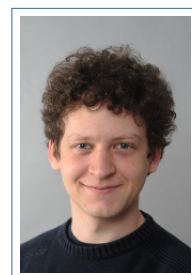# Dr. Felix Voigtlaender

Ph.D. in Mathematics

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10587 Berlin, Germany
✉ felix@voigtlaender.xyz

Personal information

Age	28 (Born: November 4, 1988)
Nationality	German

Education

2007
High school Diploma
Average grade: 1.5 (on a scale of 1 (best) to 5 (worst))
Intensive courses: Mathematics and Physics

2007
One month internship in the area of high performance computing at the "Forschungszentrum Jülich" (Research centre Jülich)

2007–2010
Bachelor student in Mathematics, RWTH Aachen University
Overall grade: Excellent (1.0)
Thesis: "Integraldarstellung metaplektischer Operatoren" ("Integral representation of metaplectic operators")

2007–2012
Bachelor student in Computer Science, RWTH Aachen University
Overall grade: Excellent (1.1)
Bachelor thesis: "Advanced Trace-Based Analysis of Hybrid Programs"

2010–2013
Master student in Mathematics, RWTH Aachen University
Overall grade: Excellent (1.0)
Thesis: "Spektralkalkül auf Gruppen von polynomialem Wachstum" ("Spectral calculus on groups of pol. growth")
Contents:
– Generalization of the spectral calc. of the discrete laplacian from $\ell^2(G)$ to $\ell^p(G)$ on groups of polynomial growth
– An elementary proof of Gromov's theorem about the structure of groups of polynomial growth

2013–2015
Ph.D. student, RWTH Aachen University
Ph.D. thesis: "Embedding Theorems for Decomposition Spaces with Applications to Wavelet Coorbit Spaces"
Supervisor: Prof. Dr. Hartmut Führ
Contents:
– Interpretation of wavelet-type coorbit spaces as decomp. spaces (generalization of Modulation/Besov spaces)
– Development of a general theory of embeddings for decomposition spaces

Thesis handed in 5. May 2015; thesis defense: 3. November 2015
Grade: Summa cum laude

Prizes, Awards and Scholarships

2009
Selected for participation in the RWTH International Research Opportunity Program (IROP)
Two month stay (June – August) at the Massachusetts Institute of Technology (MIT), Boston.
Participation in the working group "New Media Medicine" at the MIT Media Lab

2009–2013
Mentioning on the "Dean's List" containing the top **5%** of best students

2011–2013
Stipend of the education fund of the RWTH Aachen University ("Deutschlandstipendium")
Funding provided by
– 2011–2012: Ericsson GmbH – Eurolab
– 2012–2013: Dr. Franz Wirtz/proRWTH

2011
Schöneborn Award 2011
For outstanding performance in the bachelors program in mathematics

2012
Schöneborn Award 2012
For outstanding performance in the bachelors program in computer science

2014
Springorum Medal 2014
For completing the masters degree with distinction

2014
Friedrich Willhelm Award 2014
For the best master thesis in mathematics at the RWTH in the academic year 2013/2014

2016
Friedrich Willhelm Award 2016
For the best PhD thesis in mathematics at the RWTH in the academic year 2015/2016

Experience in Teaching

2008–2013

Student teaching assistant, RWTH Aachen University, Lehrstuhl A für Mathematik
Student teaching assistant for the courses
– 2008/2009: Analysis for computer scientists
– 2009/2010: Analysis I
– 2010: Analysis II
– 2010/2011: Analysis III
– 2011: Ordinary differential equations
– 2011/2012: Topology
– 2012/2013: Functional analysis

2013–2016

Teaching assistant, RWTH Aachen University, Lehrstuhl A für Mathematik
– 2013/2014: Analysis I
– 2014/2015: Analysis III
– 2015: Harmonic Analysis II
– 2015:/2016: Analysis I

Experience in Research

2013–2016

Research assistant, RWTH Aachen University, Lehrstuhl A für Mathematik
Supervisor: Prof. Dr. Hartmut Führ

Since April 2016

Research assistant, TU Berlin, Applied Harmonic Analysis Group
Supervisor: Prof. Dr. Gitta Kutyniok

2013

Participation in Summer School, Genoa, September 2013
"Three mini courses on applied harmonic analysis"

2014

Research visit to Professor Feichtinger, Marseille, CIRM, October 2014
Main topic: "Embeddings for decomposition spaces"

2014

Participation in Doctoral School, Marseille, CIRM, October 2014
"Computational Harmonic Analysis – with Applications to Signal and Image Processing"

2015

Participation in Oberwolfach Workshop, Oberwolfach, August 2015
"Applied Harmonic Analysis and Sparse Approximation"

Publications (including Preprints)

1 David Böhme, Markus Geimer, Lukas Arnold, Felix Voigtlaender, and Felix Wolf. Identifying the root causes of wait states in large-scale parallel applications. ACM Trans. Parallel Comput., 3(2):11:1–11:24, July 2016.

2 H.G. Feichtinger and F. Voigtlaender. From Frazier-Jawerth characterizations of Besov spaces to Wavelets and Decomposition spaces. Contemp. Math., 693, 2016. `arxiv.org/abs/1606.04924`.

3 J. Fell, H. Führ, and F. Voigtlaender. Resolution of the Wavefront Set using General Continuous Wavelet Transforms. J. Fourier Anal. Appl., 2015.

4 H. Führ and F. Voigtlaender. Wavelet coorbit spaces viewed as decomposition spaces. J. Funct. Anal., 269(1):80–154, 2015.

5 J. Gimenez, J. Labarta, F.X. Pegenaute, H. Wen, D.J. Klepacki, I. Chung, G. Cong, F. Voigtlaender, and B. Mohr. Guided performance analysis combining profile and trace tools. In Euro-Par 2010 Parallel Processing Workshops, Ischia, Italy, August 31-September 3, 2010, Revised Selected Papers, 2010.

6 P. Petersen and F. Voigtlaender. Optimal approximation of piecewise smooth functions using deep ReLU neural networks. arXiv preprints, 2017. `https://arxiv.org/abs/1709.05289`.

7 F. Voigtlaender. Embeddings of decomposition spaces. arXiv preprints, 2016. `arxiv.org/abs/1605.09705`.

8 F. Voigtlaender. Embeddings of Decomposition Spaces into Sobolev and BV Spaces. arXiv preprints, 2016. `arxiv.org/abs/1601.02201`.

9 F. Voigtlaender. Structured, Compactly Supported Banach Frame Decompositions of Decomposition Spaces. arXiv preprints, 2016. `arxiv.org/abs/1612.08772`.

10 F. Voigtlaender. A general version of Price's theorem. arXiv preprints, 2017. `arxiv.org/abs/1710.03576`.

11 F. Voigtlaender and A. Pein. Analysis sparsity vs. synthesis sparsity for α-shearlets. arXiv preprints, 2017. `arxiv.org/abs/1702.03559v1`.

Professional Experience

Referee   For J. Funct. Anal., J. Four. Anal. Appl., Int. J. Wavelets Multi, J. Nonlinear Sci. Appl., and Sci. China Math.

Talks, Posters and Lectures

2014   Conference: Strobl 2014, Strobl, Austria, June 2014
Talk title: "Coorbit spaces as decomposition spaces"

2014   Conference: Function Spaces and Harmonic Analysis, Marseille, CIRM, France, October 2014
Talk title: "Embeddings between decomposition spaces"

2014   Seminar talk at the Lehrstuhl für Analysis, University of Jena, Jena, Germany, November 2014
Talk title: "Embeddings between decomposition spaces"

2015   Conference: SampTA 2015, American University, Washington D.C., USA, May 2015
Talk title: "Resolution of the Wave Front Set using general Wavelet Transforms"

2016   Winter School, Hausdorff Research Institute for Mathematics, Bonn, Germany, January 2016
Title of the poster: "Embeddings of Decomposition Spaces into Sobolev Spaces and BV Spaces"

2016   Conference: Strobl 2016 (Time-Frequency Analysis and Related Topics), Strobl, Austria, June 2016
Talk title: "Embeddings of decomposition spaces"

2016   Conference: International Workshop on Mathematical Imaging and Emerging Modalities, Osnabrück, Germany, June 2016
Talk title: "Embeddings of decomposition spaces"

2016   Conference: FSDONA (Fct. spaces, diff. op. and nonlin. analysis), Charles University, Prague, July 2016
Talk title: "Embeddings of decomposition spaces"

2016   Conference: Coherent States and their Applications: A Contemporary Panorama, Marseille, CIRM, France, November 2016
Talk title: "Shearlets: Theory, applications and generalizations"

2017   Conference: ATFA17 (Aspects of Time-Frequency Analysis), Politecnico di Torino, Italy, June 2017
Talk title: "Structured Banach frame decompositions of decomposition spaces"

2017   Conference: SampTA 2017, Tallinn, Estonia, July 2017
Talk title: "Understanding X-let sparsity via decomposition spaces"

2017   Summer School on Applied Harmonic Analysis, Genoa, Italy, July 2017
Lecture series title: "Sparsity Properties of Frames via Decomposition Spaces"

2017   Conference: NPFSA-2017 (New persp. in the th. of fct. spaces and appl.), Będlewo, Poland, September 2017
Talk title: "Structured Banach frame decompositions of decomposition spaces"