

# 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  
Track Record: h-index: **12**, citations: **1269** (Google Scholar, May 3, 2018), children: 2  
Homepage: <https://www.uibk.ac.at/mathematik/personal/schnass/index.html.en>

---

### 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 03/16 Tenure track assistant professor (Laufbahnstelle), Department of Mathematics, University of Innsbruck, AT.

since 06/15 University assistant, 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 (part-time), Johann Radon Institute for Computational and Applied Mathematics (RICAM), Linz, AT.

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, €1.165.000 for up to 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 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 Offer of (first-listed for) a Rudolf Mößbauer Tenure Track Professorship at the Technical University of Munich, DE, *declined*.
- 2014 Invited Affiliate Member of the Signal Processing Theory and Methods (SPTM) Technical Committee of the IEEE Signal Processing Society.
- 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

- 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.
- 

## REFEREE

IEEE Transactions on Information Theory;  
 IEEE Transactions on Signal Processing;  
 IEEE Transactions on Pattern Analysis and Machine Intelligence;  
 Applied and Computational Harmonic Analysis;  
 SIAM Journal on Imaging Sciences;  
 Elsevier Signal Processing;  
 Signal, Image and Video Processing;  
 IEEE Signal Processing Letters;  
 ICASSP; EUSIPCO; SampTA; SPARS; COLT;

---

## LANGUAGES

German, English, Italian and bad French.

---

## 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>.

For journal publications the bold faced number in brackets indicates the number of citations according to Google Scholar, e.g. [10].

## Journal publications (including preprints)

13. *Compressed dictionary learning* (with F. Teixeira), arXiv:1805.00692, 2018.
12. *Dictionary learning - from local towards global and adaptive*, arXiv:1804.07101, 47 pages, 2018.
11. *Online and stable learning of analysis operators* (with M. Sandbichler), arXiv:1704.00227v2, 21 pages, 2018.
10. *Convergence radius and sample complexity of ITKM algorithms for dictionary learning*, Applied and Computational Harmonic Analysis, 45(1):22–58, 2018. [15]
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. [25]
7. *On the identifiability of overcomplete dictionaries via the minimisation principle underlying K-SVD*, Applied and Computational Harmonic Analysis, 37(3):464–491, 2014. [46]
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. [45]
5. *Dictionary identification - sparse matrix-factorisation via  $\ell_1$ -minimisation* (with R. Gribonval), IEEE Transactions on Information Theory, 56(7):3523–3539, 2010. [140]
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. [170]
3. *Compressed sensing and redundant dictionaries* (with H. Rauhut and P. Vandergheynst), IEEE Transactions on Information Theory, 54(5):2210–2219, 2008. [566]
2. *Dictionary preconditioning for greedy algorithms* (with P. Vandergheynst), IEEE Transactions on Signal Processing, 56(5):1994–2002, 2008. [131]
1. *Average performance analysis for thresholding* (with P. Vandergheynst), IEEE Signal Processing Letters, 14(11):828–831, 2007. [53]

## 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  $\ell_1$ -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

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.

- ★ *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, 2016, 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.