

# Dr. Felix Voigtlaender

Ph.D. in Mathematics

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## Personal information

Age 28  
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

- 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. Submitted for publication, 2016. Preprint: [arxiv.org/abs/1606.04924](https://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 F. Voigtlaender. Embeddings of decomposition spaces. Submitted for publication, 2016. Preprint: [arxiv.org/abs/1605.09705](https://arxiv.org/abs/1605.09705).
- 7 F. Voigtlaender. Embeddings of Decomposition Spaces into Sobolev and BV Spaces. Submitted for publication, 2016. Preprint: [arxiv.org/abs/1601.02201](https://arxiv.org/abs/1601.02201).
- 8 F. Voigtlaender. Structured, Compactly Supported Banach Frame Decompositions of Decomposition Spaces. *arXiv preprints*, 2016. [arxiv.org/abs/1612.08772](https://arxiv.org/abs/1612.08772).
- 9 F. Voigtlaender and A. Pein. Analysis sparsity vs. synthesis sparsity for  $\alpha$ -shearlets. *arXiv preprints*, 2017. [arxiv.org/abs/1702.03559v1](https://arxiv.org/abs/1702.03559v1).

## Professional Experience

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

## Talks and Posters

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"