Karin Schnass

Curriculum Vitae

Personal Details

Address:	Technikerstraße 13, 6020 Innsbruck, Austria
Email:	karin.schnass@uibk.ac.at
Date of Birth:	May 3, 1980
Nationality:	Austrian
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Education

March 2009	PhD in computer, communication and information sciences, Swiss Federal Institute of Technology Lausanne (EPFL), CH, no grades are awarded, the thesis was proposed for the EPFL PhD-thesis prize by the jury. Thesis: Sparsity & Dictionaries - Algorithms & Design, Advisor: Pierre Vandergheynst.
April 2004	Master in mathematics with distinction (mit Auszeichnung), University of Vienna, AT. Thesis: Gabor Multipliers - A Self-Contained Survey, Supervisor: Hans G. Feichtinger.

Current and Former Positions (including career breaks)

since 09/19	Associate professor, Department of Mathematics, University of Innsbruck, AT.
03/16 - 08/19	Tenure track assistant professor (Laufbahnstelle), Department of Mathematics, University of Innsbruck, AT. (part-time 80%, 03/16 - 12/18).
06/15 - 02/16	University assistent, Department of Mathematics, University of Innsbruck, AT.
12/14 - 05/15	Erwin Schrödinger Research Fellow (return phase), Department of Mathematics, University of Innsbruck, AT.
10/12 - 09/14	Erwin Schrödinger Research Fellow, Computer Vision Laboratory, University of Sassari, IT.
06/11 - 09/12	Maternity leave.
01/10 - 05/11	Postdoc, Johann Radon Institute for Computational and Applied Mathematics (RICAM), Linz, AT. (part-time 50% until 09/10 then 70%)
06/09 - 01/10	Maternity leave.
04/05 - 06/09	Research Assistant, Signal Processing Laboratory 2, Swiss Federal Institute of Technology Lausanne (EPFL), CH.
05/04 - 01/05	Leonardo da Vinci Industrial Internship at Philips Research, Eindhoven, NL.
10/03 - 01/04	Mathematics teaching assistant at the University of Vienna and the University of Natural Resources and Applied Life Sciences Vienna (BOKU), AT.

Grants

2014	START-programme, grant Y760, €1.167.000 for 6 years, FWF (Austrian Science Fund), project: *Optimisation Principles, Models & Algorithms for Dictionary Learning.*
2012	Erwin Schrödinger Fellowship, grant J3335, €120.000 for 2.5yrs, FWF (Austrian Science Fund) Marie Curie cofunded, project: *Dictionary Learning for Biometric Data.*

Honours

2015	Offer of (first-listed for) a Rudolf Mößbauer Tenure Track Professorship at the Technical University of Munich, DE, *declined*.
2014	Shortlisted for a tenure track W2-professor position in *Optimization and Data Analysis* at the Technical University of Munich, DE.
2013	Best Video Abstract at SPARS13.
2011	Offer of a postdoctoral position at Duke University, US, with Ingrid Daubechies, *declined*.
2010	Offer of a postdoctoral position at Stanford University, US, with Yonina Eldar and Andrea Goldsmith, *declined*.
2009	Nomination of the doctoral thesis for the EPFL PhD-thesis prize by the jury.

Teaching

SS19	Signal Processing & Learning, together with M. Haltmeier, University of Innsbruck, AT.
WS18/19	Exercise Sessions: Linear Algebra 1, University of Innsbruck, AT.
WS17	Exercise Sessions: Stochastics 2, University of Innsbruck, AT.
WS16	Selected Statistical Methods, together with T. Hell, University of Innsbruck, AT.
SS16	Time Frequency Analysis, Wavelets and Signal Processing, together with M. Haltmeier, University of Innsbruck, AT.
WS15/SS17/18	Seminar: Channel Coding, University of Innsbruck, AT.
SS15	Seminar: Randomness, matrices and random matrices, University of Innsbruck, AT.
SS13	Informatica Grafica - Introduzione a Blender, University of Sassari, IT.
WS06/07/08	Exercise Sessions: Advanced Signal Processing, EPFL, CH.
WS03	Workshop Lineare Algebra und Geometrie, University of Vienna, AT.
WS03	Exercise Sessions: Mathematik für Landwirte, BOKU Vienna, AT.

Mentoring

Michael Sandbichler, PhD, University of Innsbruck, 2015-2018.
Flavio Teixeira, Postdoc, University of Innsbruck, 2016-2018.
Marie-Christine Pali, PhD, University of Innsbruck, since 2017.
Simon Ruetz, PhD, University of Innsbruck, since 2019.

Community Service

Referee for IEEE Transactions on Information Theory; IEEE Transactions on Signal Processing; IEEE Transactions on Computational Imaging; IEEE Signal Processing Letters; Linear Algebra and its Applications; Applied and Computational Harmonic Analysis; Constructive Approximation; Information and Inference; SIAM Journal on Imaging Sciences; SIAM Journal on Mathematics of Data Science; Signal, Image and Video Processing; ICASSP; EUSIPCO; SampTA; SPARS; COLT;

Member of the Special Area Team *Signal and Data Analytics for Machine Learning* of the European Association for Signal Processing, (SAT SiG-DML, EURASIP), 2015 - 2019

Organisation of the *Workshop Donau-Isar-Inn (WDI2) - Approximation Theory and Applications* together with M. Sandbichler, March 10, 2017, Innsbruck, AT.

Personal Publications

all publications and - where applicable - toolboxes to reproduce numerical results are available at: `https://www.uibk.ac.at/mathematik/personal/schnass/publications.html.en`.

Journal publications (including preprints)

14. *Compressed dictionary learning* (with F. Teixeira), arXiv:1805.00692, 23 pages, 2018.
13. *Dictionary learning - from local towards global and adaptive*, arXiv:1804.07101, 49 pages, 2018.
12. *Online and stable learning of analysis operators* (with M. Sandbichler), IEEE Transactions on Signal Processing, 67(1):41–53, 2019.
11. *Average performance of Orthogonal Matching Pursuit (OMP) for sparse approximation*, IEEE Signal Processing Letters (extended version arXiv:1809.06684), 25(12):1865–1869, 2018.
10. *Convergence radius and sample complexity of ITKM algorithms for dictionary learning*, Applied and Computational Harmonic Analysis, 45(1):22–58, 2018.
9. *Fast dictionary learning from incomplete data* (with V. Naumova), EURASIP Journal on Advances in Signal Processing, 2018(12), 21 pages, 2018.
8. *Local identification of overcomplete dictionaries,* Journal of Machine Learning Research, 16(Jun):1211–1242, 2015.
7. *On the identifiability of overcomplete dictionaries via the minimisation principle underlying K-SVD,* Applied and Computational Harmonic Analysis, 37(3):464–491, 2014.
6. *Learning functions of few arbitrary linear parameters in high dimensions* (with M. Fornasier and J. Vybiral), Foundations of Computational Mathematics, 12(2):229–262, 2012.
5. *Dictionary identification - sparse matrix-factorisation via ℓ_1-minimisation* (with R. Gribonval), IEEE Transactions on Information Theory, 56(7):3523–3539, 2010.
4. *Atoms of all channels, unite! Average case analysis of multi-channel sparse recovery using greedy algorithms* (with R. Gribonval, H. Rauhut and P. Vandergheynst), Journal of Fourier Analysis and Applications, 14(5):655–687, 2008.
3. *Compressed sensing and redundant dictionaries* (with H. Rauhut and P. Vandergheynst), IEEE Transactions on Information Theory, 54(5):2210–2219, 2008.
2. *Dictionary preconditioning for greedy algorithms* (with P. Vandergheynst), IEEE Transactions on Signal Processing, 56(5):1994–2002, 2008.
1. *Average performance analysis for thresholding* (with P. Vandergheynst), IEEE Signal Processing Letters, 14(11):828–831, 2007.

Refereed conference proceedings

12. *Dictionary learning from incomplete data for efficient image restoration,* (with V. Naumova), EUSIPCO17, Kos island, GR, 2017.
11. *Dictionary identification results for K-SVD with sparsity parameter 1,* SampTA13, Bremen, DE, 2013.
10. *Learning functions of few arbitrary linear parameters in high dimensions* (with M. Fornasier and J. Vybiral), SampTA11, Singapore, 2011.
9. *Compressed learning of high-dimensional sparse functions* (with J. Vybiral), ICASSP11, Prague, CZ, 2011.
8. *A union of incoherent spaces model for classification* (with P. Vandergheynst), ICASSP10, Dallas, US, 2010.
7. *Basis identification from random sparse samples* (with R. Gribonval), SPARS09, St. Malo, FR, 2009.
6. *Dictionary identifiability from few training samples* (with R. Gribonval), EUSIPCO08, Lausanne, CH, 2008.
5. *Some recovery conditions for basis learning by ℓ_1-minimization* (with R. Gribonval), ISCCSP08, St. Julian's, Malta, 2008.

4. *Dictionary learning based dimensionality reduction for classification* (with P. Vandergheynst), ISCCSP08, St. Julian's, Malta, 2008.
3. *Multichannel thresholding with sensing dictionaries* (with R. Gribonval, B. Mailhe, H. Rauhut and P. Vandergheynst), CAMSAP07, St. Thomas, US Virgin Islands, 2007.
2. *Average case analysis of multichannel sparse approximations using p-thresholding* (with R. Gribonval, B. Mailhe, H. Rauhut and P. Vandergheynst), SPIE Optics and Photonics, Wavelets XII, San Diego, US, 2007.
1. *Average case analysis of multichannel thresholding* (with R. Gribonval, B. Mailhe, H. Rauhut and P. Vandergheynst), ICASSP07, Honolulu, US, 2007.

Theses

3. *Dictionary learning & related topics,* habilitation thesis (venia docendi), University of Innsbruck, 2019.
2. *Sparsity & Dictionaries - Algorithms & Design,* PhD-Thesis, n. 4349, Swiss Federal Institute of Technology Lausanne (EPFL), 2009.
1. *Gabor Multipliers - A Self-Contained Survey,* Master's Thesis, University of Vienna, Austria, 2004.

Other

1. *A personal introduction to theoretical dictionary learning*, Internationale Mathematische Nachrichten, 228:5–15, 2015.

Conferences, workshops and talks

Invited talks are listed with a ⋆, keynote/plenary talks with a 💣.
Workshops/conferences without a presentation are only listed if participation is by personal invitation.

- *SPARS 2019 - Signal Processing with Adaptive Sparse Structured Representations*, July 1-4, 2019, Toulouse, FR.
- ⋆ K. Schnass, *OSA Imaging and Applied Optics Congress* , June 24-27, 2019, Munich, DE.
- *Oberwolfach Workshop - Statistical and Computational Aspects of Learning with Complex Structure* , March 5-11, 2019, Oberwolfach, DE.
- 💣 *Workshop on Signal and Image Analysis*, April 1-3, 2019, Raitenhaslach, DE.
- ⋆ *Strobl18 - Harmonic Analysis and Applications*, June 4-8, 2018, Strobl, AT.
- ⋆ *Oberwolfach Workshop - Applied Harmonic Analysis and Data Processing*, March 25-31, 2018, Oberwolfach, DE.
- 💣 *SpaRTaN-MacSeNet Workshop on Sparse Representations and Compressed Sensing*, March 23, 2018, Paris, FR.
- ⋆ *Foundations of Computational Mathematics (FoCM)*, July 10-19, 2017, Barcelona, ES.
- *SPARS17 - Signal Processing with Adaptive Sparse Structured Representations*, June 5-8, 2017, Lisbon, PT.
- ⋆ *Dagstuhl Seminar - Foundations of Unsupervised Learning*, September 18-23, 2016, Wadern, DE.
- 💣 *iTWIST16*, August 24-26, 2016, Aalborg, DK.
- ⋆ *Workshop on Low Complexity Models* within the Hausdorff Institute Trimester Program: Mathematics of Signal Processing, February 15-24, 2016, Bonn, DE.
- ⋆ *Seminar*, Acoustic Research Insitut, OEAW, February 11, 2016, Vienna, AT.
- ⋆ *Matheon Conference on Compressed Sensing and its Applications*, December 7-11, 2015, Berlin, DE.
- ⋆ *Dagstuhl Seminar - Mathematical and Computational Foundations of Learning Theory*, August 16-22, 2015, Wadern, DE.
- ⋆ *Oberwolfach Workshop - Applied Harmonic Analysis and Sparse Approximation*, August 30 - September 4, 2015, Oberwolfach, DE.

- *SPARS15 - Signal Processing with Adaptive Sparse Structured Representations*, July 6-9, 2015, Cambridge, UK.
- ⋆ *AIP15 - Applied Inverse Problems Conference*, May 25-29, 2015, Helsinki, FI.
- ⋆ *Seminar*, Team Panama, INRIA Rennes, July 7, 2014, Rennes, FR.
- ⋆ *Seminar*, Chair of Mathematics C, RWTH Aachen, May 5, 2014, Aachen, DE.
- ⋆ *Telecommunications Forum*, Telecommunications Research Center Vienna (FTW)/ Vienna University of Technology, April 25, 2014, Vienna, AT.
- *Matheon Conference on Compressed Sensing and its Applications*, December 9-13, 2013, Berlin, DE, **Young Researcher Travel Grant**.
- ⋆ *ENUMATH13 - European Conference on Numerical Mathematics and Advanced Applications*, August 26-30, 2013, Lausanne, CH.
- ⋆ *Seminar*, Institute of Telecommunications, Vienna University of Technology, August 21, 2013, Vienna, AT.
- *SPARS13 - Signal Processing with Adaptive Sparse Structured Representations*, July 8-11, 2013, Lausanne, CH, **Best Video Abstract**.
- ⋆ *SampTA13 - International Conference on Sampling Theory and Applications*, July 1-5, 2013, Bremen, DE.
- *Oberwolfach Workshop - Applied Harmonic Analysis and Sparse Approximation*, June 10-16, 2012, Oberwolfach, DE, **Young Researcher Travel Grant**.
- *ICASSP11 - International Conference on Acoustics, Speech, and Signal Processing*, May 23-27, 2011, Prague, CZ.
- ⋆ *SMALL Workshop on Dictionary Learning*, January 6-7, 2011, London, GB.
- ⋆ *Oberseminar Numerische Mathematik*, University of Jena, November 17, 2010, Jena, DE.
- ⋆ *Curves and Surfaces*, June 24-30, 2010, Avignon, FR.
- ⋆ *Workshop - Sparsity and Computation*, Hausdorff Center for Mathematics, June 7-11, 2010, Bonn, DE.
- ⋆ *NuHAG Seminar*, University of Vienna, May 5, 2010, Vienna, AT.
- ⋆ *Seminar*, Acoustic Research Institute, May 4, 2010, Vienna, AT.
- *SPARS09 - Signal Processing with Adaptive Sparse Structured Representations*, April 6-9, 2009, Saint-Malo, FR.
- ⋆ *NuHAG Seminar*, University of Vienna, October 30, 2008, Vienna, AT.
- *AIM Workshop - Frames for the Finite World: Sampling, Coding and Quantization*, August 18-22, 2008, Palo Alto (CA), US, **Travel Grant**.
- *ISCCSP08*, March 12-14, 2008, St. Julian's, MT.
- ⋆ *Von Neumann Symposium on Sparse Representation and High-Dimensional Geometry*, July 8-12, 2007, Snowbird (UT), US.
- *Strobl07 - Trends in Harmonic Analysis*, June 18-22, 2007, Strobl, AT.

Languages

German, English, Italian and bad French.