S. Ahmadi, L. Kastner, J. Hauffen, P. Jung and M. Ziegler, "Photothermal-SR-Net: A Customized Deep Unfolding Neural Network for Photothermal Super Resolution Imaging", *IEEE Transactions on Instrumentation and Measurement* 71, 2022

Employment history

since 02/23 **German Aerospace Center**, *DLR Institute of Optical Sensor Systems, Group Leader "Computational Sensing and AI"*

- since 04/12 **Technical University Berlin**, *Senior Researcher and Lecturer*
PI of DFG projects JU 2795/1-2, JU 2795/2 and JU 2795/3
- 01/21-08/21 **Technical University Munich**, *Guest professor (W3)*, International AI Future Lab,
Artificial Intelligence in Earth Observation (AI4EO)
<https://www.ai4eo.de>
- 01/12-03/12 Technical University Munich
- 01/10-12/11 **Technical University Berlin**
PI of DFG project JU 2795/1-1
- 01/04-12/10 Fraunhofer German–Sino Lab for Mobile Communications
- 06/01-12/03 Fraunhofer Heinrich-Hertz Institute
- 11/00-05/01 Computing center at the DESY/IFH Zeuthen
- 09/93-11/94 Zivildienst (national service) at the Charite Berlin

Education

- 07/2007 **PhD thesis**, (*Dr.rer.nat., with distinction*), Technical University Berlin
Weyl-Heisenberg Representations in Communication Theory
- 10/2000 **Diploma**, in *Physics*, Humboldt University Berlin
Pion-Kaon Separation mit dem HERMES RICH Detektor
- 1992 graduated from math&physics class at Humboldt University Berlin
(Abitur, Spezialklasse Mathematik–Physik der Humboldt–Universität Berlin)

Research activities and funding

- in 2022 **AIMS**, *Visiting Associate*, Bubacarr Bah, AIMS South Africa Data Science Research Group
Machine learning methods to improve Covid19 pooled testing
- in 2021-22 **Caltech**, *Visiting Associate*, Babak Hassibi, Electrical Engineering and Computing and Mathematical Science
Blind communication and polynomial factorization methods
- since 2016 **DFG-grant**, (*JU 2795/3*), priority program SPP 1798, “Compressed Sensing in der Informationsverarbeitung”
Bilinear Compressed Sensing
- 2019-2023 **DAAD-grant**, Joint research and cooperation project with AIMS South Africa
Physics-inspired Neural Networks
- 2018-2022 **DAAD-grant**, Joint research and cooperation project with AIMS South Africa
Non-Negative Structured Regression in Communication and Data Science
- 2013-2016 **DFG-grant**, (*JU 2795/2*)
Non-adaptive Methods for Dimension Reduction in Dispersive and Noncoherent Communication Channels
- 2010-2013 **DFG-grant**, (*JU 2795/1*)
Information-theoretic Description of Time-continuous, Doubly-Dispersive Communication Channels

in 2016 **HIM**, *Research grant for the Hausdorff trimester program "Mathematics of Signal Processing", Hausdorff Research Institute for Mathematics (HIM), Bonn, Germany*

Teaching Experience

since 2008 **Technical University Berlin**

Compressed Sensing for Signal Processing and Applications (2-courses module since 2015),
Parameter Estimation and Compressed Sensing (lectures 2012-2015),
Banach Space Geometry and Measure of Concentration (seminar series, 2008-2009),
Estimation and Decision Theory in Communication Theory (lecture 2011-2012)

2011-2012 **Technical University Munich**

Estimation Theory and Compressed Sensing (lecture)

in 2015 **Technical University Dresden**

Compressed Sensing (invited block lecture)

Selection of Invited Talks

2022 The 2022 SIAM Conference on Mathematics of Data Science, MDS2022, "Algorithm Unrolling: Bridging the Gap between Theory and Practice" *"Learning Discrete Measurement Matrices and Algorithm Unfolding for Signal Recovery"*

2022 10th International Conference Inverse Problems Modeling and Simulation, IPMS 2022, "Inverse Problems with Data-Driven Methods and Deep Learning" *"Solving MMV Problems via Algorithm Unfolding"*

2019 13th International Conference on Sampling Theory and Applications, SampTA 2019, *"Robust Recovery of Sparse Non-negative Weights from Mixtures of Positive-Semidefinite Matrices"*

2017 12th International Conference on Sampling Theory and Applications, SampTA 2017, *"Blind sparse recovery from superimposed non-linear sensor measurements"*

2013 Matheon Workshop 2013 Compressed Sensing and its Applications, *"Low-complexity model uncertainties in compressed sensing with application to sporadic communication"*

2008 The 2008 IEEE Wireless Communications and Networking Conference, *"Pulse Shaping, Localization and the Approximate Eigenstructure of LTV Channels"*

Memberships

IEEE Communication and Information Theory Society (IEEE ComSoc and ItSoc)

VDE German Engineering Association

DPG German Physics Association

Service, Administration and Other

- Referee I act as a referee for several major journals and conferences in communication, signal processing, information theory and applied math. Including: IEEE Transactions on Information Theory, Signal Processing, IEEE Signal Processing Letters, IEEE Transactions on Wireless Communications, IEEE Transactions on Communications, SampTA, STIP-SampTA Guest editor, Globecom/ISWCS/WASA TPC
- Editor Frontiers in Applied Mathematics and Statistics, Mathematics of Computation and Data Science
- Supervisor I have supervised and co-supervised several diploma and M.Sc. theses on a variety of topics in time-frequency analysis, multicarrier transmission, compressed sensing, computational imaging and deep learning
- Patents about 13 patents
- Other cofounder of MOXZ GmbH - TU-Berlin spin-off via "EXIST Forschungstransfer"

Presence

- personal Personal webpage at the TU Berlin
<http://user.tu-berlin.de/peter.jung>
- Google Scholar <http://scholar.google.de/citations?user=Jh5kItUAAAAJ>
- ResearchGate <http://www.researchgate.de/profile/peter.jung>
- Scopus <https://www.scopus.com/authid/detail.uri?authorId=56517675200>
- Orcid <http://orcid.org/0000-0001-7679-9697>
- dblp https://dblp.uni-trier.de/pers/hd/j/Jung_0001:Peter